

DISPLAY Elektronik GmbH

DATA SHEET

LCD MODULE

DEM 122032A1 SYH-LY

Product Specification

Version:0

14.09.2021

GENERAL SPECIFICATION

MODULE NO. :

DEM 122032A1 SYH-LY

CUSTOMER P/N

Version NO.	Change Description	Date
0	Original Version	14.09.2021

PREPARED BY: LM

DATE: 14.09.2021

APPROVED BY: WH

DATE: 14.09.2021

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1. FUNCTIONS & FEATURES

- DEM 122032A1 Series LCD Type :

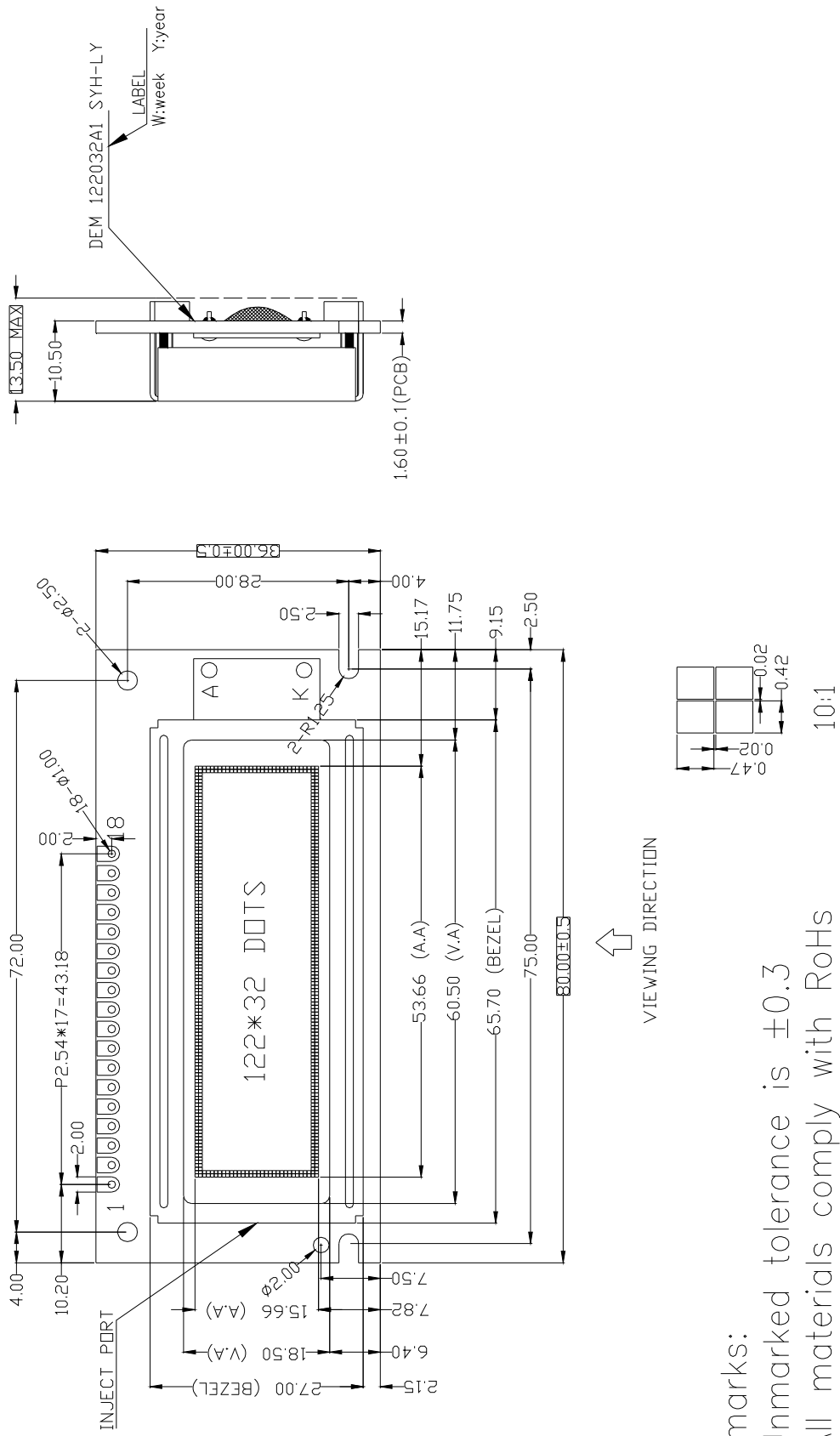
Module	LCD Type	Remark
DEM 122032A1 SYH-LY	STN Yellow-Green Transflective Positive Mode	-

- Viewing Direction : 6 O'clock
- Driving Scheme : 1/32 Duty Cycle, 1/5 Bias
- Power Supply Voltage : 5.0V
- LCD Driving Voltage : 3.9V
- Display Contents : 122 x 32 dots
- Interface : Parallel
- Driver IC : AiP31520
- RoHS Compliant

2. MECHANICAL SPECIFICATIONS

- Module Size : 80.00mm x 36.00mm x 13.50mm
- Viewing Area : 60.00mm x 18.50mm
- Active Area : 53.66mm x 15.66mm
- Dot Pitch : 0.44 x 0.49
- Dot Size : 0.42 x 0.47

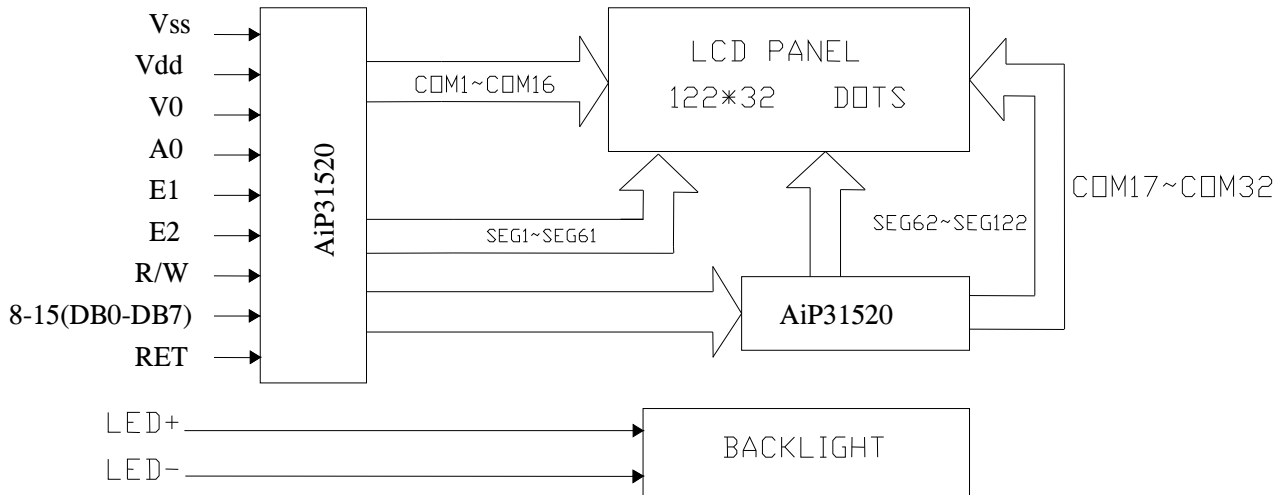
3. EXTERNAL DIMENSIONS



Remarks:

1. Unmarked tolerance is ±0.3
2. All materials comply with RoHS
3. ...:critical dimension.

4. BLOCK DIAGRAM



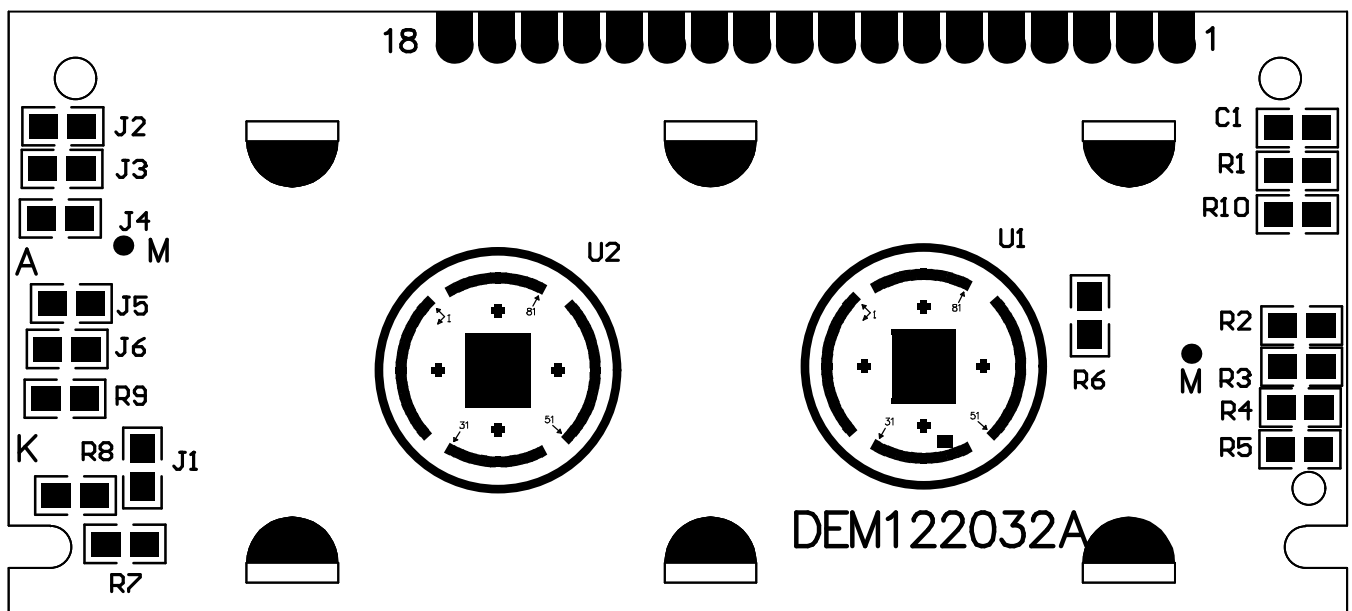
5. PIN ASSIGNMENT

Pin No.	Symbol	Function
1	VSS	0V, connected to system GND.
2	VDD	Connected to +5V power.
3	V0	Supply voltage for LCD drive
4	A0	Input pin. Normally, the LSB of the MPU address bus is connected to this input pin to provide data/command selection. 0: Display control data on D7-D0 1: Display data on D7-D0
5	E1	Operation (data read/write) enable signal (U1)
6	E2	Operation (data read/write) enable signal (U2)
7	R/W	Chip interface with 68 family MPU: Read/Write control signal input pin. R/W = "H":Read R/W = "L":Write Chip interfaced with 80 family MPU: "L" Active input pin to which the 80 family WR is connected. The signal on the data bus is fetched by the leading edge of WR.
8~15	DB0~DB7	8-bit, tri-state, bi-directional I/O bus. Normally, connected to the data bus of an 8-/16-bit standard microcomputer.
16	RST	Input pin. The AiP31520 can be reset or initialized by setting RESET to low level (if it is interfaced with a 68 family MPU) or high level (if with an 80 family MPU). This reset operation occurs when an edge of the RESET signal is sensed. The level input selects the type of interface with the 68 or 80 family MPU:

		High level: Interface with 68 family MPU Low level: Interface with 80 family MPU
17	VLED+	Power supply for backlight (Current:100m, Reference voltage:5.0V)
18	VLED-	Power supply for backlight

6.PCB DRAWING AND DESCRIPTION

6-1 PCB DRAWING



6-2.DESRIPTION:

6-2-1.The polarity of the pin 15 and the pin 16:

J2,J4	J3, J5	LED Polarity	
		17 Pin	18 Pin
Each open	Each closed	Anode	Cathode
Each closed	Each open	Cathode	Anode

Note: In application module: J3=J5=closed, J2=J4=open

6-2-2. The metal-bezel is set on ground when the J1 is closed.

Note: In application module: J1=closed

6-2-3.The LED resistor can be bridged when the J6 is closed.

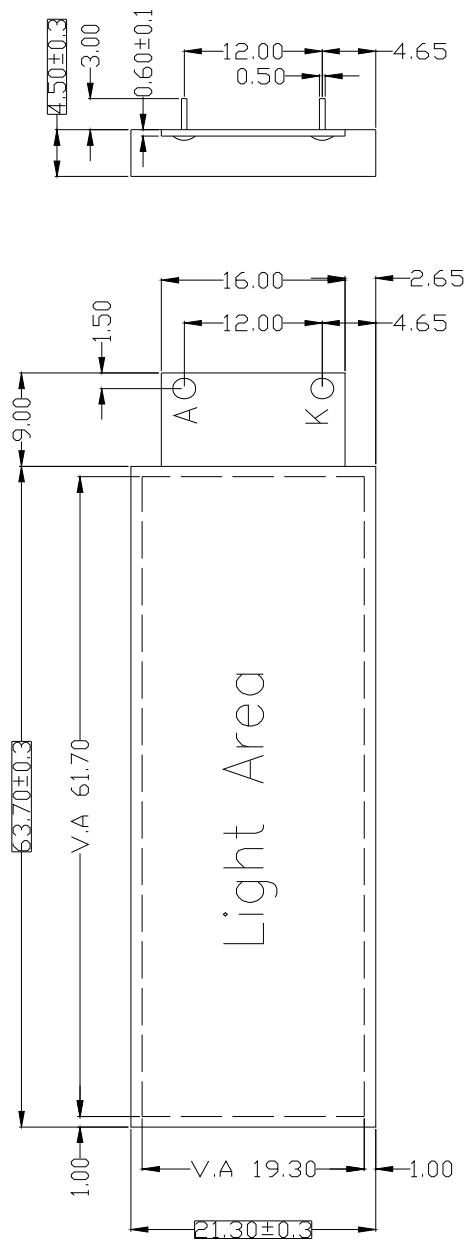
Note: In application module: J6=open

6-2-4.The R7 and the R8、 R9 is the LED resistor.

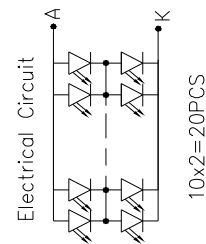
Note: R8=8.2Ω, R7= open, R9= open

7. BACKLIGHT ELECTRICAL/OPTICAL SPECIFICATIONS

Item	Symbol	min.	typ.	max.	Unit	Condition
Forward Voltage	Vf	4.0	4.2	4.4	V	If= 100 mA
Power Dissipation	Pd	400	420	440	mW	
Luminous Uniformity	ΔLv	75			%	MIN/MAX*100%
Luminance	Lv	150	200		cd/m ²	If=100mA T=25°C
Wavelength	λD	569	572	575		



Remarks:
 1. Unmarked tolerance is ± 0.3
 2. All materials comply with RoHs
 3. ...critical dimension.
 4. Color: Yellow-Green



8. MAXIMUM ABSOLUTE POWER RATINGS

($T_a=25^\circ\text{C}$, $V_{DD}=0\text{V}$)

Parameter	Symbol	Rating	Unit
Supply Voltage (1)	VSS	-8.0 to 0.3	V
Supply Voltage (2)	V5	-16.5 to 0.3	V
Supply Voltage (3)	V1, V4, V2, V3	V5 to 0.3	V
Input Voltage	V_{IN}	VSS -0.3 to 0.3	V
Output Voltage	V_{OUT}	VSS -0.3 to 0.3	V
Operating Temperature	T_{opr}	-20 to 70	$^\circ\text{C}$
Storage Temperature	T_{stg}	-30 to 80	$^\circ\text{C}$

9. ELECTRICAL CHARACTERISTICS

9.1 DC Characteristics

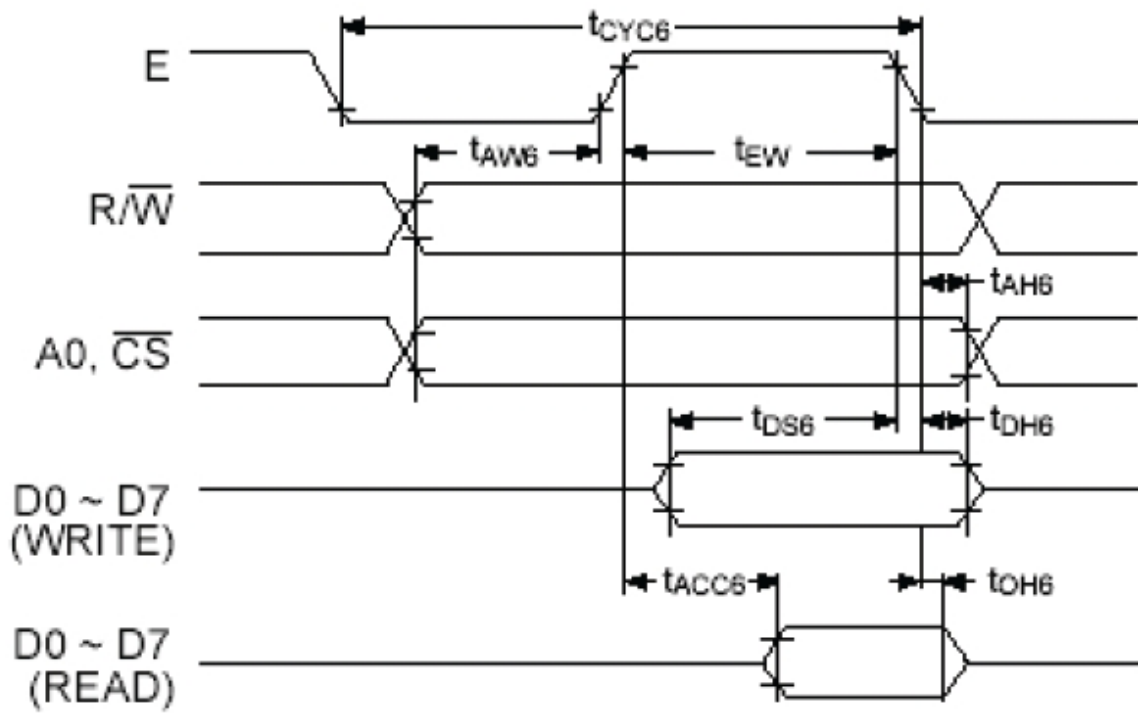
(Ta= 25°C, VSS= 0V)

Item	Symbol	Standard Value			Test Condition	Unit
		Min.	Typ.	Max.		
Operating Voltage	VDD	4.7	5.0	5.3	--	V
LCD Voltage	VLCD	3.6	3.9	4.2	VDD – V0	V
Supply Current	IDD	--	TBD	--		mA

9.2 AC Characteristics

READ/WRITE TIMING FOR THE 68-PORT MPU

Parameter	Signal	Symbol	Condition	Min.	Max.	Unit
System cycle time	A0, \overline{CS}	t _{CYC6}		1000		
Address setup time	R/ \overline{W}	t _{AW6}	-	20	-	ns
Address hold time		t _{AH8}		10		
Data setup time	D0-D7	t _{DS6}		80	-	ns
Data hold time		t _{DH6}		10	-	
Output disable time		t _{OH6}	10	60		
Access time		t _{ACC6}	-	90		
Enable pulse width	Read	E	-	100	-	ns
	Write			80	-	ns



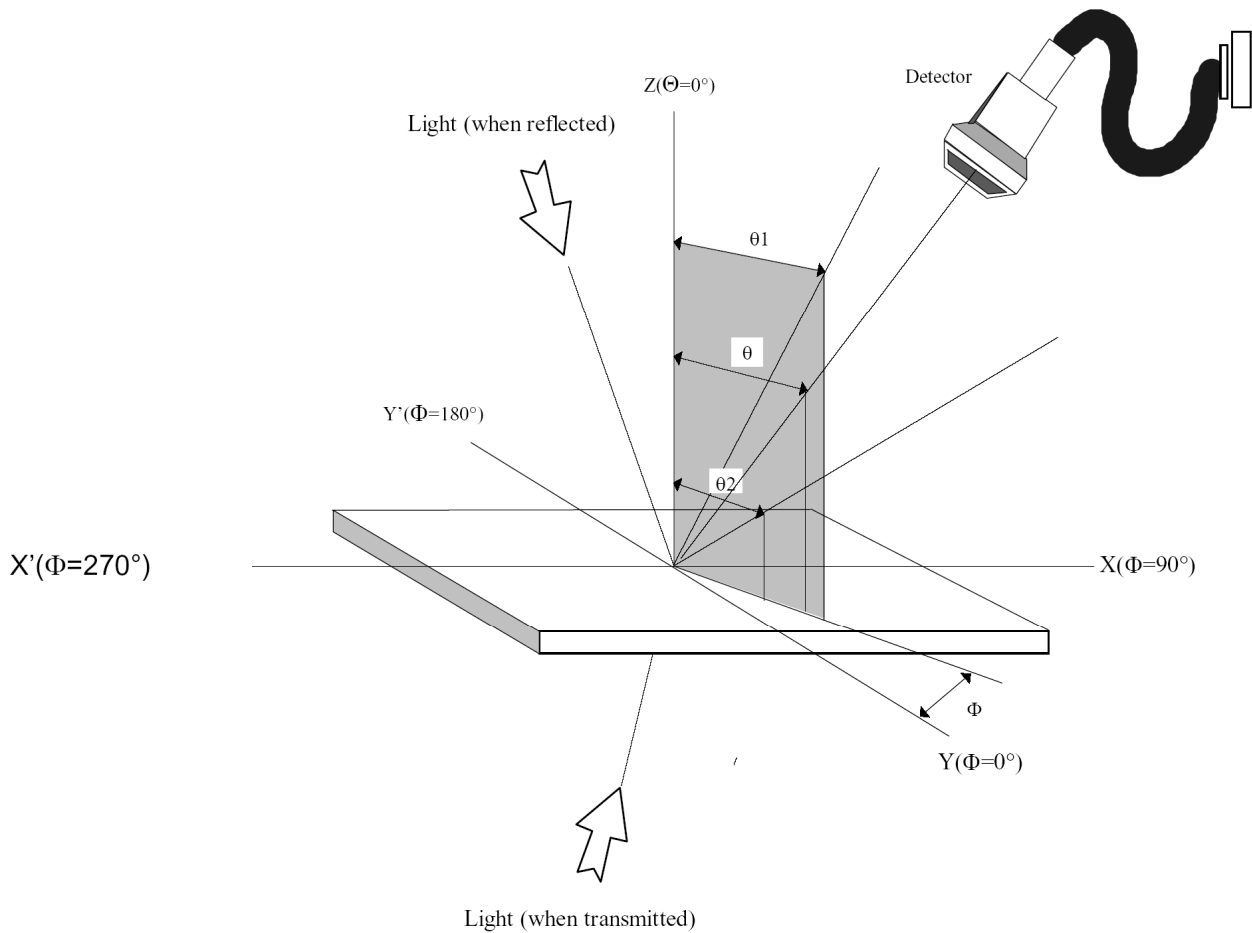
10. CONTROL AND DISPLAY COMMAND

Command	Code											Function
	A0	\overline{RD}	\overline{WR}	D7	D6	D5	D4	D3	D2	D1	D0	
Display ON/OFF	0	1	0	1	0	1	0	1	1	1	0/1	Turns all display on or off, independently of display RAM data or internal status. 1:ON 0:OFF
Display start line	0	1	0	1	1	0	Display Start Address (0~31)				Specifies RAM line corresponding to uppermost line (COM0) of display.	
Set page address	0	1	0	1	0	1	1	1	0	Page (0~3)		Sets display RAM page in page address register.
Set column address	0	1	0	0	Column Address (0~79)						Sets display RAM column address in column address register.	
Read status	0	0	1	BUSY	ADC	ON/OFF	RESET	0	0	0	0	Reads the following status: BUSY 1: Internal operation 0: Ready ADC 1: CW output(forward) 0: CCW output (reverse) ON/OFF 1: Display off 0: Display on RESET 1: Being reset 0: Normal
Write data	1	1	0	Write Data								Writes data from data bus into display RAM.
Read data	1	0	1	Read Data								Reads data from display RAM onto data bus.
Select ADC	0	1	0	1	0	1	0	0	0	0	0/1	Used to invert relationship of assignment between display RAM column addresses and segment

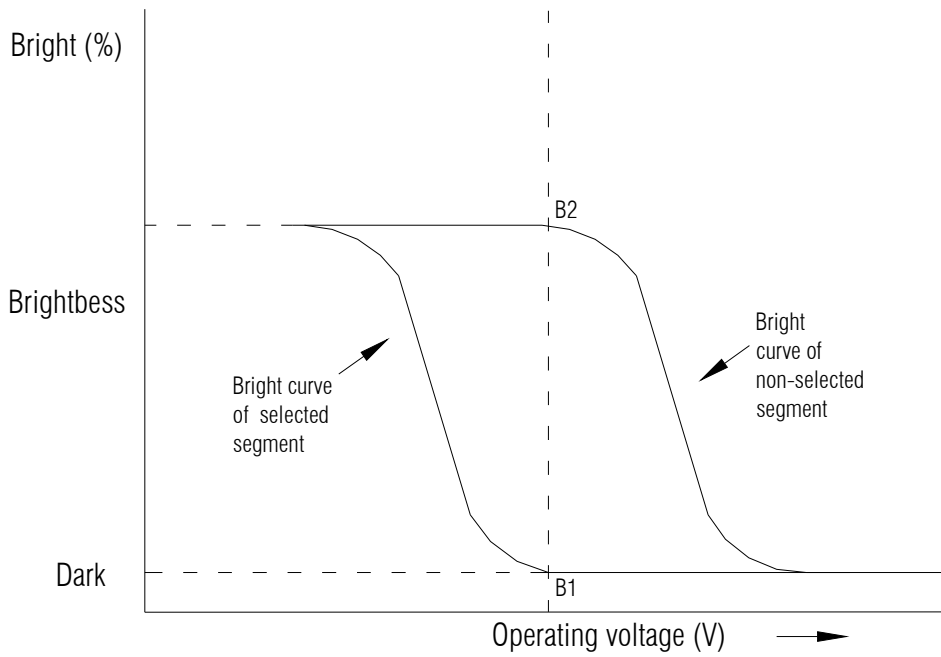
11. LCD ELECTRO-OPTICAL DEFINITION

Optical Characteristics

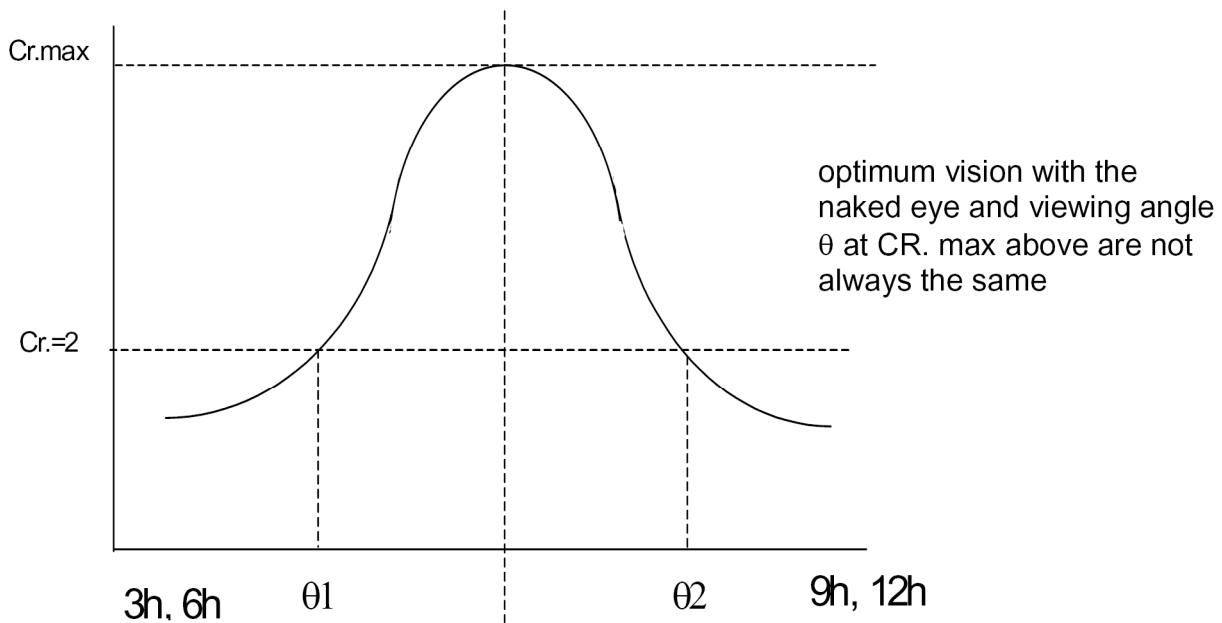
Item	Symbol	Description	Condition	Min	Typ	Max	Unt
Operating Voltage of	Vop	---	-20□	4.6	5.0	5.4	V
			25□	3.6	3.9	4.2	
			70□	3.6	4.0	4.4	
Response Time	Tr	Rise	Ta=25□	---	185	---	ms
	Tf	Fall		---	200	---	ms
Contrast	Cr		Ta=25□	---	4	---	---
Viewing Angle	□	6 o'clock axis	Cr≥2	---	40	---	deg
		12 o'clock axis		----	40	---	deg
		3 o'clock axis		---	40	---	deg
		9 o'clock axis		---	40	---	deg



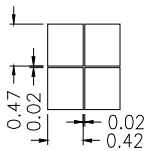
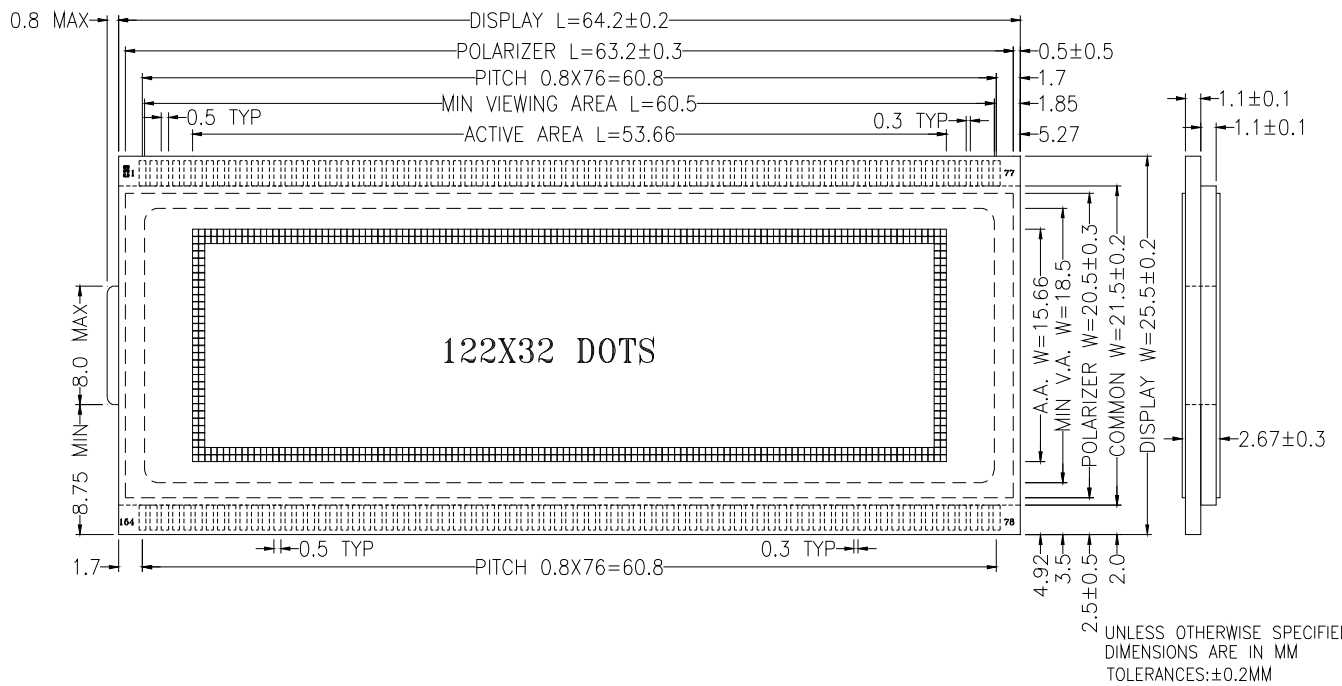
Definition of contrast $Cr. = \frac{B2}{B1} = \frac{\text{Bright curve of not selected segment}}{\text{Bright curve of selected segment}}$



Definition of viewing angle $\theta 1$ and $\theta 2$

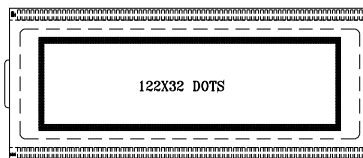


12. LCD ARTWORK



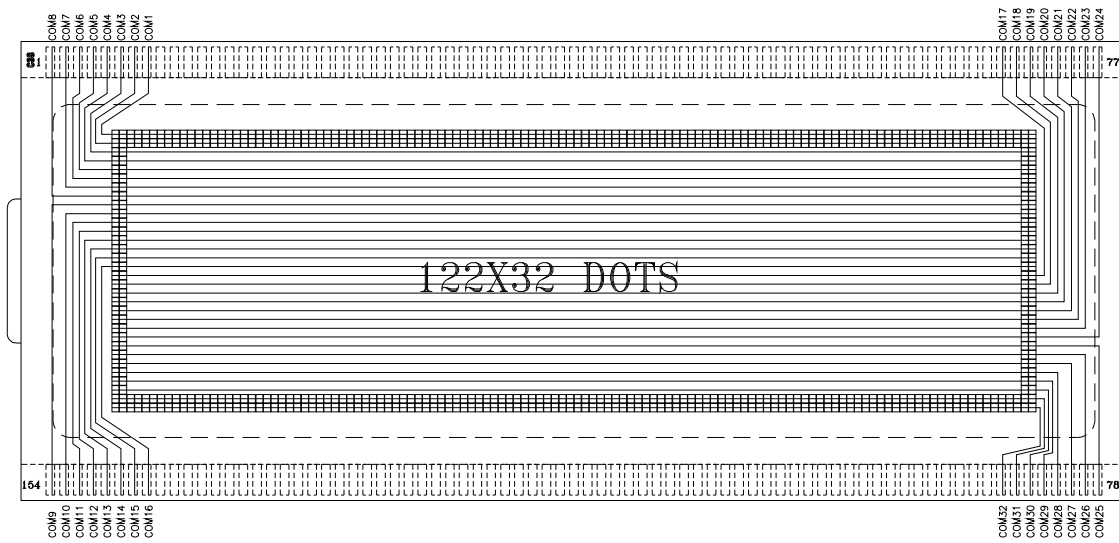
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UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM TOLERANCES:±0.1MM

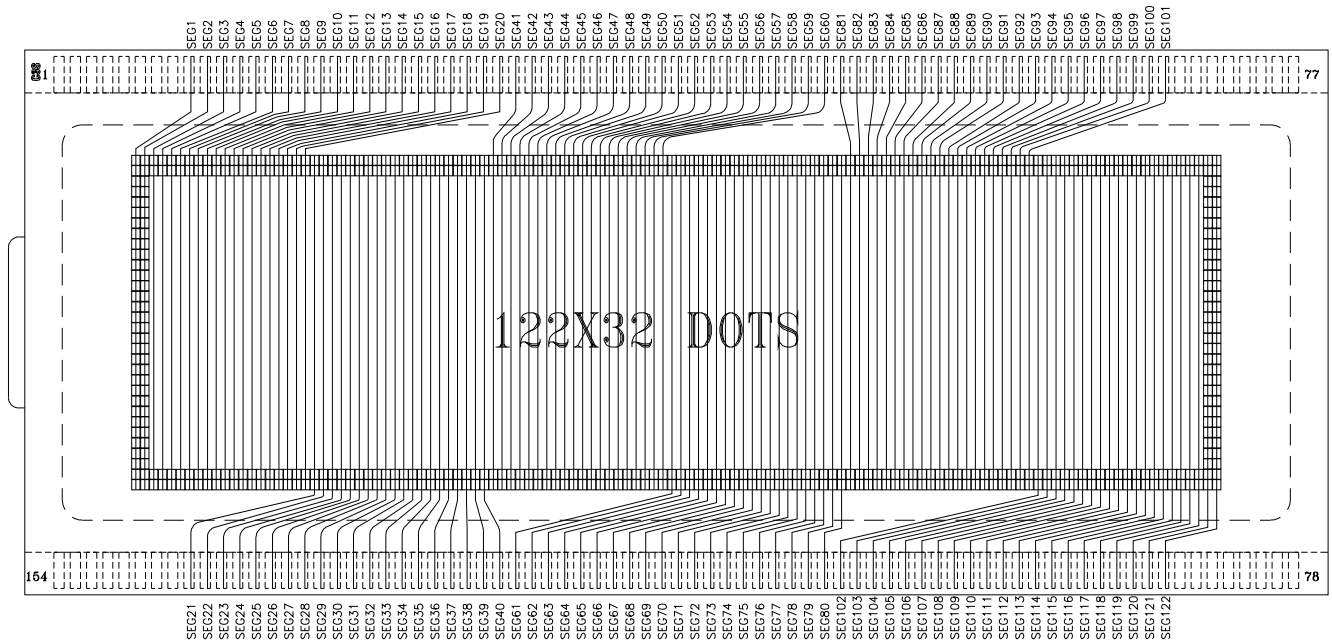


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13. COMMON LAYOUT



14. SEGMENT LAYOUT



15. MODULE ACCEPT QUALITY LEVEL (AQL)

15.1. Inspection Standard: MIL-STD-105E Table Normal Inspection Single Sampling Level II.

16. RELIABILITY TEST

Operating life time: 50,000 hours (at room temperature without direct irradiation of sunlight)

Reliability characteristics shall meet following requirements.

Tests Item	Condition
High Temperature Storage	+80°C x 96 hrs
Low Temperature Storage	-30°C x 96 hrs
High Temperature Operation	+70°C x 96 hrs
Low Temperature Operation	-20°C x 96 hrs
High Temperature, High Humidity	+60°C x 90%RH x 96 hrs
Thermal Shock	0°C x 30min → 25°C x 10s → +70°C x 30 min x 5 cycles
Vibration Test	Frequency x Swing x Time 40Hz x 4mm x 4hrs
Drop Test	Height x no. of drop 1.0m x 6 drops

17. LCD MODULES HANDLING PRECAUTIONS

- Please remove the protection foil of polarizer before using.
- The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- If the display panel is damaged and the liquid crystal substance inside it leaks out, do not get any in your mouth. If the substance come into contact with your skin or clothes promptly wash it off using soap and water.
- Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarize carefully.
- To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - Be sure to ground the body when handling the LCD module.
 - Tools required for assembly, such as soldering irons, must be properly grounded.
 - To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
 - The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.
- Storage precautions
When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps. Keep the modules in bags designed to prevent static electricity charging under low temperature / normal humidity conditions (avoid high temperature / high humidity and low temperatures below 0°C).Whenever possible, the LCD modules should be stored in the same conditions in which they were shipped from our company.

18. OTHERS

- Liquid crystals solidify at low temperature (below the storage temperature range) leading to defective orientation of liquid crystal or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subjected to a strong shock at a low temperature.
- If the LCD modules have been operating for a long time showing the same display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. Abnormal operating status can be resumed to be normal condition by suspending use for some time. It should be noted that this phenomena does not adversely affect performance reliability.
- To minimize the performance degradation of the LCD modules resulting from caused by static electricity, etc. exercise care to avoid holding the following sections when handling the modules:
 - Exposed area of the printed circuit board
 - Terminal electrode sections