



ASTRA ELEKTRONİK SANAYİ İTHALAT ve TİCARET LİMİTED ŞİRKETİ

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## ● STANDARD MODULE LIST FOR CHARACTER LCM

Model Name	Module Size	View Area	Dot Size	Dot Pitch	Character Size	Duty-Bias	Controller	Booster*	Backlight	LCD type
PC0802-A	58.0 x 32.0	38.0 x 16.0	0.56 x 0.66	0.60 x 0.70	2.96 x 5.56	1/16-1/4	KS0066U*	●	NONE,LED,EL	TN, STN
PC0802-L	84.0 x 44.0	63.0 x 25.0	1.15 x 1.36	1.23 x 1.44	6.17 x 11.56	1/16-1/5	KS0066U*		NONE,LED	STN
PC1002-A	84.0 x 44.0	60.5 x 18.5	0.44 x 0.49	0.44 x 0.49	4.80 x 5.84	1/27-1/6	HD66730	●	NONE,LED,EL	TN, STN
PC1202-A	55.7 x 32.0	46.7 x 17.5	0.45 x 0.60	0.55 x 0.70	2.65 x 5.50	1/16-1/4	KS0066U*	●	NONE,LED	TN, STN
PC1601-A	80.0 x 36.0	64.5 x 13.8	0.55 x 0.75	0.63 x 0.83	3.07 x 6.56	1/16-1/4	KS0066U*		NONE,LED,EL	TN, STN
PC1601-E,F,G	80.0 x 36.0	65.0 x 16.0	0.55 x 0.75	0.63 x 0.83	3.07 x 6.56	1/16-1/4	KS0066U*		NONE,LED,EL	TN, STN
PC1601-H	85.0 x 28.0	65.0 x 16.0	0.55 x 0.75	0.63 x 0.83	3.07 x 6.56	1/16-1/4	KS0066U*		NONE,LED,EL	TN, STN
PC1601-K	72.0 x 26.4	65.5 x 15.0	0.55 x 0.75	0.63 x 0.83	3.07 x 6.56	1/16-1/4	KS0066U*		NONE,LED	STN
PC1601-L	122.0 x 33.0	99.0 x 13.0	0.92 x 1.10	0.98 x 1.16	4.84 x 9.66	1/16-1/4	KS0066U*		NONE,LED,EL	TN, STN
PC1602-C	80.0 x 36.0	61.0 x 16.0	0.56 x 0.66	0.60 x 0.70	2.96 x 5.56	1/16-1/4	KS0066U*		NONE,LED,EL	TN, STN
PC1602-D	80.0 x 36.1	66.0 x 16.2	0.56 x 0.67	0.60 x 0.70	2.96 x 5.56	1/16-1/4	KS0066U*	●	NONE,LED,EL	TN, STN
PC1602-E	66.7 x 23.3	61.0 x 15.9	0.55 x 0.65	0.60 x 0.70	2.95 x 5.55	1/16-1/4	KS0066U*		NONE	TN, STN
PC1602-F	84.0 x 44.0	61.0 x 15.8	0.56 x 0.66	0.60 x 0.70	2.96 x 5.56	1/16-1/4	KS0066U*		NONE,LED,EL	TN, STN
PC1602-G	80.0 x 36.0	64.5 x 13.8	0.55 x 0.50	0.60 x 0.55	2.95 x 4.35	1/16-1/4	KS0066U*	●	NONE,LED,EL	TN, STN
PC1602-G-P2	80.0 x 36.0	64.5 x 13.8	0.55 x 0.50	0.60 x 0.55	2.95 x 4.35	1/16-1/4	KS0066U*		NONE,LED,EL	TN, STN
PC1602-H	85.0 x 36.0	66.0 x 16.2	0.56 x 0.66	0.60 x 0.70	2.96 x 5.56	1/16-1/4	KS0066U*		NONE,LED,EL	TN, STN
PC1602-I	85.0 x 32.6	61.0 x 16.0	0.56 x 0.66	0.60 x 0.70	2.96 x 5.56	1/16-1/4	KS0066U*	●	NONE,LED,EL	TN, STN
PC1602-J	85.0 x 30.0	64.5 x 17.2	0.55 x 0.50	0.60 x 0.55	2.95 x 4.35	1/16-1/4	KS0066U*	●	NONE,LED,EL	TN, STN
PC1602-K-Y4	53.0 x 20.0	36.0 x 10.0	0.33 x 0.35	0.38 x 0.40	1.85 x 3.15	1/16-1/5	KS0066U*		NONE,LED	STN
PC1602-L	122.0 x 44.0	99.0 x 24.0	0.92 x 1.10	0.98 x 1.16	4.84 x 9.66	1/16-1/4	KS0066U*	●	NONE,LED,EL	TN, STN
PC1602-Q	80.0 x 36.0	66.0 x 16.2	0.56 x 0.66	0.60 x 0.70	2.96 x 5.56	1/16-1/4	KS0066U*	●	NONE,LED,EL	TN, STN
PC1602-T	69.0 x 29.2	61.0 x 15.9	0.55 x 0.65	0.60 x 0.70	2.95 x 5.55	1/16-1/4	KS0066U*		NONE,LED	STN
PC1604-A	87.0 x 60.0	62.0 x 25.6	0.55 x 0.55	0.60 x 0.60	2.95 x 4.75	1/16-1/4	KS0066U*		NONE,LED,EL	TN, STN
PC2001-L	180.0 x 40.0	149.0 x 23.0	1.152 x 1.765	1.212 x 1.825	6.00 x 14.54	1/16-1/4	KS0066U*	●	NONE,LED,EL	STN
PC2002-A	116.0 x 37.0	85.0 x 18.6	0.60 x 0.65	0.65 x 0.70	3.20 x 5.55	1/16-1/4	KS0066U*	●	NONE,LED,EL	TN, STN
PC2002-B	116.0 x 37.0	85.0 x 18.5	0.60 x 0.65	0.65 x 0.70	3.20 x 5.55	1/16-1/4	KS0066U*	●	NONE,LED,EL	TN, STN
PC2002-E	98.0 x 60.0	85.0 x 18.6	0.60 x 0.65	0.65 x 0.70	3.20 x 5.55	1/16-1/4	KS0066U*		NONE,LED	TN, STN
PC2002-L	146.0 x 43.0	123.0 x 23.0	0.92 x 1.10	0.98 x 1.16	4.84 x 9.22	1/16-1/4	KS0066U*		NONE,LED,EL	STN
PC2002-M	180.0 x 40.0	149.0 x 23.0	1.12 x 1.12	1.22 x 1.22	6.00 x 9.66	1/16-1/4	KS0066U*	●	NONE,LED,EL	TN, STN
PC2004-A	98.0 x 60.0	76.0 x 25.2	0.55 x 0.55	0.60 x 0.60	2.95 x 4.75	1/16-1/4	KS0066U*		NONE,LED,EL	TN, STN
PC2004-B	118.0 x 43.0	76.0 x 25.2	0.55 x 0.55	0.60 x 0.60	2.95 x 4.75	1/16-1/4	KS0066U*		NONE,LED,EL	TN, STN
PC2004-C	77.0 x 47.0	60.0 x 22.0	0.42 x 0.46	0.47 x 0.51	2.30 x 4.03	1/16-1/4	KS0066U*		NONE,LED,EL	TN, STN
PC2004-C-P1	93.0 x 47.0	60.0 x 22.0	0.42 x 0.46	0.47 x 0.51	2.30 x 4.03	1/16-1/4	KS0066U*		SINGLE LED	TN, STN
PC2004-D	65.0 x 28.4	46.0 x 18.4	0.33 x 0.35	0.38 x 0.40	1.85 x 3.15	1/32-1/5	HD66712/KS0073		NONE,LED	STN
PC2004-F	98.8 x 60.2	77.0 x 26.3	0.55 x 0.55	0.60 x 0.60	2.95 x 4.75	1/16-1/4	KS0066U*		NONE,LED,EL	TN, STN
PC2004-G	86.0 x 36.6	79.0 x 27.0	0.55 x 0.55	0.60 x 0.60	2.95 x 4.75	1/16-1/4	KS0066U*		NONE,LED	STN
PC2004-M	146.0 x 62.5	135.5 x 43.0	0.92 x 1.10	0.98 x 1.16	4.84 x 9.22	1/16-1/4	KS0066U*	●	NONE,LED,EL	STN
PC2402-A	118.0 x 36.0	93.50 X 16.0	0.60 x 0.65	0.65 x 0.70	3.20 x 5.55	1/16-1/4	KS0066U*	●	NONE,LED,EL	TN, STN
PC2402-F	98.16 x 32.5	93.5 x 15.8	0.60 x 0.65	0.65 x 0.70	3.20 x 5.55	1/32-1/6	PCF2116A	●	NONE	STN
PC2402-H	100.16 x 26.4	93.5 x 15.8	0.60 x 0.65	0.65 x 0.70	3.20 x 5.55	1/32-1/6	PCF2116A/KS0071	●	LED	STN
PC2402-L	208.0 x 40.0	178.0 x 23.0	1.16 x 1.16	1.21 x 1.21	6.00 x 9.63	1/16-1/4	KS0066U*	●	NONE,LED,EL	STN
PC2404-A	125.0 x 39.0	97.0 x 27.0	0.60 x 0.65	0.65 x 0.70	3.20 x 5.55	1/32-1/6	NJU6426	●	NONE,LED,EL	TN, STN
PC4001-L	285.0 x 40.0	246.0 x 20.0	1.00 x 1.77	1.05 x 1.82	5.20 x 14.51	1/16-1/4	KS0066U*		NONE,EL	STN
PC4002-B	182.0 x 33.5	154.0 x 16.0	0.60 x 0.65	0.65 x 0.70	3.20 x 5.55	1/16-1/4	KS0066U*		NONE,LED,EL	TN, STN
PC4002-C	182.0 x 33.5	154.4 x 15.8	0.60 x 0.65	0.65 x 0.70	3.20 x 5.55	1/16-1/4	KS0066U*		NONE,LED	TN, STN
PC4002-F	161.5 x 25.6	155.1 x 15.8	0.60 x 0.65	0.65 x 0.70	3.20 x 5.55	1/16-1/4	KS0066U*		NONE,LED	STN
PC4002-L	285.0 x 56.0	246.0 x 38.0	1.00 x 1.77	1.05 x 1.82	5.20 x 14.51	1/16-1/4	KS0066U*		NONE,EL	STN
PC4004-A	190.0 x 54.0	147.0 x 29.5	0.50 x 0.55	0.57 x 0.62	2.78 x 4.89	1/16-1/5	KS0066U*	●	NONE,LED,EL	TN, STN
PC4004-D	160.0 x 47.0	140.0 x 29.0	0.50 x 0.50	0.55 x 0.55	2.70 x 4.35	1/16-1/5	KS0066U*	●	NONE	TN, STN
PC4004-L	280.0 x 88.0	244.0 x 68.0	1.00 x 1.77	1.05 x 1.82	5.20 x 14.51	1/16-1/5	KS0066U*	●	NONE,EL	STN

Note:

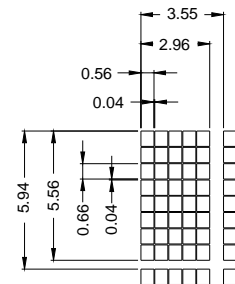
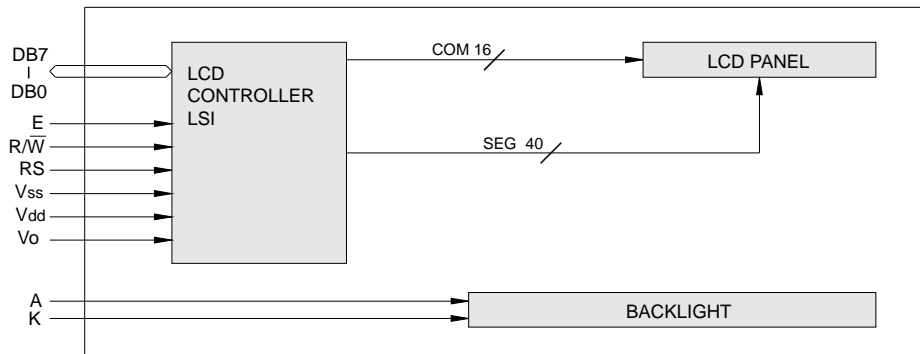
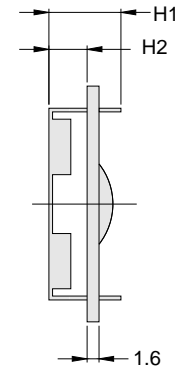
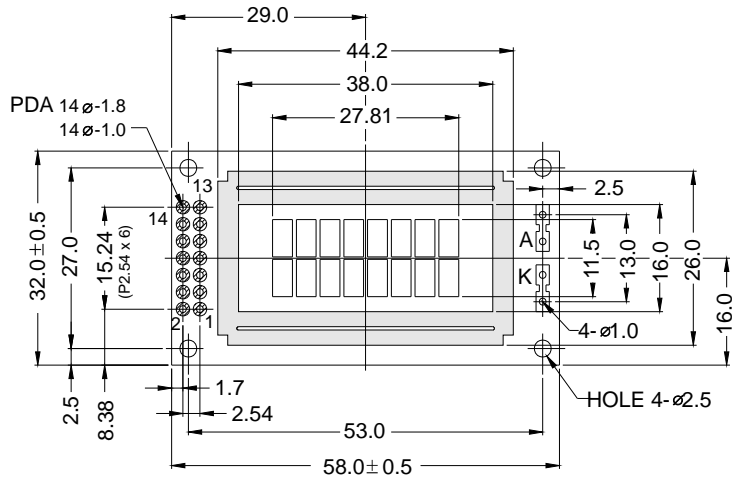
\* KS0066U or alternative contrdler IC (ST7066, SED1278,.....)

\* Booster: Voltage booster circuit available





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	58.0 x 32.0	Module	H2 / H1
View Area	38.0 x 16.0	W/O B/L	5.2 / 9.8
Dot Size	0.56 x 0.66	EL B/L	5.2 / 9.8
Dot Pitch	0.60 x 0.70	LED B/L	8.9 / 13.5

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line

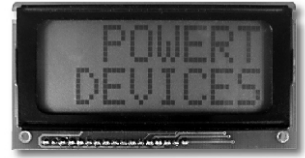
ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.4	-	4.6	-	5.2	-	V
		25°C	4.1	6.1	4.3	6.4	4.8	6.7	V
		50°C	3.8	-	4	-	4.6	-	V
70°C	-	5.7	-	6	-	6.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.5	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	110	-	mA			

**REMARK**

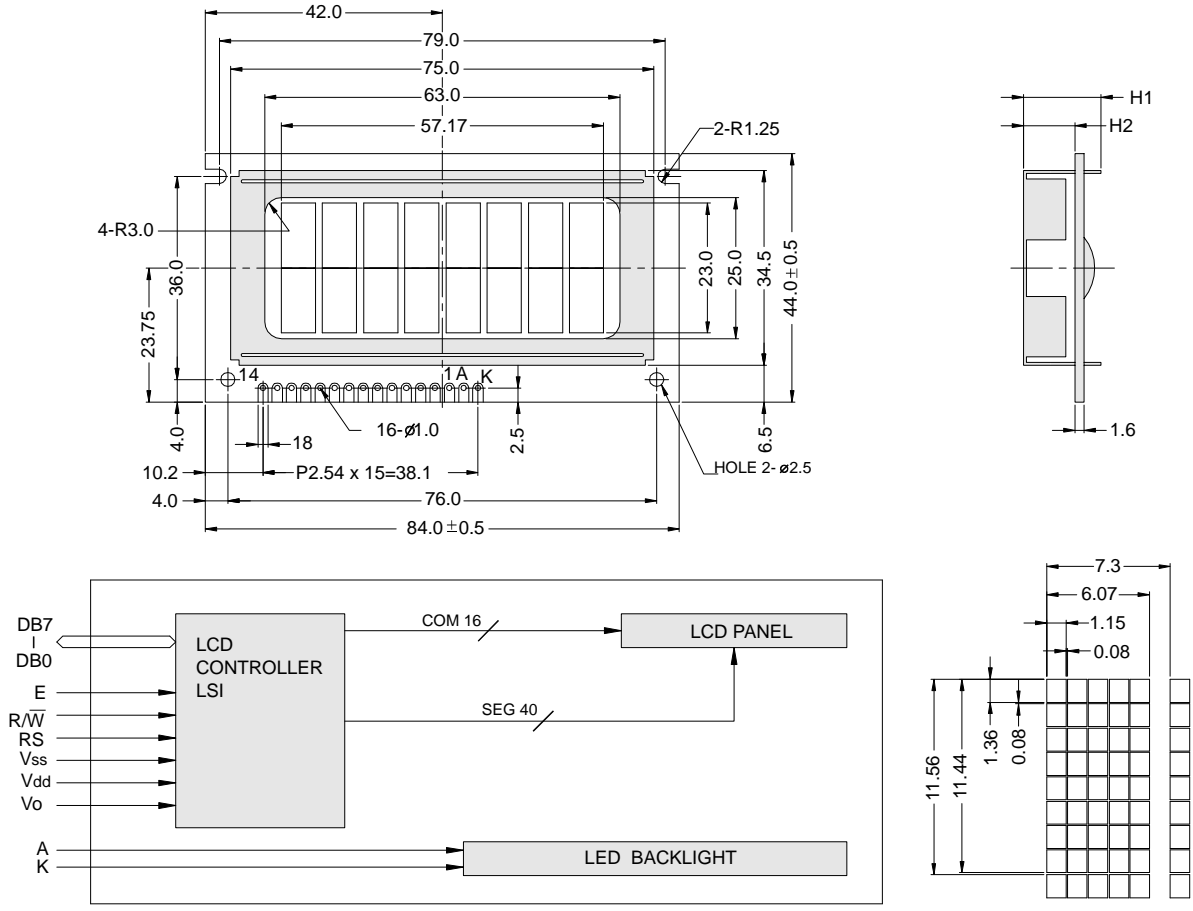
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	84.0 x 44.0	Module	H2 / H1
View Area	63.0 x 25.0	W / O B/L	- / -
Dot Size	1.15 x 1.36	EL B/L	- / -
Dot Pitch	1.23 x 1.44	LED B/L	9.1 / 13.7

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING								
Item	Symbol	Condition	Min.	Max.	Units			
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V			
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V			
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V			
ELECTRICAL CHARACTERISTICS								
Item	Symbol	Condition	Min.	Typical	Max.	Units		
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V		
LCD operation voltage	Vop	Top	N	W	N	W	V	
		-20°C	- 4.3	- 4.6	- 5.9	V		
		0°C	4.5	- 4.8	- 5.1	V		
		25°C	4.1	4.4	4.5	4.7	5	V
		50°C	3.8	- 4.1	- 4.4	V		
		70°C	- 3.9	- 4.2	- 4.5	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.5	2.5	mA		
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA		
	LED/array	VB/L=4.2V	-	60	-	mA		

**REMARK**

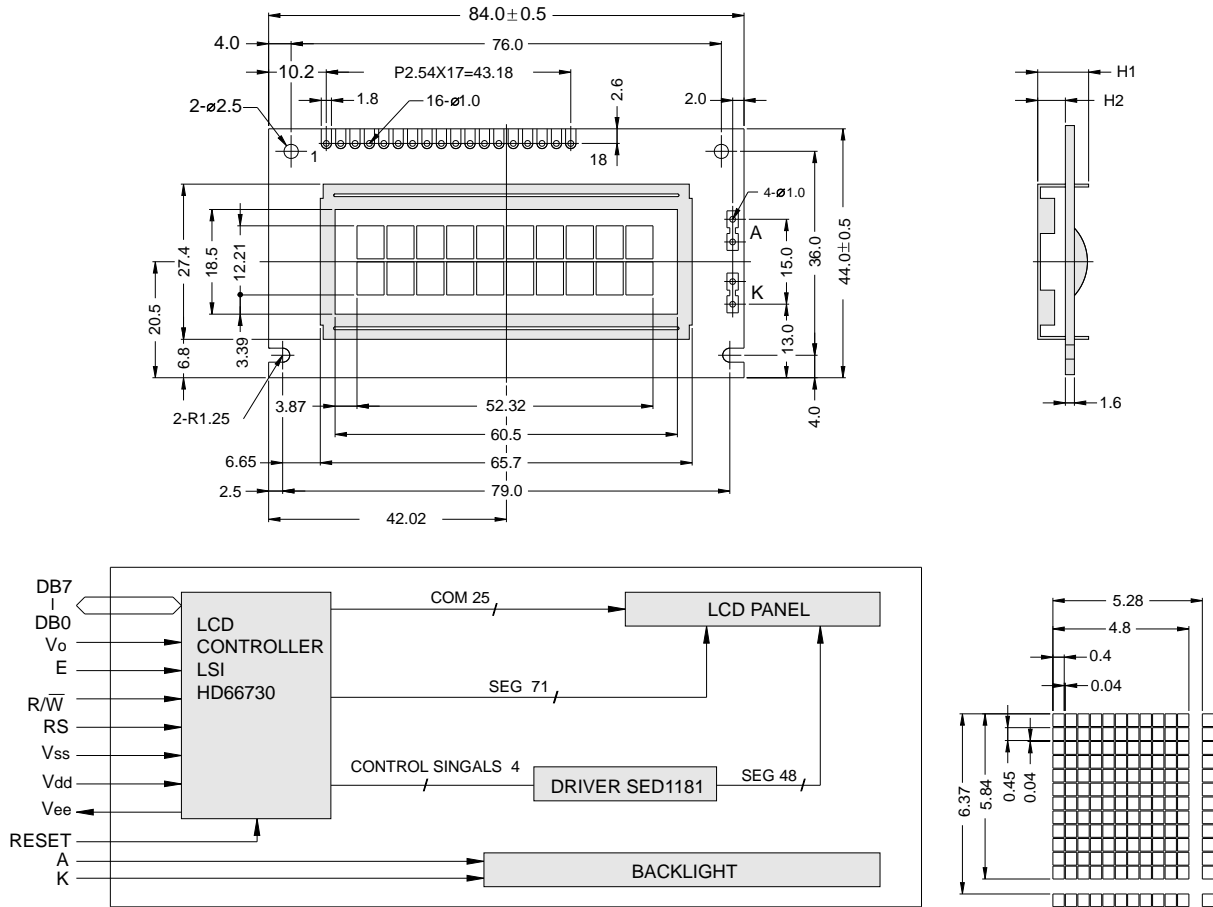
LCD option: STN, TN, FSTN  
Backlight Option: LED Backlight feature, other Specs not available on catalog is under request



# PC 1002-A



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	84.0 x 44.0	Module	H2 / H1
View Area	60.5 x 18.5	W / O B/L	4.9 / 8.9
Dot Size	0.40 x 0.45	EL B/L	4.9 / 8.9
Dot Pitch	0.44 x 0.49	LED B/L	8.9 / 13.0

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	Vee	Negative voltage
16	RESET	Reset signal
17	A	Power supply for LED B/L (+)
18	K	Power supply for LED B/L (-)

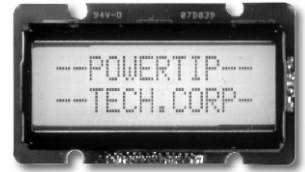
ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	17	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-25°C	-	8.6	-	9.1	-	9.6	V
		0°C	6.1	-	6.4	-	6.7	-	V
		25°C	5.6	7.7	5.9	8.1	6.2	8.5	V
		50°C	5.1	-	5.4	-	5.7	-	V
70°C	-	7.2	-	7.6	-	8	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.5	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	120	-	mA			

## REMARK

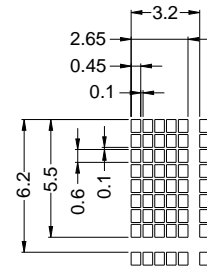
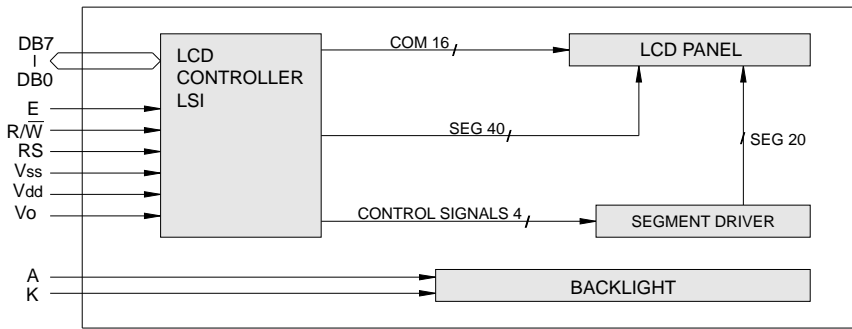
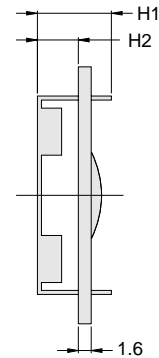
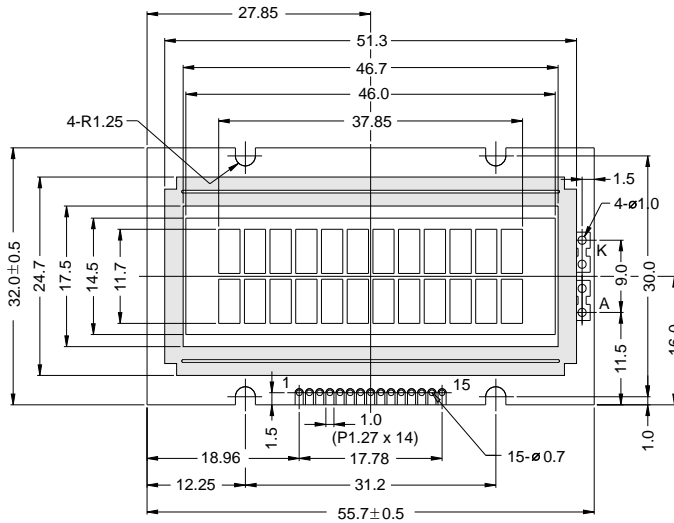
LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

**MECHANICAL SPECIFICATION**

Overall Size	55.7 x 32.0	Module	H2 / H1
View Area	46.7 x 17.5	W / O B/L	5.1 / 9.2
Dot Size	0.45 x 0.60	EL B/L	5.1 / 9.2
Dot Pitch	0.55 x 0.70	LED B/L	8.7 / 12.8

**PIN ASSIGNMENT**

Pin no.	Symbol	Function
1	Vss/K	Power supply(GND) / LED B/L(-)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)

**ABSOLUTE MAXIMUM RATING**

Item	Symbol	Condition	Min.	Max.	Units
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V

**ELECTRICAL CHARACTERISTICS**

Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vs	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.5	-	4.6	-	5.1	-	V
		25°C	4.1	6.1	4.4	6.4	4.7	6.7	V
		50°C	3.8	-	4.1	-	4.4	-	V
		70°C	-	5.7	-	6	-	6.3	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.5	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	40	-	mA			
	LED/array	VB/L=4.2V	-	80	-	mA			

**REMARK**

LCD option: STN, TN, FSTN

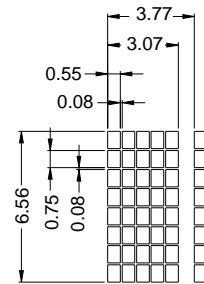
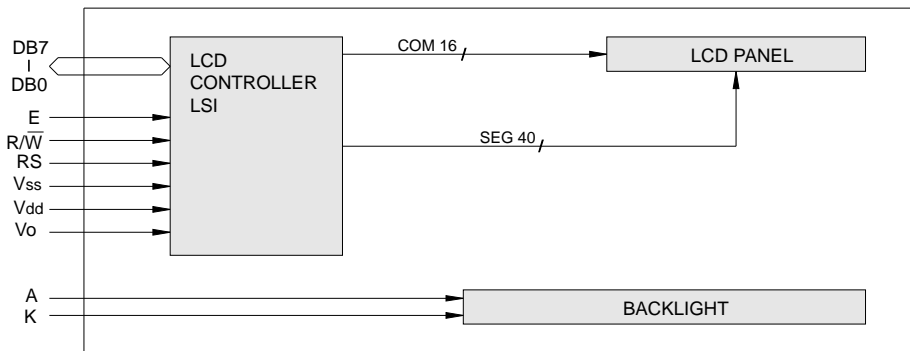
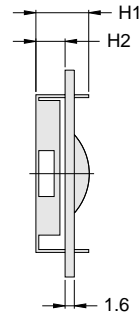
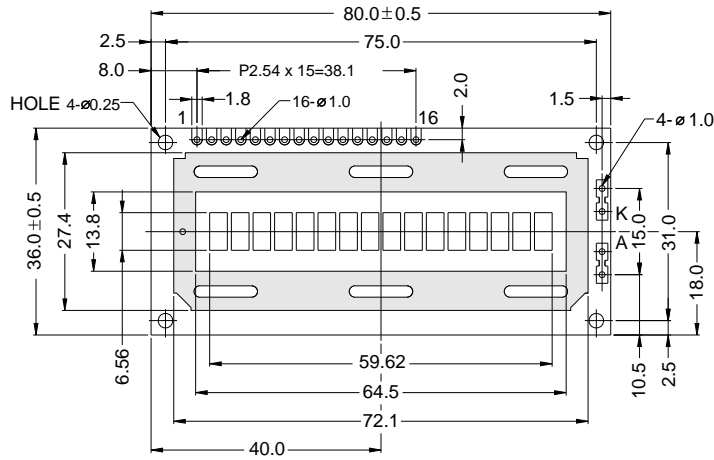
Backlight Option: LED Backlight feature, other Specs not available on catalog is under request.



# PC 1601-A



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	80.0 x 36.0	Module	H2 / H1
View Area	64.5 x 13.8	W/O B/L	5.1 / 9.2
Dot Size	0.55 x 0.75	EL B/L	5.1 / 9.2
Dot Pitch	0.63 x 0.83	LED B/L	9.4 / 14.0

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	5.2	-	5.4	-	5.7	V
		0°C	4.5	-	4.8	-	5.1	-	V
		25°C	4.1	4.2	4.5	4.5	4.7	4.9	V
		50°C	3.8	-	4.1	-	4.4	-	V
70°C	-	3.9	-	4.0	-	4.5	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.5	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	40	-	mA			
	LED/array	VB/L=4.2V	-	120	-	mA			

## REMARK

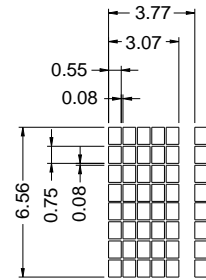
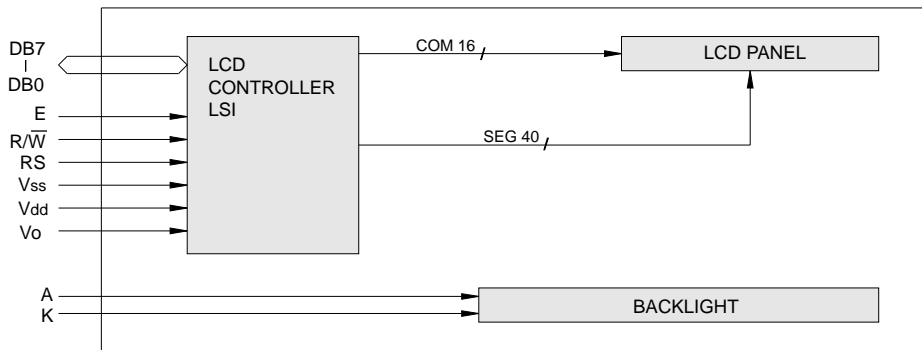
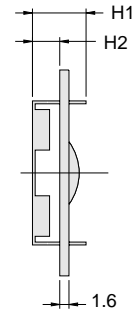
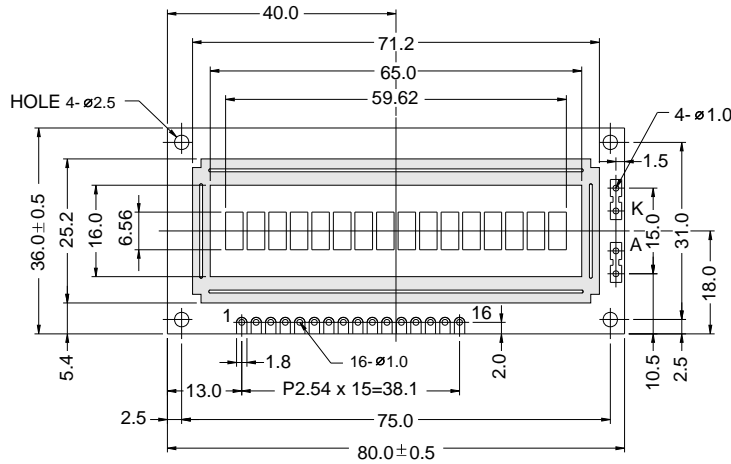
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

**MECHANICAL SPECIFICATION**

Overall Size	80.0 x 36.0	Module	H2 / H1
View Area	65.0 x 16.0	W/O B/L	4.8 / 9.4
Dot Size	0.55 x 0.75	EL B/L	4.8 / 9.4
Dot Pitch	0.63 x 0.83	LED B/L	8.9 / 13.5

**PIN ASSIGNMENT**

Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

**ABSOLUTE MAXIMUM RATING**

Item	Symbol	Condition	Min.	Max.	Units
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V

**ELECTRICAL CHARACTERISTICS**

Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	V	
		0°C	4.5	-	4.8	-	5.1	-	V
		25°C	4.1	6.1	4.4	6.4	4.7	6.7	V
		50°C	3.8	-	4.1	-	4.4	-	V
70°C	-	5.7	-	6	-	6.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.5	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	40	-	mA			
	LED/array	VB/L=4.2V	-	120	-	mA			

**REMARK**

LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.

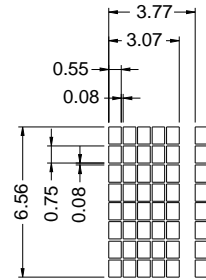
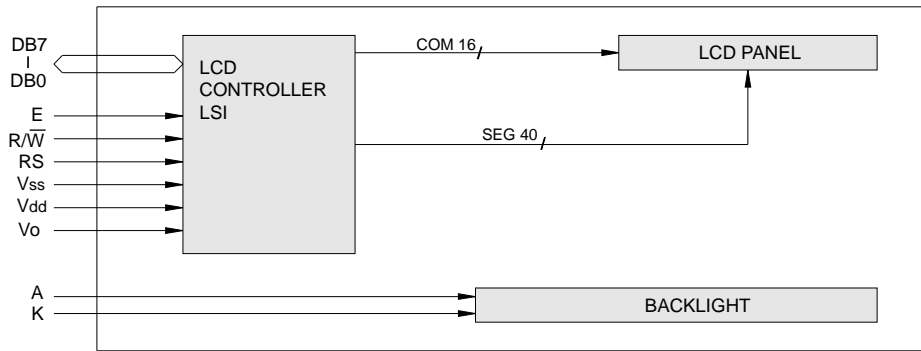
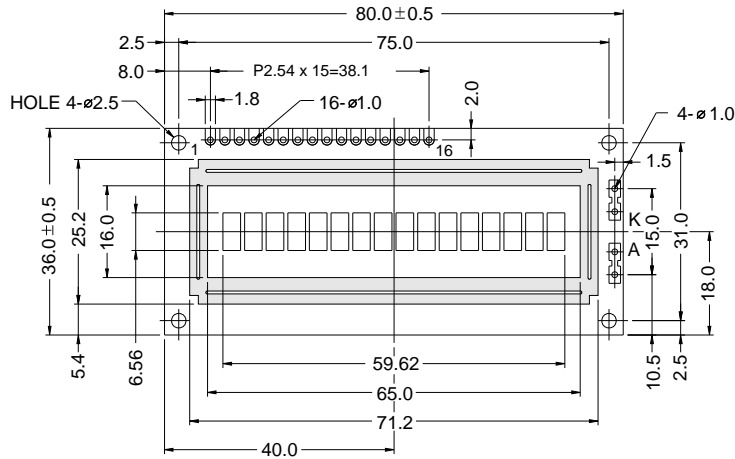




# PC 1601-F



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

### MECHANICAL SPECIFICATION

Overall Size	80.0 x 36.0	Module	H2 / H1
View Area	65.0 x 16.0	W/O B/L	4.8 / 9.4
Dot Size	0.55 x 0.75	EL B/L	4.8 / 9.4
Dot Pitch	0.63 x 0.83	LED B/L	8.9 / 13.5

### PIN ASSIGNMENT

Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

### ABSOLUTE MAXIMUM RATING

Item	Symbol	Condition	Min.	Max.	Units
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V

### ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply soltage	Vdd-Vss	25°C	2.7	—	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	—	5.2	—	5.4	V		
		0°C	4.5	—	4.8	—	5.1	V	
		25°C	4.1	4.3	4.4	4.5	4.7	4.9	V
		50°C	3.8	—	4.1	—	4.4	—	V
70°C	—	3.9	—	4.1	—	4.5	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	—	1.5	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	—	40	—	mA			
	LED/array	VB/L=4.2V	—	120	—	mA			

## REMARK

LCD option: STN, TN, FSTN

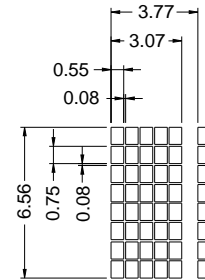
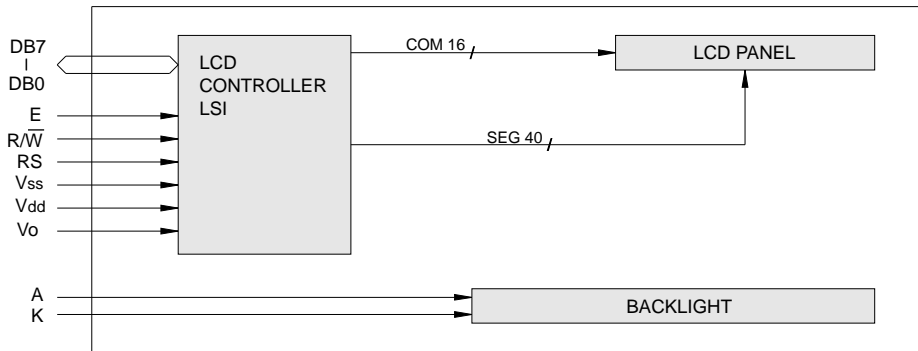
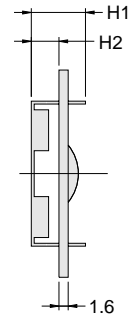
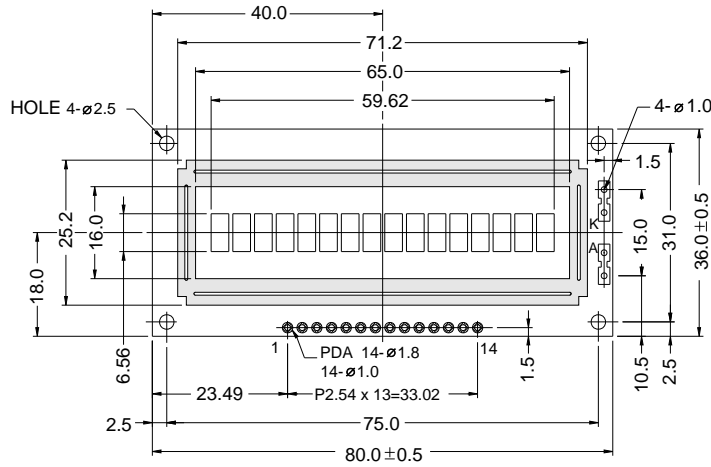
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



# PC 1601-G



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	80.0 x 36.0	Module	H2 / H1
View Area	65.0 x 16.0	W / O B/L	4.8 / 9.4
Dot Size	0.55 x 0.77	EL B/L	4.8 / 9.4
Dot Pitch	0.63 x 0.83	LED B/L	8.9 / 13.5

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	5.2	-	5.4	-	V	
		0°C	4.5	-	4.8	-	5.1	-	V
		25°C	4.1	4.3	4.5	4.5	4.7	5.3	V
		50°C	3.8	-	4.1	-	4.4	-	V
		70°C	-	3.9	-	4.1	-	4.5	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.5	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	40	-	mA			
	LED/array	VB/L=4.2V	-	120	-	mA			

## REMARK

LCD option: STN, TN, FSTN

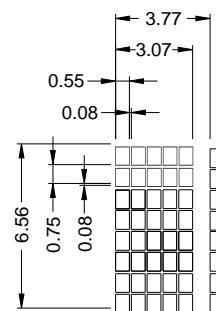
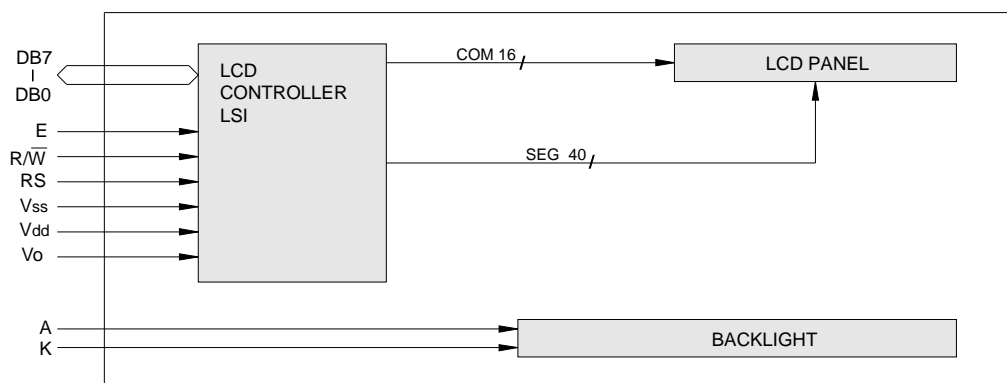
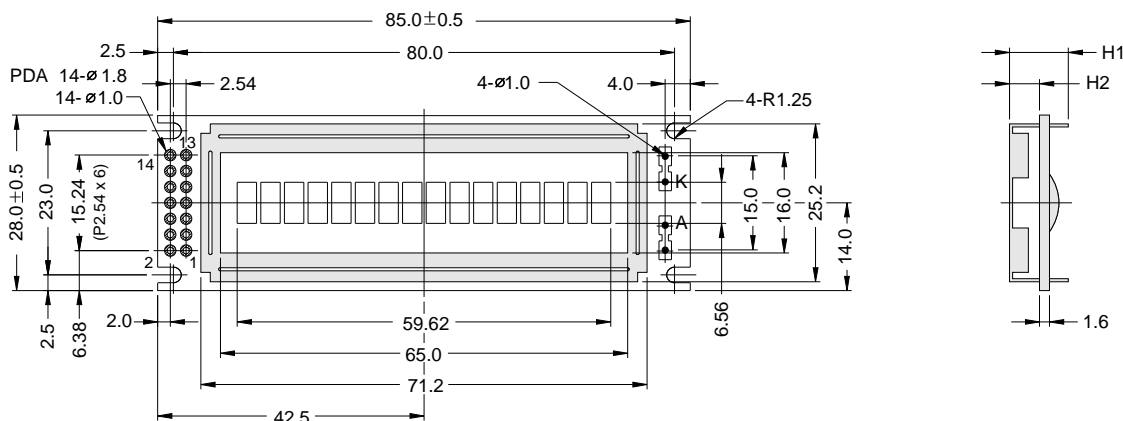
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



# PC 1601-H



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	85.0 x 28.0	Module	H2 / H1
View Area	65.0 x 16.0	W/O B/L	4.8 / 9.4
Dot Size	0.55 x 0.75	EL B/L	4.8 / 9.4
Dot Pitch	0.63 x 0.83	LED B/L	8.9 / 13.5

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	- 5.2	- 5.4	- 5.6	V			
		0°C	4.5	- 4.8	- 5.1	-	V		
		25°C	4.1	4.2	4.4	4.4	4.7	4.8	V
		50°C	3.8	-	4.1	-	4.4	-	V
70°C	-	3.8	-	4.0	-	4.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.5	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	120	-	mA			

## REMARK

LCD option: STN, TN, FSTN

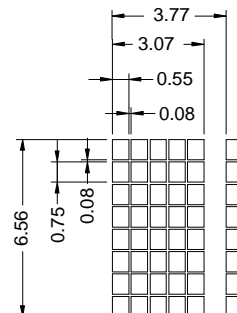
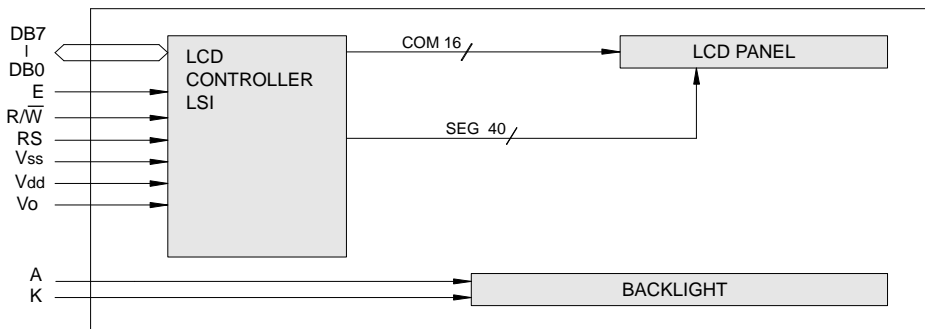
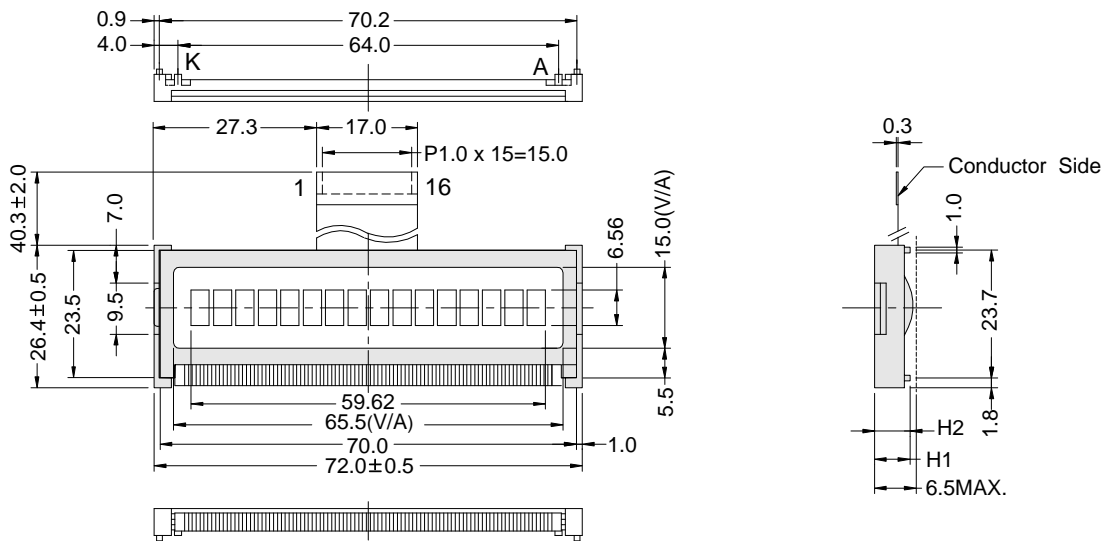
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



# PC 1601-K



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	72.5 x 26.4	Module	H2 / H1
View Area	65.5 x 15.0	W / O B/L	- / 2.6
Dot Size	0.55 x 0.75	EL B/L	- / -
Dot Pitch	0.63 x 0.83	LED B/L	5.0 / 6.0

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A/NC	Power supply for LED B/L (+)
16	K/NC	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	- 4.5	- 5.7	- 5.8	V			
		0°C	4.8	- 4.8	- 4.8	V			
		25°C	4.3	4.4	4.5	5.1	4.3	5.3	V
		50°C	3.7	- 4.8	- 3.9	-	V		
70°C	- 4.1	- 4.6	- 4.8	V					
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.5	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	40	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

## REMARK

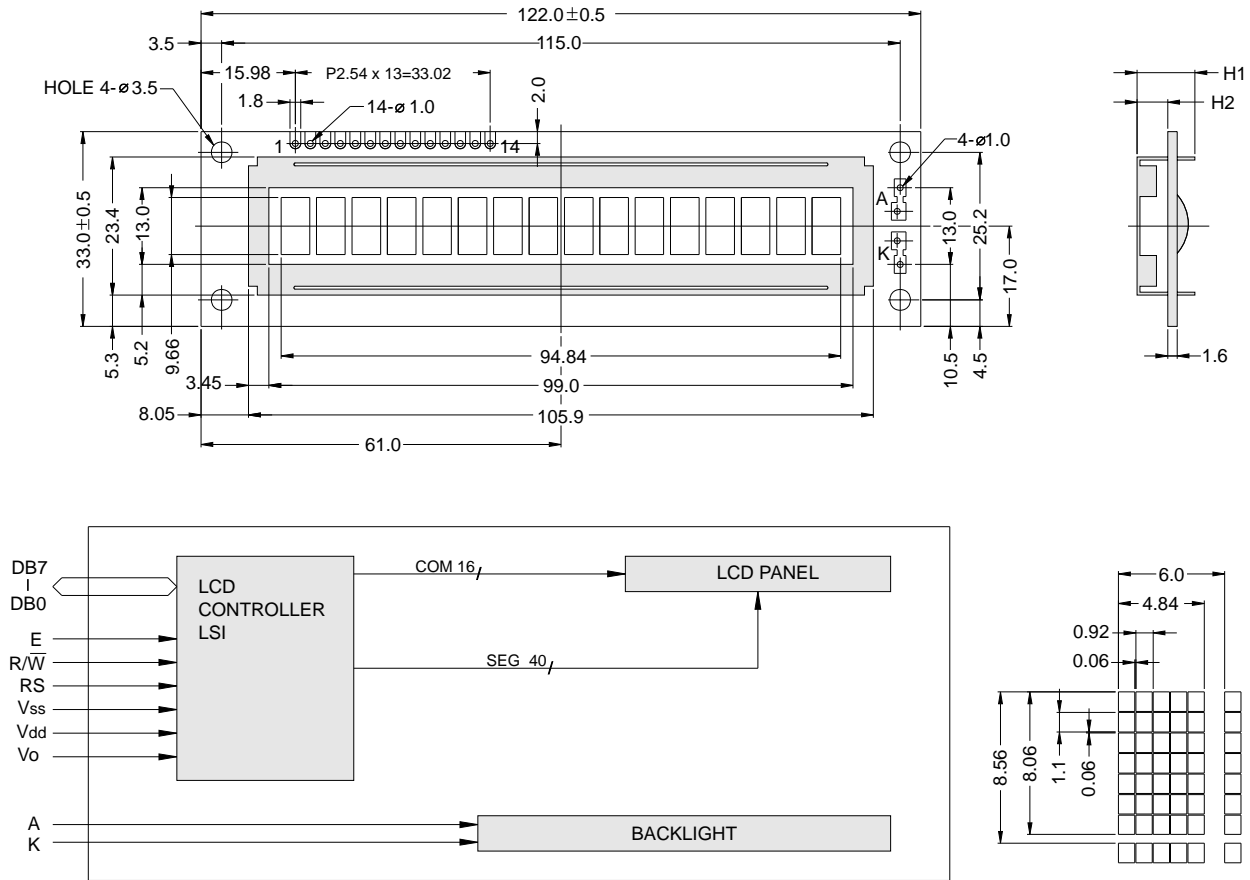
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	122.0 x 33.0	Module	H2 / H1
View Area	99.0 x 13.0	W/O B/L	5.2 / 9.8
Dot Size	0.92 x 1.10	EL B/L	5.2 / 9.8
Dot Pitch	0.98 x 1.16	LED B/L	8.9 / 13.5

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	N	W	V
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.6	-	4.9	-	5.2	-	V
		25°C	4.2	6.1	4.4	6.4	4.8	6.7	V
		50°C	3.9	-	4.2	-	4.5	-	V
70°C	-	5.7	-	6	-	6.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.5	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	190	-	mA			

**REMARK**

LCD option: STN, TN, FSTN

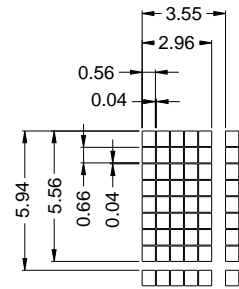
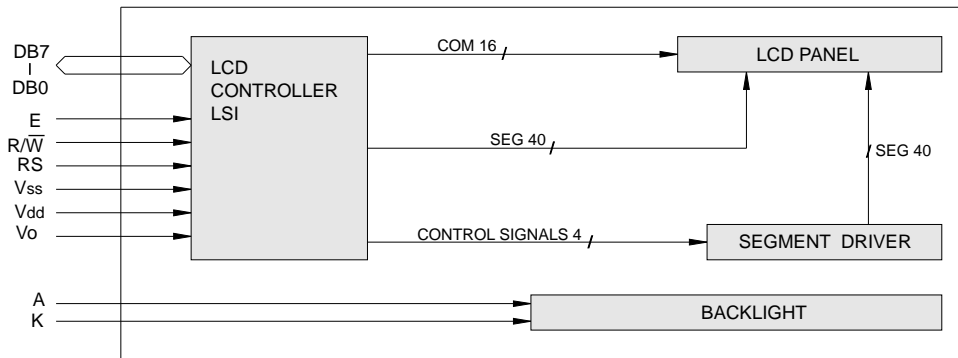
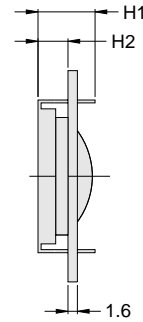
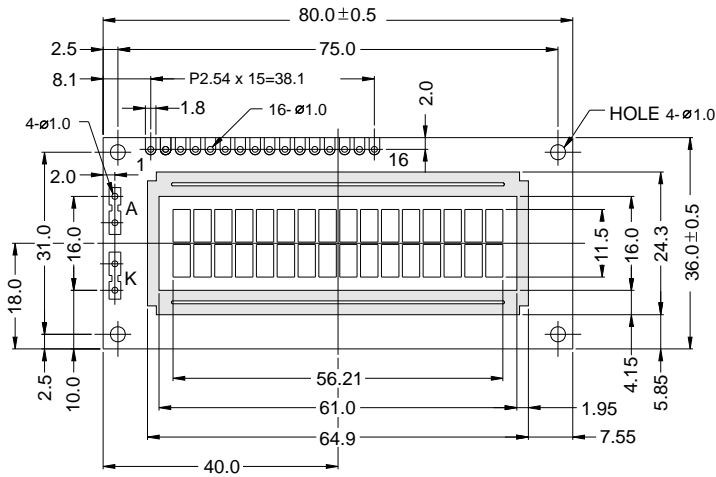
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



# PC 1602-C



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

### MECHANICAL SPECIFICATION

Overall Size	80.0 x 36.0	Module	H2 / H1
View Area	61.0 x 16.0	W/O B/L	5.1 / 9.7
Dot Size	0.56 x 0.66	EL B/L	5.1 / 9.7
Dot Pitch	0.60 x 0.70	LED B/L	9.1 / 13.7

### PIN ASSIGNMENT

Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

### ABSOLUTE MAXIMUM RATING

Item	Symbol	Condition	Min.	Max.	Units
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V

### ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	4.7	-	5	-	5.3	V
		0°C	4.6	-	4.9	-	5.2	-	V
		25°C	4.2	4.7	4.5	5	4.8	5.3	V
		50°C	3.9	-	4.2	-	4.5	-	V
70°C	-	4.5	-	4.8	-	5.1	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	20	-	mA			
	LED/array	VB/L=4.2V	-	90	-	mA			

## REMARK

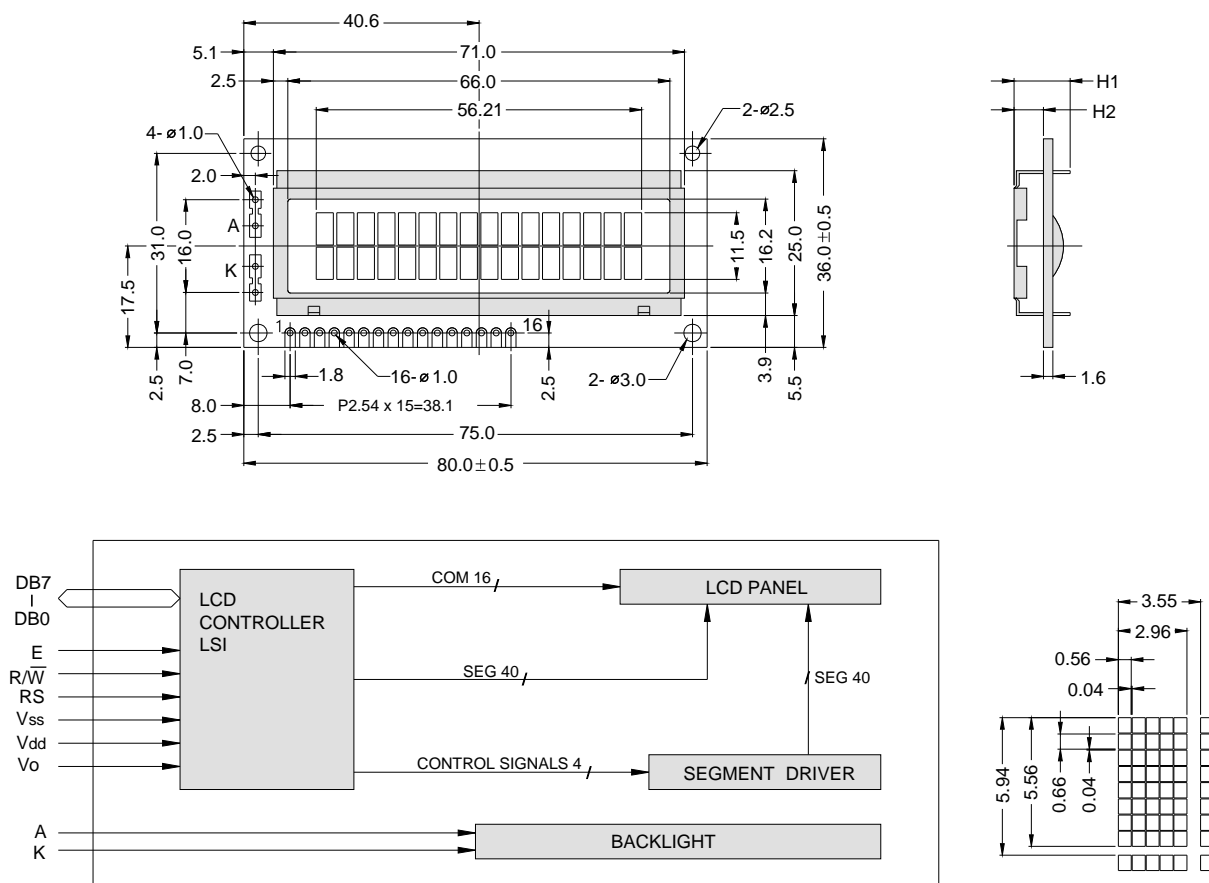
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

**MECHANICAL SPECIFICATION**

Overall Size	80.0 x 36.0	Module	H2 / H1
View Area	66.0 x 16.2	W / O B/L	5.1 / 9.7
Dot Size	0.56 x 0.66	EL B/L	5.1 / 9.7
Dot Pitch	0.60 x 0.70	LED B/L	9.4 / 14.0

**PIN ASSIGNMENT**

Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

**ABSOLUTE MAXIMUM RATING**

Item	Symbol	Condition	Min.	Max.	Units
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V

**ELECTRICAL CHARACTERISTICS**

Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	V	
		0°C	4.5	-	4.8	-	5.1	-	V
		25°C	4.1	6.1	4.1	6.4	4.7	6.7	V
		50°C	3.8	-	3.8	-	4.4	-	V
70°C	-	5.7	-	6	-	6.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	120	-	mA			

**REMARK**

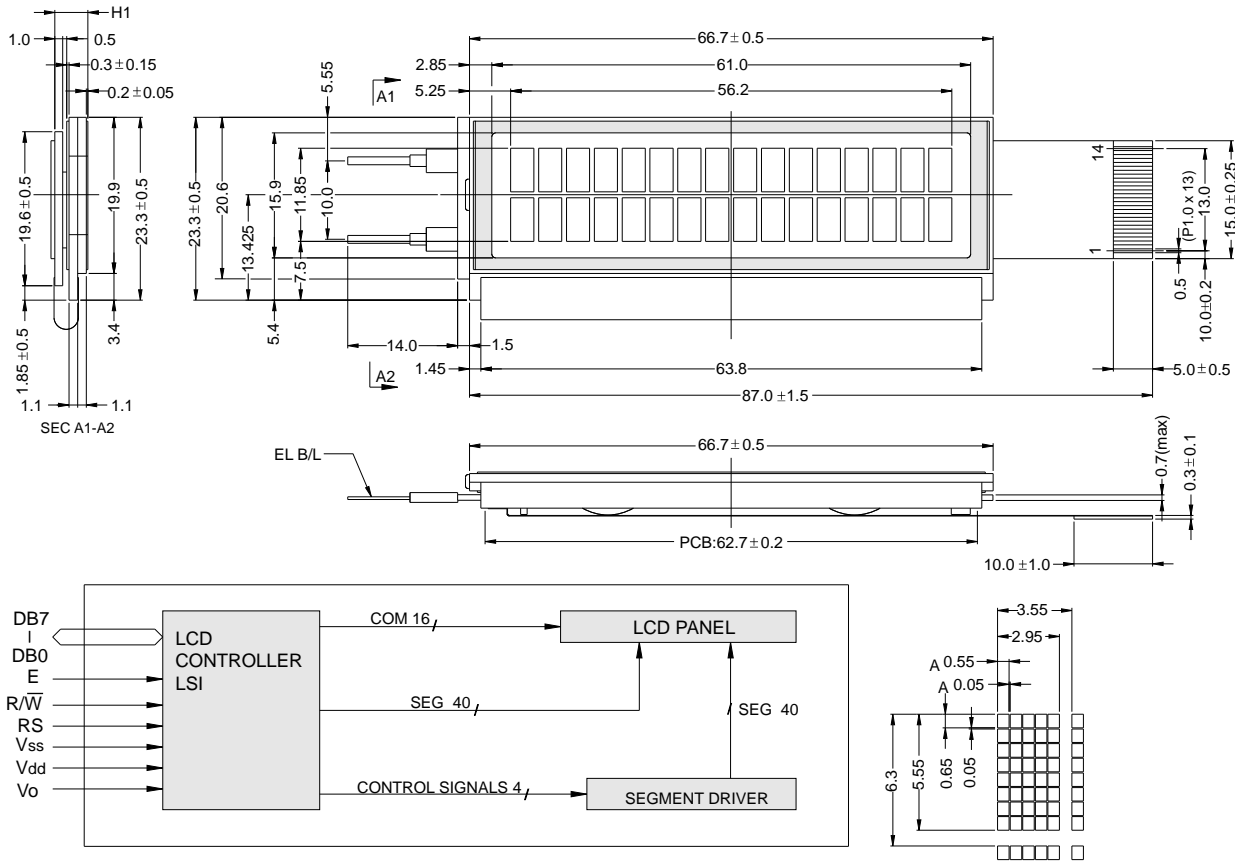
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	66.7 x 23.3	Module	H2 / H1
View Area	61.0 x 15.9	W / O B/L	- / 4.2
Dot Size	0.55 x 0.65	EL B/L	- / 4.6
Dot Pitch	0.60 x 0.70	LED B/L	-

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	5	-	5.3	-	V	
		0°C	4.4	-	4.7	-	5	-	V
		25°C	3.9	4.8	4.2	5.1	4.5	5.4	V
		50°C	3.7	-	4	-	4.3	-	V
70°C	-	4.8	-	4.9	-	5.2	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

**REMARK**

LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.

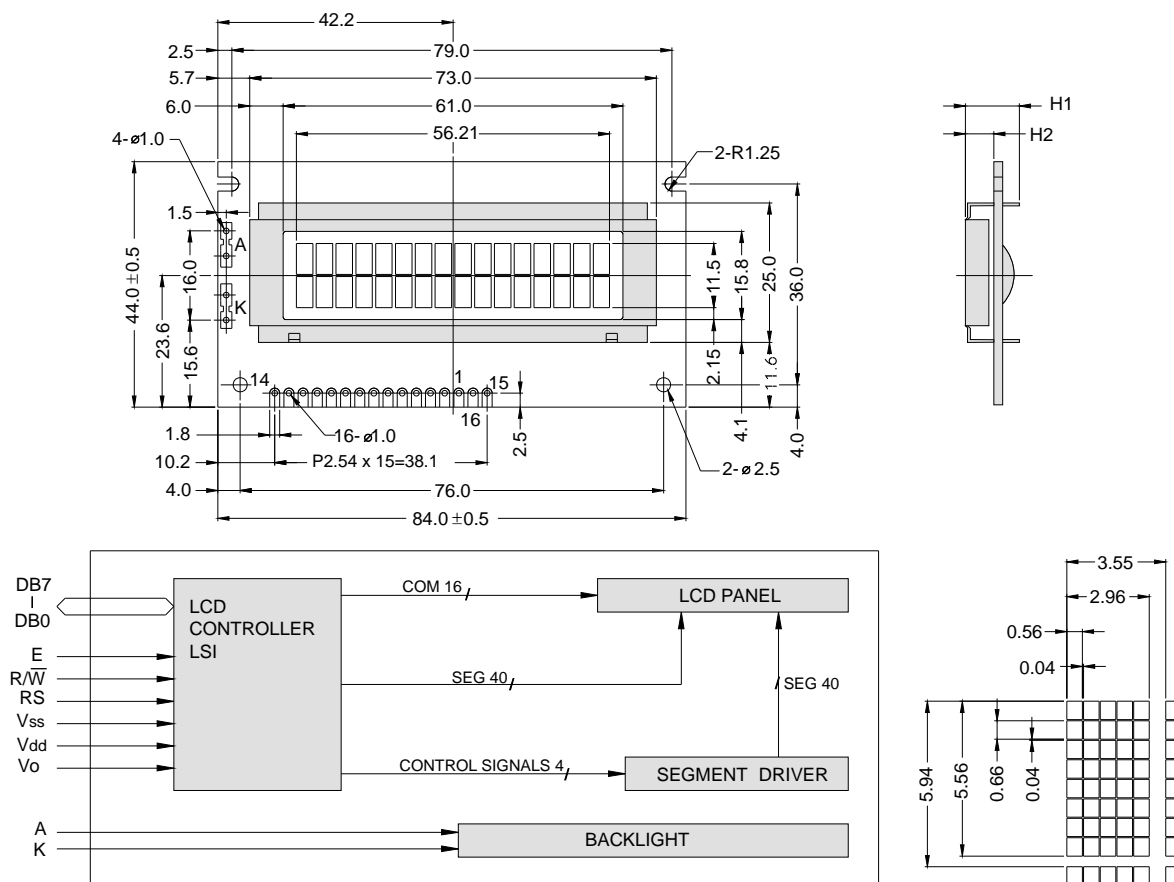




# PC 1602-F



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

### MECHANICAL SPECIFICATION

Overall Size	84.0 x 44.0	Module	H2 / H1
View Area	61.0 x 15.8	W / O B/L	5.1 / 9.7
Dot Size	0.56 x 0.66	EL B/L	5.1 / 9.7
Dot Pitch	0.60 x 0.70	LED B/L	9.4 / 14.0

### PIN ASSIGNMENT

Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

### ABSOLUTE MAXIMUM RATING

Item	Symbol	Condition	Min.	Max.	Units
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V

### ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	N	W	V
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.5	-	5.1	-	5.3	-	V
		25°C	4.1	6.1	4.7	6.4	4.9	6.7	V
		50°C	3.8	-	4.4	-	4.6	-	V
		70°C	-	5.7	-	6	-	6.3	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	40	-	mA			
	LED/array	VB/L=4.2V	-	120	-	mA			

## REMARK

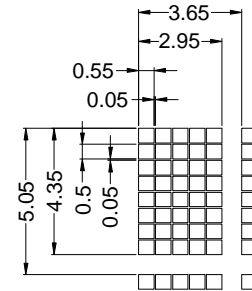
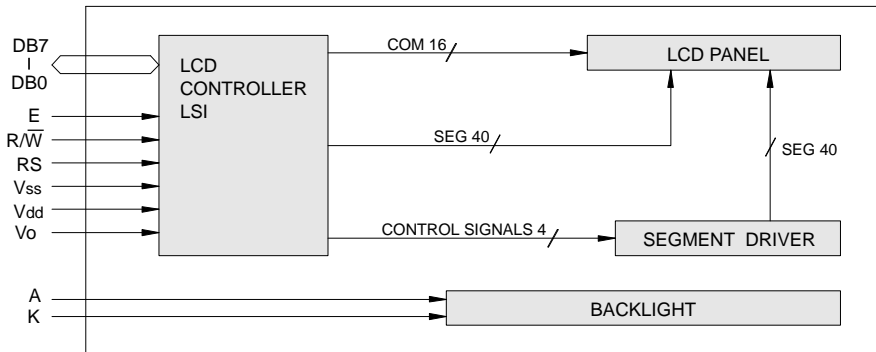
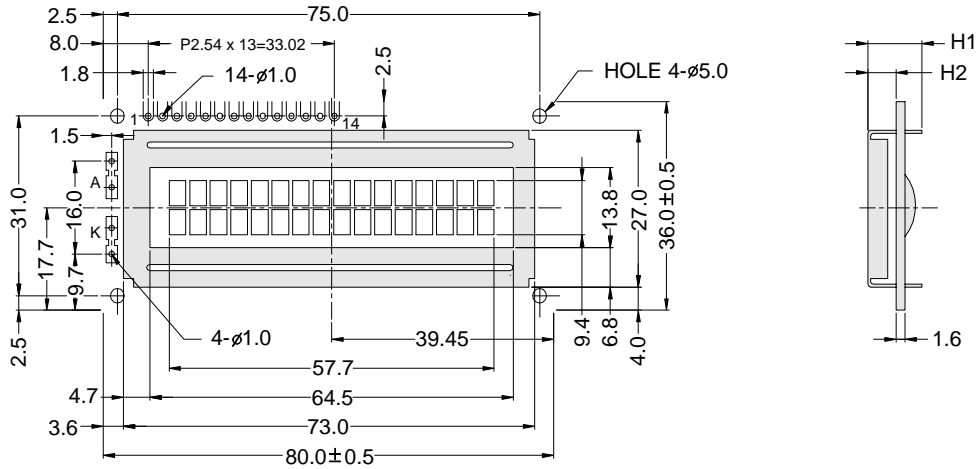
LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	80.0 x 36.0	Module	H2 / H1
View Area	64.0 x 13.8	W/O B/L	5.0 / 9.6
Dot Size	0.55 x 0.50	EL B/L	5.0 / 9.6
Dot Pitch	0.60 x 0.55	LED B/L	9.0 / 13.6

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.5	-	4.8	-	5.1	-	V
		25°C	4.1	6.1	4.4	6.4	4.7	6.7	V
		50°C	3.8	-	4.1	-	4.4	-	V
70°C	-	5.7	-	6	-	6.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	40	-	mA			
	LED/array	VB/L=4.2V	-	120	-	mA			

**REMARK**

LCD option: STN, TN, FSTN

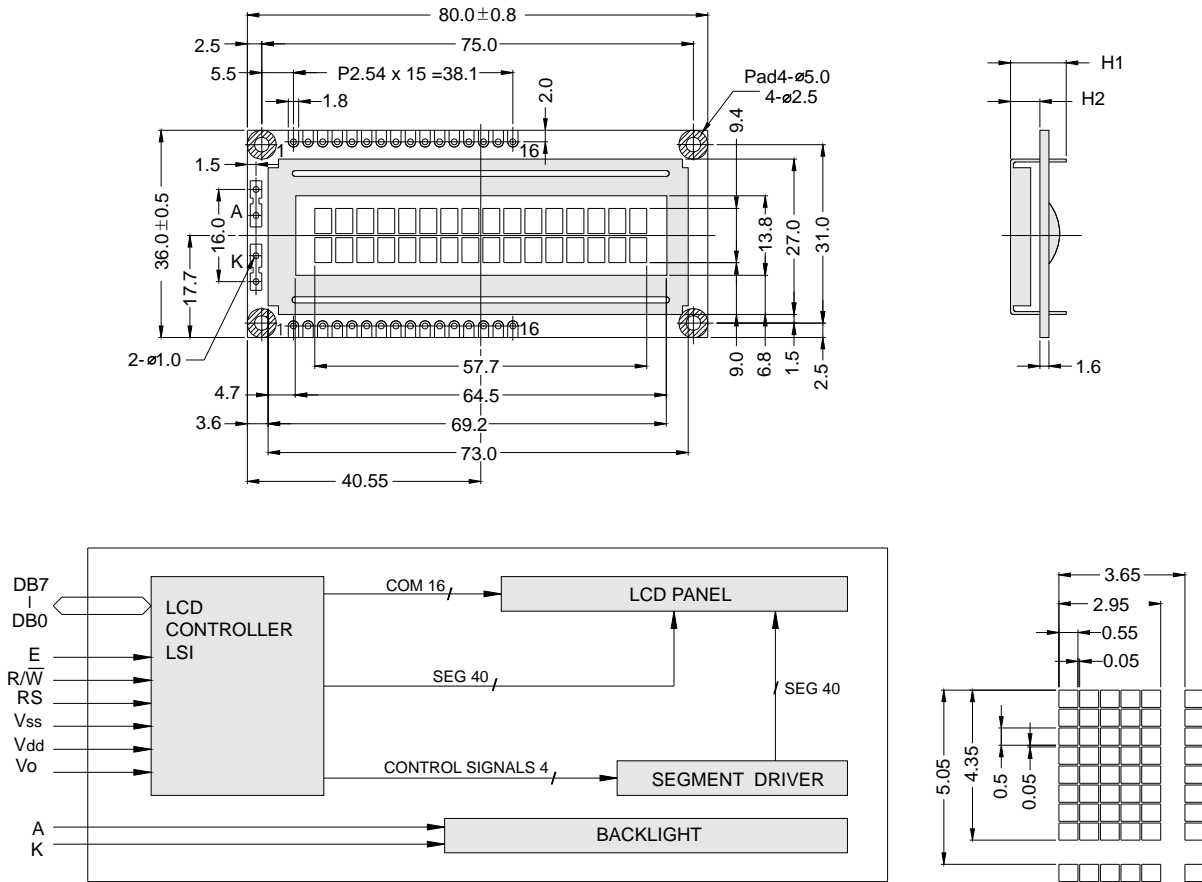
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



# PC 1602-G-P2



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified ± 0.3mm

### MECHANICAL SPECIFICATION

Overall Size	80.0 x 36.0	Module	H2 / H1
View Area	64.5 x 13.8	W / O B/L	5.0 / 9.6
Dot Size	0.55 x 0.50	EL B/L	5.0 / 9.6
Dot Pitch	0.60 x 0.55	LED B/L	9.0 / 13.6

### PIN ASSIGNMENT

Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

### ABSOLUTE MAXIMUM RATING

Item	Symbol	Condition	Min.	Max.	Units
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V

### ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.5	-	4.8	-	5.1	-	V
		25°C	4.1	6.1	4.4	6.4	4.7	6.7	V
		50°C	3.8	-	4.1	-	4.4	-	V
		70°C	-	5.7	-	6	-	6.3	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	120	-	mA			

## REMARK

LCD option: STN, TN, FSTN

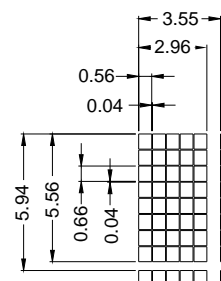
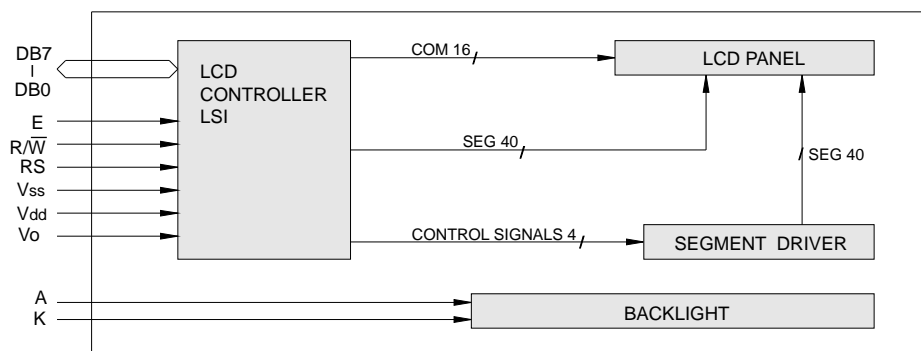
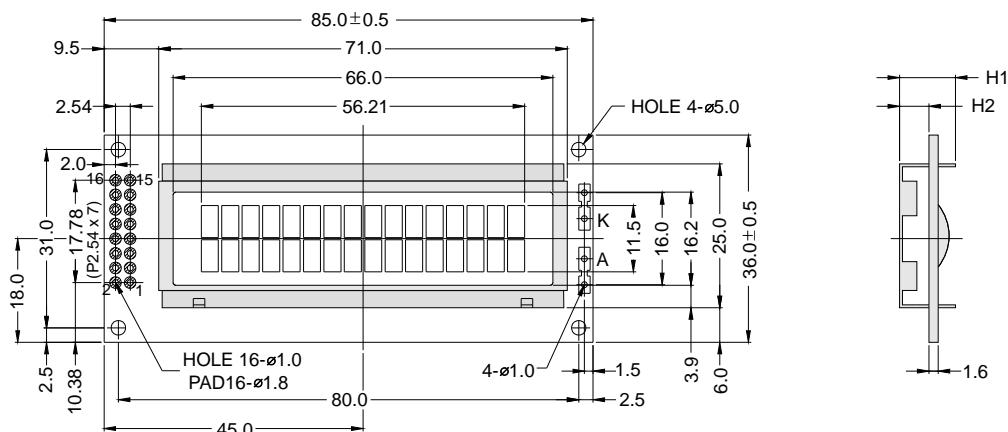
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



# PC 1602-H



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

### MECHANICAL SPECIFICATION

Overall Size	85.0 x 36.0	Module	H2 / H1
View Area	66.0 x 16.2	W / O B/L	5.1 / 9.7
Dot Size	0.56 x 0.66	EL B/L	5.1 / 9.7
Dot Pitch	0.60 x 0.70	LED B/L	9.4 / 14.0

### PIN ASSIGNMENT

Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

### ABSOLUTE MAXIMUM RATING

Item	Symbol	Condition	Min.	Max.	Units
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V

### ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	4.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.5	-	5.3	-	5.1	-	V
		25°C	4.1	6.1	4.9	6.4	4.7	6.7	V
		50°C	3.8	-	4.6	-	4.4	-	V
70°C	-	5.7	-	6	-	6.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	120	-	mA			

## REMARK

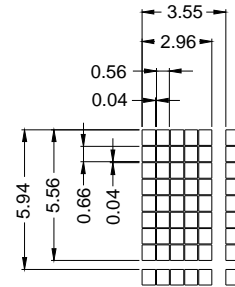
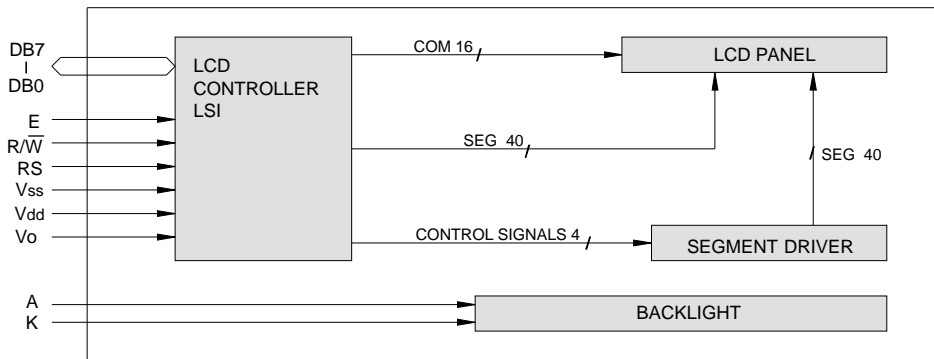
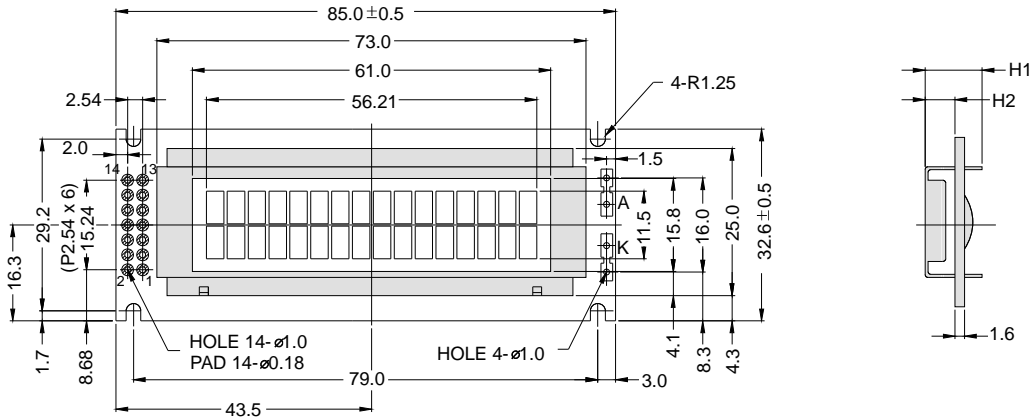
LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	85.0 x 32.6	Module	H2 / H1
View Area	61.0 x 15.8	W / O B/L	5.1 / 9.7
Dot Size	0.56 x 0.66	EL B/L	5.1 / 9.7
Dot Pitch	0.60 x 0.70	LED B/L	9.4 / 14.0

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	4.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	- 7.1	- 7.5	- 7.9	-	V		
		0°C	4.5	5.1	5.3	-	V		
		25°C	4.1	6.1	4.7	6.4	6.7	V	
		50°C	3.8	-	4.5	-	4.6	-	V
		70°C	-	5.7	-	6	-	6.3	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	40	-	mA			
	LED/array	VB/L=4.2V	-	120	-	mA			

**REMARK**

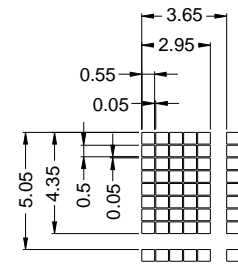
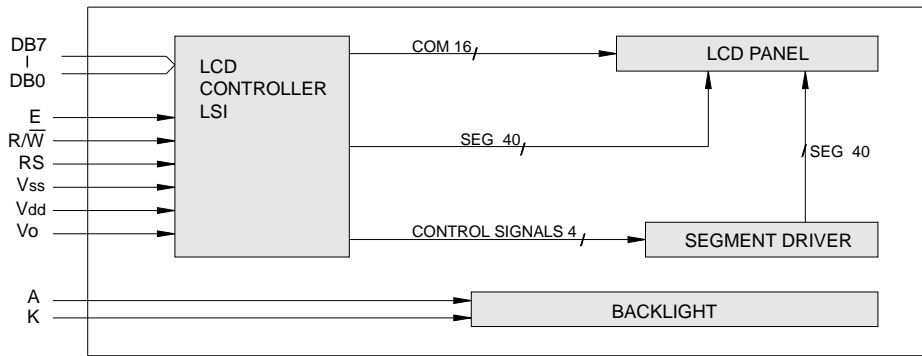
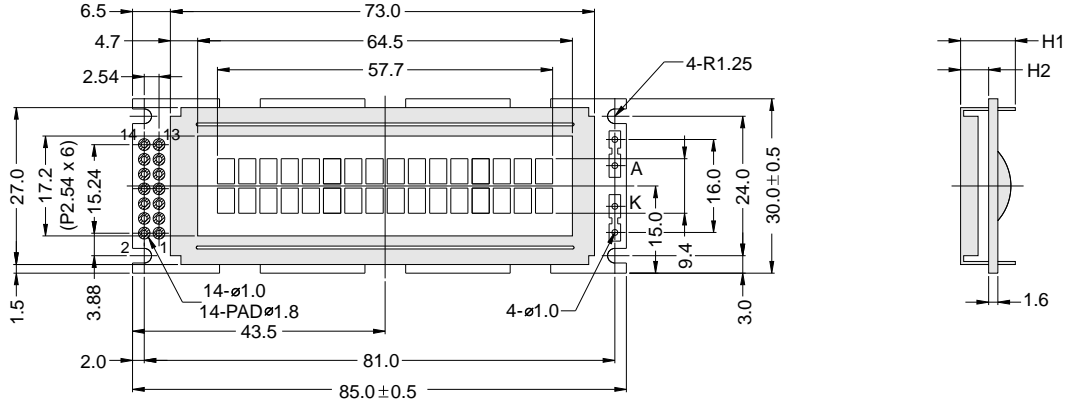
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	85.0 x 30.0	Module	H2 / H1
View Area	64.5 x 17.2	W / O B/L	4.8 / 9.4
Dot Size	0.55 x 0.50	EL B/L	4.8 / 9.4
Dot Pitch	0.60 x 0.55	LED B/L	9.0 / 13.1

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	4.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.5	-	4.8	-	5.1	-	V
		25°C	4.1	6.1	4.4	6.4	4.7	6.7	V
		50°C	3.8	-	4.1	-	4.4	-	V
70°C	-	5.7	-	6	-	6.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	40	-	mA			
	LED/array	VB/L=4.2V	-	110	-	mA			

**REMARK**

LCD option: STN, TN, FSTN

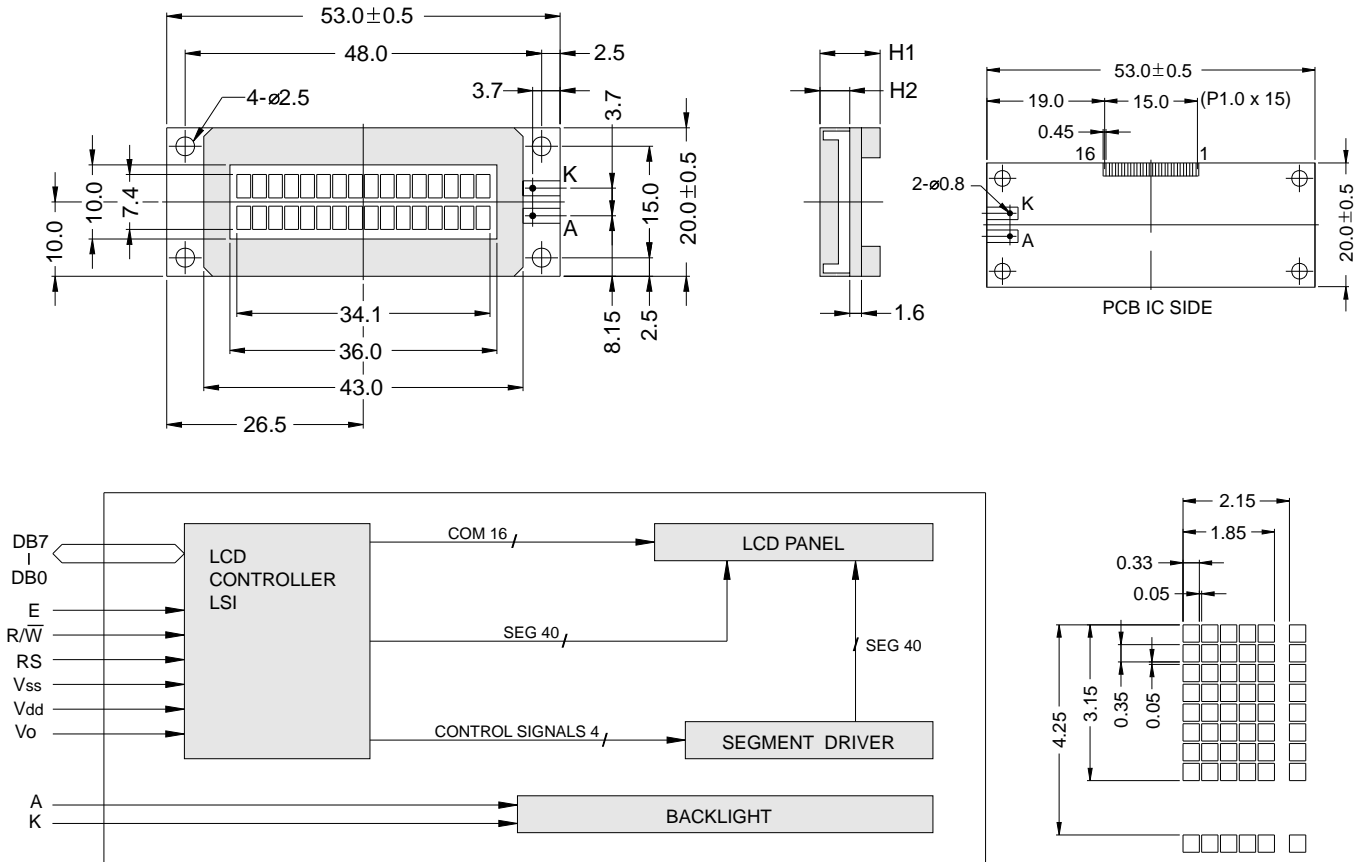
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



# PC 1602-K-Y4



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	53.0 x 20.0	Module	H2 / H1
View Area	36.0 x 10.0	W / O B/L	4.0 / 8.1
Dot Size	0.33 x 0.35	EL B/L	- / -
Dot Pitch	0.38 x 0.40	LED B/L	4.0 / 8.1

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.8	-	5.1	-	5.4	-	V
		25°C	4.4	6.1	4.7	6.4	5	6.7	V
		50°C	3.9	-	4.2	-	4.5	-	V
70°C	-	5.7	-	6	-	6.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	20	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

## REMARK

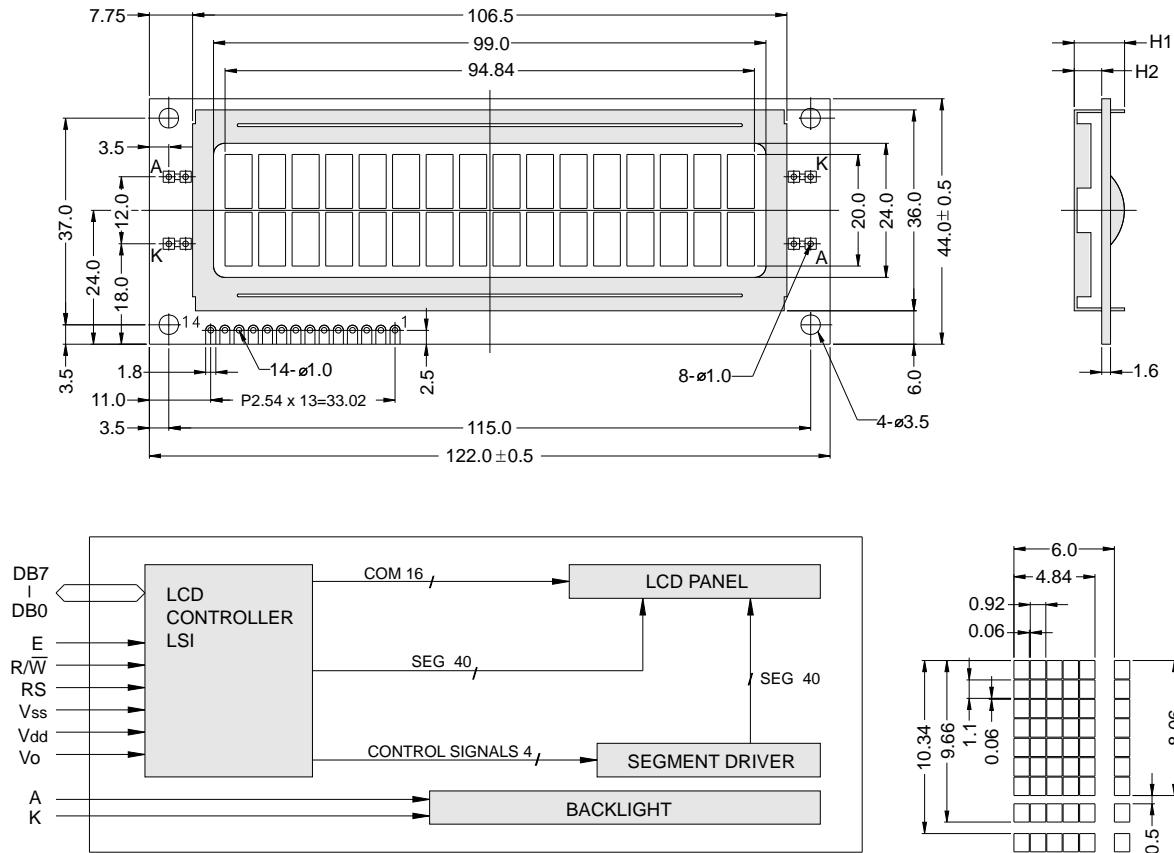
LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	122.0 x 44.0	Module	H2 / H1
View Area	99.0 x 24.0	W / O B/L	4.9 / 9.0
Dot Size	0.92 x 1.10	EL B/L	4.9 / 9.0
Dot Pitch	0.98 x 1.16	LED B/L	9.4 / 13.5

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25oC	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25oC	-0.3	13	V				
Input voltage	Vin	25oC	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25oC	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20oC	- 7.1	- 7.5	- 7.9	-	V		
		0oC	4.5	- 4.5	- 4.7	-	V		
		25oC	4.1	6.1	4.3	6.4	4.5	6.7	V
		50oC	4	-	4.2	-	4.4	-	V
		70oC	-	5.7	-	6	-	6.3	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	120	-	mA			
	LED/array	VB/L=4.2V	-	300	-	mA			

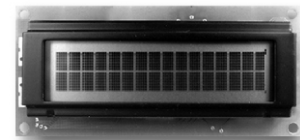
**REMARK**

LCD option: STN, TN, FSTN

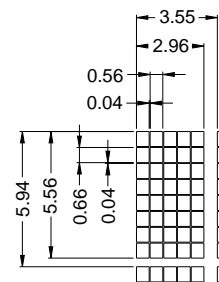
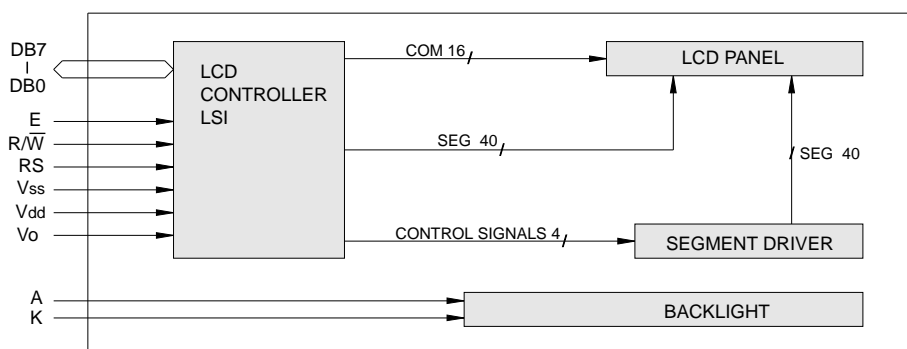
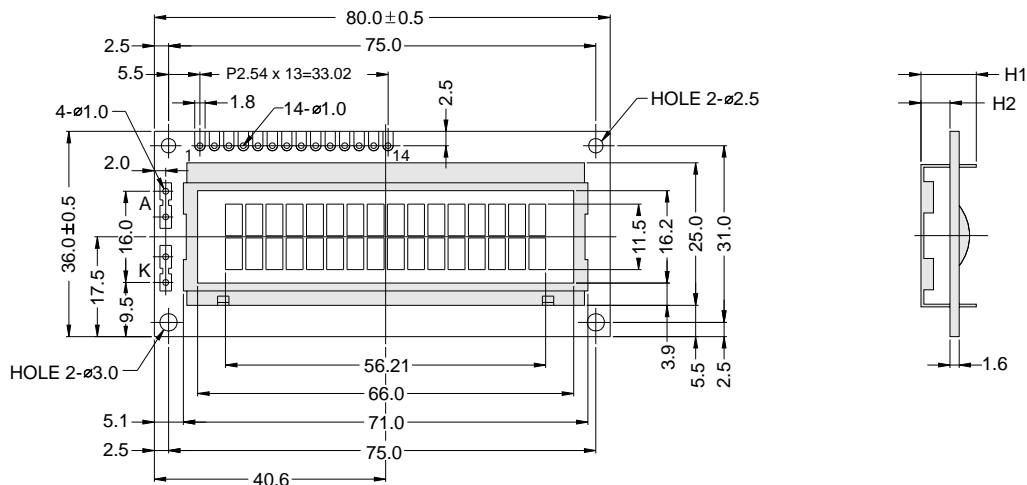
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.







**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	80.0 x 36.0	Module	H2 / H1
View Area	66.0 x 16.2	W/O B/L	5.1 / 9.7
Dot Size	0.56 x 0.66	EL B/L	5.1 / 9.7
Dot Pitch	0.66 x 0.70	LED B/L	9.4 / 14.0

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.5	-	4.8	-	5.1	-	V
		25°C	4.1	6.1	4.4	6.4	4.7	6.7	V
		50°C	3.8	-	4.1	-	4.4	-	V
70°C	-	5.7	-	6	-	6.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	120	-	mA			

**REMARK**

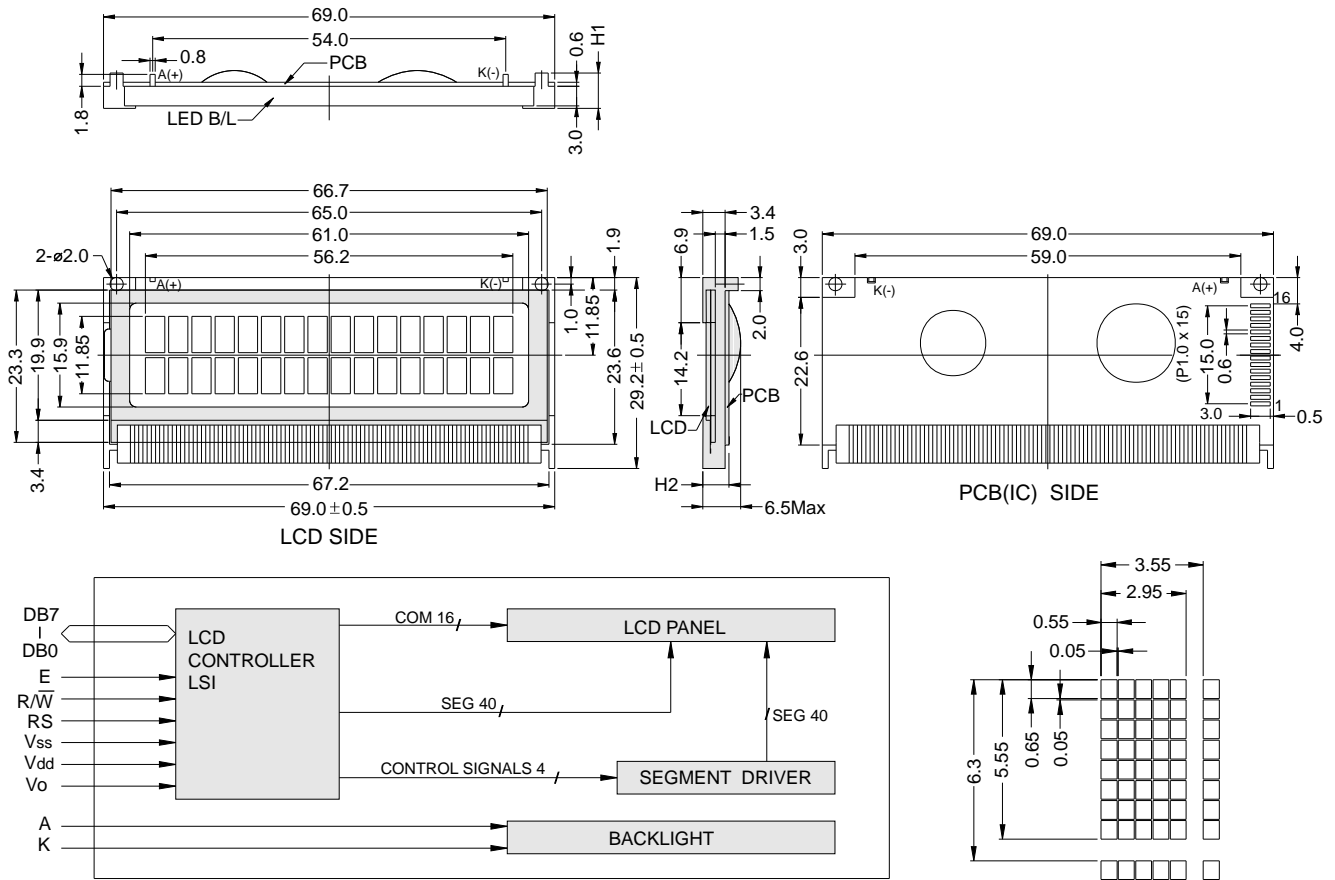
LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	69.0 x 29.2	Module	H2 / H1
View Area	61.0 x 15.9	W / O B/L	-
Dot Size	0.55 x 0.65	EL B/L	-
Dot Pitch	0.60 x 0.70	LED B/L	4.0 / 5.4

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING								
Item	Symbol	Condition	Min.	Max.	Units			
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V			
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V			
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V			
ELECTRICAL CHARACTERISTICS								
Item	Symbol	Condition	Min.	Typical	Max.	Units		
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V		
LCD operation voltage	Vop	Top	N	W	N	W	V	
		-20°C	-	5	-	5.3	V	
		0°C	4.4	-	4.7	-	5	V
		25°C	3.9	4.8	4.2	5.1	4.8	V
		50°C	3.7	-	4	-	4.5	V
		70°C	-	4.6	-	4.9	V	
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA		
Backlight current consumption	LED/edge	VB/L=4.2V	-	40	-	mA		
	LED/array	VB/L=4.2V	-	-	-	mA		

**REMARK**

LCD option: STN, TN, FSTN

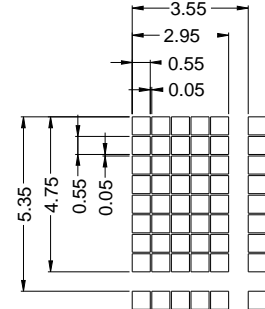
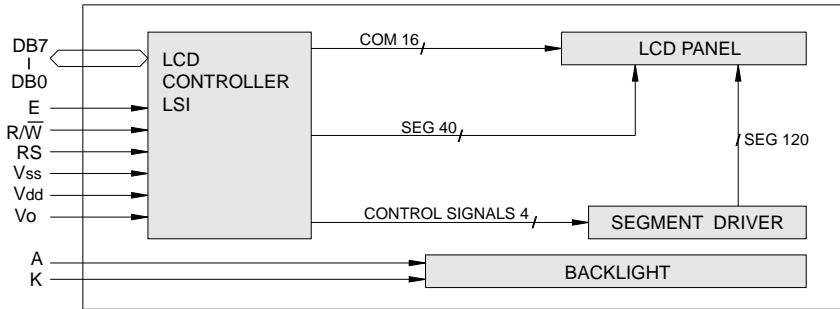
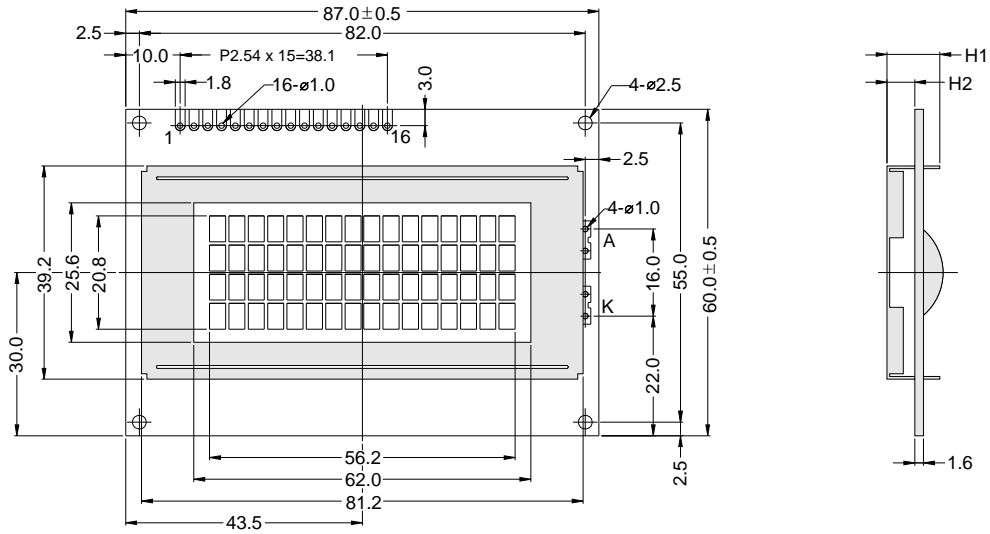
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



# PC 1604-A



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	87.0 x 60.0	Module	H2 / H1
View Area	62.0 x 25.6	W/O B/L	5.1 / 9.7
Dot Size	0.55 x 0.55	EL B/L	5.1 / 9.7
Dot Pitch	0.60 x 0.60	LED B/L	8.9 / 13.5

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.3	-	4.6	-	4.9	-	V
		25°C	3.9	6.1	4.2	6.4	4.5	6.7	V
		50°C	3.6	-	3.9	-	4.2	-	V
		70°C	-	5.7	-	6	-	6.3	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	220	-	mA			

## REMARK

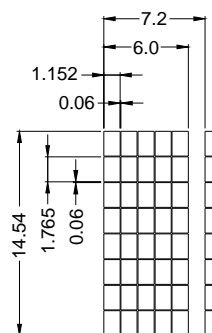
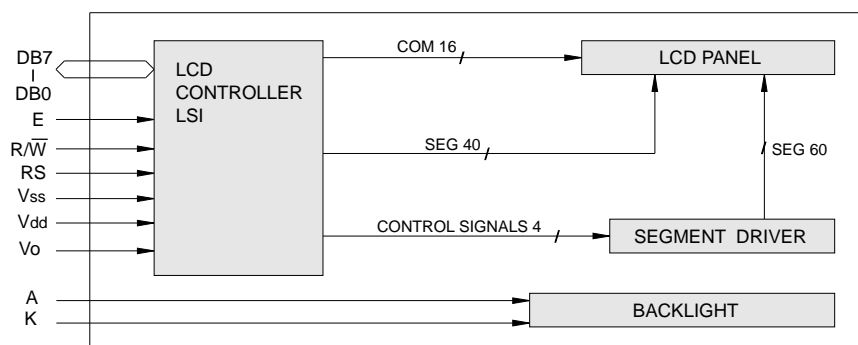
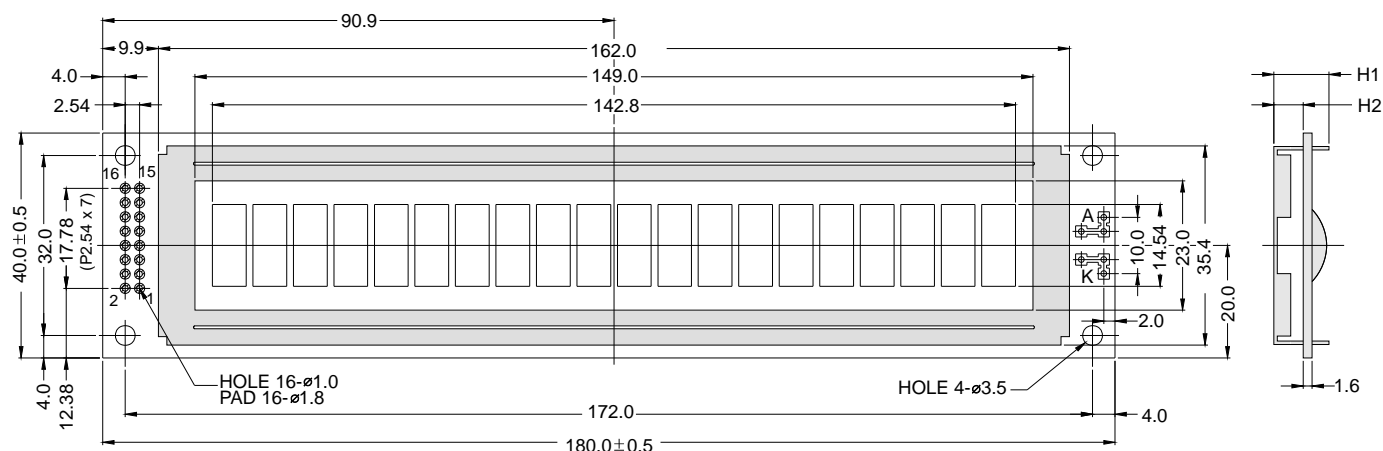
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	180.0 x 40.0	Module	H2 / H1
View Area	149.0 x 23.0	W / O B/L	5.2 / 9.8
Dot Size	1.152 x 1.765	EL B/L	5.2 / 9.8
Dot Pitch	1.212 x 1.825	LED B/L	10.7 / 15.3

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.3	-	4.6	-	4.9	-	V
		25°C	3.9	6.1	4.2	6.4	4.5	6.7	V
		50°C	3.6	-	3.9	-	4.2	-	V
		70°C	-	5.7	-	6	-	6.3	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	360	-	mA			

**REMARK**

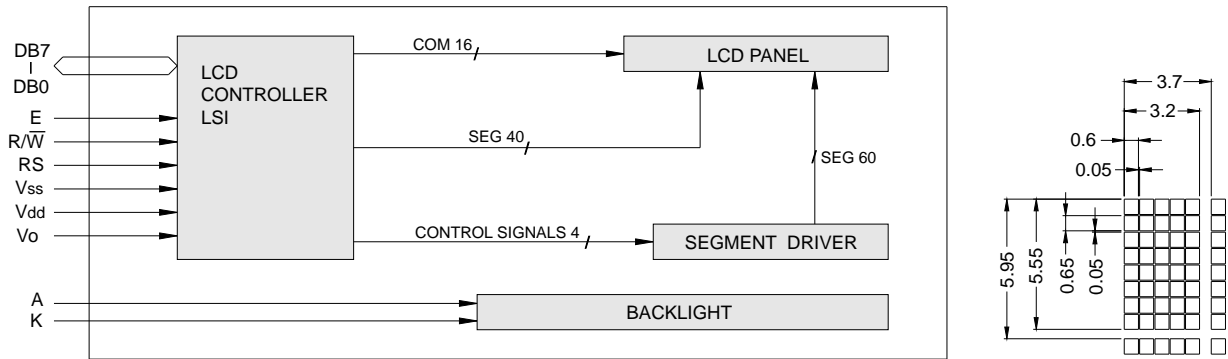
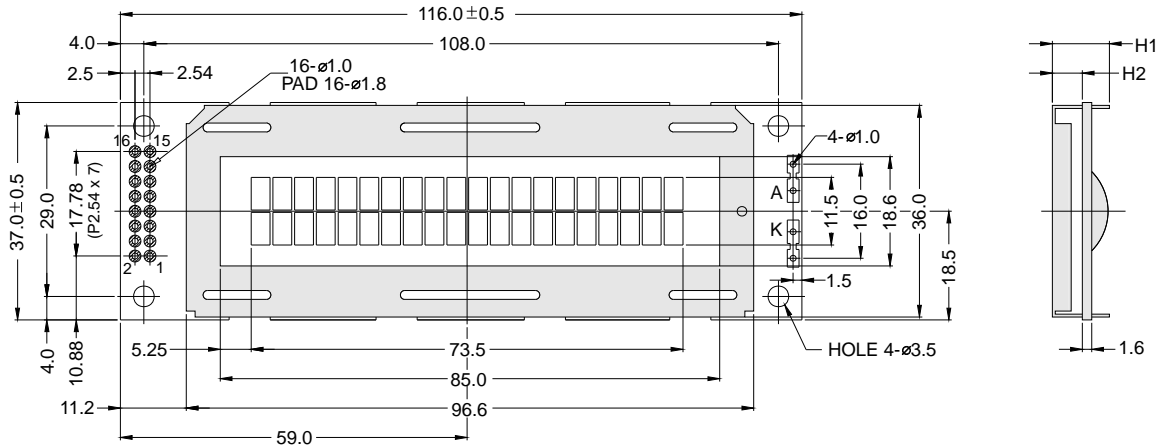
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	116.0 x 37.0	Module	H2 / H1
View Area	85.0 x 18.5	W / O B/L	5.1 / 9.7
Dot Size	0.60 x 0.65	EL B/L	5.1 / 9.7
Dot Pitch	0.65 x 0.70	LED B/L	9.4 / 14.0

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.3	-	4.7	-	4.9	-	V
		25°C	4.2	6.1	4.4	6.4	4.3	6.7	V
		50°C	3.7	-	3.8	-	3.9	-	V
70°C	-	5.7	-	6	-	6.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	210	-	mA			

**REMARK**

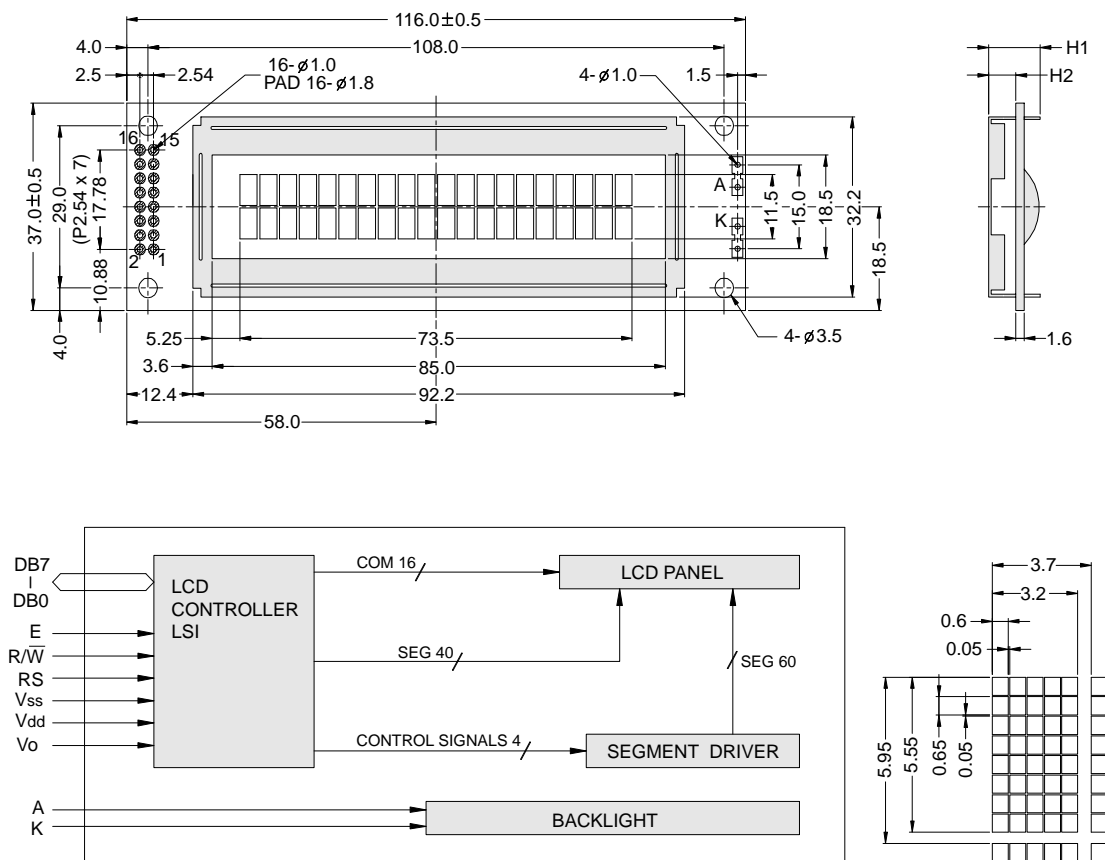
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	116.0 x 37.0	Module	H2 / H1
View Area	85.0 x 18.5	W/O B/L	5.1 / 9.7
Dot Size	0.60 x 0.65	EL B/L	5.1 / 9.7
Dot Pitch	0.65 x 0.70	LED B/L	8.7 / 13.3

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.3	-	4.7	-	5.0	-	V
		25°C	3.7	6.1	4.1	6.4	4.4	6.7	V
		50°C	3.3	-	3.6	-	4.0	-	V
		70°C	-	5.7	-	6	-	6.3	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	210	-	mA			

**REMARK**

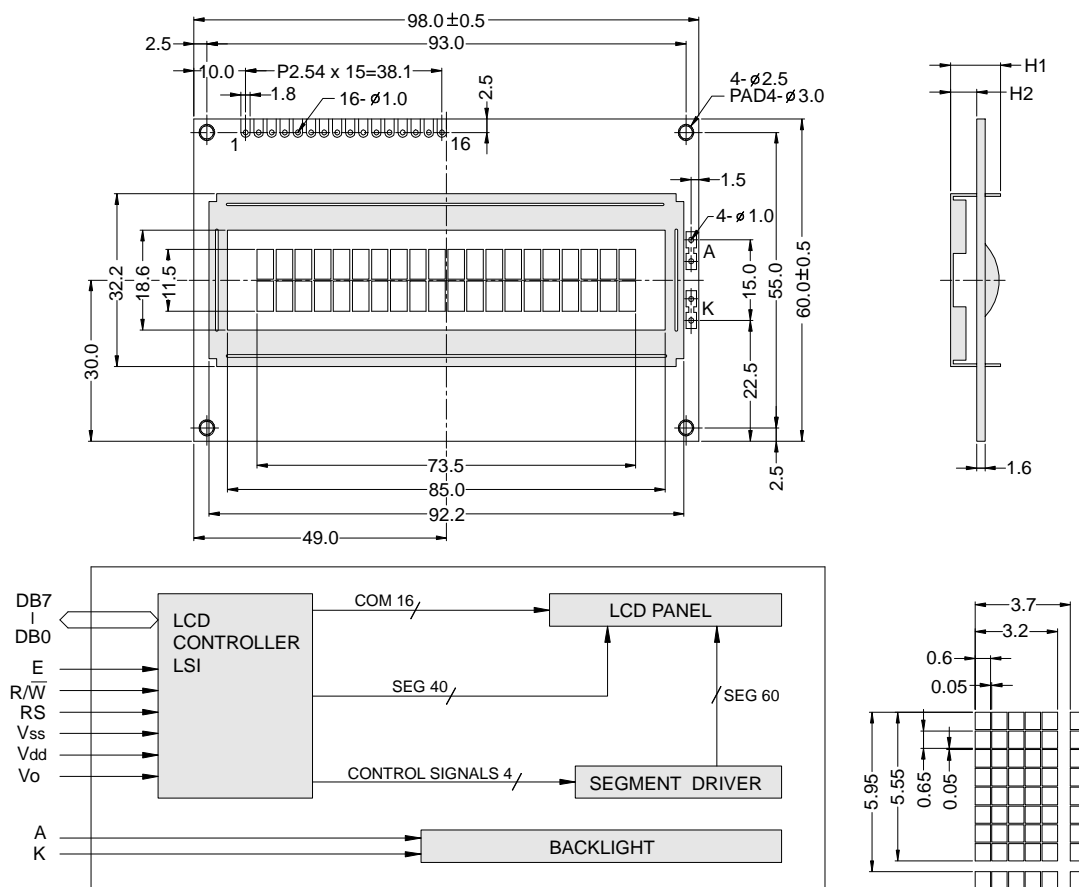
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	98.0 x 60.0	Module	H2 / H1
View Area	85.0 x 18.6	W / O B/L	5.1 / 9.7
Dot Size	0.60 x 0.65	EL B/L	-
Dot Pitch	0.65 x 0.70	LED B/L	8.7 / 13.3

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.5	-	4.8	-	5.1	-	V
		25°C	4.1	6.1	4.4	6.4	4.7	6.7	V
		50°C	3.8	-	4.1	-	4.4	-	V
70°C	-	5.7	-	6	-	6.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	210	-	mA			

**REMARK**

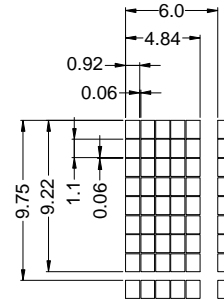
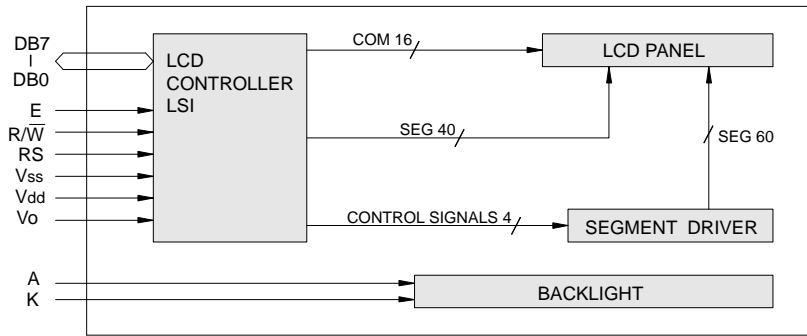
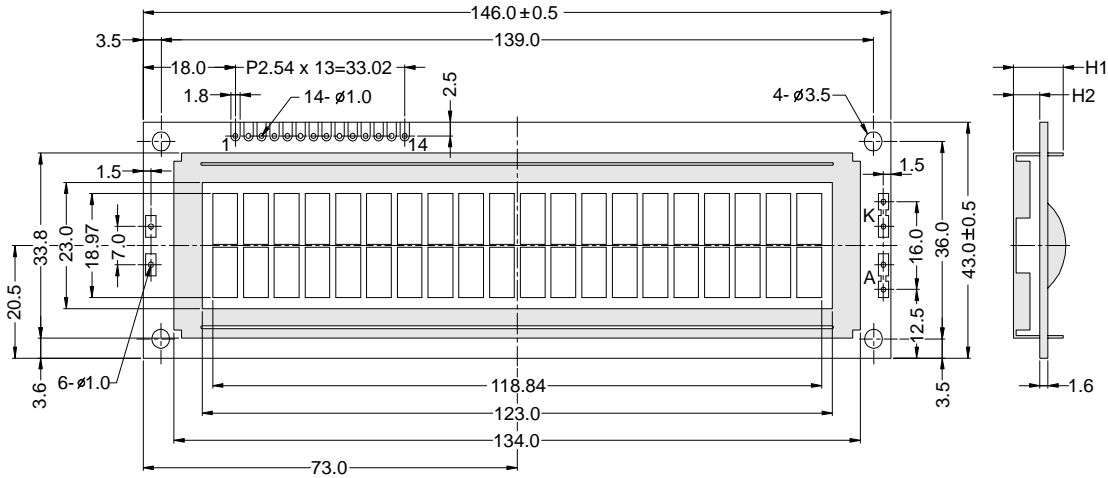
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	146.0 x 43.0	Module	H2 / H1
View Area	123.0 x 23.0	W/O B/L	5.1 / 9.7
Dot Size	0.92 x 1.10	EL B/L	5.1 / 9.7
Dot Pitch	0.98 x 1.16	LED B/L	9.1 / 13.7

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line

ABSOLUTE MAXIMUM RATING								
Item	Symbol	Condition	Min.	Max.	Units			
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V			
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V			
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V			
ELECTRICAL CHARACTERISTICS								
Item	Symbol	Condition	Min.	Typical	Max.	Units		
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V		
LCD operation voltage	Vop	Top	N	W	N	W	V	
		-20°C	-	7.1	-	7.5	-	V
		0°C	4.6	-	4.9	-	5.2	V
		25°C	4.2	6.1	4.5	6.4	4.8	V
		50°C	3.9	-	4.2	-	4.5	V
70°C	-	5.7	-	6	-	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA		
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA		
	LED/array	VB/L=4.2V	-	270	-	mA		

**REMARK**

LCD option: STN, TN, FSTN

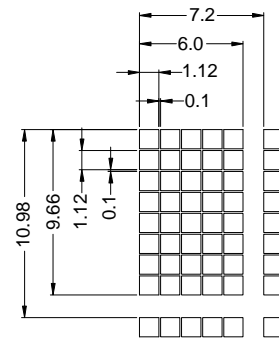
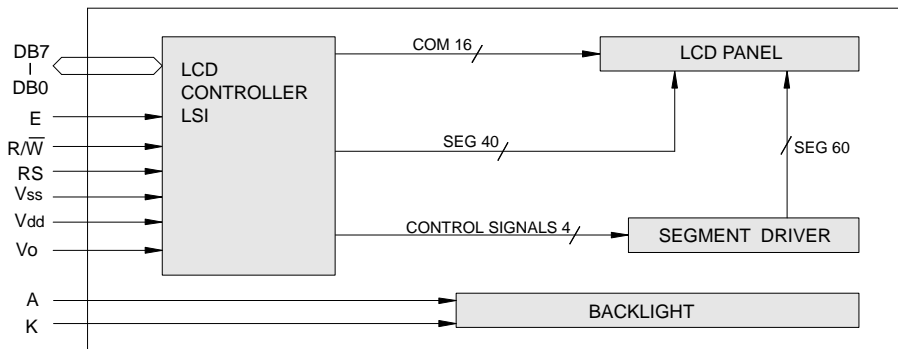
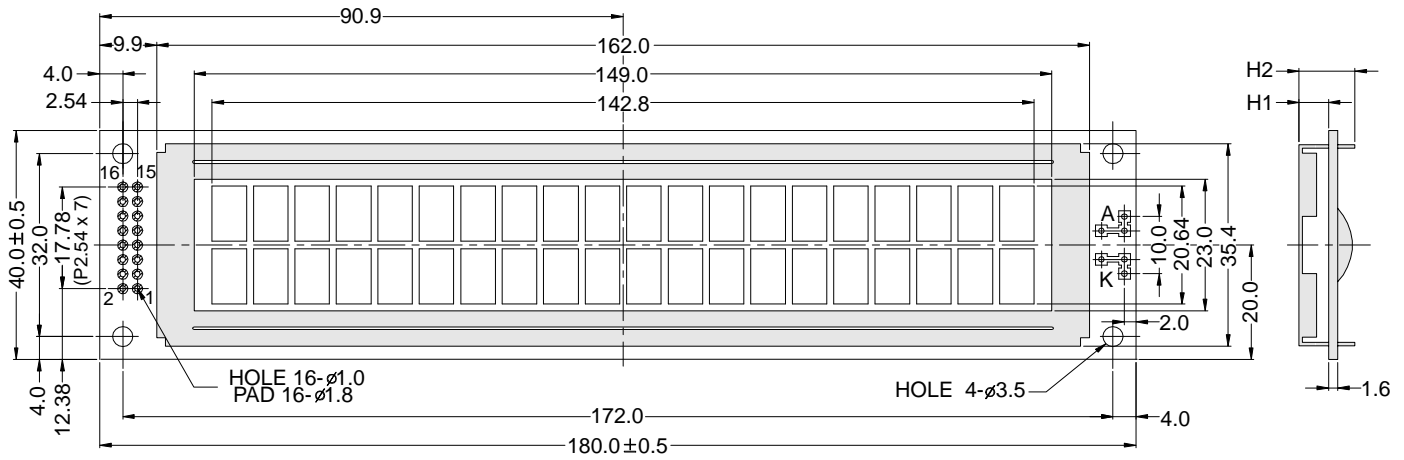
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.







**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	180.0 x 40.0	Module	H2 / H1
View Area	149.0 x 23.0	W / O B/L	5.2 / 9.8
Dot Size	1.12 x 1.12	EL B/L	5.2 / 9.8
Dot Pitch	1.22 x 1.22	LED B/L	10.7 / 15.3

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A/Vee	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	5	-	5.3	-	V	
		0°C	4.3	-	4.6	-	4.9	-	V
		25°C	3.9	4.8	5.2	5.1	4.5	5.4	V
		50°C	3.7	-	4.0	-	4.3	-	V
		70°C	-	4.3	-	4.8	-	5.1	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	360	-	mA			

**REMARK**

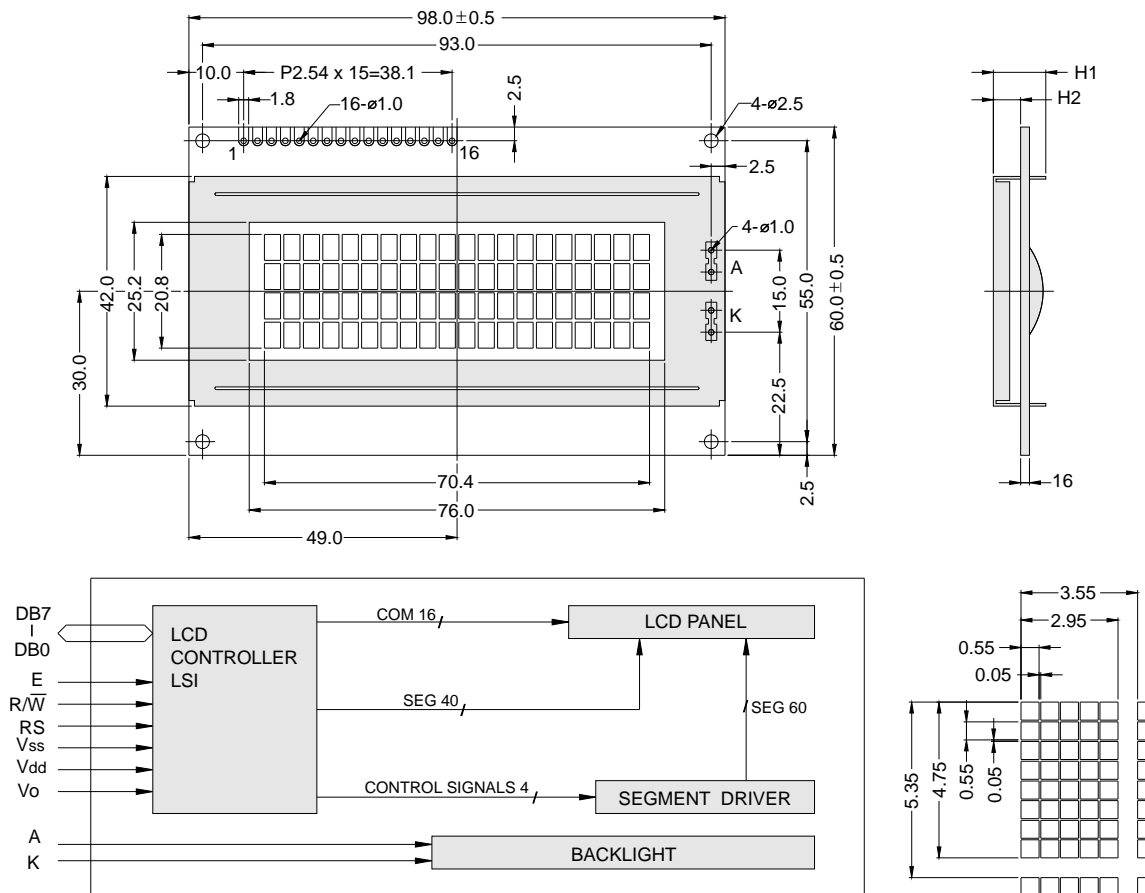
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	98.0 x 60.0	Module	H2 / H1
View Area	76.0 x 25.2	W/O B/L	5.0 / 9.6
Dot Size	0.55 x 0.55	EL B/L	5.0 / 9.6
Dot Pitch	0.60 x 0.60	LED B/L	8.7 / 13.3

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	5.1	-	5.4	-	6.1	-	V
		25°C	5	6.1	5.3	6.4	5.8	6.7	V
		50°C	4.4	-	4.7	-	5.5	-	V
70°C	-	5.7	-	6	-	6.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	4	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	260	-	mA			

**REMARK**

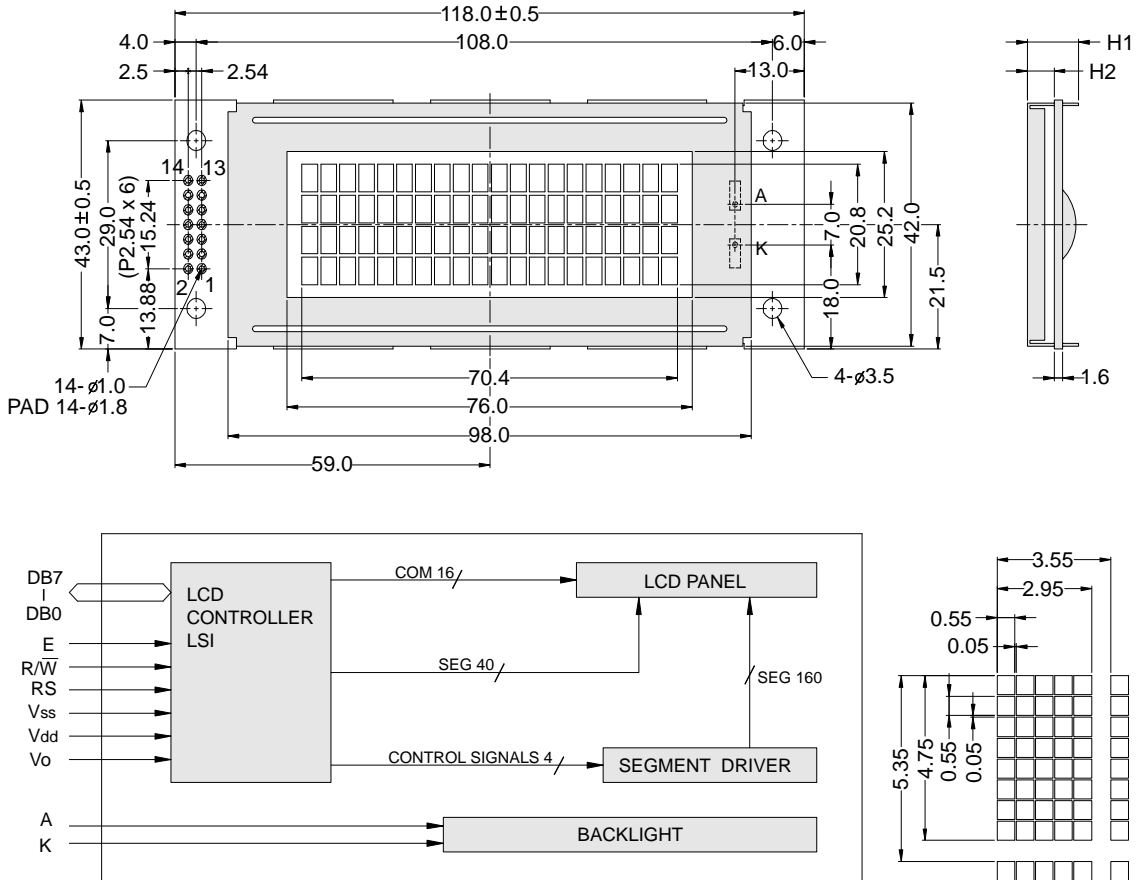
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	118.0 x 43.0	Module	H2 / H1
View Area	76.0 x 25.2	W / O B/L	5.0 / 9.6
Dot Size	0.55 x 0.55	EL B/L	5.0 / 9.6
Dot Pitch	0.60 x 0.60	LED B/L	8.7 / 13.3

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	5.3	-	5.3	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	5.3	-	5.7	-	6.1	-	V
		25°C	5	6.1	5.4	6.4	5.8	6.7	V
		50°C	4.7	-	5.1	-	5.5	-	V
70°C	-	5.7	-	6	-	6.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	4	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	260	-	mA			

**REMARK**

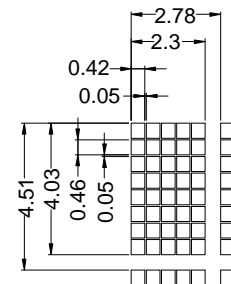
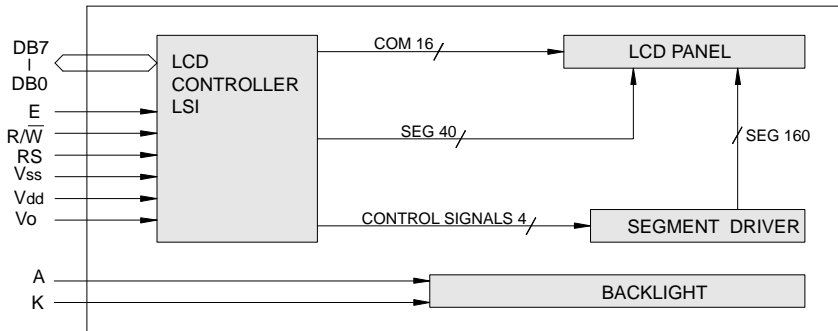
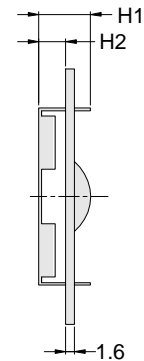
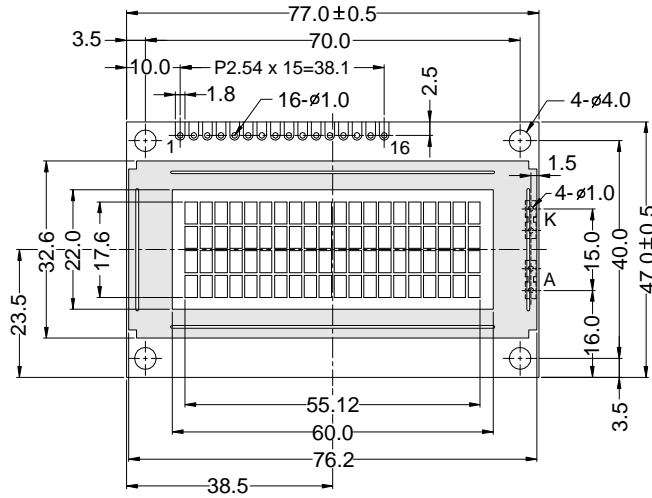
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

**MECHANICAL SPECIFICATION**

Overall Size	77.0 x 47.0	Module	H2 / H1
View Area	60.0 x 22.2	W / O B/L	5.0 / 9.6
Dot Size	0.42 x 0.46	EL B/L	5.0 / 9.6
Dot Pitch	0.47 x 0.51	LED B/L	9.6 / 14.2

**PIN ASSIGNMENT**

Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

**ABSOLUTE MAXIMUM RATING**

Item	Symbol	Condition	Min.	Max.	Units
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V

**ELECTRICAL CHARACTERISTICS**

Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.4	-	7.8	-	V	
		0°C	4.9	-	5.2	-	5.5	-	V
		25°C	4.5	6.4	4.8	6.7	5.1	7	V
		50°C	4.1	-	4.4	-	4.7	-	V
		70°C	-	6	-	6.3	-	V	
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	4	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	150	-	mA			

**REMARK**

LCD option: STN, TN, FSTN

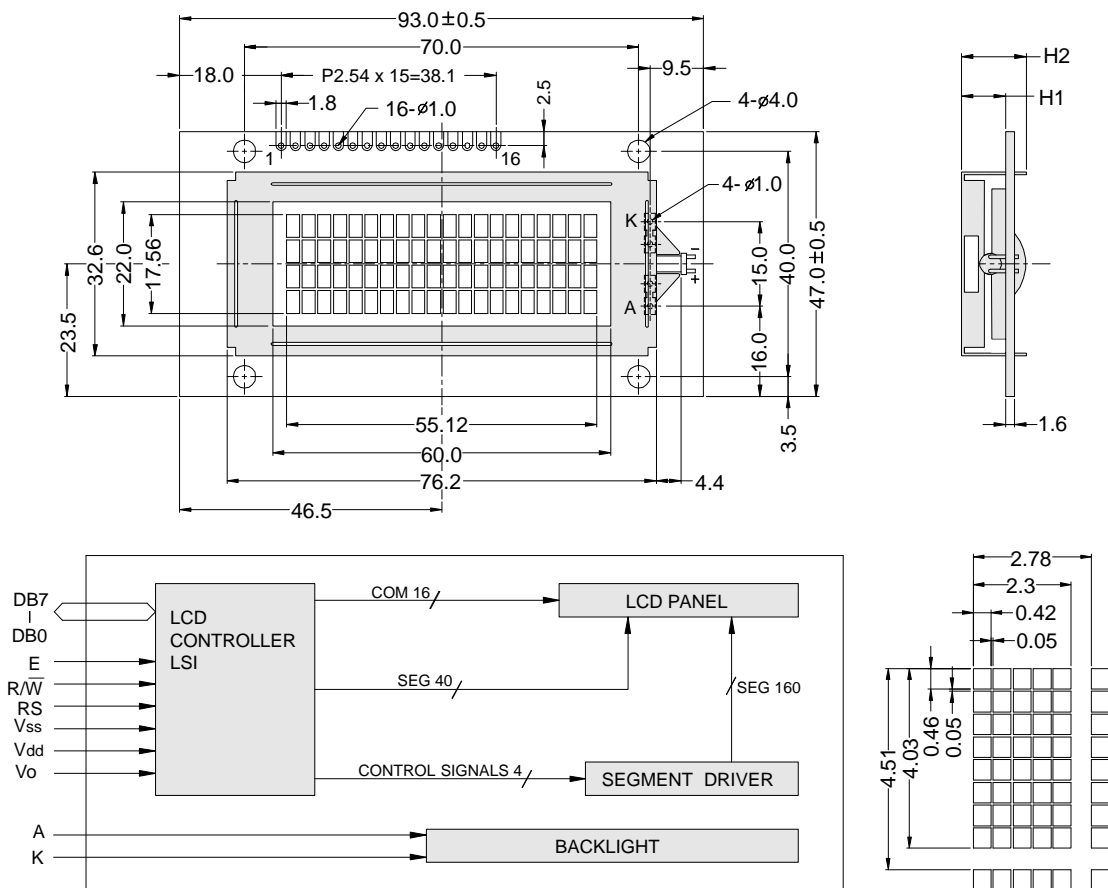
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



# PC 2004-C-PI



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

### MECHANICAL SPECIFICATION

Overall Size	93.0 x 47.0	Module	H2 / H1
View Area	60.0 x 22.0	W / O B/L	5.0 / 9.6
Dot Size	0.42 x 0.46	EL B/L	5.0 / 9.6
Dot Pitch	0.47 x 0.51	LED B/L	7.8 / 11.5

### PIN ASSIGNMENT

Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

### ABSOLUTE MAXIMUM RATING

Item	Symbol	Condition	Min.	Max.	Units
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V

### ELECTRICAL CHARACTERISTICS

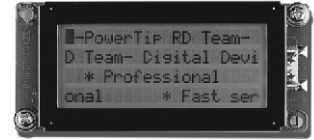
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	N	W	V
		-20°C	-	7.4	-	7.8	-	8.2	V
		0°C	4.9	-	5.2	-	5.5	-	V
		25°C	4.5	6.4	4.8	6.7	5.1	7	V
		50°C	4.1	-	4.4	-	4.7	-	V
		70°C	-	6	-	6.3	-	6.6	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	4	mA			
Backlight current consumption	LED/edge	VB/L=3.3V	-	10	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

## REMARK

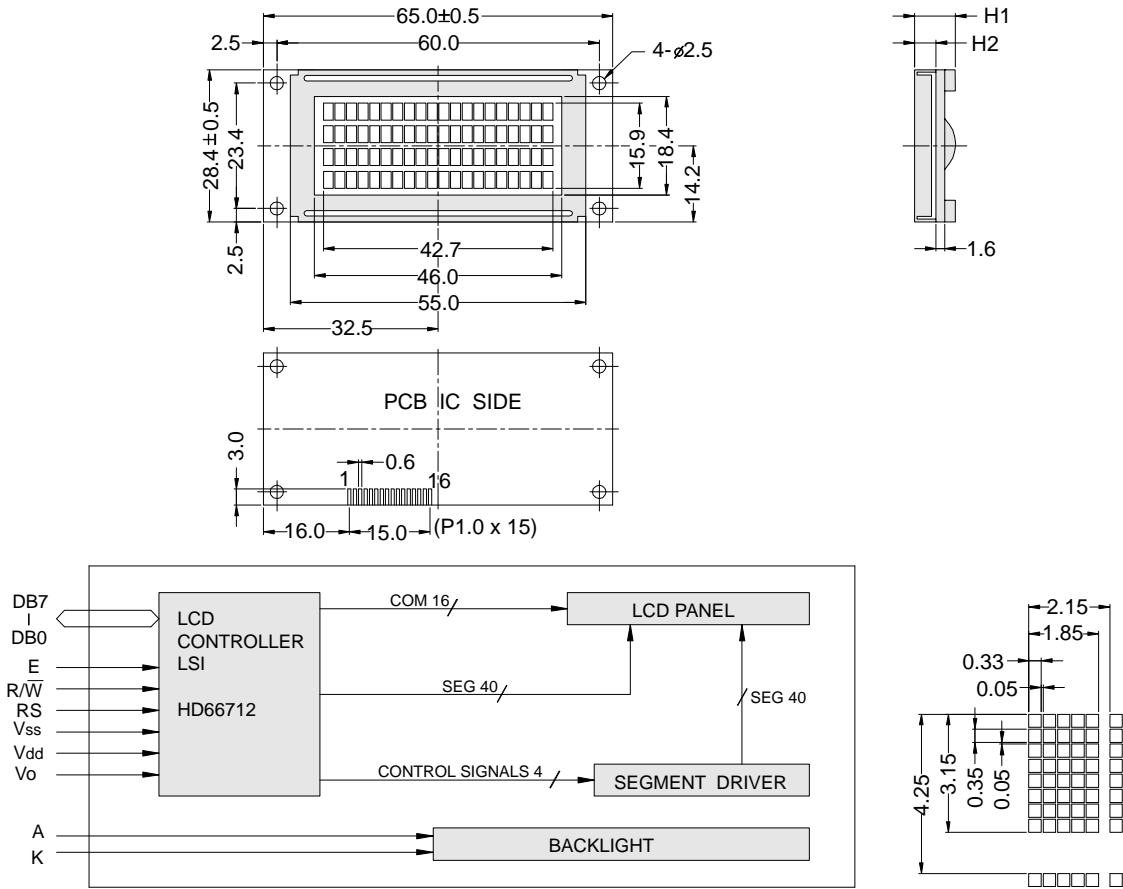
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

**MECHANICAL SPECIFICATION**

Overall Size	65.0 x 28.4	Module	H2 / H1
View Area	46.0 x 18.4	W/O B/L	4.0 / 7.6
Dot Size	0.33 x 0.35	EL B/L	- / -
Dot Pitch	0.38 x 0.40	LED B/L	4.0 / 7.6

**PIN ASSIGNMENT**

Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

**ABSOLUTE MAXIMUM RATING**

Item	Symbol	Condition	Min.	Max.	Units
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V

**ELECTRICAL CHARACTERISTICS**

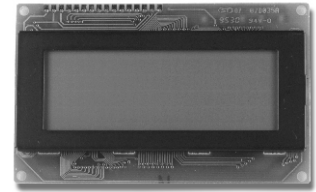
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	N	W	V
		-20°C	-	7.4	-	7.8	-	8.2	V
		0°C	4.9	-	5.2	-	5.5	-	V
		25°C	4.5	6.4	4.8	6.7	5.1	7	V
		50°C	4.1	-	4.4	-	4.7	-	V
		70°C	-	6	-	6.3	-	6.6	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	4	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	40	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

**REMARK**

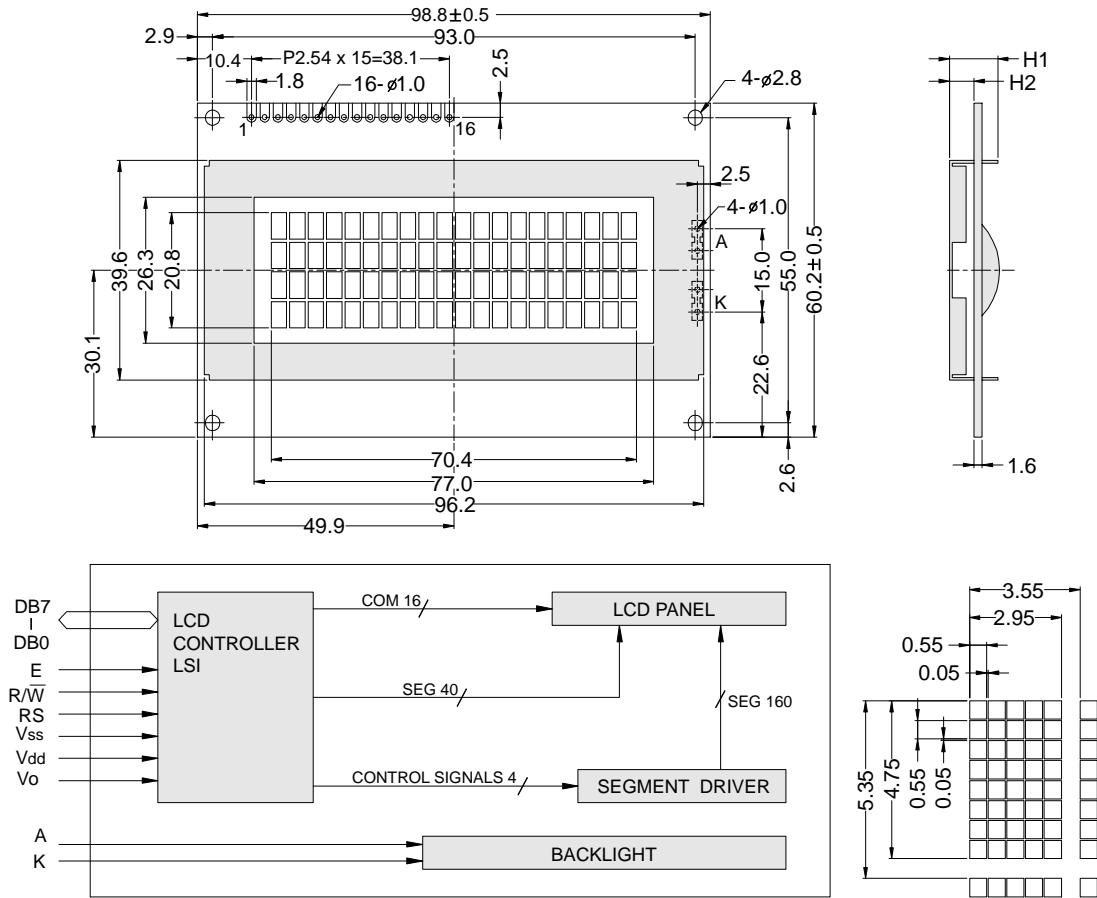
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

**MECHANICAL SPECIFICATION**

Overall Size	98.8 x 60.2	Module	H2 / H1
View Area	77.0 x 26.3	W / O B/L	4.7 / 9.3
Dot Size	0.55 x 0.55	EL B/L	- / -
Dot Pitch	0.60 x 0.60	LED B/L	8.7 / 13.3

**PIN ASSIGNMENT**

Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

**ABSOLUTE MAXIMUM RATING**

Item	Symbol	Condition	Min.	Max.	Units
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V
LCD driving supply voltage	Vdd-Vss	25°C	-0.3	13	V
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V

**ELECTRICAL CHARACTERISTICS**

Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	V	
		0°C	4.3	-	4.6	-	4.9	-	V
		25°C	3.9	6.1	4.2	6.4	4.5	6.7	V
		50°C	3.6	-	3.9	-	4.2	-	V
		70°C	-	5.7	-	6	-	6.3	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	4	V			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	260	-	mA			

**REMARK**

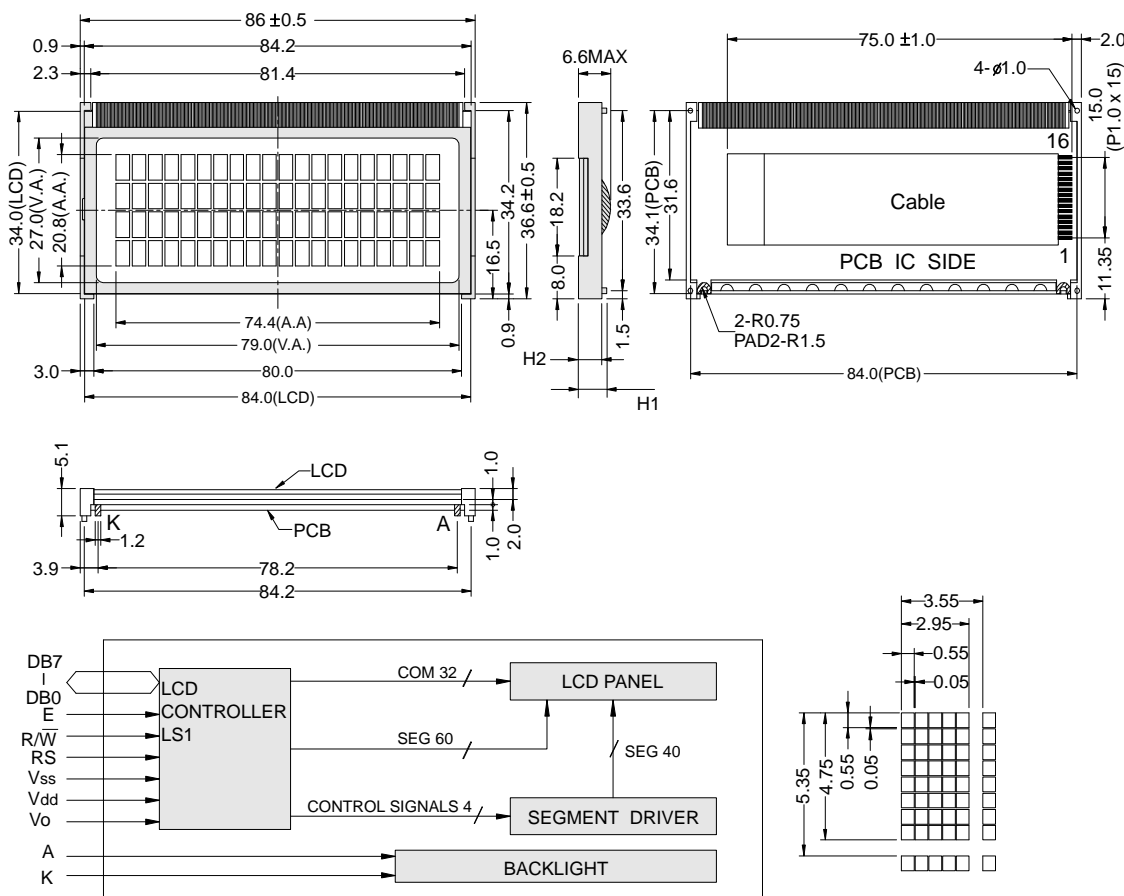
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	86.0 x 36.6	Module	H2 / H1
View Area	79.0 x 27.0	W/O B/L	- / -
Dot Size	0.55 x 0.55	EL B/L	- / -
Dot Pitch	0.60 x 0.60	LED B/L	5.1 / 6.1

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	6.5	-	6.8	-	V	
		0°C	4.3	-	4.6	-	4.9	-	V
		25°C	3.9	6.5	4.2	6.7	4.5	6.8	V
		50°C	3.6	-	3.9	-	4.2	-	V
70°C	-	6.3	-	6.5	-	6.6	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	4	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	60	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

**REMARK**

LCD option: STN, TN, FSTN

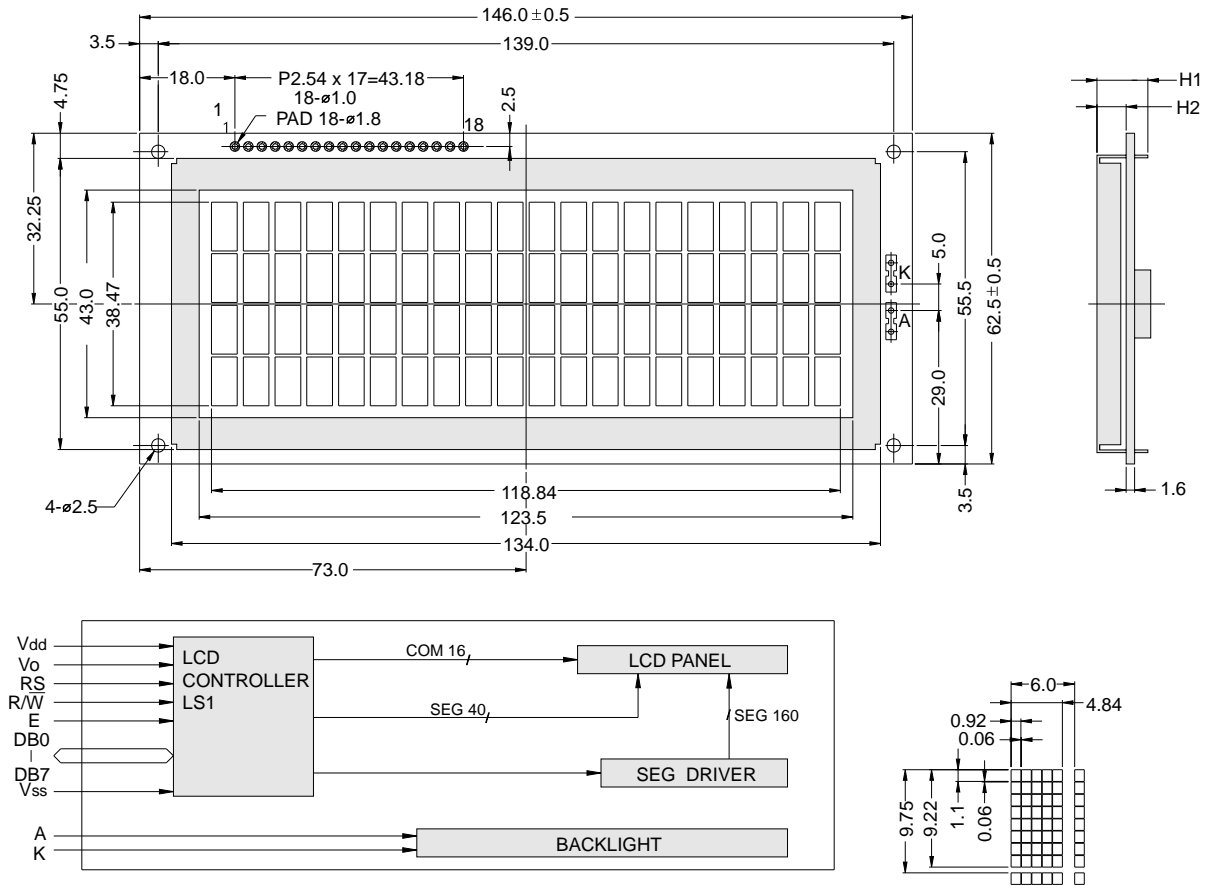
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.







**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	146.0 x 62.5	Module	H2 / H1
View Area	123.5 x 43.0	W / O B/L	5.5 / 9.6
Dot Size	0.92 x 1.10	EL B/L	5.5 / 9.6
Dot Pitch	0.98 x 1.16	LED B/L	9.0 / 13.1

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	V0	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)
17	NC/Vee	Negative voltage
18	NC	No connection

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	V	
		0°C	4.5	-	4.8	-	5.1	-	V
		25°C	4.1	6.1	4.4	6.4	4.7	6.7	V
		50°C	3.8	-	4.1	-	4.4	-	V
		70°C	-	5.7	-	6	-	6.3	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	4	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	770	-	mA			

**REMARK**

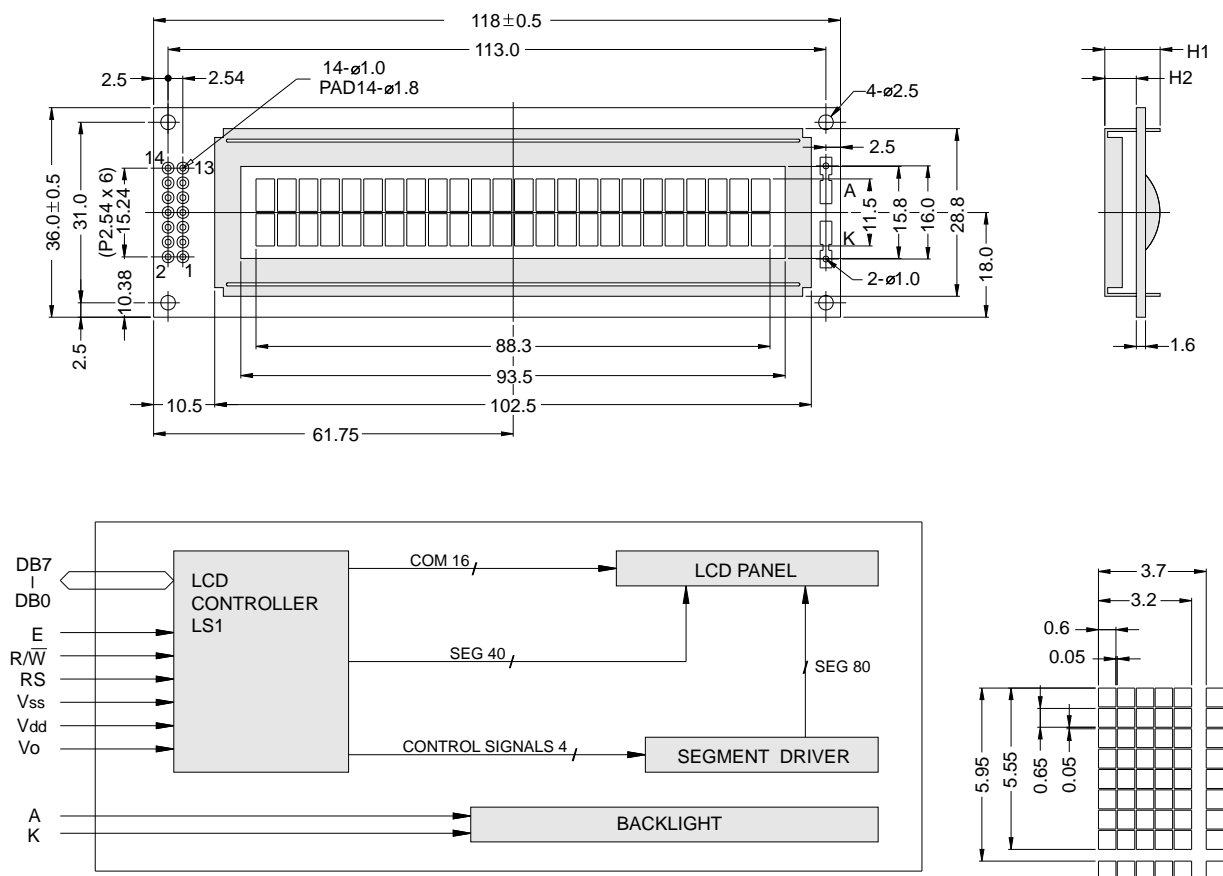
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

**MECHANICAL SPECIFICATION**

Overall Size	118.0 x 36.0	Module	H2 / H1
View Area	93.5 x 16.0	W/O B/L	5.4 / 9.5
Dot Size	0.60 x 0.65	EL B/L	5.4 / 9.5
Dot Pitch	0.65 x 0.70	LED B/L	8.7 / 13.3

**PIN ASSIGNMENT**

Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line

**ABSOLUTE MAXIMUM RATING**

Item	Symbol	Condition	Min.	Max.	Units
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V

**ELECTRICAL CHARACTERISTICS**

Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.5	-	4.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	V	
		0°C	4.5	-	4.8	-	5.1	V	
		25°C	4.1	6.1	4.4	6.4	4.7	6.7	V
		50°C	3.8	-	4.1	-	4.4	-	V
70°C	-	5.7	-	6	-	6.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	15	-	mA			
	LED/array	VB/L=4.2V	-	150	-	mA			

**REMARK**

LCD option: STN, TN, FSTN

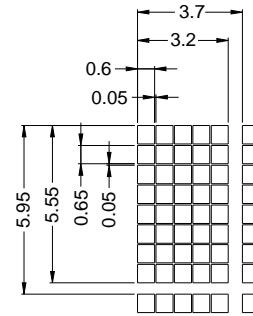
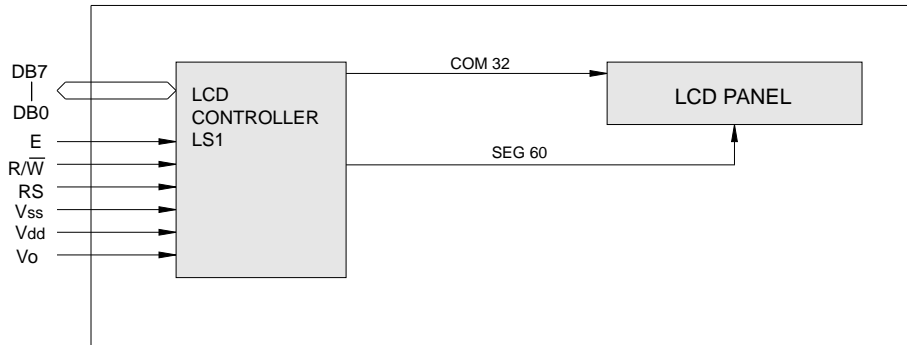
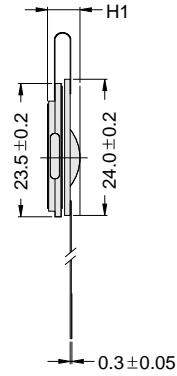
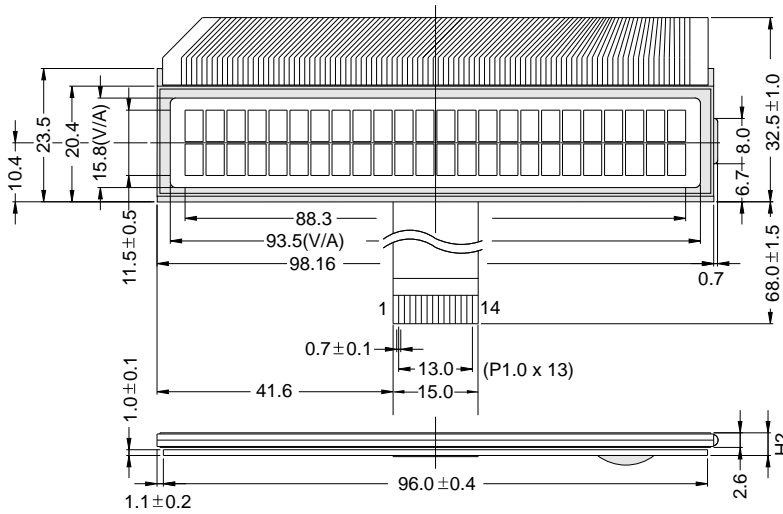
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



# PC 2402-F



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	98.16 x 32.50	Module	H2 / H1
View Area	93.5 x 15.8	W/O B/L	4.1 / 5.5
Dot Size	0.60 x 0.65	EL B/L	-
Dot Pitch	0.65 x 0.70	LED B/L	-

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	9	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	N	W	V
		-20°C	-	8.2	-	8.3	-	7.3	V
		0°C	4.5	-	4.8	-	5.1	-	V
		25°C	4.1	7.7	4.4	7.9	4.7	6.9	V
		50°C	3.8	-	4.1	-	4.4	-	V
70°C	-	6.7	-	6.9	-	6.2	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

## REMARK

LCD option: STN, TN, FSTN

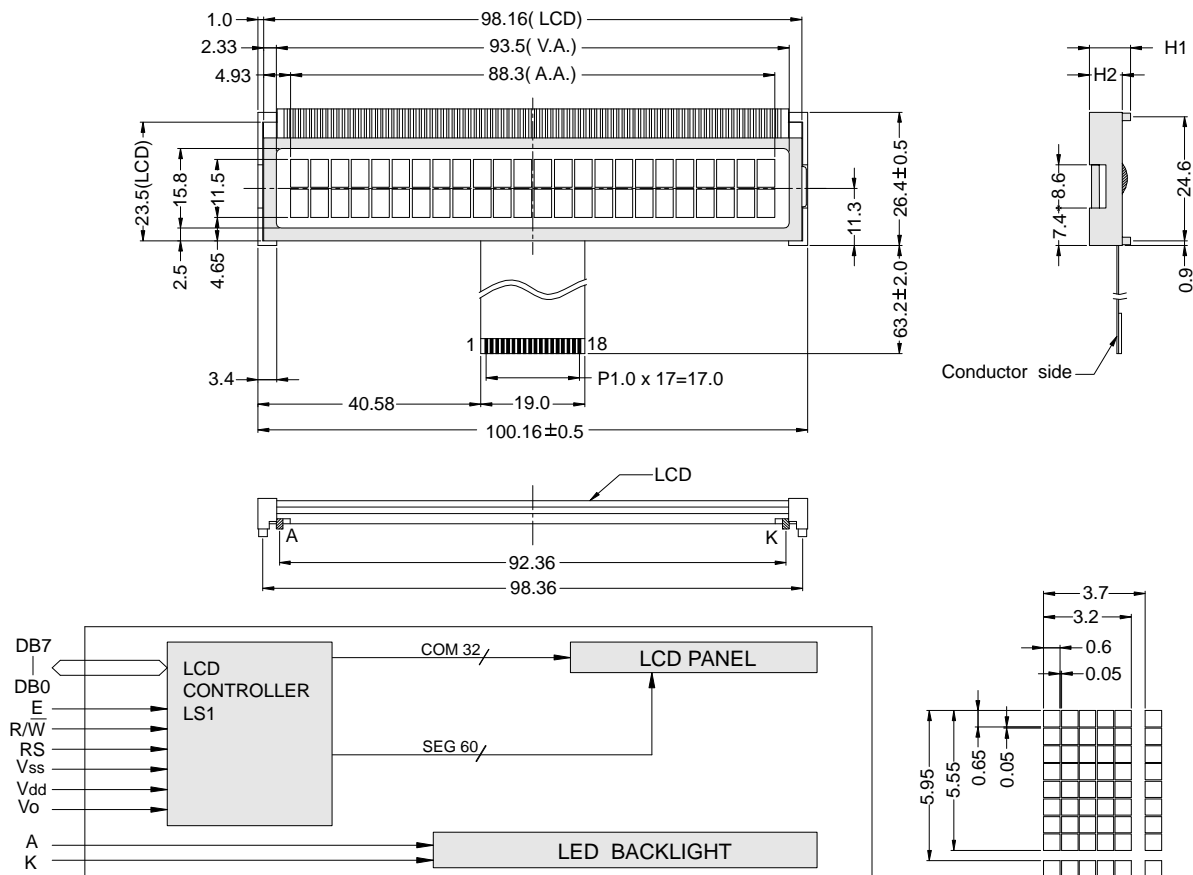
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



# PC 2402-H



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

### MECHANICAL SPECIFICATION

Overall Size	100.16 x 26.4	Module	H1 / H2
View Area	93.5 x 15.8	W / O B/L	- / -
Dot Size	0.60 x 0.65	EL B/L	- / -
Dot Pitch	0.65 x 0.70	LED B/L	6.0 / 7.5

### PIN ASSIGNMENT

Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)
17	SCL	Serial clock input
18	SDA	Serial data input

### ABSOLUTE MAXIMUM RATING

Item	Symbol	Condition	Min.	Max.	Units
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	9	V
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V

### ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	- 8.2	- 8.4	- 7.3	-	V		
		0°C	4.5	- 4.8	- 7.4	-	V		
		25°C	4.1	7.7	4.4	7.9	7.0	6.9	V
		50°C	3.8	- 4.1	- 6.5	-	V		
70°C	- 6.7	- 6.9	- 6.2	-	V				
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	60	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

## REMARK

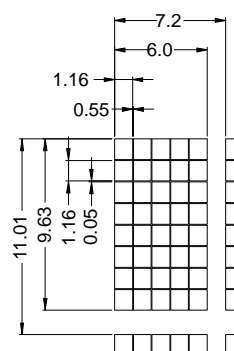
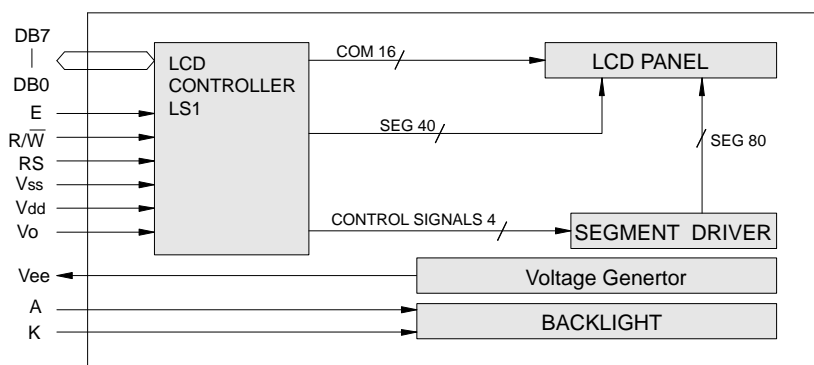
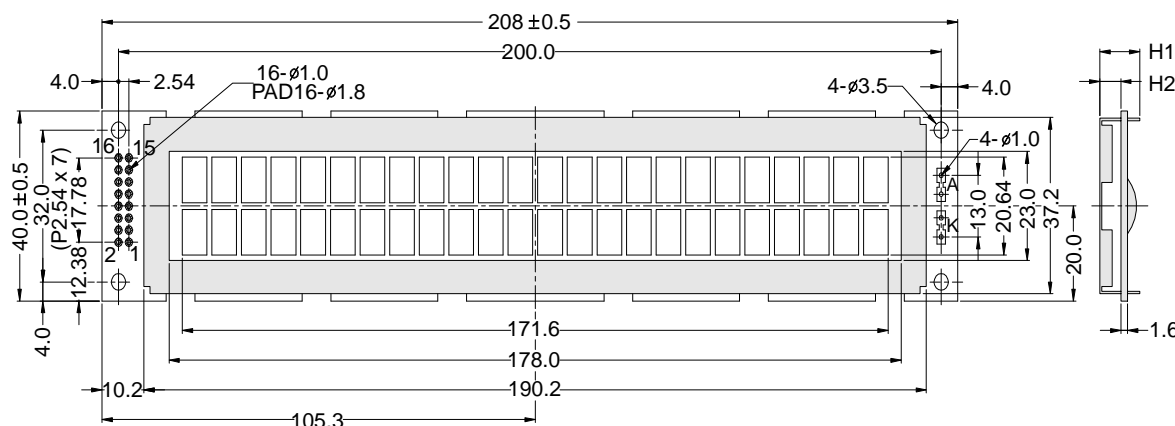
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	208.0 x 40.0	Module	H2 / H1
View Area	188.0 x 23.0	W/O B/L	5.1 / 9.7
Dot Size	1.16 x 1.16	EL B/L	5.1 / 9.7
Dot Pitch	1.21 x 1.21	LED B/L	9.2 / 13.8

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.3	-	4.6	-	4.9	-	V
		25°C	3.9	6.1	4.2	6.4	4.5	6.7	V
		50°C	3.6	-	3.9	-	4.2	-	V
		70°C	-	5.7	-	6	-	6.3	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	380	-	mA			

**REMARK**

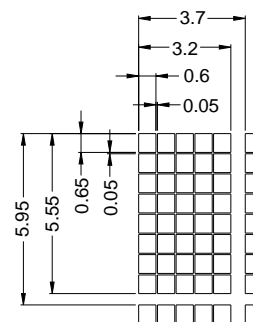
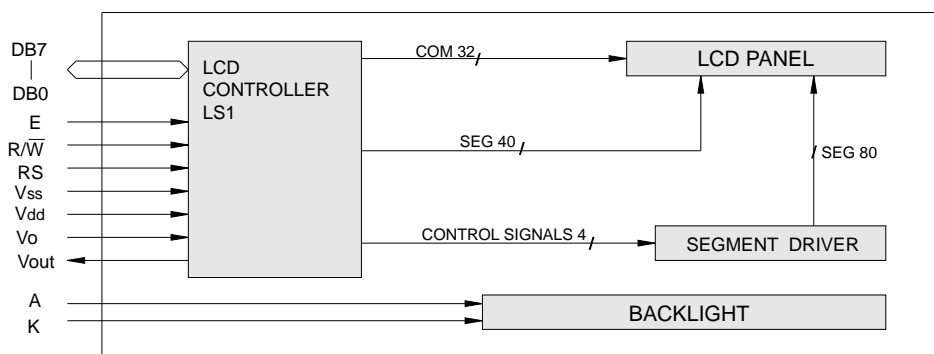
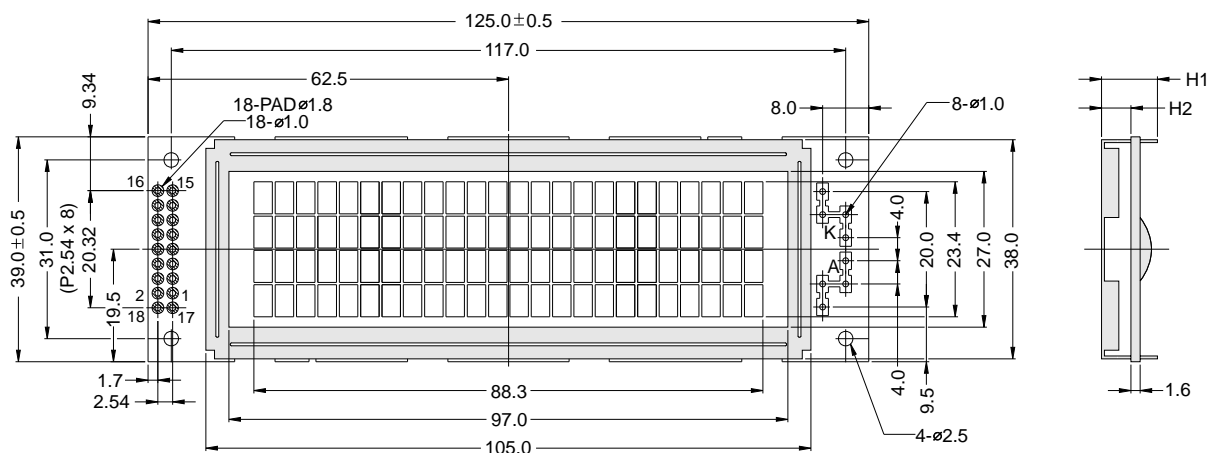
LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	125.0 x 39.0	Module	H2 / H1
View Area	97.0 x 27.0	W / O B/L	5.1 / 9.7
Dot Size	0.60 x 0.65	EL B/L	- / -
Dot Pitch	0.65 x 0.70	LED B/L	9.1 / 13.7

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	Vout	Negative voltage output
16	RESET	Reset signal
17	A	Power supply for LED B/L (+)
18	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.5	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	- 5.9	- 6.7	- 6.9	V			
		0°C	6.7	- 7.1	- 7.4	V			
		25°C	6.3	5.9	6.7	6.5	7.0	6.7	V
		50°C	5.8	-	6.2	-	6.5	-	V
70°C	-	5.5	-	5.9	-	6.1	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	4	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	320	-	mA			

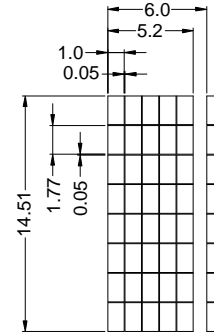
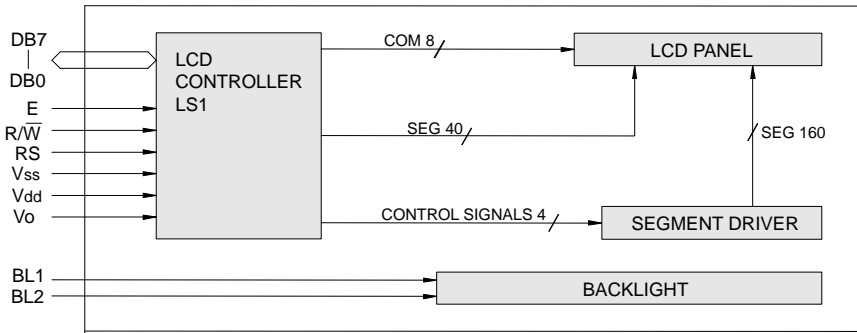
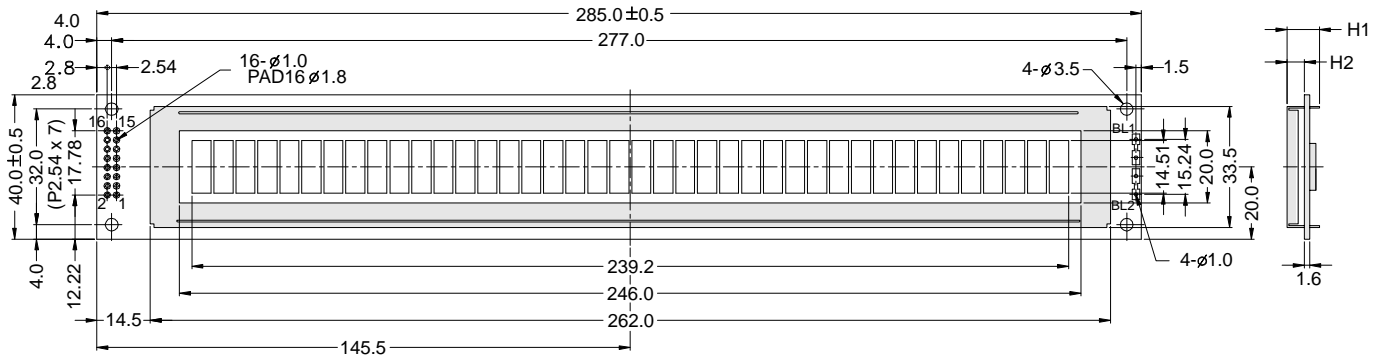
**REMARK**

LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	285.0 x 40.0	Module	H2 / H1
View Area	246.0 x 20.0	W / O B/L	4.7 / 8.8
Dot Size	1.00 x 1.77	EL B/L	4.7 / 8.8
Dot Pitch	1.05 x 1.82	LED B/L	- / -

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)
	BL1	Power supply for EL B/L
	BL2	Power supply for EL B/L

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.5	-	4.8	-	5.1	-	V
		25°C	4.1	6.1	4.4	6.4	4.7	6.7	V
		50°C	3.8	-	4.1	-	4.4	-	V
		70°C	-	5.7	-	6	-	6.3	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	4	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

**REMARK**

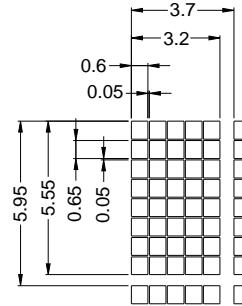
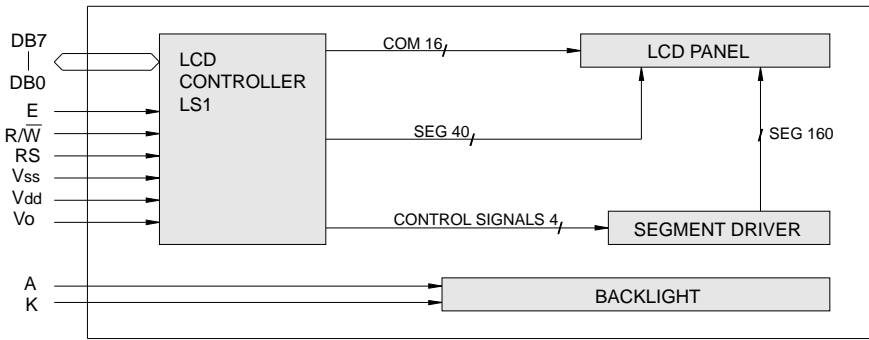
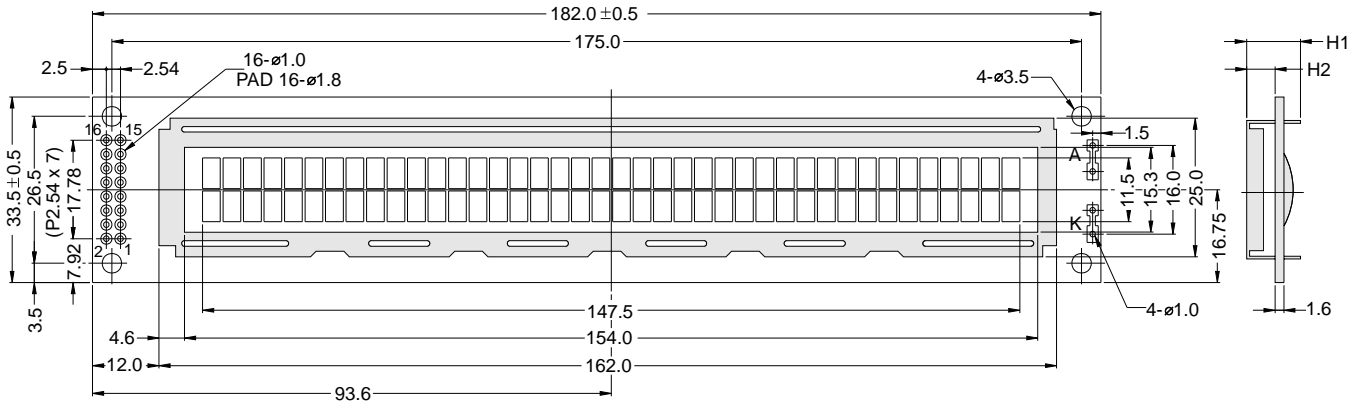
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	182.0 x 33.5	Module	H2 / H1
View Area	154.0 x 15.3	W / O B/L	5.1 / 9.7
Dot Size	0.60 x 0.65	EL B/L	5.1 / 9.7
Dot Pitch	0.65 x 0.70	LED B/L	9.4 / 14.0

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	5.2	-	6.4	-	7.5	V
		0°C	4.5	-	4.8	-	5.1	-	V
		25°C	4.1	5.3	4.4	5.9	4.7	6.9	V
		50°C	3.8	-	4.1	-	4.4	-	V
		70°C	-	4.6	-	5.2	-	6.5	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	4	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	280	-	mA			

**REMARK**

LCD option: STN, TN, FSTN

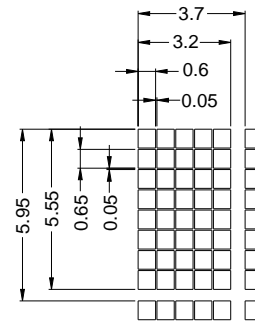
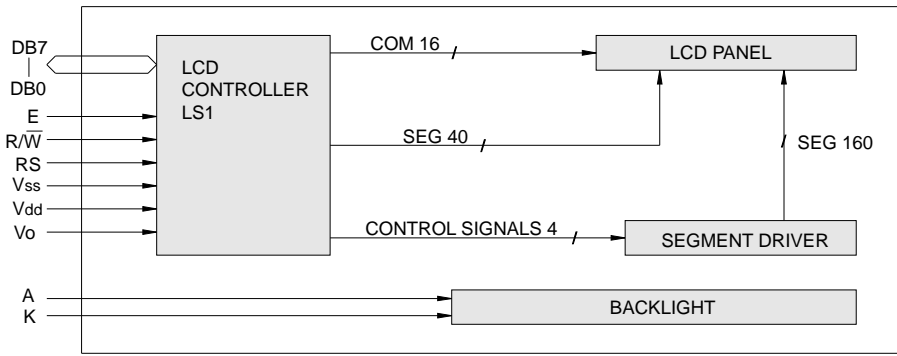
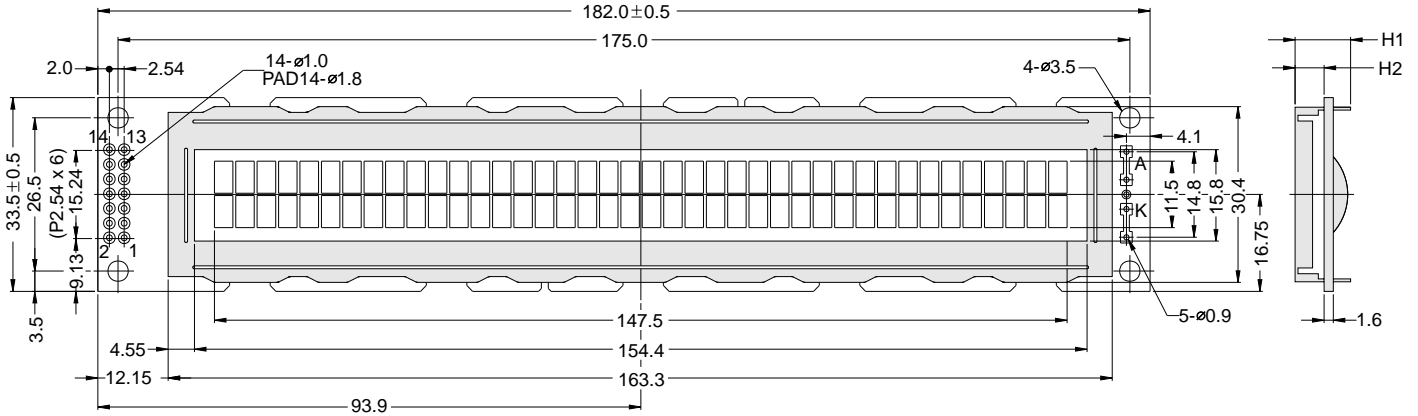
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.







**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	182.0 x 33.5	Module	H2 / H1
View Area	154.0 x 15.80	W / O B/L	5.0 / 9.6
Dot Size	0.60 x 0.65	EL B/L	- / -
Dot Pitch	0.65 x 0.70	LED B/L	10.5 / 15.1

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
	A	Power supply for LED B/L (+)
	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.5	-	4.8	-	5.1	-	V
		25°C	4.1	6.1	4.4	6.4	4.7	6.7	V
		50°C	3.8	-	4.1	-	4.4	-	V
		70°C	-	5.7	-	6	-	6.3	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	4	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	280	-	mA			

**REMARK**

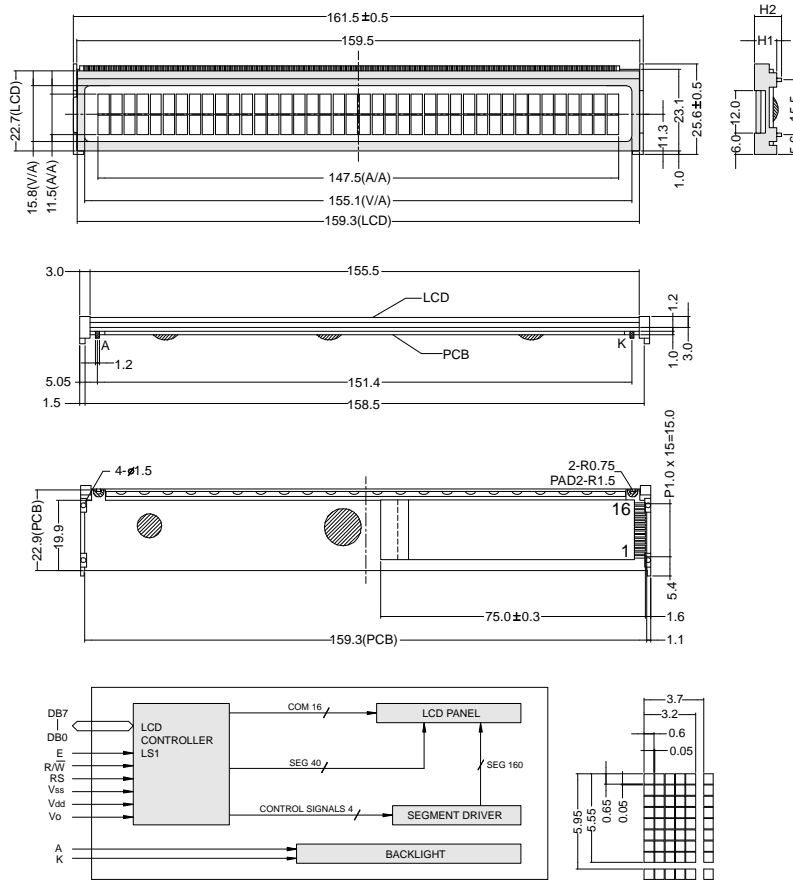
LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



# PC 4002-F

## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified ± 0.3mm

MECHANICAL SPECIFICATION			
Overall Size	167.5 x 25.6	Module	H2 / H1
View Area	155.1 x 15.8	W / O B/L	- / -
Dot Size	0.60 x 0.65	EL B/L	- / -
Dot Pitch	0.65 x 0.70	LED B/L	6.2 / 7.7

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
	A	Power supply for LED B/L (+)
	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.5	-	4.8	-	5.1	-	V
		25°C	4.1	6.1	4.4	6.4	4.7	6.7	V
		50°C	3.8	-	4.1	-	4.4	-	V
		70°C	-	5.7	-	6	-	6.3	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	4	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	100	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

## REMARK

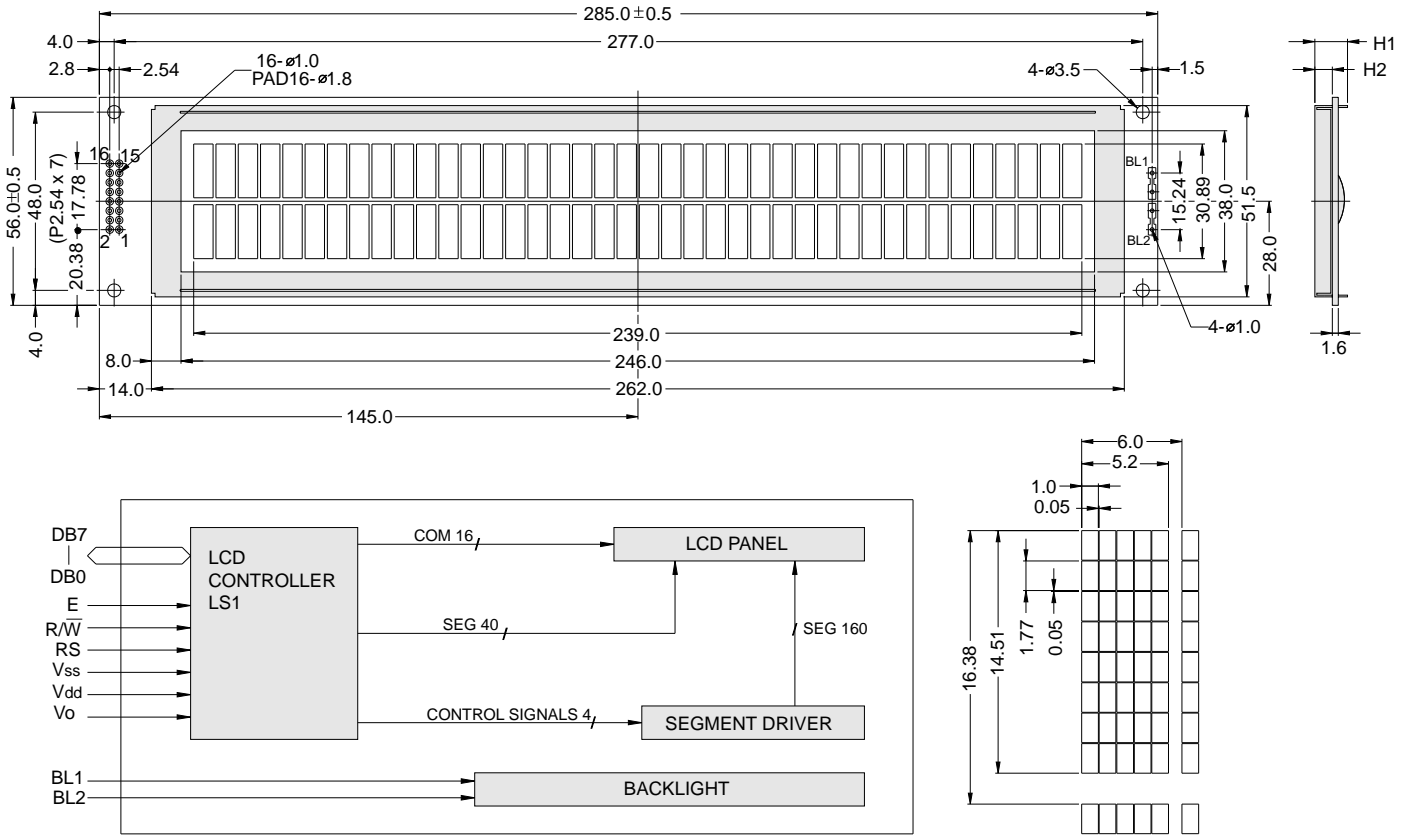
LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	285.0 x 56.0	Module	H2 / H1
View Area	246.0 x 38.0	W / O B/L	4.7 / 8.8
Dot Size	1.00 x 1.77	EL B/L	4.7 / 8.8
Dot Pitch	1.05 x 1.82	LED B/L	- / -

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)
	BL1	Power supply for EL B/L
	BL2	Power supply for EL B/L

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply vlotage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	7.9	V
		0°C	4.5	-	4.8	-	5.1	-	V
		25°C	4.1	6.1	4.4	6.4	4.7	6.7	V
		50°C	3.8	-	4.1	-	4.4	-	V
70°C	-	5.7	-	6	-	6.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	4	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

**REMARK**

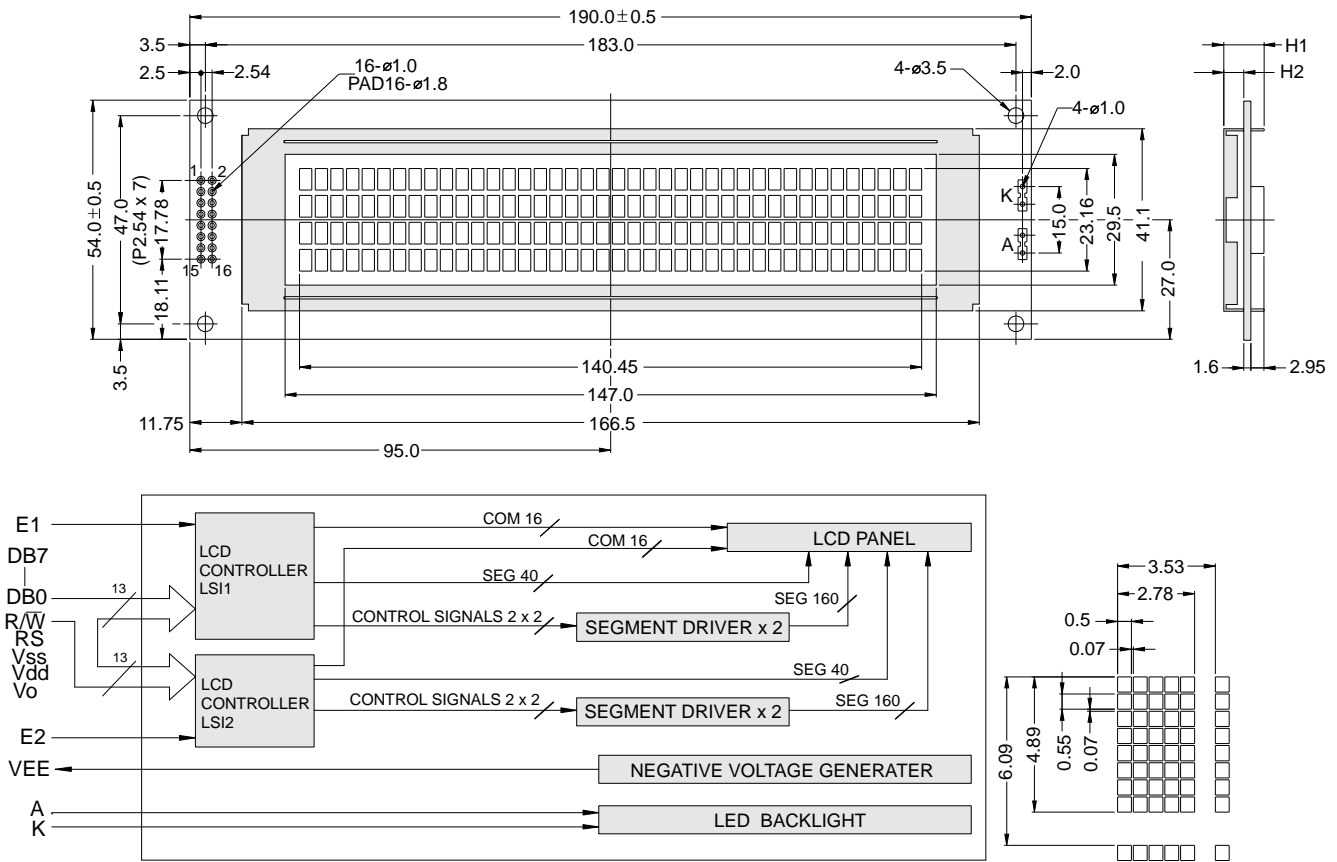
LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	190.0 x 54.0	Module	H2 / H1
View Area	147.0 x 29.50	W / O B/L	4.5 / 9.1
Dot Size	0.50 x 0.55	EL B/L	4.5 / 9.1
Dot Pitch	0.57 x 0.62	LED B/L	9.0 / 13.6

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	DB7	Data bus line
2	DB6	Data bus line
3	DB5	Data bus line
4	DB4	Data bus line
5	DB3	Data bus line
6	DB2	Data bus line
7	DB1	Data bus line
8	DB0	Data bus line
9	E1	Enable 1
10	R/W	Data read / write
11	RS	Register select signal
12	Vo	Contrast Adjust
13	Vss	Power supply(GND)
14	Vdd	Power supply(+)
15	E2	Enable 2
16	Vee	Negative voltage
17	A	Power supply for LED B/L (+)
18	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	V	
		0°C	4.8	-	4.8	-	4.9	-	V
		25°C	4.5	6.1	4.6	6.4	4.7	6.7	V
		50°C	4.4	-	4.5	-	4.6	-	V
		70°C	-	5.7	-	6	-	6.3	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	4	7	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	220	-	mA			

**REMARK**

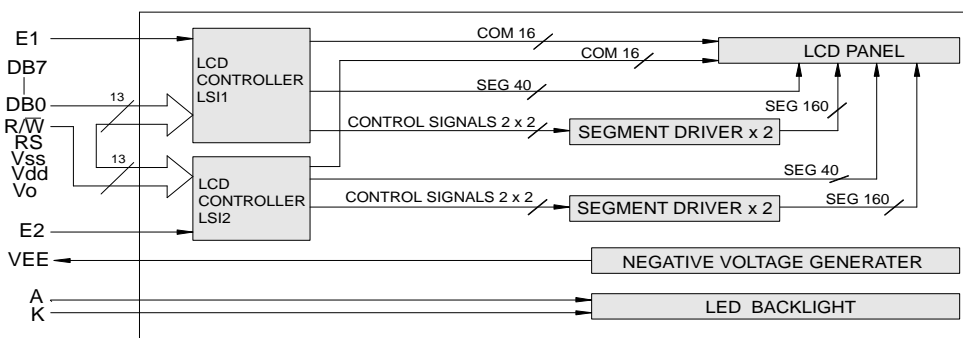
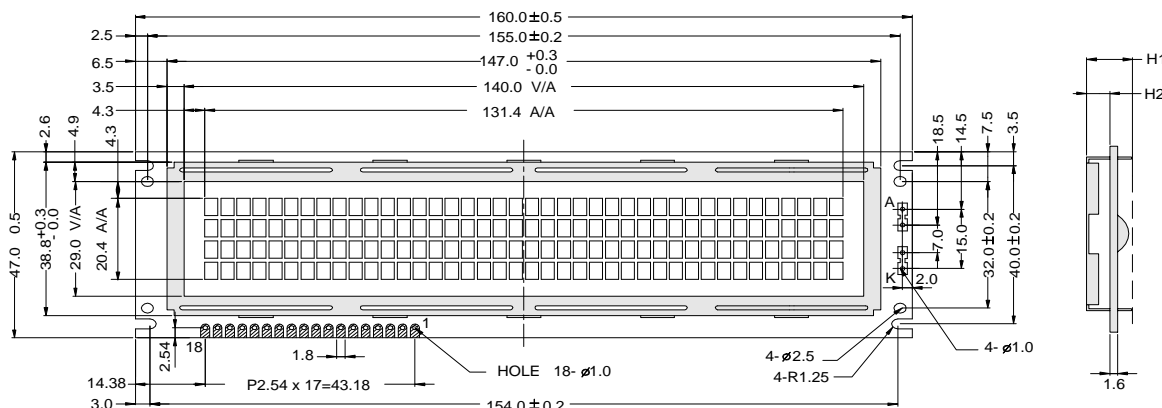
LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	160.0 x 47.0	Module	H2 / H1
View Area	140.0 x 29.0	W / O B/L	4.8 / 9.5
Dot Size	0.5 x 0.5	EL B/L	- / -
Dot Pitch	0.55 x 0.55	LED B/L	- / -

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E1	Enable 1
7	E2	Enable 2
8	DB0	Data bus line
9	DB1	Data bus line
10	DB2	Data bus line
11	DB3	Data bus line
12	DB4	Data bus line
13	DB5	Data bus line
14	DB6	Data bus line
15	DB7	Data bus line
16	A	Power supply for LED B/L (+)
17	K	Power supply for LED B/L (-)
18	NC/Vee	NC/Negative voltage

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.5	-	V	
		0°C	4.8	-	4.8	-	4.9	-	V
		25°C	4.5	6.1	4.6	6.4	4.7	6.7	V
		50°C	4.4	-	4.5	-	4.6	-	V
		70°C	-	5.7	-	6	-	6.3	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	4	7	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

**REMARK**

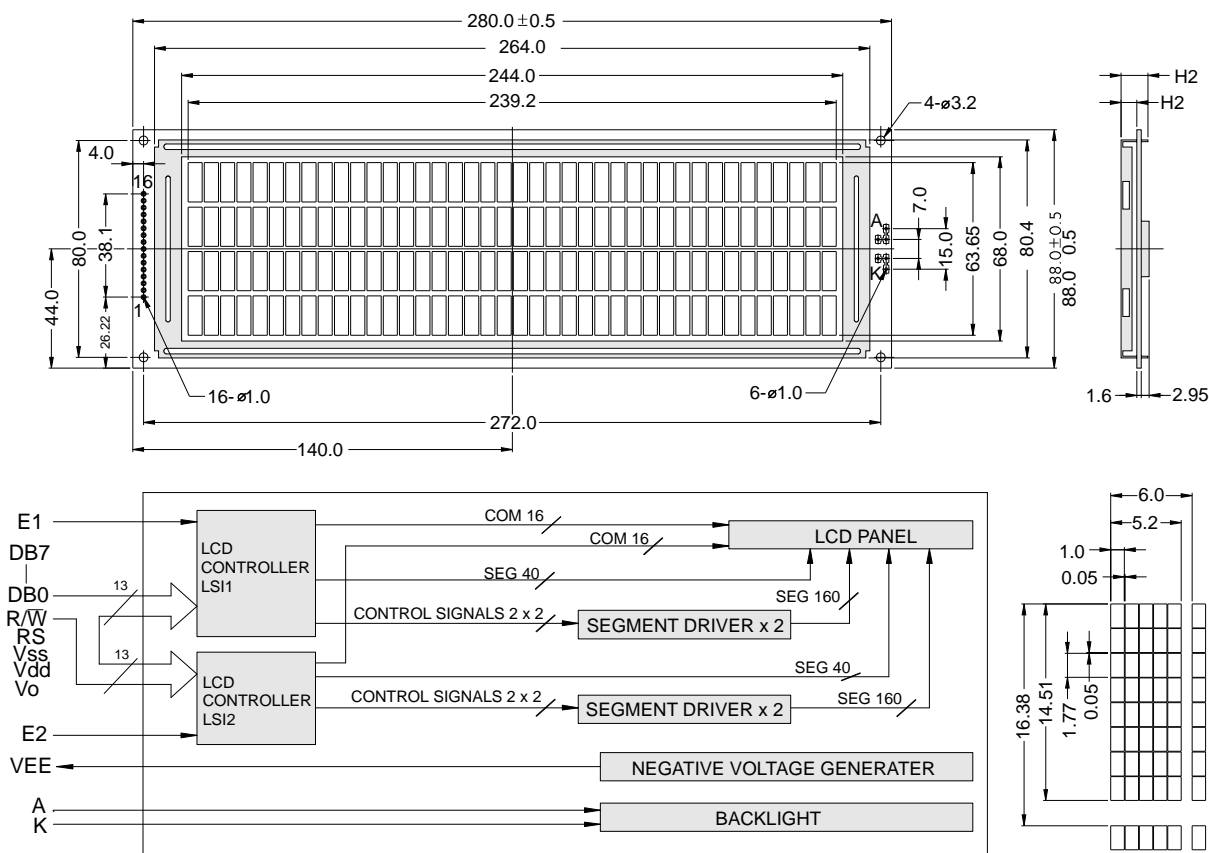
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	280.0 x 88.0	Module	H2 / H1
View Area	244.0 x 68.0	W / O B/L	5.3 / 9.9
Dot Size	1.00 x 1.77	EL B/L	5.3 / 9.9
Dot Pitch	1.05 x 1.82	LED B/L	- / -

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RS	Register select signal
5	R/W	Data read / write
6	E1	Enable 1
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	E2	Enable 2
16	NC/Vee	NC or Negative voltage

ABSOLUTE MAXIMUM RATING								
Item	Symbol	Condition	Min.	Max.	Units			
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V			
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	13	V			
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V			
ELECTRICAL CHARACTERISTICS								
Item	Symbol	Condition	Min.	Typical	Max.	Units		
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V		
LCD operation voltage	Vop	Top	N	W	N	W	V	
		-20°C	-	4.3	-	4.6	-	V
		0°C	4.3	-	4.6	-	4.9	V
		25°C	3.9	4.4	4.2	4.7	4.5	V
		50°C	3.6	-	3.9	-	4.2	V
		70°C	-	3.9	-	4.2	V	
LCM current consumption (No B/L)	Idd	Vdd=5V	-	4	7	mA		
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA		
	LED/array	VB/L=4.2V	-	-	-	mA		

**REMARK**

LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



● **STANDARD MODULE LIST FOR GRAPHIC LCM**

Model Name	Module Size	View Area	Dot Size	Dot Pitch	Duty/Bias	Controller LSI	Booster*	T.C*	Backlight	LCD Type
PG8080-A	88.0 x 88.0	62.7 x 62.7	0.66 x 0.66	0.76 x 0.76	1/80-1/9	LC7981	●		NONE,EL	STN,FSTN
PG9732-A	47.5 x 28.0	43.5 x 21.5	0.32 x 0.40	0.37 x 0.45	1/32-1/6	SED1530			NONE	STN,FSTN
PG9732-B	42.0 x 28.9	36.0 x 21.0	0.28 x 0.39	0.32 x 0.43	1/32-1/6	SED1530			NONE,LED	STN,FSTN
PG9732-C	49.7 x 31.3	43.5 x 21.5	0.32 x 0.40	0.37 x 0.45	1/32-1/6	SED1530	●		NONE,LED	STN,FSTN
PG9732-D	42.0 x 28.9	36.0 x 21.0	0.28 x 0.39	0.32 x 0.43	1/32-1/6	SED1530	●		NONE,LED	STN,FSTN
PG9832-A	52.0 x 44.0	46.0 x 18.5	0.40 x 0.45	0.44 x 0.49	1/32-1/6	SED1520DOA			NONE,LED	STN,FSTN
PG12032-D	68.1 x 38.9	62.0 x 22.5	0.42 x 0.60	0.47 x 0.65	1/32-1/6	SED1520DOA			NONE,LED	STN,FSTN
PG12232-A	84.0 x 44.0	60.5 x 18.5	0.40 x 0.45	0.44 x 0.49	1/32-1/6	SED1520DAA			NONE,LED,EL	STN,FSTN
PG12232-B	80.0 x 36.0	60.5 x 18.5	0.40 x 0.45	0.44 x 0.49	1/32-1/6	SED1520DAA			NONE,LED,EL	STN,FSTN
PG12232-C	98.0 x 60.0	76.0 x 25.2	0.53 x 0.61	0.57 x 0.65	1/32-1/6	SED1520DOA			NONE,LED	STN
PG12232-E-33	65.4 x 29.1	54.8 x 19.1	0.36 x 0.41	0.40 x 0.45	1/32-1/6	SED1520DOA			NONE,LED	STN
PG12232-F	69.2 x 31.75	57.2 x 17.2	0.38 x 0.38	0.43 x 0.43	1/32-1/6	SED1520DOA	●		NONE,LED,EL	STN,FSTN
PG12856-A	90.0 x 38.0	62.0 x 26.0	0.41 x 0.37	0.45 x 0.41	1/56-1/9	KS0108			NONE,CCFL	TN,STN
PG12864-A/K	93.0 x 70.0	72.0 x 40.0	0.48 x 0.48	0.52 x 0.52	1/64-1/9	KS0108	●		NONE,LED,EL	STN,FSTN
PG12864-B	78.0 x 70.0	72.0 x 40.0	0.48 x 0.48	0.52 x 0.52	1/64-1/9	KS0108	●	●	NONE,LED	STN,FSTN
PG12864-D	84.0 x 60.0	59.4 x 38.0	0.40 x 0.48	0.44 x 0.52	1/64-1/9	KS0108			NONE,EL,LED	STN,FSTN
PG12864-F	78.0 x 70.0	62.0 x 44.0	0.39 x 0.55	0.44 x 0.6	1/64-1/9	T6963C			NONE,EL,LED	STN,FSTN
PG12864-H	87.0 x 71.0	62.0x 44.0	0.39 x 0.55	0.44 x 0.6	1/64-1/9	KS0108	●	●	NONE,EL,LED	STN,FSTN
PG12864-I	54.0 x 50.0	43.50 x 29.0	0.28 x 0.35	0.32 x 0.39	1/64-1/6.2	KS0108	●	●	NONE,EL	STN,FSTN
PG12864-J	75.0 x 52.7	60.0 x 32.60	0.39 x 0.39	0.43 x 0.43	1/64-1/9	KS0108	●	●	NONE,EL,LED	STN,FSTN
PG12864-N	55.2 x 39.8	45.2 x 27.0	0.28 x 0.34	0.32 x 0.38	1/64-1/9	LH155BA5	●		NONE,LED	STN,FSTN
PG12864-O	80.0x 54.0	73.6 x 41.0	0.48 x 0.48	0.52 x 0.52	1/64-1/9	LH155BA5	●		NONE,LED	STN,FSTN
PG12864-Q	90.5x 50	67.0 x 40.0	0.42x 0.50	0.46 x 0.55	1/64-1/9	SED1565T04	●	●	SINGLE LED	STN,FSTN
PG128128-A	85.0 x 100.0	62.0 x 62.0	0.40 x 0.40	0.43 x 0.43	1/128-1/12	T6963C			NONE,LED,EL	STN,FSTN
PG16032-A	85.2 x 55.0	72.0 x 22.0	0.40 x 0.56	0.44 x 0.61	1/32-1/6	SED1520DAA			NONE,LED	STN,FSTN
PG16032-B	105.8 x 44.0	99.0 x 24.0	0.55 x 0.55	0.59 x 0.59	1/32-1/6	SED1520DOA			NONE,EL	STN,FSTN
PG160128-A	129.0 x 104.5	101.0 x 82.0	0.56 x 0.56	0.6 x 0.6	1/64-1/9	T6963C			NONE,EL	STN,FSTN
PG160160-B	89.2 x 85.0	62.79 x 62.79	0.34 x 0.34	0.37 x 0.37	1/160-1/11	—			NONE,LED	STN,FSTN
PG192128-A	98.0 x 86.0	77.5 x 54.0	0.33 x 0.33	0.37 x 0.37	1/128-1/12	—	●		NONE,LED,EL	STN,FSTN
PG192128-B	98.0 x 86.0	77.5 x 54.0	0.33 x 0.33	0.37 x 0.37	1/128-1/12	LC7981	●		NONE,LED,EL	STN,FSTN
PG24064-A,B	180.0 x 65.0	134.0 x 40.4	0.49 x 0.49	0.53 x 0.53	1/64-1/9	LC7981	●		NONE,LED,EL,CCFL	STN,FSTN
PG24064-D	200.0 x 66.0	134.0 x 40.4	0.49 x 0.49	0.53 x 0.53	1/64-1/9	T6963C	●		NONE,CCFL	STN,FSTN
PG24064-E,F	180.0 x 65.0	134.0 x 40.4	0.49 x 0.49	0.53 x 0.53	1/64-1/9	T6963C	●		NONE,LED,EL,CCFL	STN,FSTN
PG24064-G	180.0 x 75.0	134.0 x 40.4	0.49 x 0.49	0.53 x 0.53	1/64-1/9	—	●		NONE,LED,EL,CCFL	STN,FSTN
PG240128-A	144.0 x 104.0	114.0 x 64.0	0.40 x 0.40	0.45 x 0.45	1/128-1/12	T6963C	●		NONE,LED,EL,CCFL	STN,FSTN
PG240128-B	144.0 x 104.0	114.0 x 64.0	0.40 x 0.40	0.45 x 0.45	1/128-1/12	—	●		NONE,LED,EL,CCFL	STN,FSTN
PG320240-C	150.5 x 96.8	105.0 x 80.0	0.27 x 0.27	0.3 x 0.3	1/240-1/15	—			NONE,LED,EL,CCFL	STN,FSTN
PG320240-D	148.02 x 120.24	120.14 x 92.14	0.33 x 0.33	0.36 x 0.36	1/240-1/15	SED1335	●	●	NONE,LED,CCFL	STN,FSTN
PG320240-E	153.20 x 96.8	105.0 x 80.0	0.27 x 0.27	0.3 x 0.3	1/240-1/15	—			NONE,LED,CCFL	STN,FSTN
PG320240-F	167.1 x 109.0	122.0 x 92.0	0.33 x 0.33	0.36 x 0.36	1/240-1/15	—			NONE,CCFL	STN,FSTN
PG320240-G	139.0 x 120.0	103.0 x 79.0	0.3 x 0.3	0.27 x 0.28	1/240-1/16	—			NONE,CCFL	STN,FSTN
PG320240-H	92.0 x 71.7	78.78 x 59.58	0.22 x 0.22	0.24 x 0.24	1/240-1/15	—	●	●	NONE,LED,EL	STN,FSTN
PG640480-A	197.0 x 145.0	153.0 x 115.74	0.217 x 0.217	0.237 x 0.237	1/240-1/13	—			CCFL	STN,FSTN

Digital Touch Panel For PG240128-A/B and PG320240-C/E

Analog Touch Panel For PG320240-H and PG320240-D

**Note:**

\* Booster : Voltage booster circuit option.

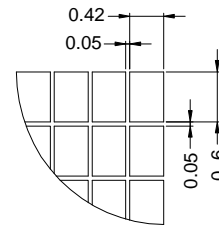
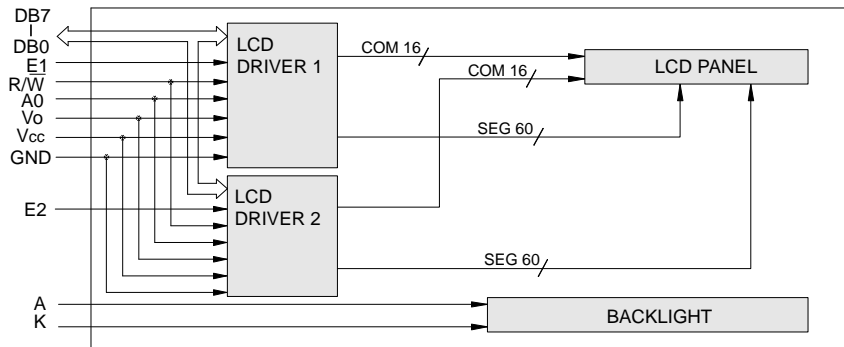
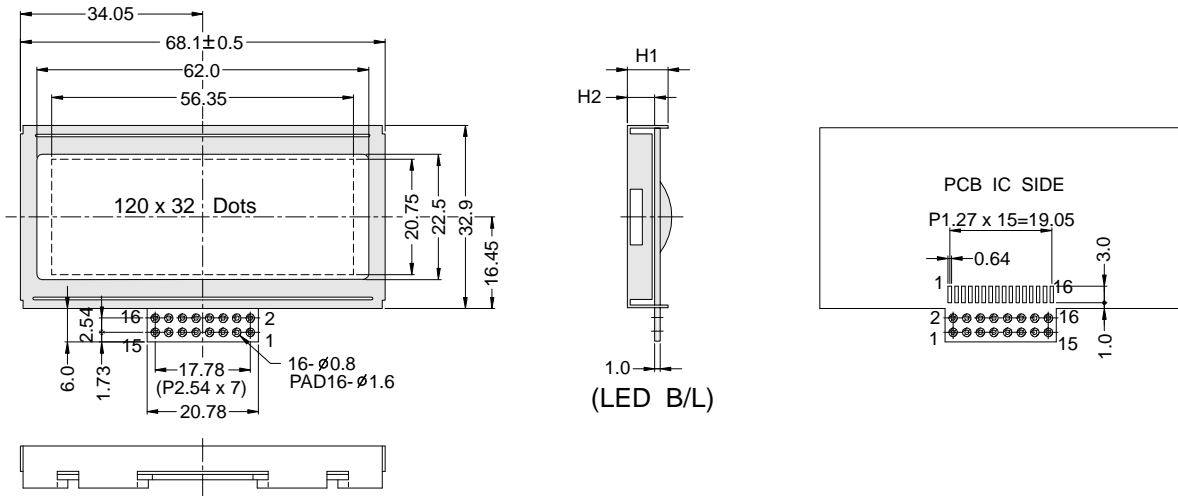
\* T.C: Temperature compensation available.



# PG 12032-D



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified ± 0.3mm

MECHANICAL SPECIFICATION			
Overall Size	74.8 x 28.8	Module	H2 / H1
View Area	70.0 x 21.0	W/O B/L	3.7 / 6.2
Dot Size	0.48 x 0.52	EL B/L	5.1 / 7.6
Dot Pitch	0.52 x 0.56	LED B/L	- / -

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	GND	Power supply (GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	A0	Command data input
5	R/W	Data read / write
6	E1	Enable driver 1
7	E2	Enable driver 2
8	NC	No connection
9-16	DB0-DB7	Data bus line

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	8.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	16.5	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	5.6	-	6	-	6.3	V
		0°C	5.3	-	5.7	-	6.1	-	V
		25°C	5.0	5.6	5.4	5.9	5.8	6.2	V
		50°C	4.7	-	5.1	-	5.5	-	V
70°C	-	5.3	-	5.6	-	5.9	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.0	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	100	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

## REMARK

LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.

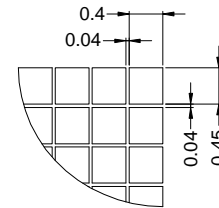
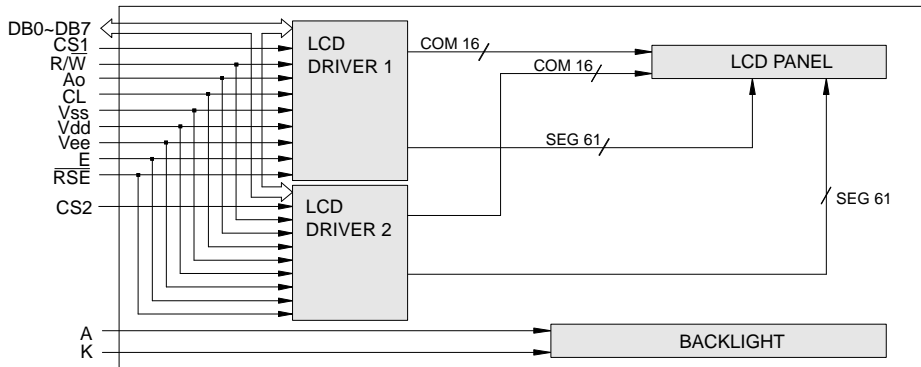
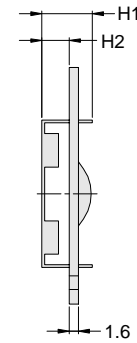
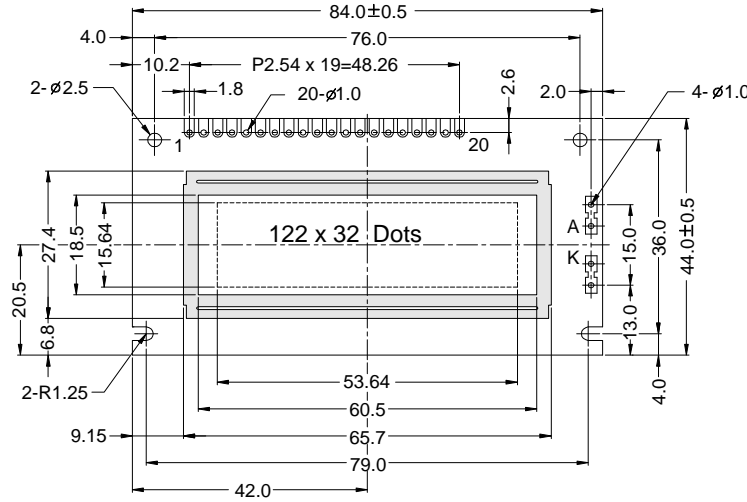




# PG 12232-A



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	84.0 x 44.0	Module	H2 / H1
View Area	60.5 x 18.5	W/O B/L	4.9 / 9.0
Dot Size	0.40 x 0.45	EL B/L	4.9 / 9.0
Dot Pitch	0.44 x 0.49	LED B/L	8.9 / 13.0

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	A0	Command / data input
5	CS1	Chip select driver 1
6	CS2	Chip select driver 2
7	CL	External clock input
8	E	Enable signal
9	R/W	Data read / write
10-17	DB0-DB7	Data bus line
18	RES	Reset
19	A	Power supply for LED B/L (+)
20	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	8.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	16.5	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	- 8.6	- 9.1	- 9.6	V			
		0°C	6.1	- 6.4	- 6.7	V			
		25°C	5.6	7.7	5.9	8.1	6.2	8.5	V
		40°C	5.1	- 5.4	- 5.7	V			
70°C	- 7.2	- 7.6	- 8	V					
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.0	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	120	-	mA			

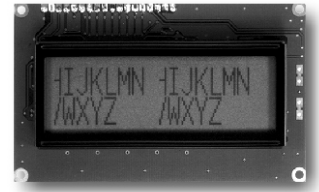
## REMARK

LCD option: STN, TN, FSTN

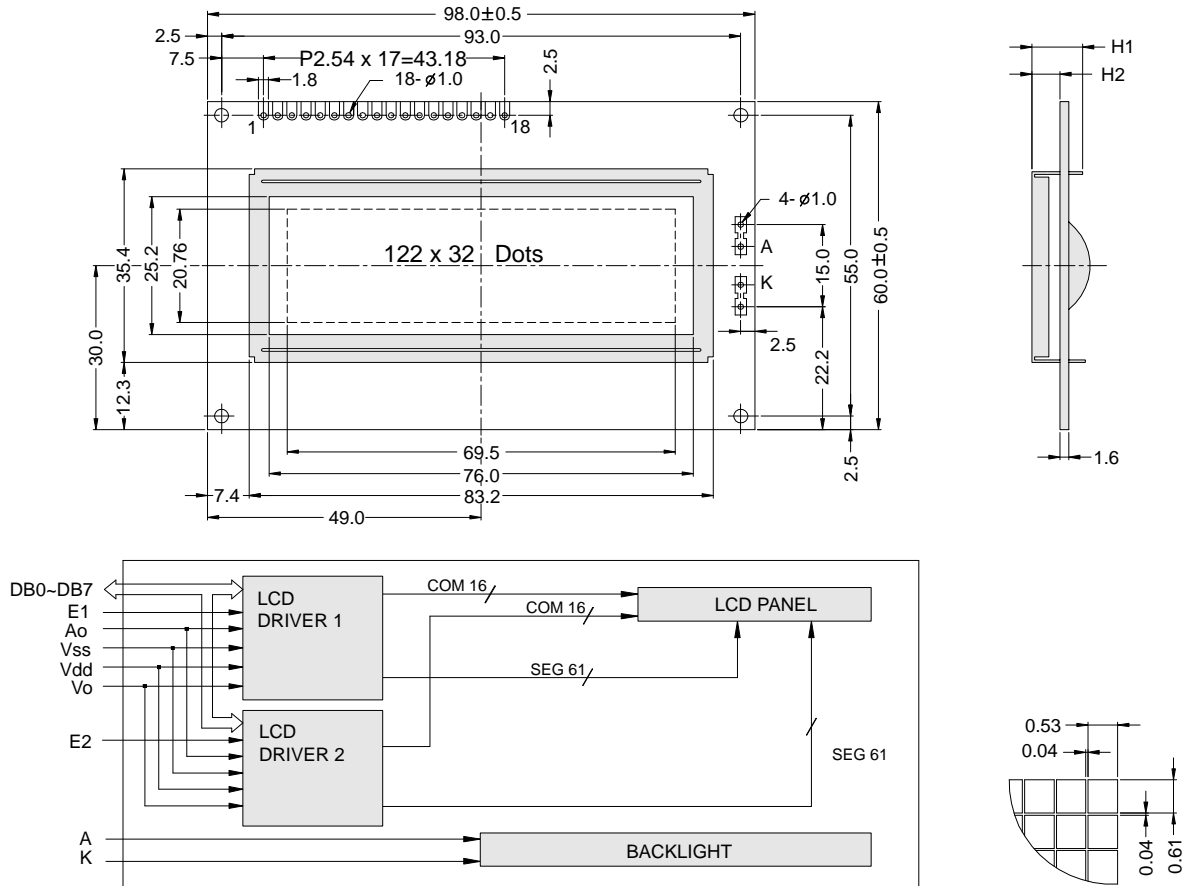
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



# PG 12232-C



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	98.0 x 60.0	Module	H2 / H1
View Area	76.0 x 25.2	W / O B/L	5.0 / 9.1
Dot Size	0.53 x 0.61	EL B/L	- / -
Dot Pitch	0.57 x 0.65	LED B/L	9.4 / 13.5

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	Ao	Command / data select
5	E1	Enable driver 1
6	E2	Enable driver 2
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)
17	N.C	No connection
18	N.C(R/W)	No connection (R/W)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	8.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	16.5	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.2	-	7.4	-	6.9	V
		0°C	4.9	-	5.1	-	4.6	-	V
		25°C	4.5	6.2	4.7	6.4	4.2	5.9	V
		50°C	3.5	-	3.7	-	3.3	-	V
70°C	-	5.6	-	5.8	-	5.4	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.0	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	260	-	mA			

## REMARK

LCD option: STN, TN, FSTN

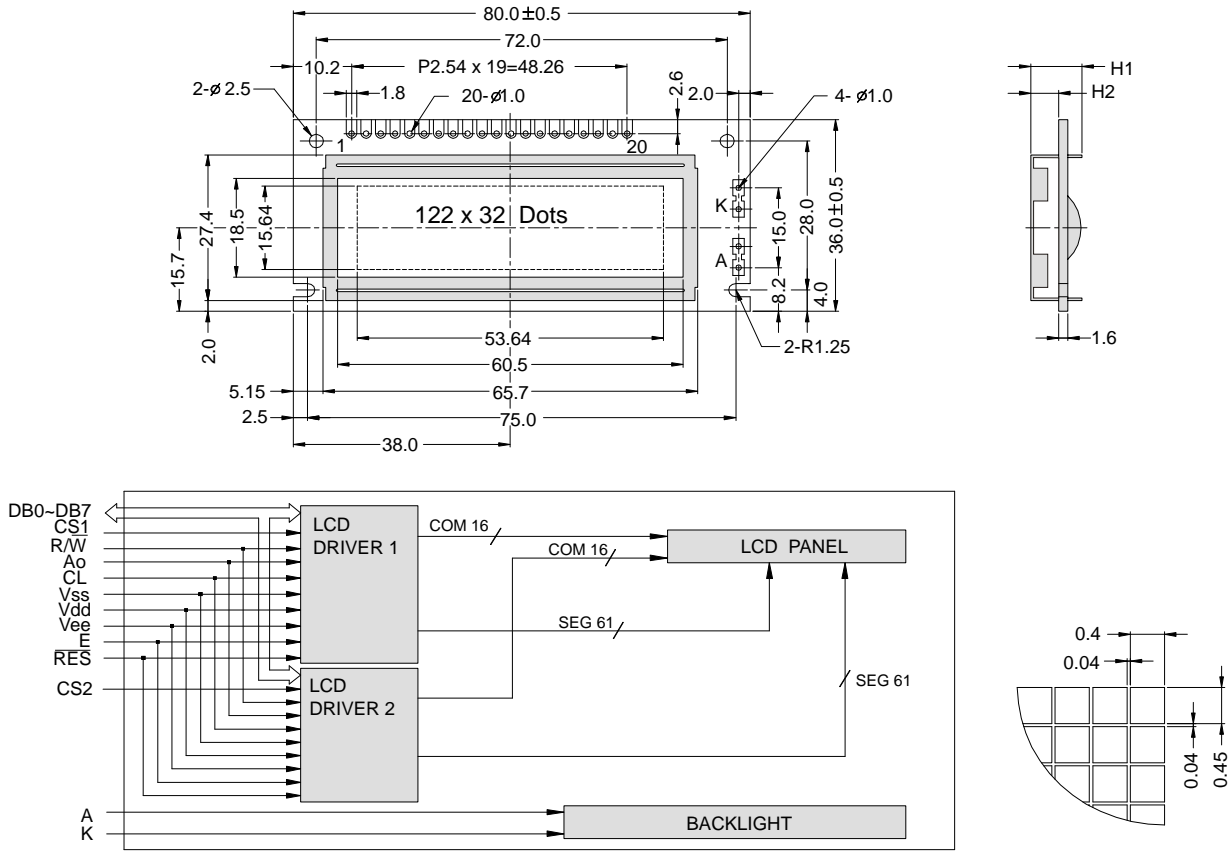
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



# PG 12232-B



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	80.0 x 36.0	Module	H2 / H1
View Area	60.5 x 18.5	W/O B/L	4.9 / 9.0
Dot Size	0.40 x 0.45	EL B/L	4.9 / 9.0
Dot Pitch	0.44 x 0.49	LED B/L	8.9 / 13.0

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	A0	Command / data input
5	CS1	Chip select driver 1
6	CS2	Chip select driver 2
7	CL	External clock input
8	E	Enable signal
9	R/W	Data read / write
10-17	DB0-DB7	Data bus line
18	RES	Reset
19	A	Power supply for LED B/L (+)
20	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	8.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	16.5	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	N	W	V
		-20°C	-	8.6	-	9.1	-	9.6	V
		0°C	6.1	-	6.4	-	6.7	-	V
		25°C	5.6	7.7	5.9	8.1	6.2	8.5	V
		50°C	5.1	-	5.4	-	5.7	-	V
70°C	-	7.2	-	7.6	-	8	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.0	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	120	-	mA			

## REMARK

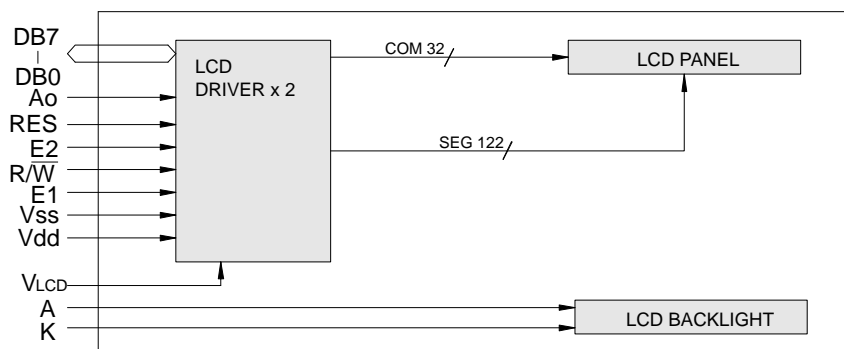
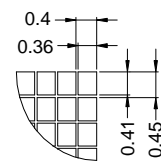
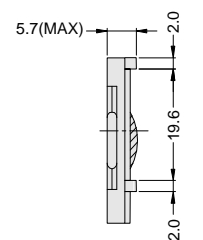
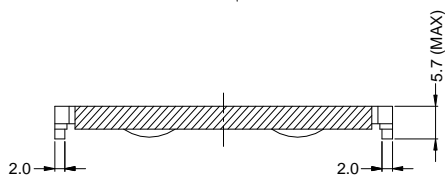
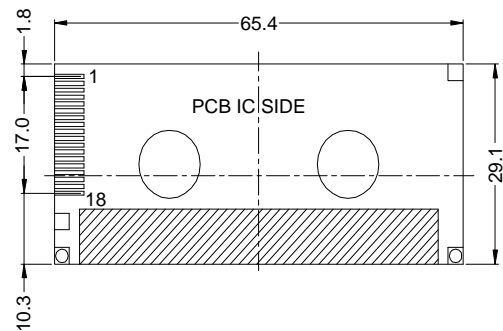
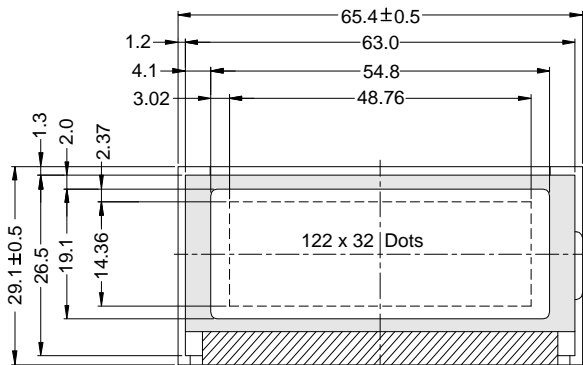
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	63.0 x 26.6	Module	H2 / H1
View Area	54.8 x 19.1	W / O B/L	- / 1.8
Dot Size	0.36 x 0.41	EL B/L	-
Dot Pitch	0.40 x 0.45	LED B/L	- / 5.7

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vdd	Power supply(+)
2	Vss	Power supply(GND)
3	VLCD	Contrast Adjust
4	RES	Reset
5	E1	Enable driver 1
6	E2	Enable driver 2
7	R/W	Data read / write
8	Ao	Command / Data select
9	DB0	Data bus line
10	DB1	Data bus line
11	DB2	Data bus line
12	DB3	Data bus line
13	DB4	Data bus line
14	DB5	Data bus line
15	DB6	Data bus line
16	DB7	Data bus line
17	N.C(A)	NC(Power supply (+) to B/L)
18	N.C(K)	NC(Power supply (-) to B/L)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	8.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	16.5	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.4	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	7.1	-	7.3	-	V	
		0°C	6.7	-	6.9	-	7.1	-	V
		25°C	6.3	6.4	6.5	6.6	6.7	7.3	V
		50°C	6.1	-	6.3	-	6.5	-	V
70°C	-	5.4	-	5.6	-	7.1	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.0	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	100	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

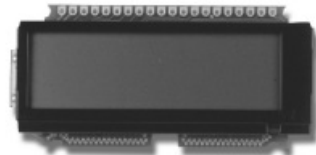
**REMARK**

LCD option: STN, TN, FSTN

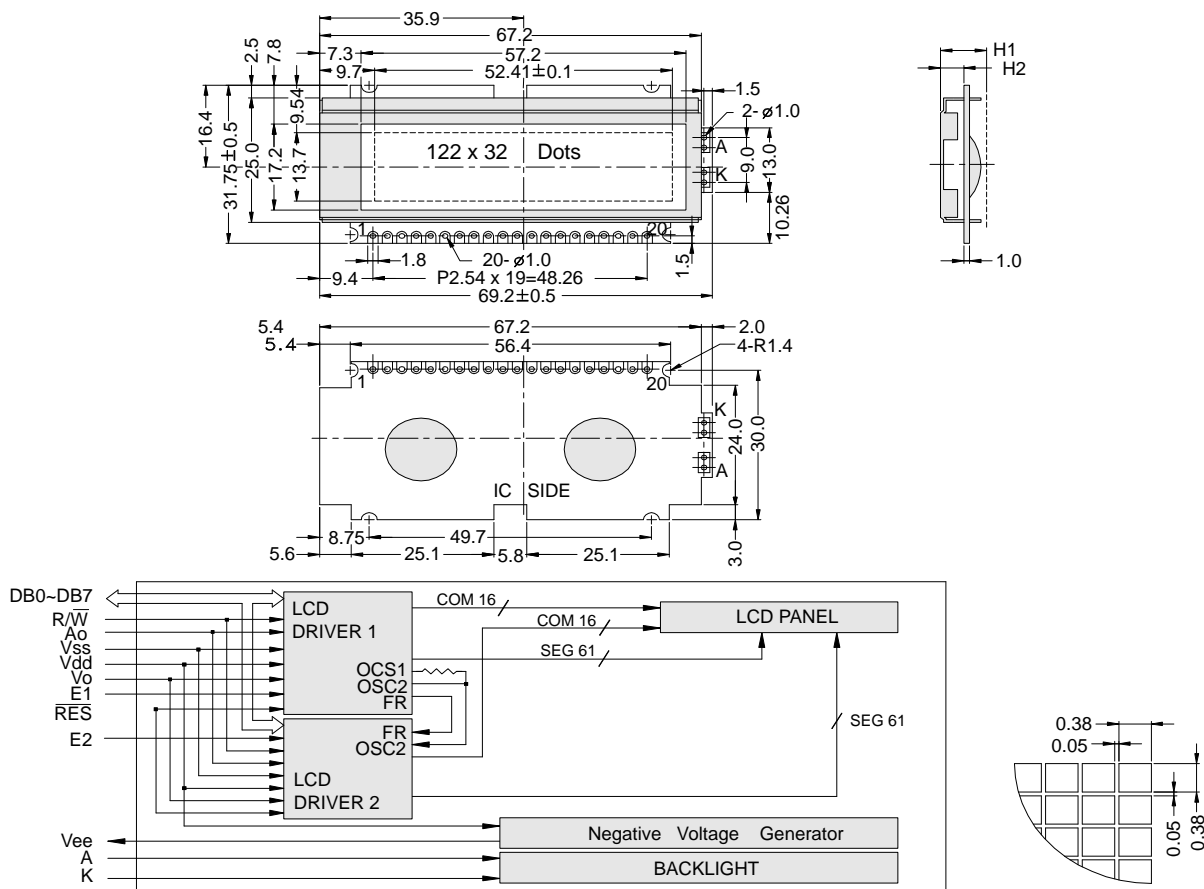
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



# PG 12232-F



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	69.2 x 31.75	Module	H2 / H1
View Area	57.2 x 17.2	W / O B/L	4.1 / 8.0
Dot Size	0.38 x 0.38	EL B/L	4.1 / 8.0
Dot Pitch	0.43 x 0.43	LED B/L	7.0 / 11.0

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	Vee	Poewr supply for LCD
5	Ao	L: Instruction / H: Data
6	E1	Enable driver 1
7	E2	Enable driver 2
8	DB0	Data bit 0
9	DB1	Data bit 1
10	NC/Vdd	NC or anode voltage
11	NC/Vss	NC or cathode voltage
12-17	DB2-DB7	Data bit 2 ~ bit 7
18	NC/RW	NC or data read/write
19	A	Power supply for LED B/L (+)
20	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	8	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	16.5	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	6.1	-	6.5	-	6.9	V
		0°C	5.0	-	5.3	-	5.6	-	V
		25°C	4.8	4.6	5.0	5.0	5.3	5.4	V
		50°C	4.5	-	4.8	-	5.2	-	V
70°C	-	4.1	-	4.4	-	4.7	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	180	-	mA			

## REMARK

LCD option: STN, TN, FSTN

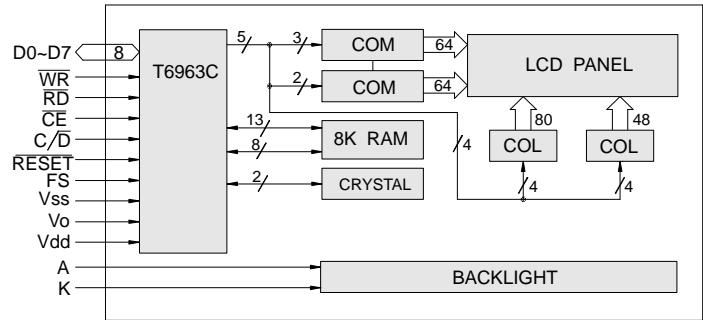
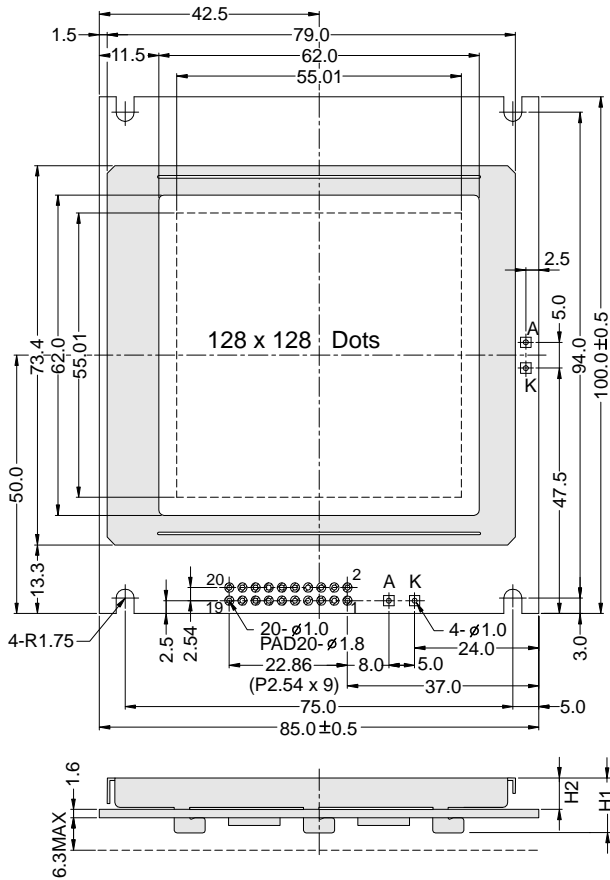
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



# PG 128128-A



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	85.0 x 100.0	Module	H2 / H1
View Area	62.0 x 62.0	W / O B/L	6.1 / 14.0
Dot Size	0.40 x 0.40	EL B/L	6.1 / 14.0
Dot Pitch	0.43 x 0.43	LED B/L	9.2 / 17.1

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	FGND	Frame ground
2	Vss	Power supply(GND)
3	Vdd	Power supply(+)
4	Vo	Contrast Adjust
5	$\overline{\text{WR}}$	Data write
6	$\overline{\text{RD}}$	Data read
7	$\overline{\text{CE}}$	Chip enable
8	C/D	Command / data select
9	NC	No connection
10	$\overline{\text{RESET}}$	Reset
11-18	DB0-DB7	Data bus line
19	FS	Font selection
20	NC	No connection

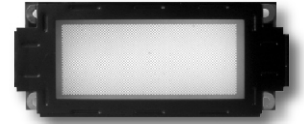
ABSOLUTE MAXIMUM RATING								
Item	Symbol	Condition	Min.	Max.	Units			
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V			
LCD driving supply voltage	Vdd-Vee	25°C	0	22.0	V			
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V			
ELECTRICAL CHARACTERISTICS								
Item	Symbol	Condition	Min.	Typical	Max.	Units		
Power supply voltage	Vdd-Vss	25°C	4.5	—	5.5	V		
LCD operation voltage	Vop	Top	N	W	N	W	V	
		-20°C	—	—	—	—	V	
		0°C	18.1	—	19	—	20	V
		25°C	17.5	—	18.4	—	19.3	V
		50°C	16.5	—	17.4	—	18.3	V
70°C	—	—	—	—	—	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	—	8.0	—	mA		
Backlight current consumption	LED/edge	VB/L=4.2V	—	—	—	mA		
	LED/array	VB/L=4.2V	—	450	—	mA		

## REMARK

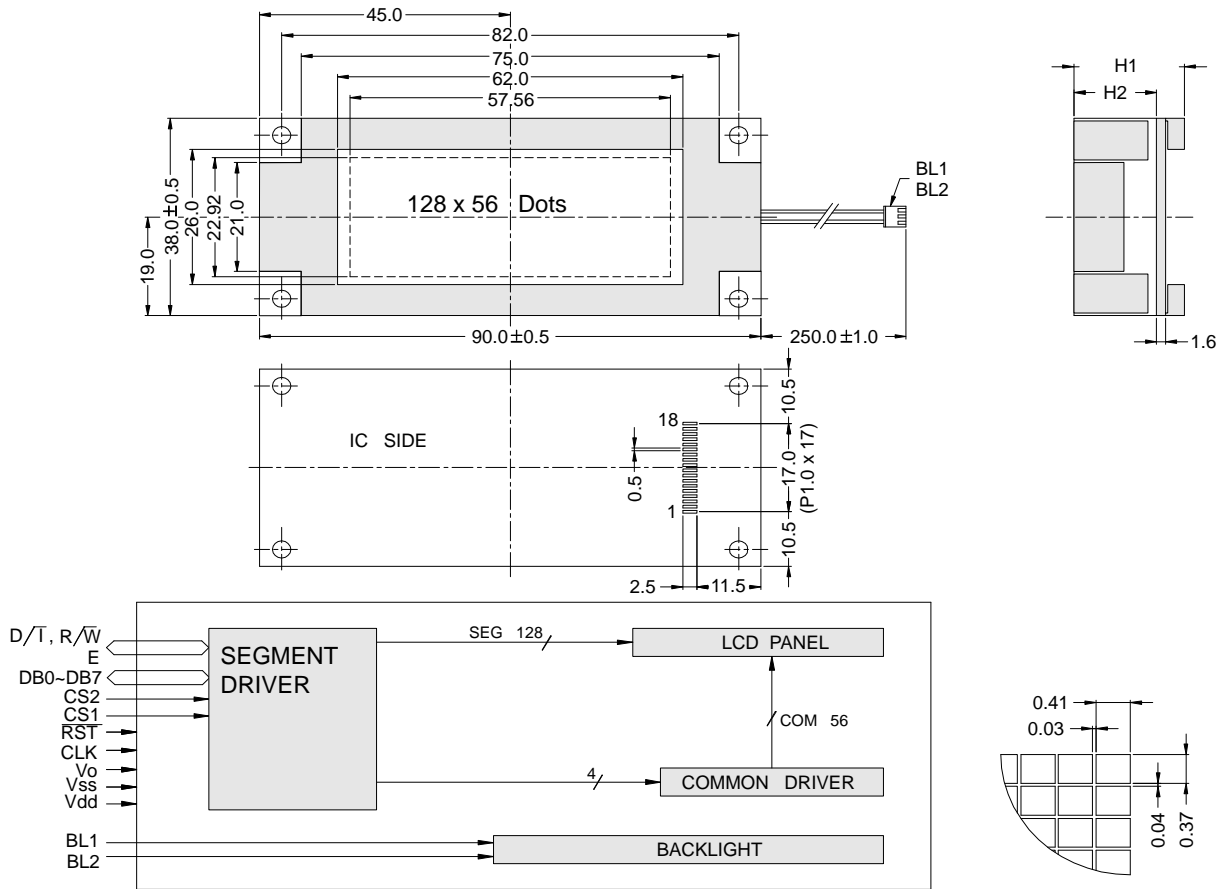
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	90.0 x 38.0	Module	H2 / H1
View Area	62.0 x 26.0	W / O B/L	- / -
Dot Size	0.41 x 0.37	EL B/L	- / -
Dot Pitch	0.45 x 0.41	LED B/L	14.8 / 19.8

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	D/I	Command / Data select
5	R/W	Data read / write
6	E	Chip enable
7-14	DB0-DB7	Data bus line
15	CS1	Chip select driver 1
16	CS2	Chip select driver 2
17	RST	Reset
18	CLK	External clock

ABSOLUTE MAXIMUM RATING							
Item	Symbol	Condition	Min.	Max.	Units		
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V		
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	19.0	V		
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V		
ELECTRICAL CHARACTERISTICS							
Item	Symbol	Condition	Min.	Typical	Max.	Units	
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V	
LCD operation voltage	Vop	Top	N	W	N	W	V
		-20°C	-	-	-	-	V
		0°C	-	-	-	-	V
		25°C	-	-	9.2	-	V
		50°C	-	-	-	-	V
		70°C	-	-	-	-	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.5	3	mA	
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA	
	LED/array	VB/L=4.2V	-	-	-	mA	

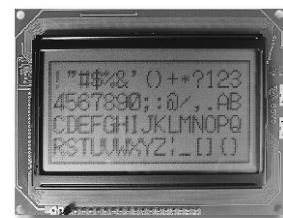
**REMARK**

LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.

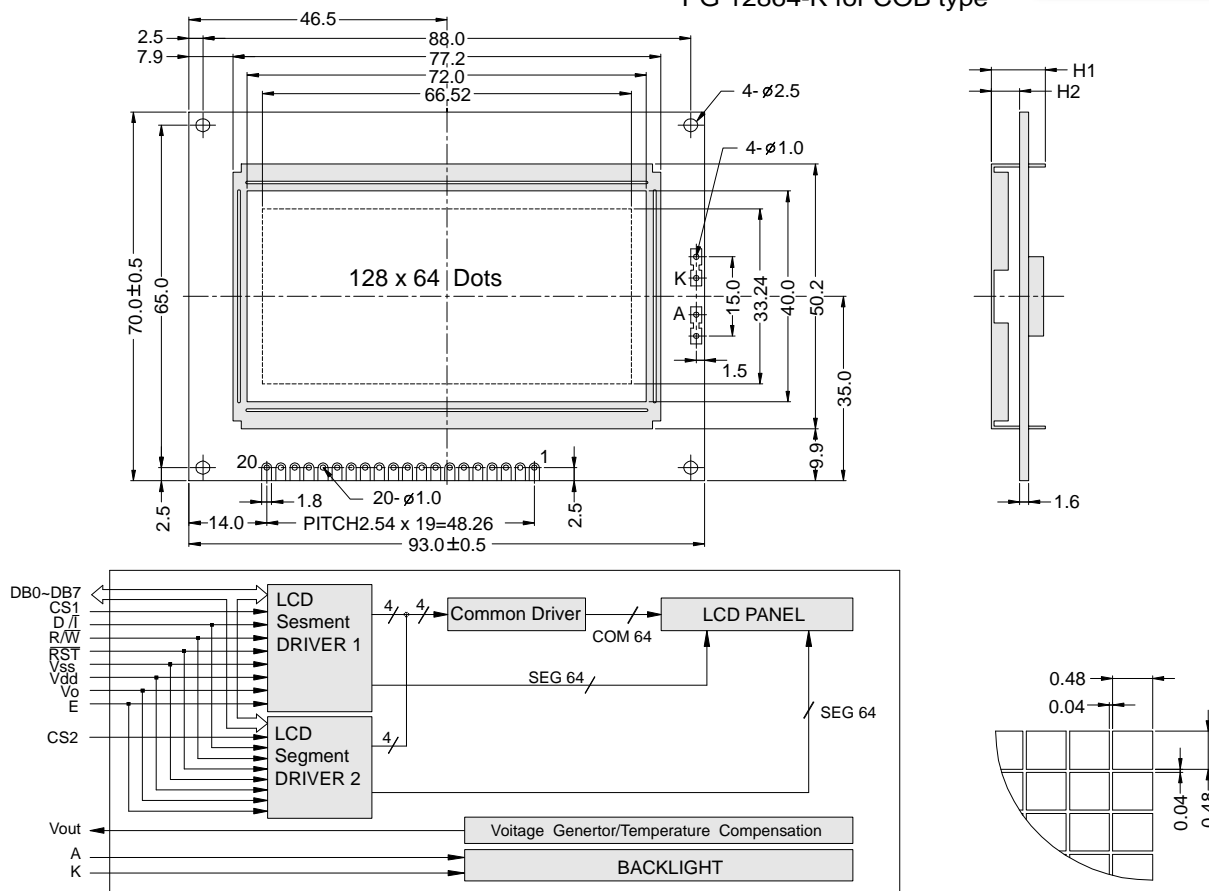


# PG 12864-A/K



## OUTLINE DIMENSION & BLOCK DIAGRAM

\*PG 12864-A for SMT type  
\*PG 12864-K for COB type



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	93.0 x 70.0	Module	H2 / H1
View Area	72.0 x 40.0	W/O B/L	5.1 / 9.7
Dot Size	0.48 x 0.48	EL B/L	5.1 / 9.7
Dot Pitch	0.52 x 0.52	LED B/L	8.9 / 13.5

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	D/I	Command / data input
5	R/W	Data read / write
6	E	Enable signal
7-14	DB0-DB7	Data bus line
15	CS1	Chip selection driver 1
16	CS2	Chip selection driver 2
17	RST	Reset
18	Vout	Negative voutage output
19	A	Power supply for LED B/L (+)
20	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	19.0	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.5	—	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	—	14.3	—	14.7	—	15.1	V
		0°C	9.7	—	10.2	—	10.7	—	V
		25°C	8.9	13.2	9.4	13.6	9.9	14	V
		50°C	8.6	—	9.1	9.6	—	—	V
70°C	—	12	—	12.4	—	12.8	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	—	2.5	5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	—	—	—	mA			
	LED/array	VB/L=4.2V	—	400	—	mA			

## REMARK

LCD option: STN, TN, FSTN

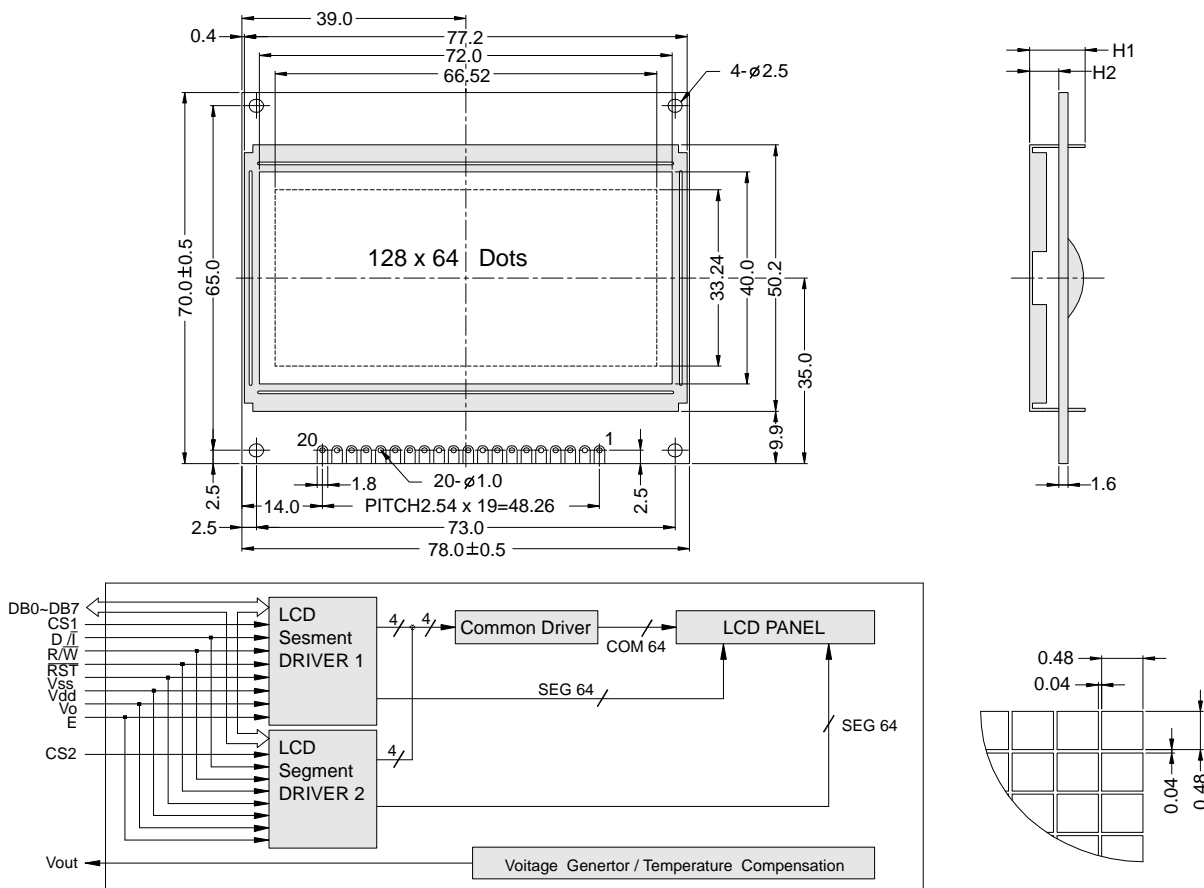
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.







**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified ± 0.3mm

MECHANICAL SPECIFICATION			
Overall Size	78.0 x 70.0	Module	H2 / H1
View Area	72.0 x 40.0	W / O B/L	5.1 / 9.7
Dot Size	0.48 x 0.48	EL B/L	- / -
Dot Pitch	0.52 x 0.52	LED B/L	8.9 / 13.5

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	D/I	Command / data input
5	R/W	Data read / write
6	E	Enable signal
7-14	DB0-DB7	Data bus line
15	CS1	Chip selection driver 1
16	CS2	Chip selection driver 2
17	RST	Reset
18	Vout	Negative voutage output
19	A	Power supply for LED B/L (+)
20	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	19.0	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.5	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	N	W	V
		-20°C	-	14.3	-	14.7	-	15.1	V
		0°C	9.7	-	10.2	-	10.7	-	V
		25°C	8.9	13.2	9.4	13.6	9.9	14	V
		50°C	8.6	-	9.1	-	9.6	-	V
70°C	-	12	-	12.4	-	12.8	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	300	-	mA			

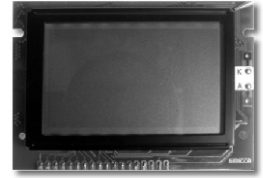
**REMARK**

LCD option: STN, TN, FSTN

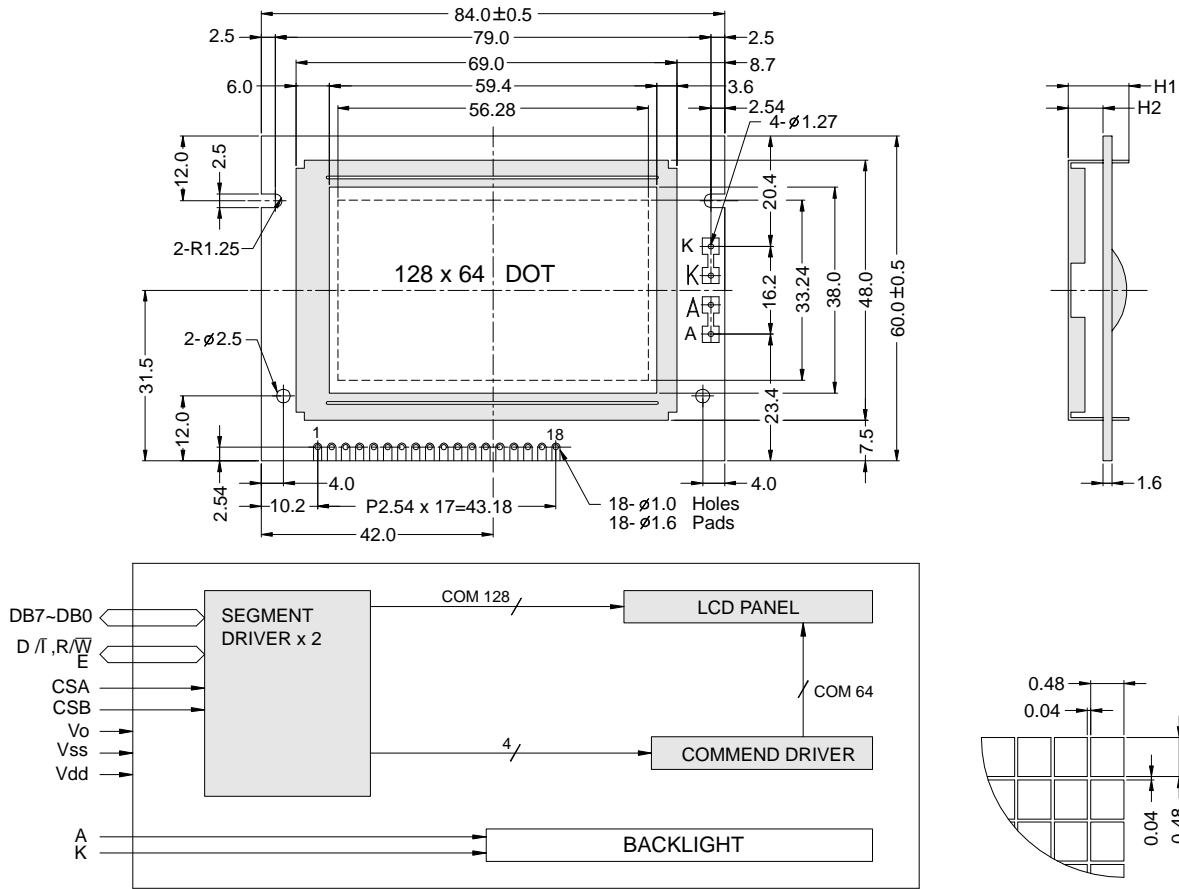
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



**PG 12864-D**



**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	84.0 x 60.0	Module	H2 / H1
View Area	59.4 x 38.0	W / O B/L	3.6 / 8.2
Dot Size	0.40 x 0.48	EL B/L	3.6 / 8.2
Dot Pitch	0.44 x 0.52	LED B/L	6.3 / 11.0

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1-8	DB0-DB7	Data bus line
9	E	Enable signal
10	R/W	Data read / write
11	D / $\bar{I}$	Command / Data select
12	Vo	Contrast Adjust
13	Vdd	Power supply(+)
14	Vss	Power supply(GND)
15	K	Power supply for LED B/L(-)
16	A	Power supply for LED B/L(+)
17	CSA	Chip selection driver 1
18	CSB	Chip selection driver 2

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	19.0	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.5	—	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	—	14.3	—	14.7	—	V	
		0°C	9.5	—	10	—	10.6	—	V
		25°C	8.8	13.2	9.3	13.6	9.8	14	V
		50°C	8.5	—	9	—	9.5	—	V
70°C	—	12	—	12.4	—	12.8	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	—	1.5	3	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	—	100	—	mA			
	LED/array	VB/L=4.2V	—	—	—	mA			

**REMARK**

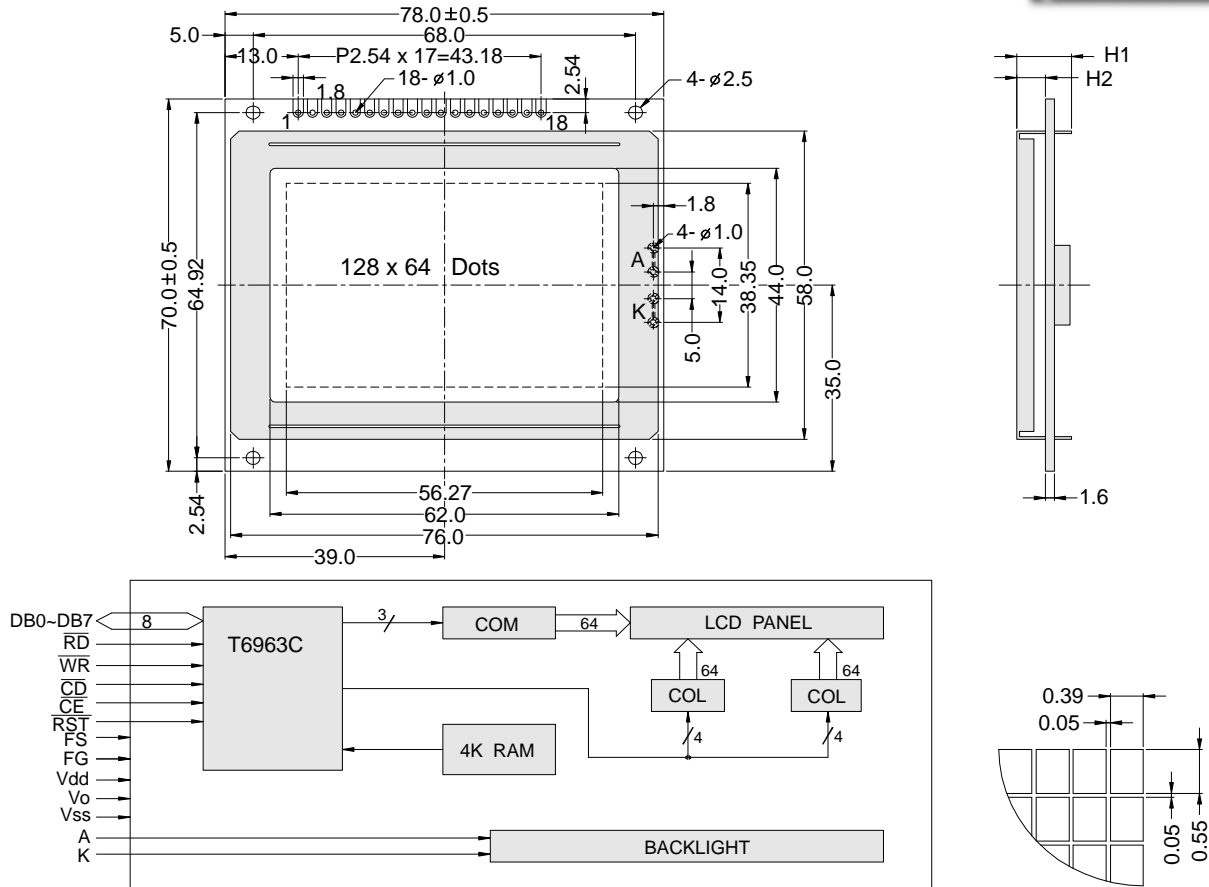
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	78.0 x 70.0	Module	H2 / H1
View Area	62.0 x 44.0	W/O B/L	5.1 / 9.7
Dot Size	0.39 x 0.55	EL B/L	5.1 / 5.7
Dot Pitch	0.44 x 0.60	LED B/L	9.2 / 13.8

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	FG	Frame ground
2	Vss	Power supply(GND)
3	Vdd	Power supply(+)
4	Vo	Contrast Adjust
5	WR	Data write
6	RD	Data read
7	CE	Chip enable
8	CD	Command / data select
9	RST	Reset
10-17	DB0-DB7	Data bus line
18	FS	Font select

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	0	22.0	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.5	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	8.6	-	9	-	9.5	V
		0°C	8.5	-	8.9	-	9.3	-	V
		25°C	8	8.6	8.4	9	8.8	9.5	V
		50°C	7.6	-	8	-	8.4	-	V
70°C	-	8	-	8.4	-	7.8	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	6.5	-	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	350	-	mA			

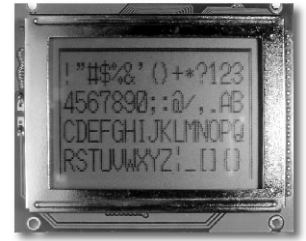
**REMARK**

LCD option: STN, TN, FSTN

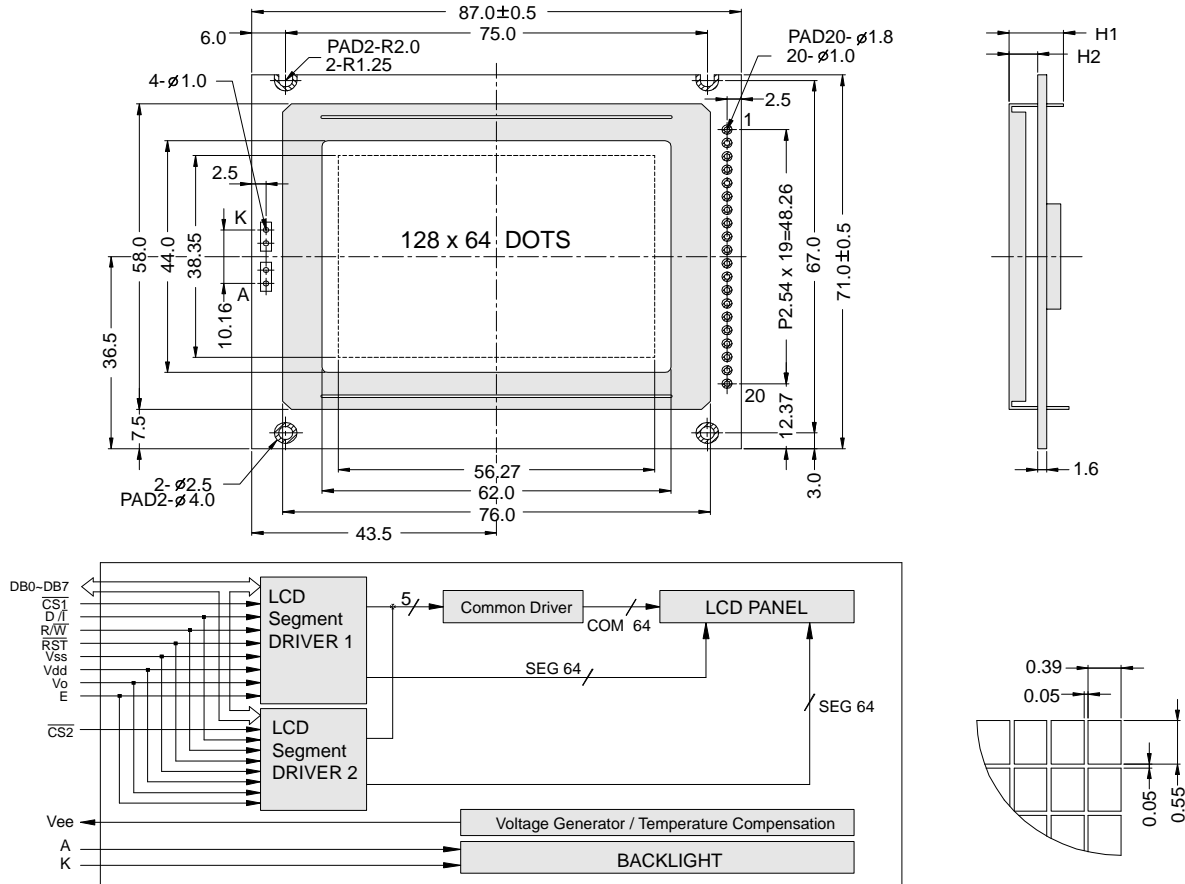
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



# PG 12864-H



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	87.0 x 71.0	Module	H2 / H1
View Area	62.0 x 44.0	W/O B/L	5.1 / 9.7
Dot Size	0.39 x 0.55	EL B/L	5.1 / 9.7
Dot Pitch	0.44 x 0.60	LED B/L	9.2 / 13.8

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	D/I	Command / data select
5	R/W	Data read / write
6	E	Chip enable signal
7-14	DB0-DB7	Data bus line
15	CS1	Chip select driver 1
17	RST	Reset
18	Vee	Negative voltage output
16	CS2	Chip select driver 1
19	A	Power supply for LED B/L (+)
20	K	Power supply for LED B/L (-)

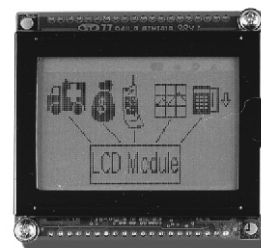
ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-Vss	25°C	-0.3	19.0	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.5	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	8.6	-	9	-	9.5	V
		0°C	8.6	-	8.9	-	9.2	-	V
		25°C	8.1	8.6	8.4	9	8.7	9.5	V
		50°C	7.7	-	8	-	8.3	-	V
70°C	-	8.0	-	8.4	-	7.8	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	390	-	mA			

## REMARK

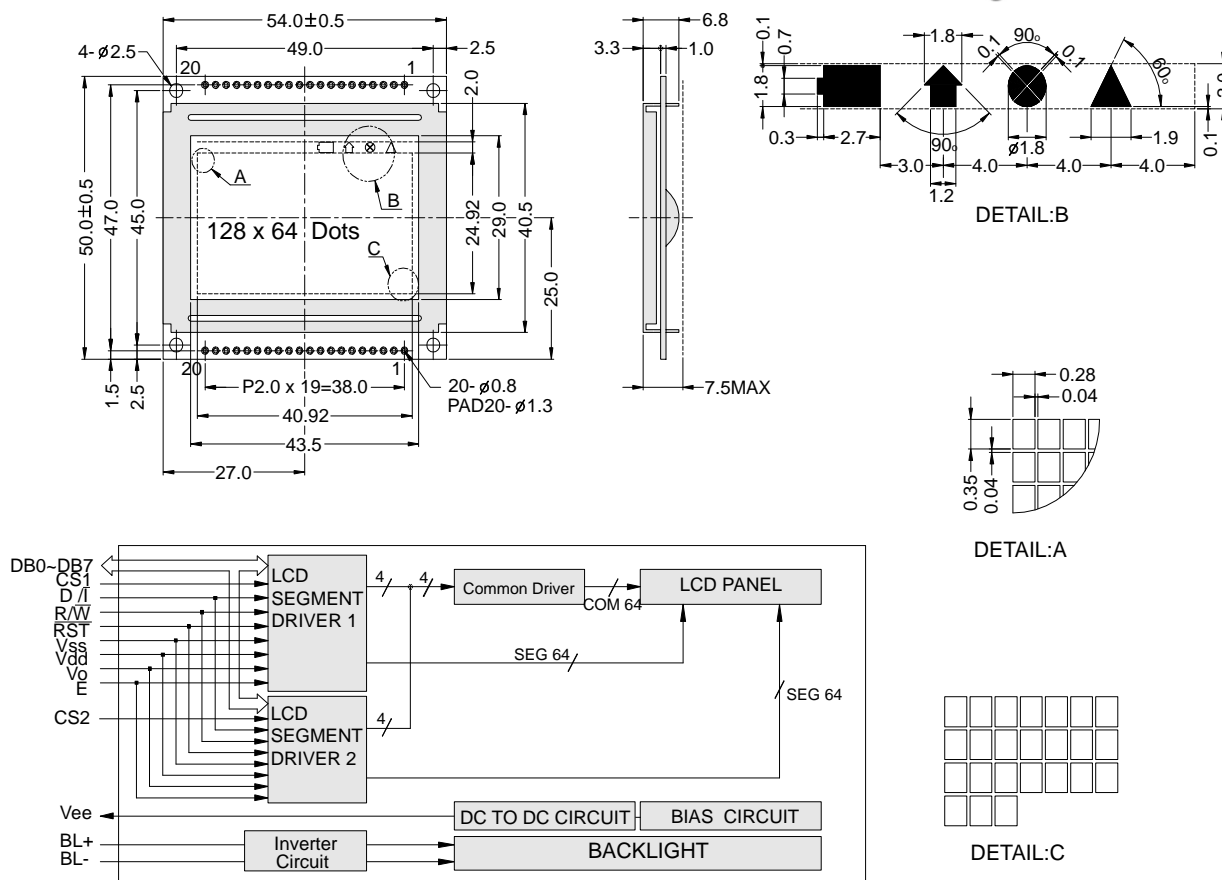
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified ± 0.3mm

MECHANICAL SPECIFICATION			
Overall Size	54.0 x 50.0	Module	H2 / H1
View Area	43.5 x 29.0	W/O B/L	3.3 / 6.8
Dot Size	0.28 x 0.35	EL B/L	3.3 / 6.8
Dot Pitch	0.32 x 0.39	LED B/L	- / -

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	D/I	Command / data select
5	R/W	Data read / write
6	E	Chip enable signal
7-14	DB0-DB7	Data bus line
15	CS1	Chip select driver 1
16	CS2	Chip select driver 2
17	RST	Reset
18	Vee	Negative voltage output
19	BL+	Enable (on/off) for EL B/L
20	BL-	No connection

ABSOLUTE MAXIMUM RATING							
Item	Symbol	Condition	Min.	Max.	Units		
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V		
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	19.0	V		
Input voltage	Vin	25°C	-0.3	Vdd-0.3	V		
ELECTRICAL CHARACTERISTICS							
Item	Symbol	Condition	Min.	Typical	Max.	Units	
Power supply voltage	Vdd-Vss	25°C	4.5	-	5.5	V	
LCD operation voltage	Vop	Top	N	W	N	W	V
		-20°C	-	-	-	-	V
		0°C	-	-	-	-	V
		25°C	-	-	8.5	-	V
		50°C	-	-	-	-	V
70°C	-	-	-	-	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	5	mA	
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA	
	LED/array	VB/L=4.2V	-	-	-	mA	

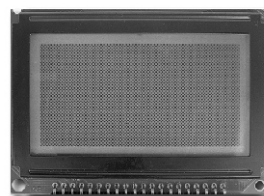
**REMARK**

LCD option: STN, TN, FSTN

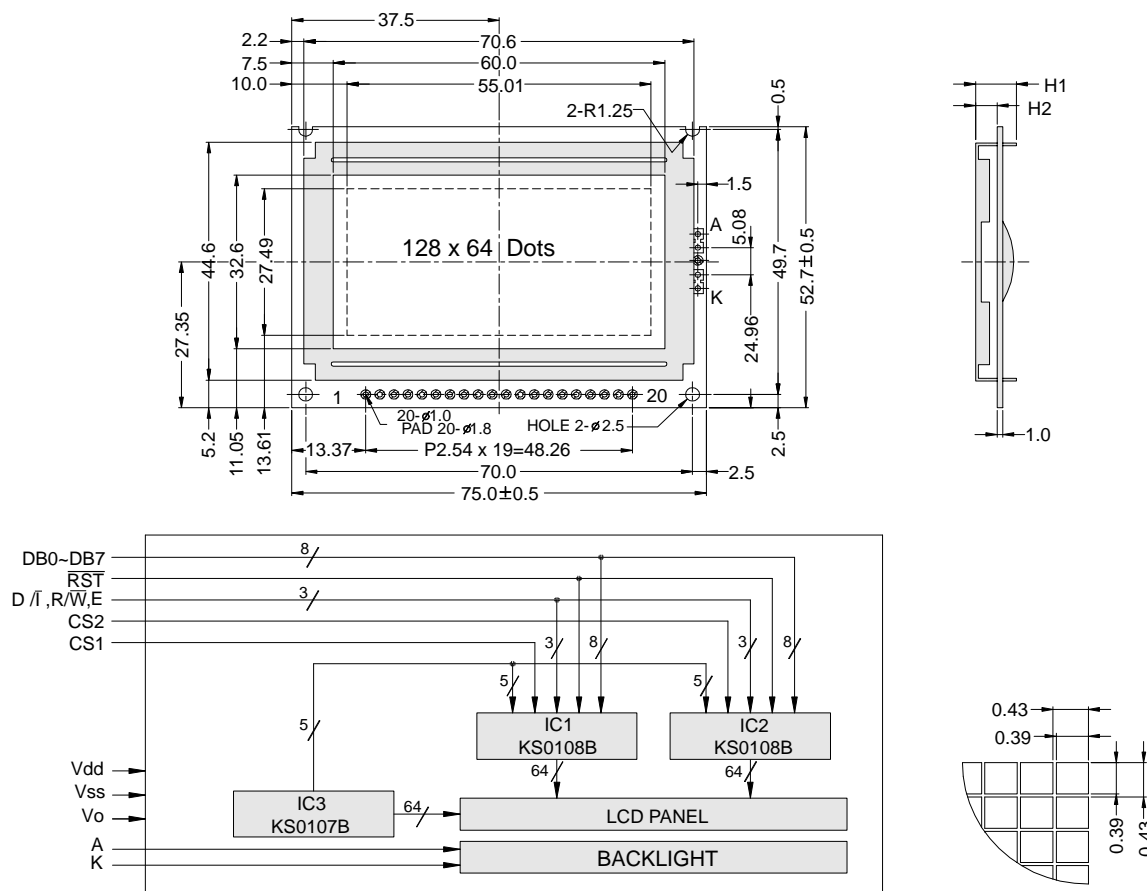
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



# PG 12864-J



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	75.0 x 52.7	Module	H2 / H1
View Area	60.0 x 32.6	W/O B/L	3.9 / 7.4
Dot Size	0.39 x 0.39	EL B/L	3.9 / 7.4
Dot Pitch	0.43 x 0.43	LED B/L	5.4 / 8.4

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vdd	Power supply(+)
2	Vss	Power supply(GND)
3	Vo	Contrast Adjust
4-11	DB0-DB7	Data bus line
12	CS1	Chip select driver 1
13	CS2	Chip select driver 2
14	RST	Reset
15	R/W	Data read / write
16	D/I	Command / data select
17	E	Chip enable signal
18	Vss	Power supply (GND)
19	A	Power supply for LED B/L(+)
20	K	Power supply for LED B/L(-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	19.0	V				
Input voltage	Vin	25°C	-0.3	Vdd-0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.5	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	8.3	-	9	-	9.7	V
		0°C	8.2	-	8.9	-	9.6	-	V
		25°C	7.7	8.3	8.4	9	9.1	9.7	V
		50°C	7.3	-	8.0	-	8.7	-	V
70°C	-	7.7	-	8.4	-	9.1	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	100	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

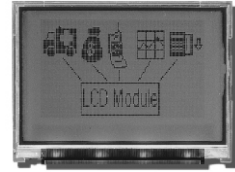
## REMARK

LCD option: STN, TN, FSTN

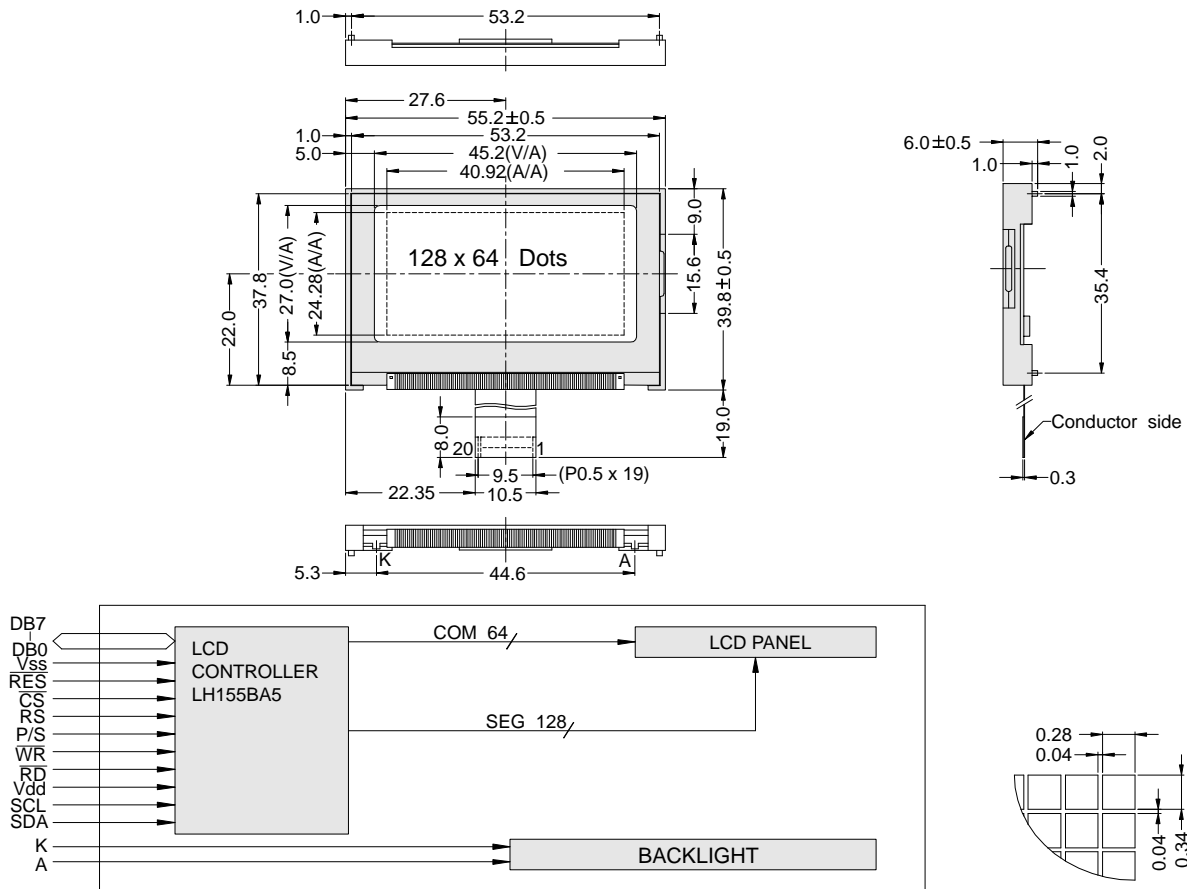
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



# PG 12864-N



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	55.2 x 39.8	Module	H2 / H1
View Area	45.2 x 27.0	W/O B/L	5.0 / 6.0
Dot Size	0.28 x 0.34	EL B/L	- / -
Dot Pitch	0.23 x 0.38	LED B/L	5.0 / 6.0

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	RES	Reset
3	CS	Chip select signal
4	RS	Identify data sent by MPU at D0 to D7
5	P/S	Switch between parallel & serial interface
6	WR	Write data signal
7	RD	Read data signal
8-15	DB0-DB7	Data bus line
16	Vdd	Power supply(+)
17	SCL	Serial data input pin
18	SDA	Serial data transfer clock pin
19	A	Power supply for LED B/L(+)
20	K	Power supply for LED B/L(-)

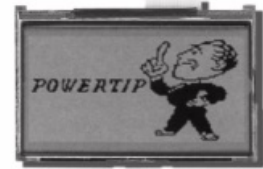
ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	6.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	15.0	V				
Input voltage	Vin	25°C	-0.3	Vdd-0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	1.8	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	8.6	-	9.0	-	V	
		0°C	8.6	-	8.9	-	9.2	-	V
		25°C	8.1	8.6	8.4	9.0	8.7	9.5	V
		50°C	7.7	-	8.0	-	8.3	-	V
70°C	-	8.0	-	8.4	-	8.8	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1	3	mA			
Backlight current consumption	LED/edge	VB/L=2.1V	-	40	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

## REMARK

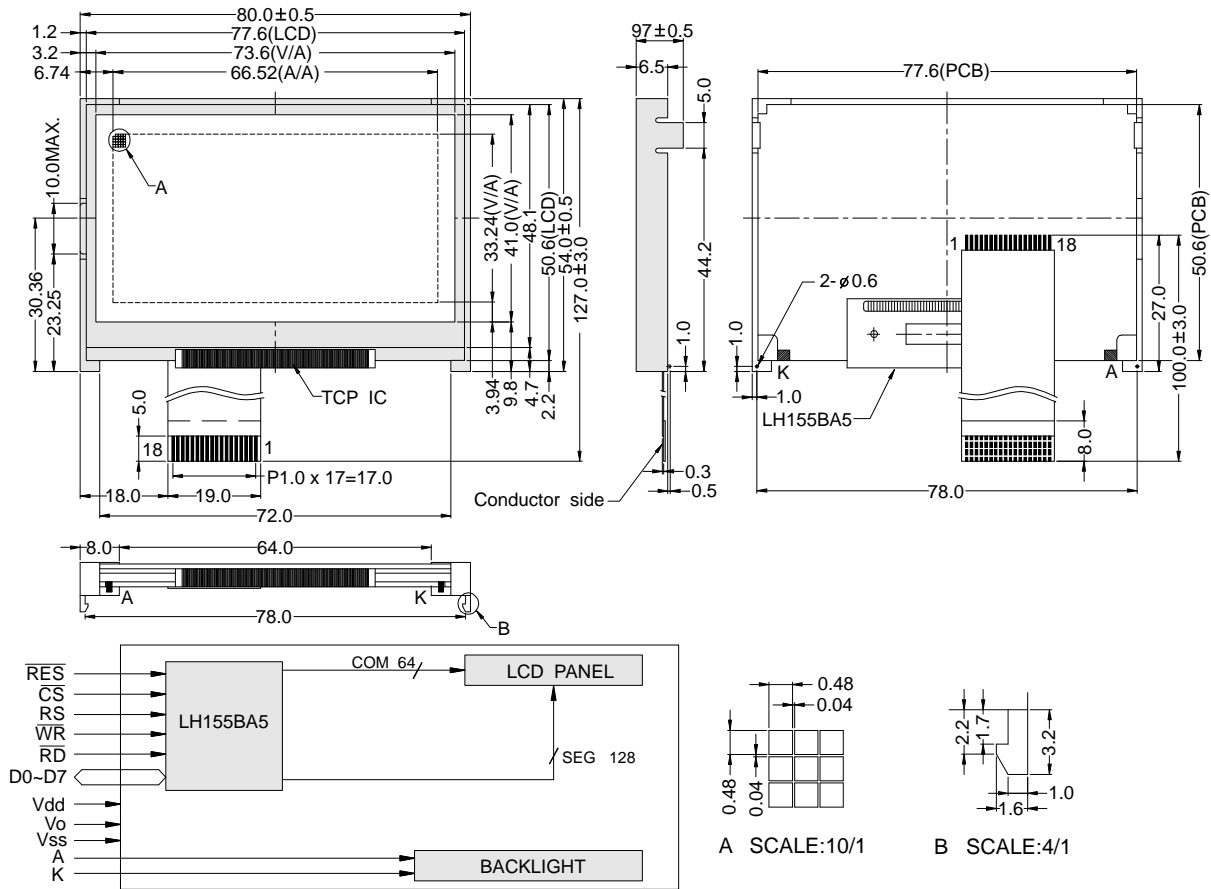
LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	50.2 x 34.5	Module	H2 / H1
View Area	45.2 x 27.0	W / O B/L	5.2 / 8.2
Dot Size	0.28 x 0.27	EL B/L	- / -
Dot Pitch	0.31 x 0.32	LED B/L	5.2 / 8.2

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	RES	Reset
5	CS	Chip select
6	RS	Command / data select
7	WR	Data write
8	RD	Data read
9-16	DB0-DB7	Data bus line
17	A	Power supply for LED B/L (+)
18	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	6.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	15.0	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	1.8	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	11.4	-	11.6	-	10.6	V
		0°C	-	-	-	-	-	-	V
		25°C	-	10.3	-	10.5	-	9.6	V
		50°C	-	-	-	-	-	-	V
		70°C	-	9.0	-	8.2	-	8.6	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	80	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

**REMARK**

LCD option: STN, TN, FSTN

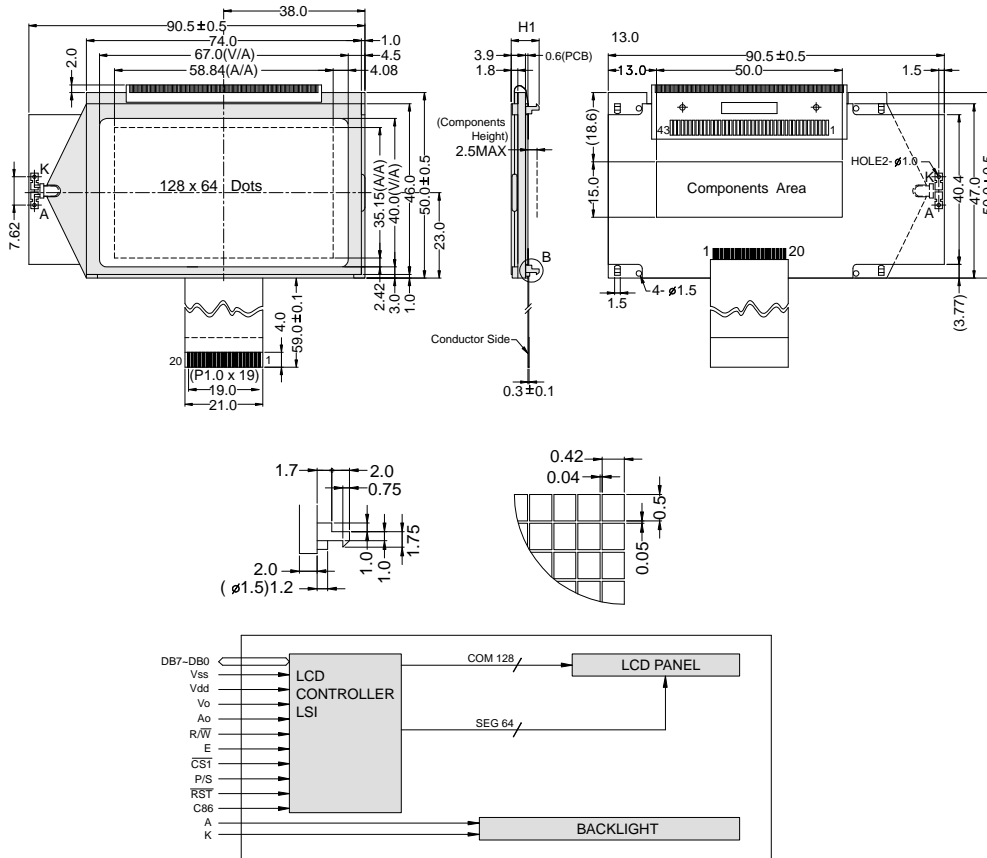
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.







**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified ± 0.3mm

MECHANICAL SPECIFICATION			
Overall Size	90.5 x 52.0	Module	H2 / H1
View Area	67.0 x 40.0	W / O B/L	- / 7.5
Dot Size	0.42 x 0.5	EL B/L	- / -
Dot Pitch	0.46 x 0.55	LED B/L	- / 7.5

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	A0	Command / data input
5	R/W	Data read / write signal(/RW)
6	E	Enable signal
7-14	DB0-DB7	Data bus line
15	P/S	Parallel / serial interface select
16	CS1	Chip select
17	RST	Reset
18	C86	8080 / 6800 select
19	A	Power supply for LED B/L (+)
20	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	18.0	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	1.8	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	N	W	V
		-20°C	-	9.9	-	10.2	-	10.4	V
		0°C	-	-	-	-	-	-	V
		25°C	-	8.4	-	9.0	-	9.4	V
		50°C	-	-	-	-	-	-	V
70°C	-	7.8	-	8.0	-	8.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.0	2.5	mA			
Backlight current consumption	LED/edge	VB/L=3.5V	-	20	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

**REMARK**

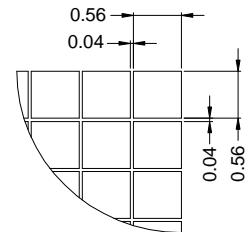
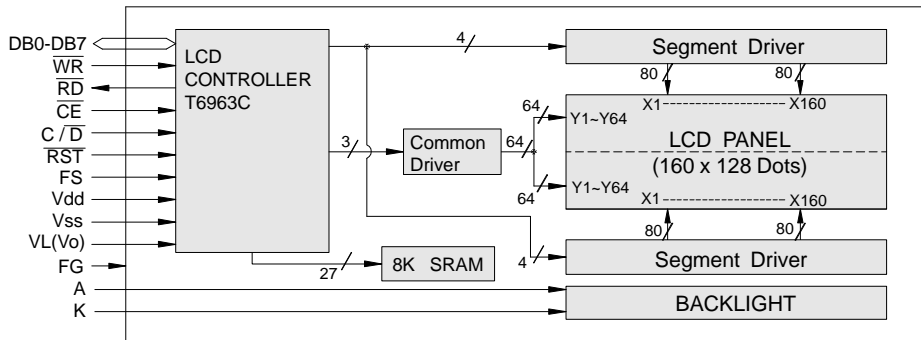
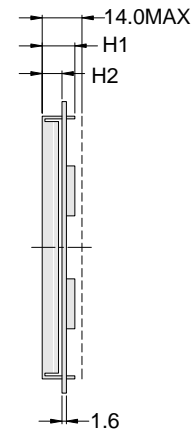
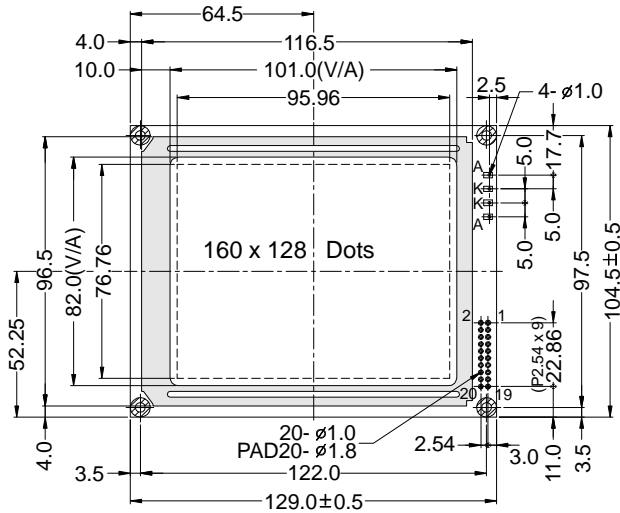
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

**MECHANICAL SPECIFICATION**

Overall Size	129.0 x 104.5	Module	H2 / H1
View Area	101.0 x 82.0	W/O B/L	7.0 / 14.0
Dot Size	0.56 x 0.56	EL B/L	7.0 / 14.0
Dot Pitch	0.60 x 0.60	LED B/L	- / -

**PIN ASSIGNMENT**

Pin no.	Symbol	Function
1	FGND	Frame ground
2	Vss	Power supply(GND)
3	Vdd	Power supply(+)
4	VL(Vo)	Contrast Adjust
5	WR	Data write
6	RD	Data read
7	CE	Chip enable
8	C/D	Command / data select
9	NC	No connection
10	RST	Reset
11-18	DB0-DB7	Data bus line
19	FS	Font selection
20	NC	No connection

**ABSOLUTE MAXIMUM RATING**

Item	Symbol	Condition	Min.	Max.	Units
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	28.0	V
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V

**ELECTRICAL CHARACTERISTICS**

Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.5	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	9.9	-	10.4	-	10.9	V
		0°C	11	-	11.6	-	12.2	-	V
		25°C	10.3	9.8	10.9	10.3	11.5	10.8	V
		50°C	9.6	-	10.2	-	10.8	-	V
		70°C	-	9.6	-	10.4	-	10.6	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	3	6	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	500	-	mA			

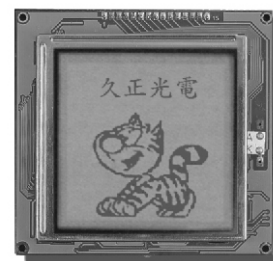
**REMARK**

LCD option: STN, TN, FSTN

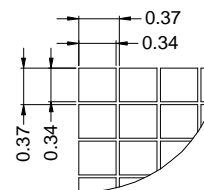
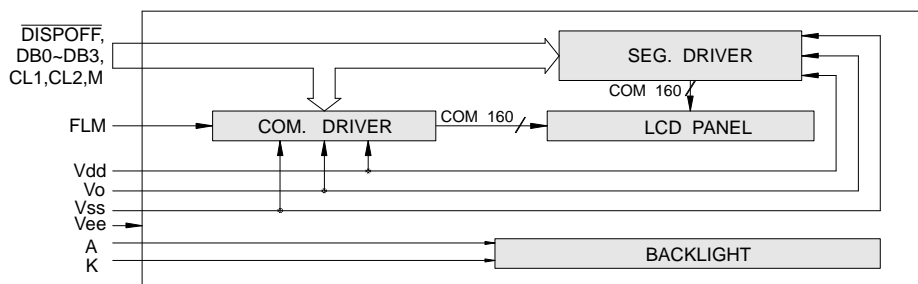
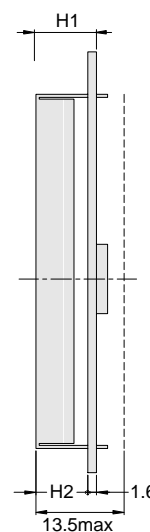
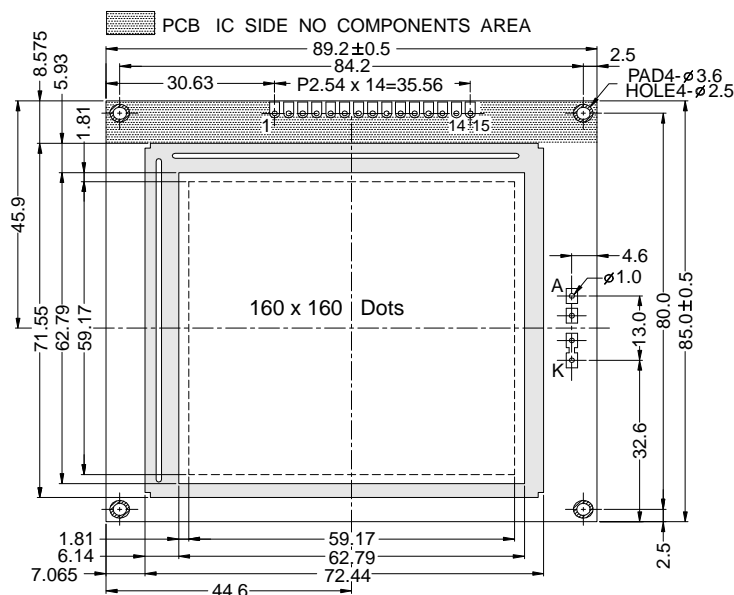
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



# PG 160160-B



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

### MECHANICAL SPECIFICATION

Overall Size	89.2 x 85.0	Module	H2 / H1
View Area	62.79 x 62.79	W / O B/L	- / -
Dot Size	0.34 x 0.34	EL B/L	- / -
Dot Pitch	0.37 x 0.37	LED B/L	9.4 / 13.5

### PIN ASSIGNMENT

Pin no.	Symbol	Function
1	Vss	Power supply (GND)
2	M	Alternation control signal
3	FLM	Shift direction select
4	CL1	Display data input clock
5	CL2	Display data input clock
6	DB3	Data bus line
7	DB2	Data bus line
8	DB1	Data bus line
9	DB0	Data bus line
10	Vee	Negative voltage Input
11	Vdd	Power supply (+)
12	Vo	Contrast Adjust
13	DISPOFF	Data bus line
14	A	Power supply for LED B/L (-)
15	K	Power supply for LED B/L (+)

### ABSOLUTE MAXIMUM RATING

Item	Symbol	Condition	Min.	Max.	Units
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V
LCD driving supply voltage	Vdd-Vee	25°C	0	30.0	V
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V

### ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typical	Max.	Units	
Power supply voltage	Vdd-Vss	25°C	4.5	-	5.5	V	
LCD operation voltage	Vop	25°C	N	W	N	W	V
		-20°C	-	-	-	-	V
		0°C	-	-	-	-	V
		25°C	-	-	18.3	-	V
		50°C	-	-	-	-	V
70°C	-	-	-	-	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	3	5	mA	
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA	
	LED/array	VB/L=4.2V	-	500	-	mA	

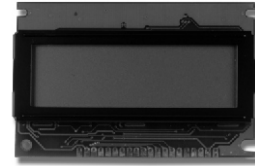
## REMARK

LCD option: STN, TN, FSTN

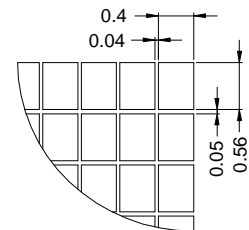
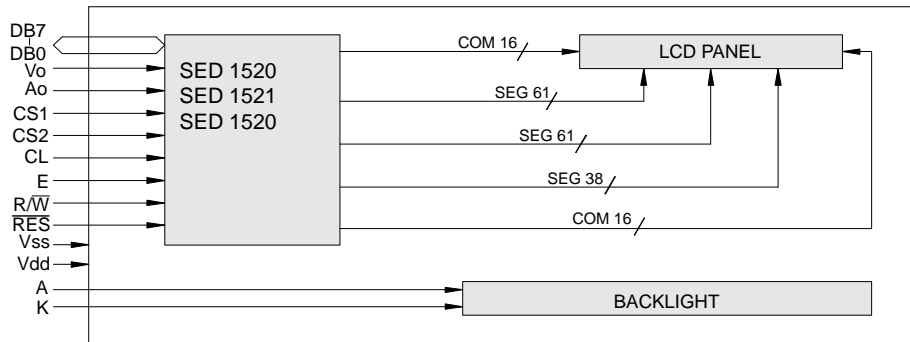
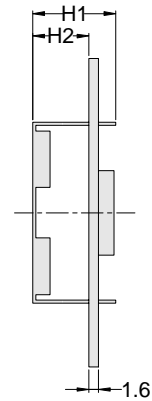
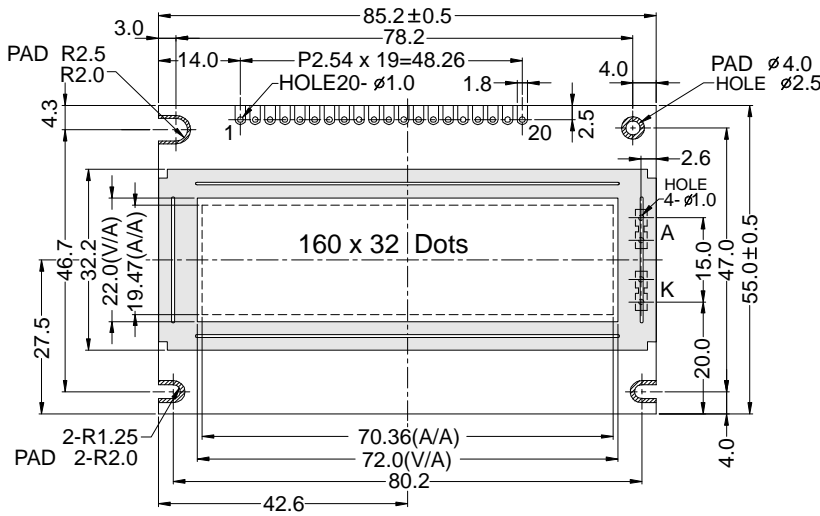
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



# PG 16032-A



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	85.2 x 55.0	Module	H2 / H1
View Area	72.0 x 22.0	W / O B/L	9.6 / 14.5
Dot Size	0.40 x 0.56	EL B/L	- / -
Dot Pitch	0.44 x 0.61	LED B/L	9.6 / 14.5

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast adjust
4	Ao	Command / Data select
5	CS1	Chip select driver 1
6	CS2	Chip select driver 2
7	CL	External clock input
8	E	Enable signal
9	R/W	Data read / write
10-17	DB0-DB7	Data bus line
18	RES	Reset
19	A	Power supply for LED B/L(+)
20	K	Power supply for LED B/L(-)

ABSOLUTE MAXIMUM RATING											
Item	Symbol	Condition	Min.	Max.	Units						
Supply for logic voltage	Vdd-Vss	25°C	-0.3	8.0	V						
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	16.5	V						
Input voltage	Vin	25°C	-0.3	Vdd-0.3	V						
ELECTRICAL CHARACTERISTICS											
Item	Symbol	Condition	Min.	Typical	Max.	Units					
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V					
		LCD operation voltage	Vop	Top	N	W	N	W	V		
				-20°C	-	6.1	-	6.4	-	6.7	V
				0°C	-	-	-	-	-	-	V
				25°C	-	6.0	-	6.3	-	6.6	V
				50°C	-	-	-	-	-	-	V
70°C	-	5.8	-	6.1	-	6.4	V				
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1	2.5	mA					
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA					
	LED/array	VB/L=4.2V	-	180	-	mA					

## REMARK

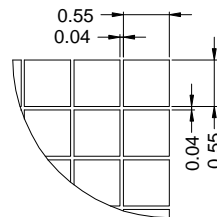
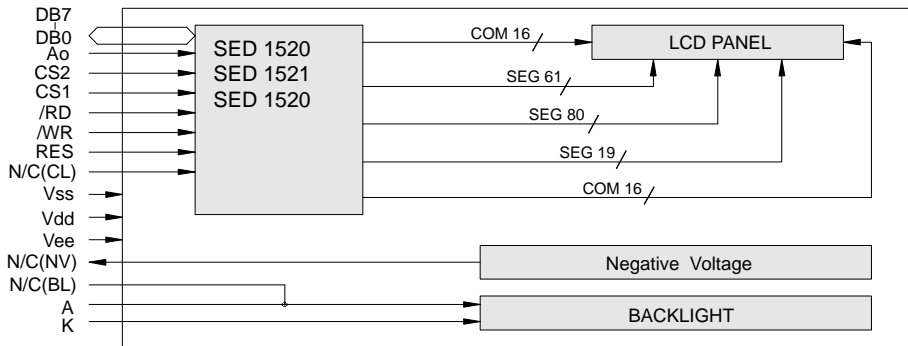
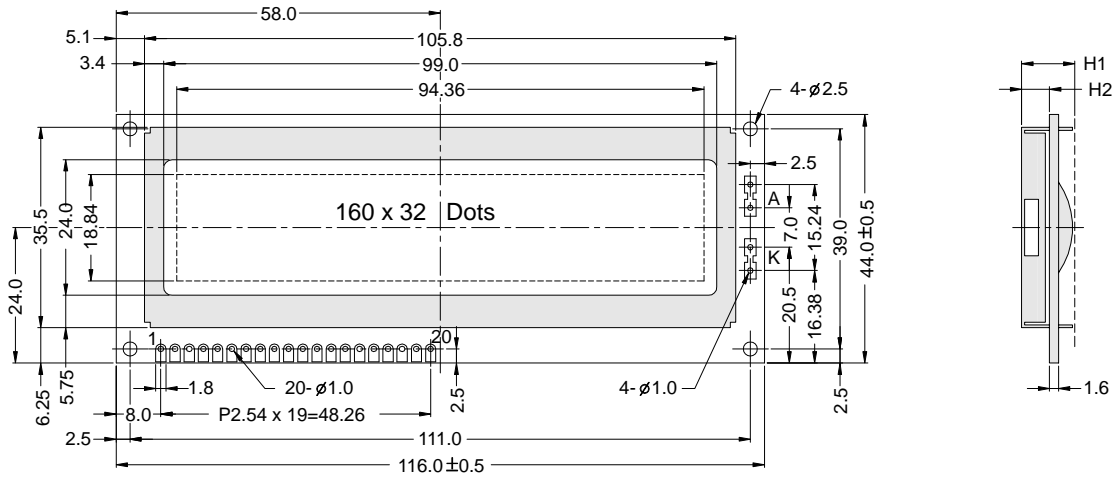
LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	116.0 x 44.0	Module	H2 / H1
View Area	99.0 x 24.0	W / O B/L	5.0 / 9.5
Dot Size	0.55 x 0.55	EL B/L	5.0 / 9.5
Dot Pitch	0.59 x 0.59	LED B/L	- / -

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Ao	Command / data select
2	CS2	Chip select driver 2
3	CS1	Chip select driver 1
4	RD	Data read
5	WR	Data write
6	Vdd	Power supply(+)
7	Vss	Power supply(GND)
8-15	DB0-DB7	Data bus line
16	RES	Reset
17	Vee	Contrast adjust
18	N.C	No Connection
19	N.C	No Connection
20	N.C	No Connection

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	8.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	16.5	V				
Input voltage	Vin	25°C	-0.3	Vdd-0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	6.4	-	6.8	-	7.4	V
		0°C	-	-	-	-	-	-	V
		25°C	-	5.8	-	6.2	-	6.8	V
		50°C	-	-	-	-	-	-	V
70°C	-	5.3	-	5.7	-	6.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

**REMARK**

LCD option: STN, TN, FSTN

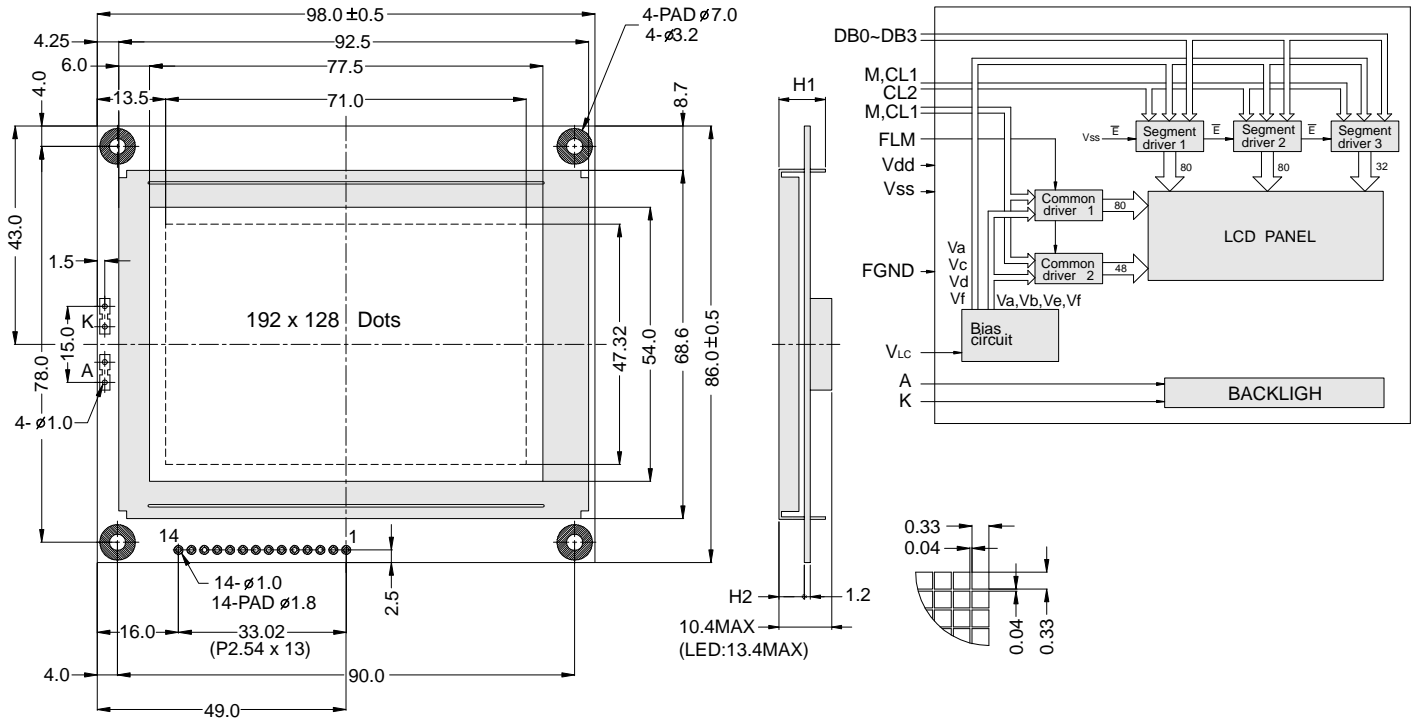
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



# PG 192128-A



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	98.0 x 86.0	Module	H2 / H1
View Area	75.0 x 54.0	W/O B/L	5.0 / 9.2
Dot Size	0.33 x 0.33	EL B/L	5.0 / 9.2
Dot Pitch	0.37 x 0.37	LED B/L	8.0 / 12.2

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1,2	D3,D2	Data line
3	FLM	Shift direction select
4	M	Alternation control signal
5	CL1	Display data input colock
6	CL2	Display data input colock
7,8	D1,D0	Data line
9	Vdd	Power supply(+)
10	Vss	Power supply(GND)
11	V <sub>Lc</sub>	Contrast adjust
12	FGND	Frame adjust
13	K	Power supply for LED B/L (+)
14	A	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-V <sub>ee</sub>	25°C	0	22.0	V				
Input voltage	V <sub>in</sub>	25°C	-0.3	Vdd-0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.5	—	5.5	V			
LCD operation voltage	V <sub>op</sub>	Top	N	W	N	W	V		
		-25°C	—	19.5	—	20.6	—	V	
		0°C	19.4	—	20.4	—	21.4	—	V
		25°C	18.0	17.0	18.9	17.9	19.8	18.8	V
		50°C	16.1	—	16.9	—	17.7	—	V
70°C	—	15.4	—	16.3	—	17.2	V		
LCM current consumption (No B/L)	I <sub>dd</sub>	Vdd=5V	—	2.5	—	mA			
Backlight current consumption	LED/edge	V <sub>B/L</sub> =4.2V	—	85	—	mA			
	LED/array	V <sub>B/L</sub> =4.2V	—	—	—	mA			

## REMARK

LCD option: STN, TN, FSTN

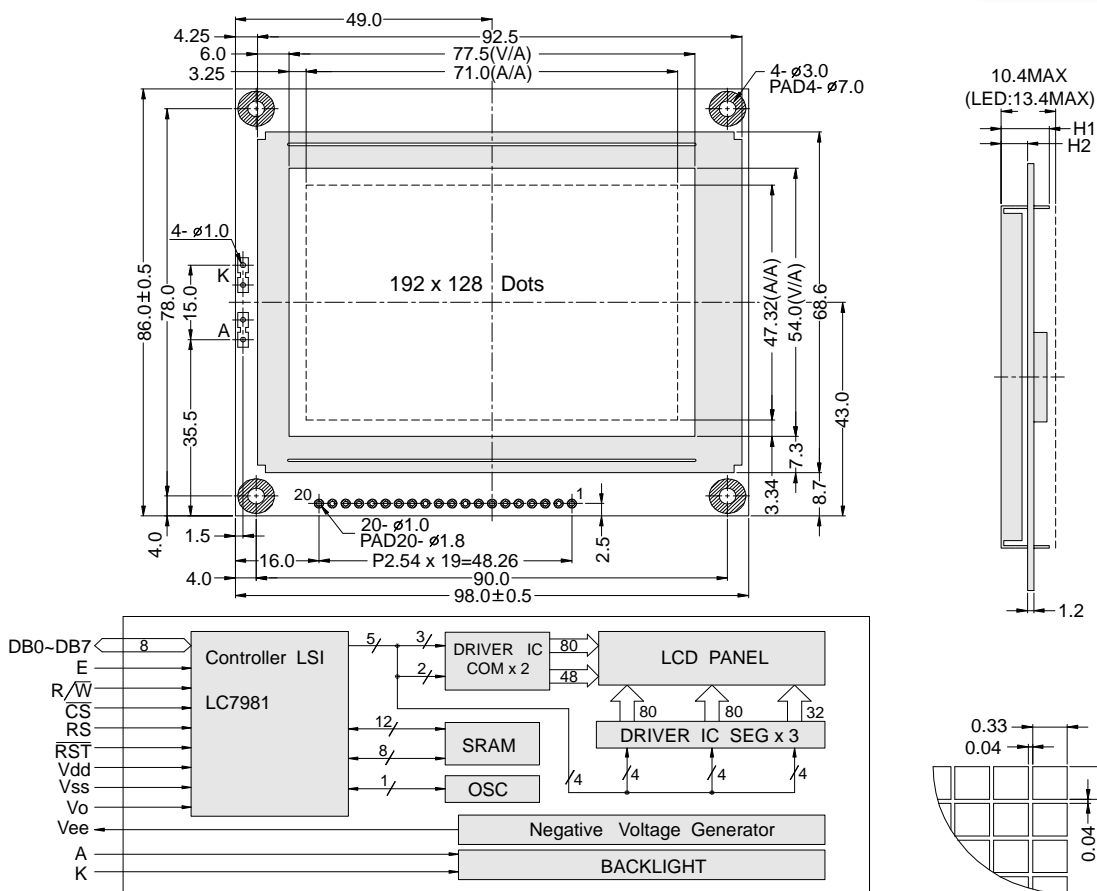
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



# PG 192128-B



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	98.0 x 86.0	Module	H2 / H1
View Area	77.5 x 54.0	W / O B/L	5.0 / 9.2
Dot Size	0.33 x 0.33	EL B/L	5.0 / 9.2
Dot Pitch	0.37 x 0.37	LED B/L	8.0 / 12.2

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply (GND)
2	Vdd	Power supply (+)
3	Vo	Contrast adjust
4	RS	Common / Data select
5	R/W	data read / write
6	E	enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	CS	Chip select
16	RST	Reset
17	Vee	Negative voltage output
18	N/C	No connection
19	A	Power supply for LED B/L (+)
20	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	0	30.0	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.75	—	5.25	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	—	19.5	—	20.6	—	V	
		0°C	19.4	—	20.4	—	21.4	—	V
		25°C	18.0	17.0	18.9	17.9	19.8	18.8	V
		50°C	16.1	—	16.9	—	17.7	—	V
70°C	—	15.4	—	16.3	—	17.2	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	—	20	25	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	—	85	—	mA			
	LED/array	VB/L=4.2V	—	—	—	mA			

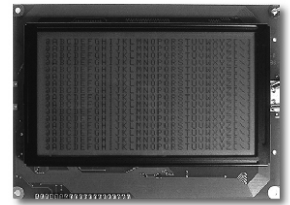
## REMARK

LCD option: STN, TN, FSTN

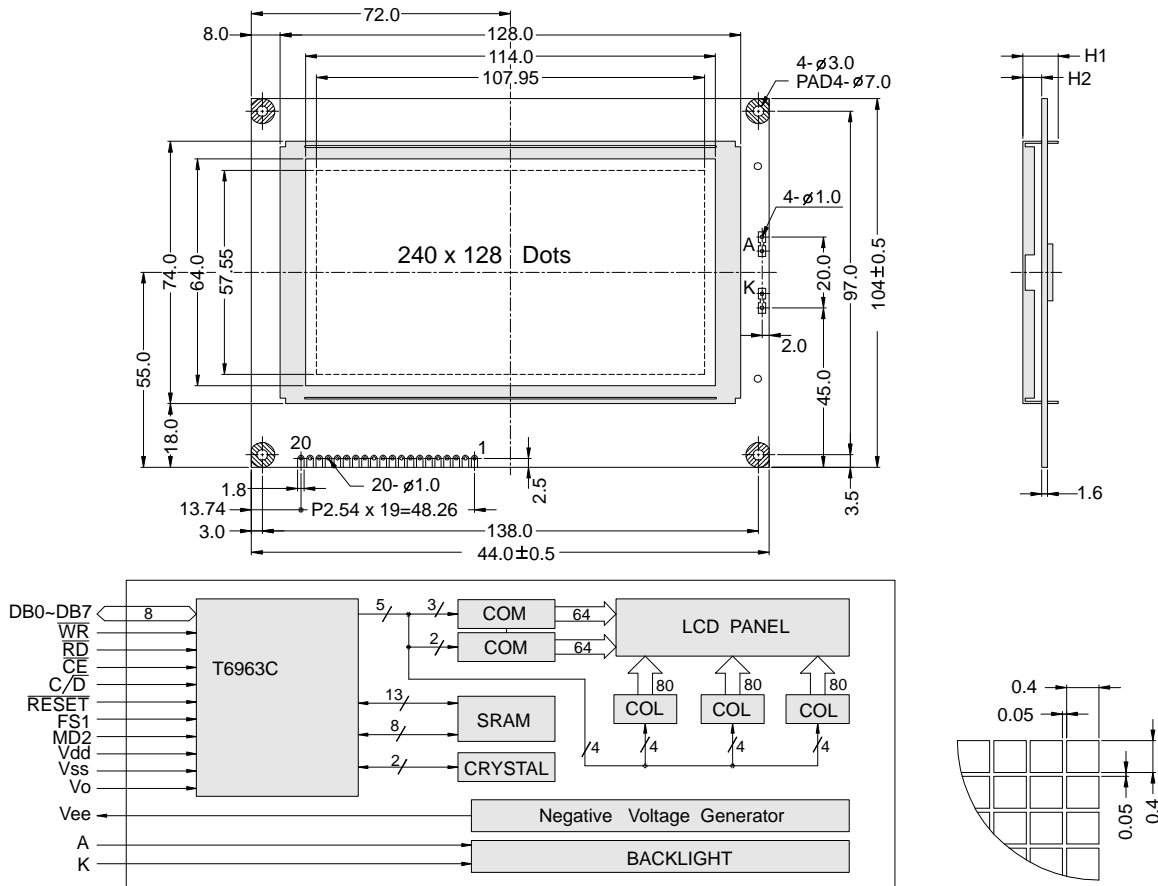
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



# PG 240128-A



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	144.0 x 104.0	Module	H2 / H1
View Area	114.0 x 64.0	W / O B/L	5.2 / 9.8
Dot Size	0.40 x 0.40	EL B/L	5.2 / 9.8
Dot Pitch	0.45 x 0.45	LED / CCFL B/L	9.2 / 13.8

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	C/D	Command / data select
5	RD	Data read
6	WR	Data write
7-14	DB0-DB7	Data bus line
15	CE	Chip enable
16	RST	Reset
17	Vee	Negative output
18	MD2	Select number of columns
19	FS1	Font selection
20	NC	No connection

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	0	22.0	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.5	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	18.8	-	19.8	-	20.8	V
		0°C	12.5	-	13.1	-	13.7	-	V
		25°C	11.7	17.2	12.3	18.1	12.9	19.1	V
		50°C	10.9	-	11.4	-	11.9	-	V
70°C	-	16.1	-	16.9	-	17.7	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	35	50	mA			
Backlight current consumption	LED/edge	VB/L=3.5V	-	120	-	mA			
	LED/array	VB/L=4.2V	-	900	-	mA			

## REMARK

LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.

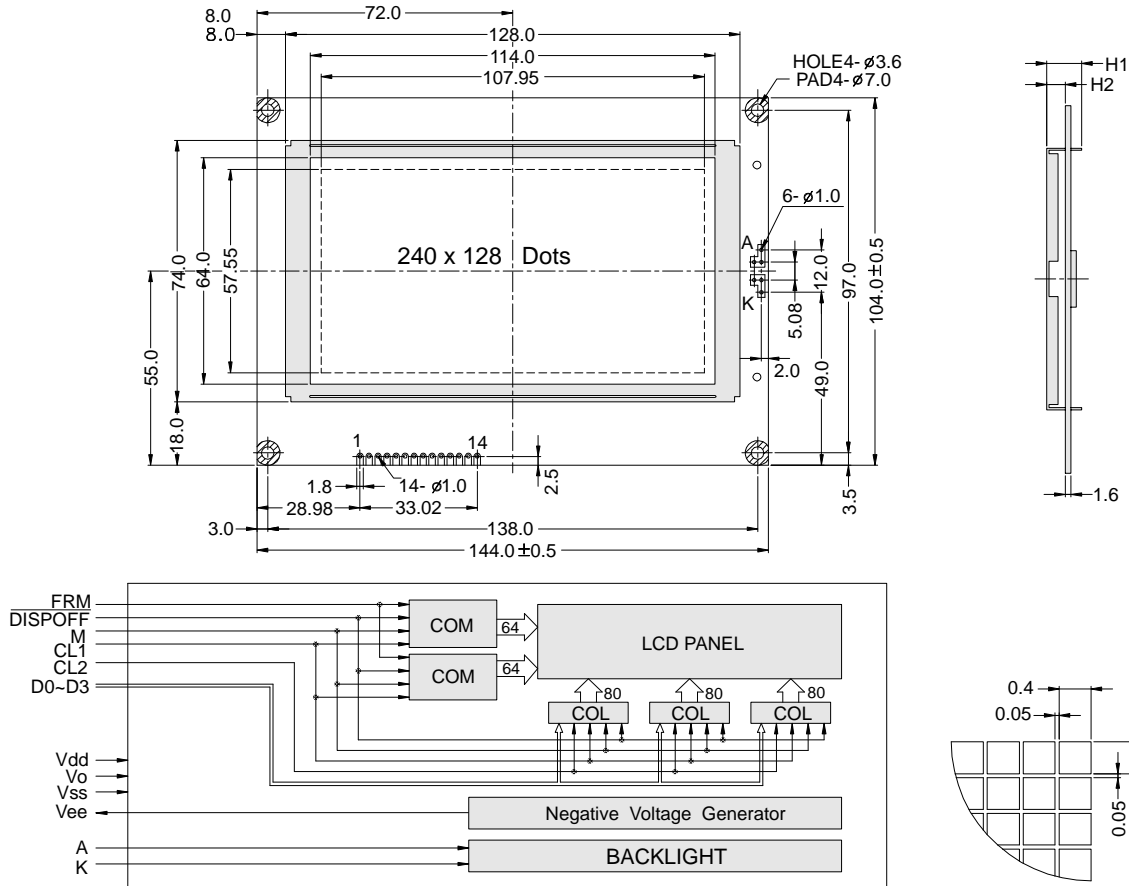




# PG 240128-B



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	144.0 x 104.0	Module	H2 / H1
View Area	114.0 x 64.0	W/O B/L	5.2 / 9.8
Dot Size	0.40 x 0.40	EL B/L	5.2 / 9.8
Dot Pitch	0.45 x 0.45	LED / CCFL B/L	9.2 / 13.8

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vo	Contrast Adjust
2	Vee	Negative voltage output
3	DB0	Data bus line
4	DB1	Data bus line
5	DB2	Data bus line
6	DB3	Data bus line
7	M	Alternation control signal
8	Vss	Power supply(GND)
9	Vdd	Power supply(+)
10	CL2	Display data input colock
11	CL1	Display data input colock
12	FRM	Shift direction select
13	DISPOFF	Column output control
14	FG	Frame ground

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7	V				
LCD driving supply voltage	Vdd-Vee	25°C	0	22.0	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.5	—	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	—	18.8	—	19.8	—	20.8	V
		0°C	12.5	—	13.1	—	13.7	—	V
		25°C	11.7	17.2	12.3	18.1	12.9	19.1	V
		50°C	10.9	—	11.4	—	11.9	—	V
70°C	—	16.1	—	16.9	—	17.7	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	—	7	—	mA			
Backlight current consumption	LED/edge	VB/L=3.5V	—	120	—	mA			
	LED/array	VB/L=4.2V	—	900	—	mA			

## REMARK

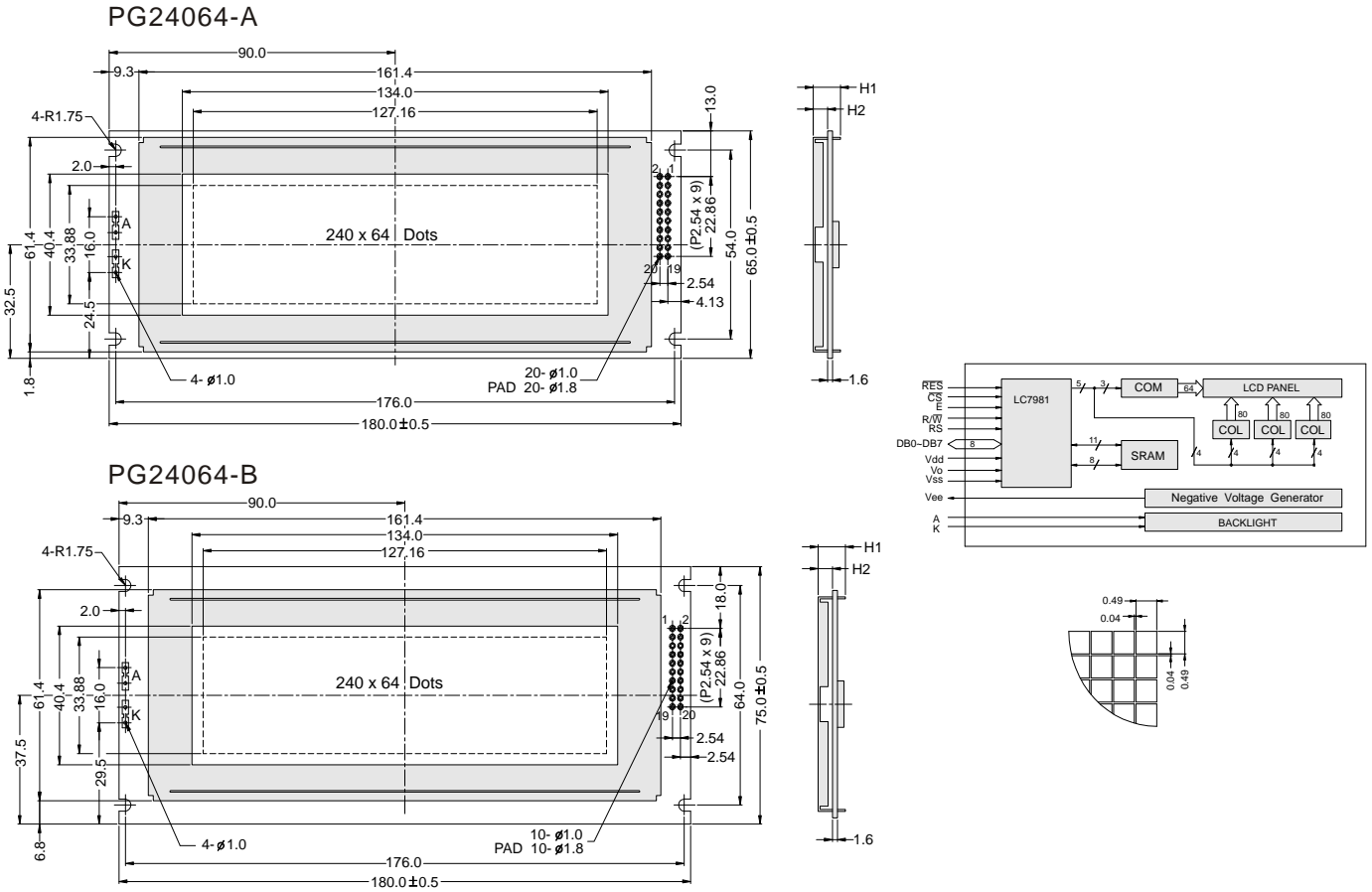
LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	180.0 x 65.0	Module	H2 / H1
View Area	134.0 x 40.4	W/O B/L	4.5 / 8.6
Dot Size	0.49 x 0.49	EL B/L	4.5 / 8.6
Dot Pitch	0.53 x 0.53	LED / CCFL B/L	9.2 / 13.3

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast adjust
4	RS	Command / data select
5	R/W	Data read / write
6	E	Enable signal
7-14	DB0-DB7	Data bus line
15	$\overline{\text{CS}}$	Chip select
16	$\overline{\text{RST}}$	Reset
17	Vee	Negative voltage output
18	NC	No Connection
19	A	Power supply for LED B/L(+)
20	K	Power supply for LED B/L(-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	0	22.0	V				
Input voltage	Vin	25°C	-0.3	Vdd-0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.75	—	5.25	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-25°C	—	14.3	—	14.7	—	V	
		0°C	9.7	—	10.2	—	10.7	V	
		25°C	8.9	13.2	9.4	13.6	9.9	14	V
		50°C	8.6	—	9.1	—	9.6	—	V
70°C	—	12	—	12.4	—	12.8	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	—	42	—	mA			
Backlight current consumption	LED/edge	VB/L=3.5V	—	80	—	mA			
	LED/array	VB/L=4.2V	—	650	—	mA			

**REMARK**

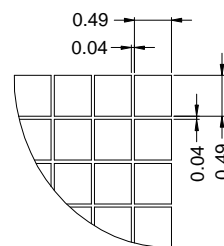
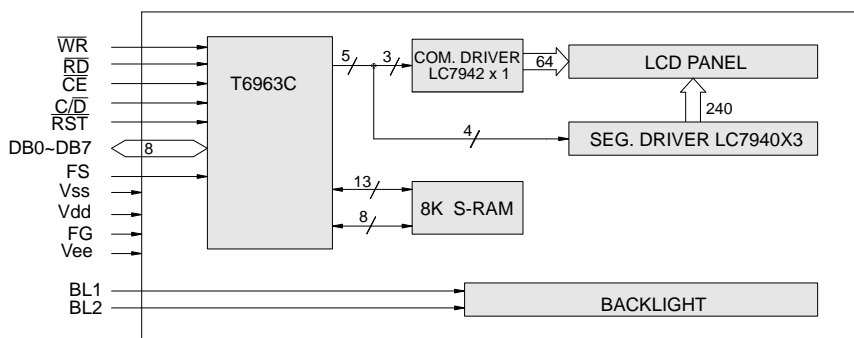
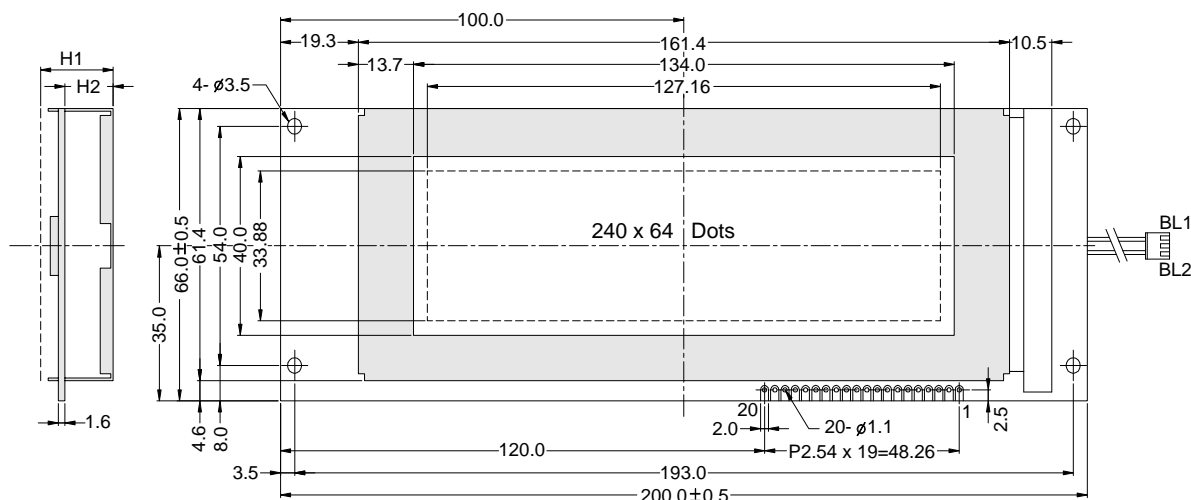
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	200.0 x 66.0	Module	H2 / H1
View Area	134.0 x 40.4	W / O B/L	- / -
Dot Size	0.49 x 0.49	EL B/L	- / -
Dot Pitch	0.53 x 0.53	CCFL B/L	16.0 / 23.0

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	FG	Frame ground
2	Vss	Power supply(GND)
3	Vdd	Power supply(+)
4	Vee	Negative voltage input
5	WR	Data write
6	RD	Data read
7	CE	Chip enable
8	C/D	Command / data select
10	RST	Reaet
11-18	DB0-DB7	Data bus line
19	FS	Font select
9/20	NC	No Connection

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	0	22.0	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.5	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	N	W	V
		-10°C	-	14.3	-	15.7	-	15.1	V
		0°C	-	-	-	-	-	-	V
		25°C	-	13.2	-	13.7	-	14.0	V
		50°C	-	-	-	-	-	-	V
60°C	-	12.0	-	11.4	-	12.8	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	10	-	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

**REMARK**

LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.

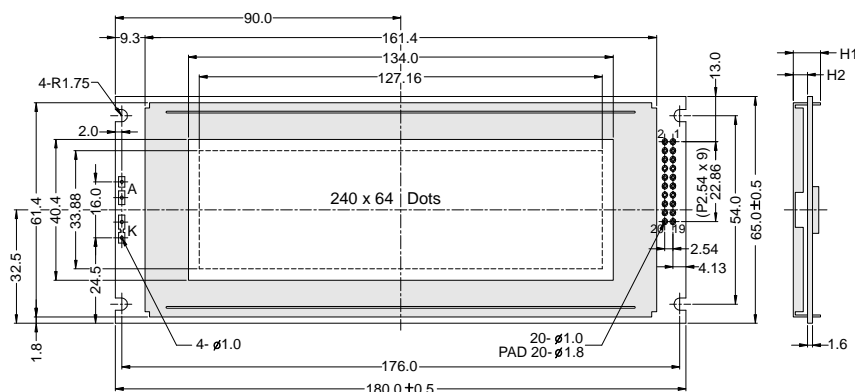


# PG 24064-E/F

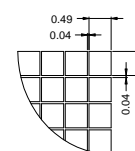
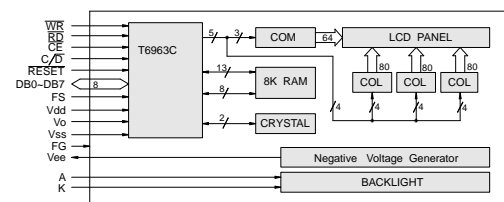
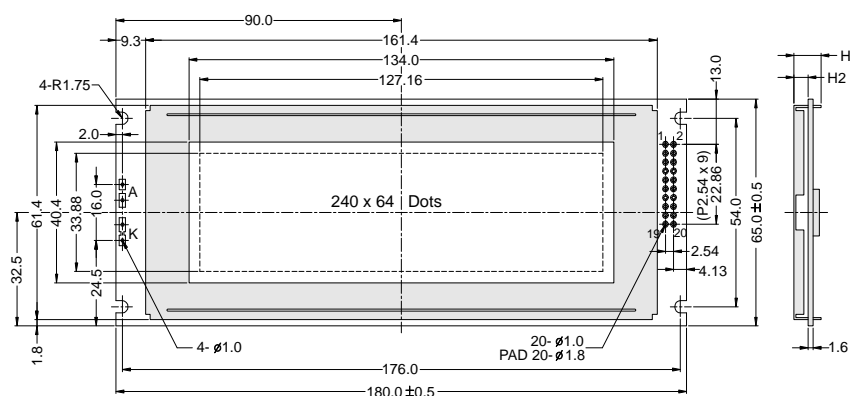


## OUTLINE DIMENSION & BLOCK DIAGRAM

PG 24064-E



PG 24064-F



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	200.0 x 66.0	Module	H2 / H1
View Area	134.0 x 40.4	W/O B/L	4.5 / 8.6
Dot Size	0.49 x 0.49	EL B/L	4.5 / 8.6
Dot Pitch	0.53 x 0.53	LED / CCFL B/L	9.2 / 13.3

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	FG	Frame ground
2	Vss	Power supply(GND)
3	Vdd	Power supply(+)
4	Vo	Contrast Adjust
5	WR	Data write
6	RD	Data read
7	CE	Chip enable
8	C/D	Command / data select
9	Vee	Negative output
10	RST	Reset
11-18	DB0-DB7	Data bus line
19	FS	Font selection
20	NC	No connection

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	0	22.0	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.5	—	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	—	14.3	—	14.7	—	V	
		0°C	9.7	—	10.2	—	10.7	V	
		25°C	8.9	13.2	9.4	13.6	9.9	14	V
		50°C	8.6	—	9.1	—	9.6	—	V
70°C	—	12	—	12.4	—	12.8	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	—	10	—	mA			
Backlight current consumption	LED/edge	VB/L=3.5V	—	80	—	mA			
	LED/array	VB/L=4.2V	—	650	—	mA			

## REMARK

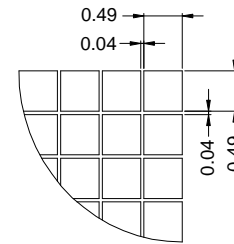
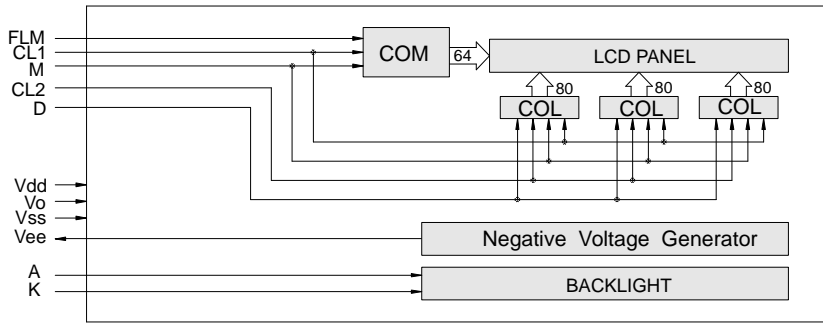
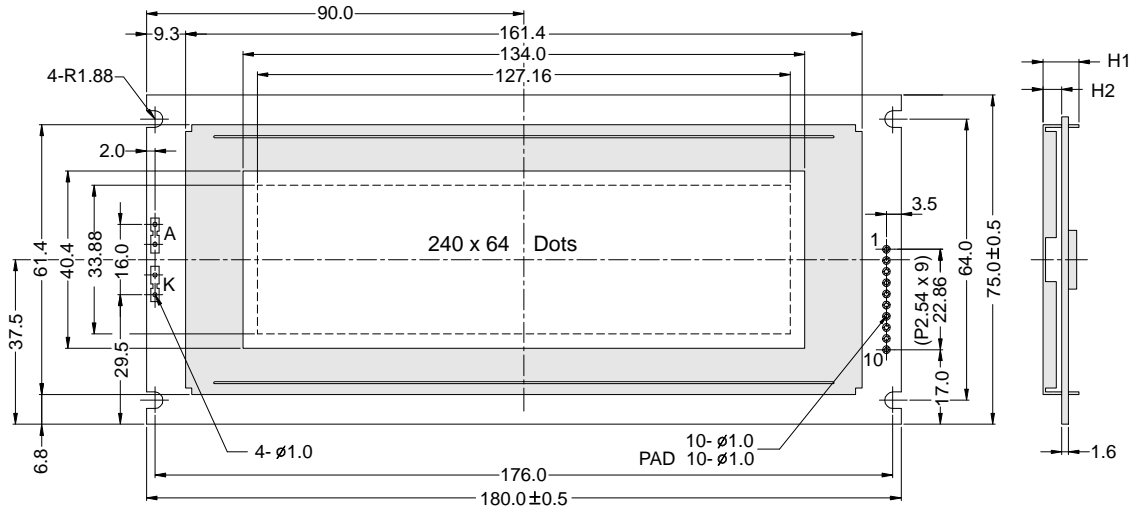
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	180.0 x 75.0	Module	H2 / H1
View Area	134.0 x 40.4	W / O B/L	4.5 / 8.6
Dot Size	0.49 x 0.49	EL B/L	4.5 / 8.6
Dot Pitch	0.53 x 0.53	LED CCFL B/L	9.2 / 13.3

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	D	Serial data input
2	FLM	Shift direction select
3	M	Alternation control signal
4	CL1	Display data input clock
5	CL2	Display data input clock
6	NC	No connection
7	Vdd	Power supply(+)
8	Vss	Power supply(GND)
9	Vee	Negative voltage output
10	Vo	Contrast Adjust

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	0	22.0	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.5	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	14.3	-	14.7	-	V	
		0°C	9.7	-	10.2	-	10.7	V	
		25°C	8.9	13.2	9.4	13.6	9.9	14	V
		50°C	8.6	-	9.1	-	9.6	-	V
70°C	-	12	-	12.4	-	12.8	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.5	-	mA			
Backlight current consumption	LED/edge	VB/L=3.5V	-	80	-	mA			
	LED/array	VB/L=4.2V	-	650	-	mA			

**REMARK**

LCD option: STN, TN, FSTN

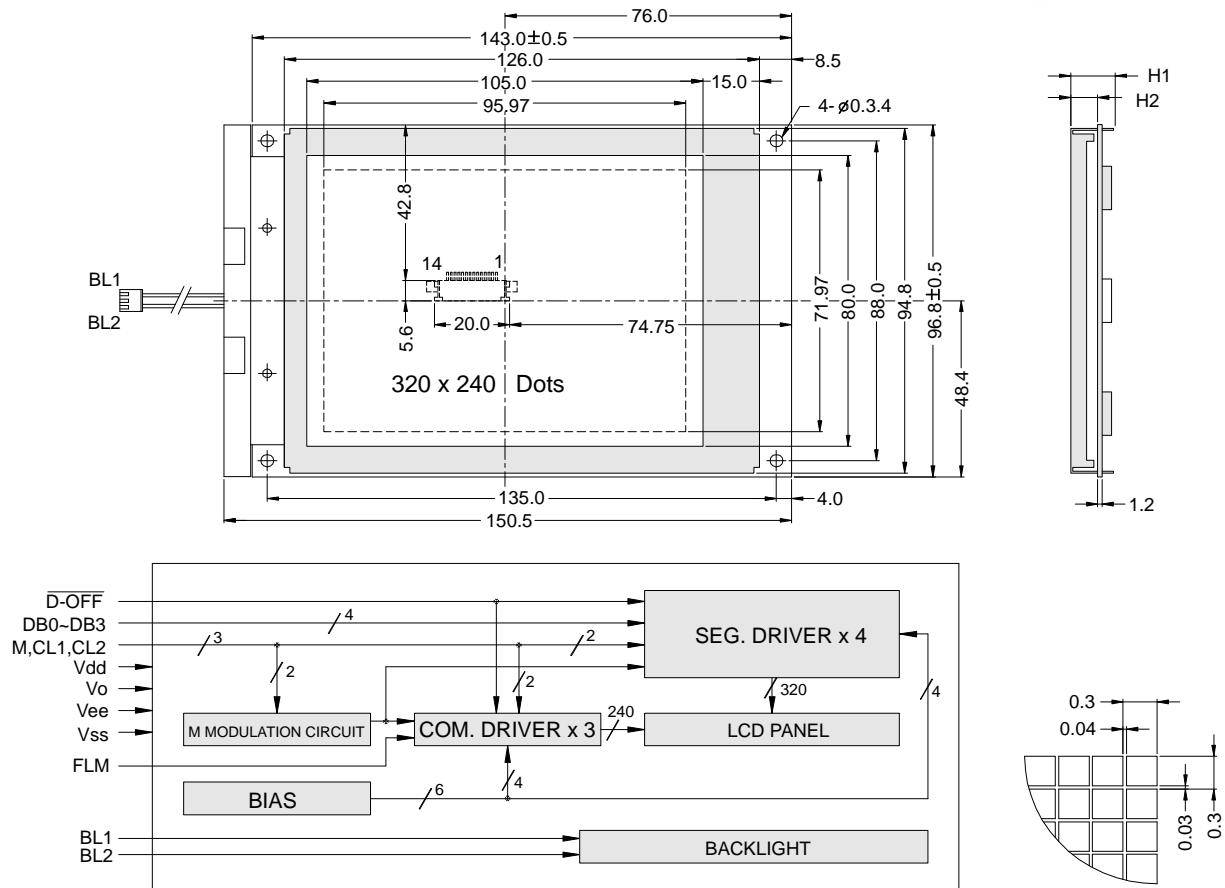
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



# PG 320240-C



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	143.0 x 96.8	Module	H2 / H1
View Area	105.0 x 80.0	W/O B/L	5.9 / 10.1
Dot Size	0.27 x 0.27	EL B/L	5.9 / 10.1
Dot Pitch	0.30 x 0.30	LED / CCFL B/L	8.0 / 11.7

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	FLM	Shift direction select
2	M	Synchronous signal input
3	CL1	Display data input clock
4	CL2	Display data input clock
5	D-OFF	Column output control
6-9	DB0-DB3	Data bus line
10	Vdd	Power supply(+)
11	Vss	Power supply(GND)
12	Vee	Negative voltage input
13	Vo	Contrast Adjust
14	FG	Frame ground

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	0	35.0	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.5	—	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	—	26.9	—	28.4	—	V	
		0°C	25.5	—	27	—	28.5	V	
		25°C	23.5	24.4	25	25.9	26.5	27.4	V
		50°C	21	—	22.5	—	24	—	V
70°C	—	22	—	23.5	—	25	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	—	7	—	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	—	180	—	mA			
	LED/white	VB/L=3.5V	—	120	—	mA			

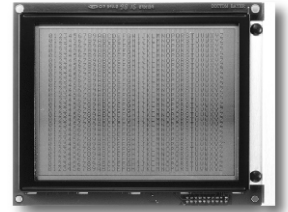
## REMARK

LCD option: STN, TN, FSTN

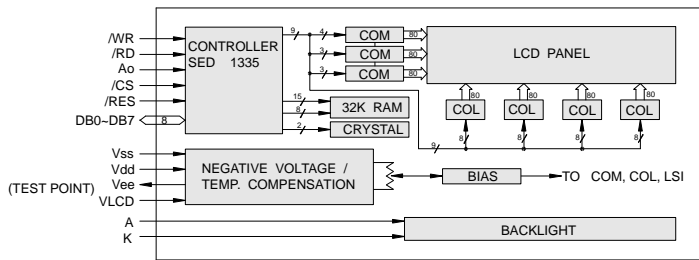
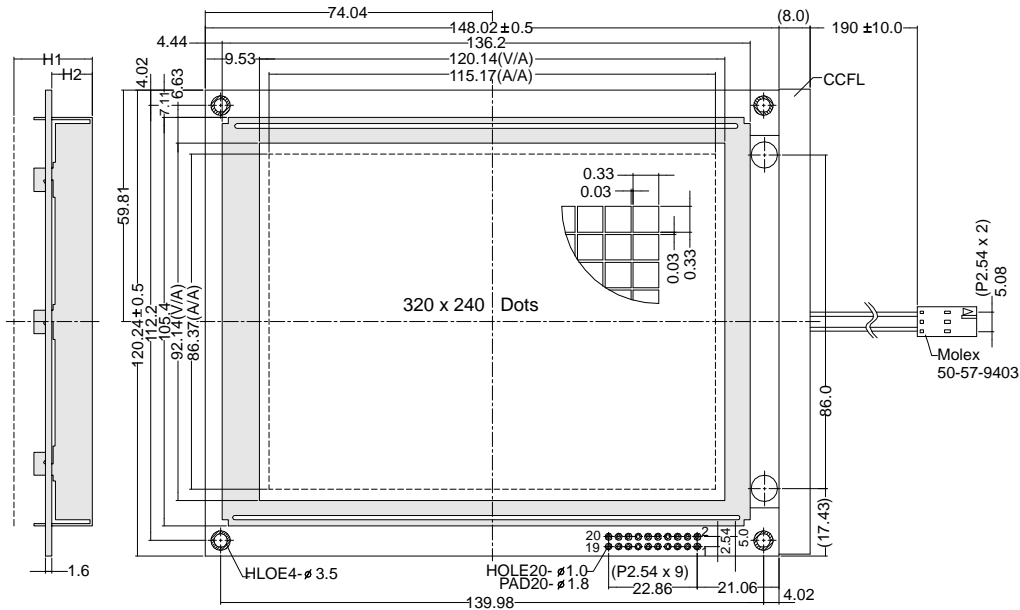
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



# PG 320240-D



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	148.02 x 120.24	Module	H2 / H1
View Area	120.14 x 92.14	W / O B/L	- / -
Dot Size	0.33 x 0.33	EL B/L	- / -
Dot Pitch	0.36 x 0.36	LED CCFL B/L	10.5 / 20.3

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	V <sub>LCD</sub>	Contrast Adjust
4	RD	Data Read
5	WR	Data Write
6	Ao	Command / Data select
7-14	DB0-DB7	Data bus line
15	CS	Chip select
16	RST	Reset
17	Vee	Negative voltage input
18	FG	Frame Ground
19/20	NC	No Connection

ABSOLUTE MAXIMUM RATING								
Item	Symbol	Condition	Min.	Max.	Units			
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V			
LCD driving supply voltage	Vdd-Vee	25°C	0	35.0	V			
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V			
ELECTRICAL CHARACTERISTICS								
Item	Symbol	Condition	Min.	Typical	Max.	Units		
Power supply voltage	Vdd-Vss	25°C	4.5	-	5.5	V		
LCD operation voltage	Vop	Top	N	W	N	W	V	
		-20°C	-	-	-	-	V	
		0°C	-	-	26.4	-	-	V
		25°C	-	-	24.8	-	-	V
		50°C	-	-	24.2	-	-	V
70°C	-	-	-	-	-	V		
LCM current consumption (No B/L)	I <sub>dd</sub>	Vdd=5V	-	50	-	mA		
Backlight current consumption	LED/edge	VB/L=4.2V	-	200	-	mA		
	LED/white	VB/L=3.5V	-	160	-	mA		

## REMARK

LCD option: STN, TN, FSTN

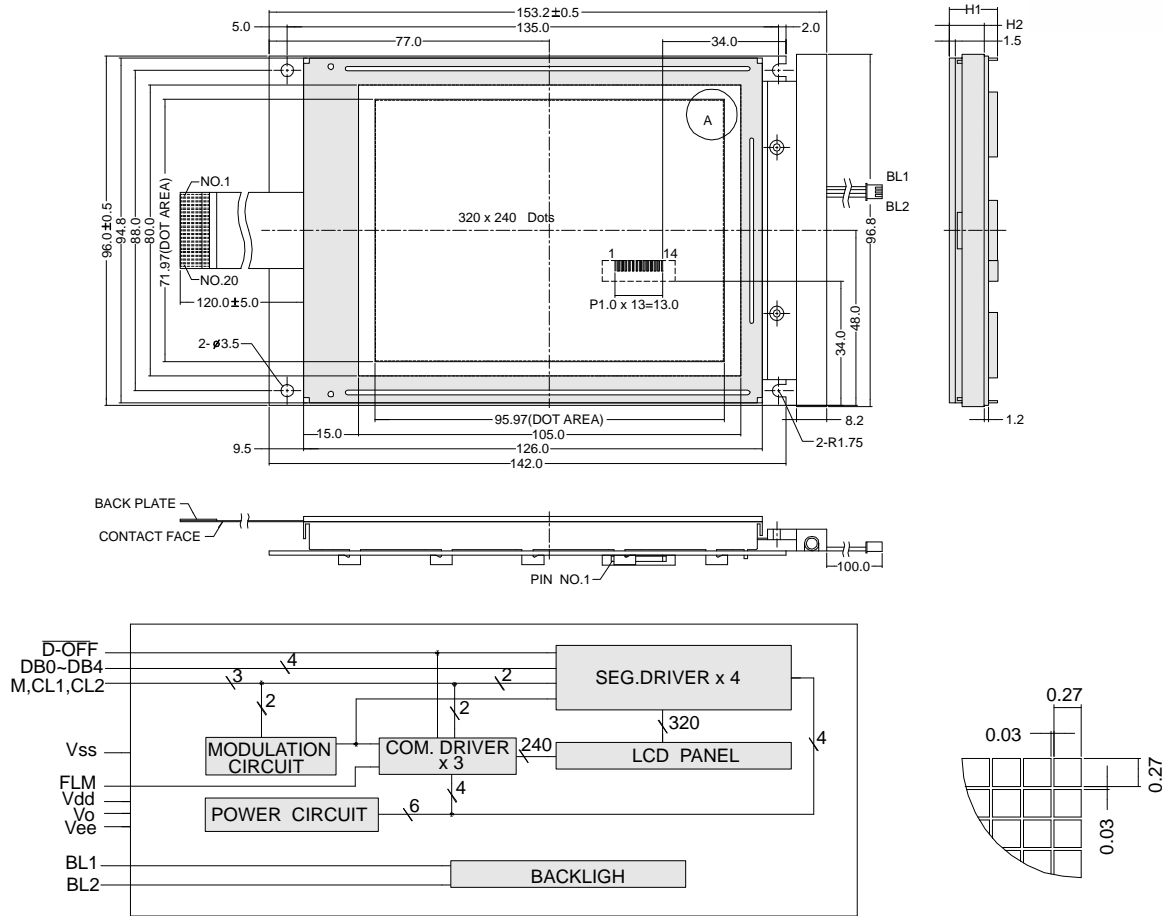
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



# PG 320240-E



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	153.2 x 96.0	Module	H2 / H1
View Area	105.0 x 80.0	W / O B/L	- / -
Dot Size	0.27 x 0.27	EL B/L	- / -
Dot Pitch	0.30 x 0.30	LED / CCFL B/L	10.5 / 20.3

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	FLM	Shift direction select
2	M	Synchronous signal input
3	CL1	Display data input clock
4	CL2	Display data input clock
5	D-OFF	Column output control
6	DB0	Data bus line
7	DB1	Data bus line
8	DB2	Data bus line
9	DB3	Data bus line
10	Vdd	Power supply(+)
11	Vss	Power supply(GND)
12	Vee	Negative voltage input
13	Vo	Contrast Adjust
14	FG	Frame ground

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	+7.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	0	+35.0	V				
Input Voltage	Vin	25°C	-0.3	Vdd-0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power Supply Voltage	Vdd-Vss	25°C	4.5	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	26.9	-	28.4	-	29.9	V
		0°C	25.5	-	27	-	28.5	-	V
		25°C	23.5	24.4	25	25.9	28.5	27.4	V
		50°C	21	-	22.5	-	24	-	V
70°C	-	22	-	23.5	-	25	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	4	7	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	180	-	mA			
	LED/white	VB/L=3.5V	-	120	-	mA			

## REMARK

LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.

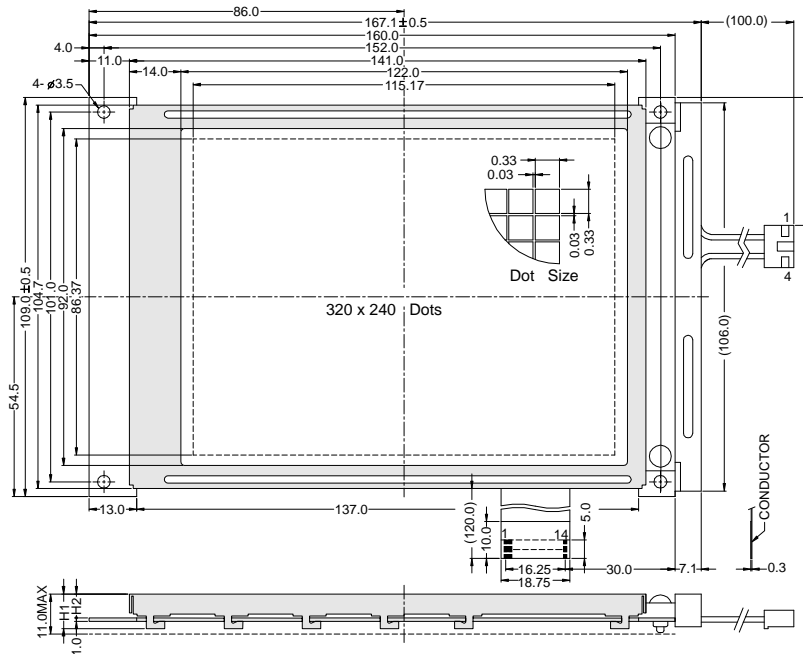




# PG 320240-F



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	169.0 x 109.0	Module	H2 / H1
View Area	122.0 x 92.0	W / O B/L	- / -
Dot Size	0.33 x 0.33	EL B/L	- / -
Dot Pitch	0.36 x 0.36	CCFL B/L	6.9 / 9.5

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	DB0	Data bus line
2	DB1	Data bus line
3	DB2	Data bus line
4	DB3	Data bus line
5	D-OFF	Column output control
6	FLM	Shift direction select
7	N.C	No connection
8	CL1	Clock signal input
9	CL2	Clock signal input
10	Vdd	Power supply (+)
11	Vss	Power supply (GND)
12	Vee	N.V. input
13	Vo	Contrast adjust
14	FGND	Frame ground

ABSOLUTE MAXIMUM RATING								
Item	Symbol	Condition	Min.	Max.	Units			
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V			
LCD driving supply voltage	Vdd-Vee	25°C	0	35.0	V			
Input Voltage	Vin	25°C	-0.3	Vdd-0.3	V			
ELECTRICAL CHARACTERISTICS								
Item	Symbol	Condition	Min.	Typical	Max.	Units		
Power Supply Voltage	Vdd-Vss	25°C	4.5	-	5.5	V		
LCD operation voltage	Vop	Top	N	W	N	W	V	
		-20°C	-	-	-	31.1	-	V
		0°C	-	-	-	-	-	V
		25°C	-	-	-	24.5	-	V
		50°C	-	-	-	-	-	V
70°C	-	-	-	20.5	-	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	3.5	7	mA		
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA		
	LED/array	VB/L=4.2V	-	-	-	mA		

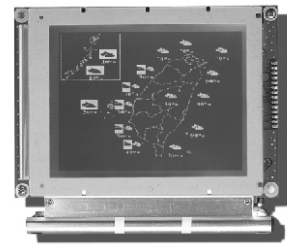
## REMARK

LCD option: STN, TN, FSTN

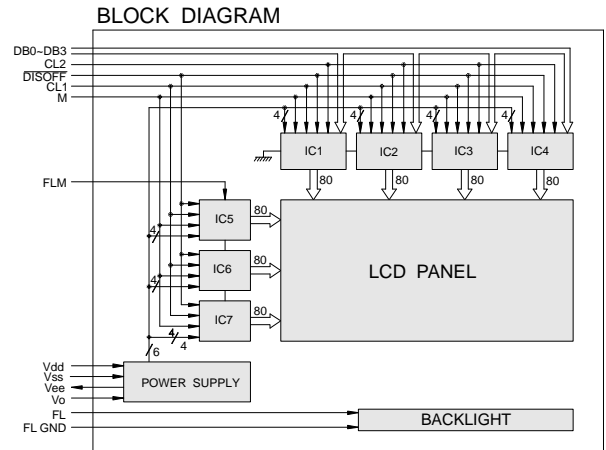
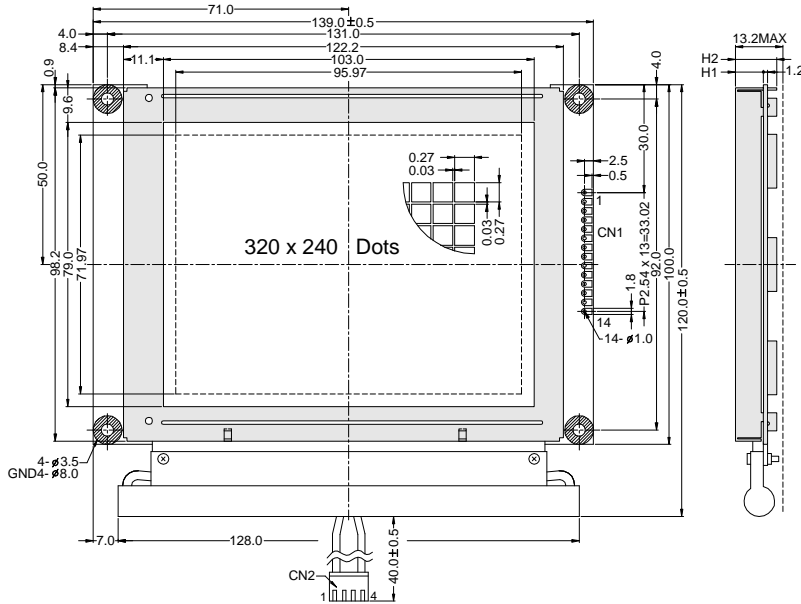
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



# PG 320240-G



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	103.0 x 120.0	Module	H2 / H1
View Area	103.0 x 79.0	W/O B/L	- / -
Dot Size	0.27 x 0.27	EL B/L	- / -
Dot Pitch	0.30 x 0.30	CCFL B/L	7.8 / 11.5

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	FLM	Shift direction select
2	CL1	Colck signal input
3	CL2	Colck signal input
4	M	Command / Data select
5	Vo	Contrast adjust
6	Vdd	Power supply (+)
7	Vss	Power supply (GND)
8	Vee	Negative voltage output
9	DB0	Data bus line
10	DB1	Data bus line
11	DB2	Data bus line
12	DB3	Data bus line
13	DISPOFF	Clumn output control
14	N.C.	No connection

ABSOLUTE MAXIMUM RATING								
Item	Symbol	Condition	Min.	Max.	Units			
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V			
LCD driving supply voltage	Vdd-Vee	25°C	0	35.0	V			
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V			
ELECTRICAL CHARACTERISTICS								
Item	Symbol	Condition	Min.	Typical	Max.	Units		
Power supply voltage	Vdd-Vss	25°C	4.5	-	5.5	V		
LCD operation voltage	Vop	Top	N	W	N	W	V	
		-20°C	-	-	-	-	V	
		0°C	-	-	30	-	31.2	V
		25°C	22.8	-	24	-	25.2	V
		50°C	18.8	-	20	-	-	V
70°C	-	-	-	-	-	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	3.5	7	mA		
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA		
	LED/array	VB/L=4.2V	-	-	-	mA		

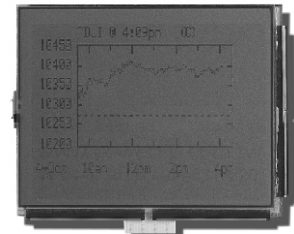
## REMARK

LCD option: STN, TN, FSTN

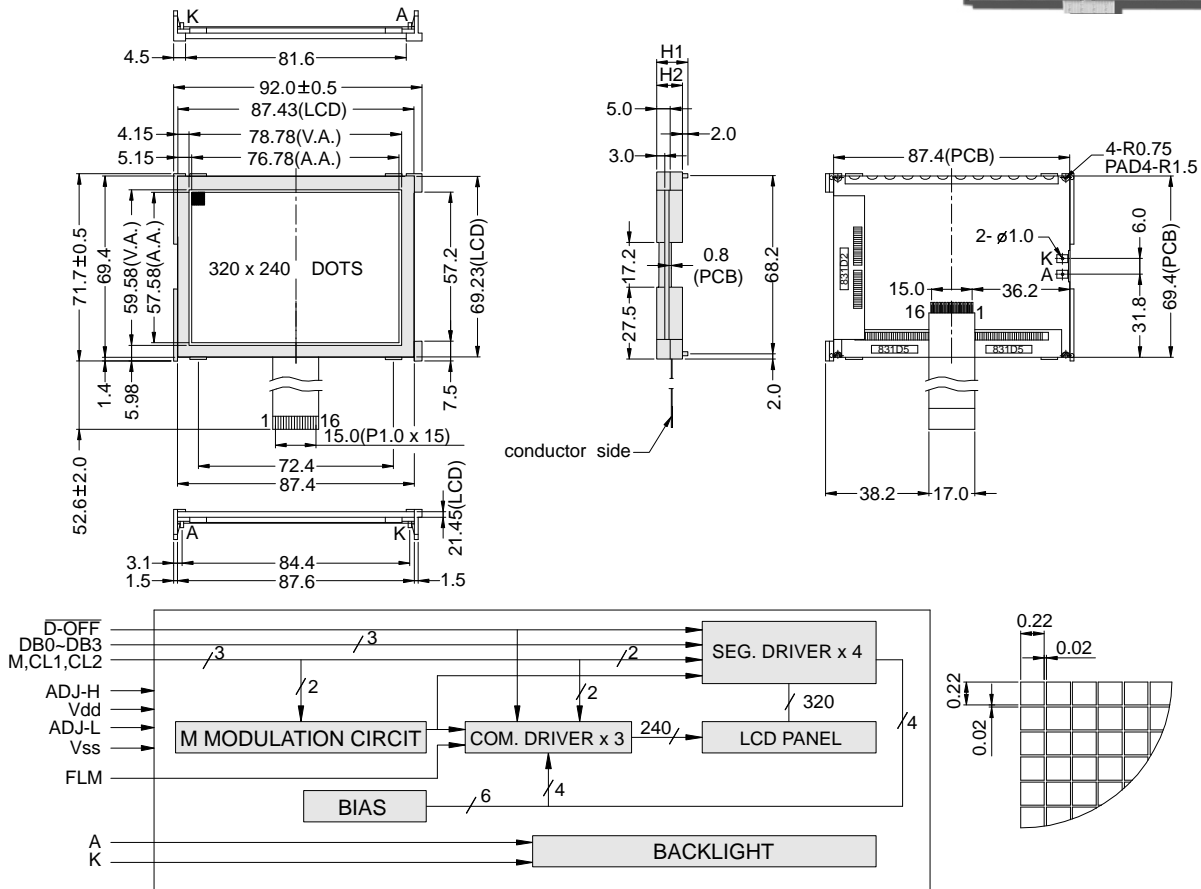
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



# PG 320240-H



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	92.0 x 71.7	Module	H2 / H1
View Area	78.78 x 59.58	W / O B/L	- / -
Dot Size	0.22 x 0.22	EL B/L	2.7 / 4.9
Dot Pitch	0.24 x 0.24	LED B/L	9.5 / 11.5

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	FLM	Shift direction select
2	M	Alternation Control signal
3	CL1	Display data input clock
4	CL2	Display data input clock
5	D-OFF	Display enable
6	DB0	Data bus line
7	DB1	Data bus line
8	DB2	Data bus line
9	DB3	Data bus line
10	Vdd	Power supply(+5V)
11	Vss	Power supply(GND)
12	Adj-H	Contrast adjust (1)
13	Adj-L	Contrast adjust (2)
14	NC/EL-EN	No connection / EL-enable
15	A	Power supply for LED B/L (+)
16	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING					
Item	Symbol	Condition	Min.	Max.	Units
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	45.0	V
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V

ELECTRICAL CHARACTERISTICS							
Item	Symbol	Condition	Min.	Typical	Max.	Units	
Power supply voltage	Vdd-Vss	25°C	2.5	-	5.5	V	
LCD operation voltage	Vop	Top	N	W	N	W	V
		-20°C	-	-	-	-	V
		0°C	-	22.9	-	23.6	V
		25°C	-	22	-	22.7	V
		50°C	-	21.1	-	21.7	V
70°C	-	-	-	-	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	13	-	mA	
Backlight current consumption	LED/edge	VB/L=4.2V	-	70	-	mA	
	LED/array	VB/L=4.2V	-	-	-	mA	

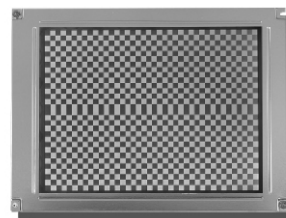
## REMARK

LCD option: STN, TN, FSTN

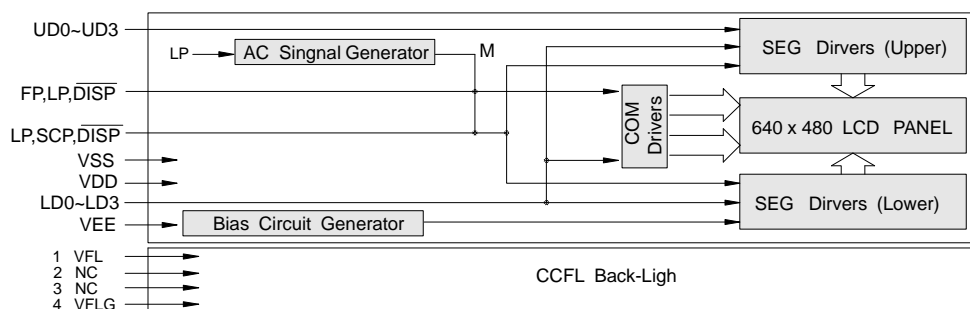
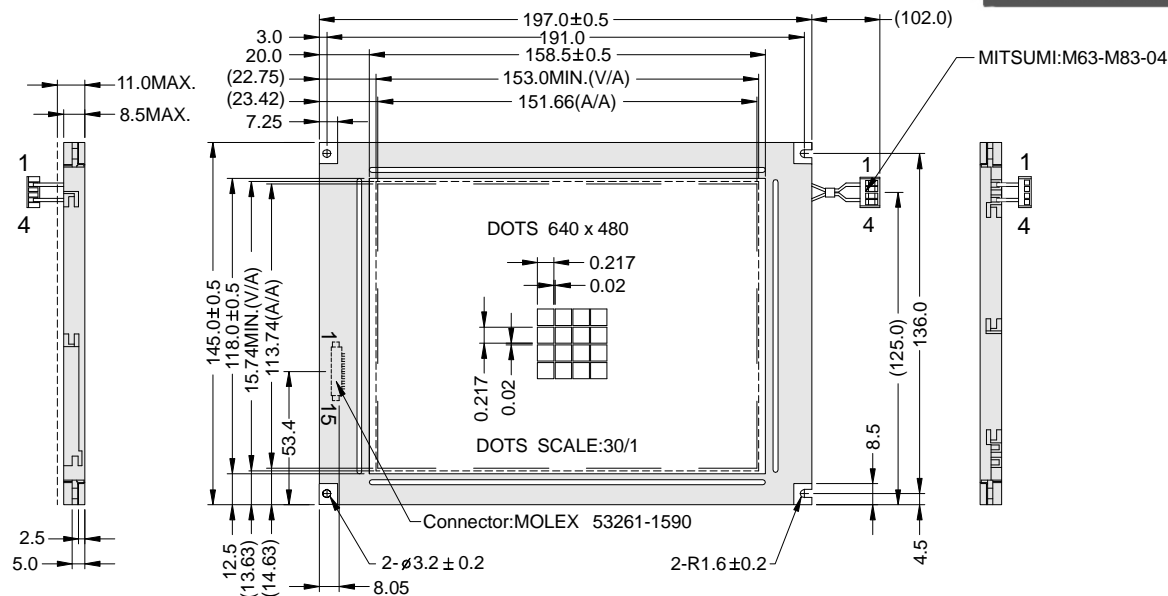
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



# PG 640480-A



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	197.0 x 145.0	Module	H2 / H1
View Area	153.0 x 115.7	W / O B/L	- / -
Dot Size	0.217 x 0.217	EL B/L	- / -
Dot Pitch	0.237 x 0.237	CCFL B/L	8.5 / 11.0

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	FLM	Shift direction select
2	CL1	Display data input clock
3	CL2	Display data input clock
4	DISPOFF	"H":Display ON; "L":Display OFF
5	Vdd	Power supply (+)
6	Vss	Power supply (-)
7	Vee	Contrast adjust
8-11	UD0-UD3	Upper screen display data
12-15	LDO-LD3	Lower screen display data

ABSOLUTE MAXIMUM RATING							
Item	Symbol	Condition	Min.	Max.	Units		
Supply for logic voltage	Vdd-Vss	25°C	-0.3	6.0	V		
LCD driving supply voltage	Vdd-Vee	25°C	0	45.0	V		
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V		
ELECTRICAL CHARACTERISTICS							
Item	Symbol	Condition	Min.	Typical	Max.	Units	
Power supply voltage	Vdd-Vss	25°C	3	-	5.5	V	
LCD operation voltage	Vop	Top	N	W	N	W	V
		-20°C	-	-	-	-	V
		0°C	-	-	23.5	-	V
		25°C	-	-	22.3	-	V
		50°C	-	-	20.5	-	V
70°C	-	-	-	-	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	3	-	mA	
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA	
	LED/array	VB/L=4.2V	-	-	-	mA	

## REMARK

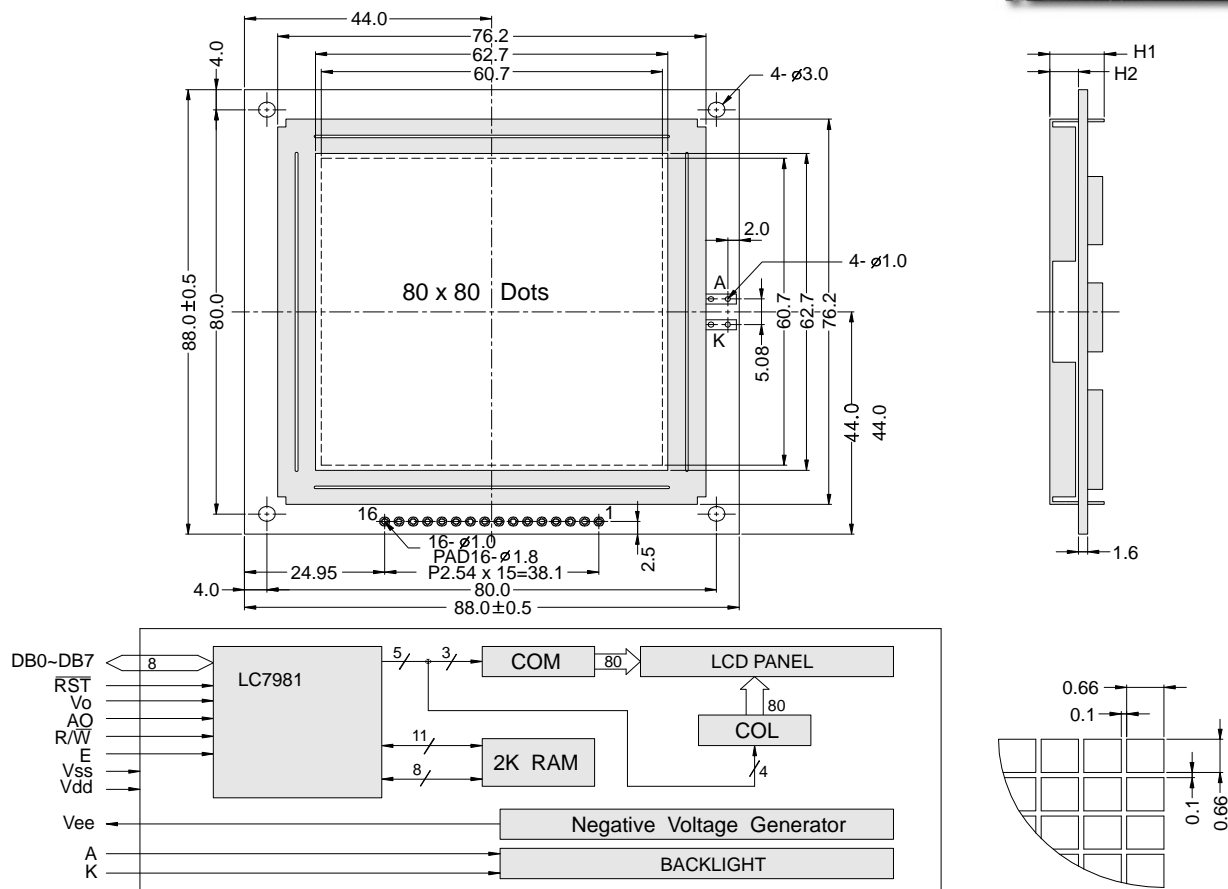
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	88.0 x 88.0	Module	H2 / H1
View Area	62.7 x 62.7	W / O B/L	5.1 / 9.7
Dot Size	0.66 x 0.66	EL B/L	5.1 / 9.7
Dot Pitch	0.76 x 0.76	LED B/L	- / -

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	Ao	Command / data select
5	R/W	Data read / write
6	E	Enable signal
7	DB0	Data bus line
8	DB1	Data bus line
9	DB2	Data bus line
10	DB3	Data bus line
11	DB4	Data bus line
12	DB5	Data bus line
13	DB6	Data bus line
14	DB7	Data bus line
15	Vee	Negative voltage
16	RST	Reset

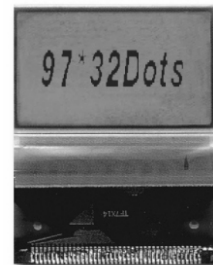
ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	16.5	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	4.5	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	N	W	V
		-20°C	-	-	-	-	-	-	V
		0°C	9.7	9.3	10.2	9.8	10.7	10.4	V
		25°C	8.9	8	9.4	8.4	9.9	8.8	V
		40°C	8.6	-	9.1	-	9.6	-	V
70°C	-	7.5	-	7.9	-	8.3	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	2.8	4	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

**REMARK**

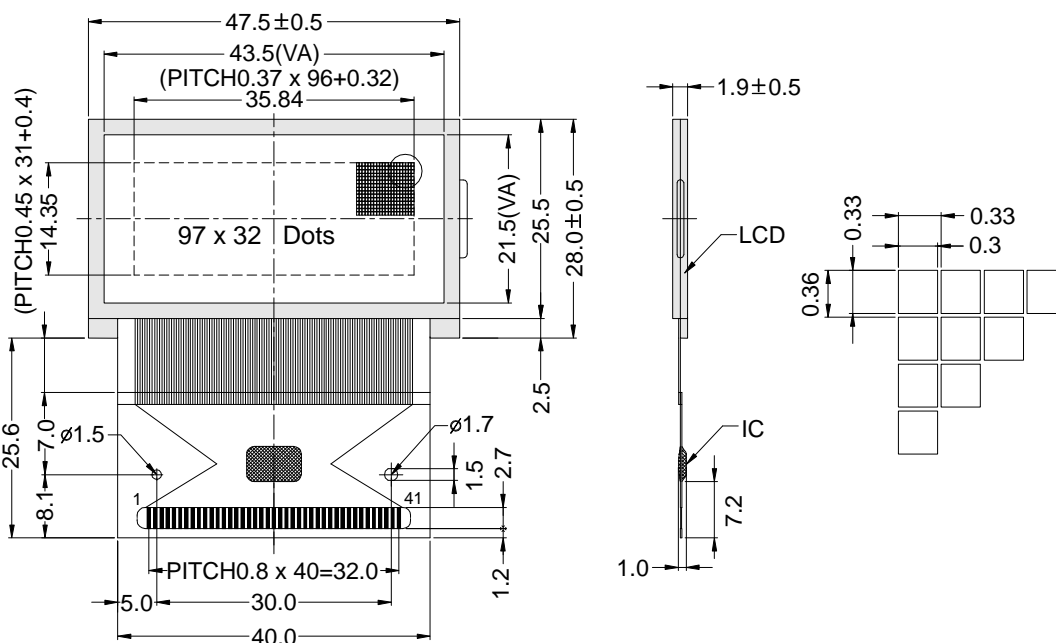
LCD option: STN, TN, FSTN

Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	47.5 x 28.0	Module	H2 / H1
View Area	43.5 x 21.5	W / O B/L	1.9
Dot Size	0.32 x 0.40	EL B/L	- / -
Dot Pitch	0.37 x 0.45	LED B/L	- / -

PIN ASSIGNMENT		
Pin no.	Symbol	Function
2	FRS	Static driver output
3	FR	LCD AC signal
4	Dyo	Command driver signal output
5	CL	Display clock I/O
6	DOF	LCD blanking control I/O
7	VS1	Internal power supply
8	MS	Master / slave mode select
9	RST	Reset
10	P/S	Serial / Parallel data select
11-12	CS1,CS2	Chip select
13	C86	Microprocessor interface select
14	Ao	Cortorl / display data flag
15/16	WR/RD	Data write /read
17/26	Vdd,Vss	Power supply
18-25	D0-D7	Data bus line
27	Vout	DC voltage output
28-32	CAP1-CAP2	Capacitor connction
34	VR	Voltage adjust
36-40	V1-V5	Bias for LCD driver supply voltage

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	18.0	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	6	-	6.4	-	V	
		0°C	5.3	-	5.6	-	5.9	-	V
		25°C	5.1	5.8	5.4	6.2	5.7	6.6	V
		50°C	4.4	-	4.7	-	5	-	V
70°C	-	5.6	-	5.9	-	6.2	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	0.5	1	mA			
Backlight current consumption	LED/edge	VB/L=2.1V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

**REMARK**

LCD option: STN, TN, FSTN

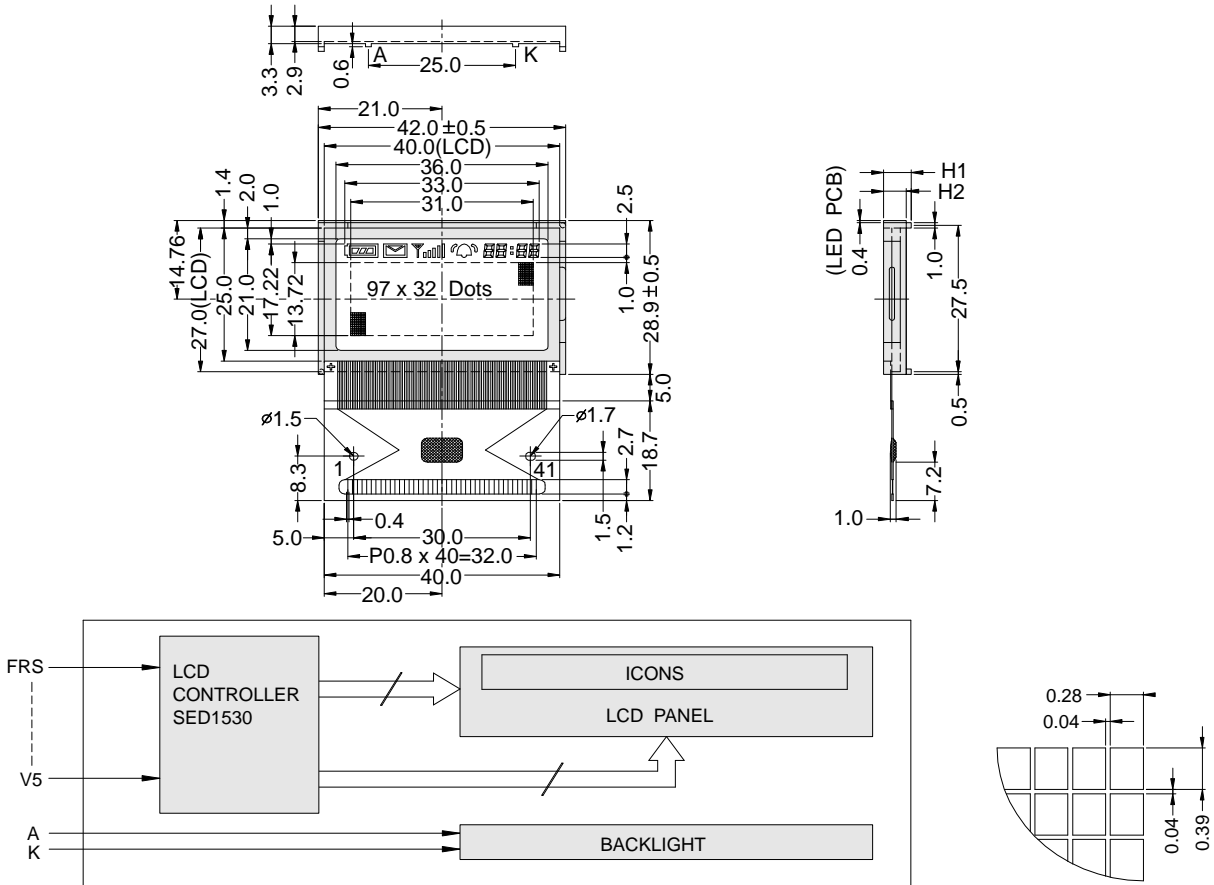
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



# PG 9732-B



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	42.0 x 28.9	Module	H2 / H1
View Area	36.0 x 21.0	W / O B/L	- / -
Dot Size	0.28 x 0.39	EL B/L	- / -
Dot Pitch	0.32 x 0.43	LED B/L	3.9 / 4.7

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	N.C	NO Connection
2	FRS	Static driver output
3	FR	LCD Ac signal I/O
4	Dyo	Common driver signal output
5	CL	DOF
6	DOF	LCD blanking control I/O
7	VS1	Internal power supply
8	M/S	Master/slave mode select
9	RST	Reset
10	P/S	Serial/Parallel data select
11~12	CS1,CS2	Chip select
13	C86	Microprocessor interface select
14	A0	Control/display data flag
15	WR	Write enable input
16	RD	Databus output enable
17/26	Vdd/Vss	Power supply
18~25	D0-D7	Data bus line
27	Vout	DC voltage output
28~32	CAP1~CAP3	Capacitor connection
36~40	V1~V5	Bias for LCD driver supply voltage
34	VR	Voltage adjust

ABSOLUTE MAXIMUM RATING							
Item	Symbol	Condition	Min.	Max.	Units		
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V		
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	18.0	V		
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V		
ELECTRICAL CHARACTERISTICS							
Item	Symbol	Condition	Min.	Typical	Max.	Units	
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V	
LCD operation voltage	Vop	Top	N	W	N	W	V
		-20°C	-	-	-	-	V
		0°C	-	-	-	-	V
		25°C	-	-	6.5	-	V
		50°C	-	-	-	-	V
70°C	-	-	-	-	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	0.5	1	mA	
Backlight current consumption	LED/edge	VB/L=4.2V	-	40	-	mA	
	LED/array	VB/L=4.2V	-	-	-	mA	

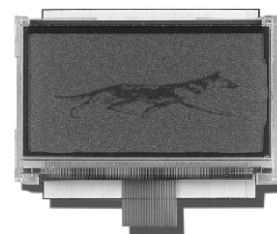
## REMARK

LCD option: STN, TN, FSTN

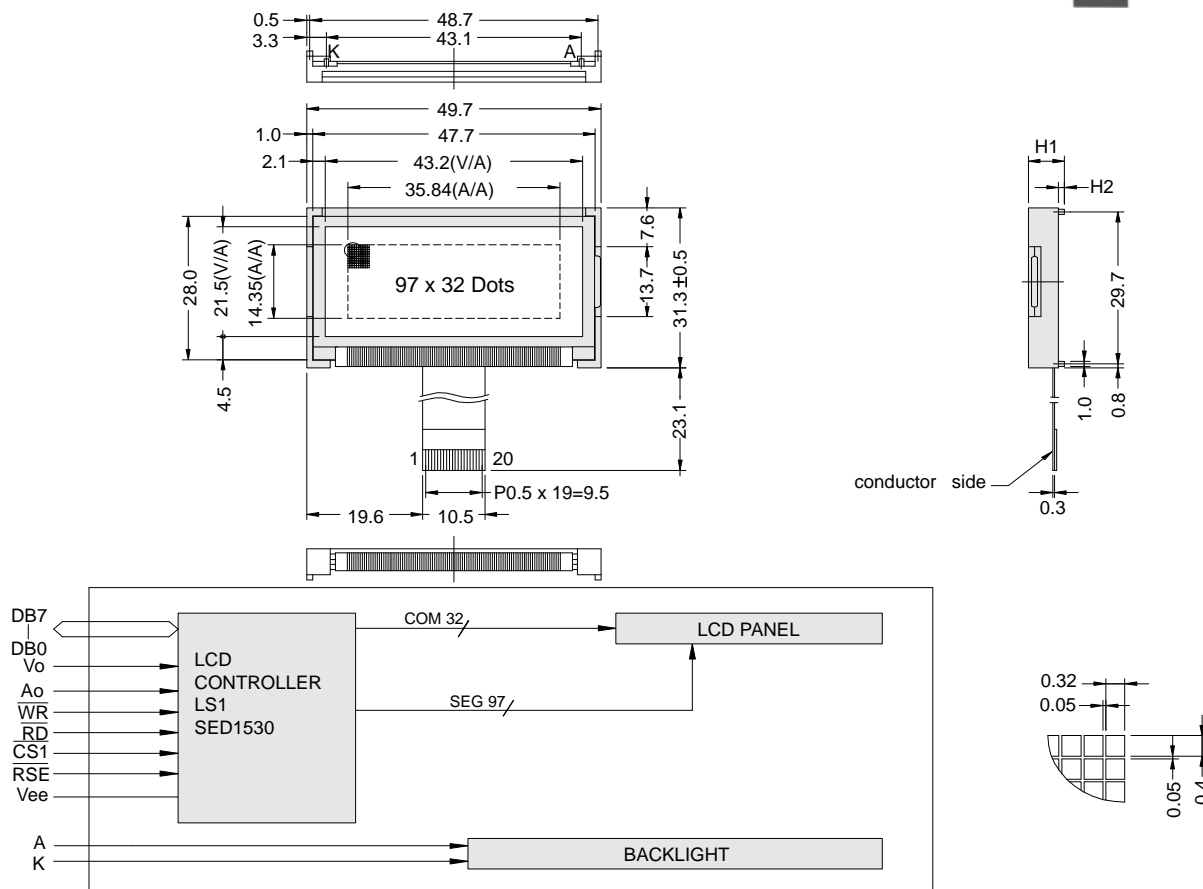
Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.



# PG 9732-C



## OUTLINE DIMENSION & BLOCK DIAGRAM



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	49.7 x 31.3	Module	H2 / H1
View Area	43.5 x 21.5	W/O B/L	- / -
Dot Size	0.32 x 0.40	EL B/L	- / -
Dot Pitch	0.37 x 0.45	LED B/L	5.1 / 6.1

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	A0	Command / Data select
5	$\overline{\text{WR}}$	Data write
6	$\overline{\text{RD}}$	Data read
7-14	DB0-DB7	Data bus line
15	$\overline{\text{CS1}}$	Chip select driver 1
16	$\overline{\text{RST}}$	Reset
17	Vee	DC / DC booster output
18	NC	No connection
19	A	Power supply for LED B/L (+)
20	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	18.0	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	N	W	V
		-20°C	-	6	-	6.4	-	6.8	V
		0°C	5.3	-	5.6	-	5.9	-	V
		25°C	5.1	5.8	5.4	6.2	5.7	6.6	V
		50°C	4.4	-	4.7	-	5	-	V
70°C	-	5.6	-	5.9	-	6.2	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	0.5	1	mA			
Backlight current consumption	LED/edge	VB/L=2.1V	-	80	-	mA			
	LED/array	VB/L=4.2V	-	-	-	mA			

## REMARK

LCD option: STN, TN, FSTN

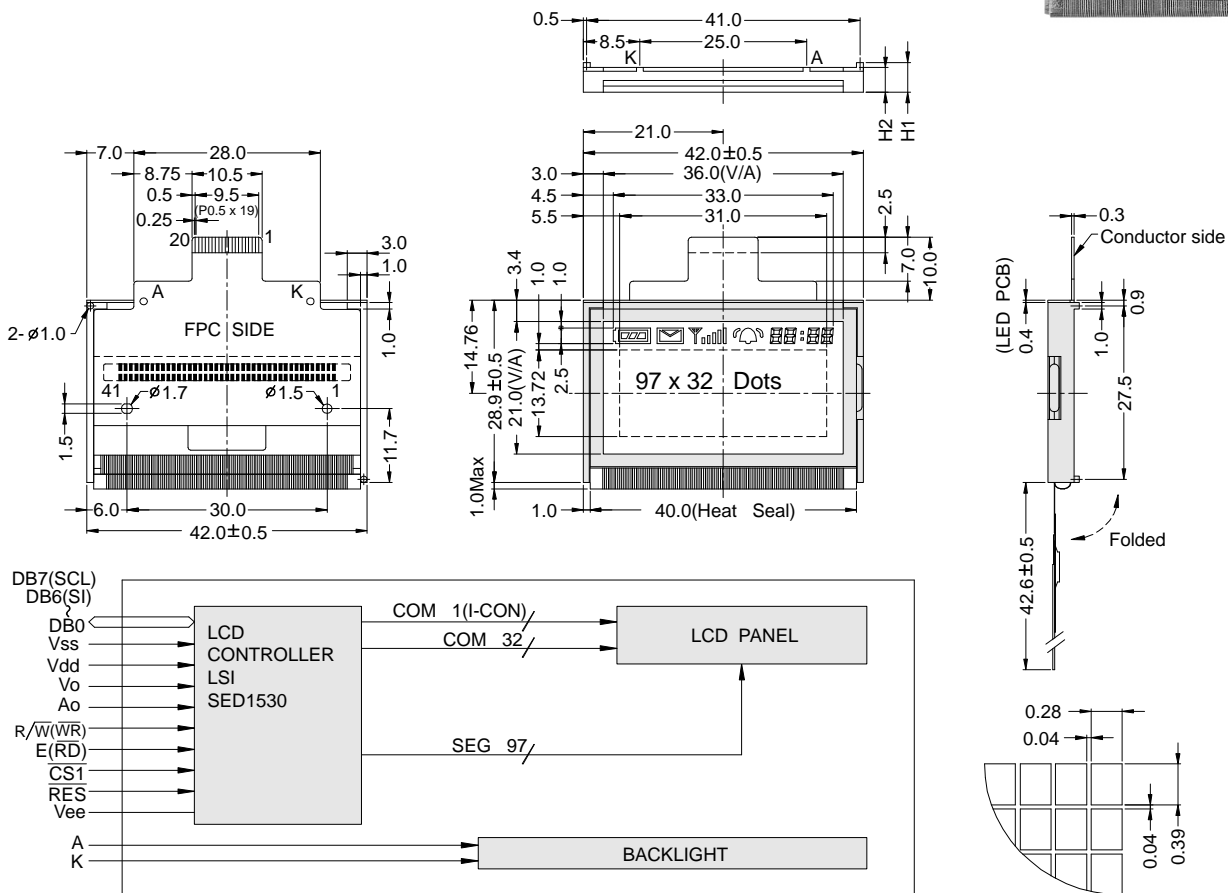
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.







**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified ± 0.3mm

MECHANICAL SPECIFICATION			
Overall Size	42.0 x 39.9	Module	H2 / H1
View Area	36.0 x 21.0	W/O B/L	- / -
Dot Size	0.28 x 0.39	EL B/L	- / -
Dot Pitch	0.32 x 0.43	LED B/L	3.9 / 4.7

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vo	Contrast Adjust
4	A0	Command / data input
5	WR	Data write / (R/W)
6	RD	Data read / (E)
7-14	DB0-DB7	Data bus line
15	CS1	Chip select
16	RES	Reset
17	Vee	Negative voltage
18	NC	No Connection
19	A	Power supply for LED B/L (+)
20	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING							
Item	Symbol	Condition	Min.	Max.	Units		
Supply for logic voltage	Vdd-Vss	25°C	-0.3	7.0	V		
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	18.0	V		
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V		
ELECTRICAL CHARACTERISTICS							
Item	Symbol	Condition	Min.	Typical	Max.	Units	
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V	
LCD operation voltage	Vop	Top	N	W	N	W	V
		-20°C	-	-	-	-	V
		0°C	-	-	-	-	V
		25°C	-	-	6.5	-	V
		50°C	-	-	-	-	V
70°C	-	-	-	-	V		
LCM current consumption (No B/L)	Idd	Vdd=5V	-	0.5	1	mA	
Backlight current consumption	LED/edge	VB/L=2.1V	-	40	-	mA	
	LED/array	VB/L=4.2V	-	-	-	mA	

**REMARK**

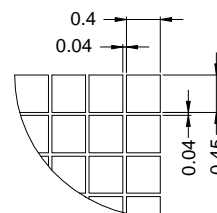
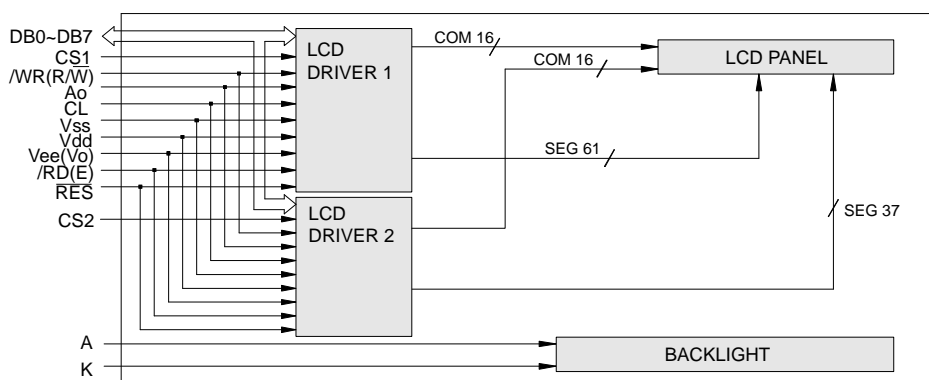
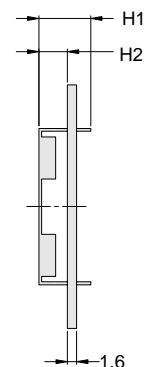
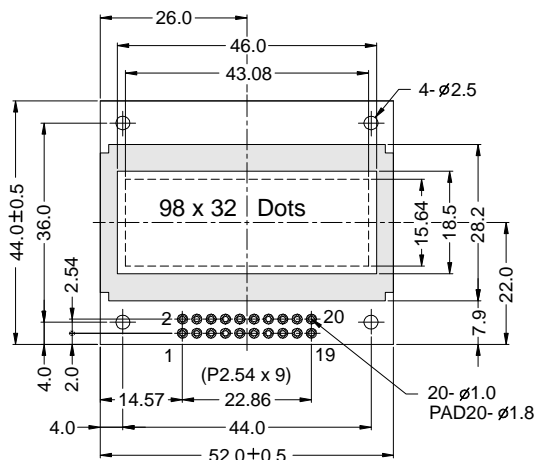
LCD option: STN, TN, FSTN

Backlight Option: LED, EL Backlight feature, other Specs not available on catalog is under request.





**OUTLINE DIMENSION & BLOCK DIAGRAM**



The tolerance unless classified  $\pm 0.3\text{mm}$

MECHANICAL SPECIFICATION			
Overall Size	52.0 x 44.0	Module	H2 / H1
View Area	46.0 x 18.5	W/O B/L	5.1 / 9.20
Dot Size	0.40 x 0.45	EL B/L	- / -
Dot Pitch	0.44 x 0.459	LED B/L	8.9 / 13.0

PIN ASSIGNMENT		
Pin no.	Symbol	Function
1	Vss	Power supply(GND)
2	Vdd	Power supply(+)
3	Vee(Vo)	Contrast Adjust
4	A0	Command / Data select
5	CS1	Chip select driver 1
6	CS2	Chip select driver 2
7	CL	External clock input
8	E	Enable signal
9	R/W	Data read / write
10-17	DB0-DB7	Data bus line
18	RES	Reset
19	A	Power supply for LED B/L (+)
20	K	Power supply for LED B/L (-)

ABSOLUTE MAXIMUM RATING									
Item	Symbol	Condition	Min.	Max.	Units				
Supply for logic voltage	Vdd-Vss	25°C	-0.3	8.0	V				
LCD driving supply voltage	Vdd-Vee	25°C	-0.3	16.5	V				
Input voltage	Vin	25°C	-0.3	Vdd+0.3	V				
ELECTRICAL CHARACTERISTICS									
Item	Symbol	Condition	Min.	Typical	Max.	Units			
Power supply voltage	Vdd-Vss	25°C	2.7	-	5.5	V			
LCD operation voltage	Vop	Top	N	W	N	W	V		
		-20°C	-	6.1	-	6.4	-	6.7	V
		0°C	-	-	-	-	-	-	V
		25°C	-	6	-	6.3	-	6.6	V
		50°C	-	-	-	-	-	-	V
		70°C	-	5.8	-	6.1	-	6.4	V
LCM current consumption (No B/L)	Idd	Vdd=5V	-	1.0	2.5	mA			
Backlight current consumption	LED/edge	VB/L=4.2V	-	-	-	mA			
	LED/array	VB/L=4.2V	-	120	-	mA			

**REMARK**

LCD option: STN, TN, FSTN

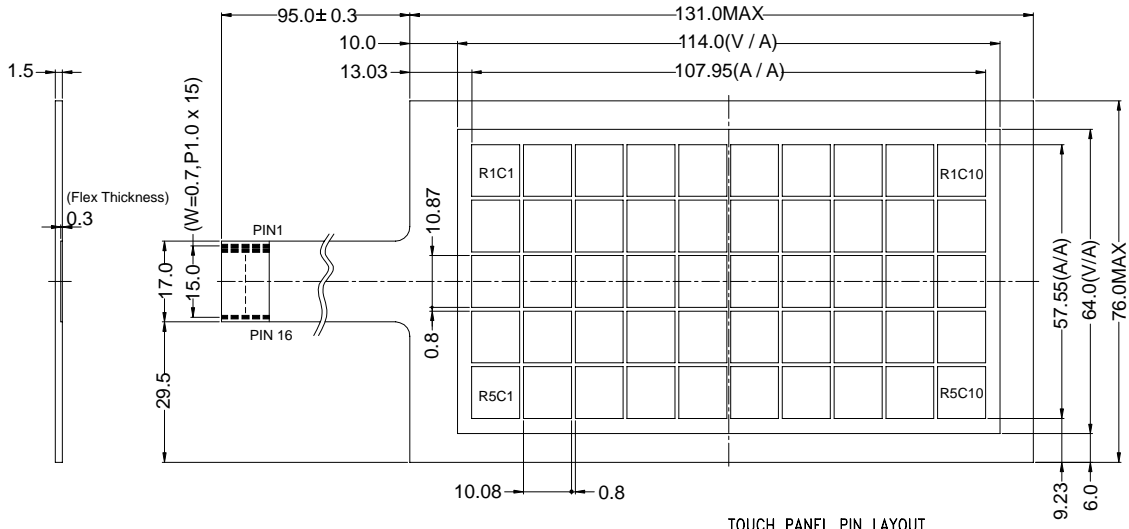
Backlight Option: LED,EL Backlight feature, other Specs not available on catalog is under request.



# DIGITAL TOUCH PANEL

## OUTLINE DIMENSION & BLOCK DIAGRAM

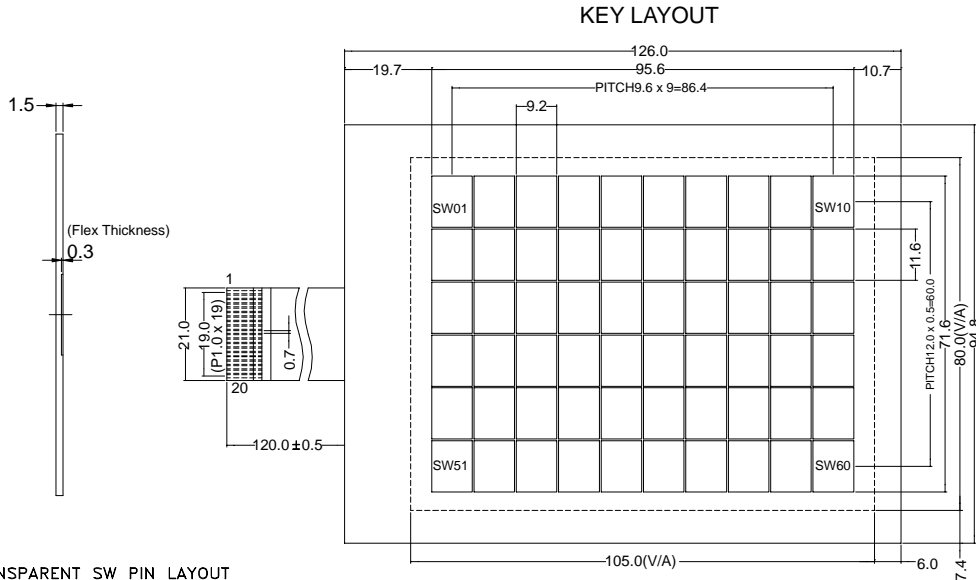
### ◆ For PG 240128-A/B



TOUCH PANEL PIN LAYOUT

PIN NO.	SIGNAL	PIN NO.	SIGNAL
1	COL5	9	ROW4
2	COL4	10	ROW5
3	COL3	11	COL6
4	COL2	12	COL7
5	COL1	13	COL8
6	ROW1	14	COL9
7	ROW2	15	COL10
8	ROW3	12	DUMMY

### ◆ For PG 320240-C/E



TRANSPARENT SW PIN LAYOUT

NO.	SYMBOL	NO.	SYMBOL
1	DUMMY	11	R4
2	DUMMY	12	R5
3	C10	13	R6
4	C9	14	C1
5	C8	15	C2
6	C7	16	C3
7	C6	17	C4
8	R1	18	C5
9	R2	19	DUMMY
10	R3	20	DUMMY

KEY MATRIX

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
R1	SW01	SW02	SW03	SW04	SW05	SW06	SW07	SW08	SW09	SW10
R2	SW11	SW12	SW13	SW14	SW15	SW16	SW17	SW18	SW19	SW20
R3	SW21	SW22	SW23	SW24	SW25	SW26	SW27	SW28	SW29	SW30
R4	SW31	SW32	SW33	SW34	SW35	SW36	SW37	SW38	SW39	SW40
R5	SW41	SW42	SW43	SW44	SW45	SW46	SW47	SW48	SW49	SW50
R6	SW51	SW52	SW53	SW54	SW55	SW56	SW57	SW58	SW59	SW60

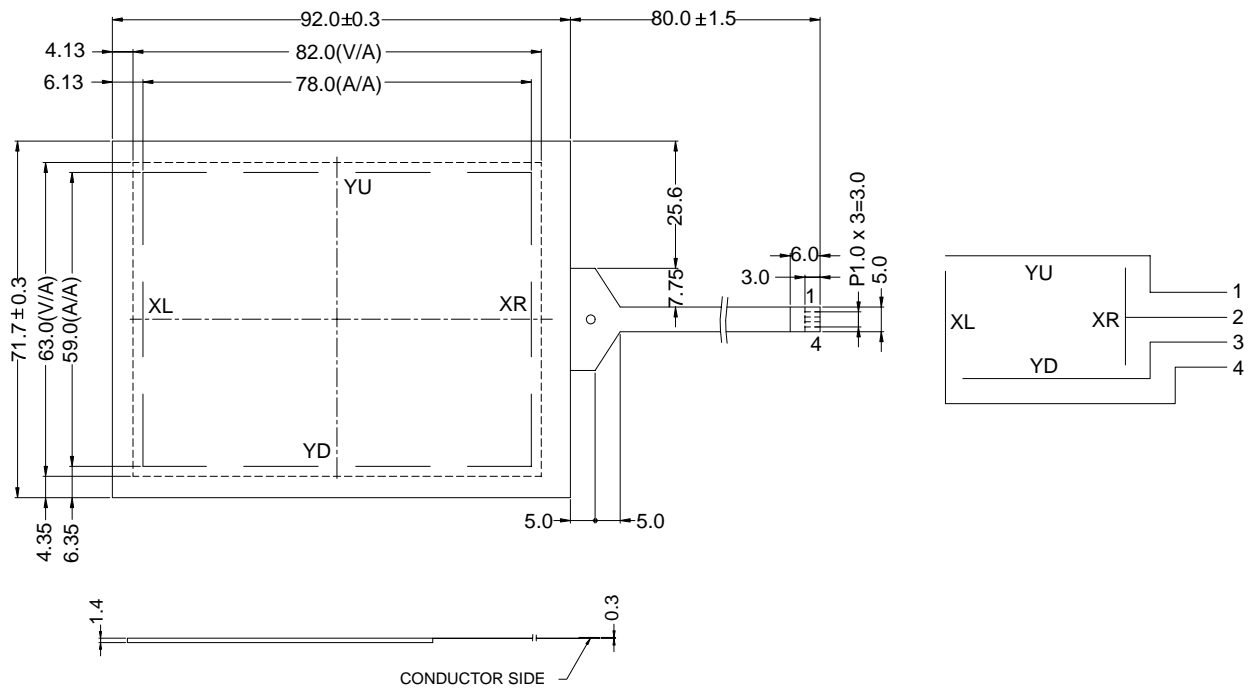
The tolerance unless classified  $\pm 0.2\text{mm}$



# ANALOG TOUCH PANEL

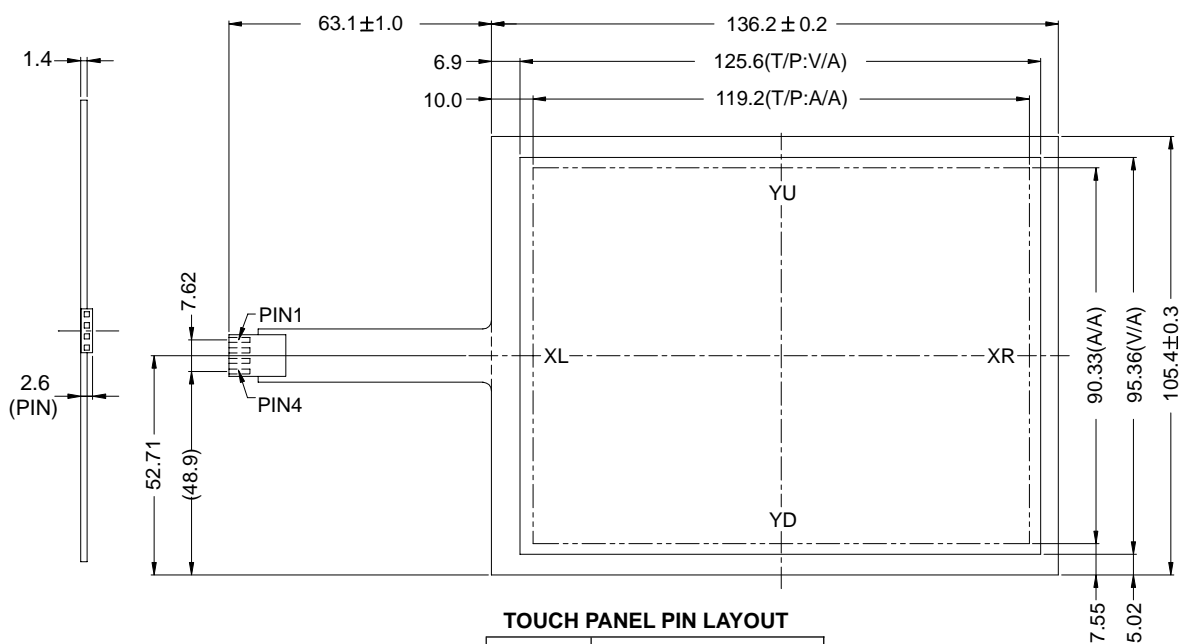
## OUTLINE DIMENSION & BLOCK DIAGRAM

◆ For PG 320240-H



The tolerance unless classified  $\pm 0.2$ mm

◆ For PG 320240-D



**TOUCH PANEL PIN LAYOUT**

PIN NO.	SYMBOL
1	YU
2	YD
3	XL
4	XR

The tolerance unless classified  $\pm 0.2$ mm



# Application Products

Application Field	Products	Model
<p>Telecommunication</p> 	Cellular Phone	PG9732-A / B / C / D
	Pay Phone	PC1602-L,PG12232-E-33,PG12864-Q
	Key Phone	PC1602-E/F, PC2002 series
	Fax Machine	PC1601 series, PC1602-E, PG320240 series
	Pager	PG12232-E-33
	Caller ID	PC1601 series, PC1602 series, PG12032-D series
	DECT Phone	PC1601-D
	Radio Control Unit	PC1602L,PC2002-A/B
	Transceiver	PC0801series, PC1601 series
	<p>Industrial Control</p> 	Central Air Conditioner
Chamber Control Panel		PG320240-C/D/E
Security System		PC1206-L, PG2004-A,PG12864-A/B/G PG320240-C/D/E-A1
Engery/Water Flow Meter		PG1602-F,PG12232-B
Mail Sorter Machine		PC0802-A/L,PG16032-A
Alarm Machine		PC1601-A/F/H, PG12864-A/F/G
Counter Machine		PC1602-L,PG20464 series
Vaccum Controller		PG12864-D/F/G
Escalator Machine		PC1601-L
MP3 Player		PC1602-K,PC2004-C/D
Traffic Info. System		PC24064 series
PLCC		PC1604-A,PG12864 series
Alcohol Test Device		PG8080-A
Heating Controller		PG12032-B,PG12232 series
Power Supply		PC1602 series, PG12864 series



# Application Products

Application Field	Products	Model
<b>Computer &amp; Peripherals</b>  	PDA	PG12864-N,PG320240-H/K
	Palm Top Cpmputer	PG240128-A/B
	Information Appliance	PC1602 series, PC2002 series , PG12232 series
	Internet Phoner	PC1602 series, PG12232 series
	ISDN	PC1602-H/PC2402-A
	POS(Banking System)	PG12232-C/E
	Printer	PC2004-A/B/C, PC4002-B PG128128-A
	Data Bank	PG240128-A/B
	UPS	PG0802-A, PC1602 series
	Modem	PC1602-K, PC1602-G
	Card Reader	PC2402-A, PG12864 series
	Eletronic Type Writer	PC4004-A/L
	Kid Computer	PG320240-E-A1
<b>Consumer Electronics</b>  	POS	PG12864-N,PG160160-B, PG320240-H
	Communication Facility	PC4002 series
	Vending Machine	PG12864 series
	Copy Machine	PG320240 series
	Ticket Machine	PC0802-L, PC1602-H
	Lottery Machine	PC1602 series, PC2002 series
	Kitchen Machine	PC1602 series, PC2002 series
	Data Collector	PG12864 series
<b>Medical &amp; Measurement</b>  	Scale Machine	PG16032-A, PG12232-A PG240128-A/B, PG24064 series
	Test Equipment	PC1602, PC2002, PC4002, PG240128 series
	Analysis Machine	PC1602 series
	Medical Device	PC4002-B
	Hand-held Scope	PG12864-A/K
<b>Automotive</b> 	GPS	PG12864-F, PG320240-E/G PG240128-A/B

The application products in this databook are described only to show representatine usages of the product and not intended for the guarantee or permisson of any right including the industrial rights.



**CHARACTER PATTERN(H2,NI)**

Lower 4 Bits \ Upper 4 Bits	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
xxxx0000	CG RAM (1)															
xxxx0001	(2)															
xxxx0010	(3)															
xxxx0011	(4)															
xxxx0100	(5)															
xxxx0101	(6)															
xxxx0110	(7)															
xxxx0111	(8)															
xxxx1000	(1)															
xxxx1001	(2)															
xxxx1010	(3)															
xxxx1011	(4)															
xxxx1100	(5)															
xxxx1101	(6)															
xxxx1110	(7)															
xxxx1111	(8)															



**CHARACTER PATTERN(SO/HO/EA,WA)**

Upper 4 Bits Lower 4 Bits	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
xxxx0000	CG RAM (1)															
xxxx0001	(2)															
xxxx0010	(3)															
xxxx0011	(4)															
xxxx0100	(5)															
xxxx0101	(6)															
xxxx0110	(7)															
xxxx0111	(8)															
xxxx1000	(1)															
xxxx1001	(2)															
xxxx1010	(3)															
xxxx1011	(4)															
xxxx1100	(5)															
xxxx1101	(6)															
xxxx1110	(7)															
xxxx1111	(8)															





**CHARACTER PATTERN(EB,WB)**

		High 4-bit (D4to D7) of Character Code (Hexadecimal)															
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Lower 4-bit (D0 to D3) of Character Code (Hexadecimal)	0	CG RAM (1)	±		0	0	P	'	P	9	é	á	'	r	á	ß	7
	1	CG RAM (2)	≡	!	1	A	Q	a	4	ú	é	í	"	j	+	y	ú
	2	CG RAM (3)	7	"	2	B	R	b	r	é	ñ	ó	°	o	é	ø	z
	3	CG RAM (4)	∟	#	3	C	S	c	s	á	ó	ú	'	p	ñ	e	v
	4	CG RAM (5)	∟	\$	4	D	T	t	t	á	ó	ú	'	e	ñ	z	o
	5	CG RAM (6)	∟	%	5	E	U	e	u	á	ó	ú	'	t	ñ	ñ	7
	6	CG RAM (7)	∟	&	6	F	V	v	v	á	ó	ú	'	u	ñ	ñ	7
	7	CG RAM (8)	∟	'	7	G	W	w	w	é	ó	ú	'	x	ñ	ñ	7
	8	CG RAM (1)	∟	(	8	H	X	x	x	é	ó	ú	'	÷	é	ñ	ñ
	9	CG RAM (2)	∟	)	9	I	Y	y	y	é	ó	ú	'	∟	ñ	ñ	7
	A	CG RAM (3)	∟	*	*	0	Z	z	z	é	ó	ú	'	∟	ñ	ñ	7
	B	CG RAM (4)	∟	+	;	K	k	k	c	i	R	á	é	∟	ñ	ñ	7
	C	CG RAM (5)	∟	=	,	<	L	∖	∖	∖	á	ó	ú	'	∟	ñ	ñ
	D	CG RAM (6)	∟	~	~	M	m	m	∖	á	ó	ú	'	∟	ñ	ñ	7
	E	CG RAM (7)	∟	~	>	N	^	^	^	á	ó	ú	'	∟	ñ	ñ	7
	F	CG RAM (8)	∟	~	?	O	_	∖	∖	∖	á	ó	ú	'	∟	ñ	ñ



**CHARACTER PATTERN(S5,N5)**

Upper 4 Bits	Lower 4 Bits	LLLL	LLHL	LLHH	LHLL	LHLH	LHHL	LHHH	HLLL	HLLH	HLHL	HLHH	HHLL	HHLH	HHHL	HHHH
		LLLL	CG RAM (1)													
LLLH	(2)															
LLHL	(3)															
LLHH	(4)															
LHLL	(5)															
LHLH	(6)															
LHHL	(7)															
LHHH	(8)															
HLLL	(1)															
HLLH	(2)															
HLHL	(3)															
HLHH	(4)															
HHLL	(5)															
HHLH	(6)															
HHHL	(7)															
HHHH	(8)															

**CHARACTER PATTERN(SH/EH,NH)**

Upper 4 Bits	Lower 4 Bits	LLLL	LLHL	LLHH	LHLL	LHLH	LHHL	LHHH	HLLL	HLLH	HLHL	HLHH	HHLL	HHLH	HHHL	HHHH
		CG RAM (1)														
LLLH	(2)															
LLHL	(3)															
LLHH	(4)															
LHLL	(5)															
LHLH	(6)															
LHHL	(7)															
LHHH	(8)															
HLLL	(1)															
HLLH	(2)															
HLHL	(3)															
HLHH	(4)															
HHLL	(5)															
HHLH	(6)															
HHHL	(7)															
HHHH	(8)															

**CHARACTER PATTERN(S4,N4)**

Upper 4 Bits	Lower 4 Bits	LLLL	LLHL	LLHH	LHLL	LHLH	LHHL	LHHH	HLLL	HLLH	HLHL	HLHH	HHLL	HHLH	HHHL	HHHH
		CG RAM (1)														
LLLH	(2)															
LLHL	(3)															
LLHH	(4)															
LHLL	(5)															
LHLH	(6)															
LHHL	(7)															
LHHH	(8)															
HLLL	(1)															
HLLH	(2)															
HLHL	(3)															
HLHH	(4)															
HHLL	(5)															
HHLH	(6)															
HHHL	(7)															
HHHH	(8)															

**OPTICAL CHARACTERISTICS**

**STN Type**

Ta=25°C

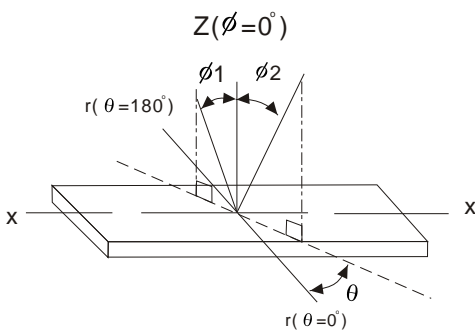
Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing angle	$\phi_2 - \phi_1$	CR=2.0	50	—	—	deg.	A
	$\theta$	CR=2.0	—	$\pm 30^\circ$	—	deg.	A
Contrast ratio	CR	$\phi = 10, \theta = 0$	5	—	—	—	B
Response time (Rise)	tr	$\phi = 10, \theta = 0$	—	150	250	ms	C
Response time (Fall)	tf	$\phi = 10, \theta = 0$	—	200	300	ms	C

**TN Type**

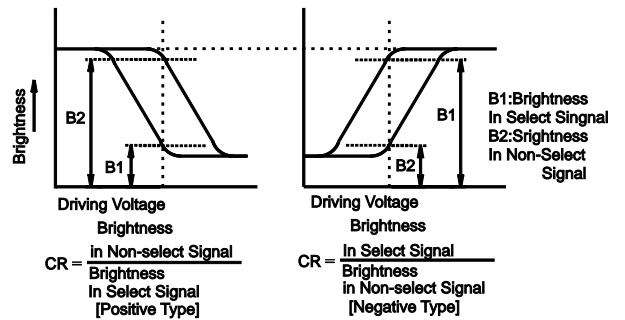
Ta=25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing angle	$\phi_2 - \phi_1$	CR=2.0	20	—	—	deg.	A
	$\theta$	CR=2.0	—	$\pm 30^\circ$	—	deg.	A
Contrast ratio	CR	$\phi = 25, \theta = 0$	5	—	—	—	B
Response time (Rise)	tr	$\phi = 25, \theta = 0$	—	80	120	ms	C
Response time (Fall)	tf	$\phi = 25, \theta = 0$	—	60	90	ms	C

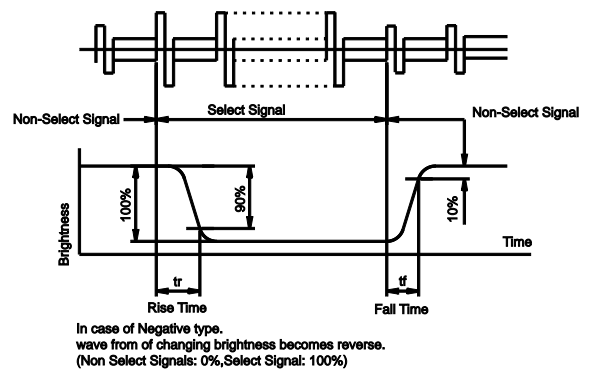
◆ Note A: Definition of Viewing Angle  $\theta$  and  $\phi$



◆ Note B: Definition of Contrast Ratio (CR)



◆ Note C: Definition of Contrast Time



## ELECTRICAL CHARACTERISTICS

V<sub>dd</sub> = 5V ±5%  
V<sub>ss</sub> = 0V

Item	Symbol	Condition	Standard value			Unit.	Applicable terminal
			Min.	Typ.	Max.		
Power voltage	V <sub>dd</sub>		4.5	5.00	5.5	V	V <sub>dd</sub>
Input H- level voltage	V <sub>IH</sub>		2.2	—	V <sub>dd</sub>	V	RS,R $\bar{W}$ ,E DB0~DB7
Input L- level voltage	V <sub>IL</sub>		-0.3	—	0.6	V	
Output H- level voltage	V <sub>OH</sub>	-I <sub>OH</sub> = 0.205mA	2.4	—	—	V	DB0~DB7
Output L- level voltage	V <sub>OL</sub>	I <sub>OL</sub> = 1.2mA	—	—	0.4	V	
I/O leakage current	I <sub>IL</sub>	V <sub>in</sub> = 0~V <sub>dd</sub>	-1	—	1.0	μA	RS,R $\bar{W}$ ,E DB0~DB7
Supply current	I <sub>dd</sub>	V <sub>dd</sub> = 5V	2	—	—	mA	V <sub>dd</sub>
LCD operating voltage	V <sub>LCD</sub>	V <sub>dd</sub> - V <sub>0</sub>	3.0	—	11.0	V	V <sub>0</sub>

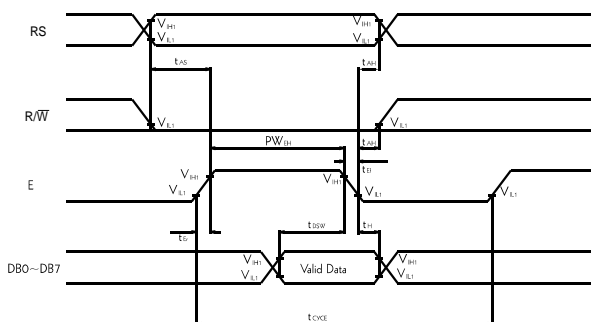
## TIMING CHARACTERISTICS

V<sub>dd</sub> = 5V ±5%  
V<sub>ss</sub> = 0V

Item	Symbol	Min.	Max.	Unit.
Enable cycle time	T <sub>cyce</sub>	500	—	ns
Enable pulse width	P <sub>WEH</sub>	200	—	ns
Enable rise/fall time	T <sub>ER</sub> , T <sub>EF</sub>	—	25	ns
Set-up time	T <sub>AS</sub>	40	—	ns
Address hold time	T <sub>AH</sub>	10	—	ns
Data Set-up time	T <sub>DSH</sub>	60	—	ns
Data delay time	T <sub>DDR</sub>	60	120	ns
Data hold time (writing)	T <sub>H</sub>	10	—	ns
Data hold time (reading)	T <sub>DHR</sub>	20	—	ns
Clock oscillating frequency	T <sub>OSC</sub>	270(Typ.)		KHz

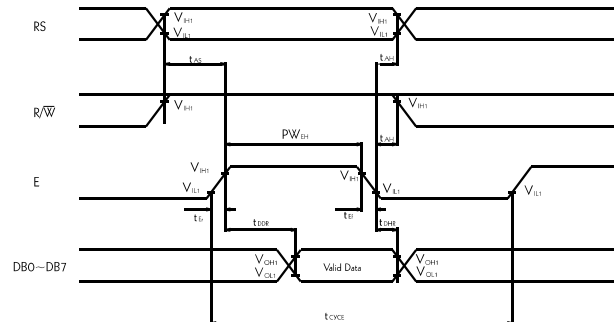
## TIMING CHART

◆ FIG.1 WRITE OPERATION



(Write Data from MPU to MODULE)

◆ FIG.2 READ OPERATION

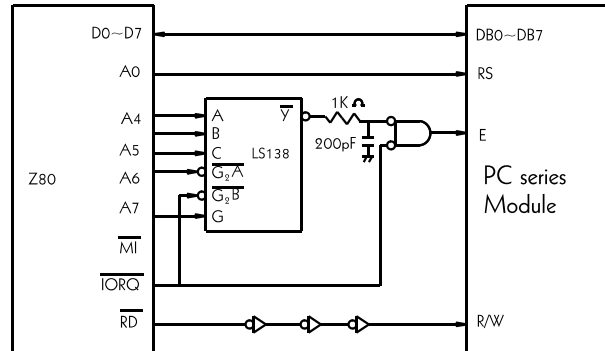
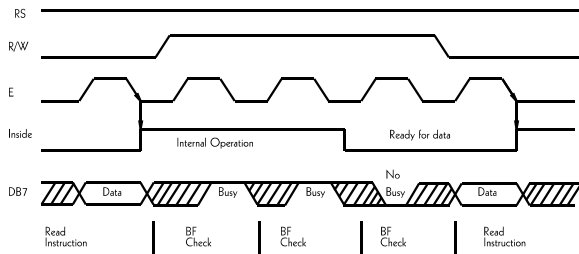


(Read Data from MODULE to MPU)



## ● INTERFACE WITH MPU

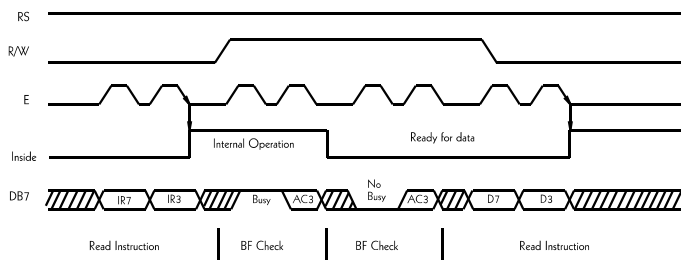
### ◆ Example of Interface with 8-bit MPU (Z80)



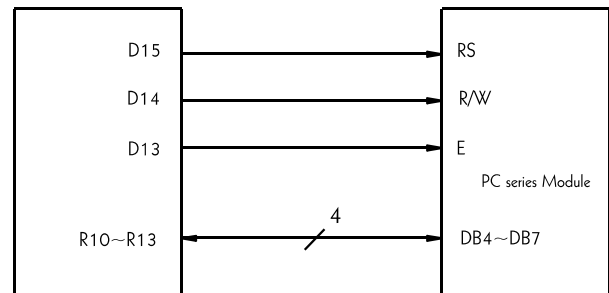
### ◆ Example of Interface with 4-bit MPU

Interface to a 4-bit MPU can be made through the I/O port of the 4-bit MPU. If there are insufficient I/O ports, data can be transferred at 8-bit cycles, however, if there are not, data transfer can be accomplished by two cycles of 4-bit transfers (select interface as 4-bits long).

Please take into account that 2 cycles of the BF check will be necessary and the timing sequence will prove to be complicated.



Note: IR7, IR3: 7th bit, 3rd bit of instruction  
AC3: 3th bit of Address Counter



### ◆ Features

- (1) Interface with 8-bit or 4-bit MPU is available.
- (2) 192 types of alphabets, numbers, symbols and special characters can be displayed by built-in character generator (ROM).
- (3) Other preferred characters can be displayed by character generator (RAM).
- (4) Various functions of instruction are available by programming.
  - Clear display
  - Cursor at home
  - On / Off cursor
  - Blink character
  - Shift display
  - Shift cursor
  - Read / write display dat ...etc.
- (5) Compact and light weight design which can be easily assembled in devices.
- (6) Single power supply + 5V drive (except for extended temp. type).
- (7) Low power consumption.

### ◆ If Interface data is 4 -bit long

- (1) Data transfer is accomplished through 4 bus lines from DB4 to DB7 (while the rest of 4 bus lines from DB0 to DB3 are not used).
- (2) Data transfer with MPU are completed when 4-bits of data are transferred twice (first upper 4-bits data, then lower 4-bits data).

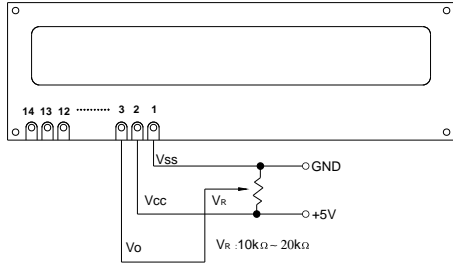
### ◆ If Interface data is 8 -bit long

Data transfer are made through all of 8 bus lines from DB0 to DB7.

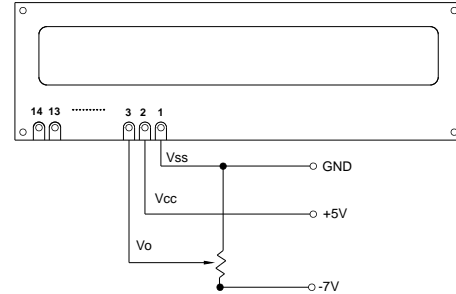


● **EXAMPLE OF POWER SUPPLY**

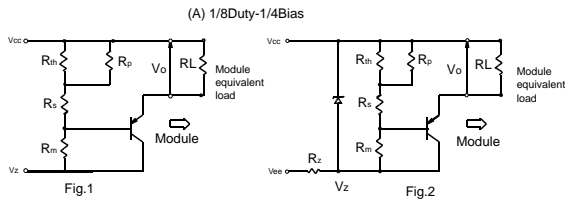
◆ **Normal Temperature Type**



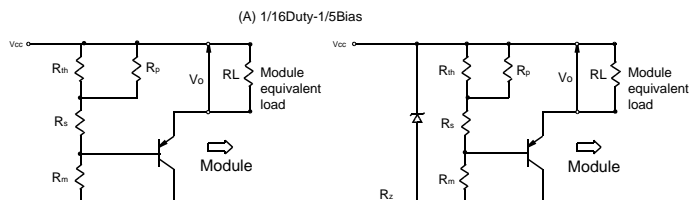
◆ **Extended Temperature Type**



◆ **Examples of Temperature Compensation Circuits for Extended Temp. (Only for reference)**



Thermistor: Rth[25°C]= 15[k-ohm], B=4200(K)  
Resistors: Rp=30[k-ohm], Rs=6.8[k-ohm], Rm=3.3[k-ohm]  
Transistor: PNP Type  
Vcc: +5V, Vss: 0V [Logic Supply]  
Vz: -8[V] (-7.8 to -8.2[V])  
Vee<Vz[V], Rz=[Vz-Vee] / 5[k-ohm]



Thermistor: Rth[25°C]= 15[k-ohm], B=4200(K)  
Resistors: Rp=510[k-ohm], Rs=8.2[k-ohm], Rm=3.9[k-ohm]  
Transistor: PNP Type  
Vcc: +5V, Vss: 0V [Logic Supply]  
Vz: -11[V] (-10.725 to -11.275[V])  
Vee<Vz[V], Rz=[Vz-Vee] / 5[k-ohm]

● **INSTRUCTIONS**

Instruction	Code										Description	Executed Time(max.)
	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		
Clear Display	0	0	0	0	0	0	0	0	0	1	Clears all display and returns the cursor to the home position (Address 0).	1.64mS
Cursor Art Home	0	0	0	0	0	0	0	0	0	*	Returns the cursor to the home position (Address 0). Also returns the display being shifted to the original position. DD RAM contents remain unchanged.	1.64mS
Entry Mode Set	0	0	0	0	0	0	0	1	I/D	S	Sets the cursor move direction and specifies or not to shift the display. These operations are performed during data write and read.	40 μS
Display On/Off Control	0	0	0	0	0	0	1	D	C	B	Sets ON/OFF of all display (D), cursor NO/OFF (C), and blink of cursor position character (B).	40 μS
Cursor /Display Shift	0	0	0	0	0	1	S/C	R/L	*	*	Moves the cursor and shifts the display without changing DD RAM contents.	40 μS
Function Set	0	0	0	0	1	DL	N	F	*	*	Sets interface data length (DL) number of display lines (L) and character font (F)	40 μS
CG RAM Address Set	0	0	0	1	ACG						Sets the CG RAM address. CG RAM data is sent and received after this setting.	40 μS
DD RAM Address Set	0	0	1	ADD						Sets the DD RAM address. DD RAM data is sent and received after this setting.	40 μS	
Busy Flag/ Address Read	0	1	BF	AC						Reads Busy flag (BF) indicating internal operation is being performed and reads address counter counts.	0 μS	
CG RAM / DD RAM Data Write	1	0	WRITE DATA							Writes data into DD RAM or CG RAM.	40 μS	
CG RAM / DD RAM Data Read	1	1	READ DATA							Reads data from DD RAM or CG RAM.	40 μS	

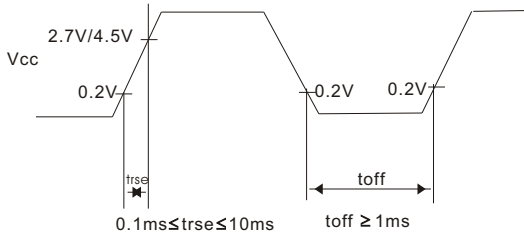
Code	Description	Executed Time (max)
I / D = 1 : Increment I / D = 0 : Decrement S = 1 : With display shift S / C = 0 : cursor movement R / L = 1 : Shift to the right R / L = 0 : Shift to the left D L = 1 : 8-bit	D / L = 0 : 4-bit N = 1 : 2 lines N = 0 : 1 line F = 1 : 5 x 10 dots F = 0.5 x 7 dots BF = 1 : internal operation is being performed BF = 0 : instruction acceptable	DD RAM : Display Data RAM CG RAM : Character Generator RAM ACG : CG RAM Address ADD : DD RAM Address Corresponds to cursor address AC : Address Counter, used for both DD RAM and CG RAM * : Invalid
		fcp or fosc = 250 KHz However, when frequency changes, execution time also changes Example if fcp or fosc is 270KHz, 70μS x 250 / 270 = 37μS





## POWER SUPPLY RESET

The internal reset circuit will be operating properly when the following power supply conditions are satisfied. If it is not operated properly, please perform the initial setting along with the instruction.



Item	Symbol	Measuring Condition	Standard Value			Unit
			Min.	Typ.	Max.	
Power Supply RISE Time	trise	—	0.1	—	10	mS
Power Supply CFF Time	toff	—	1	—	—	mS

## Reset Function

### Initialization Mode by Internal Reset Circuit

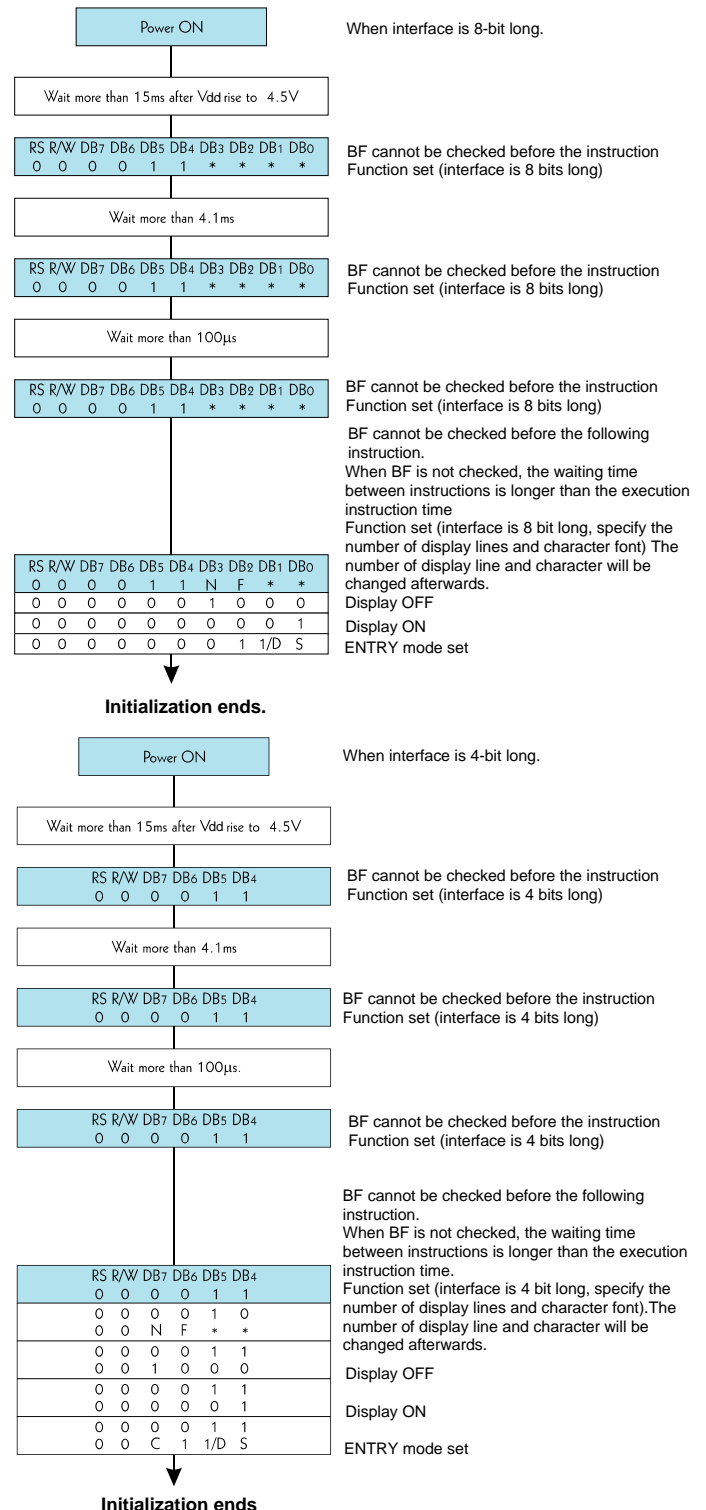
The controller automatically initializes (resets) when power is supplied (built-in internal reset circuit). The following instructions are executed during initialization. The busy flag (BF) is kept in busy state until initialization ends (BF=1). The busy state is 10ms after Vdd reaches 4.5V.

- (1) Display clear
  - ◆ DL=1:8 bit long interface data
  - ◆ DL=0:4 bit F=0:5 x 7 dots character font
  - ◆ N=1:2 lines
  - ◆ N=0:1 line
- (2) Function set
  - ◆ D=0:Display OFF
  - ◆ C=0:Cursor OFF
  - ◆ B=0:Blink OFF
- (3) Display ON/OFF control
  - ◆ 1 / D = 1: + 1 (increment)
  - ◆ S = 0: No shift

Note: When using internal reset circuit is not satisfied in power supply conditions, the internal reset circuit will not function properly and initialization will not be performed. Please initialize using the MPU along with the instruction set.

### Initialization along with Instruction

If power supply conditions are not satisfied, which for proper operation of internal reset circuit, it is required to make initialization along with instruction. Please make following procedures.



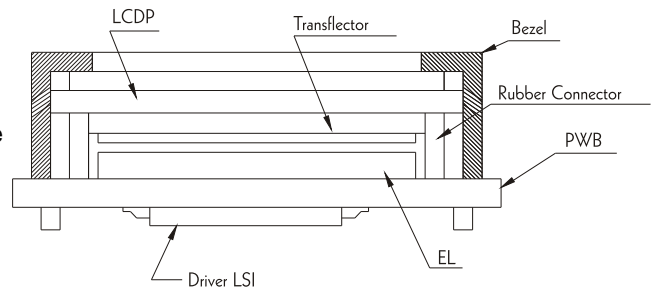
## ● BACKLIGHT FOR LCD MODULES

### ◆ EL Backlight

Flat surface light source offers simple and even illumination over large area.

#### Features

- (1) Max. 1.3mm thickness (Max. 1.5mm for lead portion)
- (2) Wide driving condition, 60 - 1,000Hz at 150V AC Max
- (3) With inverter, step-up voltage from 1.5V battery is available
- (4) Emitted colors are blue-green, yellow-green and white
- (5) Operating characteristics of PC2002-A SERIES is 110V, 400Hz, 8mA, (Ta=20°C, 60% RH)
- (6) Temperature range: Operating 0°C ~ +50°C ;  
Storage -20°C ~ +60°C

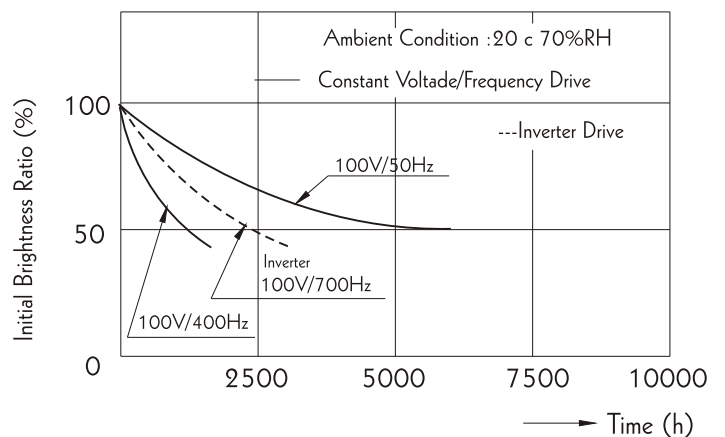


#### Precaution

Requires an inverter to operate the EL panel with a battery or DC power supply.

- (1) Low inverter loss and high light efficiency as it is designed for EL backlight
- (2) Less change of power consumption during operation under temperature change or extended hours. This is characterized by the constant supply current, which minimizes the brightness change of the EL panel

#### Life Characteristics



### ◆ CCFL Backlight (Cold Cathode Fluorescent Lamp)

Bright white color of light source offers clear and even illumination over large viewing area.

#### Features

- (1) High Brightness
- (2) Long lifetime.
- (3) White color emitted
- (4) Temperature range: Operating: 0°C ~ +50°C ;  
Storage -20°C ~ +60°C
- (5) Life time: 10,000 ~ 20,000 hours

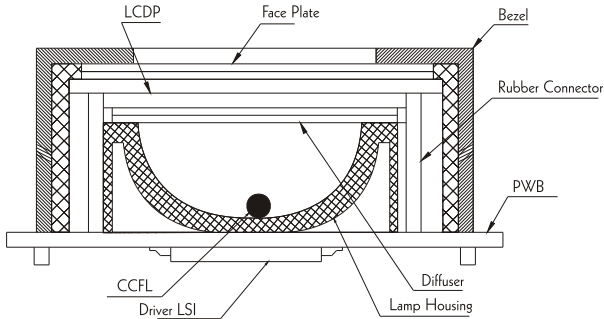
#### Precaution

Inverter for CCFL use output high pressure AC current. Therefore, please pay attention when you handle inverter and power supply cable of LCD backlight.



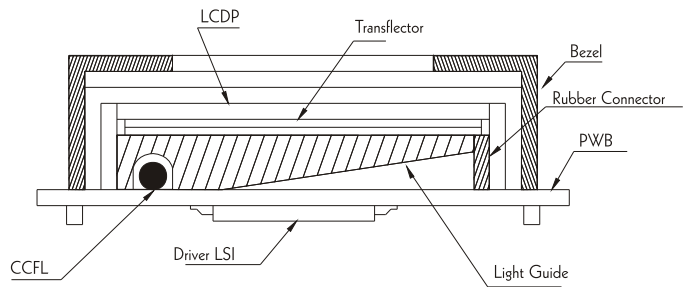
### Direct Illumination

Suitable for multi-color and / or dot matrix LCD



### Edge Illumination

Thin structure type of even illumination emits light from tube-like light source over a large area.



### ◆ LED Backlight

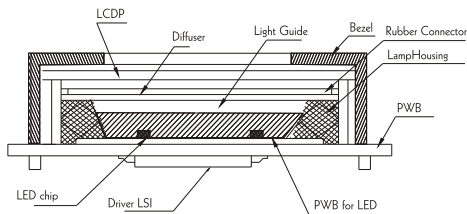
Long life, low power consumption and requires a simple power supply. Available colors are red, green and orange, available in array type illumination or edge illumination

#### Features

- (1) Low driving voltage (DC) and does not require an inverter
- (2) Long life (100,000 hours/average)
- (3) No noise occurrence
- (4) Various colors available in red, green and orange etc ( multi-color by alternative switch is also available)
- (5) Operating characteristics of PC2002-A series is 4.2V, 210mA, 250cd/m

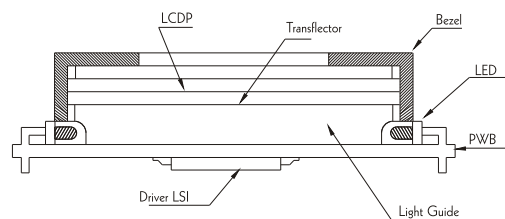
### Array Illumination

A grid array of LED's provide even illumination.



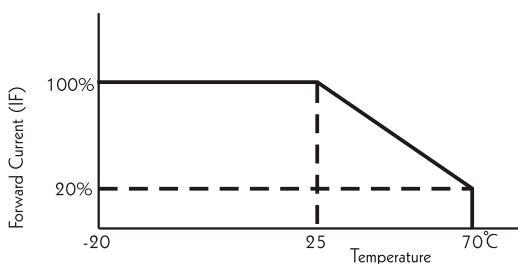
### Edge Illumination

Combination LED with a light guide offers a thin structure type of illumination.

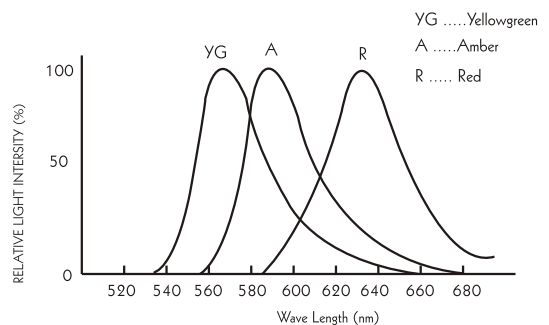


### Electrical Characteristics (Reference Data)

Forward Current De-Rating Curve



Wave Length Vs Relative Light Intensity



● **RELIABILITY CONDITION**

<b>LCD Module (Consumer Type)</b>		
<b>Item</b>	<b>Test Condition</b>	<b>Applicable Standard</b>
<b>Storage in High Temperature</b>	Storage at $60^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 96~100 hrs, then storage in normal condition for 4 hrs.	MIL-202E
<b>Storage in Low Temperature</b>	Storage at $-20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 96~100 hrs, then storage in normal condition for 4 hrs.	MIL-202E
<b>Storage in High Temperature &amp; Humidity</b>	1. Storage at $60^{\circ}\text{C} \pm 2^{\circ}\text{C} / 90\% \text{ RH}$ for 96~100 hrs, then storage in normal condition for 4hrs. (Polarizer may fail in this environment). Or 2. Storage at $40^{\circ}\text{C} \pm 2^{\circ}\text{C} / 90\% \text{ RH}$ for 96~100 hrs, then storage in normal condition for 4 hrs.	MIL-202E
<b>Temperature Cycling</b>	$-20^{\circ}\text{C} \rightarrow 25^{\circ}\text{C} \rightarrow 70^{\circ}\text{C} \rightarrow 25^{\circ}\text{C}$ (60Mins) (5Mins) (60Mins) (5Mins) 10Cycle	MIL-202E
<b>Vibration Test</b>	10~55Hz (1 minute), 1.5mm direction each time by X, Y and Z for 2 hrs each time.	MIL-202E
<b>Drop Test</b>	Package Weight	Drop Height
	0 ~ 45.4 kg	122 cm
	45.4 ~ 90.8 kg	76 cm
	90.8 ~ 454 kg	61 cm
	Over 454 kg	46 cm
		MIL-810E

## ● PRECAUTIONS FOR USING OF LCD MODULE

### ◆ Precautions for Handling LCD Modules

**Our LCMs have been assembled and adjusted before delivery; therefore, observing the following procedures for handling:**

- (1) Do not subject to excessive shocks by dropping the units.
- (2) Do not modify or adjust the tab of the metal holder nor make any changes to them.
- (3) Do not modify the printed circuit board.
- (4) Limit the soldering to the printed circuit board to only I / O terminals.
- (5) Do not touch the connective rubber (inter-connector ), nor modify its location.

### ◆ Warning for Static Electricity

**Our LCMs use CMOS LSI. Therefore, measures for static electricity have been taken through all the processes from manufacturing to shipping.**

**When using them, please take sufficient care to prevent static electricity as you would on CMOS IC.**

#### **(1) Do not take LCM from its anti-static bag until it is assembled:**

The LCM is individually packaged in bags to resist static electricity. A LCM should not be removed from the bag until it is ready for soldering operation. For storing LCMs, please always keep them packaged in the anti-static bags or electric conductive containers.

#### **(2) Always use a body ground when handling the LCM:**

Always apply the grounding to your body from the moment the LCM is taken out of the anti-static bag until it is assembled. When it is necessary to handle the LCM, once it is taken out of the bag, always place it in an electric conductive container. It is recommended that not to wear clothes with chemical fiber, cotton or conductive treated fiber.

#### **(3) Using a no-leak soldering iron:**

The soldering iron used for soldering the I / O terminals of the LCM should be insulated at the iron tip or grounded on the iron tip.

#### **(4) A grounded electrical apparatus is always required for assembly:**

An electrical apparatus is required to assemble the LCM, especially electric drivers. These drivers are to be grounded to avoid the transmission of spike noise generated when the motor is rotating.

#### **(5) Make the operation bench equal to the ground:**

When the operation bench is grounded with an aluminum or steel plate, there is a possibility of an electric shock being generated. This is caused when the impedance is too low. Therefore, it is recommended that an electric conductive (rubber) should be used.

#### **(6) Peel off the LCM protective film slowly:**

The LCM is attached with film to protect the display surface from contamination, flaw, adhesion of flux, etc. It should be noted that peeling off this film too abruptly may cause static electricity.

#### **(7) Attention should be paid on humidity:**

50~60%RH is satisfactory.

## ● PRECAUTIONS FOR USING LCD MODULES

### ◆ Precautions for Soldering LCD Modules

The following procedures should be followed when soldering the LCM:

\*Soldering is to be applied only to the I / O terminals.

\*Using a soldering iron with no leakage.

In addition, further attention should be paid to the following points:

#### (1) Conditions for soldering I / O terminals:

Temperature at iron tip: 280 °C + 10 °C

Soldering time: 3-4 sec. / terminal

Type of solder: Eutectic solder (rosin flux filled)

Avoid using flux as it may penetrate the LCM and could cause contamination. When cleaning is required, do not remove the protective film until soldering the I / O terminals is completed. This will eliminate contamination caused by the dispersion of flux while soldering.

#### (2) Removing the wiring:

When a lead wire or a connector that has been soldered to the I / O terminals of the LCM has to be removed, remove it only after soldering at the connection part has melted sufficiently. If forcefully removed, it may break or peel the terminal. It is recommended to use a suction-type soldering iron.

Furthermore, do not attempt to solder a lead wire or connector more than 3 times to a given LCM.

### ◆ Long-term Storage

When long-term storage of a LCM is necessary, please comply with the following procedures.

(1) Store in original packaging if possible.

(2) For the individual LCM, place it in an anti-static well sealed bag, and store it in where not subjected direct sunlight nor the fluorescent light.

(3) Store in a temperature range of 0°C ~35°C at low humidity. Please also refer to the specification of specific module for its requirements of storage temperature and humidity.

**Note: Improper storage could cause deterioration of the polarizer and oxide of the I/O terminals that may make soldering more difficult.**

### ◆ Excess Electric Current Protection

An excess electric current protection circuit is not provided with the LCM. Therefore, it is recommended to use an electrical source which has an excess electric current protection circuit.

### ◆ Precautions for Using LCD Modules

(1) Do not wipe the surface of the LCD with hard materials.

(2) Do not apply excessive force on the surface of the LCD.

(3) Do not apply DC voltage.

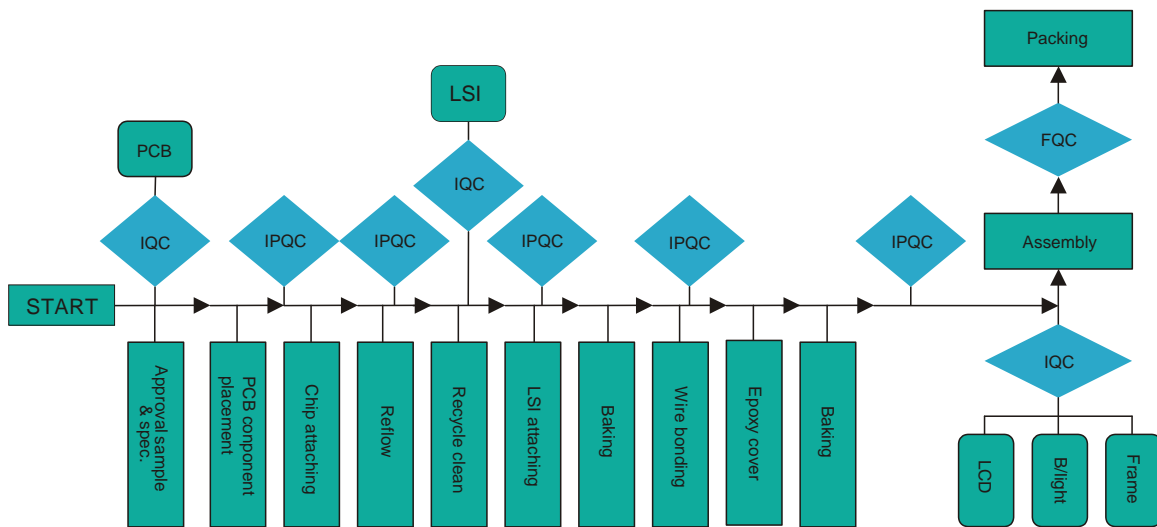
(4) Do not expose to direct sunlight or fluorescent light for extended periods.

(5) Avoid storage in high temperature and humidity. (When storage for an extended period at 40°C or higher, R/H should be less than 60%)

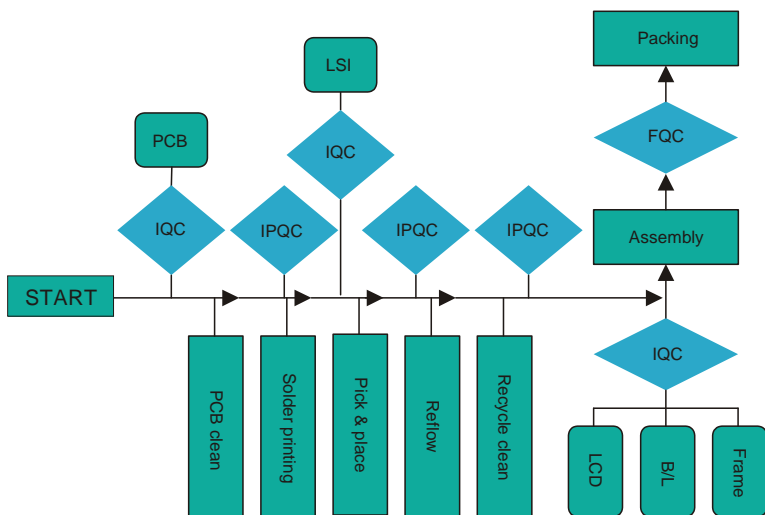
(6) The liquid substance within the LCD is hazardous. Do not permit this liquid to contact with eyes nor mouth.

# PRODUCTION PROCESS

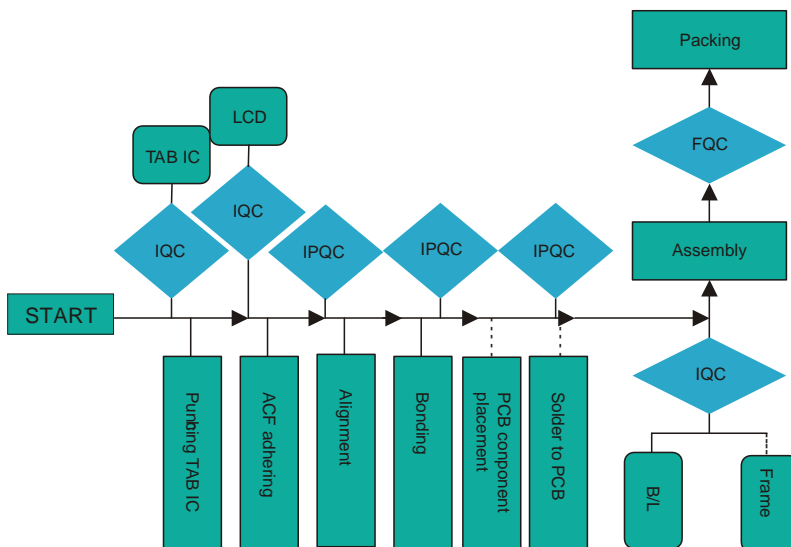
## CHIP ON BOARD PROCESS



## SURFACE MOUNTED TECHNIQUE PROCESS



## TAPE AUTOMATED BONDING PROCESS



..... optional  
| necessary

