AND Displays

AND3224MST

6” FSTN LCD Module

The AND3224MST is 480 x 234 transflective display that uses X-driver and Y-driver circuits The benefits of this display are increased viewing angle, better contrast ratio and a wide temperature range. The rugged and reliable white LED backlight provides low voltage, no noise occurance and 20K hours of life. These features makes it ideal for marine applications, handle instruments and big machinery.

Features
- Transflective (high transmissive) display mode
- White LED backlight (low voltage, no noise occurance & 20K hours of life)
- Black/White (normally white/positive image) display mode
- 480 (H) x 320 (V) pixels
- 3.3 V for Logic power supply
- Viewing angle is 6 o’clock
- Lightweight and durable

Mechanical Characteristics

Item	Specification	Unit
Outline Dimensions	156 (H) x 94.9 (V) x 10.5 max (D)	mm
Number of Pixels	480 (H) x 320 (V)	pixels
Active Area	115.2 (H) x 96.8 (V)	mm
Pixel Size	0.228 (H) x 0.228 (V)	mm
Pixel Pitch	0.24 (H) x 0.24 (V)	mm
Duty	1/320	–
Weight (approx.)	131	gram
Backlight	LED	–

Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Power Supply for Logic	V_{DD} - V_{SS}	-0.3	6.5	V
Power Supply for LCD	V_{LCD} - V_{SS}	0	27	V
Input Voltage	V_I	-0.3	V_{DD}	V
Static Electricity *	–	–	–	–
Wide Operating Temp**	T_{op}	-20	70	°C

*LCD should be grounded during handling LCM.
**See page 4 for Relative Humidity Conditions.

Absolute Maximum Ratings (Cont.)

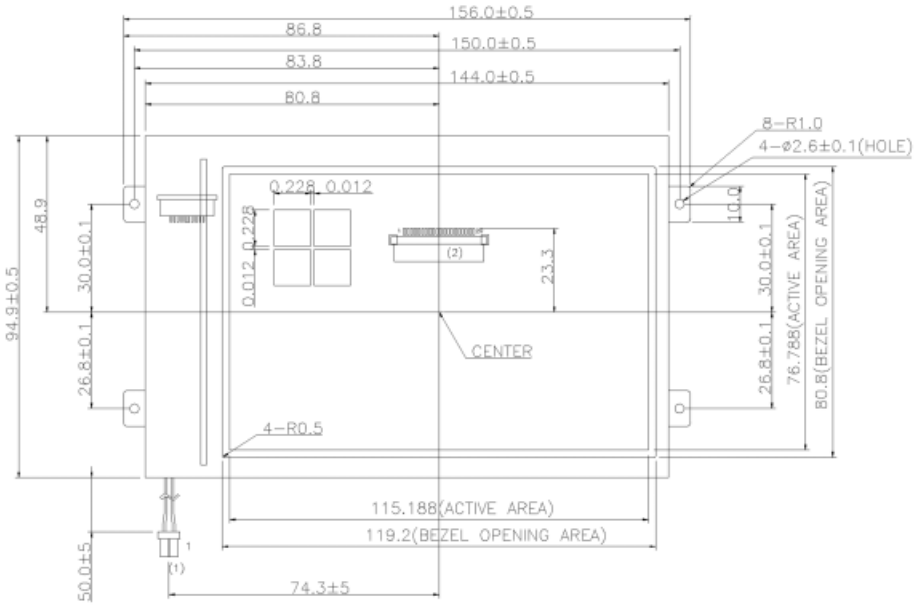
Item	Symbol	Min.	Max.	Unit
Wide Storage Temp**	T_{stg}	-30	80	°C

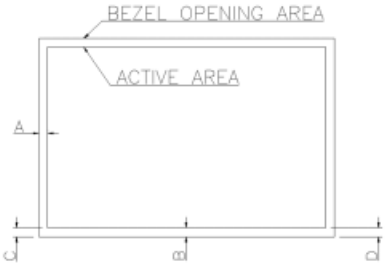
Electrico-Optical Characteristics (Ta = 25°C)

Item	Symbol	Condition		Min.	Typ.	Max.	Unit
Power Supply for Logic	V_{DD} - V_{SS}	(Ta = 0°C)		2.7	3.3	5.5	V
Input Voltage	V_{IL}	L level		V_{SS}	–	$0.2V_{DD}$	V
	V_{IH}	H level		$0.8V_{DD}$	–	V_{DD}	V
LCM Recommend LCD Module Driving Voltage	V_{LCD} - V_{SS}	1/320 Duty 1/13 Bias	0°C	24.1	24.6	25.1	V
			25°C	23.6	24.1	24.6	
			50°C	23.1	23.6	24.1	
Power Supply Current for LCM	I_{DD}	V_{DD} =3.3V V_{LCD} =24.1V FLM=70Hz		–	0.2	0.5	mA
	I_{LCD}			–	3.2	6	
Power Supply Current for B/L	I_{LED}	3.6V		–	140	160	mA
LCM Surface Luminance	L	I_{LED} =140mA Dots all off		37	–	48	cd/m^2
Contrast	K	25°C		–	4.7	–	–
Response Time	Tr	25°C		–	210	290	ms
	Tf			–	300	500	
Viewing Angle Range	θf	25°C		–	34	–	°
	θb			–	35	–	
	θl			–	29	–	
	θr			–	34	–	

Dimensional Outline

Unit: mm
Standard Tolerance: 0.5mm





NOTES: 1.RESOLUTION : 480 X 320 DOTS
2.BACKLIGHT COLOR : LED(WHITE)
3.TOLERANCE NO SPECIFIED : ±0.3mm

1> TOLERANCE X-DIRECTION A=2.0±0.6
2> TOLERANCE Y-DIRECTION B=2.0±0.6
3> OBLIQUITY OF DISPLAY AREA (C-D)<0.6

Timing Specifications (Common & Segment Interface Timing:)

Item	Symbol	Test Condition	Min	Typ	Max	Unit
Clock Cycle	tC	Fig. 1	500	–	–	ns
SCP Pulse Width	tSWH, tSWL	Fig. 1	240	–	–	ns
Data Set Up Time	tDSU	Fig. 1 & 2	240	–	–	ns
Data Hold Time	tDHD	Fig. 1 & 2	240	–	–	ns
SCP Rise/Fall Time	tr, tf	Fig. 1 & 2	–	–	50	ns
LP Rise Time	tLRP	Fig. 1	240	–	–	ns
LP Fall Time	tLFP	Fig. 1	240	–	–	ns
LP Pulse Time	tLW	Fig. 1	240	–	–	ns
SCP to LP Delay Time	tSL	Fig. 1	50	–	–	ns
LP tp SCP Delay Time	tLS	Fig. 1	100	–	–	ns
LP “H” Pulse Width	tCWH	Fig. 2	40	–	–	ns
LP “L” Pulse Width	tCWL	Fig. 2	170	–	–	ns

Timing Chart

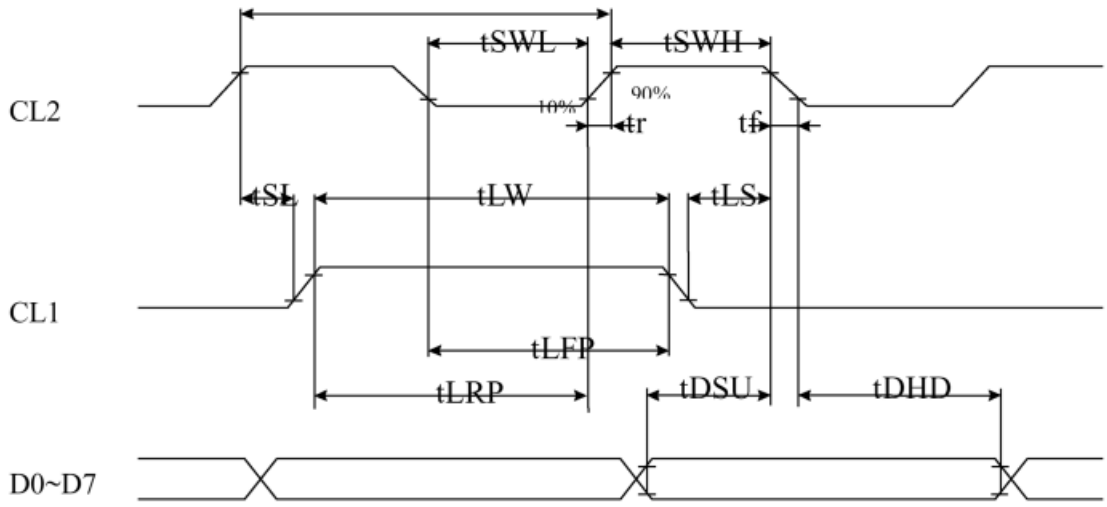


Fig 1. SEGMENT TIMING

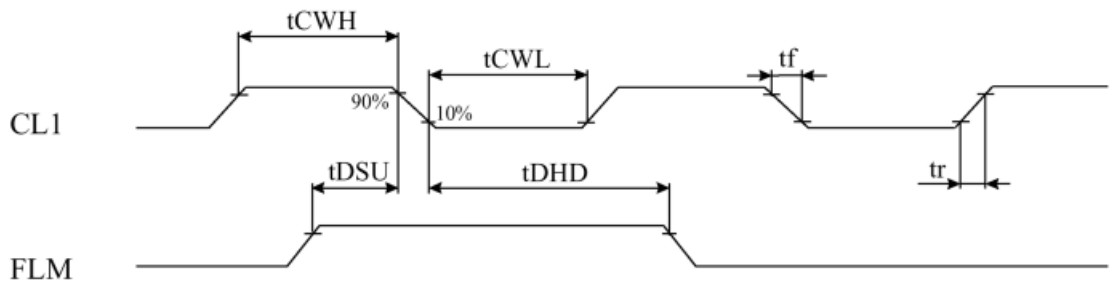
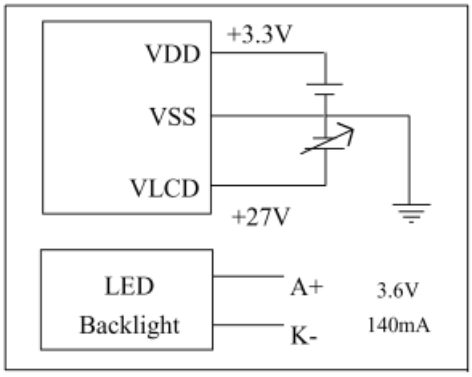
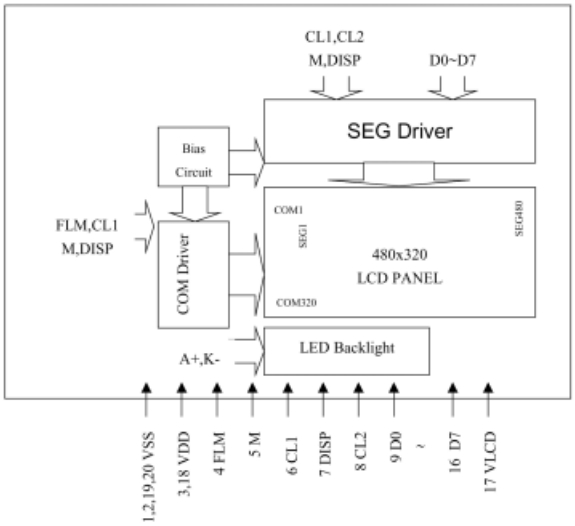


Fig 2 COMMON TIMING

Power Supply



Block Diagram



Connector Pin Assignment for Interface

CN1 Interface Pin Assignment
(DF19G-30P-1H/Hirose Electric Co.)

Terminal No.	Symbol	Level	Function
1	V_{SS}	–	Power Supply (0V)
2	V_{SS}	–	Power Supply (0V)
3	V_{DD}	–	Power Supply for Logic
4	FLM	H/L	Scan Start-up Signal
5	M	–	M Signal
6	CL1(LP)	H–>L	Data Latch Pulse
7	DISP	H/L	H: Display On, L: Display Off
8	CL2(SCP)	H–>L	Data Shift Pulse
9	D0	H/L	Display Data
10	D1	H/L	
11	D2	H/L	
12	D3	H/L	
13	D4	H/L	
14	D5	H/L	
15	D6	H/L	
16	D7	H/L	
17	V_{LCD}	–	Power Supply for LCD (+V)
18	V_{DD}	–	Power Supply for Logic
19	V_{SS}	–	Power Supply (0V)
20	V_{SS}		Power Supply (0V)

CN2 LED
(BHR-04VS-1/Japan Solderless Terminal Mfg Co.,)

Terminal No.	Symbol	Level	Function
1	A+	–	Power Supply for LED Backlight
2	K-	–	

Notes on Humidity without Condensation

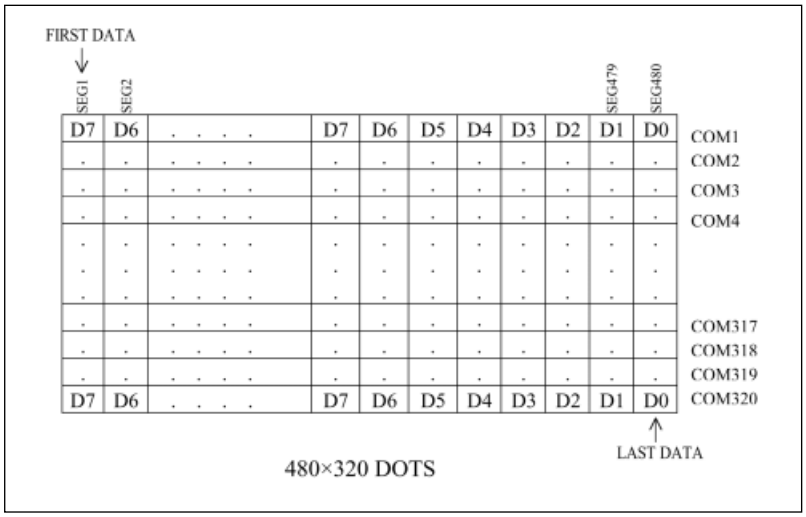
For Wide Operating & Wide Storage Temp.: Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

For Wide Operating Temp.: Ta≦70℃:75RH max

Ta＞70℃:absolute humidity must be lower than the humidity of 75%RH at 70℃

For Wide Storage Temp.: Ta at -30℃ will be <48hrs, at 80 ℃ will be <120hrs

Display Pattern



Power On/Off Timing