VISHAY INTERTECHNOLOGY, INC.

INTERACTIVE
data book

INFORMATION DISPLAY PRODUCTS
LCD DISPLAYS

VISHAY

VSD-DB0047-0303

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   b) Click on the products within the Table of Contents to go directly to the datasheet.
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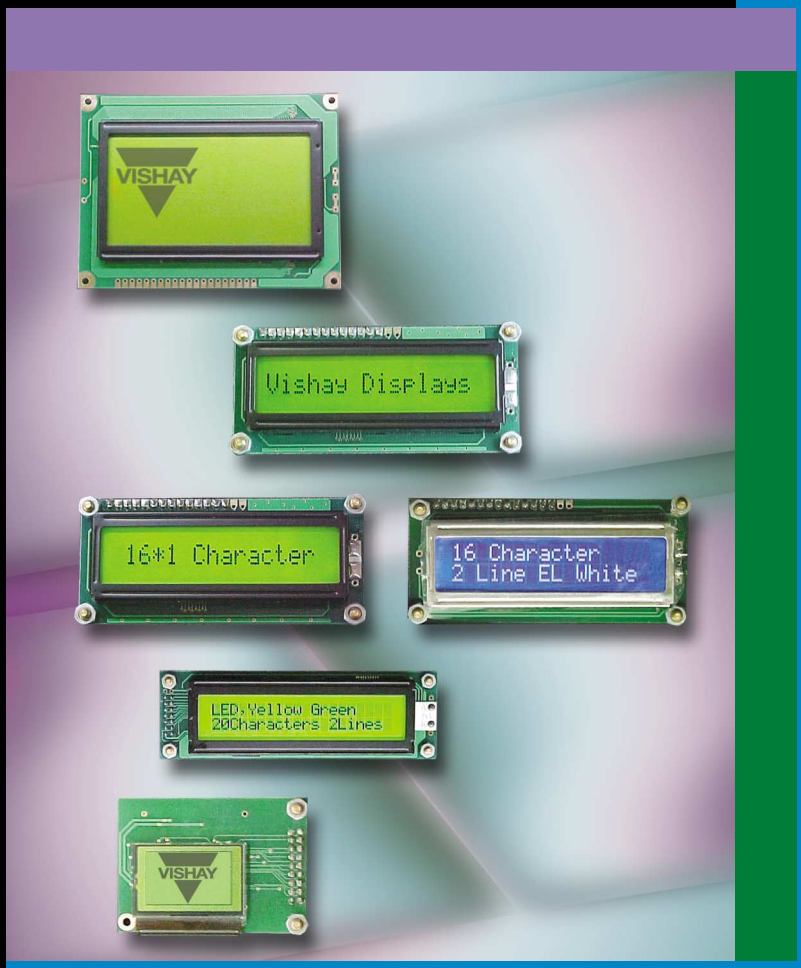
One of the World's Largest Manufacturers of
Discrete Semiconductors and Passive Components

VISHAY INTERTECHNOLOGY, INC.

DATA BOOK



INFORMATION DISPLAY PRODUCTS
LCD DISPLAYS

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VISHAY INTERTECHNOLOGY, INC.

DISCRETE SEMICONDUCTORS	**RECTIFIERS**	Schottky (single, dual)
		Standard, Fast and Ultra-Fast Recovery (single, dual)
		Clamper/Damper
		Bridge
		Superectifier®
	SMALL-SIGNAL DIODES	Schottky and Switching (single, dual)
		Tuner/Capacitance (single, dual)
		Bandswitching
		PIN
	ZENER & SUPPRESSOR DIODES	Zener Diodes (single, dual)
		TVS (TransZorb,® Automotive, Arrays)
	MOSFETs	Power MOSFETs
		JFETs
	RF TRANSISTORS	Bipolar Transistors (AF and RF)
		Dual Gate MOSFETs
		MOSMICs®
	OPTOELECTRONICS	IR Emitters, Detectors and IR Receiver Modules
		Opto Couplers and Solid State Relays
		Optical Sensors
		LEDs and 7 Segment Displays
		Infrared Data Transceiver Modules
		Custom products
	ICs	Power ICs
		Analog Switches
PASSIVE COMPONENTS	**CAPACITORS**	Tantalum Capacitors
		Solid Tantalum Capacitors
		Wet Tantalum Capacitors
		Ceramic Capacitors
		Multilayer Chip Capacitors
		Disc Capacitors
		Film Capacitors
		Power Capacitors
		Heavy Current Capacitors
		Aluminum Capacitors
	RESISTIVE PRODUCTS	Foil Resistors
		Film Resistors
		Thin Film Resistors
		Thick Film Resistors
		Metal Oxide Film Resistors
		Carbon Film Resistors
		Wirewound Resistors
		Variable Resistors
		Cermet Variable Resistors
		Wirewound Variable Resistors
		Conductive Plastic Variable Resistors
		Networks/Arrays
		Non-Linear Resistors
		NTC Thermistors
		PTC Thermistors
	MAGNETICS	Inductors
		Transformers
INTEGRATED MODULES	**DC/DC CONVERTERS**	
STRESS SENSORS AND TRANSDUCERS	**STRAIN GAGES AND INSTRUMENTS**	
	PHOTOSTRESS® INSTRUMENTS	
	TRANSDUCERS	Load Cells
		Weighing Systems

ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DISCRETE SEMICONDUCTORS AND PASSIVE COMPONENTS

Information Display Products
LCD Displays

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Vishay

INFORMATION DISPLAY PRODUCTS, LCD DISPLAYS

CHARACTER MODELS

GRAPHIC MODELS

Table of Contents

Vishay

Product Numbering System

LCD -016 M 001 A -Y Y H -EP *

1 2 3 4 5 6 7 8 9 10

1. Brand Name: Vishay Dale Electronics, Inc.

2. Horizontal Format: 16 characters

3. Display Type: M →Matrix Type, G →Graphic Type, X →TAB Type, C →Color Type

4. Vertical Format: 1 line

5. Model Serial Number: A

6. Backlight Type:

N → Without backlight	
B → EL, Blue	A →LED, Amber
D → EL, Green	R →LED, Red
W →EL, White	T → LED, White
F → CCFL, White	G →LED, Green
Y → LED, Yellow Green	P →LED, Blue

7. LCD Mode:

B → TN Positive, Gray
N → TN Negative
G → STN Positive, Gray
Y → STN Positive, Yellow Green
M → STN Negative, Blue
F → FSTN Positive
T → FSTN Negative

8. LCD Polarizer Type
Temperature Range
Viewing Direction

A → Reflective, N.T., 6:00	H →Transflective, W.T., 6:00
D → Reflective, N.T., 12:00	K →Transflective, W.T., 12:00
G → Reflective, W.T., 6:00	C →Transmissive, N.T., 12:00
J → Reflective, W.T., 12:00	F →Transmissive, N.T., 12:00
B → Transflective, N.T., 6:00	I → Transmissive, N.T., 6:00
E → Transflective, N.T., 12:00	L → Transmissive, W.T., 12:00

*N.T.: Normal temperature
W.T.: Wide temperature

9. IC Font:

JS/JP/Jn/JT:	English/Japanese
EN/EE/EU/EP/ET:	English and European standard font
ES/EC:	English/European
CP:	English/Cyrillic
HS/HP:	Hebrew
MG:	Mexico

10. Special Code

V:	Negative Voltage generator on board
T:	Negative Voltage generator and temperature compensation on board
TS:	Touch screen
E:	Edge LED backlight

Product Specifications List

CHARACTER LCM

DISPLAY FORMAT CHAR.X LINE	MODEL NO.	OUTLINE DIMENSION (W X H)mm	EFFECTIVE VIEWING AREA (W X H)mm	CHARACTER SIZE (W X H)mm	DOT SIZE (W X H)mm	DRIVING METHOD (DUTY)	PROCESS COLOR	BACKLIGHT CCFL	BUILT-IN CONTROLLER
320 x 240	LCD-320X240A	154.6 x 114.8	118.8 x 89.38	0.09 x 0.33	0.12 x 0.36	1/240	X	X	No

CHARACTER LCM

DISPLAY FORMAT CHAR.X LINE	MODEL NO.	OUTLINE DIMENSION (W X H)mm	EFFECTIVE VIEWING AREA (W X H)mm	CHARACTER SIZE (W X H)mm	DOT SIZE (W X H)mm	DRIVING METHOD (DUTY)	PROCESS COLOR					BACKLIGHT PAGE		
							TN	STN GRAY	STN YELLOW	STN BLUE	FSTN B & W	NONE	LED	EL
8 x 2	LCD-008M002A	58.0 x 32.0	38.0 x 16.0	2.96 x 5.56	0.56 x 0.66	1/16	O	O	O			O	O	O
12 x 2	LCD-012M002A	55.7 x 32.0	46.0 x 14.5	2.65 x 5.50	0.45 x 0.60	1/16		O	O			O	O	O
16 x 1	LCD-016M001A	80.0 x 36.0	66.0 x 16.0	3.07 x 6.56	0.55 x 0.75	1/16	O	O	O	O		O	O	O
16 x 1	LCD-016M001B	85.0 x 28.0	66.0 x 16.0	3.07 x 6.56	0.55 x 0.75	1/16	O	O	O	O		O	O	O
16 x 2	LCD-016M002A	84.0 x 44.0	66.0 x 17.0	2.95 x 5.55	0.55 x 0.65	1/16	O	O	O	O		O	O	O
16 x 2	LCD-016M002B	80.0 x 36.0	66.0 x 16.0	2.96 x 5.56	0.55 x 0.65	1/16	O	O	O	O		O	O	O
16 x 2	LCD-016M002C	85.0 x 36.0	66.0 x 16.0	2.96 x 5.56	0.55 x 0.65	1/16	O	O	O	O		O	O	O
16 x 2	LCD-016M002D	85.0 x 30.0	66.0 x 16.0	2.96 x 5.56	0.55 x 0.65	1/16	O	O	O	O		O	O	O
16 x 2	LCD-016M002E	85.0 x 32.6	66.0 x 17.0	2.96 x 5.56	0.55 x 0.65	1/16	O	O	O	O		O	O	O
16 x 2	LCD-016M002L	122.0 x 44.0	99.0 x 24.0	4.84 x 9.66	0.92 x 1.10	1/16	O	O	O			O	O	O
16 x 4	LCD-016M004A	87.0 x 60.0	62.0 x 26.0	2.95 x 4.75	0.55 x 0.55	1/16	O	O	O			O	O	O
20 x 2	LCD-020M002A	116.0 x 37.0	85.0 x 18.6	3.2 x 5.55	0.6 x 0.65	1/16	O	O	O			O	O	O
20 x 2	LCD-020M002L	180.0 x 40.0	149.0 x 23.0	6.0 x 9.66	1.12 x 1.12	1/16	O	O	O			O	O	O
20 x 4	LCD-020M004A	98.0 x 60.0	77.0 x 25.2	2.95 x 4.75	0.55 x 0.55	1/16	O	O	O			O	O	O
20 x 4	LCD-020M004L	146.0 x 62.5	123.5 x 43.0	4.84 x 9.22	0.92 x 1.10	1/16		O	O			O	O	O
24 x 2	LCD-024M002A	118.0 x 36.0	94.5 x 16.0	3.2 x 5.55	0.60 x 0.65	1/16	O	O	O			O	O	O
40 x 2	LCD-040M002A	182.0 x 33.5	154.4 x 16.5	3.2 x 5.55	0.60 x 0.65	1/16	O	O	O			O	O	O
40 x 4	LCD-040M004A	190.0 x 54.0	147.0 x 29.5	2.78 x 4.89	0.50 x 0.55	1/16	O	O	O			O	O	O

GRAPHIC LCM

DISPLAY FORMAT CHAR.X LINE	MODEL NO.	OUTLINE DIMENSION (W X H)mm	EFFECTIVE VIEWING AREA (W X H)mm	DOT SIZE (W X H)mm	DOT PITCH (W X H)mm	DRIVING METHOD (DUTY)	PROCESS COLOR				BACKLIGHT PAGE				BUILT-IN CONTROLLER
							STN GRAY	STN YELLOW	STN BLUE	FSTN B & W	NONE	LED	EL	CCFL	
122 x 32	LCD-122G032A	84.0 x 44.0	60.0 x 18.0	0.40 x 0.45	0.44 x 0.49	1/32	O	O			O	O	O		SED1520
122 x 32	LCD-122G032B	65.4 x 29.1	54.8 x 19.0	0.36 x 0.41	0.40 x 0.45	1/32	O	O			O	O			SED1520
122 x 32	LCD-122G032C	84.0 x 44.0	60.0 x 18.0	0.40 x 0.45	0.44 x 0.49	1/32	O	O			O	O	O		SED1520
128 x 64	LCD-128G064A	93.0 x 70.0	72.0 x 40.0	0.48 x 0.48	0.52 x 0.52	1/64	O	O			O	O	O		KS0108
128 x 64	LCD-128G064B	75.0 x 52.7	60.0 x 32.6	0.40 x 0.40	0.43 x 0.43	1/64	O	O			O	O	O		KS0108
128 x 64	LCD-128G064C	78.0 x 70.0	62.0 x 44.0	0.42 x 0.58	0.44 x 0.60	1/64	O	O			O	O	O		KS0108
128 x 64	LCD-128G064D	78.0 x 70.0	62.0 x 44.0	0.42 x 0.58	0.44 x 0.60	1/64	O	O			O	O	O		T6963C
128 x 64	LCD-128G064E	54.0 x 50.0	43.5 x 29.0	0.28 x 0.35	0.32 x 0.39	1/64	O	O			O		O		KS0108

GRAPHIC LCM

DISPLAY FORMAT CHAR. X LINE	MODEL NO.	OUTLINE DIMENSION (W X H)mm	EFFECTIVE VIEWING AREA (W X H)mm	DOT SIZE (W X H)mm	DOT PITCH (W X H)mm	DRIVING METHOD (DUTY)	PROCESS COLOR				BACKLIGHT PAGE				BUILT-IN CONTROL-LER
							STN GRAY	STN YELLOW	STN BLUE	FSTN B & W	NONE	LED	EL	CCFL	
128 x 64	LCD-128G064F	87.0 x 70.0	72.0 x 40.0	0.48 x 0.48	0.52 x 0.52	1/64	O	O			O	O	O		T6963C
128 x 64	LCD-128G064I	80.0 x 70.0	72.0 x 40.0	0.48 x 0.48	0.52 x 0.52	1/64	O	O			O	O	O		KSO108
128 x 64	LCD-128X064A	35.0 x 24.22	29.58 x 17.98	0.18 x 0.23	0.2 x 0.25	1/64	O	O		O			O		KSO713
128 x 64	LCD-128X064C	56.0 x 42.5	47.34 x 26.86	0.35 x 0.40	0.37 x 0.42	1/64	O	O		O			O		KSO713
160 x 128	LCD-160G128A	150.0 x 112.0	101.0 x 82.0	0.54 x 0.54	0.58 x 0.58	1/128	O	O						O	T6963C
160 x 160	LCD-160G160A	89.2 x 85.0	62.0 x 62.0	0.34 x 0.34	0.38 x 0.38	1/160	O	O		O	O	O	O		NO
160 x 160	LCD-160G160B	85.0 x 100.0	62.0 x 62.0	0.34 x 0.34	0.38 x 0.38	1/160	O	O		O	O	O	O		LC7981
160 x 160	LCD-160X160A	70.3 x 71.0	55.97 x 55.97	0.33 x 0.33	0.35 x 0.35	1/160				O	O		O		NO
202 x 32	LCD-202G032A	146.0 x 43.0	123.0 x 23.0	0.57 x 0.57	0.59 x 0.59	1/32	O	O				O	O		SED1520
240 x 64	LCD-240G064A	180.0 x 65.0	133.0 x 39.0	0.49 x 0.49	0.53 x 0.53	1/64	O	O	O	O	O	O	O	O	T6963C
240 x 64	LCD-240G064B	180.0 x 65.0	133.0 x 39.0	0.49 x 0.49	0.53 x 0.53	1/64	O	O	O	O	O	O	O	O	LC7981
240 x 64	LCD-240G064C	180.0 x 65.0	133.0 x 39.0	0.49 x 0.49	0.53 x 0.53	1/64	O	O	O	O	O	O	O	O	T6963C
240 x 128	LCD-240G128A	170 x 103.5	132.0 x 76.0	0.47 x 0.47	0.50 x 0.50	1/128	O	O	O		O			O	T6963C
240 x 128	LCD-240G128B	144.0 x 104.0	114.0 x 64.0	0.43 x 0.43	0.45 x 0.45	1/128	O	O	O	O	O	O	O	O	T6963C
240 x 128	LCD-240G128C	130.0 x 104.0	116.0 x 64.0	0.43 x 0.43	0.45 x 0.45	1/128	O	O			O				T6963C
240 x 128	LCD-240G128D	144.0 x 104.0	114.0 x 64.0	0.43 x 0.43	0.45 x 0.45	1/128	O	O	O	O	O	O	O	O	LC7981
240 x 160	LCD-240X160A	78.85 x 56.7	57.58 x 38.38	0.22 x 0.22	0.24 x 0.24	1/160				O	O		O		NO
320 X 240	LCD-320G240A	160.0 x 109.0	122.0 x 92.0	0.34 x 0.34	0.36 x 0.36	1/240	O		O	O	O	O	O	O	NO
320 X 240	LCD-320G240B	160.0 x 109.0	122.0 x 92.0	0.34 x 0.34	0.36 x 0.36	1/240	O		O	O	O	O	O	O	SED1335
320 X 240	LCD-320G240C	148.02 x 120.24	120.04 x 92.14	0.34 x 0.34	0.36 x 0.36	1/240	O		O	O	O	O	O	O	SED1335
320 X 240	LCD-240X240A	92.2 x 73.3	81.4 x 62.2	0.22 x 0.22	0.24 x 0.24	1/240					O		O	O	NO
640 X 480	LCD-640X480A	205.0 x 141.0	151.0 x 113.4	0.21 x 0.21	0.23 x 0.23	1/480				O				O	NO

INVERTER FOR EL PANEL

PART NO	INPUT DC	OUTPUT AC	INPUT CURRENT	EL AREA	OPERATING TEMP	STORAGE TEMP
LCD-EL01	5V ± 10%	90Vrms ± 15%	95mA MAX	84cm^2	-20°C ~ 70°C	-30°C ~ 80°C
LCD-EL02	5V ± 10%	80Vrms ± 15%	60mA MAX	30 ~ 80cm^2	-20°C ~ 70°C	-30°C ~ 80°C
LCD-EL03	5V ± 10%	120Vrms ± 15%	100mA MAX	100 ~ 260cm^2	-20°C ~ 70°C	-30°C ~ 80°C
LCD-EL04	3V ± 10%	160Vrms ± 15%	86mA MAX	84cm^2	-20°C ~ 70°C	-30°C ~ 80°C

INVERTER FOR CCFL LAMP

PART NO	INPUT DC	NO LOAD OPERATING VOLT	INPUT CURRENT	FREQUENCY	OPERATING TEMP	STORAGE TEMP
LCD-CCFL01	5V ± 10%	650Vrms	0.45A MAX	37.0K$_{HZ}$ ± 5%	-10°C ~ 80°C	-20°C ~ 85°C
LCD-CCFL02	12V ± 10%	750Vrms	0.30A MAX	37.0K$_{HZ}$ ± 5%	-10°C ~ 80°C	-20°C ~ 85°C
LCD-CCFL03	5V ± 10%	750Vrms	0.32A MAX	45.0K$_{HZ}$ ± 5%	-10°C ~ 80°C	-20°C ~ 85°C
LCD-CCFL04	5V ± 10%	950Vrms	0.35A MAX	38.0K$_{HZ}$ ± 5%	-10°C ~ 80°C	-20°C ~ 85°C
LCD-CCFL05	12V ± 10%	850Vrms	0.35A MAX	38.0K$_{HZ}$ ± 5%	-10°C ~ 80°C	-20°C ~ 85°C
LCD-CCFL06	5V ± 10%	1000Vrms	0.41A MAX	34.0K$_{HZ}$ ± 5%	-10°C ~ 80°C	-20°C ~ 85°C
LCD-CCFL08	24V ± 10%	940Vrms	0.09A MAX	56.0K$_{HZ}$ ± 5%	-10°C ~ 80°C	-20°C ~ 85°C

LED, Light Emitted Diode

DESCRIPTION

LED is a general and common type of backlight.
There are two types of backlight structure:

1. Direct lighting: LED is placed under LCD and light goes through directly.
2. Edge lighting: LED is placed at the edge of light guide under LCD.

CHARACTERISTICS

The same contents of both lighting types:

1. Low voltage DC power to drive.
2. Very long life time.
3. As the number of dice increases, the power consumption and heat increase accordingly.
4. No noise occurrence.

Direct lighting type:

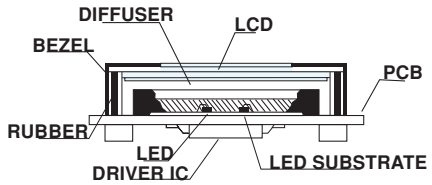
1. High brightness.
2. Used for small-size LCM.

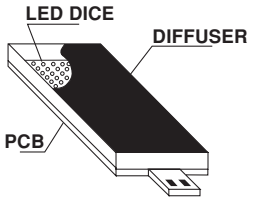
Edge Lighting type:

1. Thin.
2. Less consumption of power, low brightness.

CONSTRUCTION

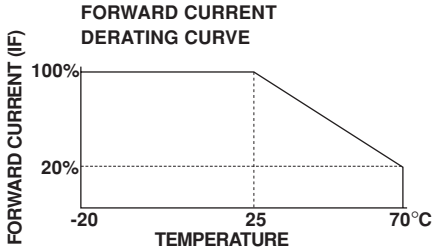
Direct lighting type:



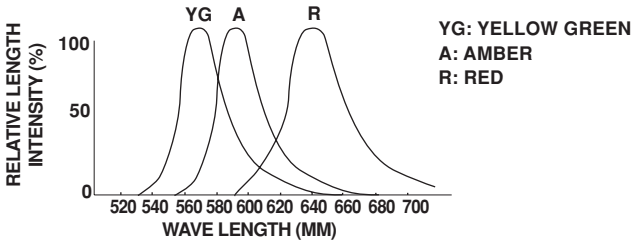


LIFE CHARACTERISTICS

Electrical Characteristics (Reference Data)



Wave Length vs Relative Light Intensity



APPLICATION

LARGE TYPE	MIDDLE TYPE	SMALL TYPE	THIN TYPE
good	good	very good	very good

Luminous Intensity	Module: 5 ~ 50 (cd/m^2)	LED only: 30 ~ 400 (cd/m^2)
Emitted color	Yellow, Yellow green, Green, Amber, Red	
Driving Voltage	DC2.1V or 4.2V	
Life Time	About 100,000 hrs	
Thickness	Direct Lighting Type: 4.5mm - 5.5mm	Edge Lighting Type: 1- 3mm
Temperature Range	-20°C to 70°C	-20°C to 70°C

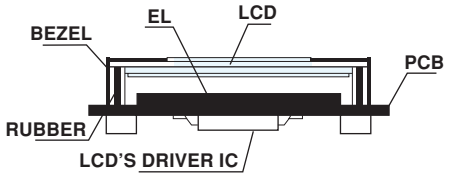
DESCRIPTION

The EL lamp is a thin structure type of illumination. It is formed by organic thick membrane, high conductive fluorescence substance, transparent electrode and uses AC power to drive.

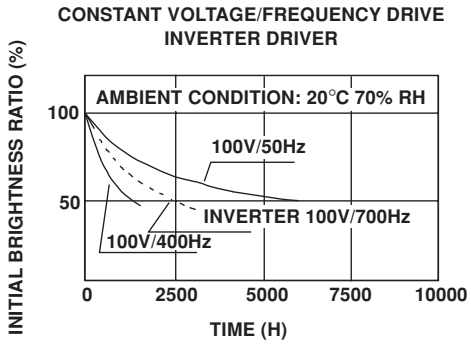
CHARACTERISTICS

1. Uniform brightness.
2. Low electric current, power consumption, and heat generation.
3. Thinner and lighter
4. Selection of colors are wide (especially for white, blue and green)
5. Needs EL inverter.

CONSTRUCTION



LIFE CHARACTERISTICS



APPLICATION

LARGE TYPE	MIDDLE TYPE	SMALL TYPE	THIN TYPE
good	good	good	very good

Luminous Intensity	Module: 10 - 30 (cd/m^2)	EL only: 40 - 150 (cd/m^2)
Emitted Color	White, Blue, Green	
Driving Voltage	AC 100V/400Hz	
Life Time	3,000 - 8,000 hrs	
Thickness	0.3 - 0.7mm	
Temperature Range	Operating: 0°C to + 50°C	Storage: -20°C to + 60°C

Backlight

Vishay

CCFL, Cold Cathode Fluorescent Lamps

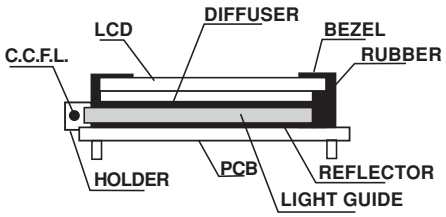
DESCRIPTION

The CCFL backlight has a very wide application. The backlight is driven by AC, which provides a very bright and even glow. The CCFL lifetime and brightness are both better than the EL backlight. If white light, low power consumption and long lifetime are your requirements, CCFL is your choice.

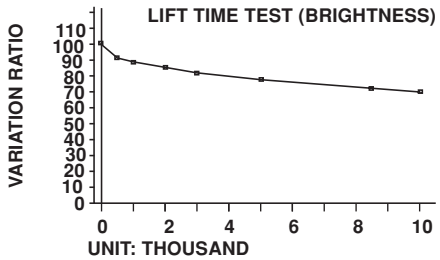
CHARACTERISTICS

- Long life time.
- High brightness
- Low heat generation.
- Need CCFL inverter.
- Uniform brightness
- Emitted color is white

CONSTRUCTION



LIFE CHARACTERISTICS



APPLICATION

LARGE TYPE	MIDDLE TYPE	SMALL TYPE	THIN TYPE
very good	very good	good	good

Luminous Intensity	Module: 50 ~ 100 (cd/m^2)	CCFL only: 500 ~ 800 (cd/m^2)
Emitted Color	White	
Driving Voltage	AC 1,000V Max/80kHz	
Life Time	15,000 hrs	
Thickness	Direct lighting type: 5mm	Edge lighting type: 3mm
Temperature Range	Operating: 0°C to + 50°C	Storage: -20°C to + 60°C

Touch Panel

FEATURES

- The film is situated on the top side, making input possible with a light touch
- Having a fingertip, stylus or pen, a touch on the key switch of the panel causes the upper and lower electrodes contact to each other, leading to the entry of the key information
- Film and glass combination structure resulting in high transitivity

DESCRIPTION

The touch panel is an input device employing a material of transparent electrodes formed on glass-film transparent board. Since the keyboard itself is transparent, the touch panel can be placed directly on top of a display device.

APPLICATION

1. Monitor
2. PDA
3. Control board
4. Data bank
5. Remote controller
6. Watch

STRUCTURE

A transparent electrode is formed uniformly over the entire effective surface on the film and glass of a touch panel (see Figure 1).

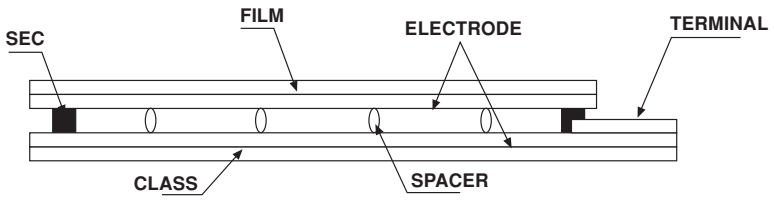


FIGURE 1

ANNOTATE

The touch panel has numerous push-button switches as keys arranged in a matrix (see Figure 2). To locate the X and Y coordinates, voltage VX taken from the Y electrode and voltage VY taken form the X electrode are converted into digital data and assigned coordinates (see Figure 3).

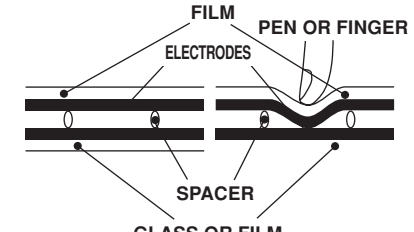


FIGURE 2

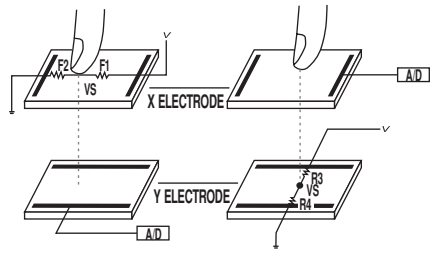
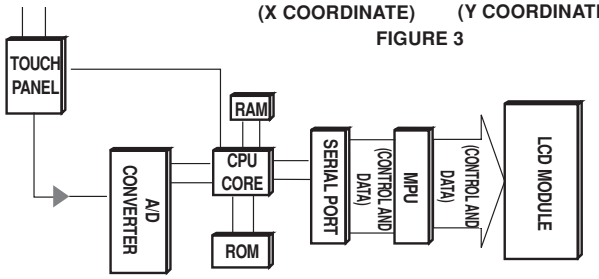


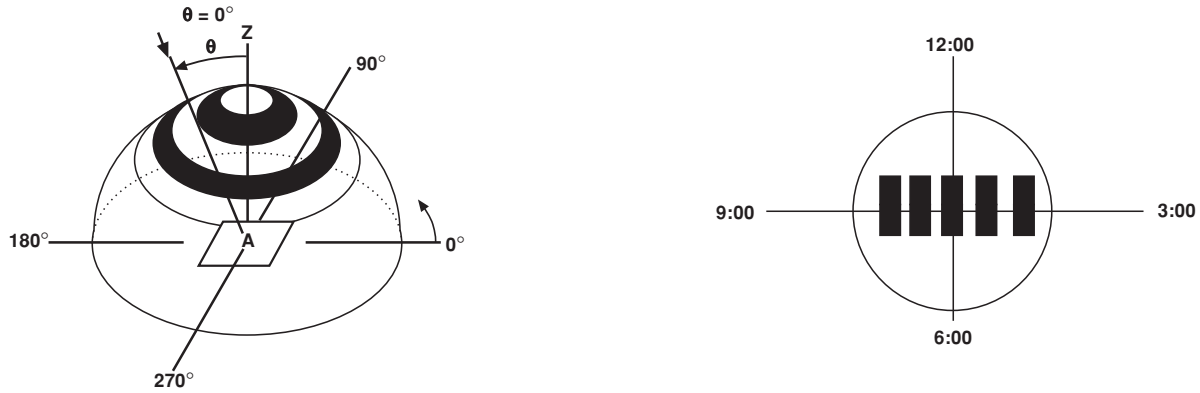
FIGURE 3

A block diagram of the configuration

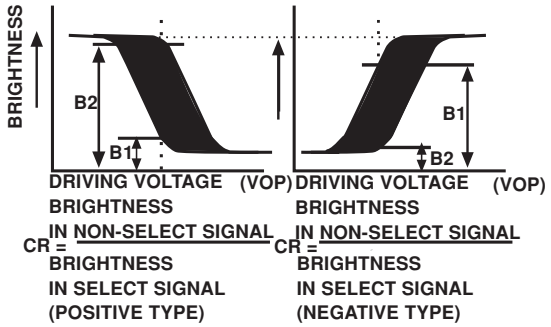


Optical Characteristics

DEFINITION OF VIEWING ANGLE AND Ψ



*DEFINITION OF CONTRAST RATIO (CR)



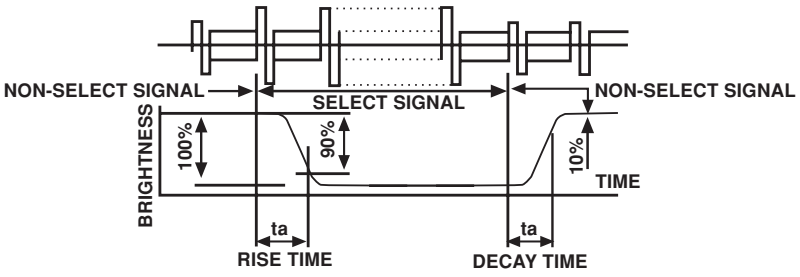
CR = BRIGHTNESS IN NON-SELECT SIGNAL / BRIGHTNESS IN SELECT SIGNAL (POSITIVE TYPE)

CR = BRIGHTNESS IN NON-SELECT SIGNAL / BRIGHTNESS IN SELECT SIGNAL (NEGATIVE TYPE)

CONDITIONS: 25°C

B1: BRIGHTNESS SELECT SIGNAL
B2: BRIGHTNESS IN NON-SELECT SIGNAL

DEFINITION OF OPTICAL RESPONSE TIME



***RESPONSE TIME (TR, TF)**
Test Condition
Operation Voltage: vop
Viewing Angle: 0
Frame Frequency: 70Hz
Applying Waveform: 1/n duty and 1/a bias

In case of negative type. Wave form of changing brightness becomes reverse.
(non select signals: 0, select signals: 100)

OPTICAL CHARACTERISTICS

TN TYPE

ITEM	SYM.	CONDITION	MIN.	TYP.	MAX.	UNIT
Viewing Angle (V)	θ	$C_R \geq 2.0$	10	–	30	deg.
Viewing Angle (H)	ψ	$C_R \geq 2.0$	- 15	–	15	deg.
Contrast Ratio	C_R	–	–	2	–	–
Response Time	Tr	–	–	100	150	ms
Response Time	Tf	–	–	100	150	ms

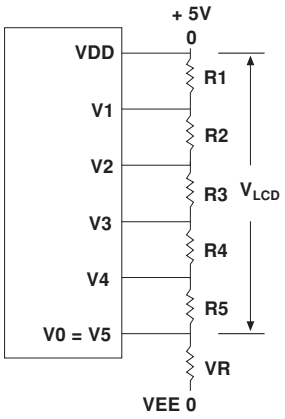
STN TYPE

ITEM	SYM.	CONDITION	MIN.	TYP.	MAX.	UNIT
Viewing Angle (V)	θ	$C_R \geq 2.0$	10	–	105	deg.
Viewing Angle (H)	ψ	$C_R \geq 2.0$	- 30	–	30	deg.
Contrast Ratio	C_R	–	–	3	–	–
Response Time	Ton	–	–	200	300	ms
Response Time	Toff	–	–	200	300	ms

User's Manual for LCD Module

POWER SUPPLY FOR LCD MODULE

1. LCD Driving Source (1/5 Bias)



$$V_1 = V_{DD} - \frac{1}{5} V_{LCD}$$

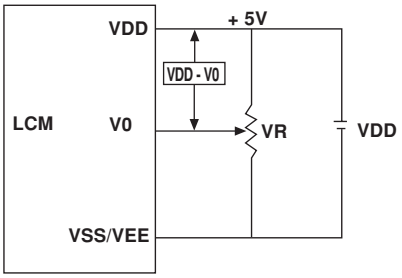
$$V_2 = V_{DD} - \frac{2}{5} V_{LCD}$$

$$V_3 = V_{DD} - \frac{3}{5} V_{LCD}$$

$$V_4 = V_{DD} - \frac{4}{5} V_{LCD}$$

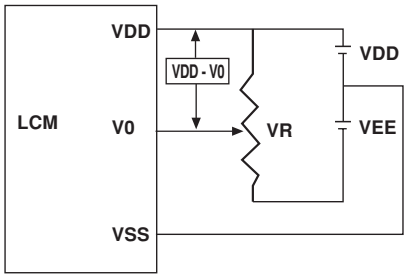
$$V_5 = V_{DD} - V_{LCD}$$

2. Single Supply Voltage Types (internal N.V.)



VDD - Vo: LCD Driving voltage
VR: 10K - 20K

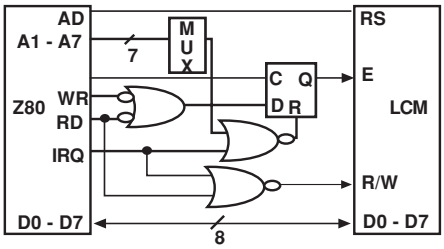
3. Dual Supply Voltage Types



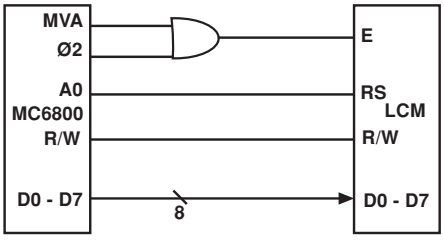
VDD - VO: LCD DRIVING VOLTAGE
VR: 10K - 20K

INTERFACE TO MPU

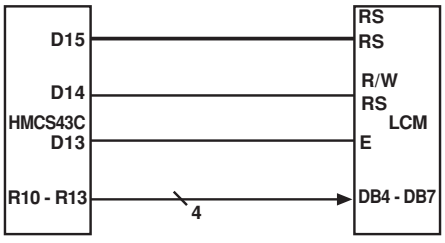
1. Interface to Z - 80 CPU



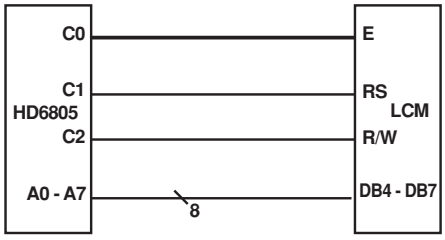
2. Interface to MC6800 CPU



3. Interface to 4 - Bit CPU (HMCS 43C)



4. Interface to HD6805 MP



Usage of Backlight

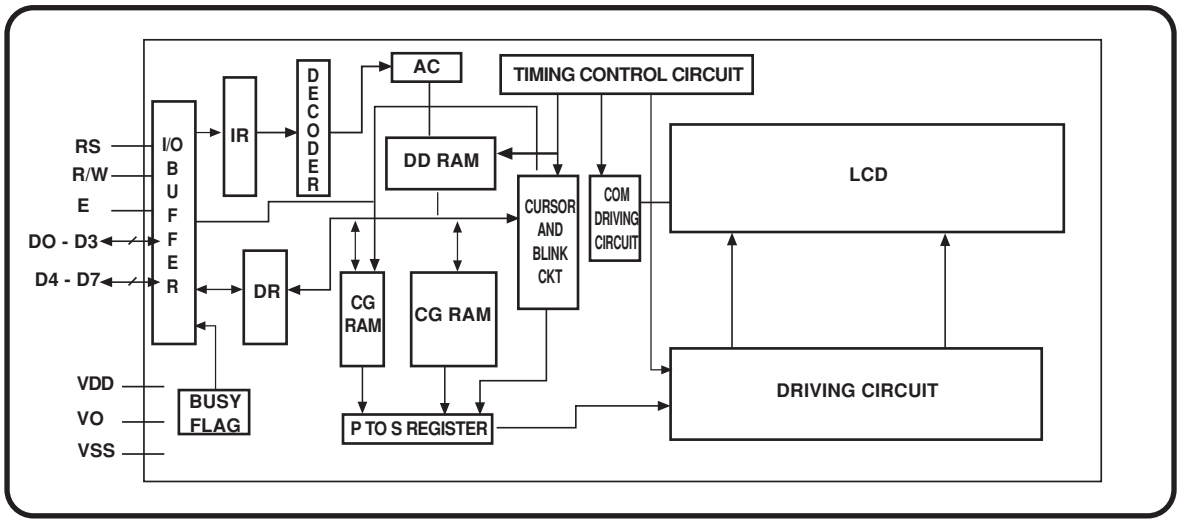
There are five usages of LED B/L in character type modules.

1. Lighting the LED through a limiting current resistance (RA) which are already included in the LCM by external voltage of 5V to J1 and J2 between pin 1 and pin 2.
2. Providing 5V by pin 15 and pin 16 of the interface to light the LED, J15 and J16 short, RA≒3 ~ 7Ω
3. Providing 4.2V by pin 15 and pin 16 of the interface to light the LED through a limiting current resistance which is already included in the LCM.

The customer can select a suitable backlight type, such as LED, EL, CCFL, for getting a good performance.

1. RA = limiting current resistance.
2. EL backlight only, driven by A and K.
3. CCFL backlight only, driven by CCFL B/C connector.

CHARACTER IC BLOCK DIAGRAM



***Data Register (DR):** DR is a register used for temporary storage of the data read/write from/into DD RAM and CG RAM.

***Instruction Register (IR):** IR is a register available for storing the instruction codes and address information of display data (DD) RAM and character generator (CG)RAM.

***Busy Flag (BF):** When the busy flag is “1”, it shows that LCM is in internal operation and it can not accept the next instruction.

***Character Generator (CG) ROM:** This ROM generates character pattern from 8-bit character code and provides 192 character patterns.

***Character Generator (CG) RAM:** This RAM allows the user to rewrite the character patterns freely according to the program.

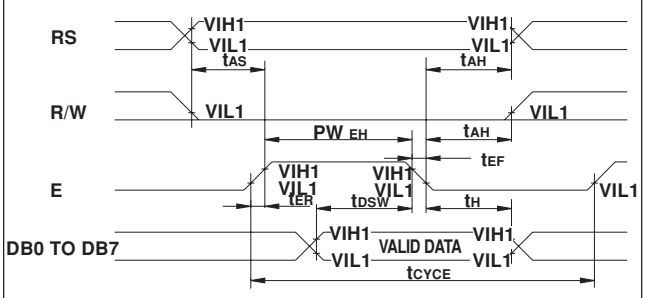
***Address Counter (AC):** This address counter is used to give the address information of DD RAM and CG RAM.

***Display Data (DD)RAM:** This display data RAM is used to store the display data expressed by 8-bit character code the capacity is 80 x 8 bits and data for 80 characters can be storage.

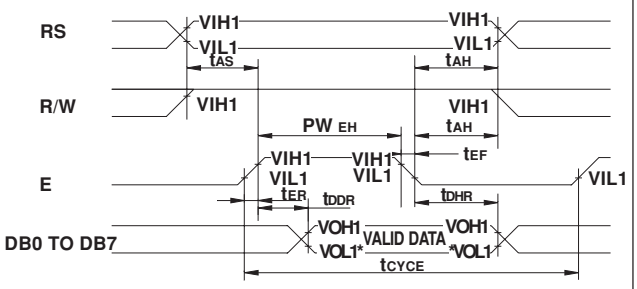
***Cursor and blink control circuit:** This generates the cursor and Blink.

Timing Control

WRITE OPERATION



READ OPERATION



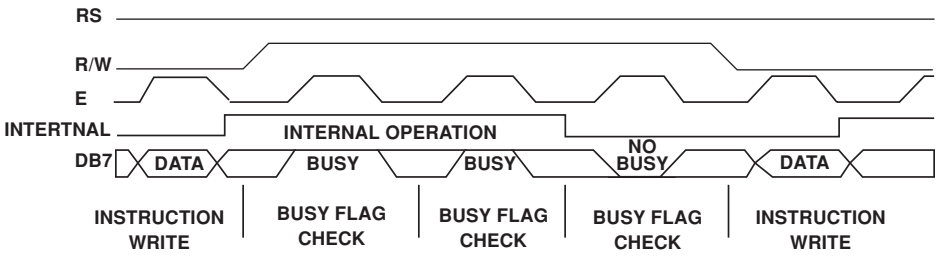
WRITING DATA FROM MPU TO LCM

ITEM	SYMBOL (MIN.)	LIMIT (MAX.)	LIMIT	UNIT
Enable Cycle Time	tCYCE	666	–	nS
Enable Pulse Width (high Level)	PWEH	300	–	nS
Enable Rise/Fall Time	tER tEF	–	25	nS
Address Set-up Time TDSW (rs, r/w, e)	tAS	40	–	nS
Address Hold Time	tAH	10	–	nS
Data Set-up Time	tDSW	100	–	nS
Data Hold Time	tH	10	–	nS

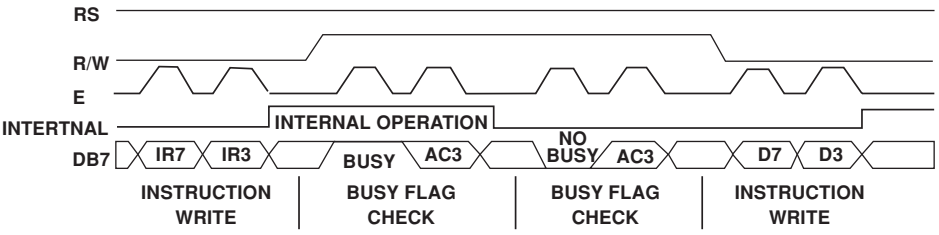
READING DATA FROM LCM TO MPU

ITEM	SYMBOL (MIN.)	LIMIT (MAX.)	LIMIT	UNIT
Enable Cycle Time	tCYCE	666	–	nS
Enable Pulse Width (high Level)	PWEH	300	–	nS
Enable Rise/Fall Time	tER tEF	–	25	nS
Address Set-up Time TDSW (rs, r/w, e)	tAS	40	–	nS
Address Hold Time	tAH	10	–	nS
Data Set-up Time	tDDR	–	190	nS
Data Hold Time	tDHR	20	–	nS

8 - BIT BUSY FLAG CHECK TIMING



4 - BIT BUSY CHECK TIMING



NOTE: IR7, IR3: Instruction 7th bit, 3rd bit, AC3: address counter 3rd bit

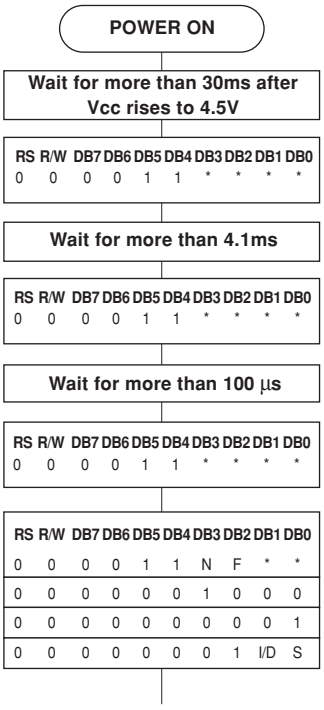
Character Modules

COMMAND	CODE										DESCRIPTION	EXECUTION
	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		TIME
Clear Display	0	0	0	0	0	0	0	0	0	1	Clear the display and return the cursor to the home position (address 0).	82 µs - 1.64ms
Return Home	0	0	0	0	0	0	0	0	1	*	Return the cursor to the home position (address 0). Also return a shifted display to the home position. DDRAM contents remain unchanged.	40 µs - 1.6ms
Entry Mode Set	0	0	0	0	0	0	0	1	I/D	S	Set the cursor's move direction and enable/disable the display.	40 µs
Display On/Off Control	0	0	0	0	0	0	1	D	C	B	Turn the display ON/OFF (D), or the cursor ON/OFF (C), and blink of the character at the cursor position (B).	40 µs
Cursor and Display Shift	0	0	0	0	0	1	S/C	R/L	*	*	Move the cursor and shift the display without changing the DD RAM contents.	40 µs
Function Set	0	0	0	0	1	DL	N	F	*	*	Set the data width (DL), the number of lines in display (L), and the character font (F).	40 µs
Set CG RAM Address	0	0	0	1	ACG						Set the CG RAM address. CG RAM data can be read or altered after making this setting.	40 µs
Set DD RAM Address	0	0	1	ADD							Set the DD RAM address. Data may be written or read after making this setting.	40 µs
Read Busy Flag and Address	0	1	BF	AC							Read the busy flag (BF) indicating that an internal operation is being performed and read the address counter contents.	1 µs
Write Data to to CG or DD RAM	1	0	Write Data								Write data into DD RAM or CG RAM.	43 µs
Read Data from CG or DD RAM	1	1	Read Data								Read data from DD RAM or CG RAM.	43 µs
	I/D = 1: Increment S = 1: Accompanies Display Shift. S/C = 1: Display Shift R/L = 1: Shift to the Right. R/L = 0: Shift to the Left DL = 1:8 Bits N = 1:2 Lines F = 1:5 x 10 Dots BF = 1:Busy BF = 0: Can Accept Data										I/D = 0: Decrement S/C = 0: Cursor Move DL = 0:4 Bits N = 0:1 Line F = 0:5 x 7 Dots	DD R 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 and CG RAM address.	

Initialization By Instruction

8-BIT INTERFACE

Always initialize by setting the software (character type LCM).
Refer to figures 1 and 2 for the procedures on 8 - bit and 4 - bit initializations, respectively.



Wait for more than 40mS after VCC rises to 2.7V

BF cannot be checked before this instruction
Function set (interface is 8 bits long.)

BF cannot be checked before this instruction.
Function set (interface is 8 bits long.)

BF cannot be checked before this instruction.
Function set (interface is 8 bits long.)

BF can be checked after the following instructions. When BF is not checked, the waiting time between instructions is longer than the execution instructions time.

Function set (interface is 8 bits long. Specify the number of display lines and character font.)

The number of display lines and character font cannot be changed after this point.

Display off
Display clear
Entry mode set
Condition: fosc = 270kHz

4-BIT INTERFACE

Wait for more than 40mS after VCC rises to 2.7V

BF cannot be checked before this instruction
Function set (interface is 8 bits long.)

BF cannot be checked before this instruction.
Function set (interface is 8 bits long.)

BF cannot be checked before this instruction.
Function set (interface is 8 bits long.)

BF can be checked after the following instructions. When BF is not checked, the waiting time between instructions is longer than the execution instructions time.

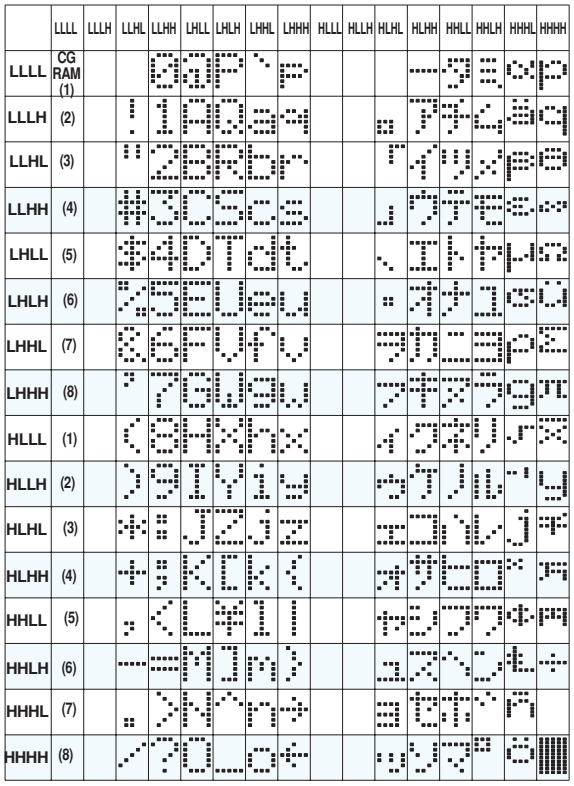
Function set (interface is 4 bits long.) Interface is 8 bits in length.

Function set (interface is 4 bits long. Specify the number of display lines and character font.) Cannot be changed after this point.

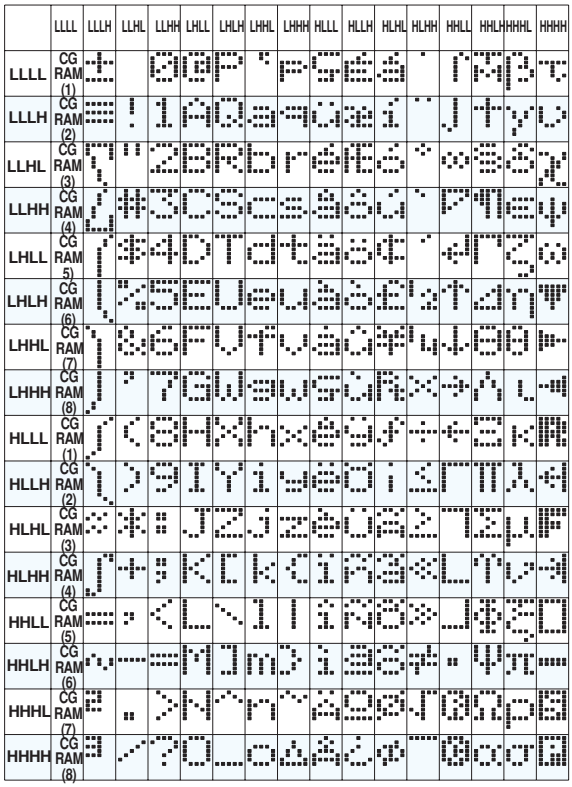
Display off
Display clears
Entry mode set.

Font Character

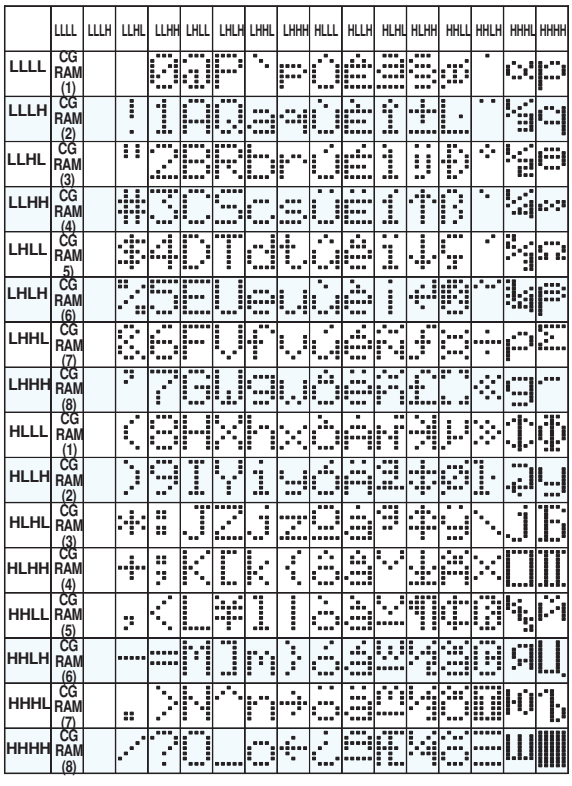
JS. JP. JT. JN FONT



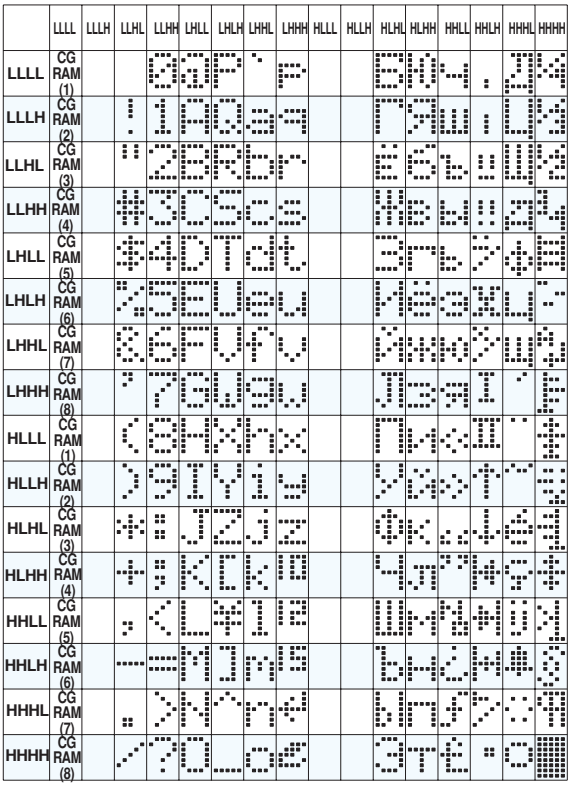
EE. EU. EP. ET. EN FONT



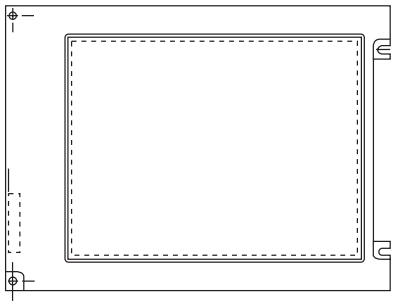
ES. EC FONT



CP FONT



320 x 240 Character LCD



FEATURES

- Color R, G, B LCD type
- 320 RGB x 240 dots
- 8 bit data bus
- Built-in white backlight (CCFL)
- + 3 ~ + 5V power supply
- 1/240 duty cycle

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	154.6 x 114.8 x 8.5	mm
Viewing Area	118.18 x 89.38	mm
Dot Size	0.09 x 0.33	mm
Character Size	0.12 x 0.36	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	2.7	3.0	3.3	V
		4.7	5.0	5.3	V
Input Voltage	VI	$0.8V_{DD}$	–	VDD	V

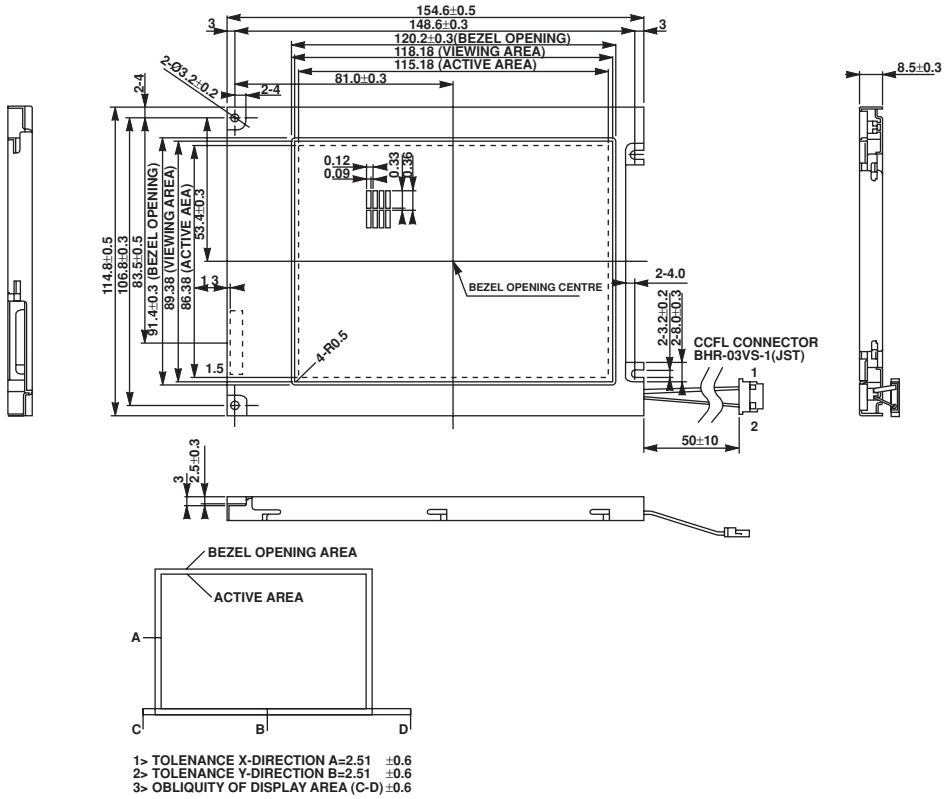
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

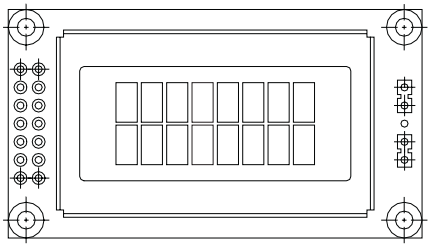
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD VIO	L level H level	$0.8V_{DD}$ V_{SS}	– –	V_{DD} $0.2V_{DD}$	V V
Supply Current	IDD	VDD = + 5V	–	–	–	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	0°C	–	–	–	V
		25°C	–	26.2	–	
		50°C	–	–	–	
Power Consumption	– –	VDD = + 5V VEE = + 26.2V	– –	2.0 2.0	– –	mA mA

PIN NUMBER	SYMBOL	FUNCTION
1	FRM	Scan Start-up Signal
2	LOAD	Data Latch
3	CP	Data Shift
4	DISP	Display Enable Signal
5	VDD	Power Supply Logic
6	VSS	Ground
7	VEE	Power Supply For LCD
8	DB7	Display Data Bus
9	DB6	Display Data Bus
10	DB5	Display Data Bus
11	DB4	Display Data Bus
12	DB3	Display Data Bus
13	DB2	Display Data Bus
14	DB1	Display Data Bus
15	DB0	Display Data Bus

DIMENSIONS in millimeters



8 x 2 Character LCD



FEATURES

- 5 x 8 dots with cursor
- Built - in controller (KS 0066 or Equivalent)
- + 5V power supply
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2, or A.K (LED)

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	58.0 x 32.0	mm
Viewing Area	38.0 x 16.0	mm
Dot Size	0.56 x 0.66	mm
Character Size	2.96 x 5.56	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

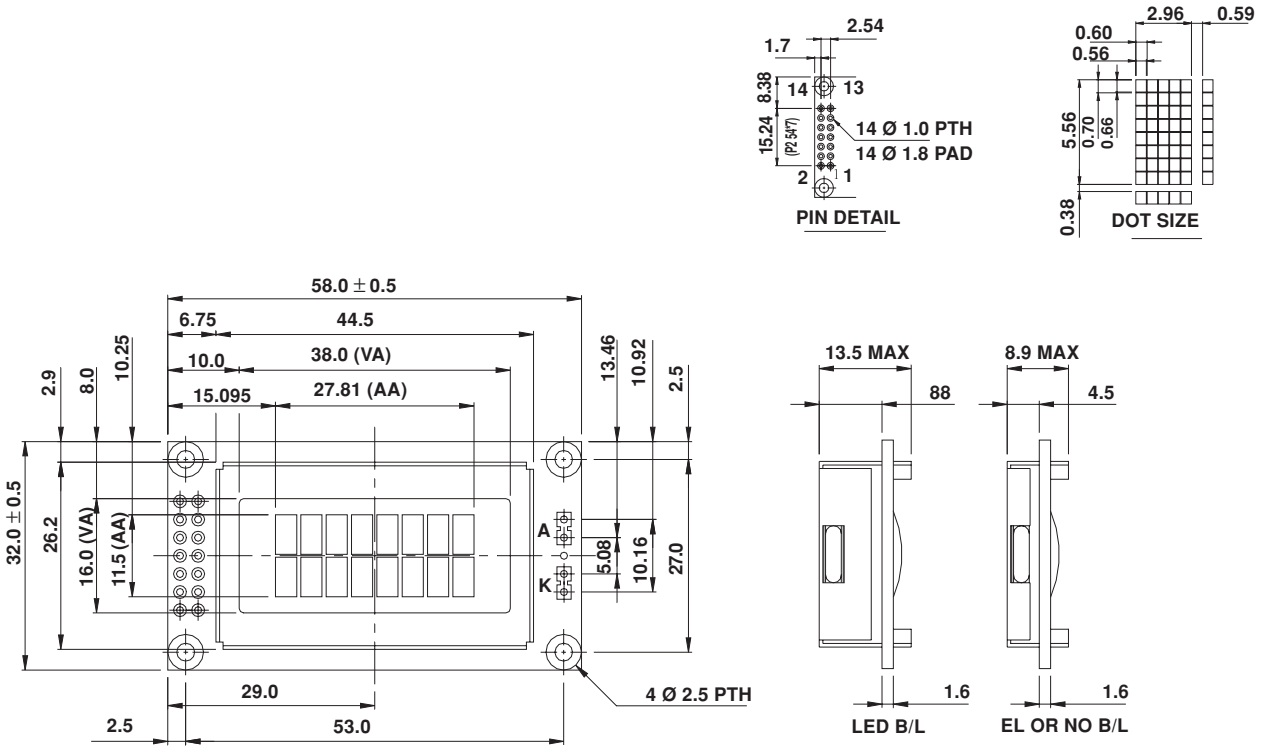
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
Supply Current	IDD	VDD = + 5V	–	1.5	3.0	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	–	–	–	V
		0°C	4.5	4.8	5.1	
		25°C	4.1	4.4	4.7	
		50°C	3.8	4.2	4.4	
		70°C	–	–	–	
LED Forward Voltage	VF	25°C	–	4.2	–	V
LED Forward Current	IF	25°C	–	70	140	mA
EL Power Supply Current	IEL	Vel = 110VAC:400Hz	–	–	–	Vrms

DISPLAY CHARACTER ADDRESS CODE:

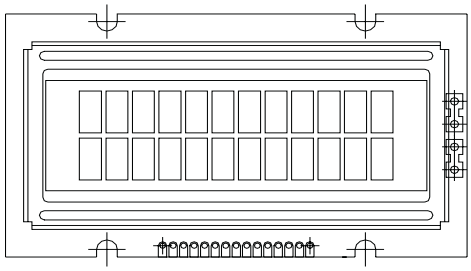
Display Position	1	2	3	4	5	6	7	8
DD RAM Address	00	01						07
DD RAM Address	40	41						47

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line

DIMENSIONS in millimeters



12 x 2 Character LCD



FEATURES

- 5 x 8 dots with cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2, or A.K (LED)

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	55.7 x 32.0	mm
Viewing Area	46.0 x 14.5	mm
Dot Size	0.45 x 0.60	mm
Character Size	2.65 x 5.50	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

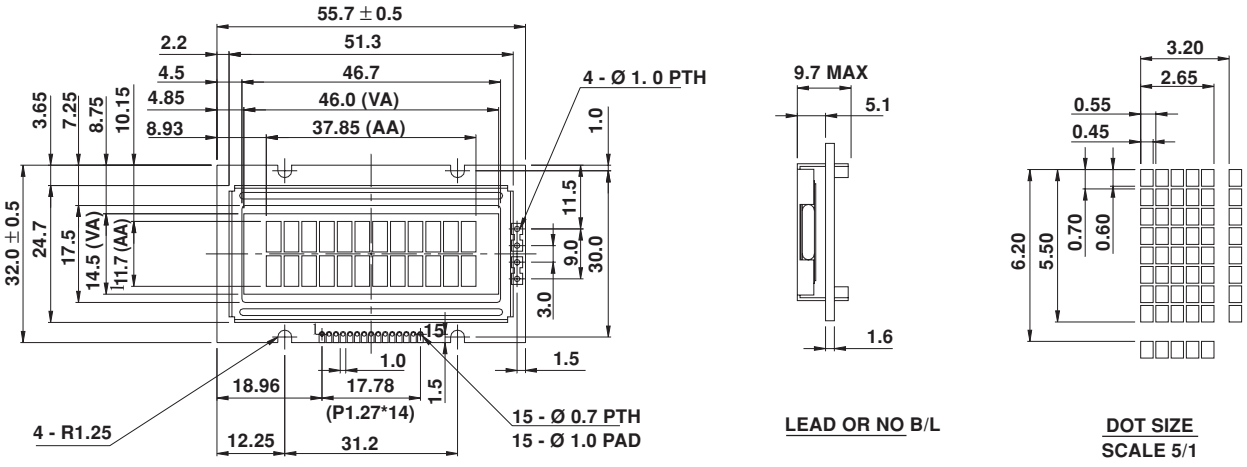
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
Supply Current	IDD	VDD = + 5V	–	1.5	3.0	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	–	–	–	V
		0°C	4.5	4.8	5.1	
		25°C	4.1	4.4	4.7	
		50°C	3.8	4.2	4.4	
		70°C	–	–	–	
LED Forward Voltage	VF	25°C	–	4.2	–	V
LED Forward Current	IF	25°C	–	40	–	mA

DISPLAY CHARACTER ADDRESS CODE:

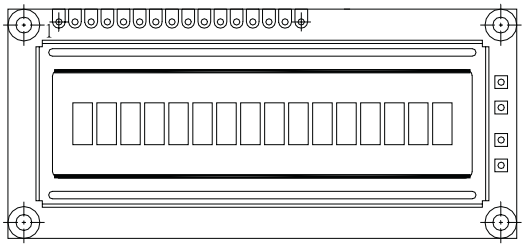
Display Position	1	2	3	4	5	6	7	8
DD RAM Address	00	01						07
DD RAM Address	40	41						47

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H $\rightarrow$L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A	4.2V for LED

DIMENSIONS in millimeters



16 x 1 Character LCD



FEATURES

- 5 x 8 dots with cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2, pin 15, pin 16 or A.K (LED)
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	80.0 x 36.0	mm
Viewing Area	66.0 x 16.0	mm
Dot Size	0.55 x 0.75	mm
Character Size	3.07 x 6.56	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

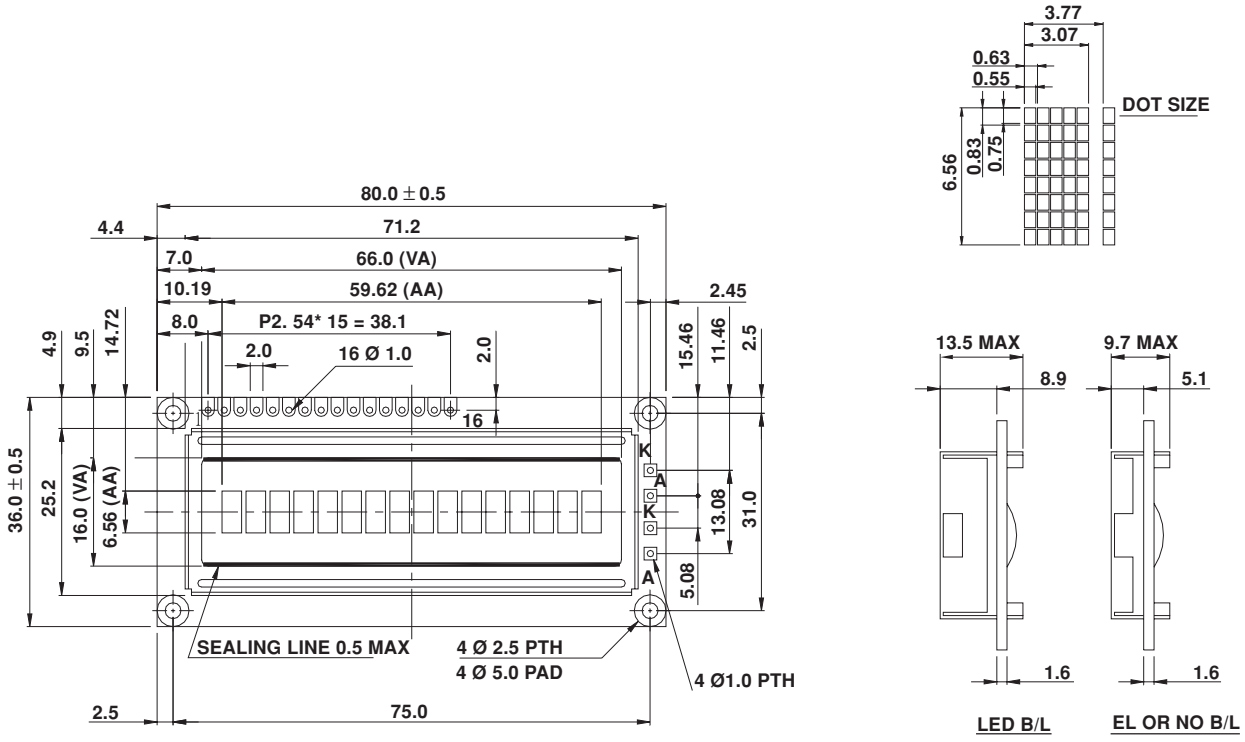
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
Supply Current	IDD	VDD = 5V	–	1.2	3.0	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	–	–	–	V
		0°C	4.5	4.8	5.1	
		25°C	4.1	4.5	4.7	
		50°C	3.8	4.2	4.4	
		70°C	3.5	3.9	4.1	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	130	260	mA
EL Power Supply Current	IEL	Vel = 110VAC:400Hz	–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

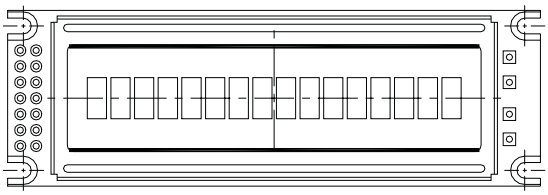
Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DD RAM Address	00	01						07	40	41						47

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A	4.2V for LED
16	K	Power Supply for B/L (OV)

DIMENSIONS in millimeters



16 x 1 Character LCD



FEATURES

- 5 x 8 dots with cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2, pin 15, pin 16 or A.K (LED)

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	85.0 x 28.0	mm
Viewing Area	66.0 x 16.0	mm
Dot Size	0.55 x 0.75	mm
Character Size	3.07 x 6.56	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

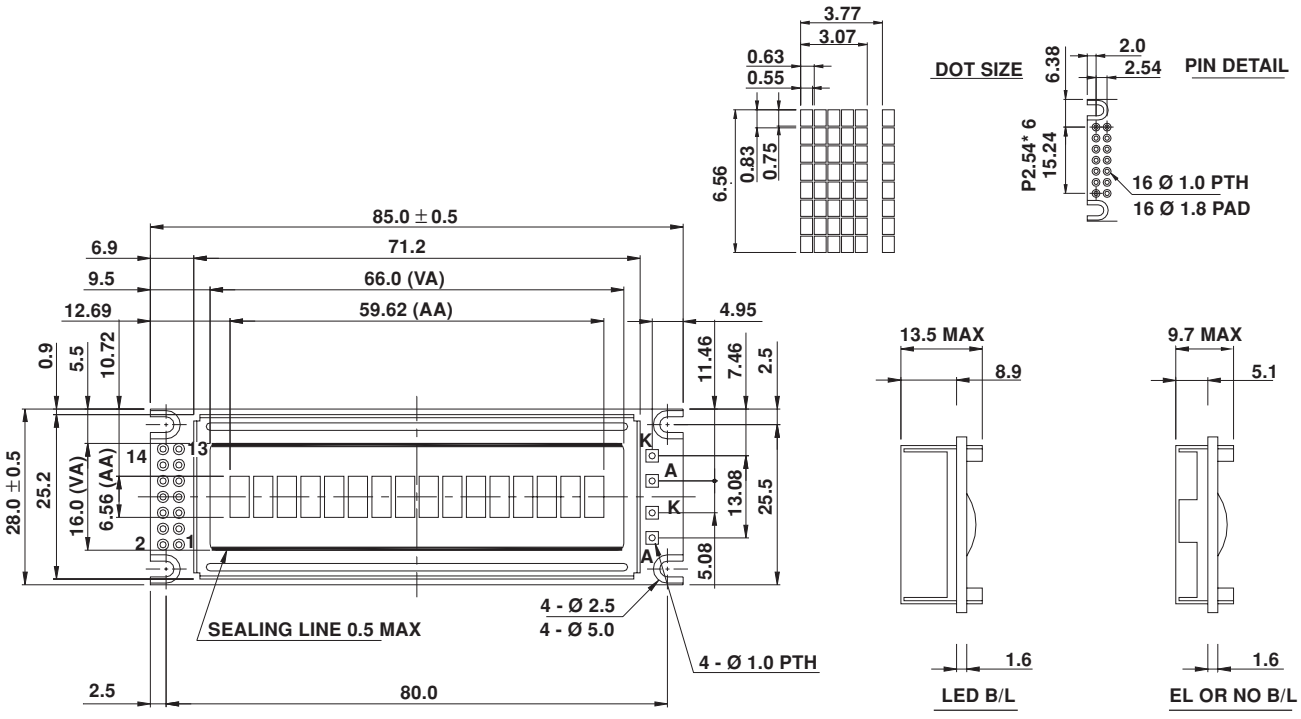
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
Supply Current	IDD	VDD = 5V	–	1.2	3.0	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	4.9	5.1	5.5	V
		0°C	4.5	4.8	5.1	
		25°C	4.1	4.5	4.7	
		50°C	3.8	4.2	4.4	
		70°C	3.5	3.9	4.1	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	130	260	mA
EL Power Supply Current	IEL	Vel = 110VAC:400Hz	–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

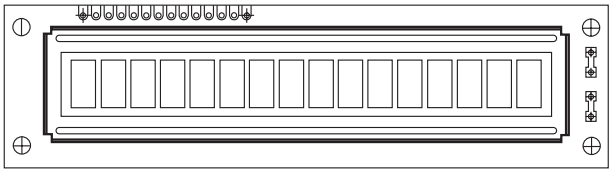
Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DD RAM Address	00	01						07	40	41						47

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line

DIMENSIONS in millimeters



16 x 1 Character LCD



FEATURES

- 5 x 8 dots includes cursor
- Built - in controller (KS 0066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- LED can be driven by pin 1, pin 2, pin 15 or A and K
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	122.0 x 33.0	mm
Viewing Area	99.0 x 13.0	mm
Mounting Hole	115.0 x 25.2	mm
Character Size	4.84 x 8.06	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

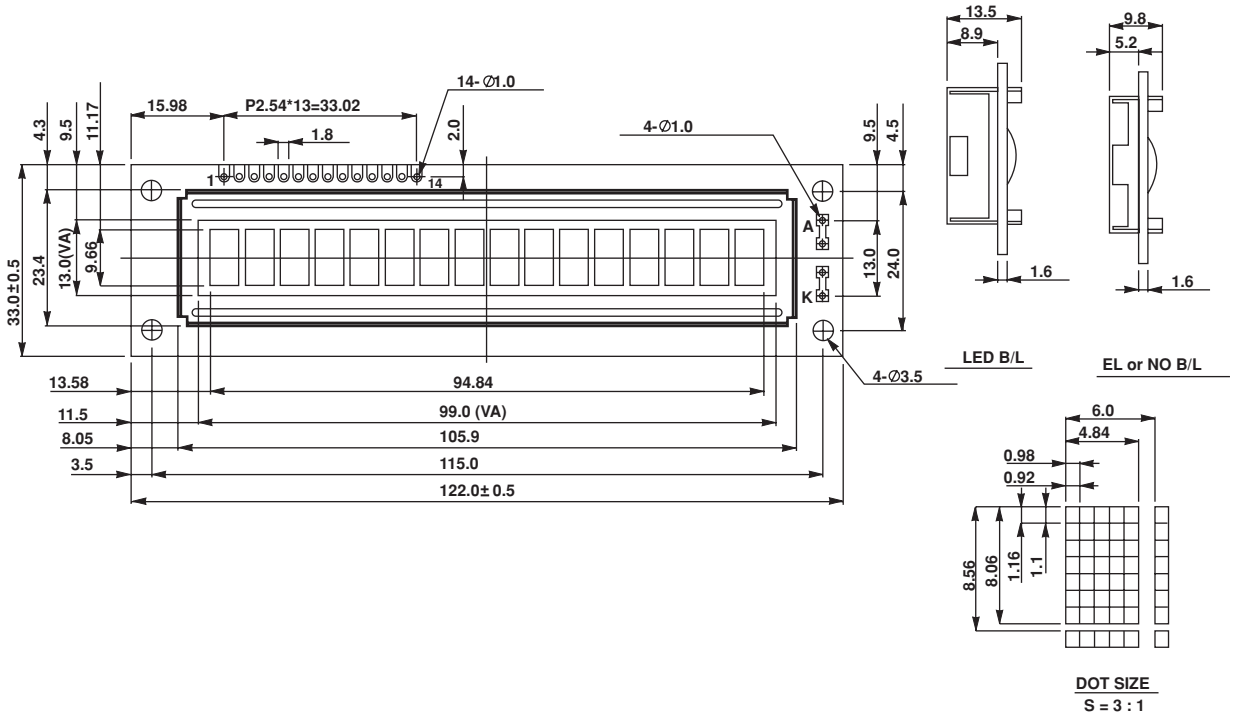
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
Supply Current	IDD	VDD = + 5V	–	1.2	1.4	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	4.9	5.1	5.5	V
		0°C	4.5	4.8	5.1	
		25°C	4.1	4.5	4.7	
		50°C	3.8	4.2	4.4	
		70°C	3.5	3.9	4.1	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	160	–	mA

DISPLAY CHARACTER ADDRESS CODE:

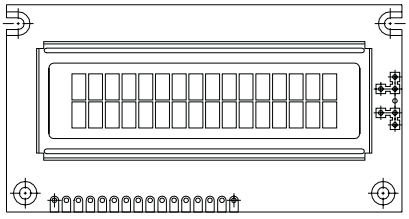
Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DD RAM Address	00	01						07	40	41						47

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/Vee	+ 4.2V for LED (RA = 0)/Negative Voltage Output
16	K	Power Supply for B/L (0V)

DIMENSIONS in millimeters



16 x 2 Character LCD



FEATURES

- 5 x 8 dots with cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A.K (LED)
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	84.0 x 44.0	mm
Viewing Area	66.0 x 16.0	mm
Dot Size	0.55 x 0.65	mm
Character Size	2.95 x 5.55	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply for Logic	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

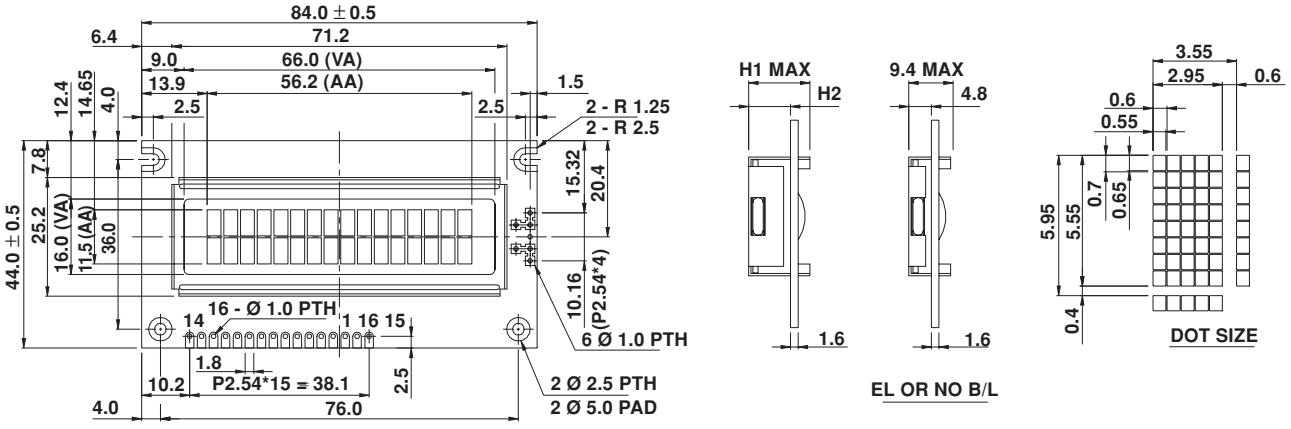
ITEM	SYMBOL	CONDITION		STANDARD VALUE			UNIT
				MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V		4.7	5.0	5.3	V
		VDD = + 3V		+ 2.7	3.0	5.3	V
Supply Current	IDD	VDD = + 5V		–	1.2	3.0	mA
Recommended LC Driving Voltage for Normal Temp. Version Module Nor Temp/Wide Temp	VDD - V0	- 20 °C		–	–	–	V
		0°C		4.2	4.6	5.0	
		25°C		3.8	4.2	4.6	
		50°C		3.6	4.0	4.4	
		70°C		–	–	–	
LED Forward Voltage	VF	25°C		–	4.2	4.6	V
LED Forward Current	IF	25°C	Array	–	130	260	mA
			Edge	–	20	40	
EL Power Supply Current	IEL	Vel = 110VAC:400Hz		–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DD RAM Address	00	01														0F
DD RAM Address	40	41														4F

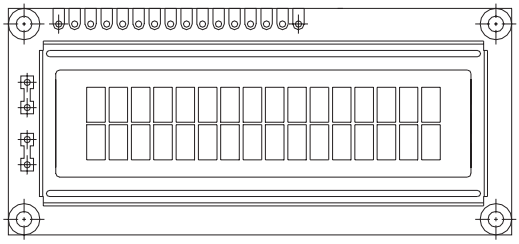
PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 3V or +5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/Vee	4.2V for LED/Negative Voltage Output
16	K	Power Supply for B/L (OV)

DIMENSIONS in millimeters



LED - H/L B/L		
	HIGH	LOW
H1	13.2	12.1
H2	8.6	7.5

16 x 2 Character LCD



FEATURES

- 5 x 8 dots with cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A.K (LED)
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	80.0 x 36.0	mm
Viewing Area	66.0 x 16.0	mm
Dot Size	0.56 x 0.66	mm
Character Size	2.96 x 5.56	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

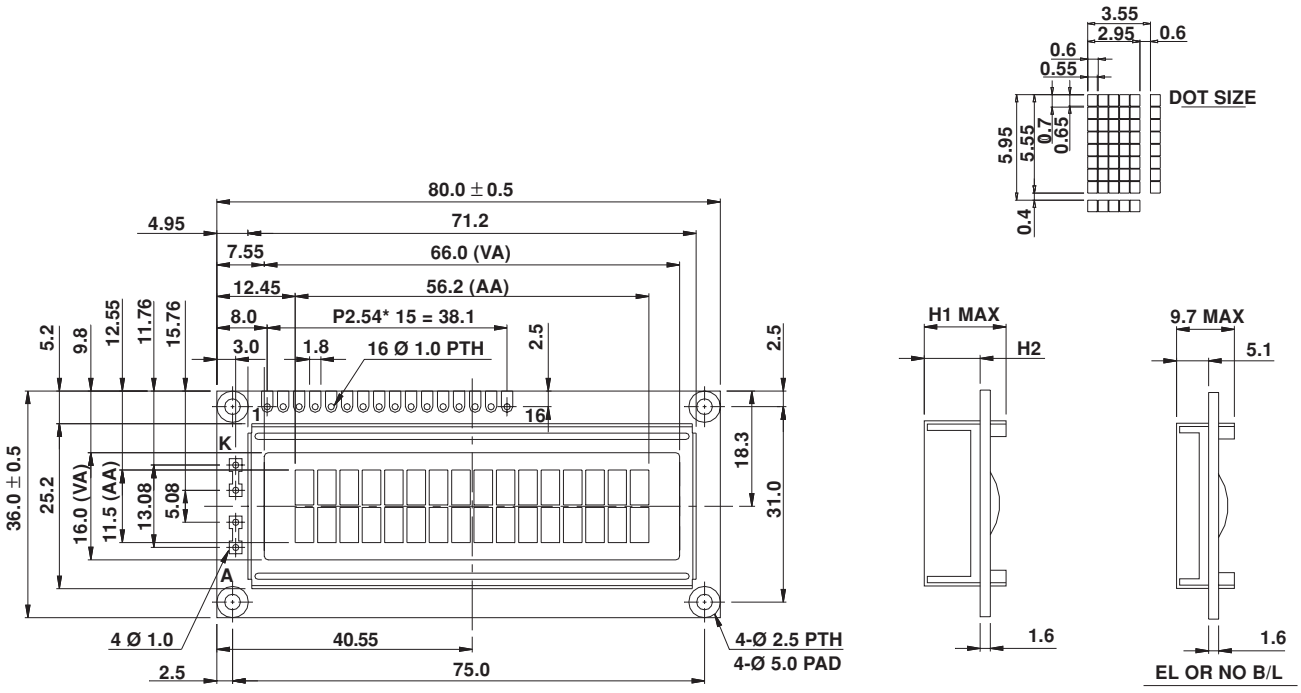
ITEM	SYMBOL	CONDITION		STANDARD VALUE			UNIT
				MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V		4.7	5.0	5.3	V
		VDD = + 3V		2.7	3.0	5.3	V
Supply Current	IDD	VDD = 5V		–	1.2	3.0	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C		–	–	–	V
		0°C		4.2	4.8	5.1	
		25°C		3.8	4.2	4.6	
		50°C		3.6	4.0	4.4	
		70°C		–	–	–	
LED Forward Voltage	VF	25°C		–	4.2	4.6	V
LED Forward Current	IF	25°C	Array	–	130	260	mA
			Edge	–	20	40	
EL Power Supply Current	IEL	Vel = 110VAC:400Hz		–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DD RAM Address	00	01														0F
DD RAM Address	40	41														4F

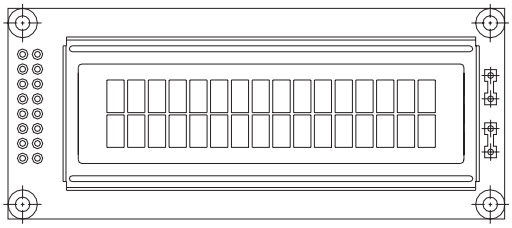
PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/Vee	+ 4.2V for LED/Negative Voltage Output
16	K	Power Supply for B/L (OV)

DIMENSIONS in millimeters



LED - H/L B/L		
	HIGH	LOW
H1	13.2	12.1
H2	8.6	7.5

16 x 2 Character LCD



FEATURES

- 5 x 8 dots with cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A.K (LED)
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	85.0 x 36.0	mm
Viewing Area	66.0 x 16.0	mm
Dot Size	0.56 x 0.66	mm
Character Size	2.96 x 5.56	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

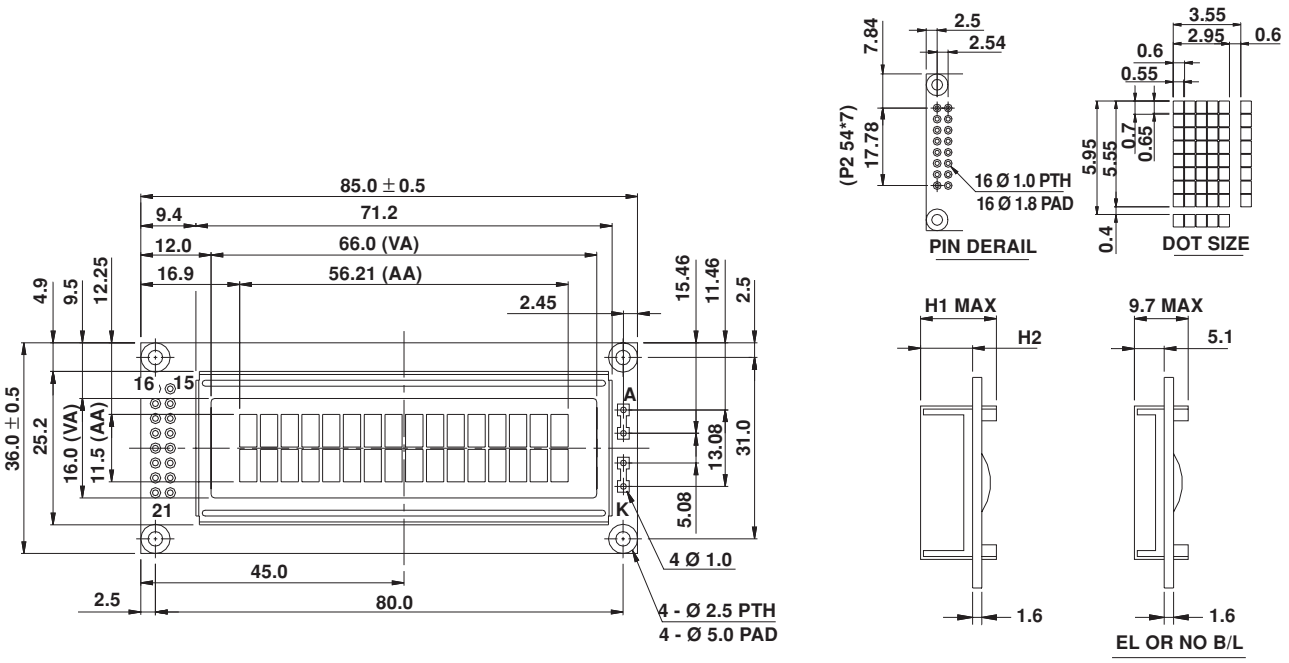
ITEM	SYMBOL	CONDITION		STANDARD VALUE			UNIT
				MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V		4.7	5.0	5.3	V
		VDD = + 3V		2.7	3.0	5.3	V
Supply Current	IDD	VDD = 5V		–	1.2	3.0	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C		–	–	–	V
		0°C		4.2	4.6	5.0	
		25°C		3.8	4.2	4.6	
		50°C		3.6	4.0	4.4	
		70°C		3.2	–	–	
LED Forward Voltage	VF	25°C		–	4.2	4.6	V
LED Forward Current	IF	25°C	Array	–	130	260	mA
			Edge	–	20	40	
EL Power Supply Current	IEL	Vel = 110VAC:400Hz		–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DD RAM Address	00	01														0F
DD RAM Address	40	41														4F

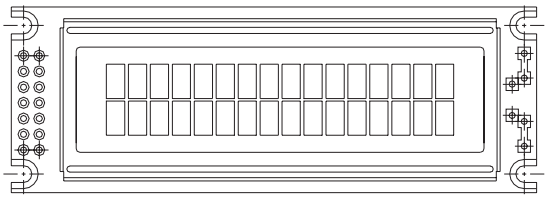
PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/Vee	4.2V for LED/Negative Voltage Output
16	K	Power Supply for B/L (OV)

DIMENSIONS in millimeters



LED - H/L B/L		
	HIGH	LOW
H1	13.2	12.1
H2	8.6	7.5

16 x 2 Character LCD



FEATURES

- 5 x 8 dots with cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2 or A.K (LED)

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	85.0 x 30.0	mm
Viewing Area	66.0 x 16.0	mm
Dot Size	0.56 x 0.66	mm
Character Size	2.96 x 5.56	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

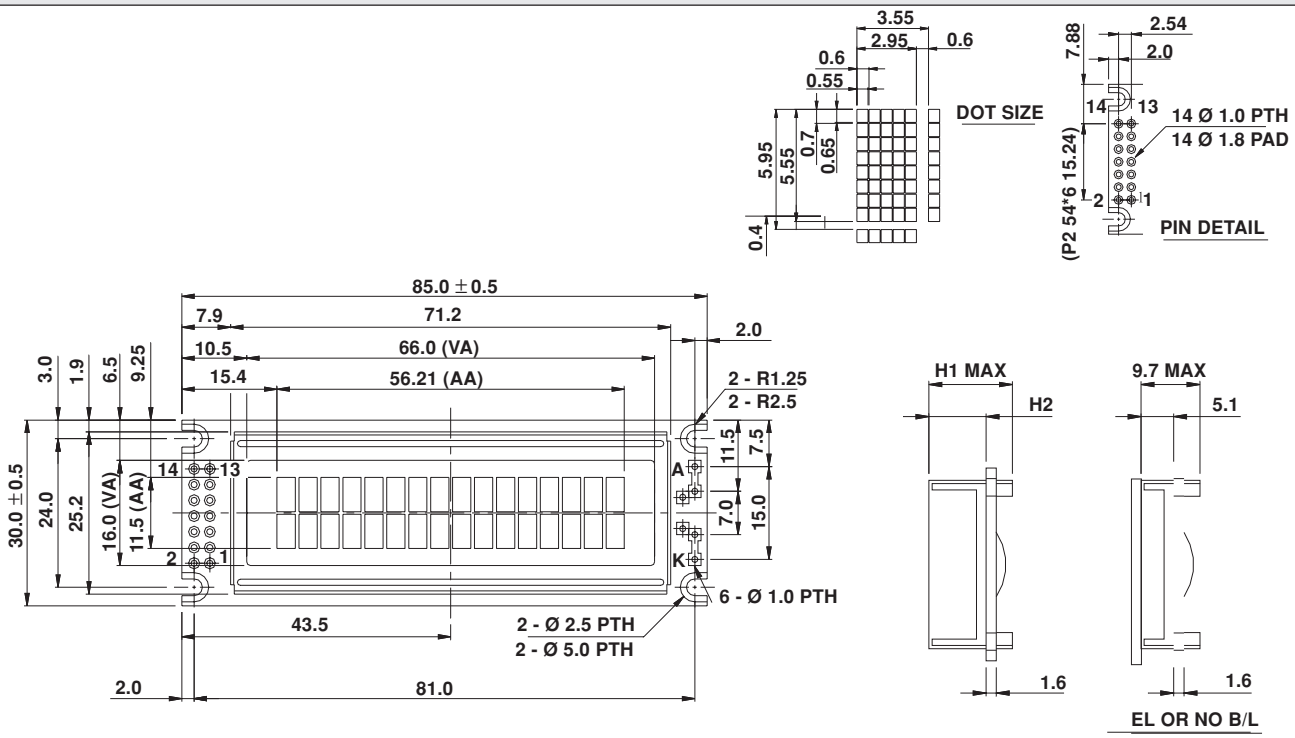
ITEM	SYMBOL	CONDITION		STANDARD VALUE			UNIT
				MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V		4.7	5.0	5.3	V
Supply Current	IDD	VDD = 5V		–	1.2	3.0	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C		–	–	–	V
		0°C		4.2	4.6	5.0	
		25°C		3.8	4.2	4.6	
		50°C		3.6	4.0	4.4	
		70°C		–	–	–	
LED Forward Voltage	VF	25°C		–	4.2	4.6	V
LED Forward Current	IF	25°C	Array	–	130	260	mA
			Edge	–	20	40	
EL Power Supply Current	IEL	Vel = 110VAC:400Hz		–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DD RAM Address	00	01														0F
DD RAM Address	40	41														4F

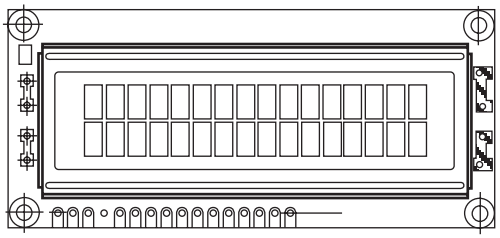
PIN NUMBER	SYMBOL	FUNCTION
1	Vdd	Power supply (+ 5V)
2	Vss	GND
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line

DIMENSIONS in millimeters



LED - H/L B/L		
	HIGH	LOW
H1	13.2	12.1
H2	8.6	7.5

16 x 2 Character LCD



FEATURES

- 5 x 8 dots includes cursor
- Built - in controller (KS 0066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- LED can be driven by pin 1, pin 2, pin 15 or A and K
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	80.0 x 36.0	mm
Viewing Area	66.0 x 16.0	mm
Mounting Hole	75.0 x 31.0	mm
Character Size	2.95 x 5.55	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

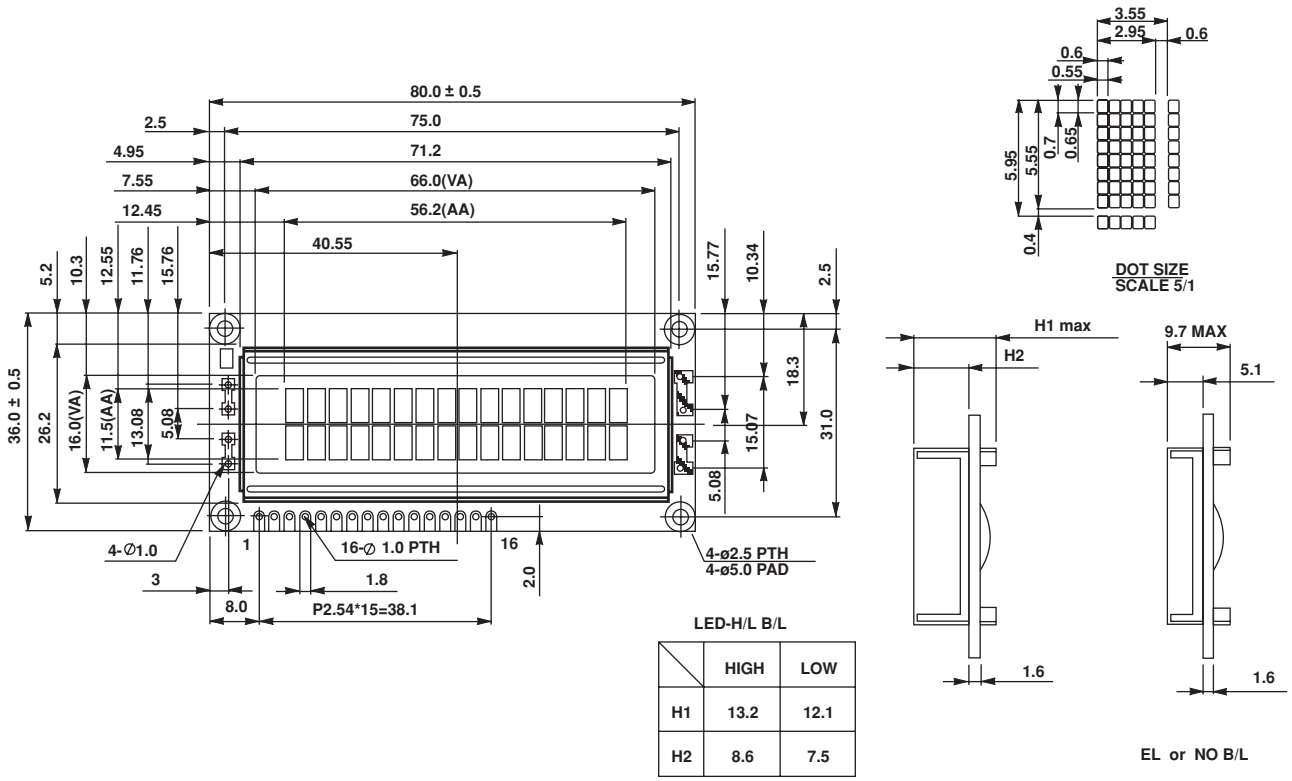
ITEM	SYMBOL	CONDITION		STANDARD VALUE			UNIT
				MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V		4.7	5.0	5.3	V
Supply Current	IDD	VDD = + 5V		–	1.2	1.4	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C		–	–	5.2	V
		0°C		–	–	4.2	
		25°C		–	3.8	–	
		50°C		3.5	–	–	
		70°C		3.2	–	–	
LED Forward Voltage	VF	25°C		–	4.2	4.6	V
LED Forward Current	IF	25°C	Array	–	130	260	mA
		25°C	Edge	–	20	40	mA
EL Power Supply Current	IEL	Vel = 110VAC; 400Hz		–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DD RAM Address	00	01														0F
DD RAM Address	40	41														4F

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/Vee	+ 4.2V for LED (RA = 0Ω)/Negative Voltage Output
16	K	Power Supply for B/L (0V)

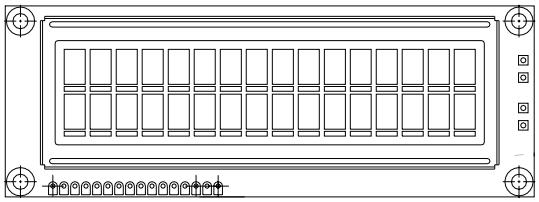
DIMENSIONS in millimeters



LED-H/L B/L

	HIGH	LOW
H1	13.2	12.1
H2	8.6	7.5

16 x 2 Character LCD



FEATURES

- 5 x 8 dots with cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply(Also available for + 3V)
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A.K (LED)
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	122.0 x 44.0	mm
Viewing Area	99.0 x 24.0	mm
Mounting Hole	115 x 37.0	mm
Character Size	4.84 x 9.66	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

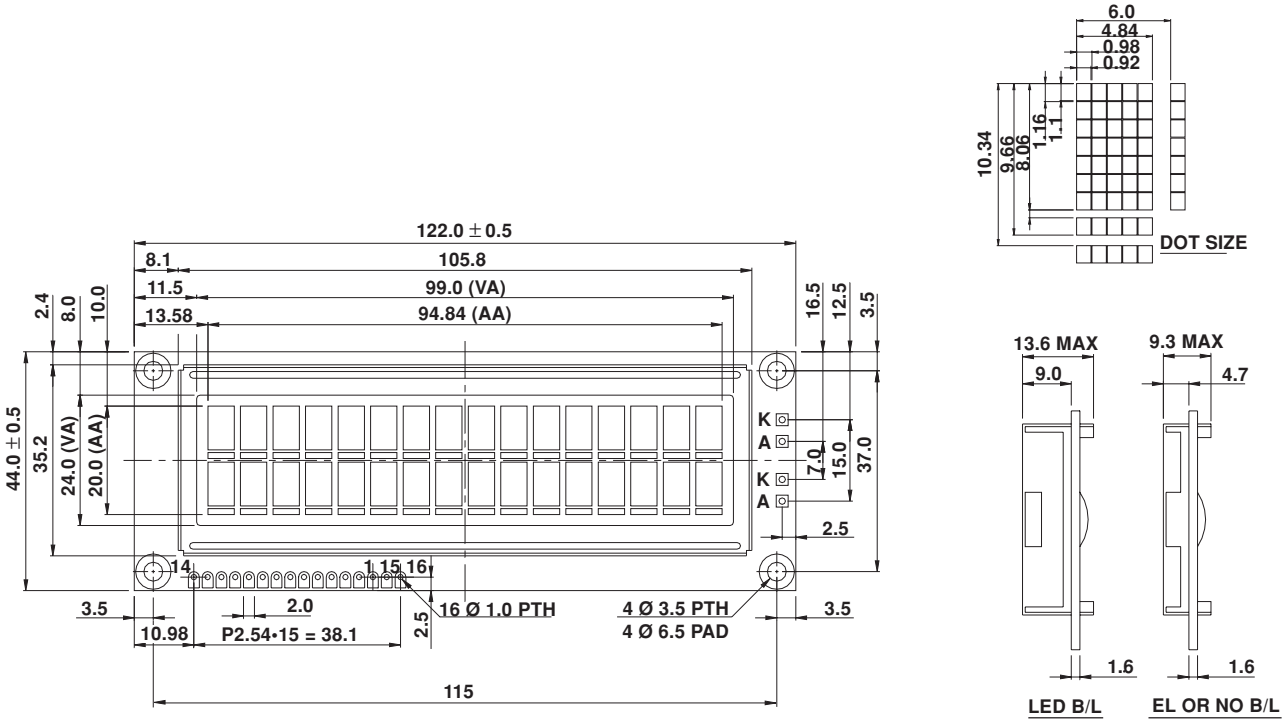
ITEM	SYMBOL	CONDITION		STANDARD VALUE			UNIT
				MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V		4.7	5.0	5.3	V
Supply Current	IDD	VDD = + 5V		–	1.6	1.5	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C		–	–	5.2	V
		0°C		–	–	4.5	
		25°C		4.2	4.2	–	
		50°C		3.8	–	–	
		70°C		3.5	–	–	
LED Forward Voltage	VF	25°C		–	4.2	4.6	V
LED Forward Current	IF	25°C	Array	–	260	520	mA
		25°C	Edge	–	20	40	mA
EL Power Supply Current	IEL	Vel = 110VAC; 400Hz		–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

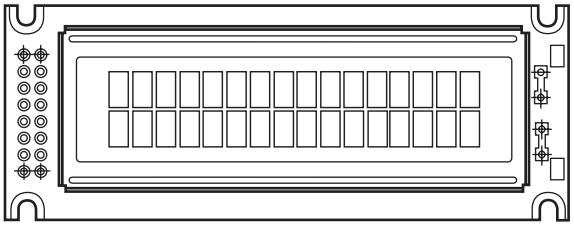
Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DD RAM Address	00	01														0F
DD RAM Address	40	41														4F

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/Vee	4.2V for LED(RA = 0Ω)/Negative Voltage Output
16	K	Power Supply for B/L (OV)

DIMENSIONS in millimeters



16 x 2 Character LCD



FEATURES

- 5 x 8 dots includes cursor
- Built - in controller (KS 0066 or Equivalent)
- + 5V power supply
- 1/16 duty cycle
- LED can be driven by pin 1, pin 2 or A and K
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	85.0 x 32.6	mm
Viewing Area	66.0 x 16.0	mm
Mounting Hole	79.0 x 25.2	mm
Character Size	2.95 x 5.55	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

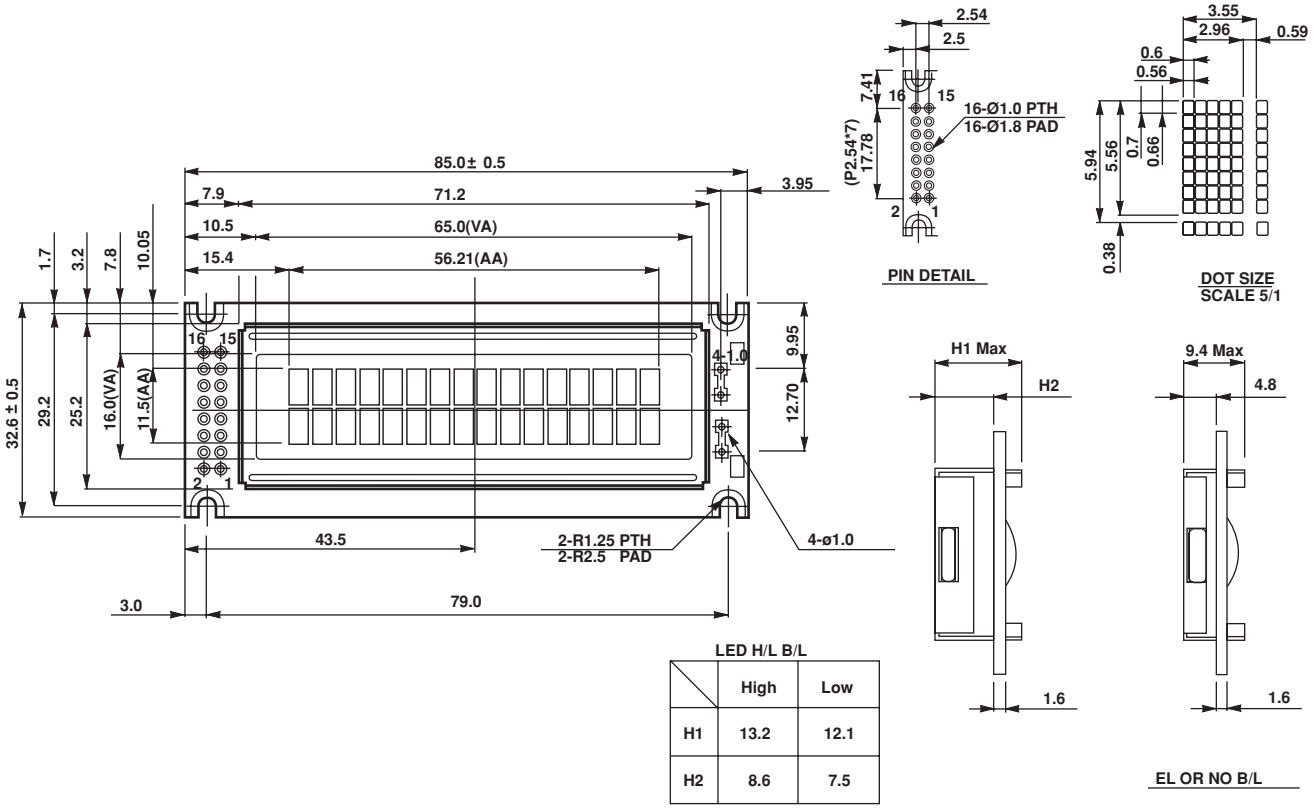
ITEM	SYMBOL	CONDITION		STANDARD VALUE			UNIT
				MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V		4.7	5.0	5.3	V
Supply Current	IDD	VDD = + 5V		–	1.2	1.5	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C		–	–	5.2	V
		0°C		–	–	4.2	
		25°C		–	3.8	–	
		50°C		3.5	–	–	
		70°C		3.2	–	–	
LED Forward Voltage	VF	25°C		–	4.2	4.6	V
LED Forward Current	IF	25°C	Array	–	130	260	mA
		25°C	Edge	–	20	40	mA
EL Power Supply Current	IEL	Vel = 110VAC; 400Hz		–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DD RAM Address	00	01														0F
DD RAM Address	40	41														4F

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/Vee	+ 4.2V for LED (RA = 0Ω)/Negative Voltage Output
16	K	Power Supply for B/L (0V)

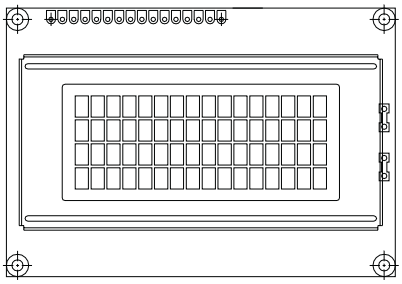
DIMENSIONS in millimeters



LED H/L B/L

	High	Low
H1	13.2	12.1
H2	8.6	7.5

16 x 4 Character LCD



FEATURES

- 5 x 8 dots includes cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A and K (LED)
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	87.0 x 60.0	mm
Viewing Area	62.0 x 26.0	mm
Dot Size	0.55 x 0.55	mm
Character Size	2.95 x 4.75	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

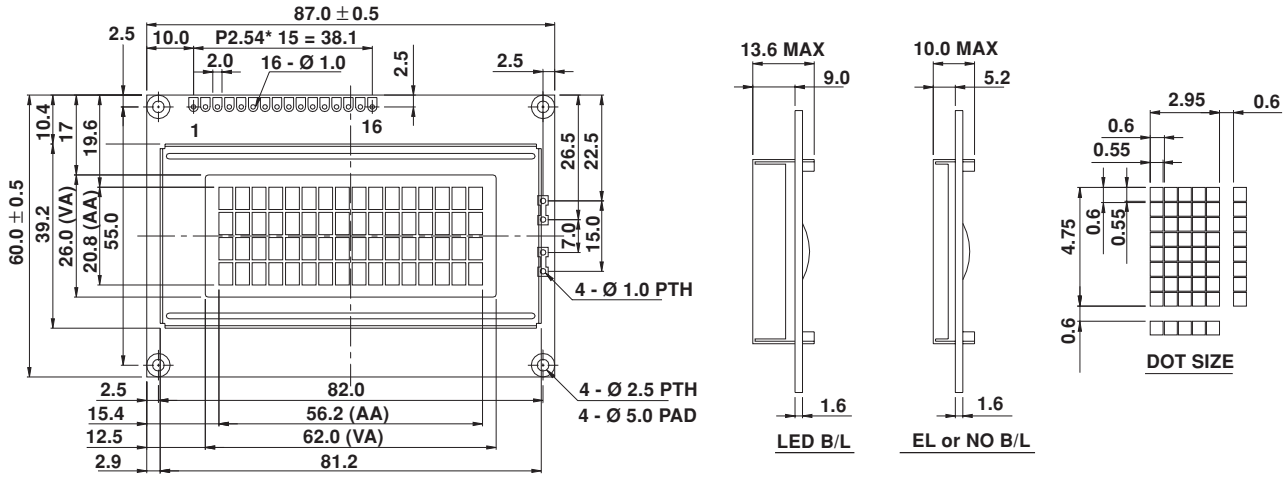
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
		VDD = + 3V	2.7	3.0	5.3	V
Supply Current	IDD	VDD = + 5V	–	1.0	1.2	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	5.0	5.1	5.7	V
		0°C	4.6	4.8	5.2	
		25°C	4.1	4.5	4.7	
		50°C	3.9	4.2	4.5	
		70°C	3.7	3.9	4.3	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	220	440	mA
EL Power Supply Current	IEL	Vel = 110VAC:400Hz	–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

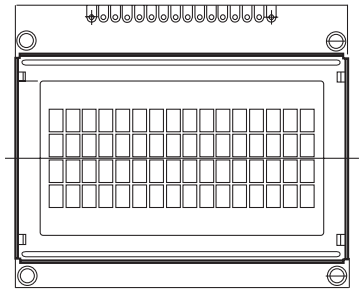
Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DD RAM Address	00	01														0F
DD RAM Address	40	41														4F
DD RAM Address	10	11														1F
DD RAM Address	50	51														5F

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H $\rightarrow$L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/Vee	4.2V for LED/Negative Voltage Output
16	K	Power Supply for B/L (0V)

DIMENSIONS in millimeters



16 x 4 Character LCD



FEATURES

- 5 x 8 dots includes cursor
- Built - in controller (KS 0066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2, or pin 15, pin 16 or A and K
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	70.6 x 60.0	mm
Viewing Area	60.0 x 32.6	mm
Mounting Hole	65.6 x 50.0	mm
Character Size	2.95 x 4.75	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

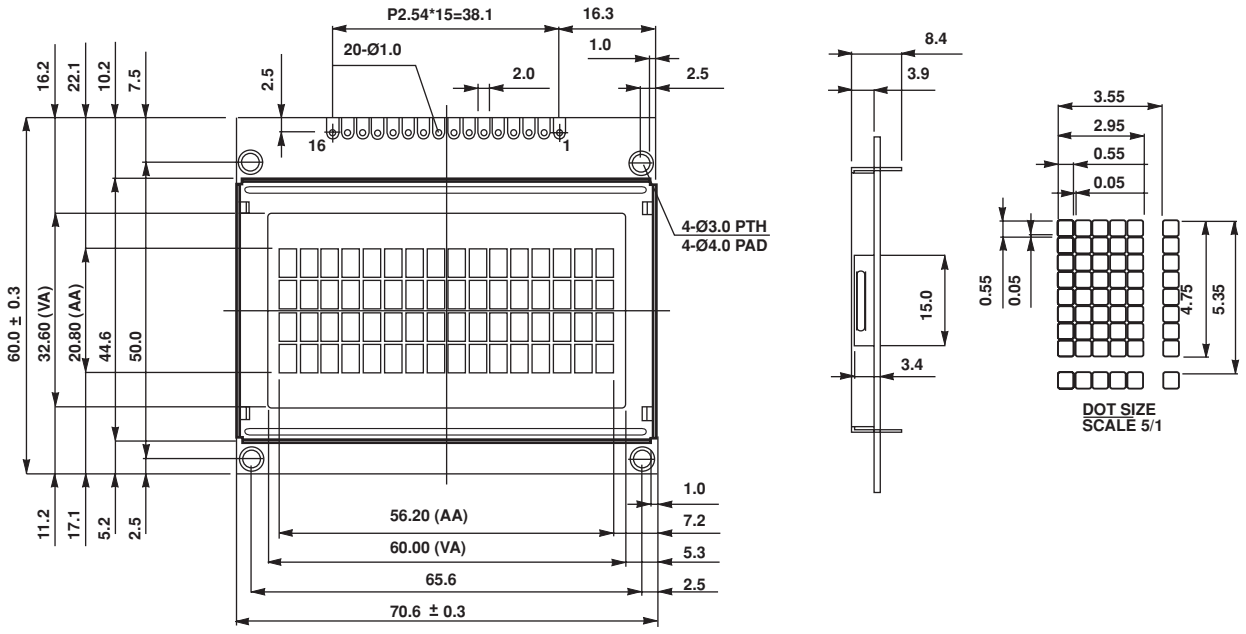
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
		VDD = + 3V	2.7	3.0	5.3	V
Supply Current	IDD	VDD = + 5V	–	1.65	–	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	5.0	5.1	5.7	V
		0°C	4.6	4.8	5.2	
		25°C	4.1	4.5	4.7	
		50°C	3.9	4.2	4.5	
		70°C	3.7	3.9	4.3	
EL Power Supply Current	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

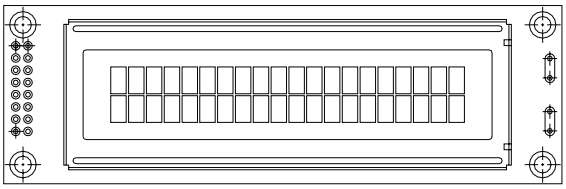
Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DD RAM Address	00	01														0F
DD RAM Address	40	41														4F
DD RAM Address	10	11														1F
DD RAM Address	50	51														5F

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/Vee	+ 4.2V for LED (RA = 0Ω)/Negative Voltage Output
16	K	Power Supply for B/L (0V)

DIMENSIONS in millimeters



20 x 2 Character LCD



FEATURES

- 5 x 8 dots includes cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply(Also available for + 3V)
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A and K (LED)
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	116.0 x 37.0	mm
Viewing Area	85.0 x 18.6	mm
Dot Size	0.6 x 0.65	mm
Character Size	3.2 x 5.55	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

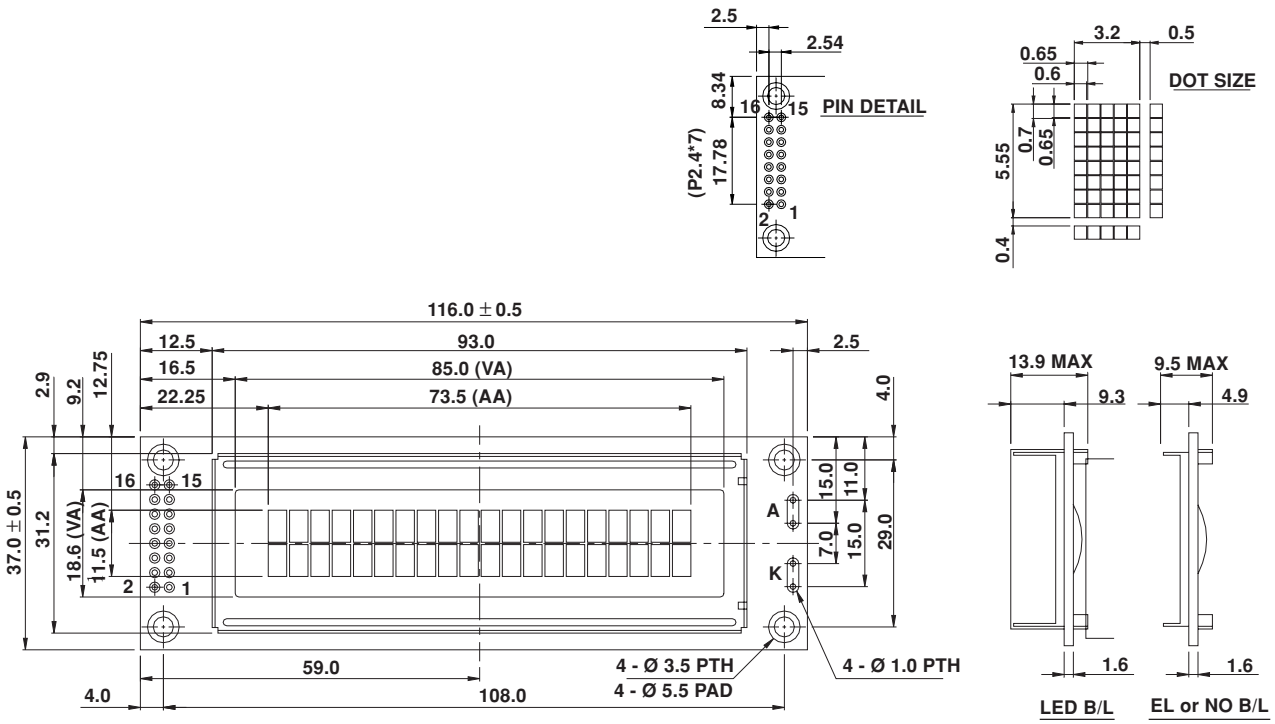
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
		VDD = + 3V	2.7	3.0	5.3	V
Supply Current	IDD	VDD = + 5V	–	1.0	1.2	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	5.0	5.1	5.7	V
		0°C	4.6	4.8	5.2	
		25°C	4.1	4.5	4.7	
		50°C	3.9	4.2	4.5	
		70°C	3.7	3.9	4.3	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	210	420	mA
EL Power Supply Current	IEL	Vel = 110VAC;400Hz	–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

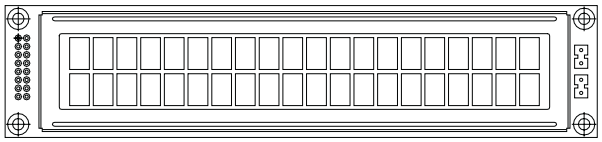
Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	–	–	20
DD RAM Address	00	01														13
DD RAM Address	40	41														53

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/Vee	+ 4.2V for LED/Negative Voltage Potput
16	K	Power Supply for B/L (OV)

DIMENSIONS in millimeters



20 x 2 Character LCD



FEATURES

- 5 x 8 dots includes cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A and K (LED)
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	180.0 x 40.0	mm
Viewing Area	149.0 x 23.0	mm
Mounting Hole	172.0 x 32.0	mm
Character Size	6.0 x 9.66	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

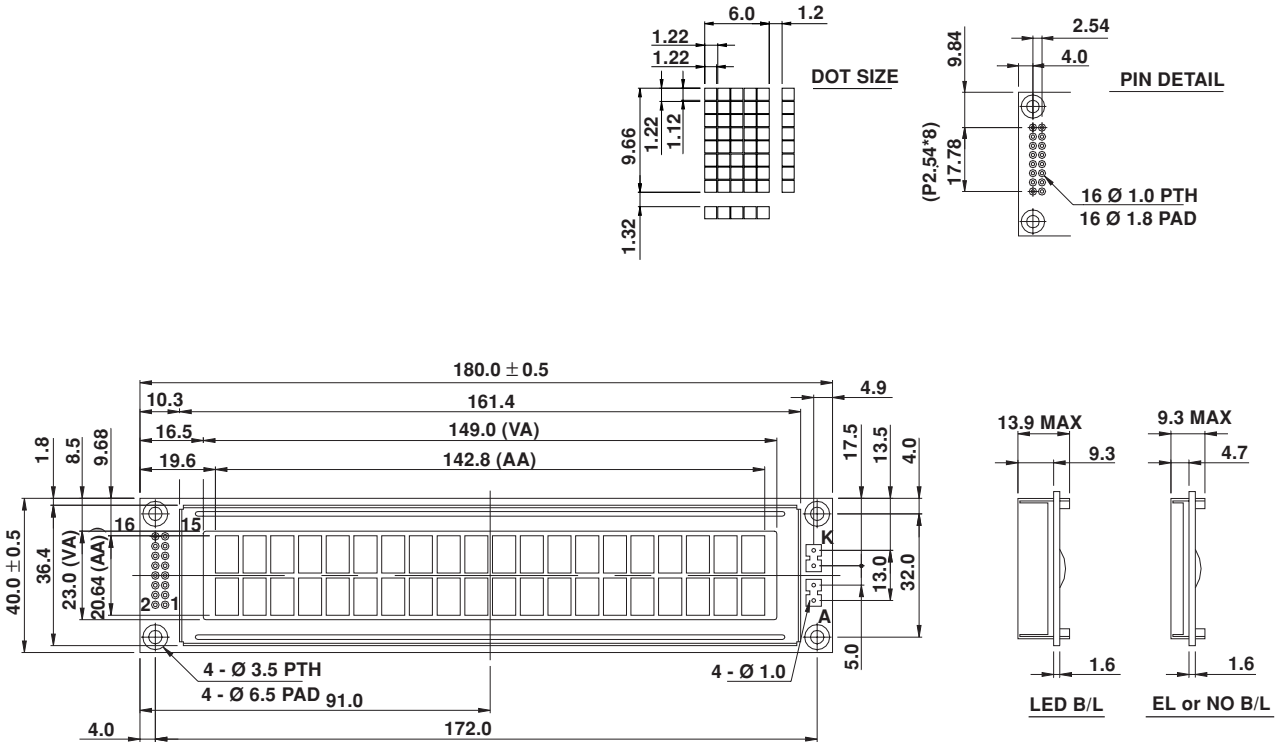
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
		VDD = + 3V	2.7	3.0	5.3	V
Supply Current	IDD	VDD = + 5V	–	1.5	1.8	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	5.0	5.1	5.7	V
		0°C	4.6	4.8	5.2	
		25°C	4.1	4.5	4.7	
		50°C	3.9	4.2	4.5	
		70°C	–	–	–	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	360	720	mA
EL Power Supply Current	IEL	Vel = 110VAC:400Hz	–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

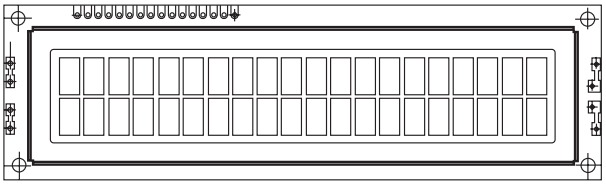
Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	–	–	20
DD RAM Address	00	01														13
DD RAM Address	40	41														53

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/Vee	+ 4.2V for LED/Negative Voltage 0utput
16	K	Power Supply for B/L (0V)

DIMENSIONS in millimeters



20 x 2 Character LCD



FEATURES

- 5 x 8 dots includes cursor
- Built - in controller (KS 0066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- LED can be driven by pin 1, pin 2, pin 15, pin 16 or A and K
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	146.0 x 43.0	mm
Viewing Area	123.0 x 23.0	mm
Mounting Hole	139.0 x 36.0	mm
Character Size	4.84 x 9.22	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

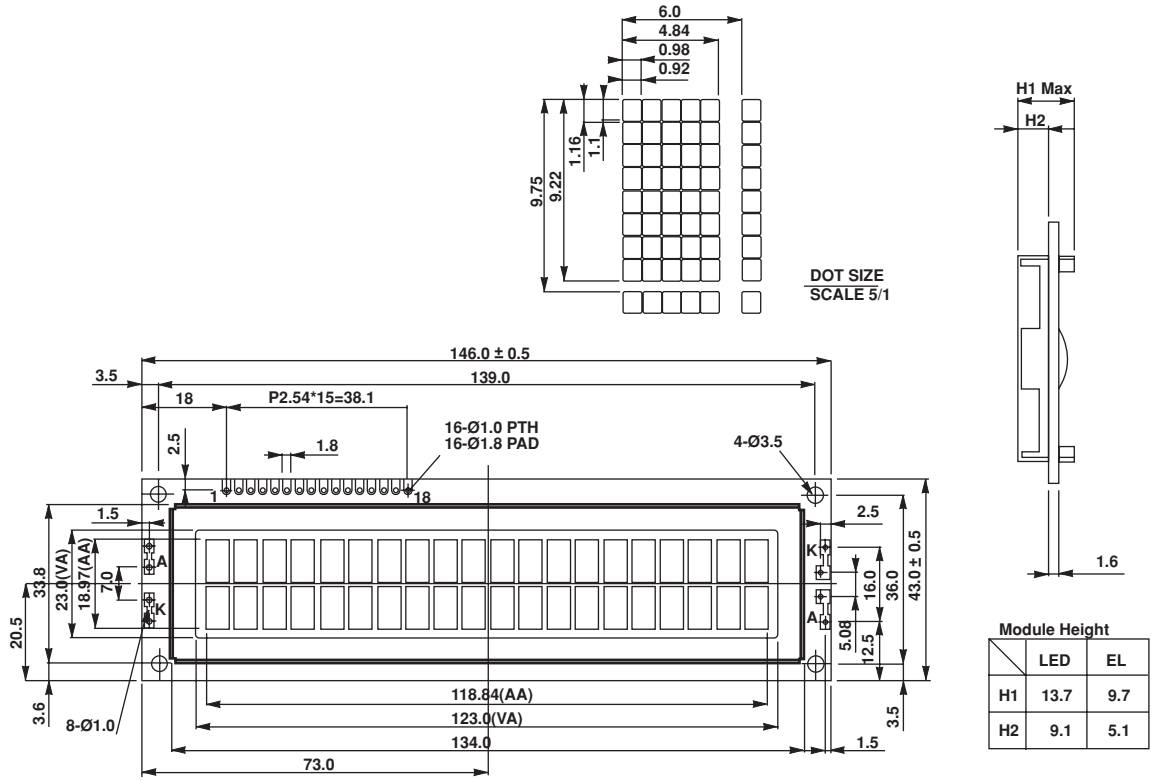
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
		VDD = + 3V	2.7	3.0	5.3	V
Supply Current	IDD	VDD = + 5V	–	1.65	–	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	5.0	5.1	5.7	V
		0°C	4.6	4.8	5.2	
		25°C	4.1	4.5	4.7	
		50°C	3.9	4.2	4.5	
		70°C	3.7	3.9	4.3	
EL Power Supply Current	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

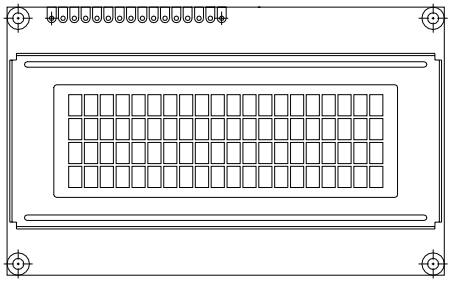
Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	–	–	20
DD RAM Address	00	01														13
DD RAM Address	40	41														53

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/Vee	+ 4.2V for LED (RA = 0)/Negative Voltage Output
16	K	Power Supply for B/L (0V)

DIMENSIONS in millimeters



20 x 4 Dots Character LCD



FEATURES

- 5 x 8 dots with cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A.K (LED)
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	98.0 x 60.0	mm
Viewing Area	77.0 x 25.2	mm
Dot Size	0.55 x 0.55	mm
Character Size	2.95 x 4.75	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

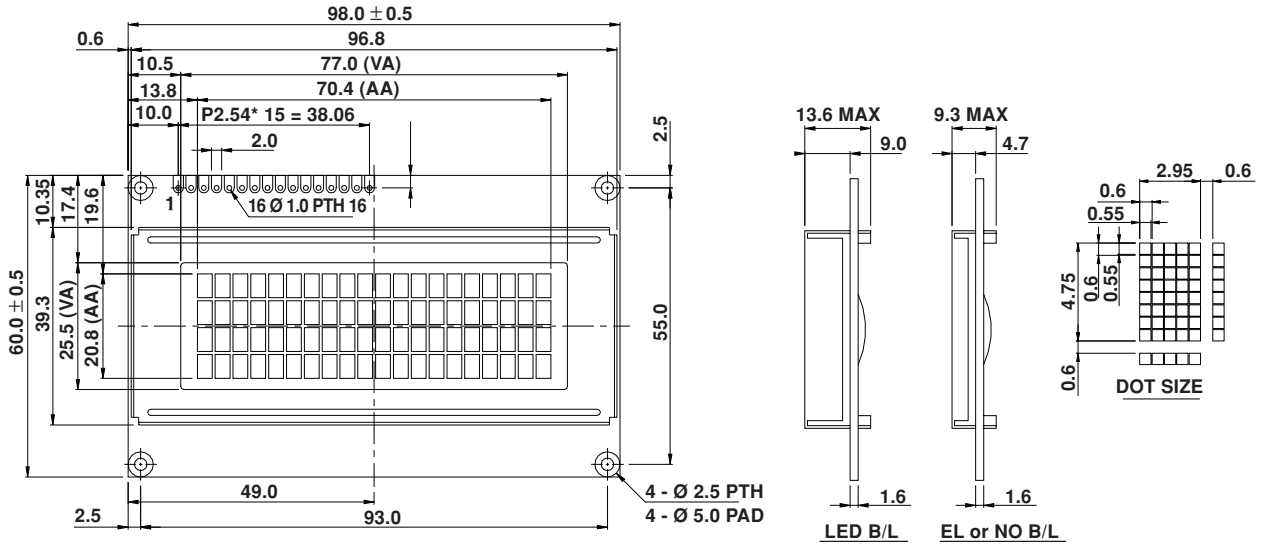
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
		VDD = + 3V	2.7	3.0	5.3	V
Supply Current	IDD	VDD = + 5V	–	1.6	1.2	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	5.0	5.1	5.7	V
		0°C	4.6	4.8	5.2	
		25°C	4.1	4.5	4.7	
		50°C	3.9	4.2	4.5	
		70°C	3.7	3.9	4.3	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	280	560	mA
EL Power Supply Current	IEL	Vel = 110VAC:400Hz	–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

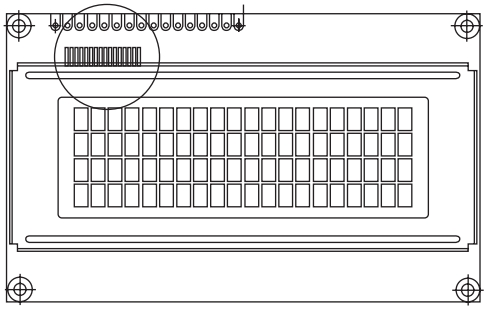
Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	–	–	20
DD RAM Address	00	01														13
DD RAM Address	40	41														53
DD RAM Address	14	15														27
DD RAM Address	54	55														67

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H $\rightarrow$L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/Vee	4.2V for LED/Negative Voltage Output
16	K	Power Szupply for B/L (0V)

DIMENSIONS in millimeters



20 x 4 Character LCD



FEATURES

- 5 x 8 dots includes cursor
- Built - in controller (KS 0066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- LED can be driven by pin 1, pin 2, pin 15, pin 16 or A and K
- N.V. optional for + 3V power supply
- FFC and FFC connector is for LCD-020M004B only

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	98.0 x 60.0	mm
Viewing Area	77.0 x 25.2	mm
Mounting Hole	93.0 x 55.0	mm
Character Size	2.95 x 4.75	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

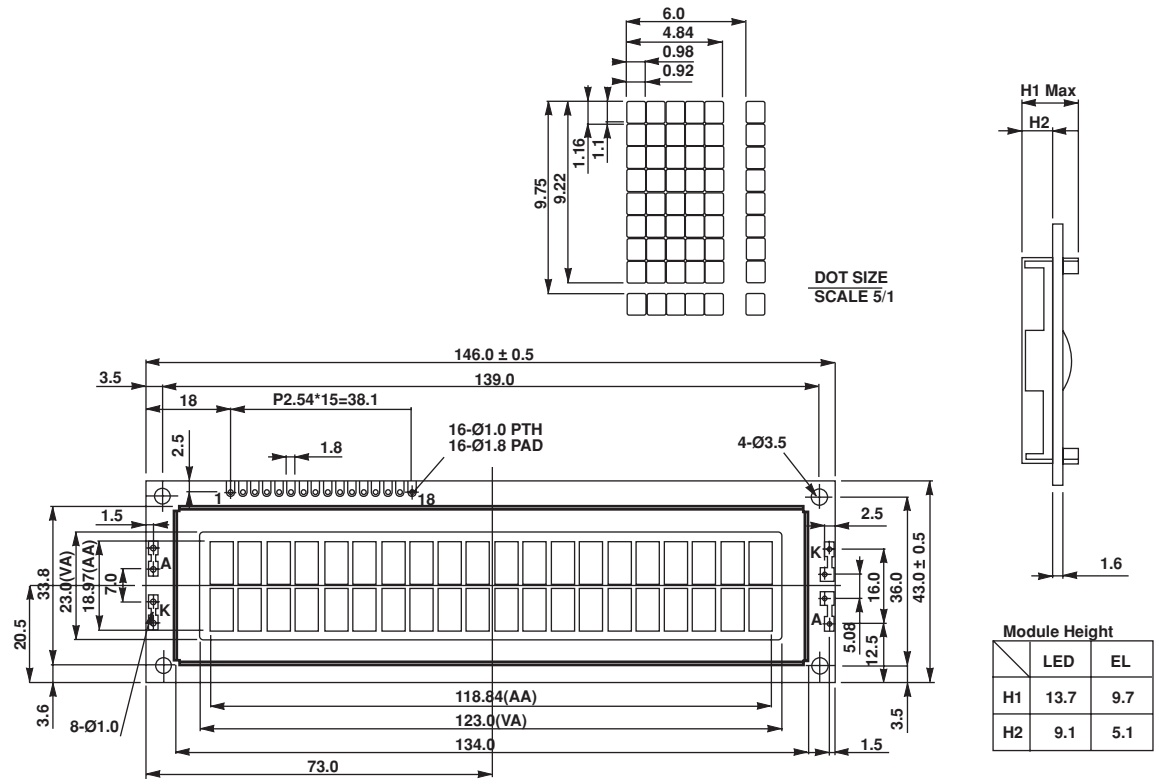
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
		VDD = + 3V	2.7	3.0	5.3	V
Supply Current	IDD	VDD = + 5V	–	1.0	1.2	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	5.0	5.1	5.7	V
		0°C	4.6	4.8	5.2	
		25°C	4.1	4.5	4.7	
		50°C	3.9	4.2	4.5	
		70°C	3.7	3.9	4.3	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	280	560	mA
EL Power Supply Current	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

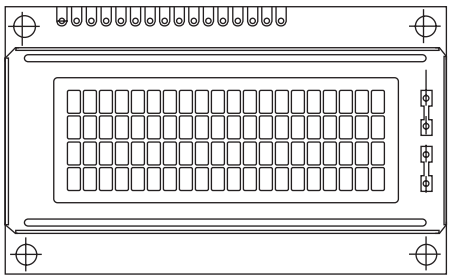
Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	–	–	20
DD RAM Address	00	01														13
DD RAM Address	40	41														53
DD RAM Address	14	15														27
DD RAM Address	54	55														67

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/Vee	+ 4.2V for LED (RA = 0)/Negative Voltage Output
16	K	Power Supply for B/L (0V)

DIMENSIONS in millimeters



20 x 4 Character LCD



FEATURES

- 5 x 8 dots includes cursor
- Built - in controller (KS 0066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- LED can be driven by pin 1, pin 2, pin 15, pin 16 or A and K
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	77.0 x 47.0	mm
Viewing Area	60.0 x 22.0	mm
Mounting Hole	70.0 x 40.0	mm
Character Size	2.30 x 4.03	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

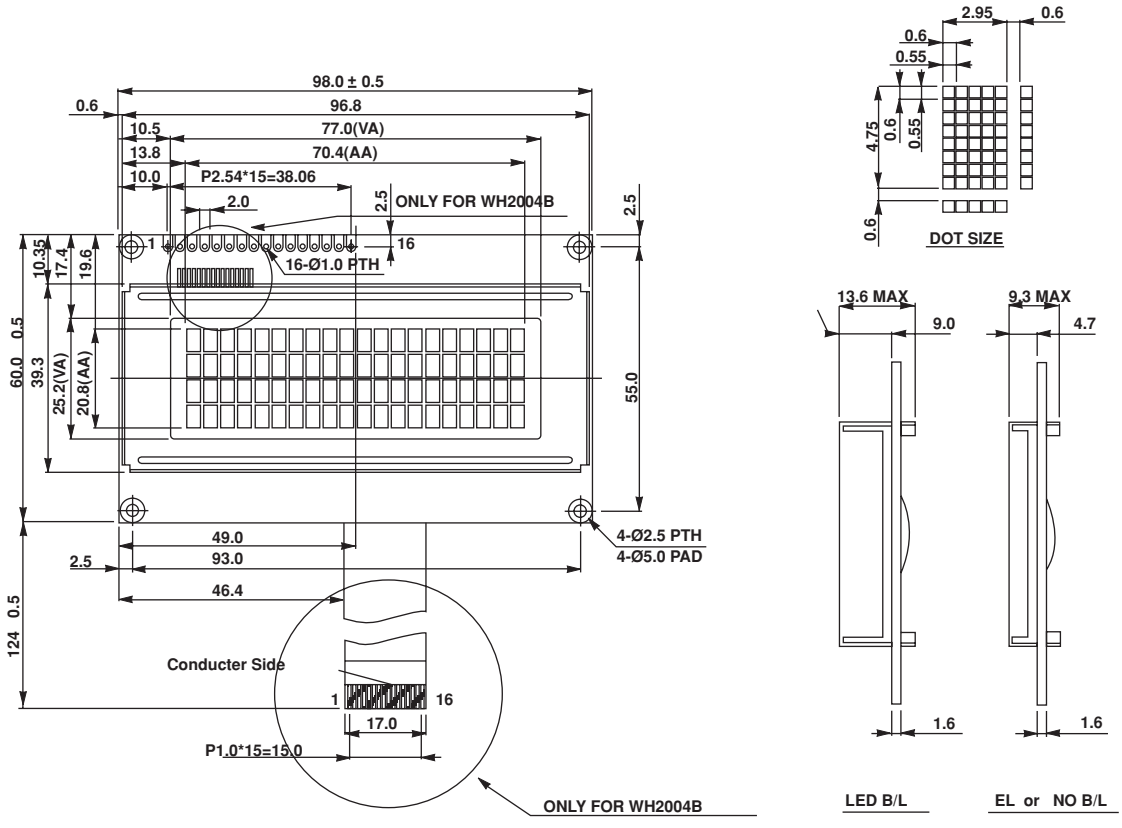
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
		VDD = + 3V	2.7	3.0	5.3	V
Supply Current	IDD	VDD = + 5V	–	8.0	10.0	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	5.0	5.1	5.7	V
		0°C	4.6	4.8	5.2	
		25°C	4.1	4.5	4.7	
		50°C	3.9	4.2	4.5	
		70°C	3.7	3.9	4.3	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	540	1080	mA
EL Power Supply Current	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

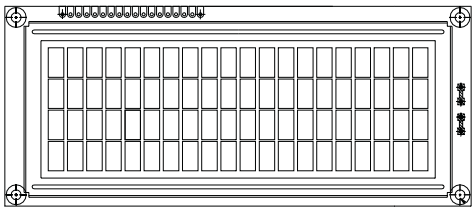
Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	–	–	20
DD RAM Address	00	01														13
DD RAM Address	40	41														53
DD RAM Address	14	15														27
DD RAM Address	54	55														67

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A	Power Supply for LED 4.2V
16	K	Power Supply for B/L (0V)

DIMENSIONS in millimeters



20 x 4 Character LCD



FEATURES

- 5 x 8 dots with cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A and K (LED)
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	146 x 62.5	mm
Viewing Area	123.5 x 43.0	mm
Dot Size	0.92 x 1.10	mm
Character Size	4.84 x 9.22	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

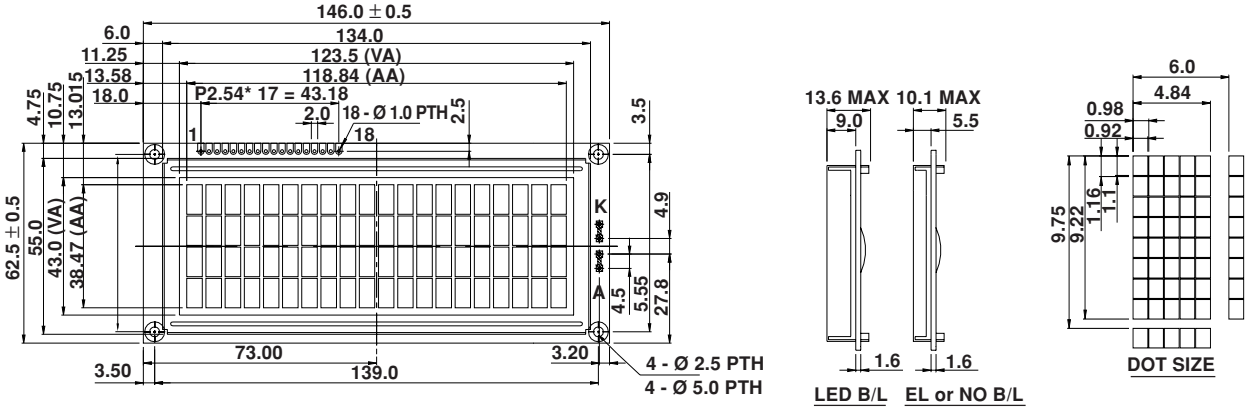
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
		VDD = + 3V	2.7	3.0	5.3	V
Supply Current	IDD	VDD = + 5V	–	8.0	10.0	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20°C	5.0	5.1	5.7	V
		0°C	4.6	4.8	5.2	
		25°C	4.1	4.5	4.7	
		50°C	3.9	4.2	4.5	
		70°C	3.7	3.9	4.3	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	540	1080	mA
EL Power Supply Current	IEL	Vel = 110VAC:400Hz	–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

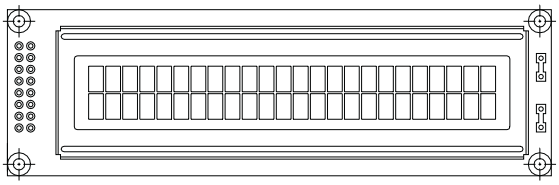
Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	–	–	20
DD RAM Address	00	01														13
DD RAM Address	40	41														53
DD RAM Address	14	15														27
DD RAM Address	54	55														67

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A	Power Supply for LED 4.2V
16	K	Power Supply for B/L (0V)
17	NC/Vee	NC or Negative Voltage Output
18	NC	No Connection

DIMENSIONS in millimeters



24 x 2 Character LCD



FEATURES

- 5 x 8 dots with cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A and K (LED)
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	118.0 x 36.0	mm
Viewing Area	94.5 x 16.0	mm
Dot Size	0.6 x 0.65	mm
Character Size	3.2 x 5.55	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

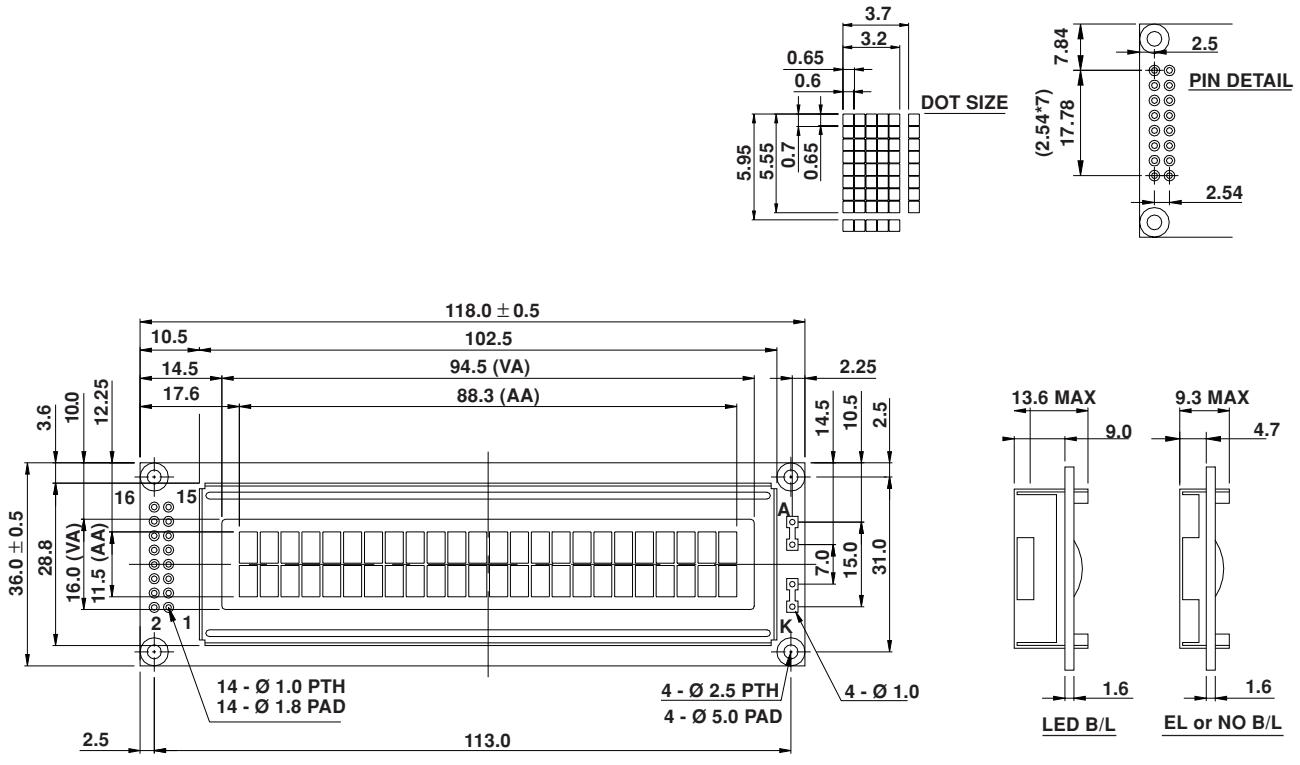
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
		VDD = + 3V	2.7	3.0	5.3	V
Supply Current	IDD	VDD = + 5V	–	0.8	1.1	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	5.1	5.3	5.7	V
		0°C	4.6	4.9	5.2	
		25°C	4.1	4.5	4.7	
		50°C	3.9	4.2	4.5	
		70°C	3.7	3.9	4.3	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	190	380	mA
EL Power Supply Current	IEL	Vel = 110VAC;400Hz	–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

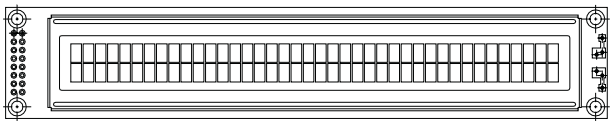
Display Position	1	2	3	4	5	6	7	8	9	10	11	12	–	–	–	24
DD RAM Address	00	01														17
DD RAM Address	40	41														57

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/Vee	+ 4.2 for LED/Negative Voltage Output
16	K	Power Supply for B/L (0V)

DIMENSIONS in millimeters



40 x 2 Character LCD



FEATURES

- 5 x 8 dots with cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A.K (LED)
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	182.0 x 33.5	mm
Viewing Area	154.4 x 16.5	mm
Dot Size	0.6 x 0.65	mm
Character Size	3.2 x 5.55	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

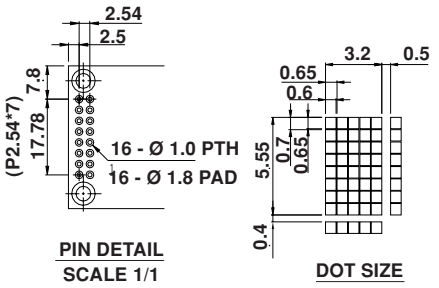
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
		VDD = + 3V	2.7	3.0	5.3	V
Supply Current	IDD	VDD = 5V	–	6.0	8.0	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	5.0	5.1	5.7	V
		0°C	4.6	4.8	5.2	
		25°C	4.1	4.5	4.7	
		50°C	3.9	4.2	4.5	
		70°C	3.7	3.9	4.5	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	280	560	mA
EL Power Supply Current	IEL	Vel = 110VAC:400Hz	–	–	5.0	mA

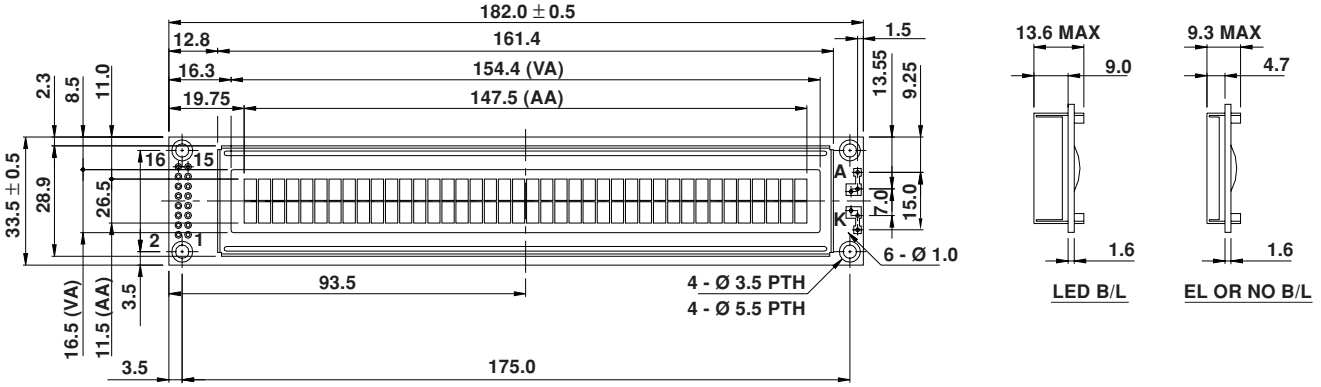
DISPLAY CHARACTER ADDRESS CODE:

Display Position	1	2	3	4	5	6	7	8	9	–	–	39	40
DD RAM Address	00	01											27
DD RAM Address	40	41											67

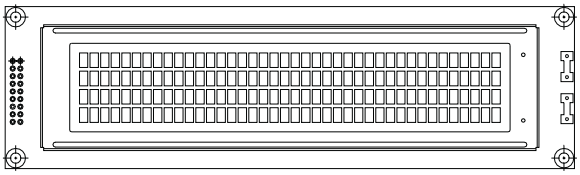
PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/$\overline{W}$	H/L Read/Write Signal
6	E	H →L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/Vee	4.2V for LED/Negative Voltage Output
16	K	Power Supply for B/L (0V)

DIMENSIONS in millimeters





40 x 4 Character LCD



FEATURES

- 5 x 8 dots with cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A.K (LED)
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	190.0 x 54.0	mm
Viewing Area	147.0 x 29.5	mm
Dot Size	0.5 x 0.55	mm
Character Size	2.78 x 4.89	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	7.0	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

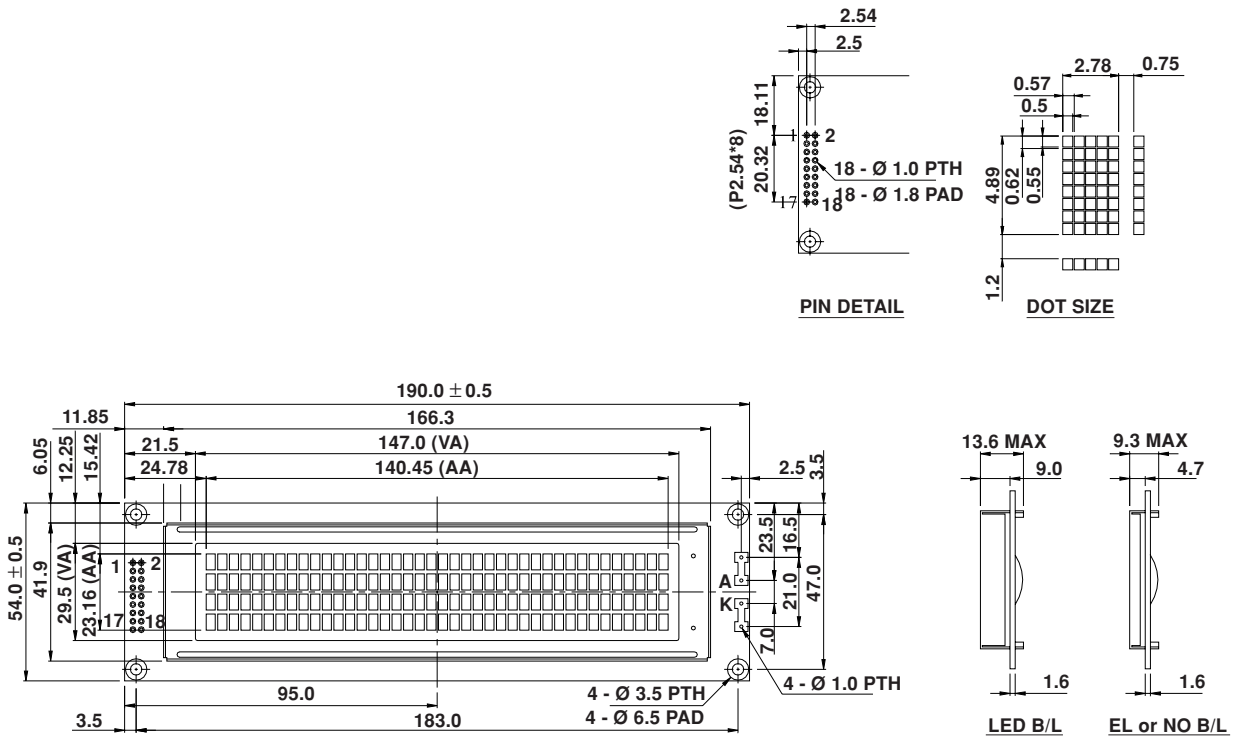
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.7	5.0	5.3	V
		VDD = + 3V	2.7	3.0	5.3	V
Supply Current	IDD	VDD = 5V	–	2.4	3.0	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	4.9	5.1	5.5	V
		0°C	4.5	4.8	5.1	
		25°C	4.1	4.5	4.7	
		50°C	3.8	4.2	4.4	
		70°C	3.5	3.9	4.1	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	600	1200	mA
EL Power Supply Current	IEL	Vel = 110VAC:400Hz	–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

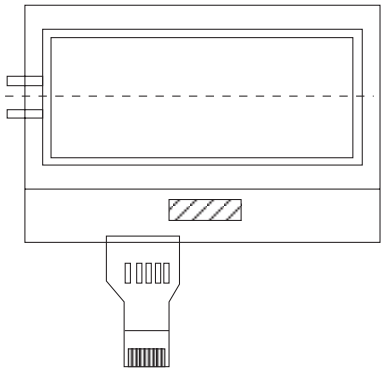
Display Position	1	2	3	4	5	6	7	8	9	10	11	12	–	–	–	40	
DD RAM Address	00	01														27	Line 1
DD RAM Address	40	41														67	Line 2
DD RAM Address	00	01														27	Line 3
DD RAM Address	40	41														67	Line 4

PIN NUMBER	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	H →L Enable Signal
10	R/$\overline{W}$	H/L Read/Write
11	RS	Register Select
12	Vo	Contrast Adjustment
13	Vss	GND
14	Vdd	+ 5V
15	E2	H →L Enable Signal IC2
16	NC/Vee	NC/Negative Voltage Output
17	A	LED + 5V/18K GND

DIMENSIONS in millimeters



80 x 32 Dots Graphic LCD



FEATURES

- SAMSUNG KS0713COG IC
- 1/32 duty cycle
- Built in booster

MECHANICAL DATA		
ITEM	STANDARD VALUE	UNIT
Module Dimension	44.0 x 30.0	mm
Viewing Area	40.0 x 17.4	mm
Dot Pitch	0.48 x 0.4	mm

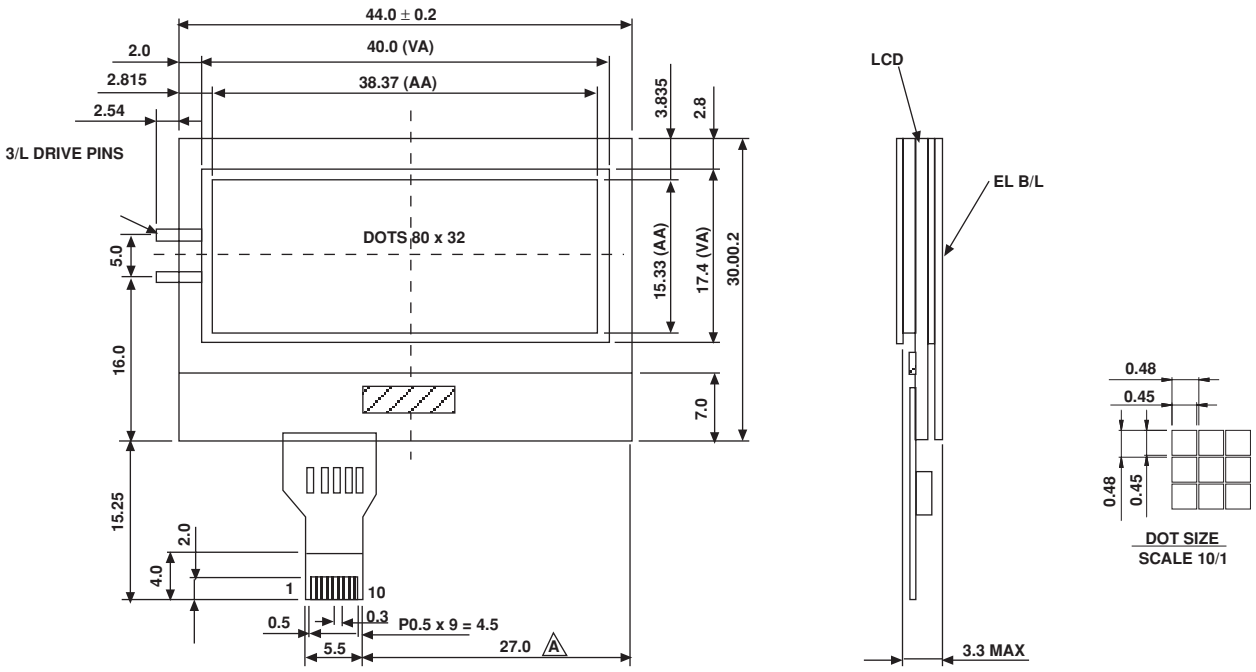
ABSOLUTE MAXIMUM RATING					
ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	2.40	3..00	3.60	V
Input Voltage	VI	0	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

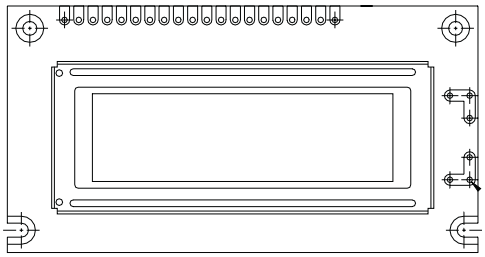
ELECTRICAL SPECIFICATIONS						
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	2.4	3.0	3.6	V
Supply Current	IDD	VDD = 5V	–	1.0	1.4	mA
Recommended LC Driving	VDD - V0	- 2	5.8	6.0	6.2	V
Voltage for Normal Temp.		25°C	5.4	5.6	5.8	
Version Module		7	4.8	5.0	5.2	
EL Power Supply Current	IEL	Vel = 110VAC:400Hz	–	–	0.8	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	+ 5V
3	$\overline{\text{RESET}}$	Reset the LCM
4	RS	Data/Instruction
5	R/W	H: read data L=write data
6	E	Enable Signal
7	SID	Serial Data Input
8	SCLK	Data Bus Line
9	$\overline{\text{CS}}$	Chip Enable
10	NC	No Connection

DIMENSIONS in millimeters



122 x 32 Dots Graphic LCD



FEATURES

- Available for internal oscilation 2KHz
- SED 1520, or equivalent
- 1/32 duty cycle
- N.V. optional for + 3V power supply

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	84.0 x 44.0	mm
Viewing Area	60.0 x 18.0	mm
Dot Size	0.4 x 0.45	mm
Dot Pitch	0.44 x 0.49	mm

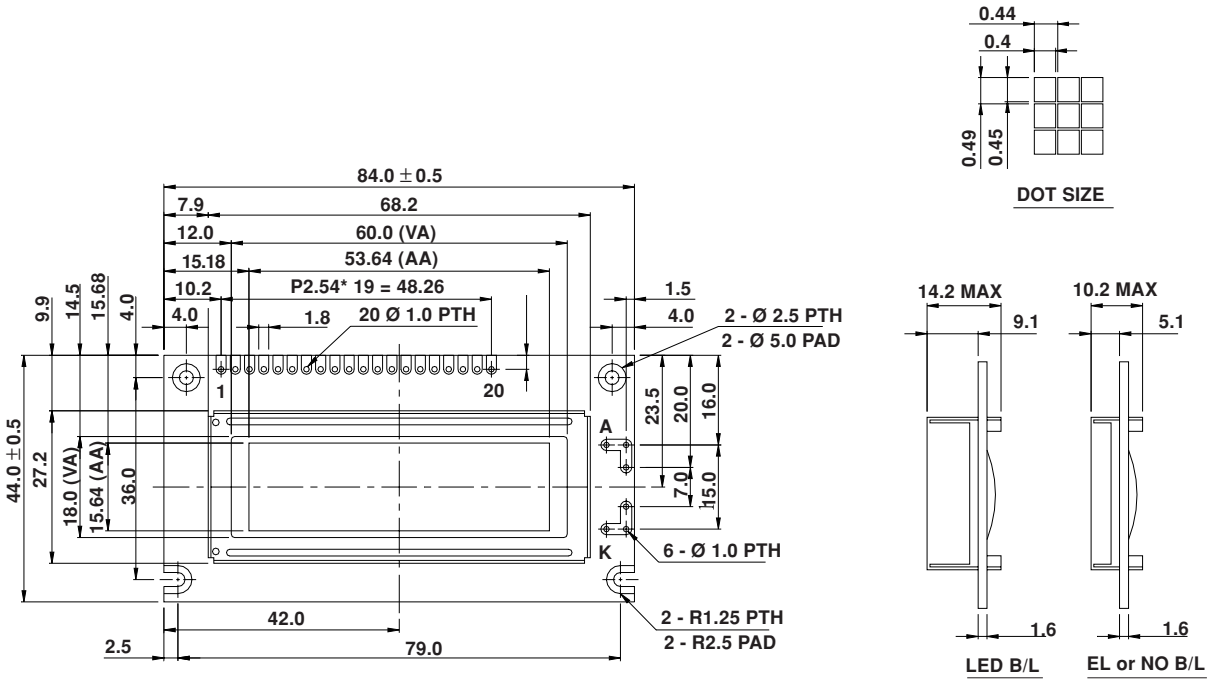
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	4.75	5	5.25	V
Input Voltage	VI	0	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

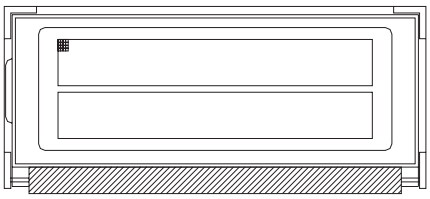
ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	VDD = + 5V	4.5	5.0	5.5	V
Supply Current	IDD	VDD = 5V	–	0.6	0.8	mA
Recommended LC Driving	VDD - V0	0°C	4.7	4.8	4.9	V
Voltage for Normal Temp.		25°C	4.6	4.7	4.8	
Version Module		50°C	4.3	4.4	4.6	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	120	240	mA
EL Power Supply Current	IEL	Vel = 110VAC:400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	(+ 5V)
3	Vo	Contrast Adjustment
4	Ao	H →Data L →Instruction
5	CS1	L →Chip 1 Enable
6	CS2	L →Chip 2 Enable
7	NC	No Connection
8	NC	No Connection
9	R/$\overline{W}$	$\overline{WR}$ for 80 Serial R/W for 68 Serial
10	DB0	Data Bus Line
11	DB1	Data Bus Line
12	DB2	Data Bus Line
13	DB3	Data Bus Line
14	DB7	Data Bus Line
15	DB5	Data Bus Line
16	DB6	Data Bus Line
17	DB7	Data Bus Line
18	RES	H →L Reset the LCM
19	A/Vee	4.2V for LED/Negative Voltage Output
20	K	Power Supply for B/L (0V)

DIMENSIONS in millimeters



122 x 32 Dots Graphic LCD



FEATURES

- Available for internal oscilation 2KHz
- Built-in controller (SED1520 or Equivalent)
- 1/32 duty cycle
- 2.85 ~ 5V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	65.4 x 29.1	mm
Viewing Area	54.8 x 19.0	mm
Dot Size	0.36 x 0.41	mm
Dot Pitch	0.4 x 0.45	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	4.75	5	5.25	V
Input Voltage	VI	0	–	VDD	V

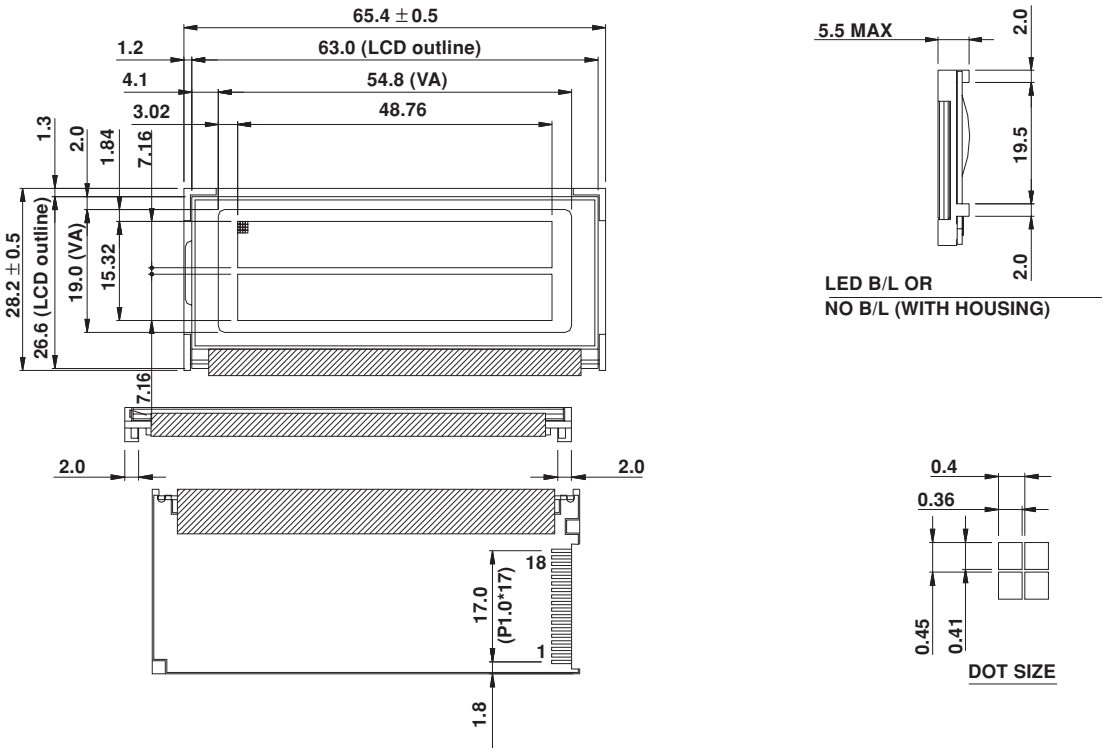
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

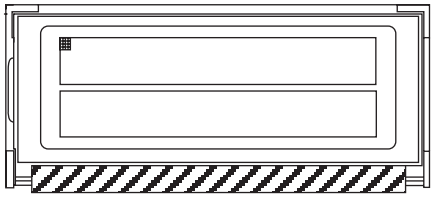
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = 3V ± 5V	2.7	3.0	3.3	V
Supply Current	IDD	VDD = 3V	–	1.0	1.4	mA
Recommended LC Driving	VDD - V0	0°C	4.5	4.7	4.9	V
Voltage for Normal Temp.		25°C	4.3	4.5	4.7	
Version Module		50°C	4.2	4.3	4.5	
LED Forward Voltage	VF	25°C	1.7	2.1	2.5	V
LED Forward Current	IF	25°C	–	100	200	mA
EL Power Supply Current	IEL	Vel = 110VAC:400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Vdd	Power Supply (+ 3V, 5V)
2	Vss	GND
3	Vo	Contrast Adjustment
4	$\overline{RES}$	H →68 Serial L →80 Serial
5	E1	Enable Chip 1
6	E2	Enable Chip 2
7	R/$\overline{W}$	$\overline{WR}$ for 80 Serial R/W for 68 Serial
8	A0	$\overline{RD}$ for 80 Serial/E for 68 Serial
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	A	+ 2.1V for LED
18	K	Power Supply for B/L (0V)

DIMENSIONS in millimeters



122 x 32 Dots Graphic LCD



FEATURES

- Available for internal oscilation 2KHz
- Built in controller Epson-(SED 1520 or equivalent)
- 1/32 duty cycle
- 2.85 ~ 5V power supply
- The feature of LCD-122G032G is the same of LCD-122G032B

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	65.4x 29.1	mm
Viewing Area	54.8 x 19.0	mm
Dot Size	0.36 x 0.41	mm
Dot Pitch	0.4 x 0.45	mm

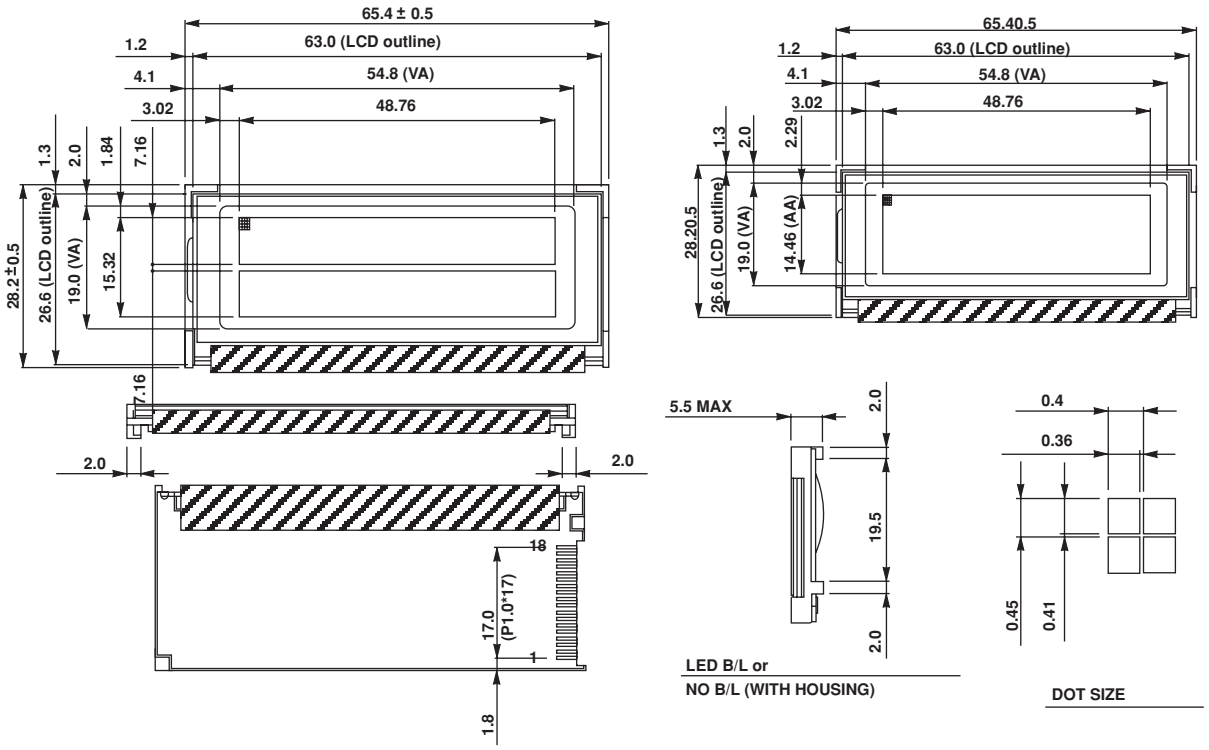
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	4.75	5	5.25	V
Input Voltage	VI	0	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

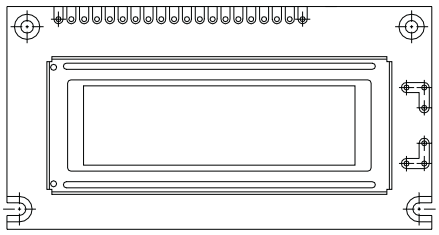
ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	VDD = 3V ± 5V	2..7	3.0	3.3	V
Supply Current	IDD	VDD = 3V	–	1.0	1.4	mA
Recommended LC Driving	VDD - V0	0°C	4.5	4.7	4.9	V
Voltage for Normal Temp.		25°C	4.3	4.5	4.7	
Version Module		50°C	4.2	4.3	4.5	
LED Forward Voltage	VF	25°C	1.7	2.1	2.5	V
LED Forward Current	IF	25°C	–	100	200	mA
EL Power Supply Current	IEL	Vel = 110VAC:400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Vdd	Power Supply (+ 3V, 5V)
2	Vss	GND
3	Vo	Contrast Adjustment
4	$\overline{RES}$	L: Reset the LCM
5	E1	Enable Chip 1
6	E2	Enable Chip 2
7	R/$\overline{W}$	H: read data L: write data
8	A0	H: D_0 ~ D_7 are display data H: D_0 ~ D_7 are display control data
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	A	Data Bus Line
18	K	Power Supply for B/L (0V)

DIMENSIONS in millimeters



122 x 32 Dots Graphic LCD



FEATURES

- Avaliable for external oscillation 2KHz
- SED 1520, or equivalent
- 1/32 duty cycle
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	84.0 x 44.0	mm
Viewing Area	60.0 x 18.0	mm
Dot Size	0.4 x 0.45	mm
Dot Pitch	0.44 x 0.49	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	4.75	5	5.25	V
Input Voltage	VI	0	–	VDD	V

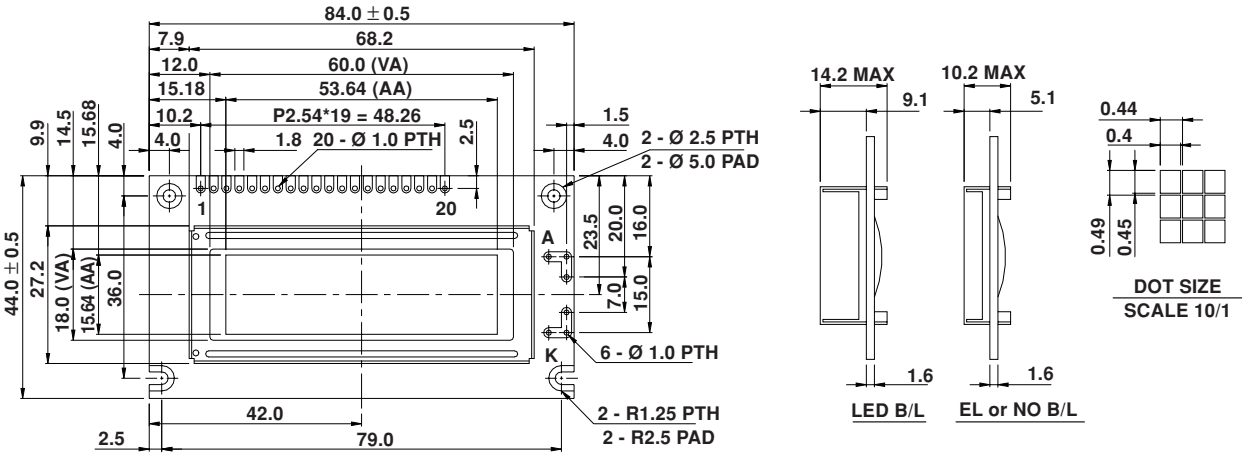
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

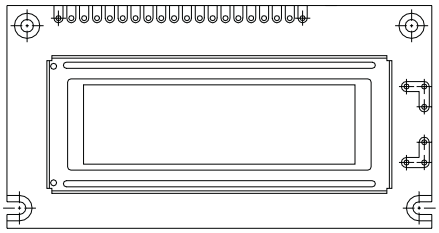
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.5	5.0	5.5	V
Supply Current	IDD	VDD = 5V	–	1.0	1.5	mA
Recommended LC Driving	VDD-V0	0°C	4.7	4.8	4.9	V
Voltage for Normal Temp.		25°C	4.6	4.7	4.8	
Version Module		50°C	4.3	4.4	4.7	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	120	240	mA
EL Power Supply Current	IEL	Vel = 110VAC:400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	(+ 5V)
3	Vo	Contrast Adjustment
4	Ao	H →Data L →Instruction
5	CS1	L →Chip 1 Enable
6	CS2	L →Chip 2 Enable
7	CL	External Clock 2KHz
8	E	Enable Signal
9	$R\overline{W}$	Data Read/Write
10	DB0	Data Bus Line
11	DB1	Data Bus Line
12	DB2	Data Bus Line
13	DB3	Data Bus Line
14	DB4	Data Bus Line
15	DB5	Data Bus Line
16	DB6	Data Bus Line
17	DB7	Data Bus Line
18	RES	H →L Reset the LCM
19	A/Vee	4.2V for LED/Negative Voltage Output
20	K	Power Supply for B/L (0V)

DIMENSIONS in millimeters



122 x 32 Dots Graphic LCD



FEATURES

- Epson-SED 1520, or equivalent
- 1/32 duty cycl

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	59.0 x 29.3	mm
Viewing Area	52.0 x 15.0	mm
Mounting Hole	50.0	mm
Dot Pitch	0.375 x 0.375	mm

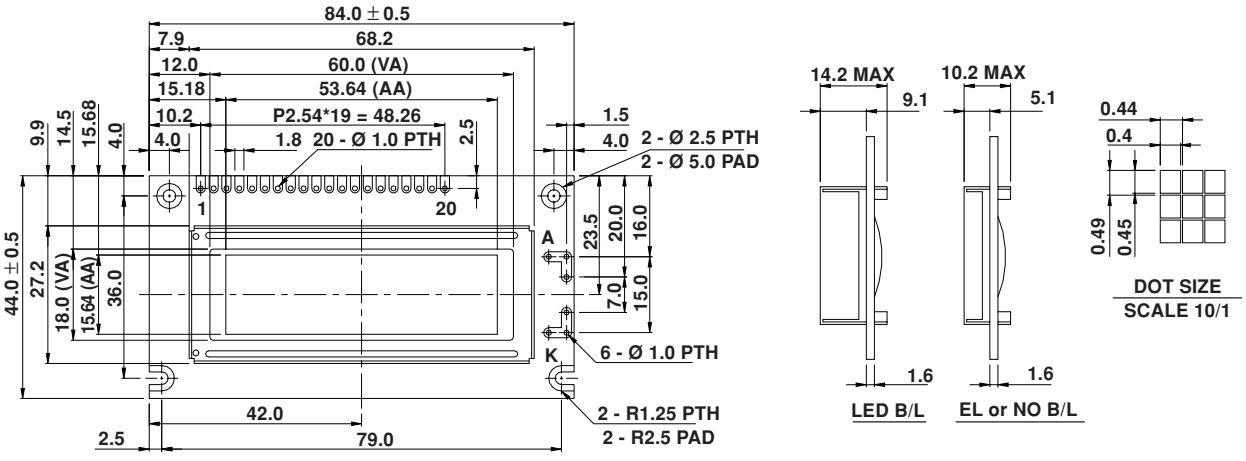
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	2.75	5	5.25	V
Input Voltage	VI	0	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

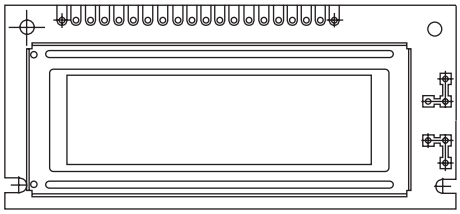
ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	VDD = + 5V	4.5	5.0	5.5	V
Supply Current	IDD	VDD = 5V	–	1.0	1.4	mA
Recommended LC Driving	VDD-V0	- 20°C	5.3	5.5	5.7	V
Voltage for Normal Temp.		25°C	4.7	4.9	5.1	
Version Module		7°C	4.1	4.4	4.7	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	20	40	mA
EL Power Supply Current	IEL	Vel = 110VAC:400Hz	–	–	–	mA

PIN NUMBER	SYMBOL	FUNCTION
1	$\overline{VLED}$	Power Supply for LED BL"-"
2	Vss	GND
3	Vdd	+ 5V
4	Vo	Contrast Adjustment
5	AO	H: Data L: Instruction
6	E1	Chip Enable for U1 (Segment 1~61)
7	E2	Chip Enable for U1 (Segment 62~122)
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	R/W	H: read data L: write data

DIMENSIONS in millimeters



122 x 32 Dots Graphic LCD



FEATURES

- Available for external oscillation 2KHz
- Epson-SED 1520, or equivalent
- 1/32 duty cycle
- N.V. optional for + 3V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	80.0 x 36.0	mm
Viewing Area	60.0 x 18.0	mm
Mounting Hole	75.0 x 28.0	mm
Dot Pitch	0.44 x 0.49	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	4.75	5	5.25	V
Input Voltage	VI	0	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = + 5V	4.5	5.0	5.5	V
Supply Current	IDD	VDD = 5V	–	1.0	1.4	mA
Recommended LC Driving	VDD-V0	0°C	4.7	4.8	4.9	V
Voltage for Normal Temp.		25°C	4.6	4.7	4.8	
Version Module		50°C	4.3	4.4	4.7	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	120	240	mA
EL Power Supply Current	IEL	Vel = 110VAC:400Hz	–	–	5.0	mA

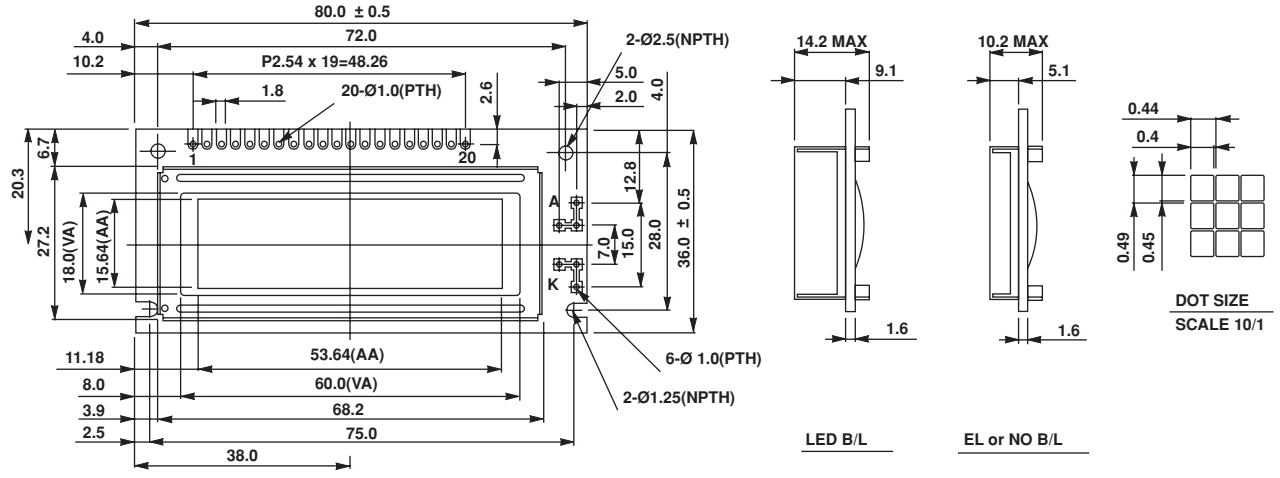
LCD-122G032E

Vishay

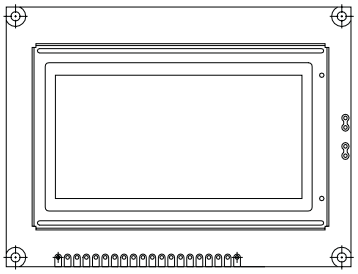
122 x 32 Dots Graphic LCD

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	(+ 5V)
3	Vo	Contrast Adjustment
4	Ao	H → Data L → Instruction
5	CS1	L → Chip 1 Enable
6	CS2	L → Chip 2 Enable
7	CL	External Clock 2KHz
8	E	Enable Signal
9	$R\overline{W}$	H: Read Data L: Write Data
10	DB0	Data Bus Line
11	DB1	Data Bus Line
12	DB2	Data Bus Line
13	DB3	Data Bus Line
14	DB4	Data Bus Line
15	DB5	Data Bus Line
16	DB6	Data Bus Line
17	DB7	Data Bus Line
18	RES	H → L Reset the LCM
19	A/Vee	4.2V for LED/Negative Voltage Output
20	K	Power Supply for B/L (0V)

DIMENSIONS in millimeters



128 x 64 Dots Graphic LCD



FEATURES

- Built-in controller (KS0107 - KS0108 re Equivalent)
- + 5V power supply
- 1/64 duty cycle
- N.V. Built-in

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	93.0 x 70.0	mm
Viewing Area	72.0 x 40.0	mm
Dot Size	0.48 x 0.48	mm
Dot Pitch	0.52 x 0.52	mm

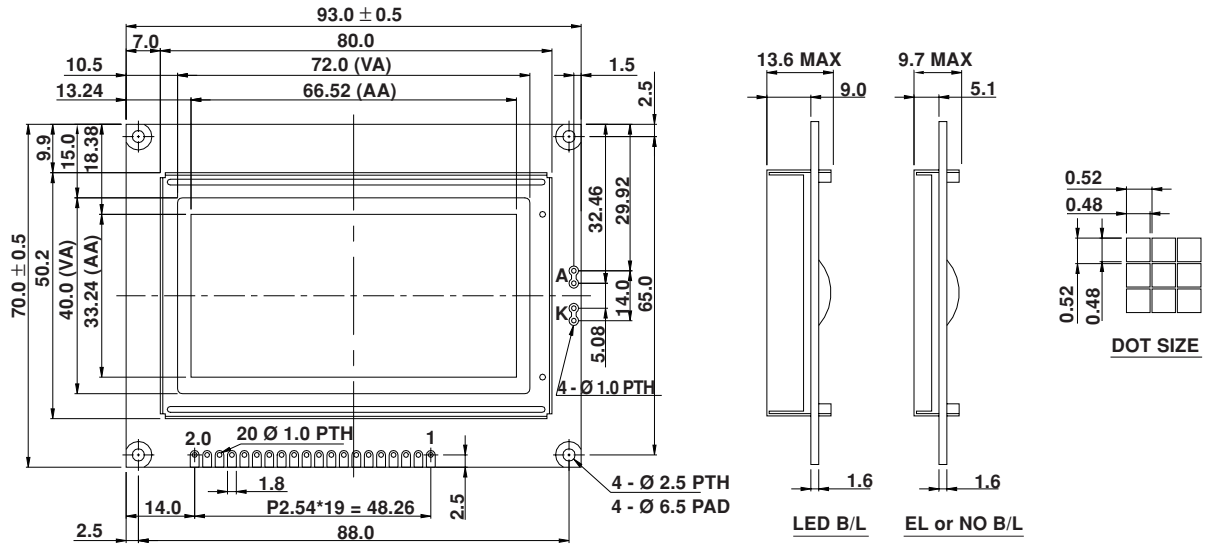
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

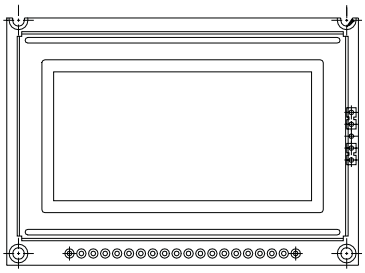
ELECTRICAL SPECIFICATIONS							
ITEM	**SYMBOL**	**CONDITION**		**STANDARD VALUE**			**UNIT**
				MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	L level		$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level		0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V		–	2.5	7.5	mA
Recommended LC Driving	VDD-V0	0°C		9.7	10.2	10.7	V
Voltage for Normal Temp.		25°C		8.9	9.4	9.9	
Version Module		50°C		8.6	9.1	9.6	
LED Forward Voltage	VF	25°C		–	4.2	4.6	V
LED Forward Current	IF	25°C	Array	–	330	660	mA
		25°C	Edge	–	120	240	mA
EL Power Supply Current	IEL	Vel = 110VAC; 400Hz		–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	Power Supply (+ 5V)
3	Vo	Contrast Adjustment
4	D/I	Data/Instruction
5	R/$\overline{W}$	Data Read/Write
6	E	H →L 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	CS1	Chip Select for IC1
16	CS2	Chip Select for IC2
17	$\overline{RST}$	Reset
18	Vee	Negative Voltage Output
19	A	Power Supply for LED (4.2V)
20	K	Power Supply for LED (0V)

DIMENSIONS in millimeters



128 x 64 Dots Graphic LCD



FEATURES

- Built-in controller (KS0107 - KS0108 re Equivalent)
- + 5V power supply
- 1/64 duty cycle
- N.V. Built-in

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	75.0 x 52.7	mm
Viewing Area	60.0 x 32.6	mm
Dot Size	0.4 x 0.4	mm
Dot Pitch	0.43 x 0.43	mm

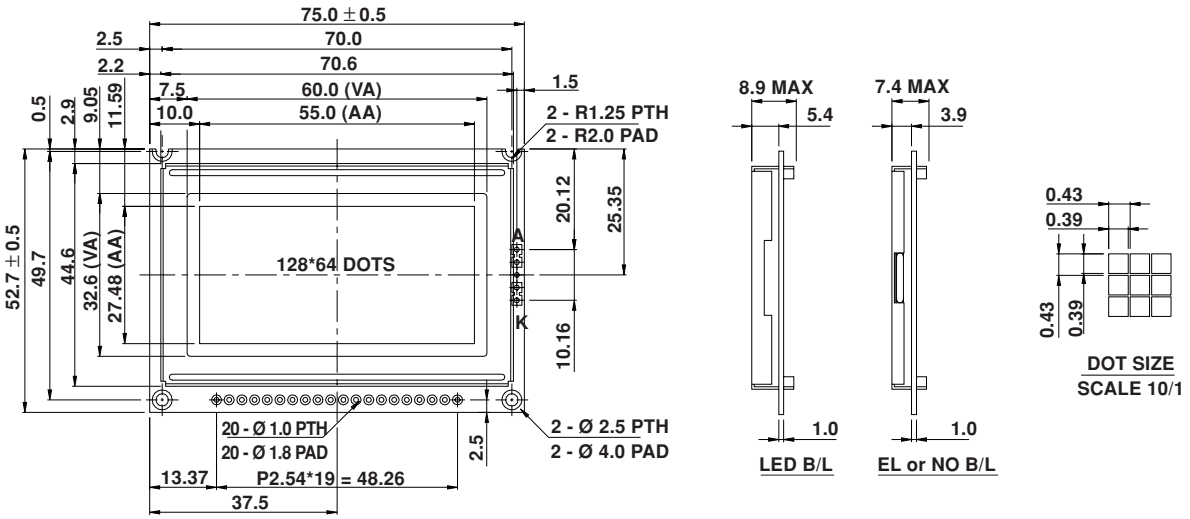
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

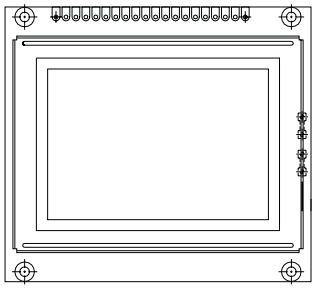
ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V	–	4.0	5.2	mA
Recommended LC Driving	VDD-V0	0°C	9.7	10.2	10.7	V
Voltage for Normal Temp.		25°C	7.5	8.0	8.5	
Version Module		50°C	8.6	9.1	9.6	
LED Forward Voltage	VF	25°C	–	4.0	4.4	V
LED Forward Current	IF	25°C	–	100	200	mA
EL Power Supply Current	IEL	Vel = 110VAC:400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Vdd	Power Supply (+5V)
2	GND	Power Supply (GND)
3	Vo	Contrast Adjustment
4	DB0	Data Bus Line
5	DB1	Data Bus Line
6	DB2	Data Bus Line
7	DB3	Data Bus Line
8	DB4	Data Bus Line
9	DB5	Data Bus Line
10	DB6	Data Bus Line
11	DB7	Data Bus Line
12	CS1	Chip Select IC1
13	CS2	Chip Select IC2
14	$\overline{RST}$	Reset Signal
15	R/$\overline{W}$	Data Read/Write
16	D/I	Data/Instruction
17	E	Enable Signal
18	Vee	Negative Voltage Output
19	A	Power Supply for LED (4.2V)
20	K	Power Supply for LED (0V)

DIMENSIONS in millimeters



128 x 64 Dots Graphic LCD



FEATURES

- Built-in controller (KS0107 - KS0108 re Equivalent)
- + 5V power supply
- 1/64 duty cycle
- N.V. Built-in

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	78.0 x 70.0 x 12.1	mm
Viewing Area	62.0 x 44.0	mm
Dot Size	0.42 x 0.58	mm
Dot Pitch	0.44 x 0.60	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	4.5	5.0	5.5	V
Input Voltage	VI	- 0.3	–	VDD	V

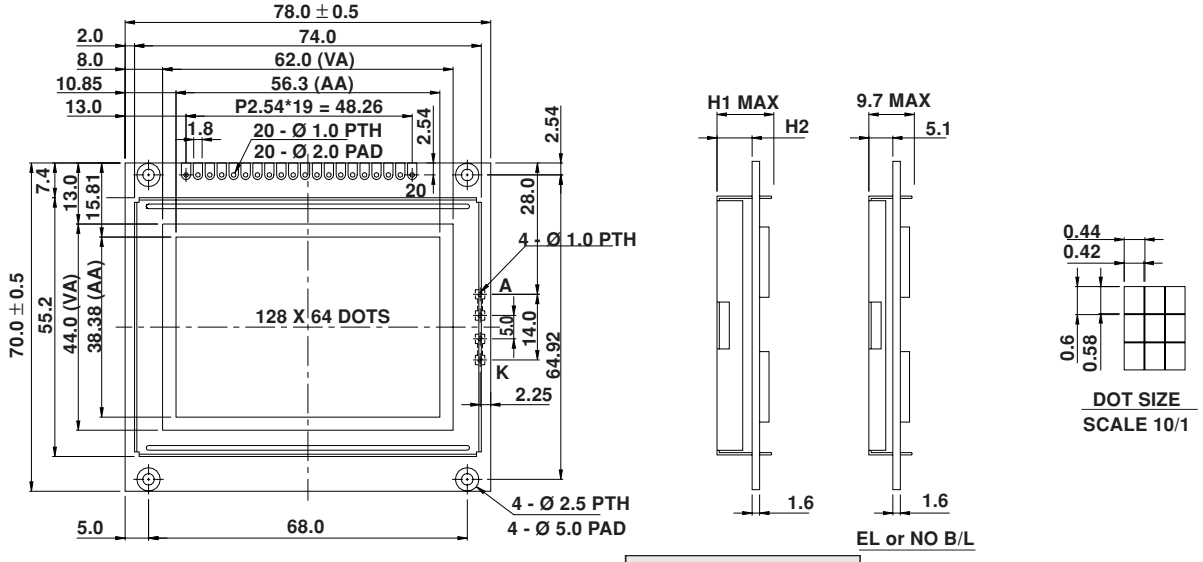
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

ITEM	SYMBOL	CONDITION		STANDARD VALUE			UNIT
				MIN.	TYP.	MAX.	
Input Voltage	VDD	L level		$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level		0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V		–	3.5	–	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD-V0	0°C		9.4	9.9	10.4	V
		25°C		9.4	9.6	10.4	
		50°C		9.4	9.2	9.7	
LED Forward Voltage	VF	25°C		–	4.2	4.6	V
LED Forward Current	IF	25°C Array	High	–	480	960	mA
		25°C Array	Low	–	140	280	mA
EL Power Supply Current	IEL	Vel = 110VAC; 400Hz		–	–	5.0	mA

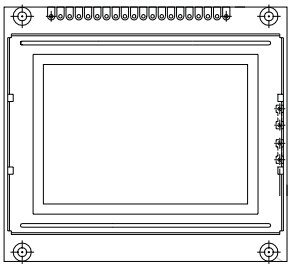
PIN NUMBER	SYMBOL	FUNCTION
1	$\overline{CS1}$	Chip Select for IC1
2	$\overline{CS2}$	Chip Select for IC2
3	Vss	GND
4	Vdd	Power Supply (+ 5V)
5	Vo	Contrast Adjustment
6	D/I	Data/Instruction
7	R/$\overline{W}$	Data Read/Write
8	E	H →L Enable Signal
9	DB0	Data Bus Line
10	DB1	Data Bus Line
11	DB2	Data Bus 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	$\overline{RST}$	Reset
18	Vee	Negative Voltage-5V Output
19	A	Power Supply for LED Backlight (+)
20	K	Power Supply for LED Backlight (-)

DIMENSIONS in millimeters



LED-H/L B/L	HIGH	LOW
H1	14.3	12.1
H2	9.7	7.5

128 x 64 Dots Graphic LCD



FEATURES

- Built-in controller (T6963C)
- + 5V power supply
- 1/64 duty cycle
- N.V. Built-in

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	78.0 x 70.0 x 12.1	mm
Viewing Area	62.0 x 44.0	mm
Dot Size	0.42 x 0.58	mm
Dot Pitch	0.44 x 0.6	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	4.5	5.0	5.5	V
Input Voltage	VI	- 0.3	–	VDD	V

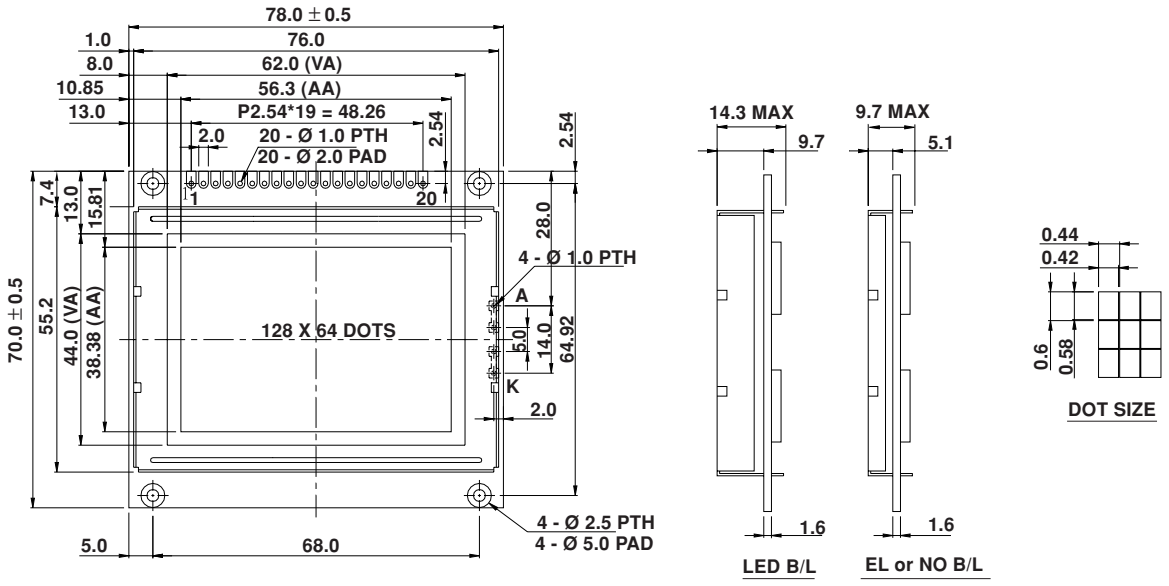
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

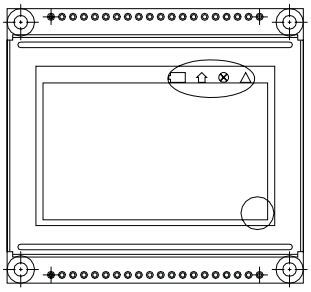
ITEM	SYMBOL	CONDITION		STANDARD VALUE			UNIT
				MIN.	TYP.	MAX.	
Input Voltage	VDD	L level		$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level		0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V		–	11.2	11.8	mA
Recommended LC Driving	VDD-V0	0°C		9.4	9.9	10.4	V
Voltage for Normal Temp.		25°C		9.4	9.6	10.4	
Version Module		50°C		8.7	9.2	9.7	
LED Forward Voltage	VF	25°C		–	4.2	–	V
LED Forward Current	IF	25°C Array	High	–	480	960	mA
		25°C Array	Low	–	140	280	mA
EL Power Supply Current	IEL	Vel = 110VAC; 400Hz		–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	FG/Vee	Frame Ground/N/V
2	Vss	Power Supply (0V)
3	Vdd	Power Supply (+ 5V)
4	Vo	Power Supply for LCD Driver
5	$\overline{WR}$	Data Write
6	$\overline{RD}$	Data Read
7	$\overline{CE}$	Chip Enable
8	$\overline{CD}$	Command/Data Read/Write
9	$\overline{RST}$	Controller Reset
10	DB0	Data Bus Line
11	DB1	Data Bus Line
12	DB2	Data Bus Line
13	DB3	Data Bus Line
14	DB4	Data Bus Line
15	DB5	Data Bus Line
16	DB6	Data Bus Line
17	DB7	Data Bus Line
18	FS	Font Select
19	K	Power Supply for LED B/L (0V)
20	A	Power Supply for LED B/L (+ 5V)

DIMENSIONS in millimeters



128 x 64 Dots Graphic LCD



FEATURES

- 128 x 64 dots + 4 Icons
- Built-in controller (KS0108)
- + 5V power supply
- 1/64 duty cycle
- EL backlight (built-in EL inverter)
- Built-in N.V

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	54.0 x 50.0 x 7.5	mm
Viewing Area	43.5 x 29.0	mm
Dot Size	0.28 x 0.35	mm
Dot Pitch	0.32 x 0.39	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	2.8	5	5.5	V
Input Voltage	VI	- 0.3	–	VDD	V

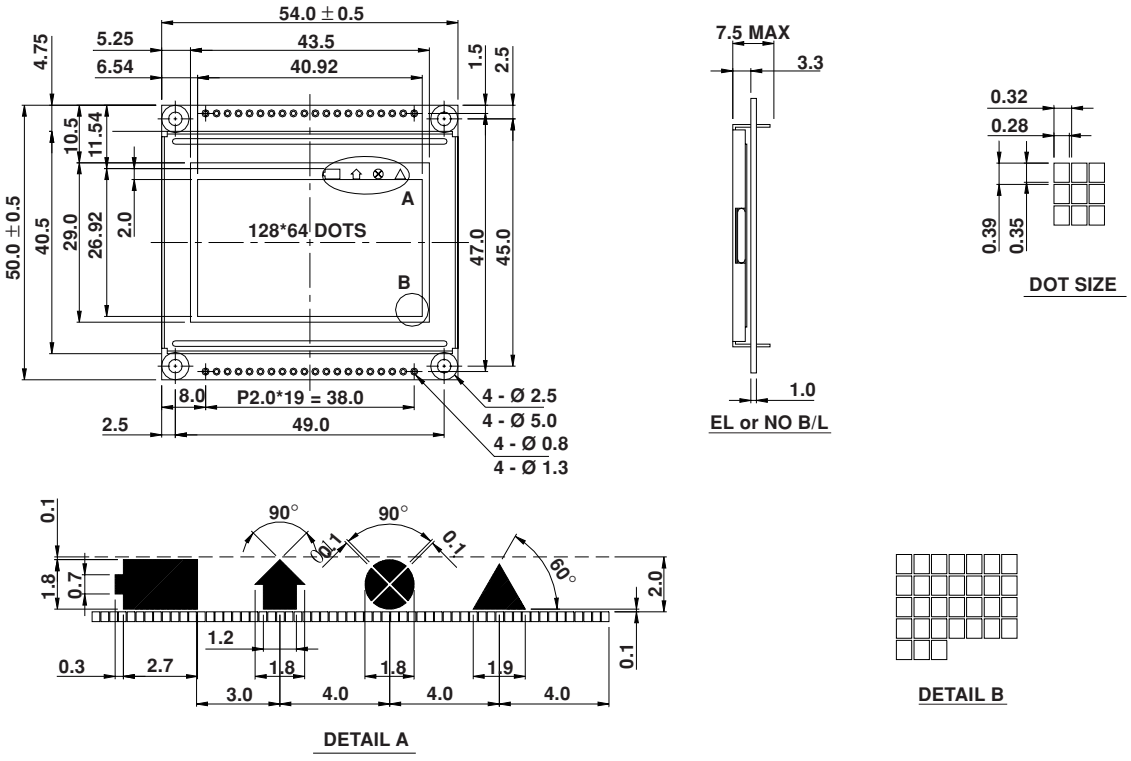
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

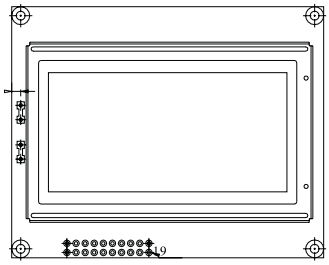
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V	–	49.5	–	mA
Recommended LC Driving	VDD-V0	- 20°C	9.3	9.5	9.8	V
Voltage for Normal Temp.		25°C	8.3	8.5	8.8	
Version Module		60°C	7.2	7.3	7.8	
EL Power Supply Current	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	Power Supply (0V)
2	Vdd	Power Supply
3	Vo	Operating Voltage for LCD Driving
4	D/$\overline{I}$	Register Selection Input High = Data Register Low = Instruction Register (for Write) Busy Flag Address Counter (for Read)
5	R/$\overline{W}$	R/W Signal Input is used to Select the Read/Write Mode High = Read Mode, Low = Write Mode
6	E	Start Enable Signal to Read or Write the Data
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	CS1	Chip Enable for D2 (Segment 1 to Segment 64)
16	CS2	Chip Enable for D3 (Segment 65 to Segment 128)
17	$\overline{RST}$	Reset Signal
18	Vee	Power Supply for LCD
19	BL +	Enable (on/off) for EL B/L
20	BL -	No Connection

DIMENSIONS in millimeters



128 x 64 Dots Graphic LCD



FEATURES

- Built-in controller (T6963C)
- + 5V power supply
- 1/64 duty cycle
- Built-in N.V

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	87.0 x 70.0	mm
Viewing Area	72.0 x 40.0	mm
Dot Size	0.48 x 0.48	mm
Dot Pitch	0.52 x 0.52	mm

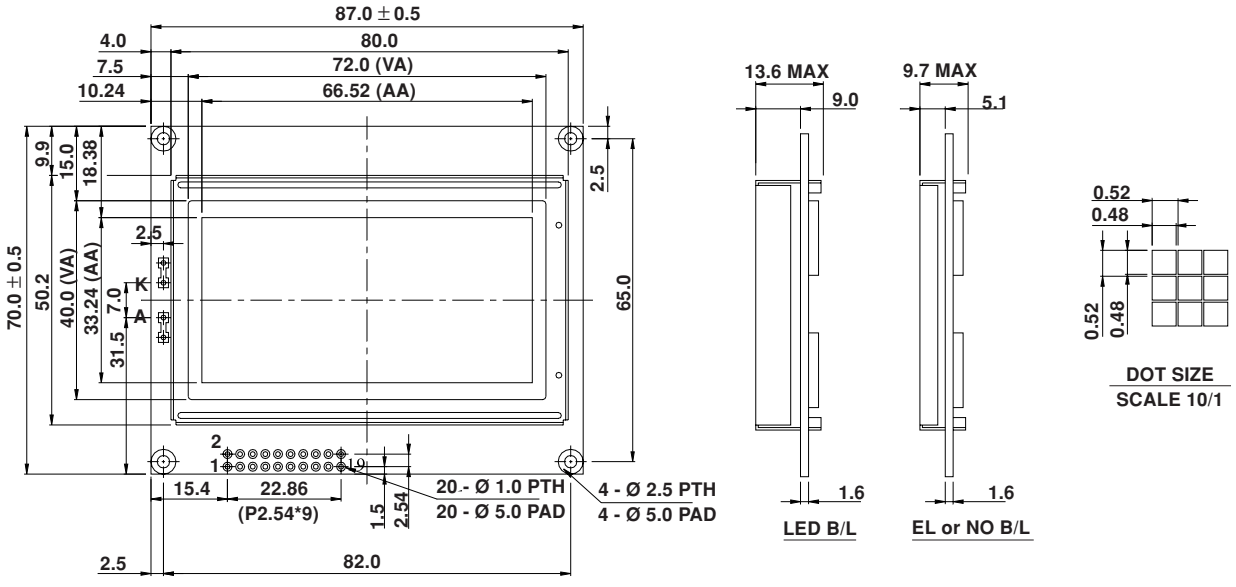
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	4.5	5.0	5.5	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

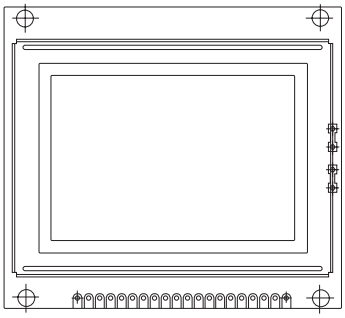
ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V	–	9.7	–	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD-V0	0°C	9.4	9.9	10.4	V
		25°C	9.4	9.6	10.4	
		50°C	8.7	9.2	9.7	
LED Forward Voltage	VF	25°C	–	4.2	–	V
LED Forward Current	IF	25°C Array High	–	480	–	mA
EL Power Supply Current	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	Power Supply (0V)
2	Vdd	Power Supply (+ 5V)
3	Vo	Power Supply for LCD Driver
4	C/D	Command/Data Read/Write
5	$\overline{RD}$	Data Read
6	$\overline{WR}$	Data Write
7	DB0	Data Bus Line
8	DB1	Data Bus Line
9	DB2	Controller Reset
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	$\overline{CE}$	Chip Enable
16	$\overline{RST}$	Controller Reset
17	Vee	Negative Voltage
18	Md2	Power Supply for LED B/L (0V)
19	FSI	Font Select
20	HLT	Power Supply for LED B/L (+ 5V)

DIMENSIONS in millimeters



128 x 64 Dots Graphic LCD



FEATURES

- Built-in controller TOSHIBA-(T6963C)
- + 5V power supply
- 1/64 duty cycle
- Built-in N.V

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	78.0 x 70.0 x 12.1	mm
Viewing Area	62.0 x 44.0	mm
Mounting Hole	68.0 x 64.9	mm
Dot Pitch	0.44 x 0.6	mm

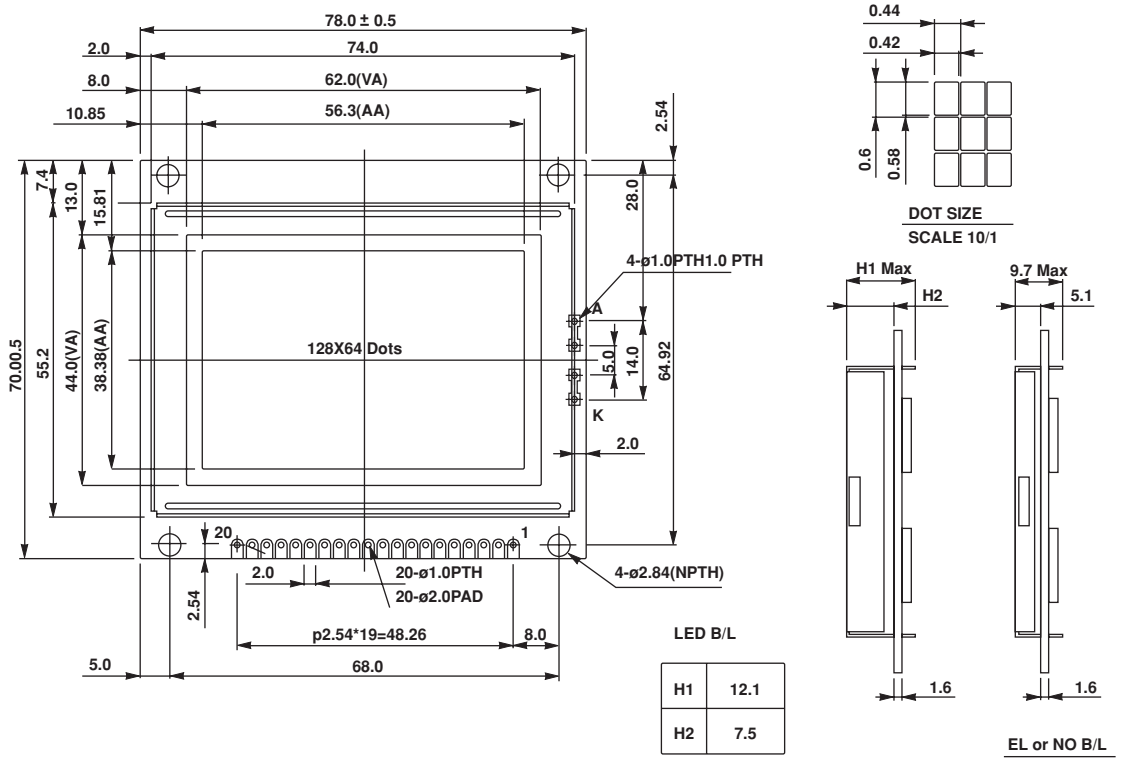
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	4.5	5.0	5.5	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

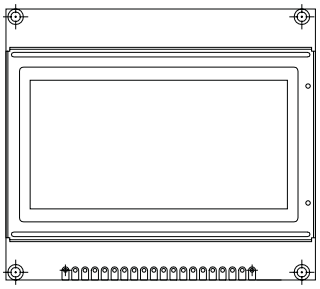
ELECTRICAL SPECIFICATIONS							
ITEM	**SYMBOL**	**CONDITION**		**STANDARD VALUE**			**UNIT**
				MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	L level		$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level		0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V		–	11.2	11.8	mA
Recommended LC Driving	VDD-V0	0°C		9.4	9.9	10.4	V
Voltage for Normal Temp.		25°C		9.4	9.6	10.4	
Version Module		50°C		8.7	9.2	9.7	
LED Forward Voltage	VF	25°C		–	4.2	–	V
LED Forward Current	IF	25°C Array	High	–	480	960	mA
		25°C Array	Low	–	140	280	mA
EL Power Supply Current	IEL	Vel = 110VAC; 400Hz		–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	FG/Vee	Frame Ground
2	Vss	Power Supply (0V)
3	Vdd	Power Supply (+ 5V)
4	Vo	Power Supply for LCD Driver
5	$\overline{WR}$	Data Write
6	$\overline{RD}$	Data Read
7	$\overline{CE}$	Chip Enable
8	$\overline{CD}$	Command/Data Read/Write
9	$\overline{RST}$	Controller Reset
10	DB0	Data Bus Line
11	DB1	Data Bus Line
12	DB2	Data Bus Line
13	DB3	Data Bus Line
14	DB4	Data Bus Line
15	$\overline{DB5}$	Data Bus Line
16	$\overline{DB6}$	Data Bus Line
17	DB7	Data Bus Line
18	FS	Font Select
19	A	Power Supply for LED B/L (+ 4.2V) RA = 0Ω
20	K	Power Supply for LED B/L (0V)

DIMENSIONS in millimeters



128 x 64 Dots Graphic LCD



FEATURES

- Built-in controller (KS0108 - KS0108 or Equivalent)
- + 5V power suppy
- 1/64 duty cycle
- N.U. option

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	80.0 x 70.0	mm
Viewing Area	72.0 x 40.0	mm
Dot Size	0.48 x 0.48	mm
Dot Pitch	0.52 x 0.52	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

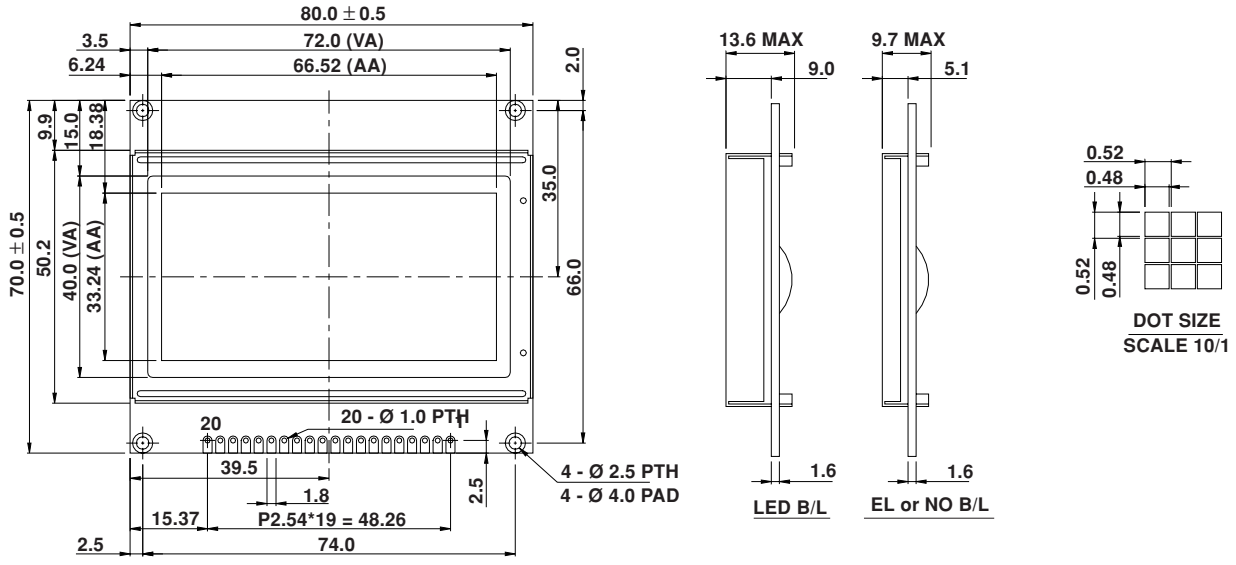
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

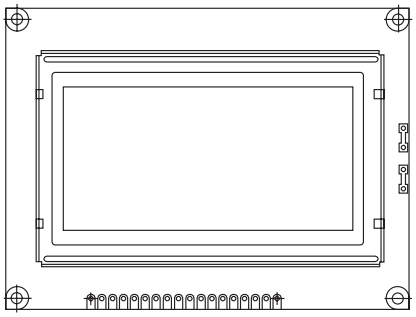
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V	–	3.6	3.9	mA
Recommended LC Driving	VDD-V0	0°C	9.7	10.2	10.7	V
Voltage for Normal Temp.		25°C	8.9	9.4	9.9	
Version Module		50°C	8.6	9.1	9.6	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	300	660	mA
EL Power Supply Current	IEL	Vel =110VAC;400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	Power Supply (+ 5V)
3	Vo	Contrast Adjustment
4	D/L	Data/Instruction
5	R/W	Data Read/Write
6	E	H → L 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	CS1	Chip Select for IC1
16	CS2	Chip Select for IC2
17	$\overline{RST}$	Reset
18	Vee	Negative Voltage Output
19	A	Power Supply for LED (4.2V)
20	K	Power Supply for LED (0V)

DIMENSIONS in millimeters



128 x 64 Dots Graphic LCD



FEATURES

- Character mode:
  Display BIG5 or GB Chinese font (16 x 16 dots) and ASCII code (8 x 16 dots)
- Graphic mode: 128 x 64 dots
- Built-in controller (ST7920)
- + 5V power suppy
- 1/32 duty cycle
- LED can be driven by A and K
- N.V. option

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	93.0 x 70.0	mm
Viewing Area	72.0 x 40.0	mm
Mounting Hole	88.0 x 65.0	mm
Dot Pitch	0.52 x 0.52	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

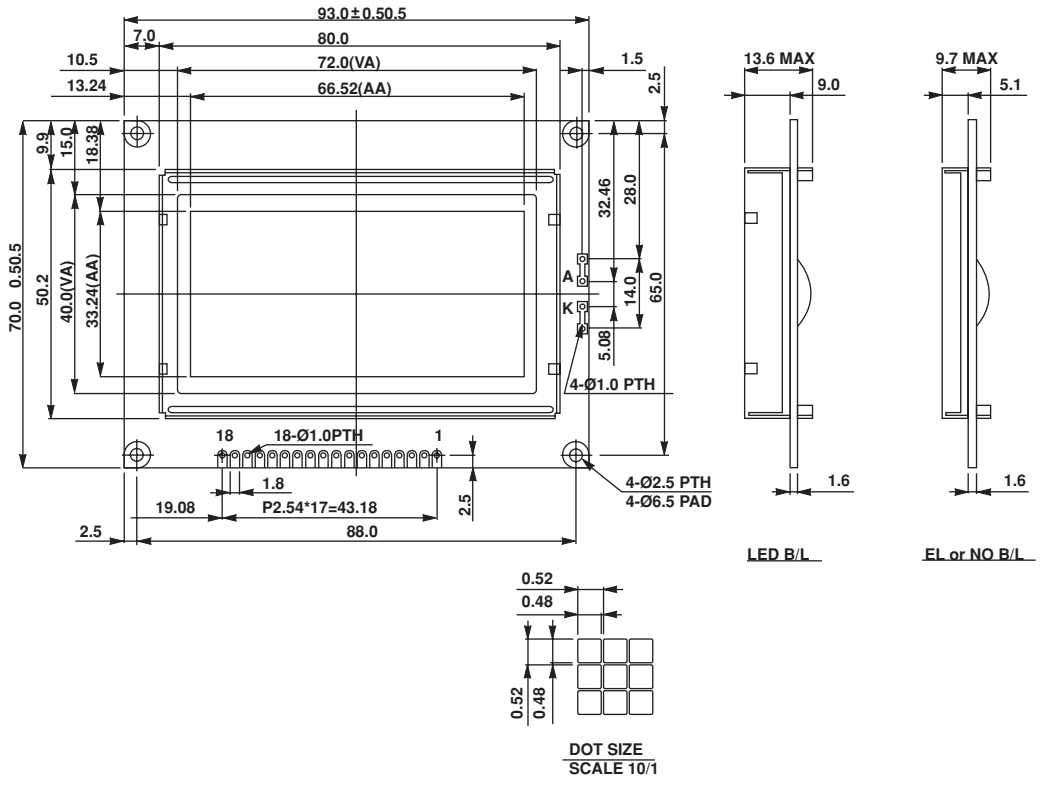
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V	–	3.6	3.9	mA
Recommended LC Driving	VDD-V0	0°C	9.7	10.2	10.7	V
Voltage for Normal Temp.		25°C	8.9	9.4	9.9	
Version Module		50°C	8.6	9.1	9.6	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	330	660	mA
EL Power Supply Current	IEL	Vel =110VAC;400Hz	–	–	5.0	mA

DISPLAY CHARACTER ADDRESS CODE:

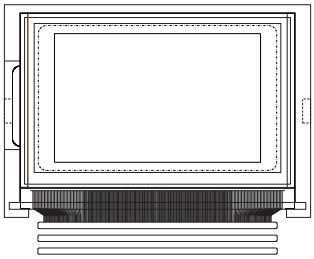
Display Position	1	2	3	4	5	6	7	8	9	10	11	12	13	–	–	16
DD RAM Address	80	81														8F
DD RAM Address	90	91														9F
DD RAM Address	A0	A1														AF
DD RAM Address	B1	B0														BF

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	Power Supply (+ 5V)
3	NC	NO Connection
4	RS	Registor Select Signal
5	R/$\overline{W}$	Data Read/Write
6	E	H $\rightarrow$ L 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 B/L
16	K	Power Supply for B/L
17	$\overline{RST}$	Reset LCD Module
18	Vout	Negative Voltage Output

DIMENSIONS in millimeters



128 x 64 Dots Graphic LCD



FEATURES

- Built-in controller (KS0713)
- + 3V or +5V power supply
- 1/64 duty cycle

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	35.0 x 24.22	mm
Viewing Area	29.58 x 17.98	mm
Dot Size	0.18 x 0.23	mm
Dot Pitch	0.2 x 0.25	mm

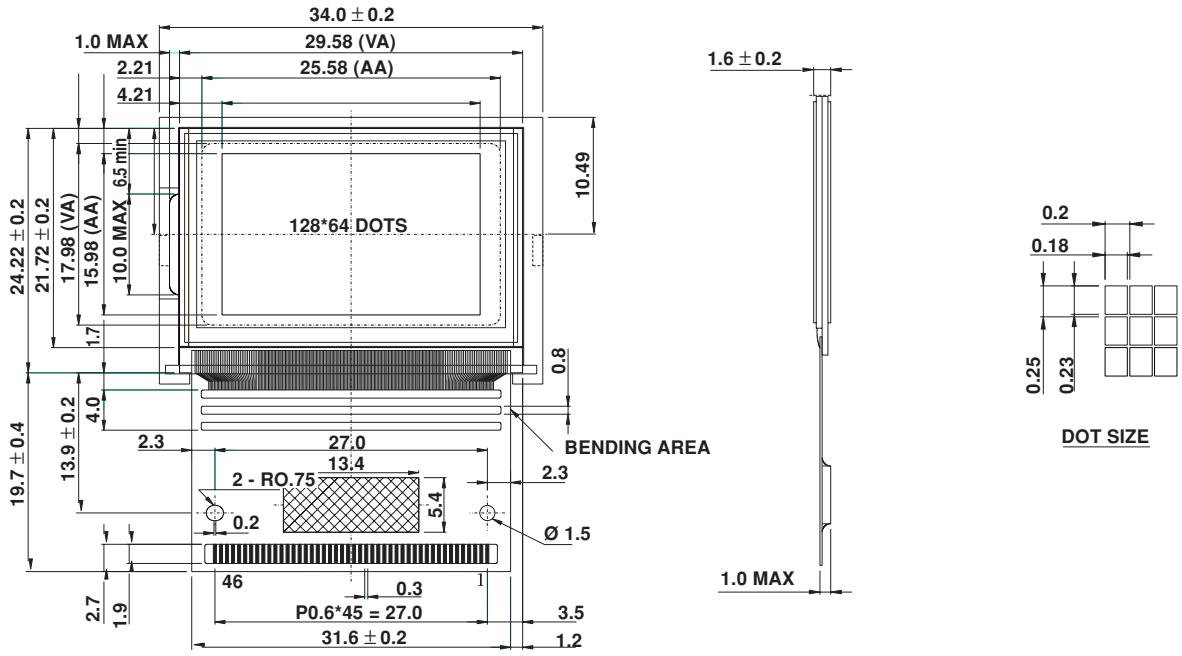
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	2.4	–	5.5	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

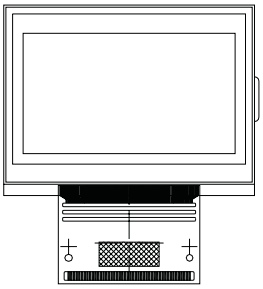
ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	L level	$0.8V_{DD}$	–	V_{DD}	V
	VIO	H level	–	–	–	V
Supply Current	IDD	VDD = 5V	–	–	–	mA
Recommended LC Driving	VDD-V0	0°C	9.3	9.8	10.3	V
Voltage for Normal Temp.		25°C	7.9	8.4	8.9	
Version Module		50°C	7.0	7.5	8.0	
LED Forward Voltage	VF	25°C	–	–	–	V
LED Forward Current	IF	25°C	–	–	–	mA
EL Power Supply Current	IEL	Vel =110VAC;400Hz	–	–	–	mA

PIN NUMBER	SYMBOL	PIN NUMBER	SYMBOL
1	NC	24	CLS
2	TEMPS	25	MS
3	INTRS	26	DUTY 1
4	HPM	27	DUTY 0
5	DCDC5B	28	DB7
6	BSTS	29	DB6
7	V4	30	DB5
8	V3	31	DB4
9	V2	32	DB3
10	V1	33	DB2
11	V0	34	DB1
12	VR	35	DB0
13	C2 -	36	E_RD
14	C2 +	37	RW_WR
15	C1 -	38	RS
16	C1 +	39	RESETB
17	C3 -	40	CS2
18	C3 +	41	CS1B
19	Vout	42	DISP
20	Vdd	43	CL
21	Vss	44	M
22	PS	45	FRS
23	MI	46	NC

DIMENSIONS in millimeters



128 x 64 Dots Graphic LCD



FEATURES

- Built-in controller (KS0713)
- + 3V or +5V power supply
- 1/64 duty cycle
- Optional touch panel

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	56.0 x 42.5	mm
Viewing Area	52.0 x 33.5	mm
Dot Size	0.35 x 0.4	mm
Dot Pitch	0.37 x 0.42	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 2.4	–	5.5	V
Input Voltage	VI	- 0.3	–	VDD	V

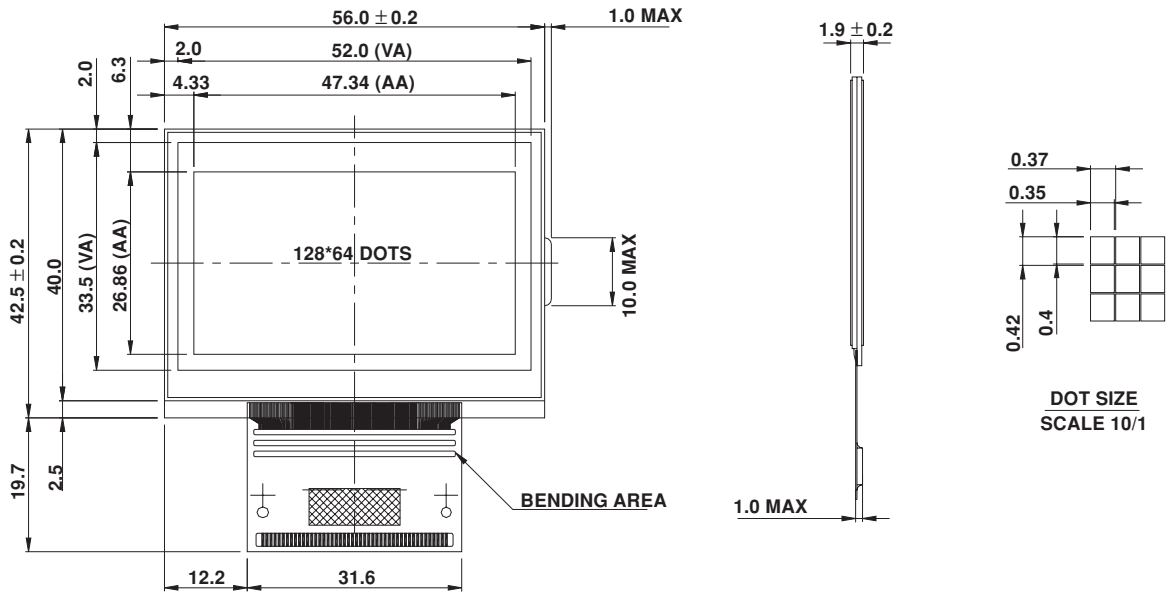
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

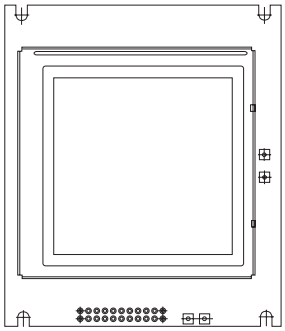
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	L level	$0.8V_{DD}$	–	V_{DD}	V
	VIO	H level	–	–	–	V
Supply Current	IDD	VDD = 5V	–	–	–	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD-V0	0°C	9.3	9.8	10.3	V
		25°C	7.9	8.4	8.9	
		50°C	7.0	7.5	8.0	
EL Power Supply Current	IEL	Vel =110VAC;400Hz	–	–	–	mA

PIN NUMBER	SYMBOL	PIN NUMBER	SYMBOL
1	NC	24	CLS
2	TEMPS	25	MS
3	INTRS	26	DUTY 1
4	HPM	27	DUTY 0
5	DCDC5B	28	DB7
6	BSTS	29	DB6
7	V4	30	DB5
8	V3	31	DB4
9	V2	32	DB3
10	V1	33	DB2
11	V0	34	DB1
12	VR	35	DB0
13	C2 -	36	E_RD
14	C2 +	37	RW_WR
15	C1 -	38	RS
16	C1 +	39	RESETB
17	C3 -	40	CS2
18	C3 +	41	CS1B
19	Vout	42	DISP
20	Vdd	43	CL
21	Vss	44	M
22	PS	45	FRS
23	MI	46	NC

DIMENSIONS in millimeters



128 x 128 Dots Graphic LCD



FEATURES

- Built-in controller TOSHIBA-(T6963C)
- 1/128 duty cycle
- N.V. optional
- + 5V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	85.0 x 100.0	mm
Viewing Area	62.0 x 62.0	mm
Mounting Hole	75.0 x 94.0	mm
Dot Pitch	0.4 x 0.4	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

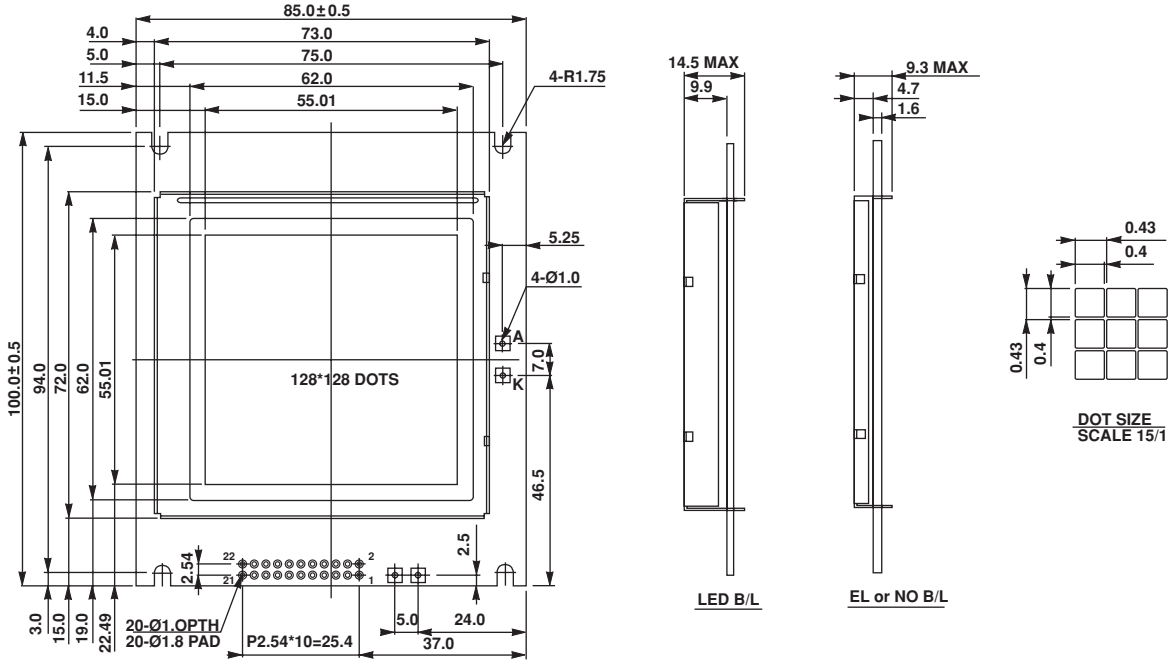
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

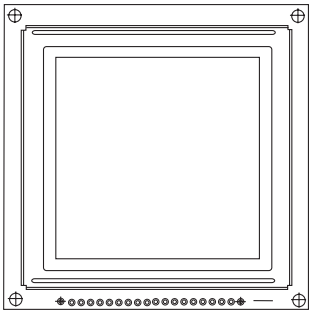
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	–	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V	–	1.5	–	mA
Recommended LC Driving	VDD-V0	- 20°C	–	18.0	–	V
Voltage for Normal Temp.		25°C	–	17.0	–	
Version Module		60°C	–	16.0	–	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	500	–	mm
EL Power Supply Current	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	FGND	Frame Ground
2	GND	Power Supply (GND)
3	Vdd	Power Supply (+ 5V)
4	Vo	Contrast Adjustment
5	$\overline{WR}$	Data Write
6	$\overline{RD}$	Data Read
7	$\overline{CE}$	Chip Enable
8	C/$\overline{D}$	Command/Data Select
9	NC	No Connection
10	$\overline{RST}$	Reset Signal
11	DB0	Data Bus Line
12	DB1	Data Bus Line
13	DB2	Data Bus Line
14	DB3	Data Bus Line
15	DB4	Data Bus Line
16	DB5	Data Bus Line
17	DB6	Data Bus Line
18	DB7	Data Bus Line
19	FS	Font Selection
20	NC/Vee	NC/Negative Voltage Output
21	A	Power Supply for LED B/L (+ 4.2V)
22	K	Power Supply for LED B/L (0V)

DIMENSIONS in millimeters



128 x 128 Dots Graphic LCD



FEATURES

- Built-in controller
- 1/128 duty cycle
- + 5V power supply

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	72.5 x 69.9	mm
Viewing Area	50.0 x 49.0	mm
Dot Size	0.32 x 0.32	mm
Dot Pitch	0.35 x 0.35	mm

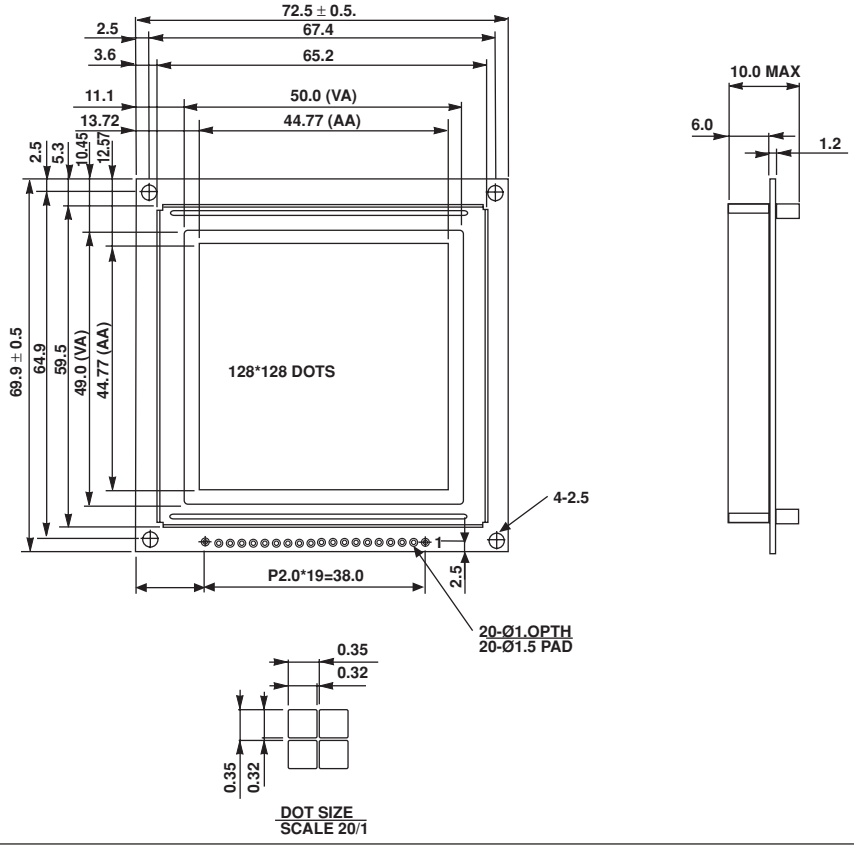
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

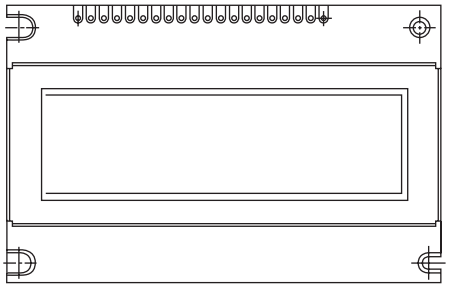
ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	–	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V	–	1.5	–	mA
Recommended LC Driving	VDD-V0	- 20°C	–	18.0	–	V
Voltage for Normal Temp.		25°C	–	17.0	–	
Version Module		60°C	–	16.0	–	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	–	–	mm
EL Power Supply Current	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	DB0	Data Bus Line
2	DB1	Data Bus Line
3	DB2	Data Bus Line
4	DB3	Data Bus Line
5	DB4	Data Bus Line
6	DB5	Data Bus Line
7	DB6	Data Bus Line
8	DB7	Data Bus Line
9	RS	Data/Instruction Select
10	R/$\overline{W}$	Data Read/Write
11	E	Enable Signal
12	$\overline{CS}$	Chip Select
13	$\overline{RES}$	Reset Signal
14	VEE	Negative Voltage Output
15	VDD	Power Supply (+ 5V)
16	VSS	Power Supply (GNO)
17	NC	No Connection
18	NC	No Connection
19	LED (+)	Power Supply for LED B/L (+ 4.2V)
20	LED (-)	Power Supply for LED B/L (0V)

DIMENSIONS in millimeters



160 x 32 Dots Graphic LCD



FEATURES

- Available for external oscilation 2KHz
- Epson-SED 1520, or equivalent
- 1/32 duty cycle
- N.V. optional for + 3V power supply

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	85.2 x 55.0	mm
Viewing Area	72.0 x 22.0	mm
Mounting Hole	80.2 x 46.7	mm
Dot Pitch	0.44 x 0.61	mm

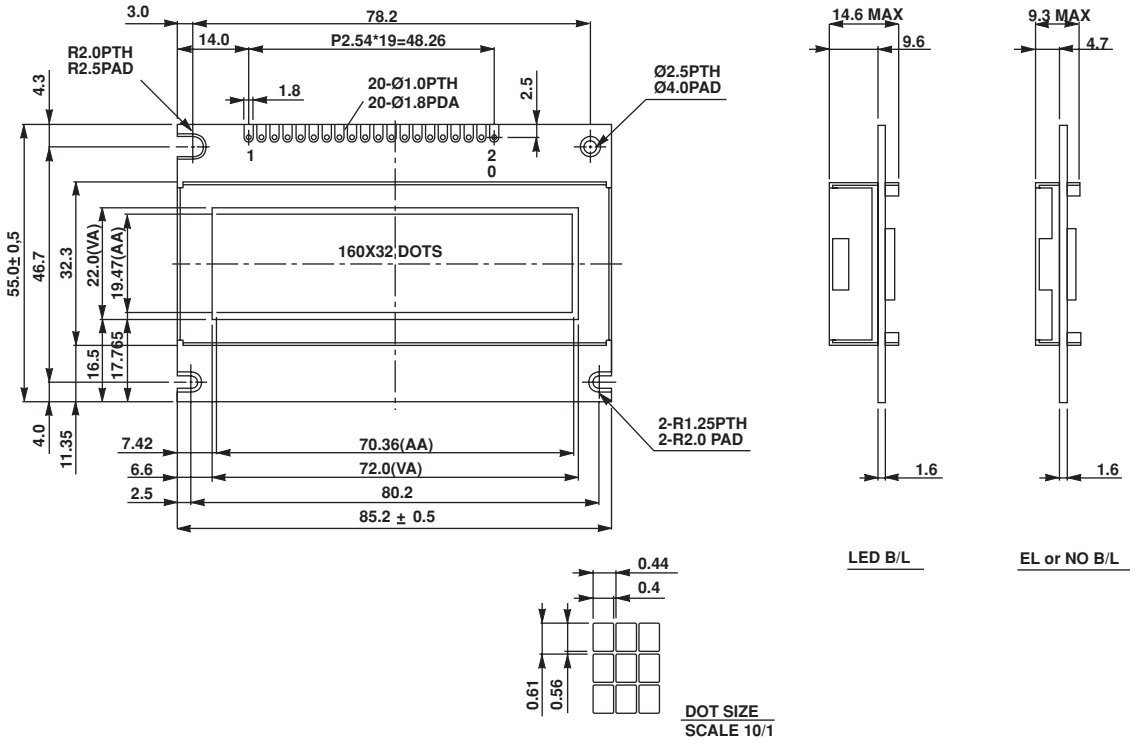
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	4.75	5.0	5.52	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

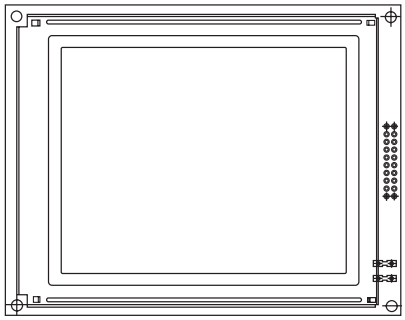
ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	VDD = + 5V	4.5	5.0	5.5	V
Supply Current	IDD	VDD = 5V	–	1.0	1.4	mA
Recommended LC Driving	VDD-V0	- 2	5.8	6.0	6.2	V
Voltage for Normal Temp.		25°C	5.3	5.5	5.7	
Version Module		+ 7	4.8	5.0	5.2	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	180	360	mA
EL Power Supply Current	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	(+ 5V)
3	Vo	Contrast Adjustment
4	Ao	H →Data L →Instruction
5	CS1	CS1 = 0, CS2 = 0 Select U1 CS1 = 1, CS2 = 0 Select U2 CS1 = 0, CS2 = 1 Select U3
6	CS2	
7	CL	External Clock 2KHz
8	E	Enable Signal
9	R/$\overline{W}$	H: Read Data L: Write Data
10	DB0	Data Bus Line
11	DB1	Data Bus Line
12	DB2	Data Bus Line
13	DB3	Data Bus Line
14	DB4	Data Bus Line
15	DB5	Data Bus Line
16	DB6	Data Bus Line
17	DB7	Data Bus Line
18	RES	H →L Reset the LCM
19	A	Power Supply forLED B/L (+ 4.2V)
20	K	Power Supply forLED B/L (0V)

DIMENSIONS in millimeters



160 x 128 Dots Graphic LCD



FEATURES

- Built in controller TOSHIBA-(T6963C or equivalent)
- + 5V power supply
- 1/28 duty cycle
- N.V. optional
- Built in CCFL inverter

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	129.0 x 102.0	mm
Viewing Area	101.0 x 82.0	mm
Dot Size	0.54 x 0.54	mm
Dot Pitch	0.58 x 0.58	mm
Mounting Hole	122.0 x 96.2	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

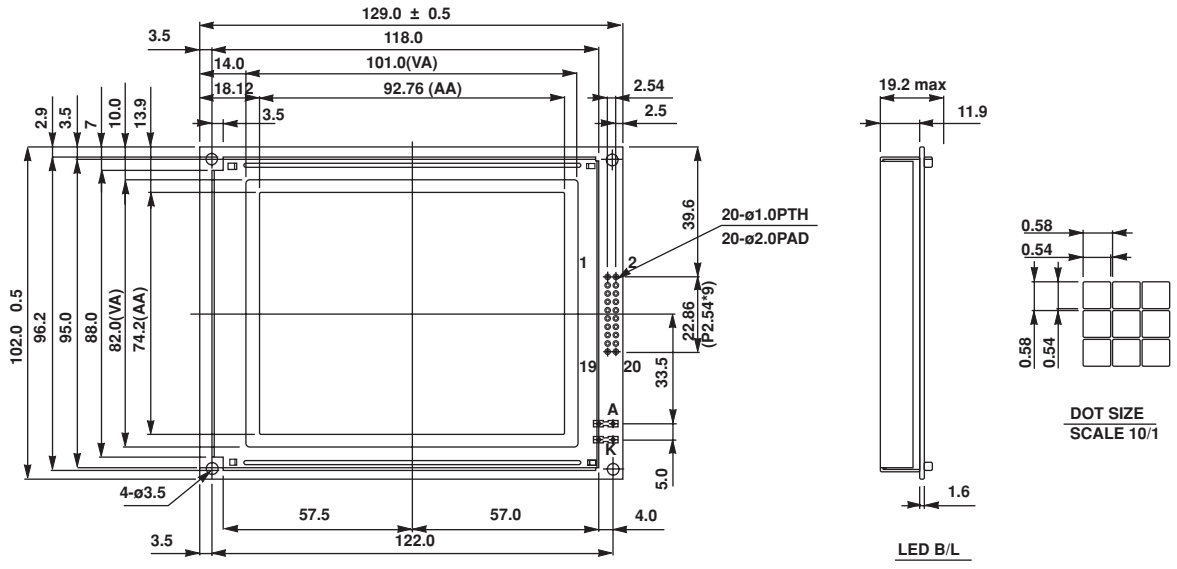
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

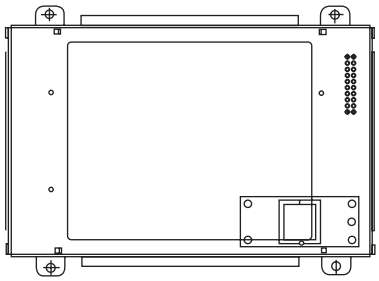
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V	–	45	50	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	19.9	21.0	22.1	V
		0°C	19.0	–	21.2	
		25°C	18.6	19.1	19.6	
		50°C	16.2	16.5	16.8	
		70°C	11.6	9.1	12.8	
CCFL Forward Voltage	VF	25°C	–	256	560	V
CCFL Forward Current	IF	25°C	–	–	5.0	mA
LED Forward Voltage	VF	25°C	–	4.6	4.6	V
LED Forward Current	IF	25°C	–	–	500	mA

PIN NUMBER	SYMBOL	FUNCTION
1	FG	Frame Ground
2	Vss	Power Supply (GND)
3	Vdd	Power Supply (+ 5V)
4	Vadj	Contrast Adjustment
5	Vee	Negative Voltage Output
6	$\overline{WR}$	Data Write
7	$\overline{RD}$	Data Read
8	CE	Chip Enable
9	C/D	Command/Data Read/Write
10	$\overline{HALT}$	Clock Operating Stop Signal
11	$\overline{Reset}$	Reset Signal
12	DB0	Data Bus Line
13	DB1	Data Bus Line
14	DB2	Data Bus Line
15	DB3	Data Bus Line
16	DB4	Data Bus Line
17	DB5	Data Bus Line
18	DB6	Data Bus Line
19	DB7	Data Bus Line
20	NC	No Connection

DIMENSIONS in millimeters



160 x 128 Dots Graphic LCD



FEATURES

- Built in controller TOSHIBA-(T6963C or equivalent)
- + 5V power supply
- 1/28 duty cycle
- N.V. optional
- Built in CCFL inverter

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	150.0 x 112.0	mm
Viewing Area	101.0 x 82.0	mm
Dot Size	0.54 x 0.54	mm
Dot Pitch	0.58 x 0.58	mm
Mounting Hole	118.0 x 105.0	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

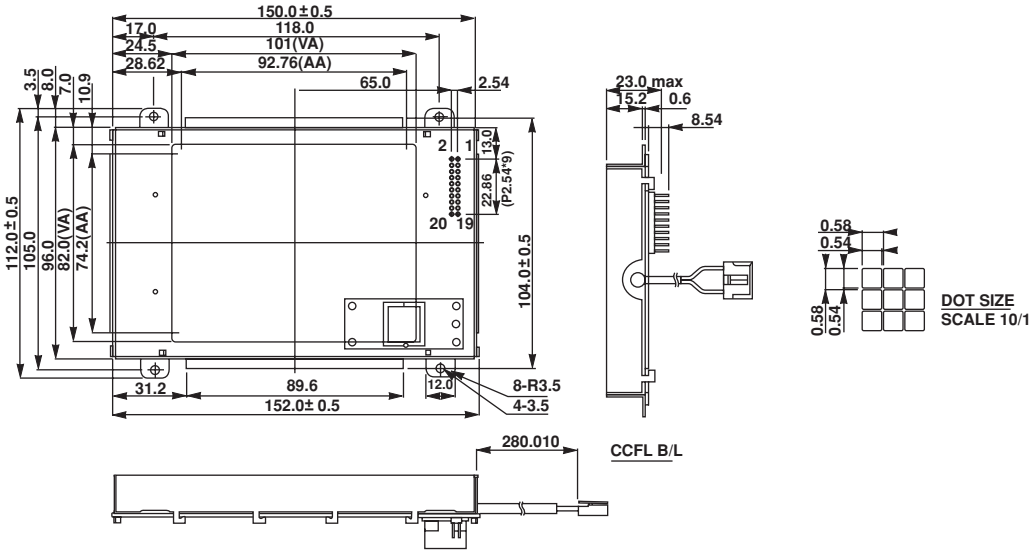
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

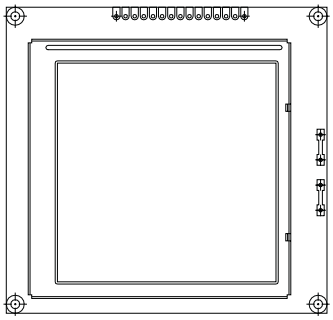
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V	–	45	50	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20 °C	19.9	21.0	22.1	V
		0°C	19.0	–	21.2	
		25°C	18.6	19.1	19.6	
		50°C	16.2	16.5	16.8	
		70°C	11.6	9.1	12.8	
CCFL Forward Voltage	VF	25°C	–	256	560	V
CCFL Forward Current	IF	25°C	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	FG	Frame Ground
2	Vss	Power Supply (GND)
3	Vdd	Power Supply (+ 5V)
4	Vadj	Contrast Adjustment
5	Vee	Negative Voltage Output
6	$\overline{WR}$	Data Write
7	$\overline{RD}$	Data Read
8	$\overline{CE}$	Chip Enable
9	C/D	Command/Data Read/Write
10	$\overline{HALT}$	Clock Operating Stop Signal
11	$\overline{Reset}$	Reset Signal
12	DB0	Data Bus Line
13	DB1	Data Bus Line
14	DB2	Data Bus Line
15	DB3	Data Bus Line
16	DB4	Data Bus Line
17	DB5	Data Bus Line
18	DB6	Data Bus Line
19	DB7	Data Bus Line
20	NC	No Connection

DIMENSIONS in millimeters



160 x 160 Dots Graphic LCD



FEATURES

- No Built-in controller
- + 5V power supply
- 1/160 duty cycle
- 4-Bit parallel or 1-Bit serial interface mode

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	89.2 x 85.0	mm
Viewing Area	62.0 x 62.0	mm
Dot Size	0.34 x 0.34	mm
Dot Pitch	0.38 x 0.38	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	4.75	5.0	5.52	V
Input Voltage	VI	- 0.3	–	VDD	V

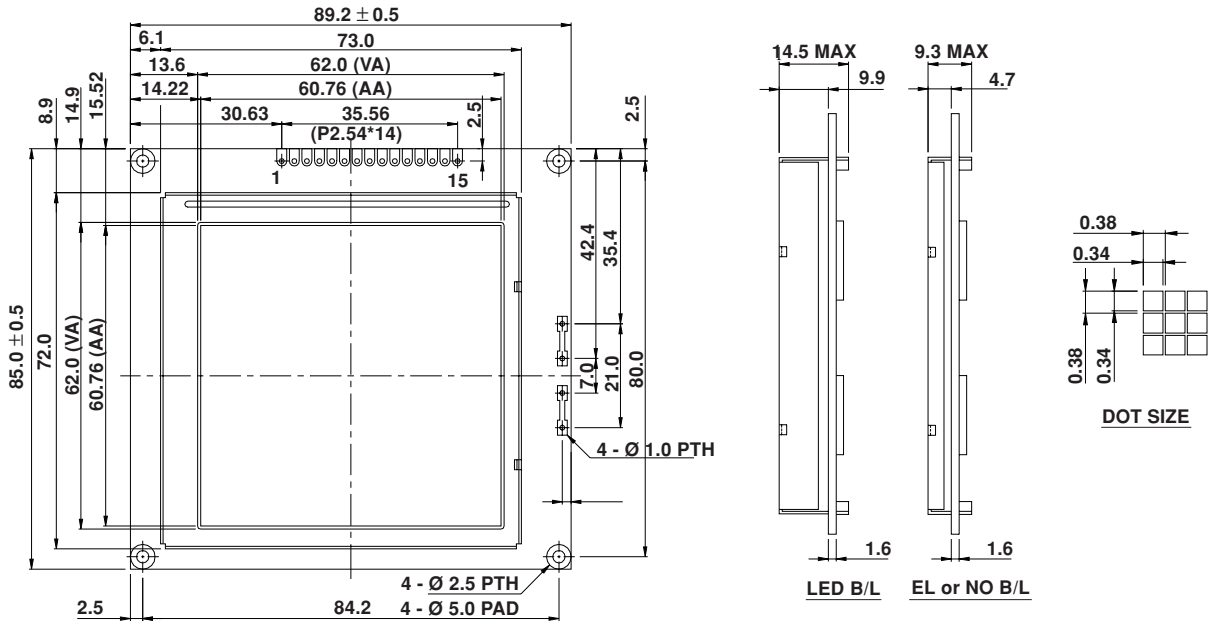
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

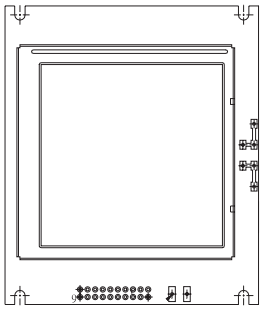
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	–	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V	–	1.5	3.0	mA
Recommended LC Driving	VDD-V0	- 20°C	16.5	18.0	19.5	V
Voltage for Normal Temp.		25°C	15.5	17.0	18.5	
Version Module		60°C	14.5	16.0	17.5	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	500	1000	mm
EL	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Vss (GND)	Ground
2	M	Control signal for A.C.driving
3	FLM	The FLM Signal Indicates the Beginning of each Display Cycle
4	CL1	The CL1 Latches the Serial Data in Shift Register
5	CL2	Clock Signal for Shifting the Serial Data
6	DB3	Data Bus Line
7	DB2	Data Bus Line
8	DB1	Data Bus Line
9	DB0	Data Bus Line
10	Vee	Power Supply for LCD Driving
11	Vdd	Power Supply (+ 5V)
12	Vo	Contrast Adjustment
13	$\overline{\text{DISPOFF}}$	Controls Display off, 0: off, 1: on
14	A	Power Supply for B/L
15	K	Power Supply for B/L

DIMENSIONS in millimeters



160 x 160 Dots Graphic LCD



FEATURES

- Built-in controller (LC7981)
- 1/160 duty cycle
- N.V. optional
- + 5V power supply

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	85.0 x 100.0	mm
Viewing Area	62.0 x 62.0	mm
Dot Size	0.34 x 0.34	mm
Dot Pitch	0.38 x 0.38	mm

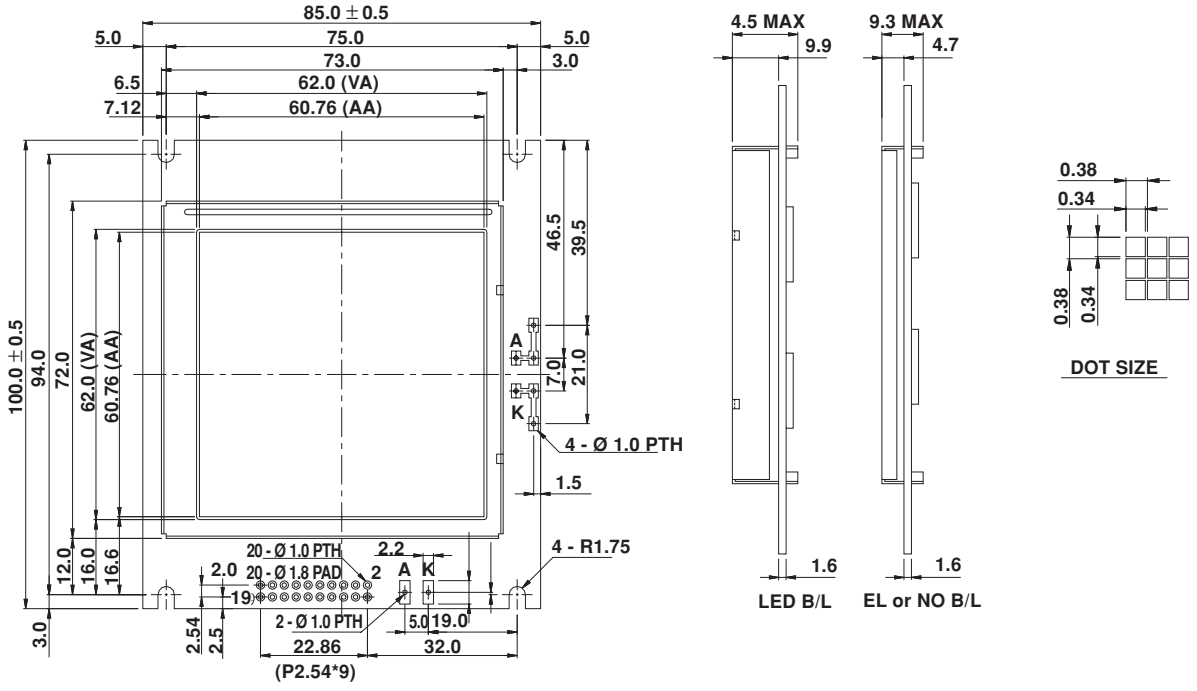
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

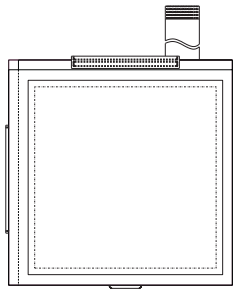
ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	–	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V	–	7.3	8.4	mA
Recommended LC Driving	VDD - V0	- 20°C	16.5	18.0	19.5	V
Voltage for Normal Temp.		25°C	15.5	17.0	18.5	
Version Module		60°C	14.5	16.0	17.5	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	500	1000	mA
EL	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	FGND	Frame Ground
2	Vss	Power Supply (GND)
3	Vdd	Power Supply (+ 5V)
4	Vo	Contrast Adjustment
5	R/$\overline{W}$	Data Read/Write
6	E	Enable Signal
7	CS	Chip Select
8	RS	Data Instruction Select
9	NC	No Connection
10	$\overline{RST}$	Reset Signal
11	DB0	H/L Data Bus Line
12	DB1	H/L Data Bus Line
13	DB2	H/L Data Bus Line
14	DB3	H/L Data Bus Line
15	DB4	H/L Data Bus Line
16	DB5	H/L Data Bus Line
17	DB6	H/L Data Bus Line
18	DB7	H/L Data Bus Line
19	NC	No Connection
20	NC/Vee	NC/Negative Voltage Output

DIMENSIONS in millimeters



160 x 160 Dots Graphic LCD



FEATURES

- 160 x 160 dots FSTN
- 4-Bit data bus
- + 5V power supply
- 1/160 duty cycle

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	69.0 x 69.5	mm
Viewing Area	60.0 x 60.0	mm
Dot Size	0.33 x 0.33	mm
Character Size	0.35 x 0.35	mm

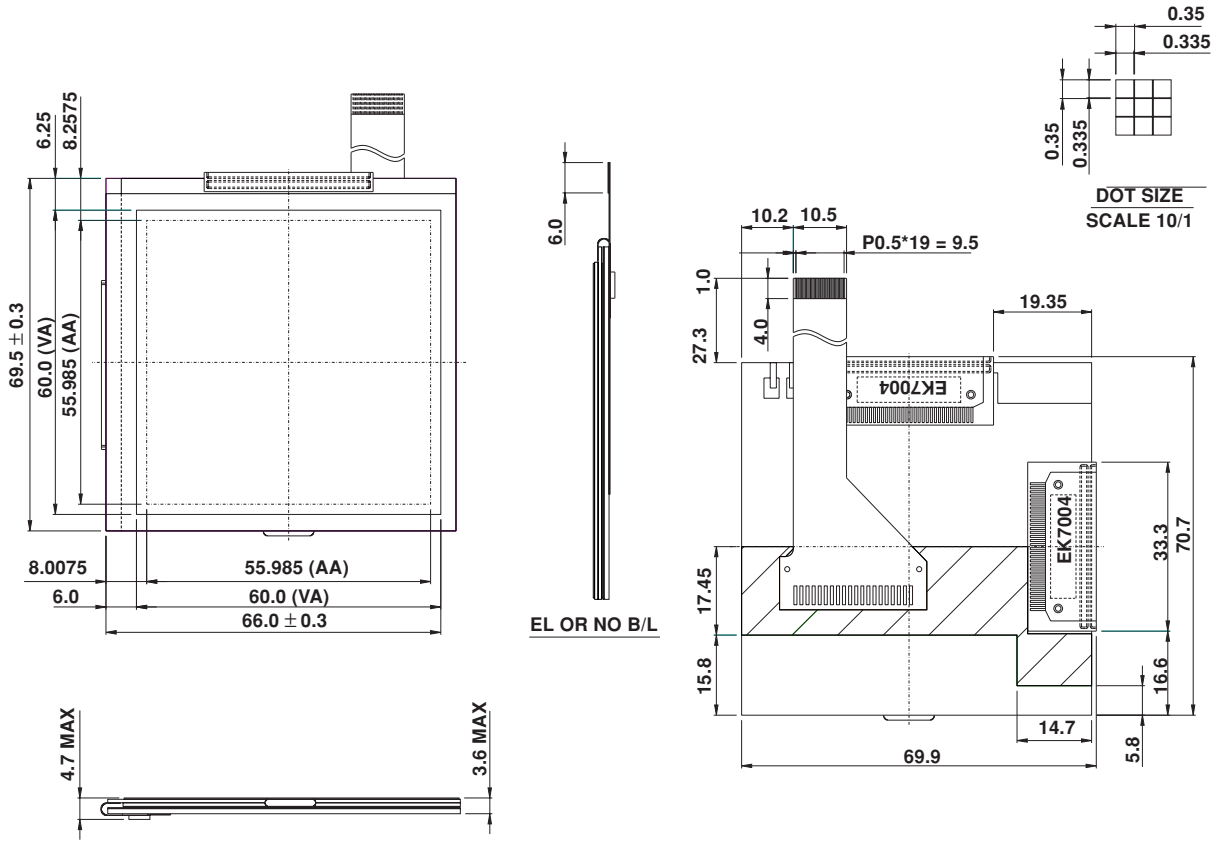
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	–	5.0	6.5	V
Input Voltage	VI	$0.8V_{DD}$	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

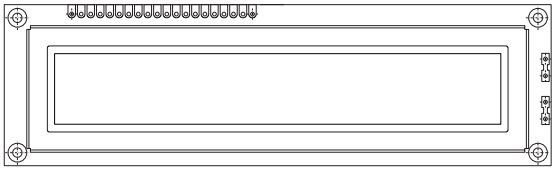
ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	L level	$0.8V_{DD}$	V_{DD}	–	V
	VIO	H level	V_{SS}	$0.2V_{DD}$	–	V
Supply Current	IDD	VDD = 5V	–	–	–	mA
Recommended LC Driving	VDD - V0	0°C	18.5	20.0	21.5	V
Voltage for Normal Temp.		25°C	17.5	19.0	20.5	
Version Module		50°C	16.5	18.0	19.5	
EL	VF	25°C	–	–	–	V
EL	IF	25°C	–	–	–	mA
Power Consumption	–	VDD = 5V VSS = 19.0V	–	0.19	–	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Velg/NC	Power Supply for EL (GND, 0V/NC)
2	Vel/NC	Power Supply for EL (+)/NC
3	NC	No Connection
4	FLM	Scan Start-Up Signal
5	CL2 (SCP)	Data Shift Pulse
6	CL1 (LP)	Data Latch Pulse
7	Disp	H: ON L: OFF
8	Vdd	Power Supply for LOGIC
9	Vss	Power Supply (0V)
10	VLCD	Power Supply for LCD (+ V)
11	DB0	Data Bus Line
12	DB1	Data Bus Line
13	DB2	Data Bus Line
14	DB3	Data Bus Line

DIMENSIONS in millimeters



202 x 32 Dots Graphic LCD



FEATURES

- Built-in oscilation
- Built-in controller (SED1520 or Equivalent)
- 1/32 duty cycle
- 2.85 ~ 5V power supply

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	146.0 x 43.0	mm
Viewing Area	123.0 x 23.0	mm
Dot Size	0.57 x 0.57	mm
Dot Pitch	0.59 x 0.59	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	- 0.3	–	8.0	V
Input Voltage	VI	- 0.3	–	VDD	V

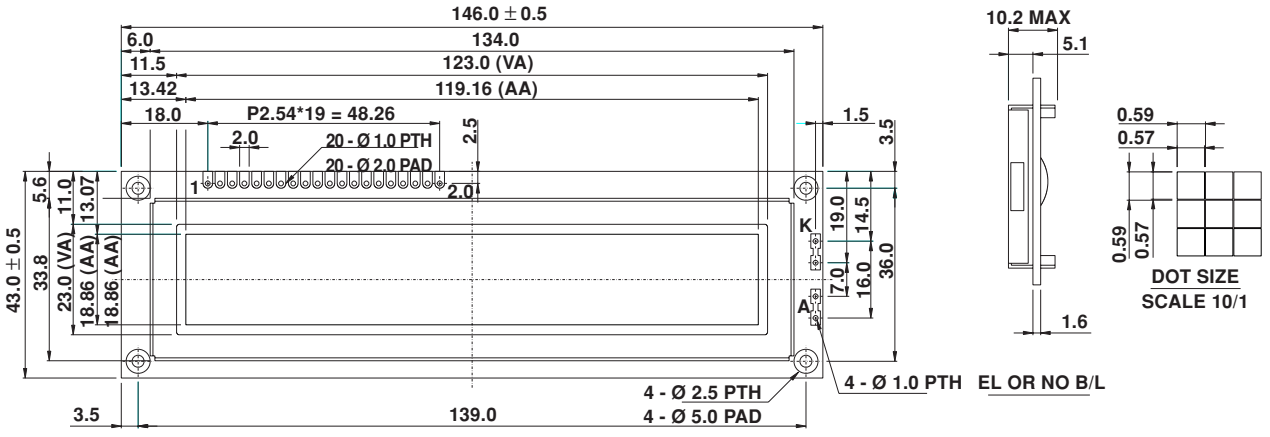
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

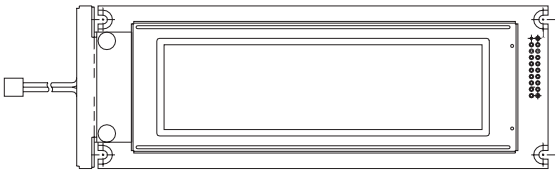
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	VDD = 3V ± 5V	2.7	3.0	3.3	V
Supply Current	IDD	VDD = 3V	–	1.0	1.5	mA
Recommended LC Driving	VDD - V0	0°C	5.7	6.0	6.3	V
Voltage for Normal Temp.		25°C	4.6	4.7	4.8	
Version Module		50°C	3.3	3.4	3.5	
LED Forward Voltage	VF	25°C	1.7	2.1	2.5	V
LED Forward Current	IF	25°C	–	100	200	mA
El Power Supply Current	IEL	Vel = 110VAC;400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vdd	Power Supply (+ 3V, 5V)
3	Vo	Contrast Adjustment
4	A0	$\overline{RD}$ for 80 Serial/E for 68 Serial
5	R/$\overline{W}$	$\overline{WR}$ for 80 Serial R/W for 68 Serial
6	CS1	Enable Chip 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	Vee	Negative Voltage Output
16	$\overline{Reset}$	Reset Signal
17	A	+ 4.2V for LED
18	K	Power Supply for B/L (0V)
19	CS2	Enable Chip 2
20	CS3	Enable Chip 3

DIMENSIONS in millimeters



240 x 64 Dots Graphic LCD



FEATURES

- Built-in controller (T6963C or equivalent)
- + 5V power supply
- 1/64 duty cycle
- Built-in N/V

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	180.0 x 65.0	mm
Viewing Area	133.0 x 39.0	mm
Dot Size	0.49 x 0.49	mm
Dot Pitch	0.53 x 0.53	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

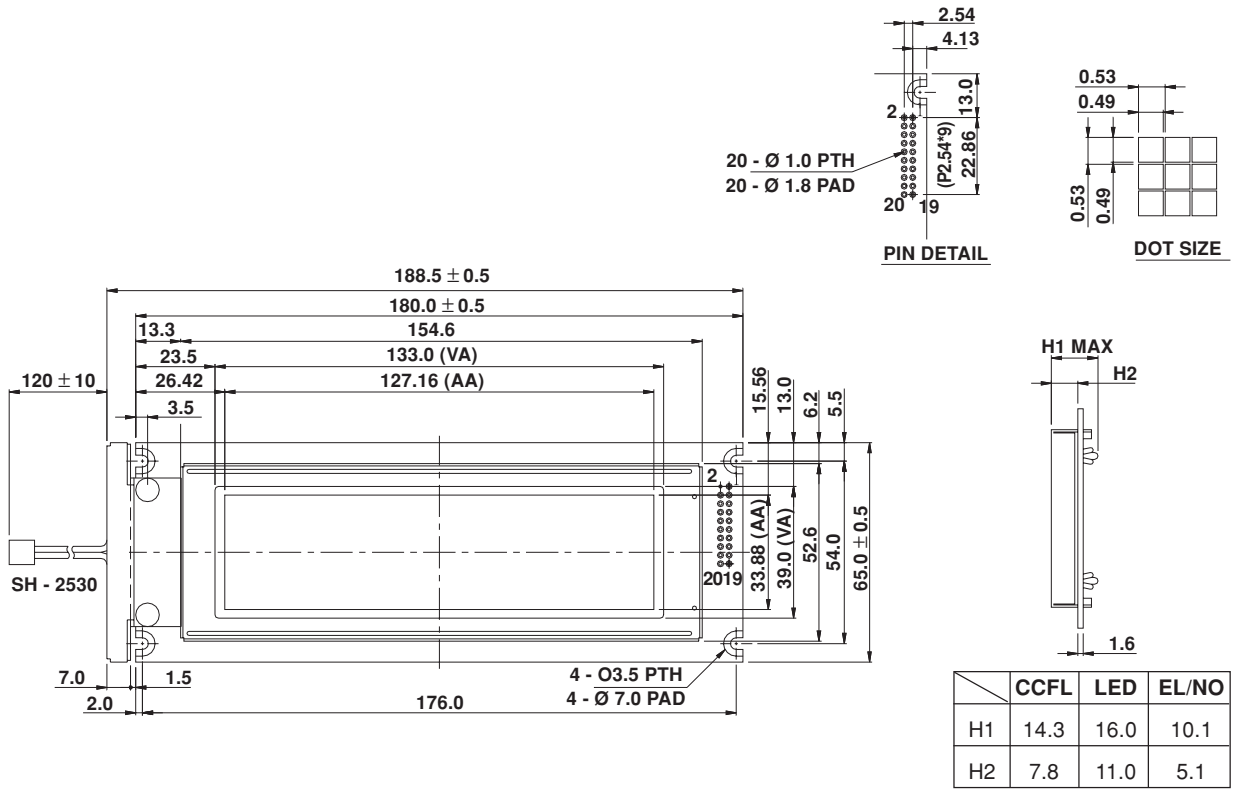
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = + 5V	–	18.5	21.0	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20°C	13.0	13.5	14.1	V
		0°C	12.5	13.1	13.7	
		25°C	12.1	12.7	13.3	
		50°C	11.1	12.2	13.0	
		70°C	9.1	11.6	12.8	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	450	900	mA
CCFL	VF	25°C	–	215	650	Vms
	IF	25°C	–	–	5.0	mA
EL	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

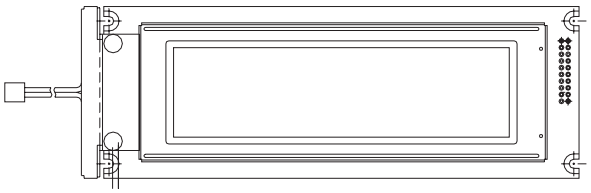
PIN NUMBER	SYMBOL	FUNCTION
1	FG	Frame Ground
2	Vss	Power Supply (GND)
3	Vdd	Power Supply (+ 5V)
4	V0	Contrast Adjustment
5	$\overline{WR}$	Data Write
6	$\overline{RD}$	Data Read
7	$\overline{CE}$	Chip Enable
8	C/$\overline{D}$	Command/Data Read/Write
9	Vee	Negative Voltage Output
10	$\overline{Reset}$	Reset Signal
11	DB0	Data Bus Line
12	DB1	Data Bus Line
13	DB2	Data Bus Line
14	DB3	Data Bus Line
15	DB4	Data Bus Line
16	DB5	Data Bus Line
17	DB6	Data Bus Line
18	DB7	Data Bus Line
19	FS	Font Selection FS = “H”, 6 x 8 Character Font FS = “H” 8 x 8 Character Font
20	NC	No Connection

DIMENSIONS in millimeters



	CCFL	LED	EL/NO
H1	14.3	16.0	10.1
H2	7.8	11.0	5.1

240 x 64 Dots Graphic LCD



FEATURES

- Built-in controller (LC7981 or equivalent)
- + 5V power supply
- 1/64 duty cycle
- Built-in N/V

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	180.0 x 65.0	mm
Viewing Area	133.0 x 39.0	mm
Dot Size	0.49 x 0.49	mm
Dot Pitch	0.53 x 0.53	mm

ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = + 5V	–	18.6	24.0	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20°C	13.0	13.5	14.1	V
		0°C	12.5	13.1	13.7	
		25°C	12.1	12.7	13.3	
		50°C	11.1	12.2	13.0	
		70°C	9.1	11.6	12.8	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	450	900	mA
CCFL	VF	25°C	–	215	650	Vms
	IF	25°C	–	–	5.0	mA
EL	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

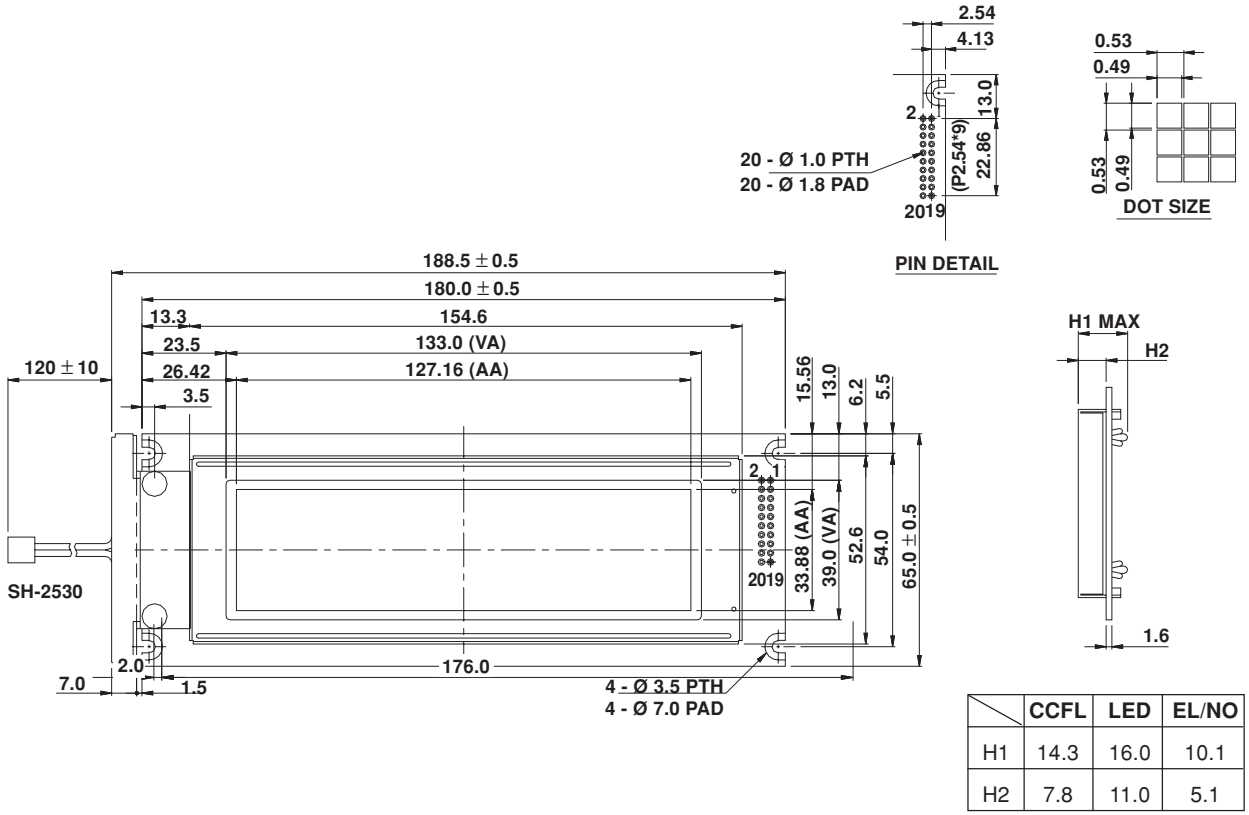
LCD-240G064B

Vishay

240 x 64 Dots Graphic LCD

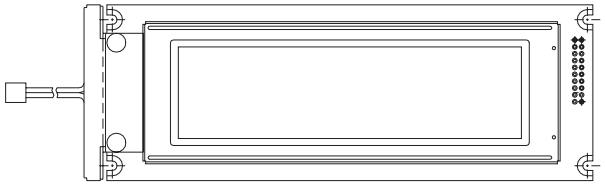
PIN NUMBER	SYMBOL	FUNCTION
1	Vss	Power Supply (GND)
2	Vdd	Power Supply (+ 5V)
3	Vo	Contrast Adjustment
4	RS	Data/Instruction Select
5	R/$\overline{W}$	Data Read Write
6	E	Enable Signal
7	DB0	Data Bus Line
8	DB1	Data Bus Line
9	DB2	Data Bus Line
10	DB3	Data Bus Line
11	DB4	Data Bus Line
12	DB5	Data Bus Line
13	DB6	Data Bus Line
14	DB7	Data Bus Line
15	$\overline{CS}$	Chip Select
16	$\overline{Res}$	Rest Signal
17	Vee	Negative Voltage Output
18	NC	No Connection
19	NC	No Connection
20	FGND	Frame GEN (Connected to Bezel)

DIMENSIONS in millimeters



	CCFL	LED	EL/NO
H1	14.3	16.0	10.1
H2	7.8	11.0	5.1

240 x 64 Dots Graphic LCD



FEATURES

- Built-in controller (T6963C or equivalent)
- + 5V power supply
- 1/64 duty cycle
- Built-in N/V

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	180.0 x 65.0	mm
Viewing Area	133.0 x 39.0	mm
Dot Size	0.49 x 0.49	mm
Dot Pitch	0.53 x 0.53	mm

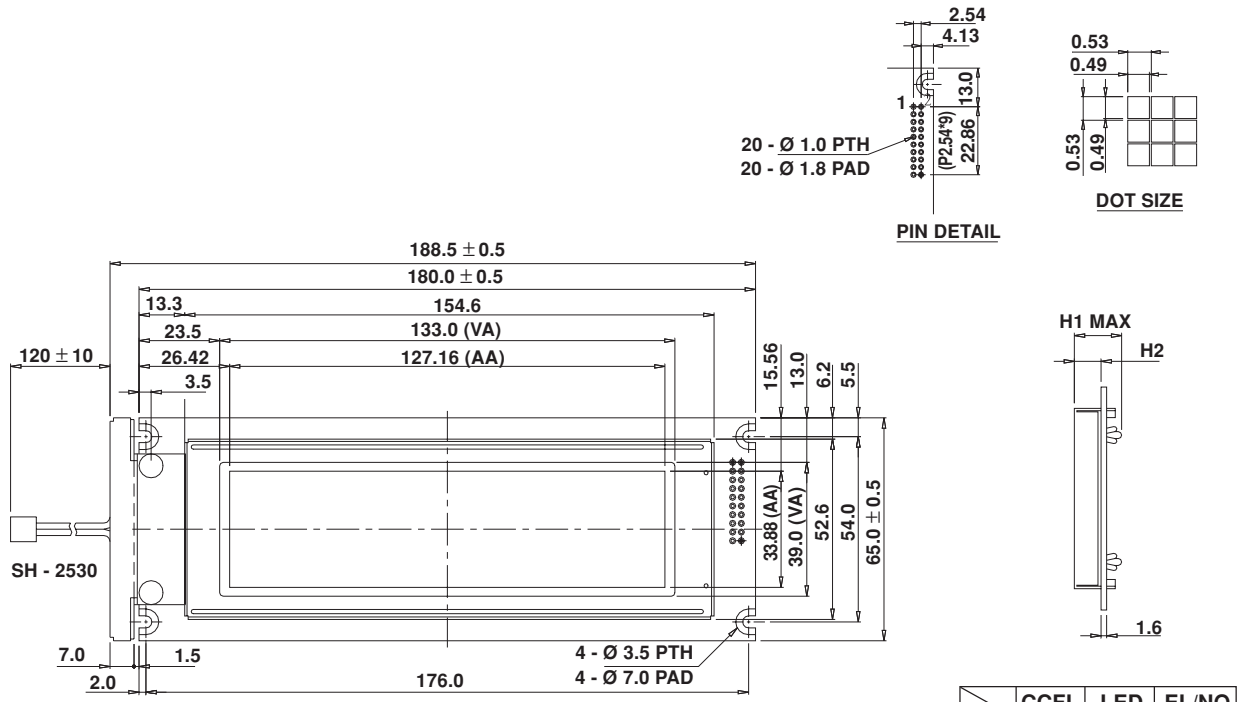
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = + 5V	–	23.0	24.0	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20°C	13.0	13.5	14.1	V
		0°C	12.5	13.1	13.7	
		25°C	12.1	12.7	13.3	
		50°C	11.1	12.2	13.0	
		70°C	9.1	11.6	12.8	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	450	900	mA
CCFL	VF	25°C	–	215	650	Vms
	IF	25°C	–	–	5.0	mA
EL	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

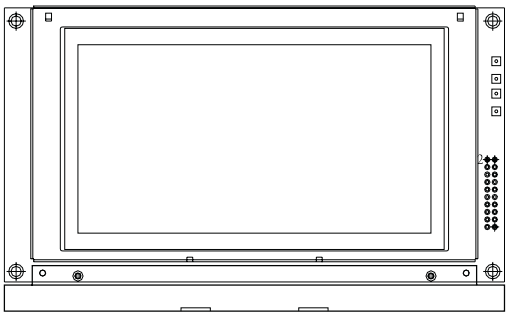
PIN NUMBER	SYMBOL	FUNCTION
1	FG	Frame Ground
2	Vss	Power Supply (GND)
3	Vdd	Power Supply (+ 5V)
4	V0	Contrast Adjustment
5	$\overline{WR}$	Data Write
6	$\overline{RD}$	Data Read
7	$\overline{CE}$	Chip Enable
8	C/$\overline{D}$	Command/Data Read/Write
9	Vee	Negative Voltage Output
10	$\overline{Reset}$	Reset Signal
11	DB0	Data Bus Line
12	DB1	Data Bus Line
13	DB2	Data Bus Line
14	DB3	Data Bus Line
15	DB4	Data Bus Line
16	DB5	Data Bus Line
17	DB6	Data Bus Line
18	DB7	Data Bus Line
19	FS	Font Selection FS = “H”, 6 x 8 Character Font FS = “H” 8 x 8 Character Font
20	NC	No Connection

DIMENSIONS in millimeters



	CCFL	LED	EL/NO
H1	14.3	16.0	10.1
H2	7.8	11.0	5.1

240 x 128 Dots Graphic LCD



FEATURES

- Built-in controller (T6963C)
- 1/240 duty cycle
- Built-in N/V (option)

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	170.0 x 103.5	mm
Viewing Area	132.0 x 76.0	mm
Dot Size	0.47 x 0.47	mm
Dot Pitch	0.5 x 0.5	mm

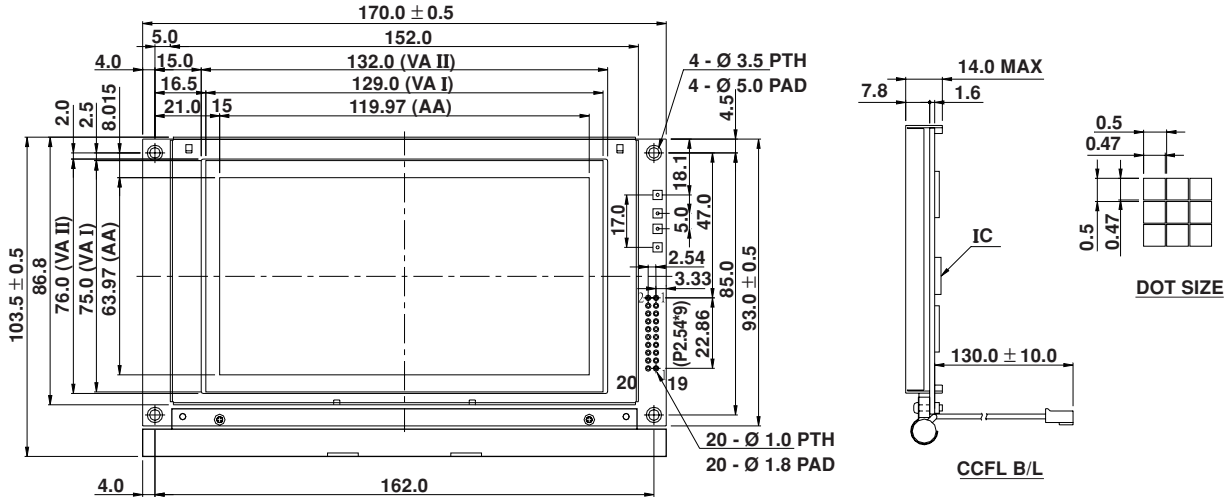
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	–	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = + 5V	–	23.0	–	mA
Recommended LC Driving	VDD - V0	0°C	19.1	19.5	20.1	V
Voltage for Normal Temp.		25°C	18.1	18.5	19.1	
Version Module		50°C	17.1	17.5	18.1	
LED Forward Voltage	VF	25°C	–	–	–	V
LED Forward Current	IF	25°C	–	–	–	mA
CCFL	VF	25°C	–	325	580	Vms
	IF	25°C	–	–	5.0	mA
EL	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

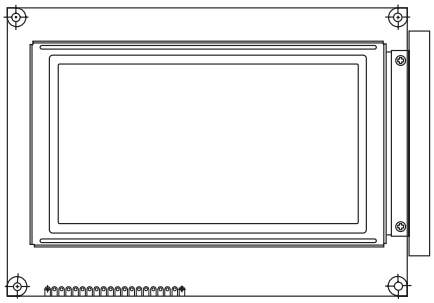
PIN NUMBER	SYMBOL	FUNCTION
1	FGND	Frame GEN (Connected to Bezel)
2	Vss	GND
3	Vdd	Power Supply for Logic Circuit
4	Vee	Power Supply for LCD Driving
5	$\overline{WR}$	Data Write
6	$\overline{RD}$	Data Read
7	$\overline{CE}$	Chip Enable
8	C/D	Code/Data
9	NC	No Connection/Negative Voltage Output
10	$\overline{RST}$	Controller Reset
11	DB0	Data Bus Line
12	DB1	Data Bus Line
13	DB2	Data Bus Line
14	DB3	Data Bus Line
15	DB4	Data Bus Line
16	DB5	Data Bus Line
17	DB6	Data Bus Line
18	DB7	Data Bus Line
19	FS	Font Selection FS = “H”, 6 x 8 Character Font FS = “H” 8 x 8 Character Font
20	RV	Reverse

DIMENSIONS in millimeters



VA IIE EFFECTIVE AREA OF LCD
VA II IS WINDOW OF BEZEL

240 x 128 Dots Graphic LCD



FEATURES

- Built-in controller (T6963C)
- 1/240 duty cycle
- Built-in N/V
- Temperature conpensation, option

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	144.0 x 104.0	mm
Viewing Area	114.0 x 64.0	mm
Dot Size	0.4 x 0.4	mm
Dot Pitch	0.45 x 0.45	mm

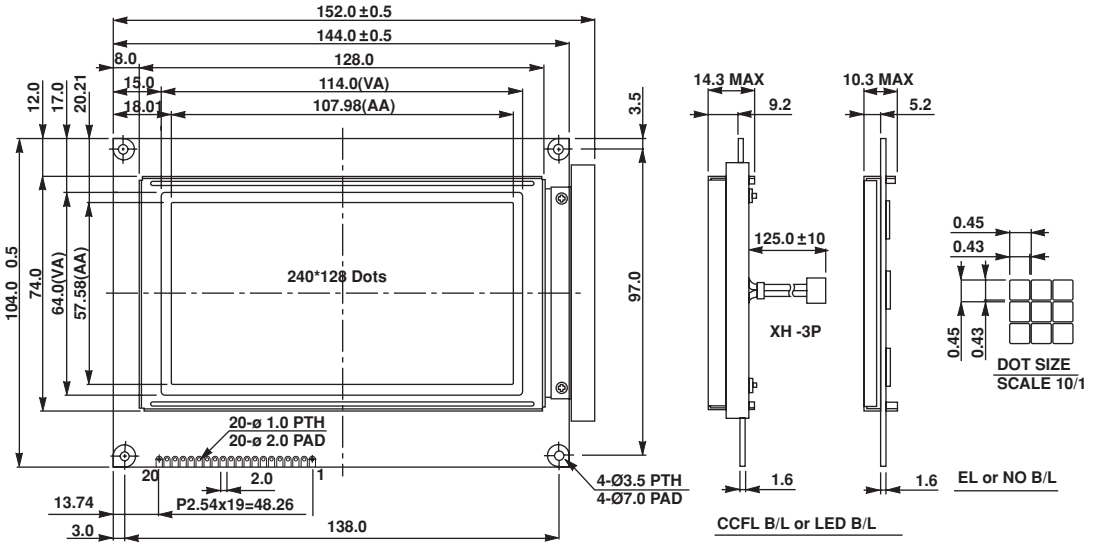
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

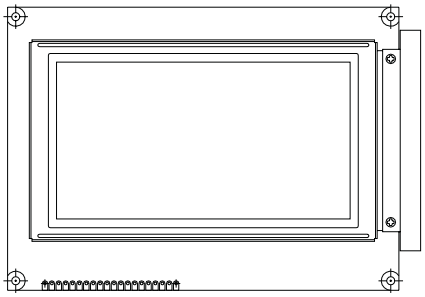
ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	–	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = + 5V	0	55	60	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	0°C	20.3	21.4	22.5	V
		25°C	18.0	19.1	20.2	
		50°C	17.8	18.9	20.0	
LED Forward Voltage	VF	25°C	–	4.2	–	V
LED Forward Current	IF	25°C	–	900	1800	mA
CCFL	VF	25°C	–	250	590	Vms
	IF	25°C	–	–	5.5	mA
EL	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	Power Supply (GND)
2	Vdd	Power Supply (+ 5V)
3	Vo	Power Supply for LCD Driving
4	C/D	Command/Data Read/Write
5	$\overline{RD}$	Data Read
6	$\overline{WR}$	Data Write
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	$\overline{CE}$	Chip Enable
16	$\overline{RESET}$	Reset Signal
17	Vee	Negative Voltage
18	MD2	Control Signal
19	FS1	Font Selection
20	NC	No Connection

DIMENSIONS in millimeters



240 x 128 Dots Graphic LCD



FEATURES

- Built-in controller (LC7981 or equivalent)
- + 5V power supply
- 1/64 duty cycle
- Built-in N.V

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	144.0 x 104.0	mm
Viewing Area	114.0 x 64.0	mm
Dot Size	0.4 x 0.4	mm
Dot Pitch	0.45 x 0.45	mm

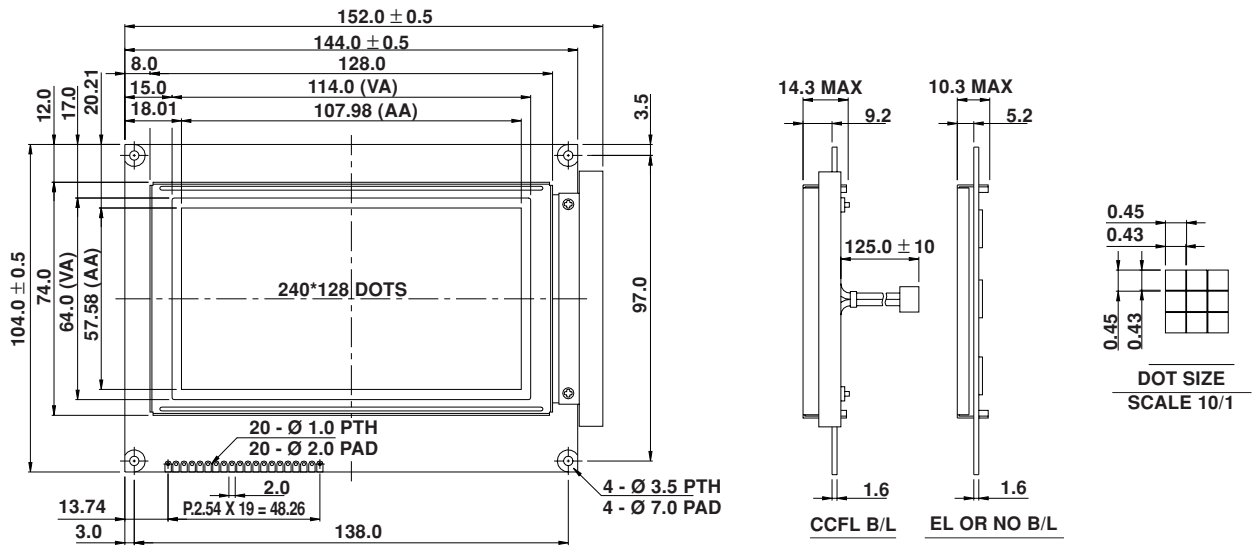
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

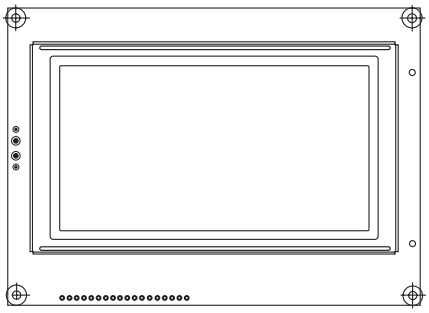
ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	–	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = + 5V	0	55	60	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	0°C	20.3	21.4	22.5	V
		25°C	18.0	19.1	20.2	
		50°C	17.8	18.9	20.0	
LED Forward Voltage	VF	25°C	–	4.2	–	V
LED Forward Current	IF	25°C	–	900	1800	mA
CCFL	VF	25°C	–	250	590	Vms
	IF	25°C	–	–	5.5	mA
EL	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	Power Supply (GND)
2	Vdd	Power Supply (+ 5V)
3	Vo	Contrast Adjustment
4	RS	Data/Instruction Select
5	$\overline{R/W}$	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	$\overline{CS}$	Chip Select
16	$\overline{Res}$	Rest Signal
17	Vee	Negative Voltage Output
18	NC	No Connection
19	A	Power Supply for B/L
20	K	Power Supply for B/L

DIMENSIONS in millimeters



240 x 128 Dots LCD



FEATURES

- Built in controller TOSHIBA-(T6963C or equivalent)
- + 5V power supply
- 1/28 duty cycle
- Built in N.V.

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	144.0 x 104.0	mm
Viewing Area	114.0 x 64.0	mm
Dot Size	0.43 x 0.43	mm
Dot Pitch	0.45 x 0.45	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

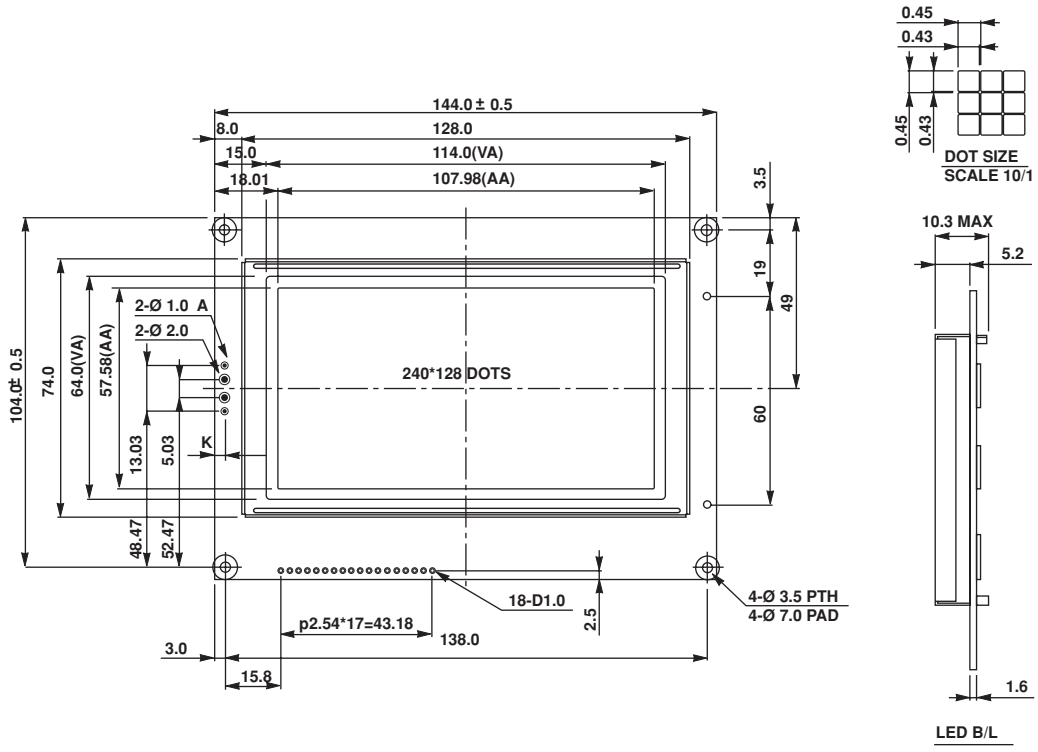
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

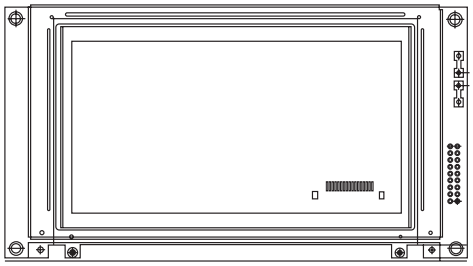
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	–	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V	0	55	60	mA
Recommended LC Driving	VDD - V0	0°C	20.3	21.4	22.5	V
Voltage for Normal Temp.		25°C	18.0	19.1	20.2	
Version Module		50°C	17.8	18.9	20.0	
LED Forward Voltage	VF	25°C	–	4.2	–	V
LED Forward Current	IF	25°C	–	900	1800	mA
CCFL	VF	25°C	–	250	590	Vms
	IF	25°C	–	–	5.5	mA
EL	–	–	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	FG	Frame GND
2	VSS	GND
3	VDD	+ 5V
4	VO	Scan Start-Up Signal
5	$\overline{WR}$	Frame Reverse Signal (Alternate Signal)
6	$\overline{RD}$	Data Latch Pulse
7	$\overline{CE}$	Display Enable Signal
8	C/$\overline{D}$	Data Shift Pulse
9	RST	Display Data Signal
10	DB0	Data Bus Line
11	DB1	Data Bus Line
12	DB2	Data Bus Line
13	DB3	Data Bus Line
14	DB4	Data Bus Line
15	DB5	Data Bus Line
16	DB6	Data Bus Line
17	DB7	Data Bus Line
18	FS	Pins for Selection of Font; H:6*8, L:8*8

DIMENSIONS in millimeters



240 x 128 Dots LCD



FEATURES

- No controller
- + 5V power supply
- 1/64 duty cycle
- Built in N.V.

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	170.0 x 93.6	mm
Viewing Area	128.0 x 75.0	mm
Dot Size	0.43 x 0.43	mm
Dot Pitch	0.45 x 0.45	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

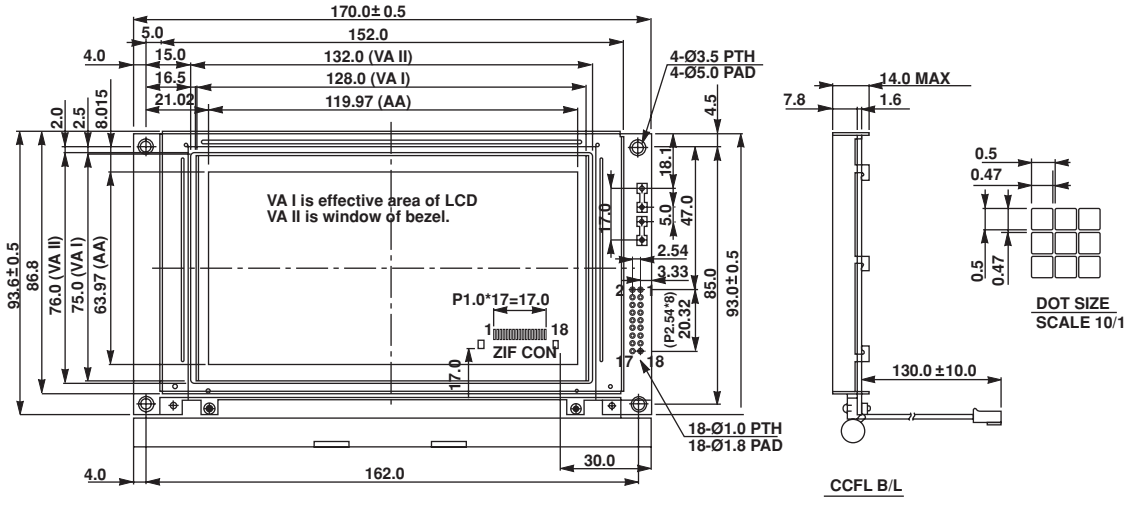
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

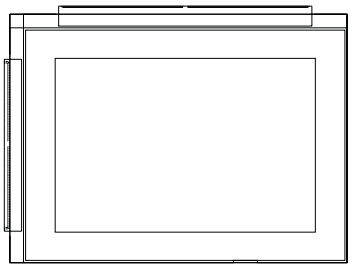
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V	–	55	60	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	- 20°C	–	–	–	V
		0°C	20.3	21.4	21.8	
		25°C	12.1	19.1	22.1	
		50°C	17.7	18.9	20.1	
		70°C	9.1	11.6	12.8	
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	900	1800	mA
CCFL	VF	25°C	–	250	590	Vms
	IF	25°C	–	–	5.5	mA
EL	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	FGND	Frame GND
2	DB0	H/L Data Bus Line
3	DB1	H/L Data Bus Line
4	DB2	H/L Data Bus Line
5	DB3	H/L Data Bus Line
6	$\overline{\text{DISPOFF}}$	Display Off when Low Level
7	FLM	Operating Voltage for LCD
8	M	Control Signal for AC Driving
9	LP	Display Data Slatch
10	CP	Display Data Shift
11	Vdd	Power Supply for (+ 5V)
12	Vss	Power Supply for (GND)
13	Vee	Negative Voltage Output
14	Vo	Contrast Adjustment
15	RV	H/L Data Bus Line
16	NC	No Connection
17	A	Power Supply for B/L
18	K	Power Supply for B/L

DIMENSIONS in millimeters



240 x 160 Dots LCD



FEATURES

- 240 x 160 dots FSTN
- 4-bit data bus
- + 5V power supply
- 1/160 duty cycle
- Built-in EL backlight & EL driver
- Touch panel option

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	75.85 x 56.7	mm
Viewing Area	57.58 x 38.38	mm
Dot Size	0.22 x 0.22	mm
Dot Pitch	0.24 x 0.24	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	–	5.0	6.5	V
Input Voltage	VI	$0.8V_{DD}$	–	VDD	V

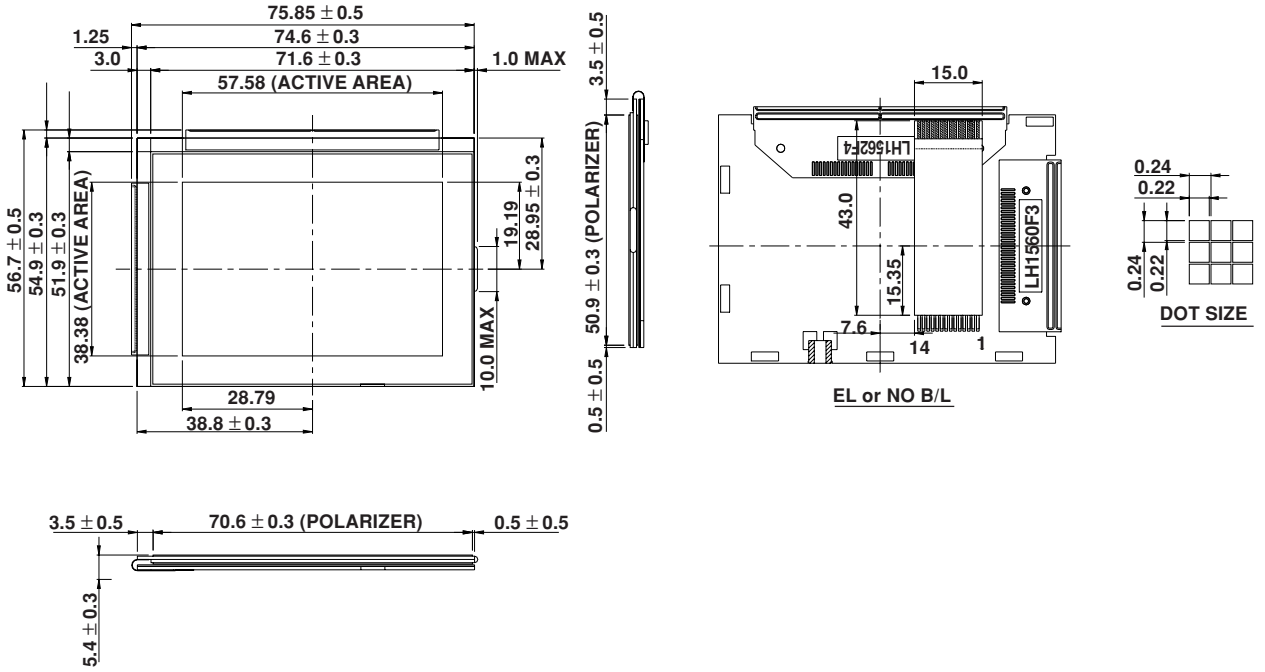
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

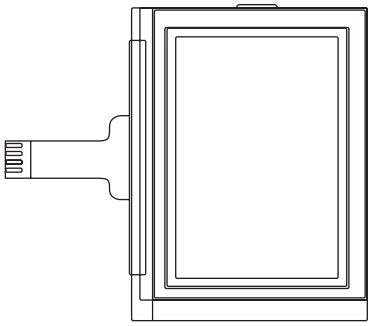
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	L level	$0.8V_{DD}$	V_{DD}	–	V
	VIO	H level	V_{SS}	$0.2V_{DD}$	–	V
Supply Current	IDD	VDD = 5V	–	–	–	mA
Recommended LC Driving	VDD - V0	0°C	19.4	20.5	21.6	V
Voltage for Normal Temp.		25°C	17.9	19.0	20.1	
Version Module		50°C	16.9	18.0	19.1	
Power Consumption	–	VDD = 5V VSS = 19.5V	–	0.12	–	mA
EL	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	CL2 (SCP)	Data Shift Pulse
2	CL1 (LP)	Data Latch Pulse
3	FLM	Scan Start-Up Signal
4	M (N.C)	Frame Reverse Signal (Alternate Signal)
5	DB0	Data Bus Line
6	DB1	Data Bus Line
7	DB2	Data Bus Line
8	DB3	Data Bus Line
9	Vee	Power Supply for LCD (+V)
10	Vdd	Power Supply for LOGIC
11	Vss	Power Supply (0V)
12	BLE	H:EL Enable L:EL disable
13	VELG	Power Supply for EL (GND, 0V)
14	VEL	Power Supply for EL (+)

DIMENSIONS in millimeters



240 x 160 Dots Graphic LCD



FEATURES

- 240 x 160 dots FSTN
- 4-bit data bus
- + 5V power supply
- 1/160 duty cycle
- Touch panel option

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	74.6x 56.1	mm
Viewing Area	62.2 x 43.5	mm
Dot Size	0.22 x 0.22	mm
Dot Pitch	0.24 x 0.24	mm

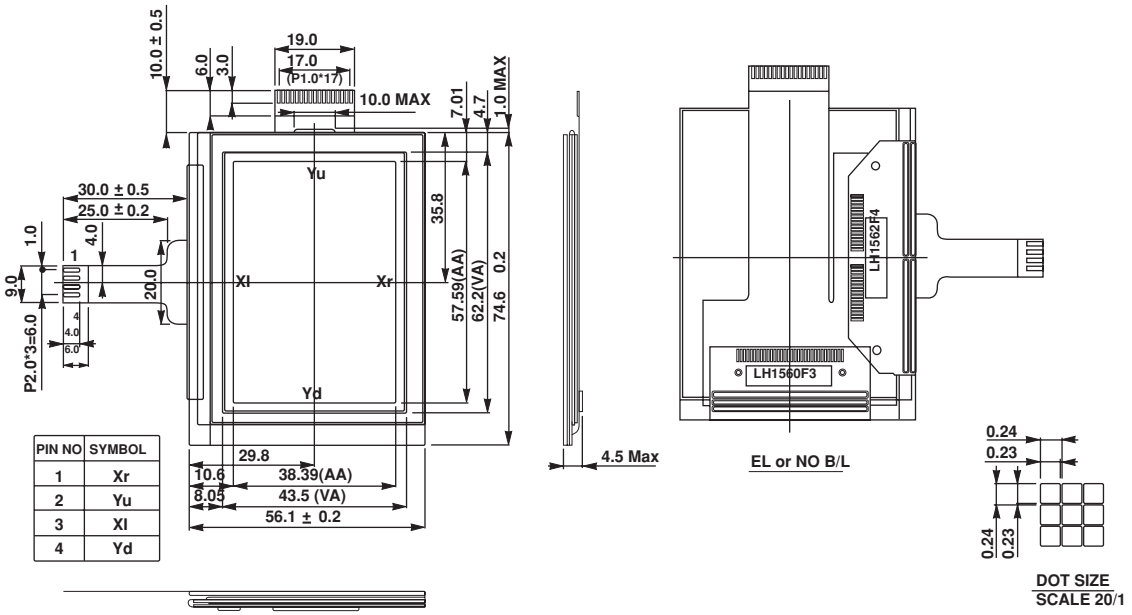
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	–	5.0	6.5	V
Input Voltage	VI	$0.8V_{DD}$	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

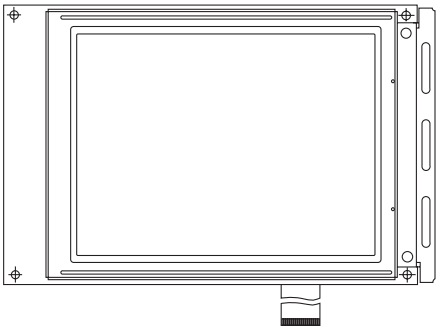
ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	L level	$0.8V_{DD}$	V_{DD}	–	V
	VIO	H level	V_{SS}	$0.2V_{DD}$	–	V
Supply Current	IDD	VDD = + 5V	–	–	–	mA
Recommended LC Driving	VDD - V0	0°C	19.4	20.5	21.6	V
Voltage for Normal Temp.		25°C	18.9	19.0	20.1	
Version Module		50°C	16.9	18.0	19.1	
Power Consumption	–	VDD = 5V VSS = 19.5V	–	0.12	–	mA
EL	–	Vel = 110VAC; 400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	V5	Bias Voltage for Non-select
2	V2	Bias Voltage for Non-select
3	VEE	Power Supply for LCD
4	VDD	Power Supply for LOGIC
5	FR	Frame Start Signal
6	VGND	Ground
7	LOAD	Data Latch Pulse
8	VSS	Logic GND
9	DF	Switch Signal Input for LC Drive Waveform
10	DOFF	H: Display DN,L: Display OFF
11	CP	Data Shift Pulse
12	V4	Bias Voltage for Non-select
13	V3	Bias Voltage for Non-select
14	D3	Data Bus 3
15	D2	Data Bus 2
16	D1	Data Bus 1
17	D0	Data Bus 0
18	NC	No Connection

DIMENSIONS in millimeters



320 x 240 Dots Graphic LCD



FEATURES

- 320 x 240 dots
- + 5V power supply
- 1/240 duty cycle
- No controllers
- Touch screen option (analog type)

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	166.8 x 109.0	mm
Viewing Area	122.0 x 92.0	mm
Dot Size	0.34 x 0.34	mm
Dot Pitch	0.36 x 0.36	mm
Mounting Hole	152.0 x 101.0	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

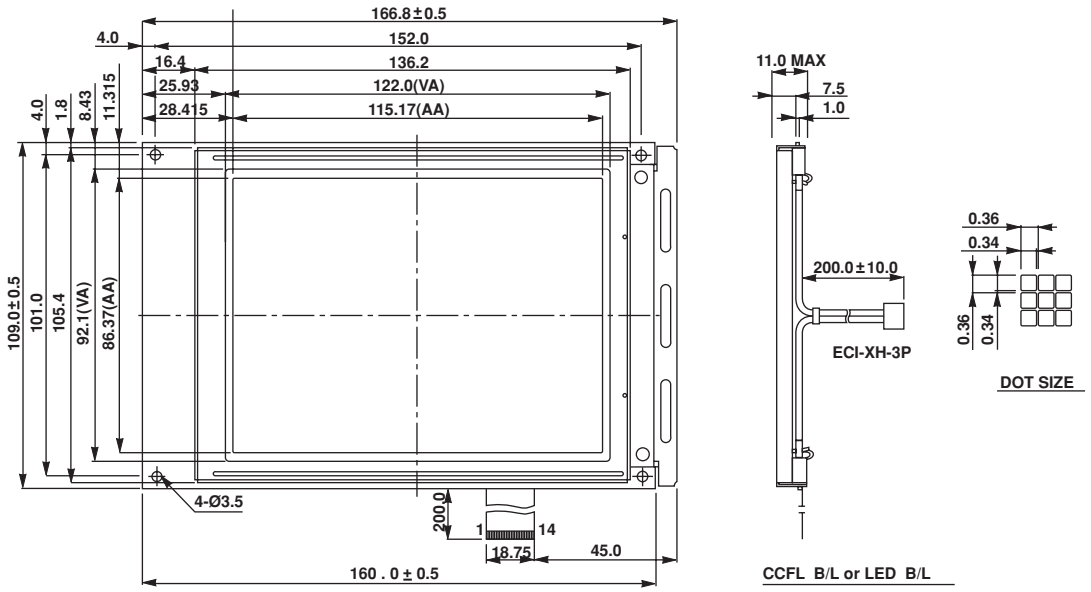
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

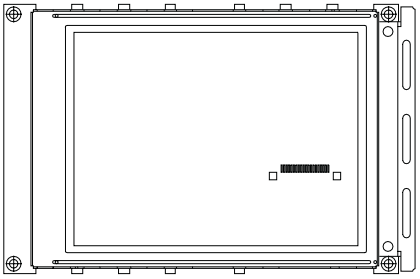
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = + 5V	–	7.5	–	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	0°C	22.0	23.0	24.0	V
		25°C	21.3	22.2	23.0	
		50°C	19.5	20.8	22.1	
CCFL Starting Voltage	VFLS	25°C	–	600	–	Vrms
CCFL Driving Voltage	VFLD	25°C	–	268	–	Vrms
CCFL Driving Current	IFLD	VFQ = 450Vrms 30KHz	–	5.0	–	mArms
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	180	360	mA
EL	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	DB0	Data Bus Line
2	DB1	Data Bus Line
3	DB2	Data Bus Line
4	DB3	Data Bus Line
5	$\overline{\text{DISPOFF}}$	H: ON L: OFF
6	FRAME	First Line Marker
7	M(NC)	Frame Reverse Signal (Alternate Signal)
8	LP	Data Latch
9	CP	Data Shift
10	Vdd	Power Supply for LOGIC
11	Vss	GND
12	Vee	Power Supply for LCD
13	V0	Operating Voltage LCD Driving
14	FGND	Film Ground

DIMENSIONS in millimeters



320 x 240 Dots Graphic LCD



FEATURES

- Built-in SED 1335 controller and SRAM
- Built-in negative voltage
- 1/240 duty cycle
- Touch screen option (analog type)
- Temperature compensation option

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	166.8 x 109.0	mm
Viewing Area	122.0 x 92.0	mm
Dot Size	0.34 x 0.34	mm
Dot Pitch	0.36 x 0.36	mm
Mounting Hole	152.0 x 101.0	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

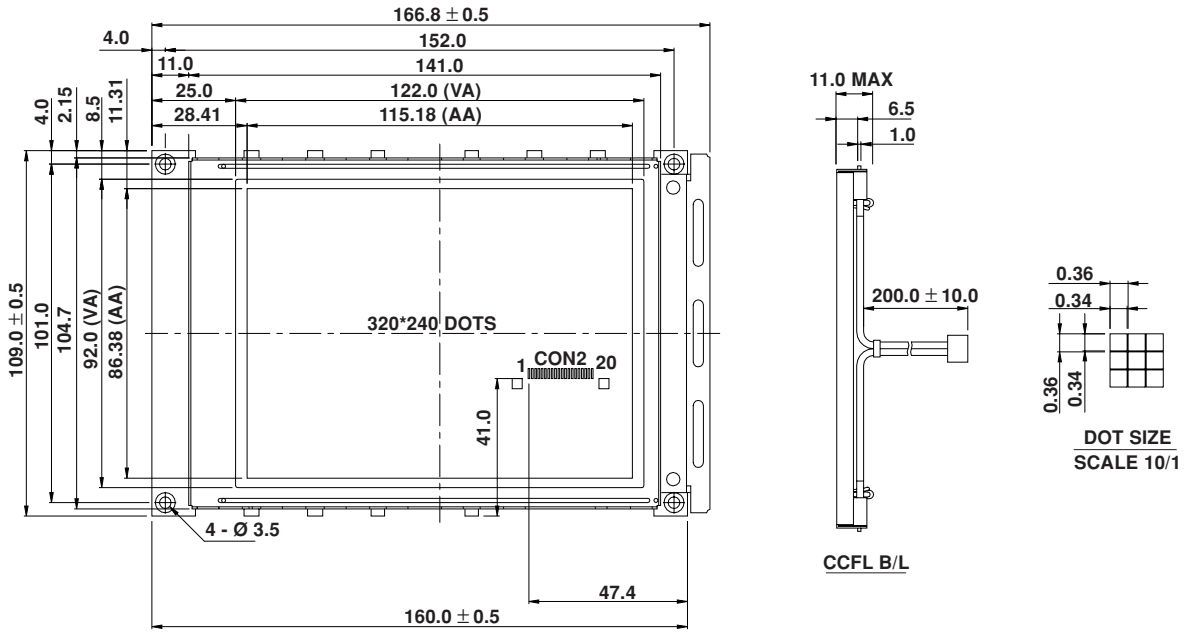
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

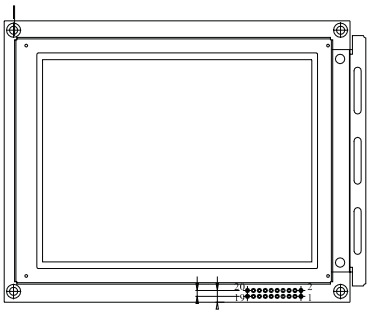
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V	–	100	105	mA
Recommended LC Driving	VDD - V0	0°C	22.0	23.0	24.0	V
Voltage for Normal Temp.		25°C	21.3	22.2	23.0	
Version Module		50°C	19.5	20.8	22.1	
CCFL Starting Voltage	VFLS	25°C	–	600	–	Vrms
CCFL Driving Voltage	VFLD	25°C	–	268	–	Vrms
CCFL Driving Current	IFLD	VFQ = 450Vrms 30KHz	–	5.0	–	mArms

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	Ground
2	Vdd	Power Supply for Logic
3	Vo	Driving Voltage for LCD
4	Ao	Data Type Select
5	$\overline{WR}$	8080 Family: Write Signal, 6800 Family: R/W Signal
6	$\overline{RD}$	8080 Family: Read Signal, 6800 Family: Enable Clock
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	$\overline{CS}$	Chip Select, Active L
16	$\overline{RES}$	Controller Rest Signal Active L
17	Vee	Negative Voltage Output
18	SEL1	H: 68, L: 80
19	FGND	Frame Ground
20	NC	No Connection

DIMENSIONS in millimeters



320 x 24 Dots Graphic LCD



FEATURES

- Built-in SED 1335 controller and SRAM
- Built-in negative voltage generator
- 1/240 duty cycle
- Touch screen option (analog type)
- Temperature compensation option

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	148.0 x 120.24	mm
Viewing Area	120.14 x 92.14	mm
Dot Size	0.34 x 0.34	mm
Dot Pitch	0.36 x 0.36	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

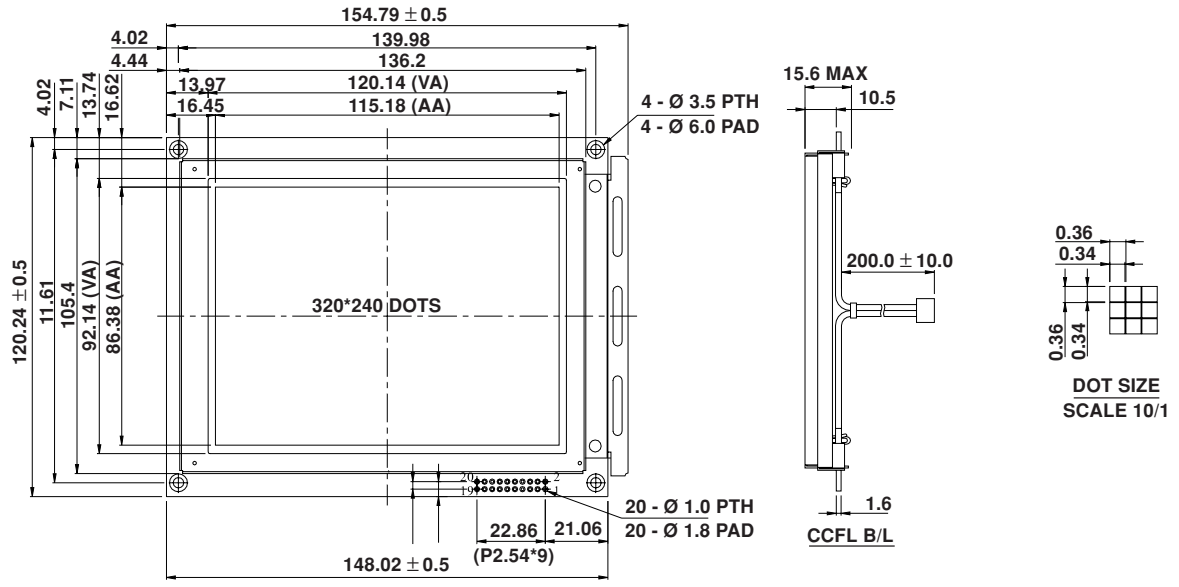
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

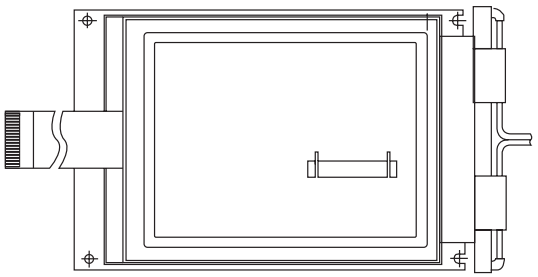
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V	–	100	105	mA
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	0°C	22.0	23.0	24.0	V
		25°C	21.3	22.2	23.0	
		50°C	19.5	20.8	22.1	
CCFL Starting Voltage	VFLS	25°C	–	600	–	Vrms
CCFL Driving Voltage	VFLD	25°C	–	268	–	Vrms
CCFL Driving Current	IFLD	VFQ = 450Vrms 30KHz	–	5.0	–	mArms
LED Forward Voltage	VF	25°C	–	4.2	4.6	V
LED Forward Current	IF	25°C	–	180	360	mA
EL	IEL	Vel = 110VAC; 400Hz	–	–	5.0	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	Ground
2	Vdd	Power Supply for Logic
3	Vo	Driving Voltage for LCD
4	$\overline{RD}$	8080 Family: Read Signal, 6800 Family: Enable Clock
5	$\overline{WR}$	8080 Family: Write Signal, 6800 Family: R/W Signal
6	Ao	Data Select Type RD = L WR = H, A0 = L: Data Read AO = H: Status Read RD = H WR = L, A0 = L: Data Read AO = H: Command Write For 80 Family R/W = L A0 = H: Command Write A0 = L: Data Write R/W = H A0 = H: Status Read AO = L: Data Read For 68 Family
7	DB0	Data Bus Line
8	DB1	Data Bus Line
9	DB2	Data Bus Line
10	DB3	Data Bus Line
11	$\overline{DB4}$	Data Bus Line
12	$\overline{DB5}$	Data Bus Line
13	DB6	Data Bus Line
14	DB7	Data Bus Line
15	CS	Chip Select, Active L
16	RES	Controller Rest Signal Active L
17	Vee	Negative Voltage Output (Optional)
18	FGND	Frame Ground
19	NC	No Connection
20	NC	No Connection

DIMENSIONS in millimeters



320 x 240 Dots Graphic LCD



FEATURES

- 320 x 240 dots
- + 5V power supply
- 1/240 duty cycle
- No controller
- Touch screen option

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	142.0 x 96.0	mm
Viewing Area	104.0 x 79.3	mm
Mounting Hole	135.0 x 88.0	mm
Dot Pitch	0.3 x 0.3	mm

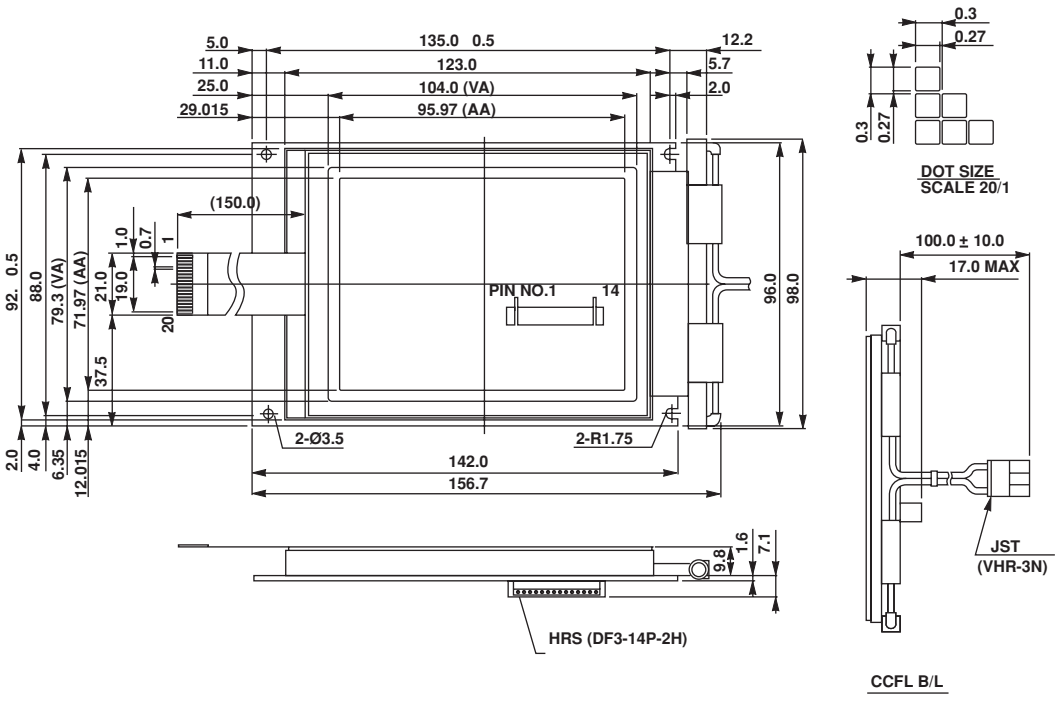
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	4.75	5.0	5.25	V
Input Voltage	VI	- 0.3	–	VDD	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

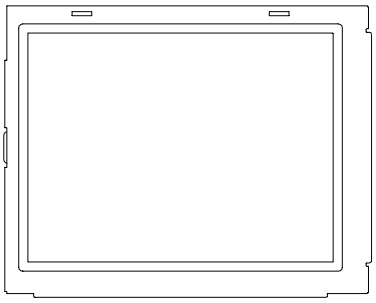
ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	L level	$0.7V_{DD}$	–	V_{DD}	V
	VIO	H level	0	–	$0.3V_{DD}$	V
Supply Current	IDD	VDD = 5V	–	10.0	15.0	mA
Recommended LC Driving	VDD - V0	0°C	22.0	23.0	24.0	V
Voltage for Normal Temp. Version Module		25°C	21.3	22.2	23.0	
		50°C	19.5	20.8	22.1	
CCFL Starting Voltage	VFLS	25°C	–	600	–	Vrms
CCFL Driving Voltage	VFLD	25°C	–	268	–	Vrms
CCFL Driving Current	IFLD	VFQ = 450Vrms 30KHz	–	5.0	–	mArms

PIN NUMBER	SYMBOL	FUNCTION
1	FRAME	First Line Marker
2	DF	Alternate Signal
3	LOAD	Data Latch
4	CP	Data Shift
5	$\overline{\text{DISPOFF}}$	H: ON L: OFF
6	D	Data Bus Line
7	D	Data Bus Line
8	D	Data Bus Line
9	D	Data Bus Line
10	Vdd	Power Supply for LOGIC
11	Vss	GND
12	Vee	Negative Voltage
13	Vo	Operating Voltage LCD Driving
14	FG	Fix Hole Ground

DIMENSIONS in millimeters



320 x 240 Dots Graphic LCD



FEATURES

- 320 x 240 dots FSTN
- 4-bit data bus
- Built-in EL backlight & EL inverter
- + 5V power supply
- 1/240 duty cycle

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	92.2 (H) x 73.3 (W) x 7.8	mm
Viewing Area	81.4 x 62.2	mm
Dot Size	0.22 x 0.22	mm
Dot Pitch	0.24 x 0.24	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	–	5.0	6.5	V
Input Voltage	VI	$0.8V_{DD}$	–	VDD	V

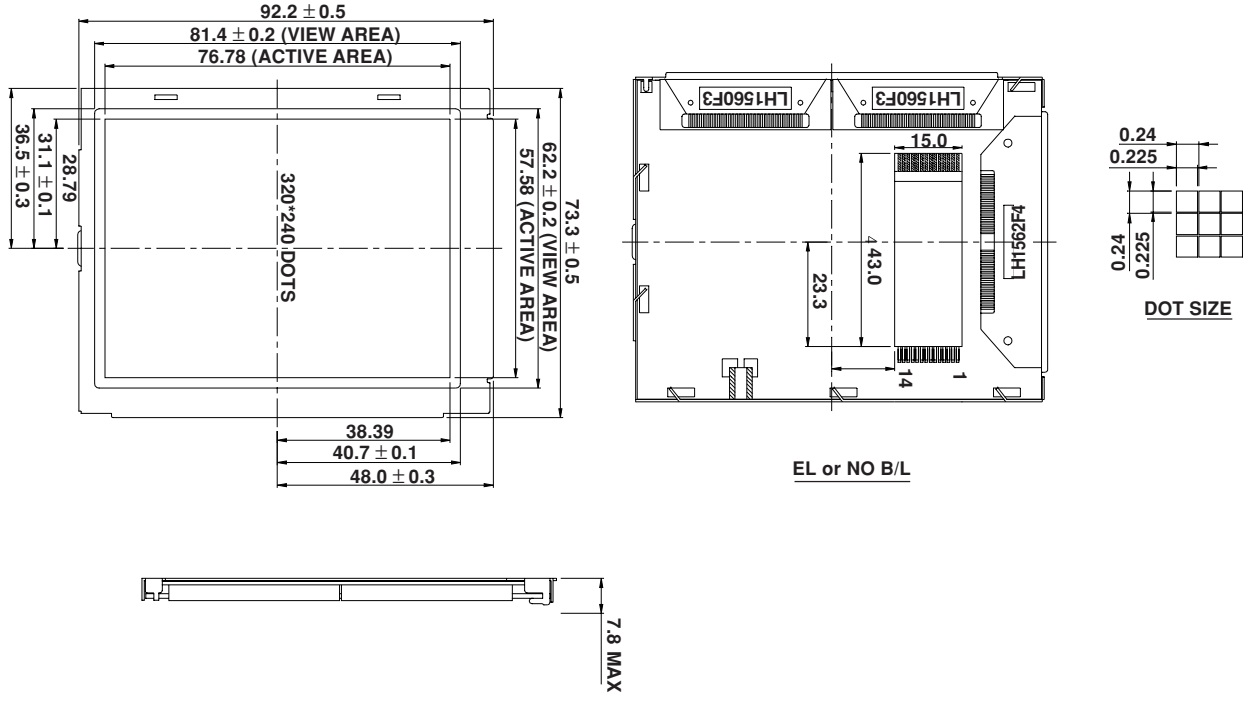
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

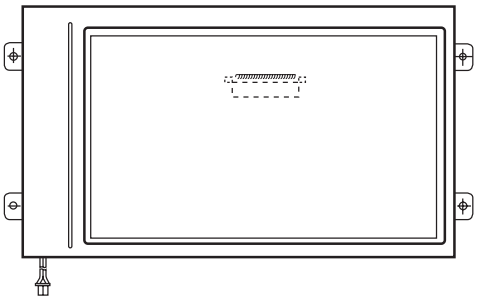
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	L level	$0.8V_{DD}$	–	V_{DD}	V
	VIO	H level	V_{SS}	–	$0.2V_{DD}$	V
Supply Current	IDD	VDD = 5V	–	–	–	mA
Recommended LC Driving	VDD - V0	0°C	–	–	–	V
Voltage for Normal Temp.		25°C	–	21.6	–	
Version Module		50°C	–	–	–	
LED Forward Voltage	VF	25°C	–	–	–	V
LED Forward Current	IF	25°C	–	–	–	mA
Power Consumption	–	VDD = 5V VEE = 21.6V VEL = 5V	–	0.52	–	mA

PIN NUMBER	SYMBOL	FUNCTION
1	CL2 (SCP)	Data Shift Pulse
2	CL1 (LP)	Data Latch Pulse
3	FLM	Scan Start-Up Signal
4	M (N.C)	Frame Reverse Signal (Alternate Signal)
5	DB0	Display Data
6	DB1	Display Data
7	DB2	Display Data
8	DB3	Display Data
9	Vee	Power Supply for LCD (+V)
10	Vdd	Power Supply for LOGIC
11	Vss	Power Supply (0V)
12	BLE	H:EL Enable L:EL Disable
13	V_{ELG}	Power Supply for EL (GND, 0V)
14	V_{EL}	Power Supply for EL (+)

DIMENSIONS in millimeters



480 x 320 Dots Graphic LCD



FEATURES

- 480 x 320 dots FSTN
- 8-bits data bus
- 3.3 power supply
- 1/320 duty cycle
- White LED backlight

MECHANICAL DATA

ITEM	STANDARD VALUE	UNIT
Module Dimension	156.0 x 94.9	mm
Viewing Area	120.2 x 81.8	mm
Dot Size	0.228 x 0.228	mm
Dot Pitch	0.24 x 0.24	mm
Mounting Hole	150 x 56.8	mm

ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	STANDARD VALUE			UNIT
		MIN.	TYP.	MAX.	
Power Supply	VDD-VSS	–	3.3	–	V
Input Voltage	VEE	–	23.5	–	V

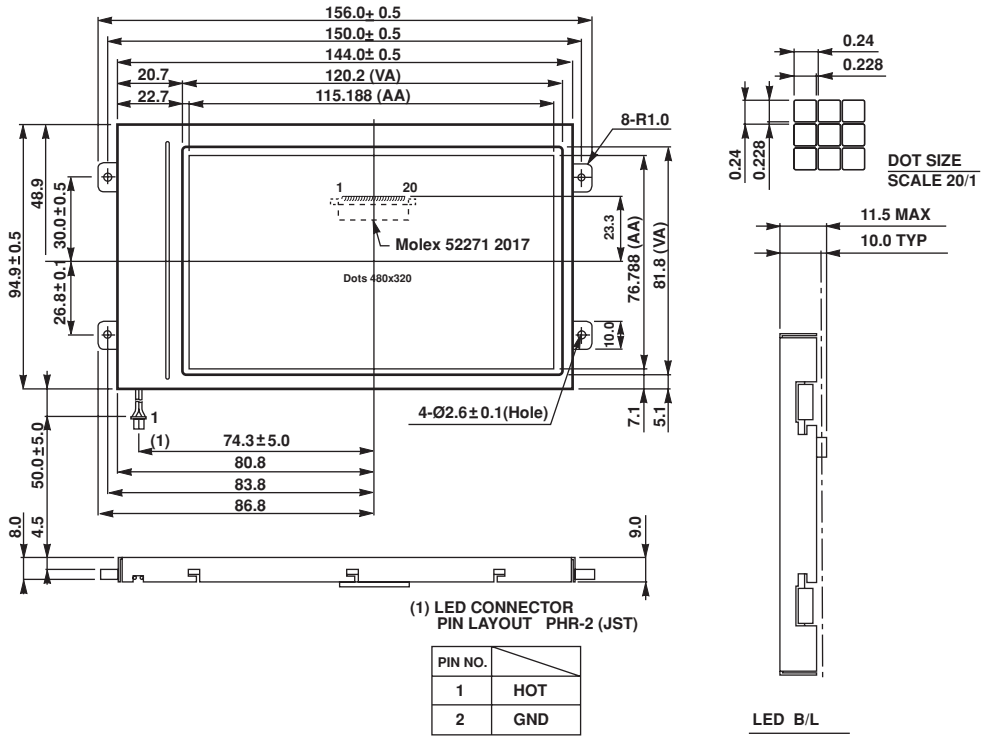
NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS

ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN.	TYP.	MAX.	
Input Voltage	VDD	L level	$0.9V_{DD}$	–	–	V
	VIO	H level	–	–	$0.1V_{DD}$	V
Recommended LC Driving	VDD - V0	0°C	–	24.7	–	V
Voltage for Normal Temp.		25°C	–	23.5	–	
Version Module		50°C	–	22.5	–	
LED	VF	25°C	–	3.5	–	V
LED	IF	25°C	–	140	–	mA
Power Consumption	–	VDD = 5V VEE = 25.5V	–	6	–	mA

PIN NUMBER	SYMBOL	FUNCTION
1	Vss	GND
2	Vss	GND
3	Vdd	Power Supply for Logid (3.3V)
4	S	Scan Start-up Signal
5	M(NC)	Frame Reverse Signal (Alternate Signal)
6	CP1	Data Latch Signal
7	ENAB	Display Data Enable Signal
8	CLK	Data Shift Pulse
9	DB0	Display Data Signal
10	DB1	Display Data Signal
11	DB2	Display Data Signal
12	DB3	Display Data Signal
13	DB4	Display Data Signal
14	DB5	Display Data Signal
15	DB6	Display Data Signal
16	DB7	Display Data Signal
17	Vee	Power Supply for LCD
18	Vdd	Power Supply for Logic
19	Vss	GND
20	Vss	GND

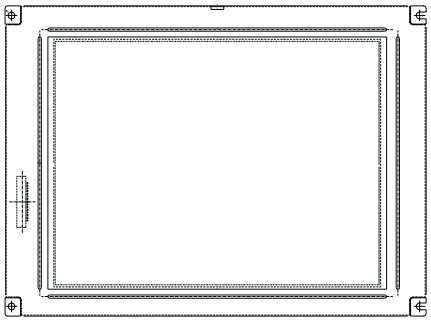
DIMENSIONS in millimeters



(1) LED CONNECTOR
PIN LAYOUT PHR-2 (JST)

PIN NO.	
1	HOT
2	GND

640 x 480 Dots Graphic LCD



FEATURES

- 640 x 480 dots FSTN
- 8-bits data bus
- + 5V power supply
- 1/240 duty cycle
- FSTN negative type only

MECHANICAL DATA		
ITEM	**STANDARD VALUE**	**UNIT**
Module Dimension	197.0 x 145.0	mm
Viewing Area	153.0 x 115.7	mm
Dot Size	0.217 x 0.217	mm
Dot Pitch	0.237 x 0.237	mm

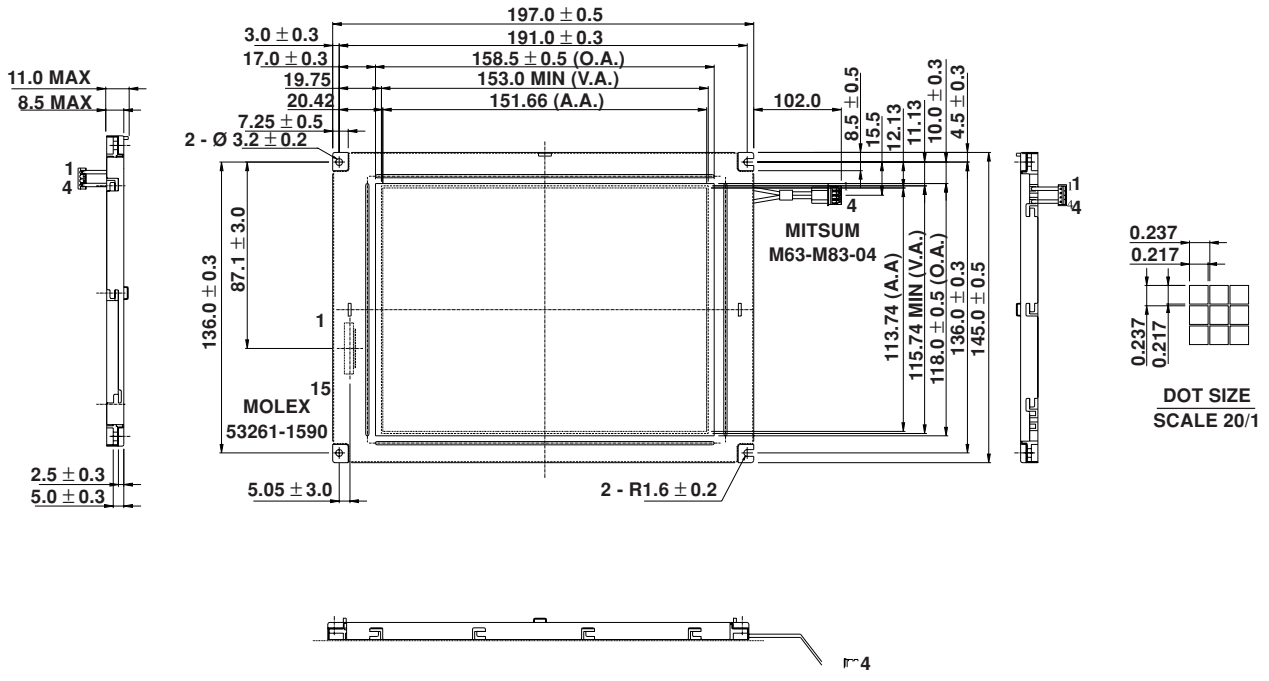
ABSOLUTE MAXIMUM RATING					
ITEM	**SYMBOL**	**STANDARD VALUE**			**UNIT**
		MIN.	**TYP.**	**MAX.**	
Power Supply	VDD-VSS	–	5.0	–	V
Input Voltage	VEE	–	2.3	–	V

NOTE: VSS = 0 Volt, VDD = 5.0 Volt

ELECTRICAL SPECIFICATIONS						
ITEM	**SYMBOL**	**CONDITION**	**STANDARD VALUE**			**UNIT**
			MIN.	**TYP.**	**MAX.**	
Input Voltage	VDD	L level	$0.8V_{DD}$	–	–	V
	VIO	H level	–	–	$0.2V_{DD}$	V
Recommended LC Driving Voltage for Normal Temp. Version Module	VDD - V0	0°C	–	24.7	–	V
		25°C	–	23.0	–	
		50°C	–	22.5	–	
LED Forward Voltage	VF	25°C	–	–	–	V
LED Forward Current	IF	25°C	–	–	–	mA
Power Consumption	–	VDD = 5V VEE = 25.5V	–	2.6	–	mA

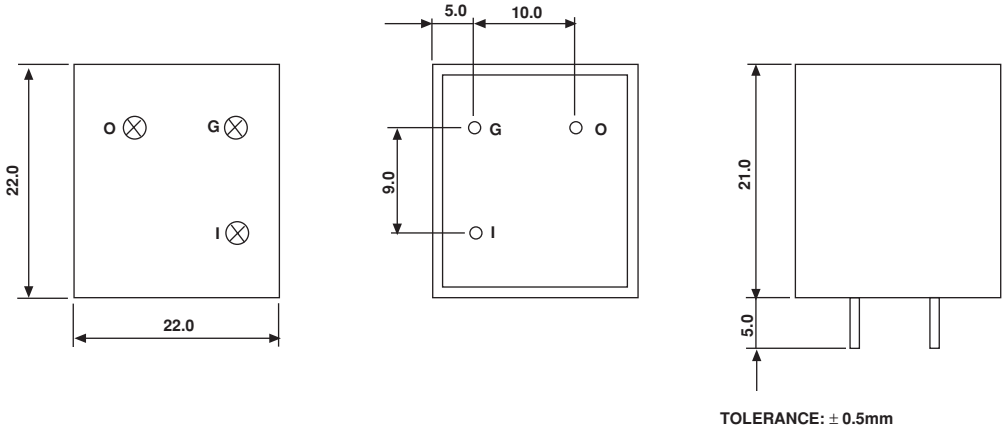
PIN NUMBER	SYMBOL	FUNCTION
1	FP	Frame Pulse
2	LP	Latch Pulse in One Line
3	SCP	Shift Clock Pulse for X-Drivers
4	DISP	Sequence Signal of Power Supply (L:OFF)
5	Vdd	Power Supply for Contrast Control
6	GND	Ground (0V)
7	Vee	Power Supply for LCD
8	UD0	Data Input for Upper Screen (LSB)
9	UD1	Data Input for Upper Screen
10	UD2	Data Input for Upper Screen
11	UD3	Data Input for Upper Screen
12	LD0	Data Input for Lower Screen
13	LD1	Data Input for Lower Screen
14	LD2	Data Input for Lower Screen
15	LD3	Data Input for Lower Screen (MSB)

DIMENSIONS in millimeters



Inverter for EL Panel

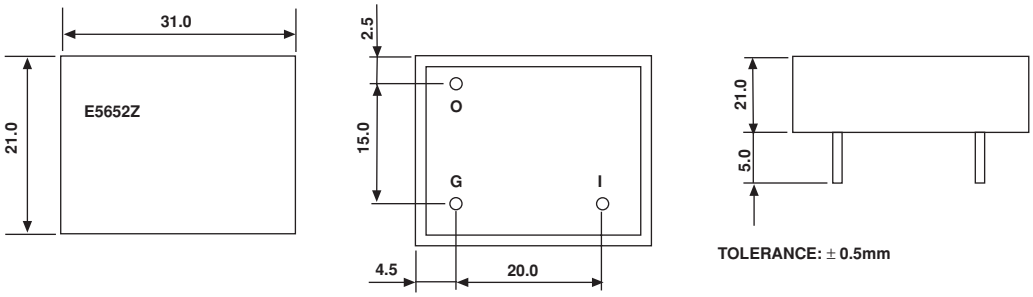
PART NUMBER: WIEL 1



Input DC	5V ± 10%
Output DC	90Vrms ± 15%
Input Current	95mA max
EL Area	84cm^2
Operating Temp	- 20°C ~ 70°C
Storage Temp	- 30°C ~ 80°C

PIN NUMBER	DESCRIPTION
1	Input DC Voltage
G	DC/AC ground
O	Output AC Voltage

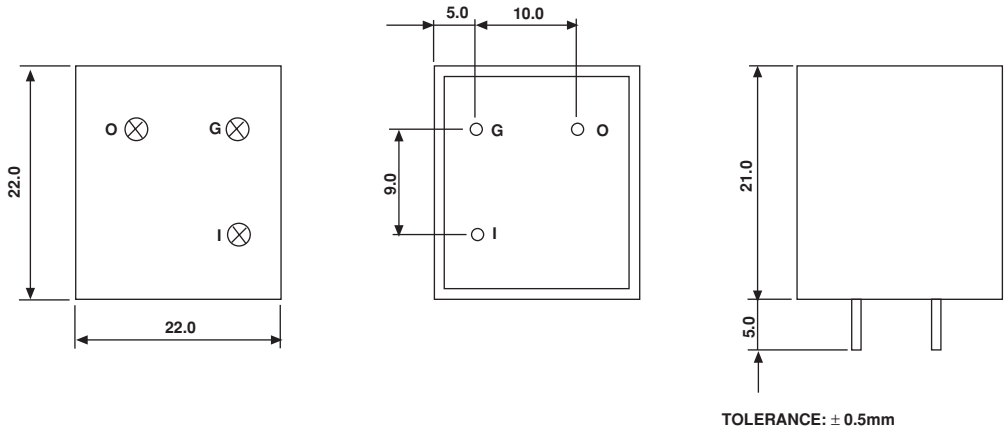
PART NUMBER: WIEL 2



Input DC	5V ± 10%
Output DC	80Vrms ± 15%
Input Current	60mA max
EL Area	30 ~ 80cm^2
Operating Temp	- 20°C ~ 70°C
Storage Temp	- 30°C ~ 80°C

PIN NUMBER	DESCRIPTION
1	Input DC Voltage
G	DC/AC ground
O	Output AC Voltage

PART NUMBER: WIEL 3

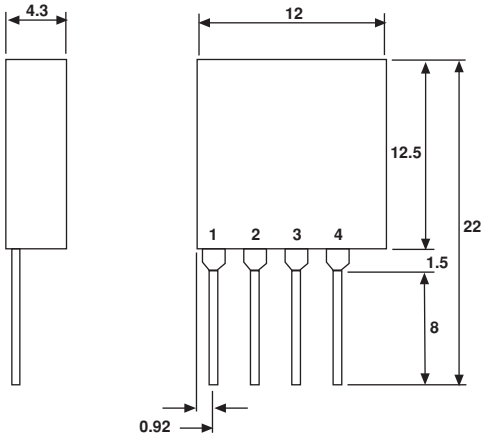


TOLERANCE: ± 0.5mm

Input DC	5V ± 10%
Output DC	120Vrms ± 15%
Input Current	100mA max
EL Area	100 ~ 260cm^2
Operating Temp	- 20°C ~ 70°C
Storage Temp	- 30°C ~ 80°C

PIN NUMBER	DESCRIPTION
1	Input DC Voltage
G	DC/AC ground
O	Output AC Voltage

PART NUMBER: WIEL 4



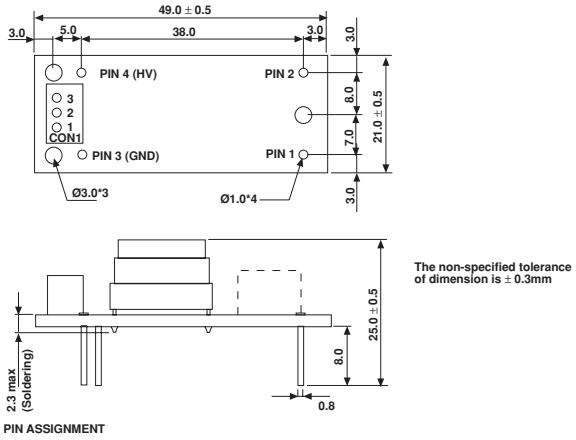
P2.54* 3 = 7.62

Input DC	3V ± 10%
Output DC	160Vrms ± 15%
Input Current	86mA max
EL Area	84cm^2
Operating Temp	- 20°C ~ 70°C
Storage Temp	- 30°C ~ 80°C

PIN NUMBER	DESCRIPTION
1	VSS
2	EL1
3	EL2
4	VDD

Inverter for CCFL Lamp

PART NUMBER: WICCFL1

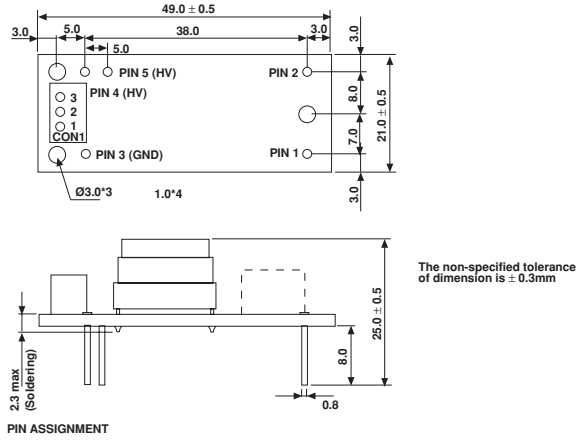


Input DC	5V ± 10%
No Load Operating Volt	650Vrms
Input Current	0.45A max
Frequency	37.0KHz ± 5%
Operating Temp	- 10°C ~ 80°C
Operating Temp	- 20°C ~ 85°C

INPUT CONNECTOR	
PIN NUMBER	**FUNCTION**
PIN 1	V +
PIN 2	GND

OUTPUT(CON1) CONNECTOR 2532-03	
PIN NUMBER	**FUNCTION**
1	GND
2	NC
3	HV

PART NUMBER: WICCFL2

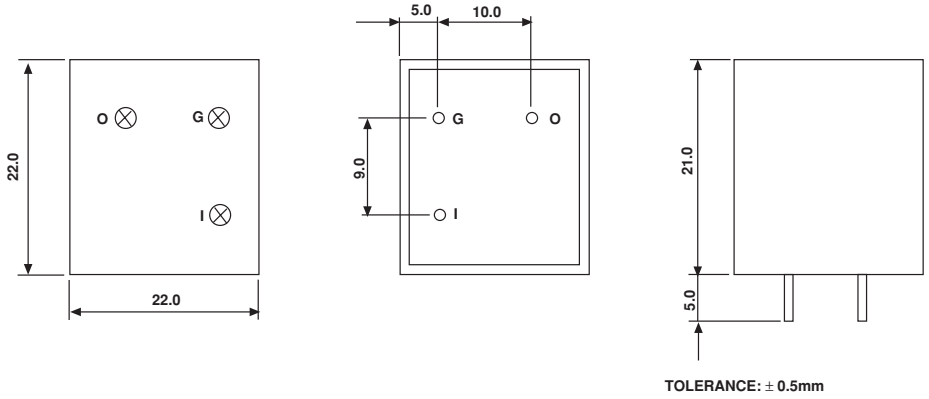


Input DC	12V ± 10%
No Load Operating Volt	750Vrms
Input Current	0.30A max
Frequency	37.0KHz ± 5%
Operating Temp	- 10°C ~ 80°C
Operating Temp	- 20°C ~ 85°C

INPUT CONNECTOR	
PIN NUMBER	**FUNCTION**
PIN 1	VIN
PIN 2	GND

OUTPUT(CON1) CONNECTOR 2532-03	
PIN NUMBER	**FUNCTION**
1	GND
2	NC
3	HV

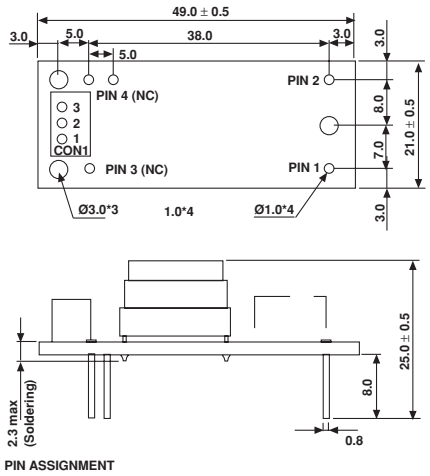
PART NUMBER: WICCFL3



Input DC	5V ± 10%
No Load Operating Volt	750Vrms
Input Current	0.32A max
Frequency	45.0KHz ± 5%
Operating Temp	- 10°C ~ 80°C
Operating Temp	- 20°C ~ 85°C

PIN ASSIGNMENT	
PIN NUMBER	**FUNCTION**
1	+ VIN
2	GND
3	Iout1
4	Iout2
5	Iout-reture

PART NUMBER: WICCFL4

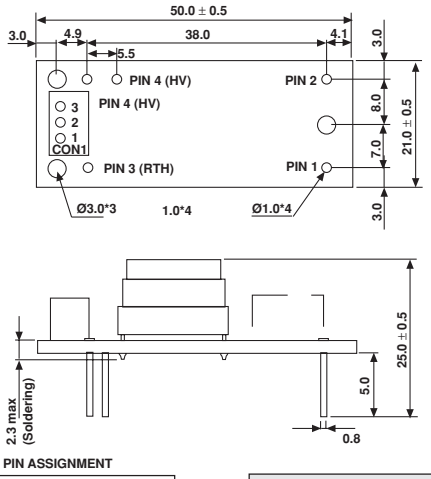


Input DC	5V ± 10%
No Load Operating Volt	950Vrms
Input Current	0.35A max
Frequency	38.0KHz ± 5%
Operating Temp	- 10°C ~ 80°C
Operating Temp	- 20°C ~ 85°C

INPUT CONNECTOR	
PIN NUMBER	**FUNCTION**
PIN 1	VIN
PIN 2	GND

OUTPUT(CON1) CONNECTOR 2532-03	
PIN NUMBER	**FUNCTION**
1	GND
2	NC
3	X

PART NUMBER: WICCFL5



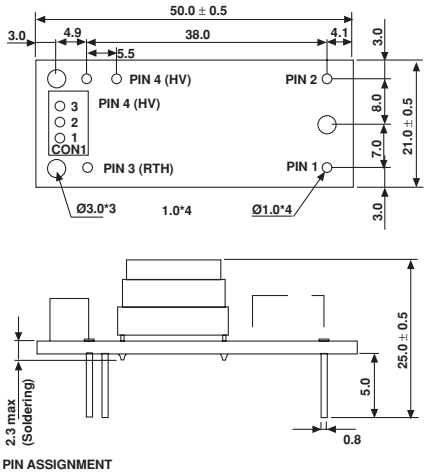
PIN ASSIGNMENT

Input DC	12V ± 10%
No Load Operating Volt	850Vrms
Input Current	0.35A max
Frequency	38.0KHz ± 5%
Operating Temp	- 10°C ~ 80°C
Operating Temp	- 20°C ~ 85°C

INPUT CONNECTOR	
PIN NUMBER	**FUNCTION**
PIN 1	VIN
PIN 2	GND

OUTPUT(CON1) CONNECTOR 2532-03	
PIN NUMBER	**FUNCTION**
1	RTH
2	NC
3	HV

PART NUMBER: WICCFL6



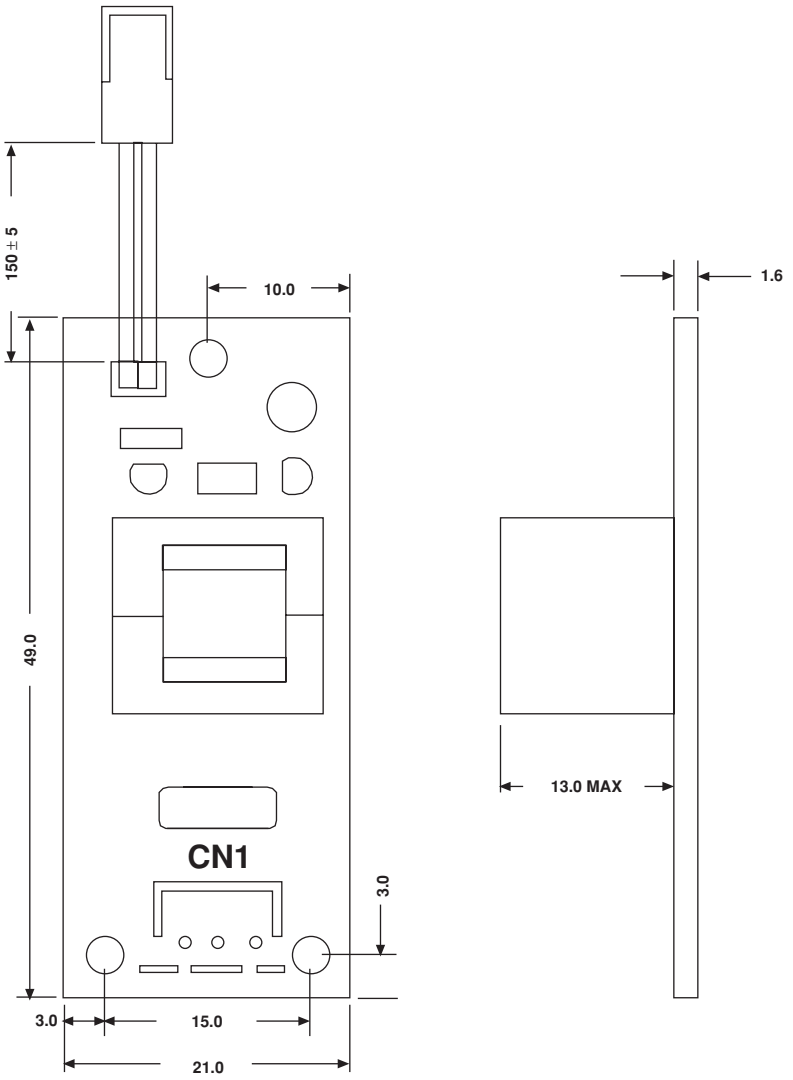
PIN ASSIGNMENT

Input DC	5V ± 10%
No Load Operating Volt	1000Vrms
Input Current	0.41A max
Frequency	34.0KHz ± 5%
Operating Temp	- 10°C ~ 80°C
Operating Temp	- 20°C ~ 85°C

INPUT CONNECTOR	
PIN NUMBER	**FUNCTION**
PIN 1	VIN
PIN 2	GND

OUTPUT(CON1) CONNECTOR 2532-03	
PIN NUMBER	**FUNCTION**
1	RTH
2	NC
3	HV

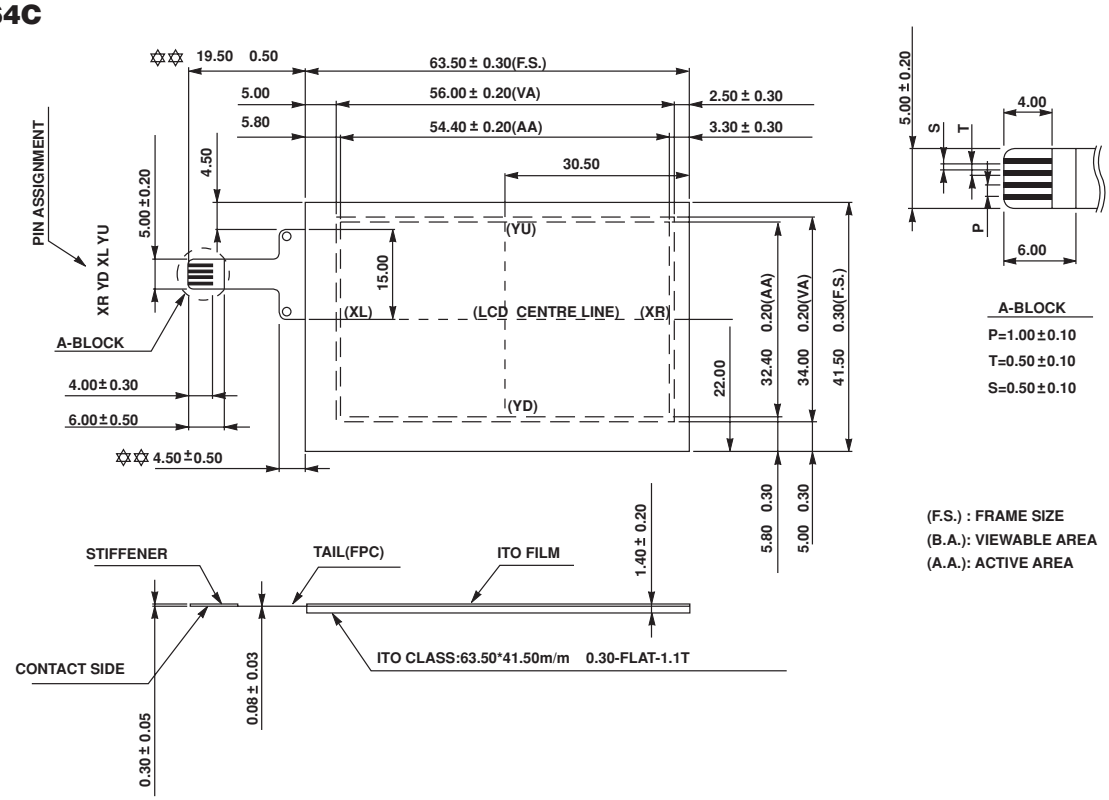
PART NUMBER: WICCFL8



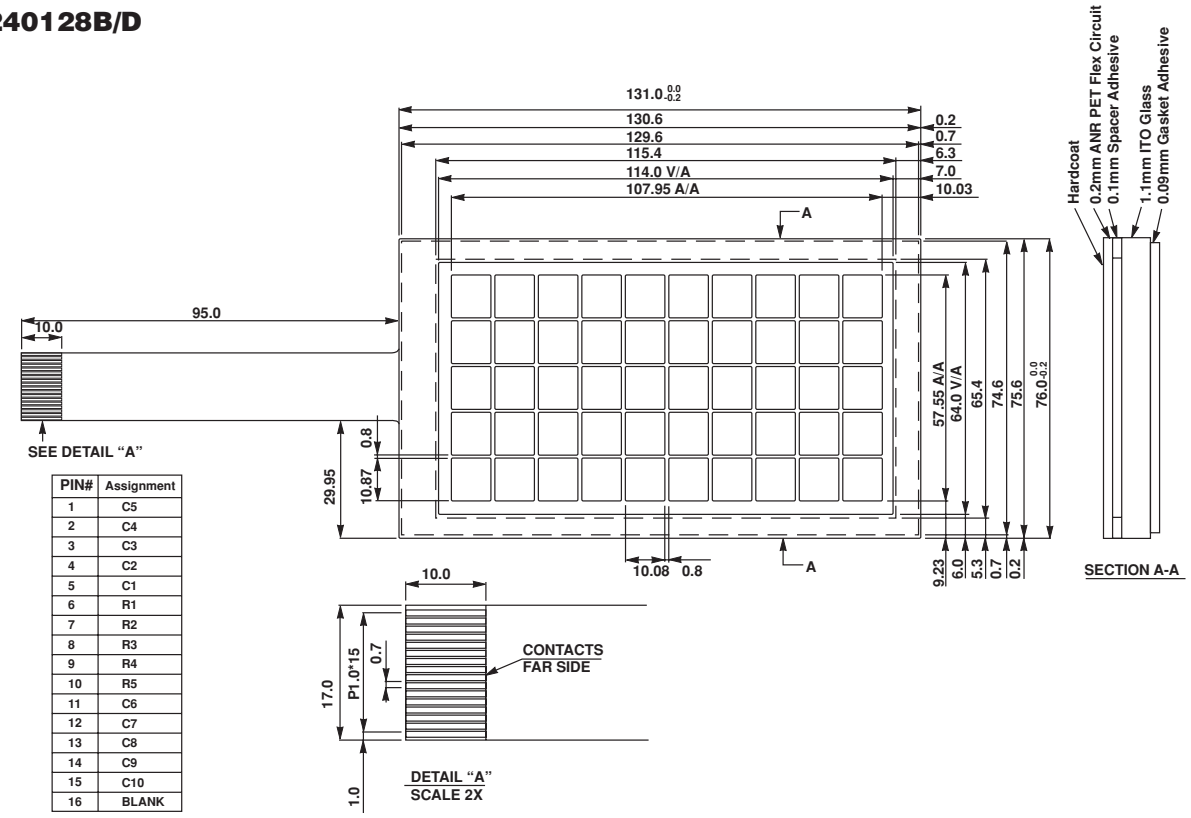
Input DC	24V ± 10%
No Load Operating Volt	940Vrms
Input Current	0.09A max
Frequency	56.0KHz ± 5%
Operating Temp	- 10°C ~ 80°C
Operating Temp	- 20°C ~ 85°C

Touch Panel Outline Dimensions

WX12864C

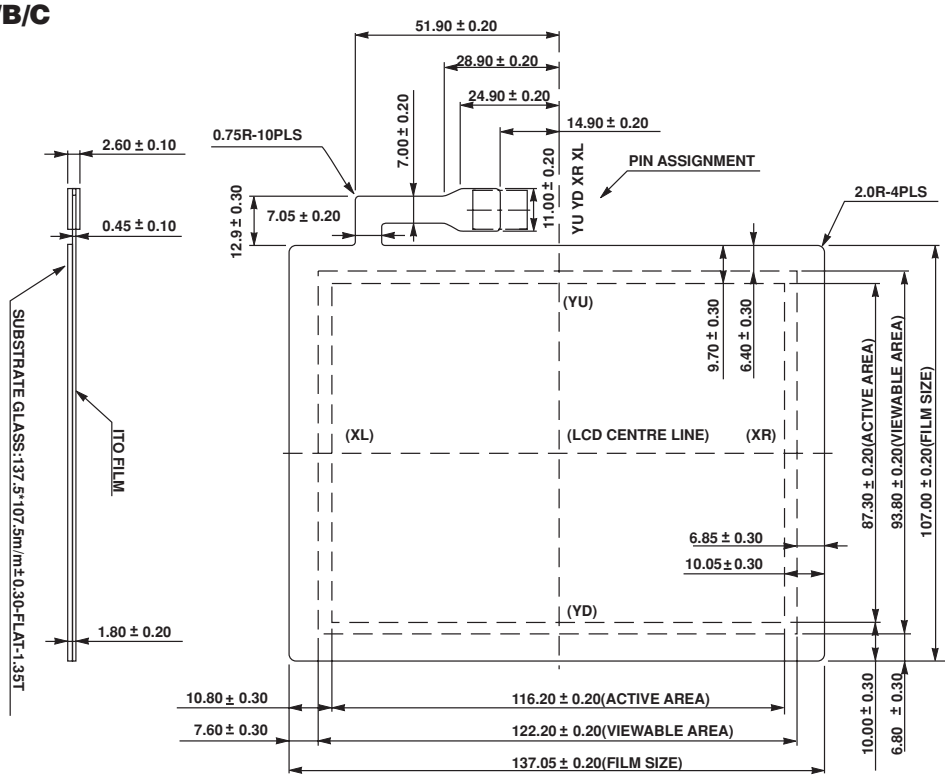


WG240128B/D

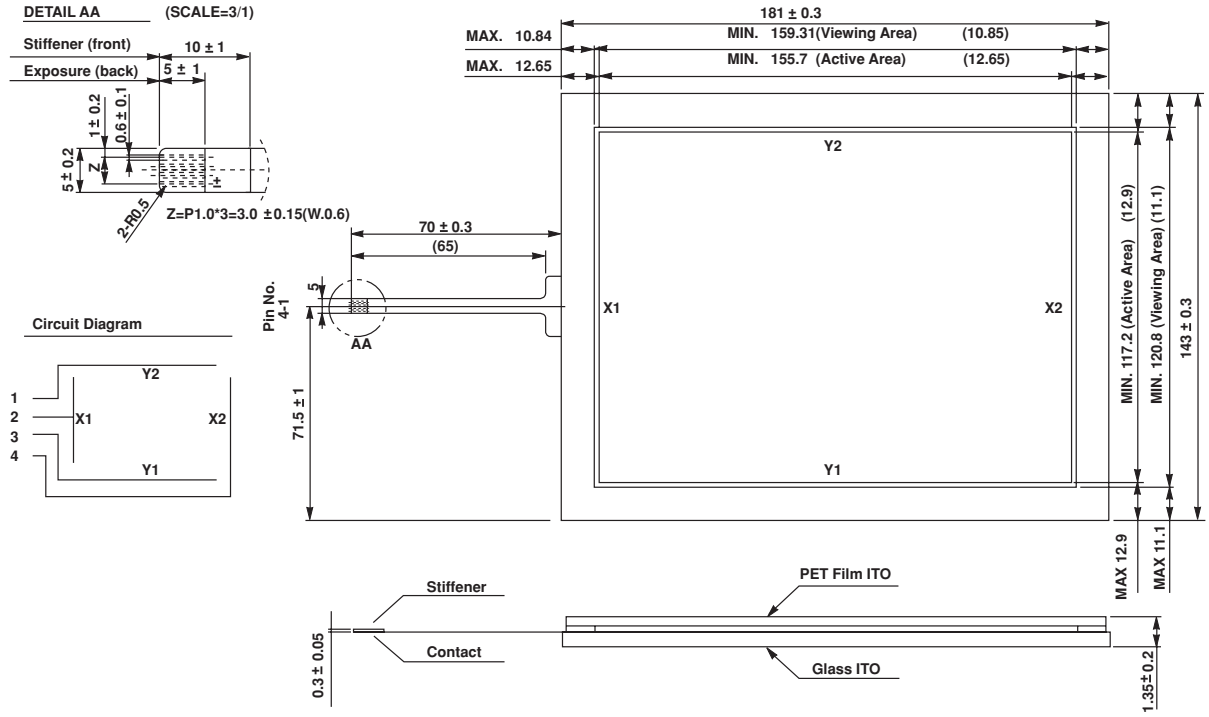


PIN#	Assignment
1	C5
2	C4
3	C3
4	C2
5	C1
6	R1
7	R2
8	R3
9	R4
10	R5
11	C6
12	C7
13	C8
14	C9
15	C10
16	BLANK

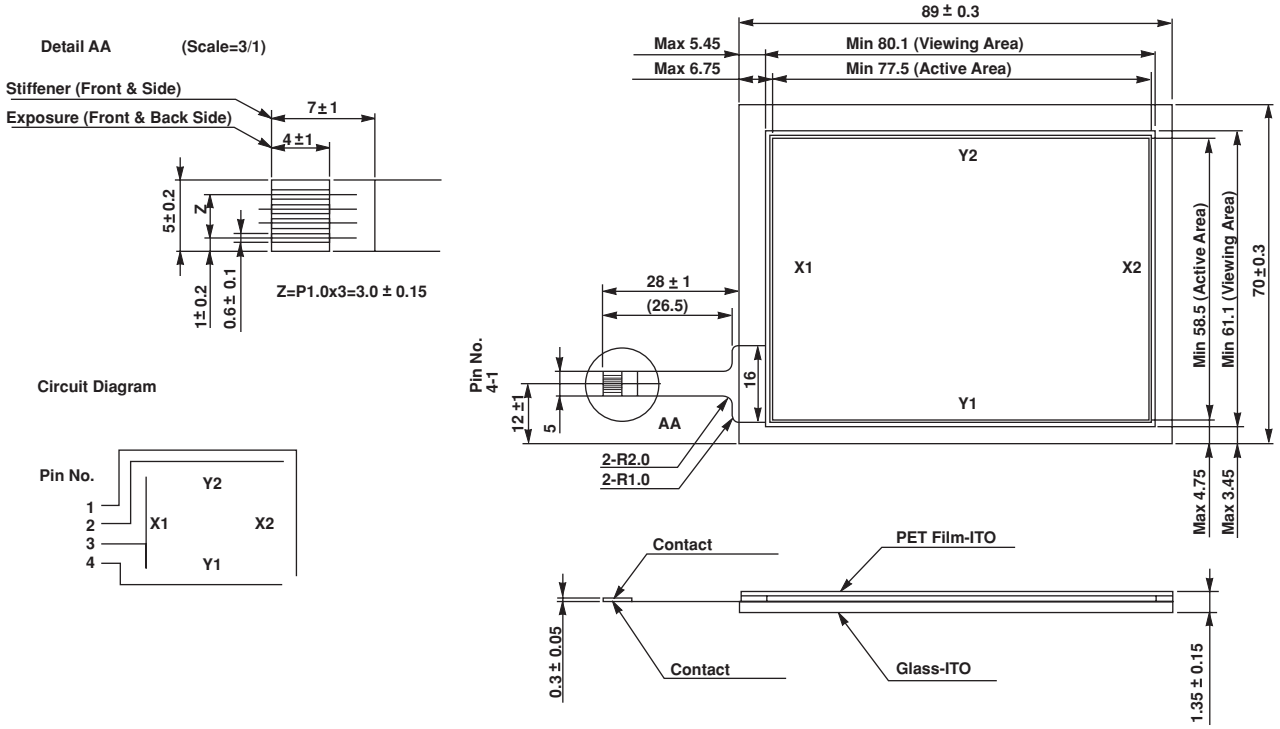
WG320240A/B/C



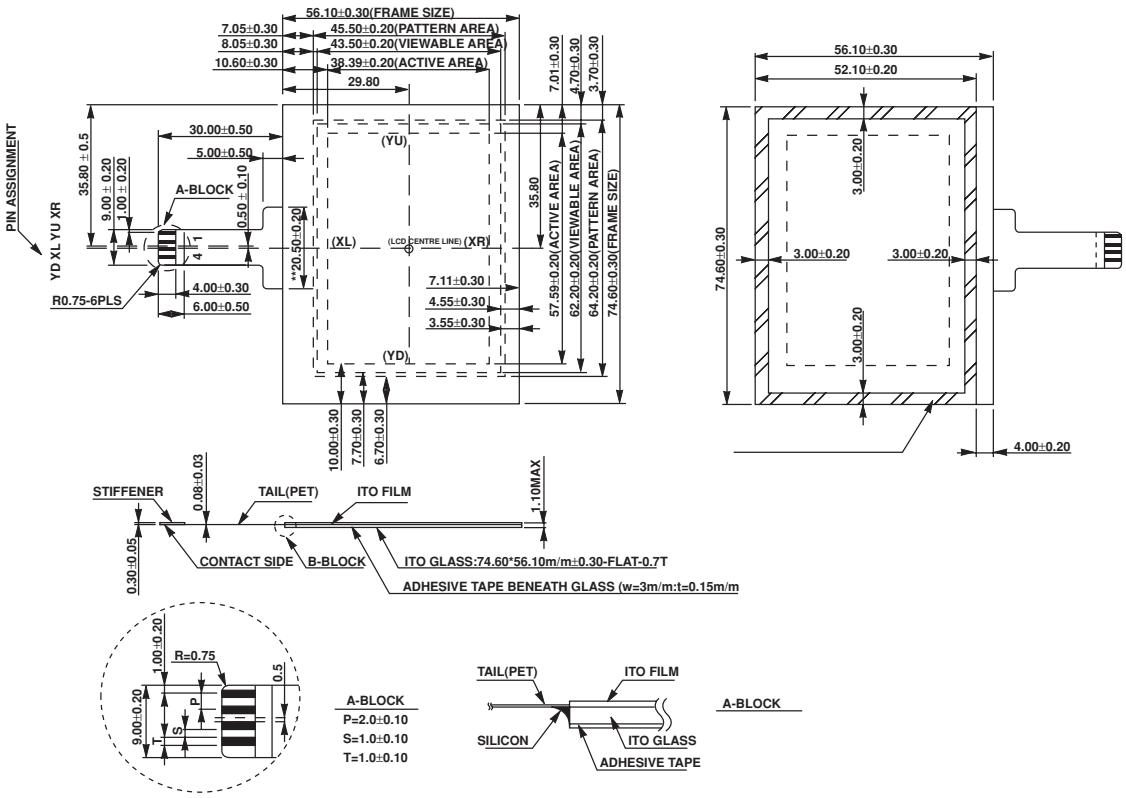
WX640480A



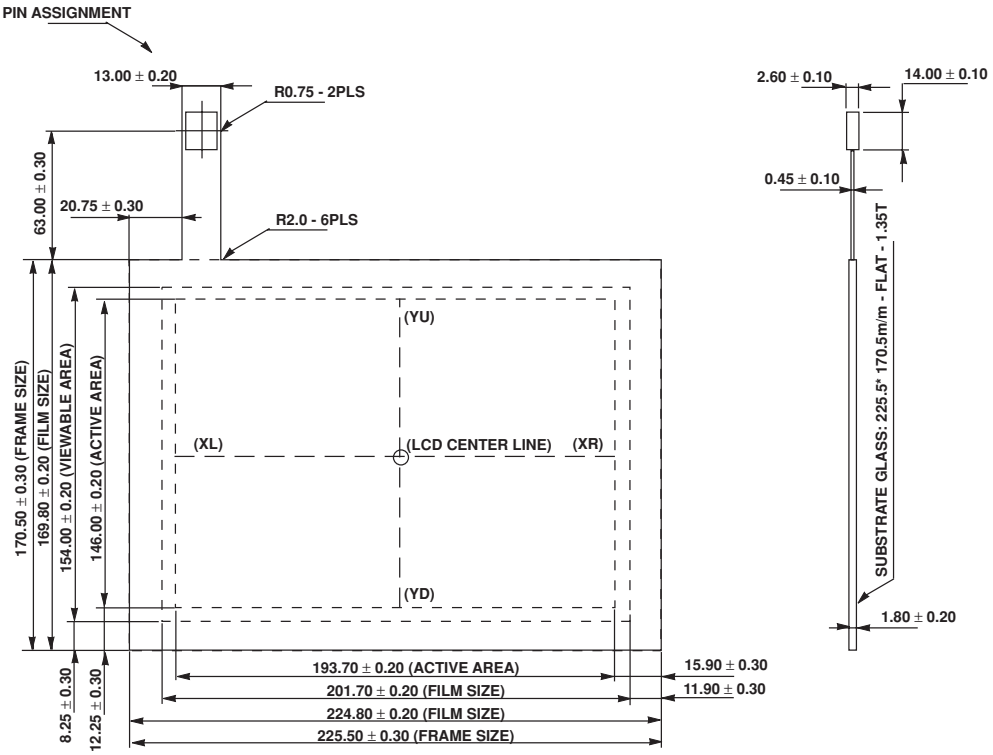
WX320240A



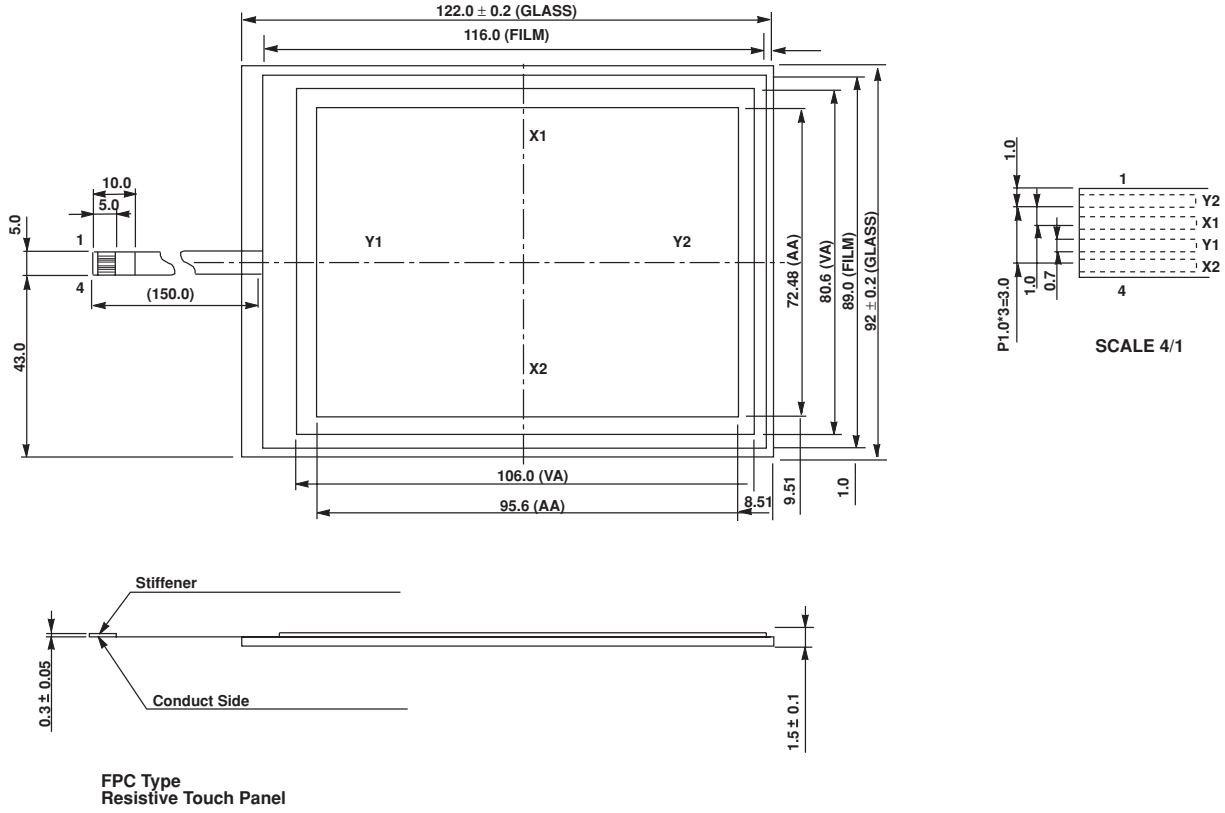
WX240160A/B



WX640480A

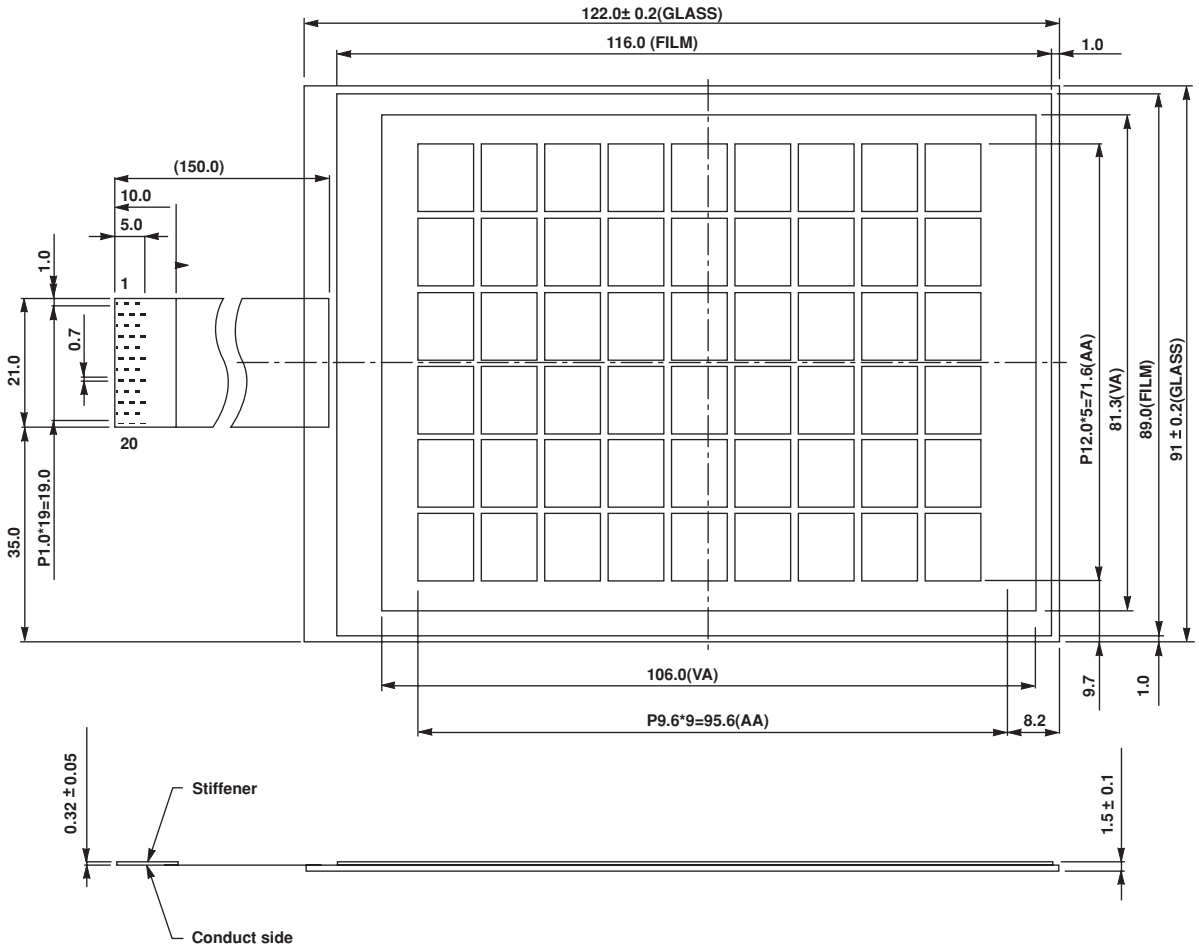


WG320240D



FPC Type
Resistive Touch Panel

WG320240D

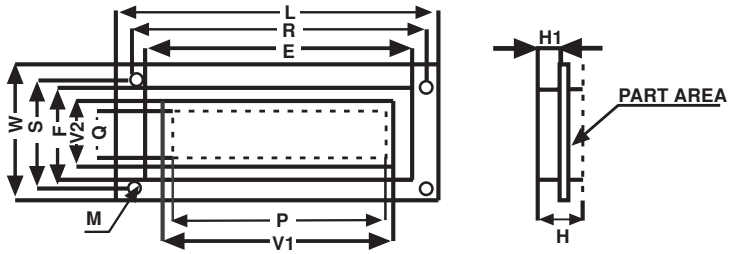

122.0± 0.2(GLASS)
116.0 (FILM)
1.0
(150.0)
10.0
5.0
1.0
1
0.7
21.0
20
35.0
P1.0*19=19.0
P12.0*5=71.6(AA)
81.3(VA)
89.0(FILM)
91 ± 0.2(GLASS)
106.0(VA)
9.7
1.0
P9.6*9=95.6(AA)
8.2
0.32 ± 0.05
Stiffener
1.5 ± 0.1
Conduct side

Glossary

TERM	EXPLANATION
COB (Chip on board)	An IC chip is mounted onto a printed circuit board by wire bonding.
COF (Chip on fpc)	A chip product is mounted on a FPC.
EL (Electro luminescence)	Light generated by an electric field. An EL layer is formed on a high molecular weight film and is used as an EL light source for a liquid crystal display.
FSTN (Formulated STN)	An optically compensated film is added to a STN, and used as a monochrome display.
LED (Light emitting diode)	A diode which emits light for backlight.
PCB (Print circuit board)	A printed circuit board.
PFP (Plastic film panel)	An LCD using plastic film on a cell base board.
QFP (quad flat package)	A package formed with leads on surfaces oriented in four directions.
QTP (quad tape carrier package)	Four directional type TCP.
SMT (surface mount technology)	Mounting on the surface.
STN (super twisted nematic)	A nematic liquid crystal with a twist of roughly 180 degrees to 270 degrees, and the type of display that uses it.
TCP (tape carrier package)	A flexible board printed with a circuit pattern, with ic chips mounted on it.
tf (fall time)	Response speed: falling edge time.
TN (twisted nematic)	A nematic liquid crystal with a twist of roughly 90 degrees, and the type of display that uses it.
TNR (tn with retardation film)	A type of color display which does not use a color filter, made by attaching a phase difference plate to a normal TN panel.
tr (rise time)	Response speed: rising edge time.
Vop (operating voltage)	LCD drive voltage/liquid crystal drive voltage
Vth (threshold voltage)	A threshold voltage.
COG (chip on glass)	An IC chip mounted onto glass.

Custom Designed LCM

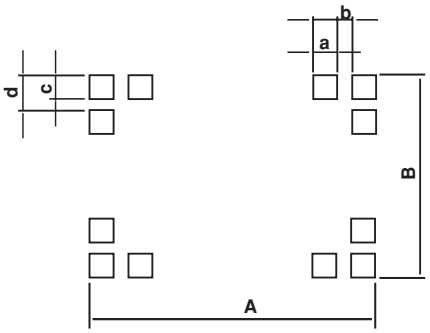
1. DIMENSIONS in millimeters



L x W:	Module size ____ x ____ mm		S:	Length between mounting holes ____ mm	
E x F:	Bezel size ____ x ____ mm		M:	Diameter of mounting hole ____ mm	
V1 x V2:	View area ____ x ____ mm		H:	Total thickness ____ mm	
P x Q:	Displays area ____ x ____ mm		H1:	Upper thickness ____ mm	
R:	Length between mounting holes ____ mm				

2. DISPLAY RESOLUTION

☐ Graphic Type



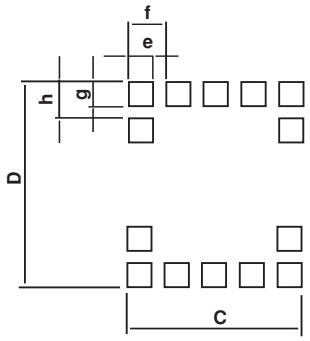
Resolution: ____ x ____

Dot size: a = ____ mm x c = ____ mm

Dot pitch: b = ____ mm x d = ____ mm

Active area: a = ____ mm x b ____ mm

☐ Character Type



Resolution: ____ characters x ____ lines

Font: ☐ 5 x 7 ☐ 5 x 8 ☐ 5 x 11 ☐ 5 x 7 + cursor

Dot size: e = ____ mm x g = ____ mm

Dot pitch: f = ____ mm x h = ____ mm

Character size: c = ____ mm x d = ____ mm

Check List

Vishay — Custom Designed LCM

3. DISPLAY MODE

*Viewing Angle: (Viewing Direction)

☐ 6 O'clock ☐ 12 O'clock ☐ O'clock

*Type

☐ STN ☐ Yellow ☐ Gray ☐ Blue

☐ FSTN ☐ Normally Black ☐ Normally White

☐ Others _____

☐ Positive Type ☐ Negative Type

Rear Polarizer:

☐ Reflective ☐ Transflective ☐ Transmissive

4. POLARIZER

*Visual Specifications

☐ Normal ☐ Anti-glare

☐ Special Requirement _____

5. OPERATION VOLTAGE

☐ Operation Voltage _____ V

☐ Multiplexing: 1/_____ Duty, 1/_____ Bias

☐ According to Winstar's Design

*Frame Frequency _____ Hz

6. IC

Controller: _____ ☐ Built-in ☐ External

Driver: ☐ Segment drive _____

7. DEVELOPING SCHEDULE

*Sample: Delivery _____ quantity: _____ pcs

*Mass production: Delivery _____

quantity _____ pcs/month

total quantity _____ pcs

8. POWER SOURCE

* ☐ Single power supply ☐ _____ 5V ☐ _____ V

* ☐ 2 power supplies

for logic: VDD-VSS = _____ V

for LCD drive: VDD-VO = _____ V

9. CONTRAST ADJUSTMENT

*Method: _____

☐ Built-in ☐ External

10. TEMPERATURE RANGE

*Operating temperature range:

☐ _____ °C to _____ °C

*Storage temperature range:

☐ _____ °C to _____ °C

11. DEVELOPING SCHEDULE

*Sample: delivery _____ quanity _____ pcs

*Mass production: delivery _____

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