DATASHEET

8/4/2017

Fema Part Number

GM1024768DW-80-TIX2-HLTGG	
	8” Full Color TFT
	1024X768 Resolution
	IPS Type (no color inversion)
	High Brightness 1100 nits
	Integrated projected capacitive touchpanel
	Focaltech FT5826 Controller on flex (USB)

Fema Electronics Corporation:

22 Corporate Park, Irvine, CA 92606 USA Tel: 714-825-0140

1. GENERAL DESCRIPTION

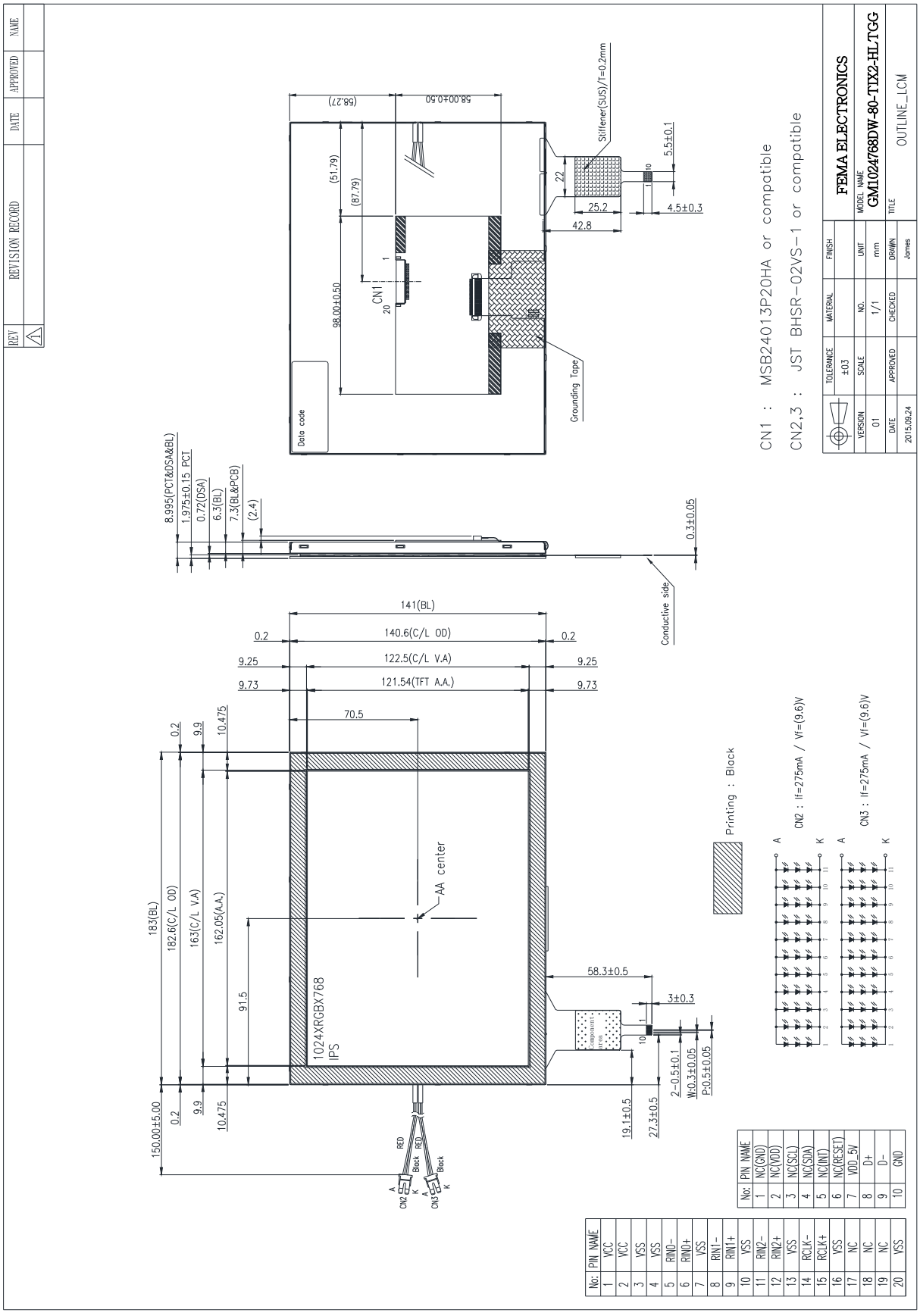
1.1 Description

The specification is model GM1024768DW-80-TIX2-HLTGG is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit, a backlight system and projected capacitive touch panel. This TFT LCD has an 8.0 (4:3) inch diagonally measured active display area with XGA (1024 horizontal by 768 vertical pixels) resolution.

1.2 Features:

No.	Item	Specification	Unit
1	Panel Size	8.0”	Inch
2	Number of Pixels	1024 (W) x RGB x 768 (H)	Pixels
3	Active Area	162.05 (W) × 121.54 (H)	mm
4	Pixel Pitch	0.15825 (W) x 0.15825(H)	mm
5	Outline Dimension	183 (W) × 141 (H) × 8.995 (T)	mm
6	Number of Colors	262K	- -
7	Display Mode	IPS / Normally Black / Transmissive	- -
8	View Direction	Free of direction	- -
9	Display Format	RGB vertical stripe	- -
10	Surface Treatment	Clear (7H)	- -
11	Contrast Ratio	800 (Typ.)	- -
12	Luminance (cd/m^2)	1100 (Typ.)	cd/m2
13	Interface	LVDS 6 bit Interface	- -
14	Backlight	White LED	- -
15	Weight	(TBD)	g

2. MECHANICAL SPECIFICATION



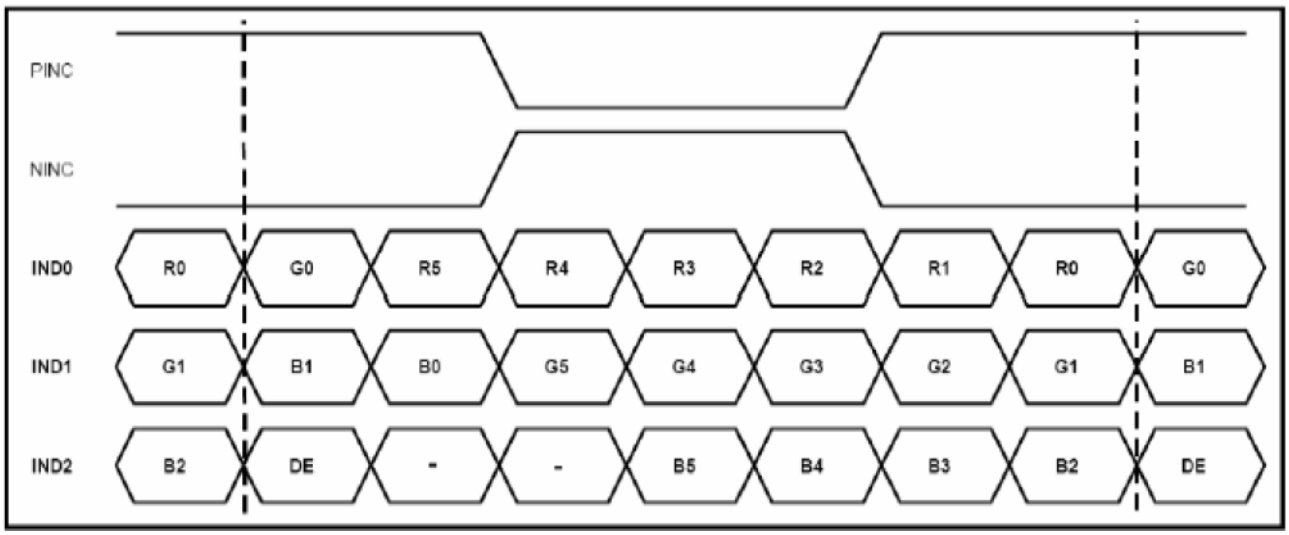
3. PIN DESCRIPTION

3.1 TFT LCD Module(CN1)

Pin No.	Symbol	I/O	Function	Remark
1	VCC	P	Power Supply +3.3V	
2	VCC	P	Power Supply +3.3V	
3	GND	P	Ground	
4	GND	P	Ground	
5	RXIN0-	I	Negative LVDS differential data input	
6	RXIN0+	I	Positive LVDS differential data input	
7	GND	P	Ground	
8	RXIN1-	I	Negative LVDS differential data input	
9	RXIN1+	I	Positive LVDS differential data input	
10	GND	P	Ground	
11	RXIN2-	I	Negative LVDS differential data input	
12	RXIN2+	I	Positive LVDS differential data input	
13	GND	P	Ground	
14	CLK-	I	Negative LVDS differential clock input	
15	CLK+	I	Positive LVDS differential clock input	
16	GND	P	Ground	
17	NC	-	No Connection	
18	NC	-	No Connection	
19	NC	-	No Connection	
20	GND	P	Ground	

NOTE:

1) LVDS Data Mapping



3.2 Backlight Unit (CN2, CN3)

Pin No.	Symbol	Function	Remark
1	LEDA	Power Supply for LED backlight	RED
2	LEDK	GND for LED backlight	BLACK

4. ABSOLUTE MAXIMUM RATINGS

4.1 Electrical Absolute Rating

4.1.1 TFT LCD Module

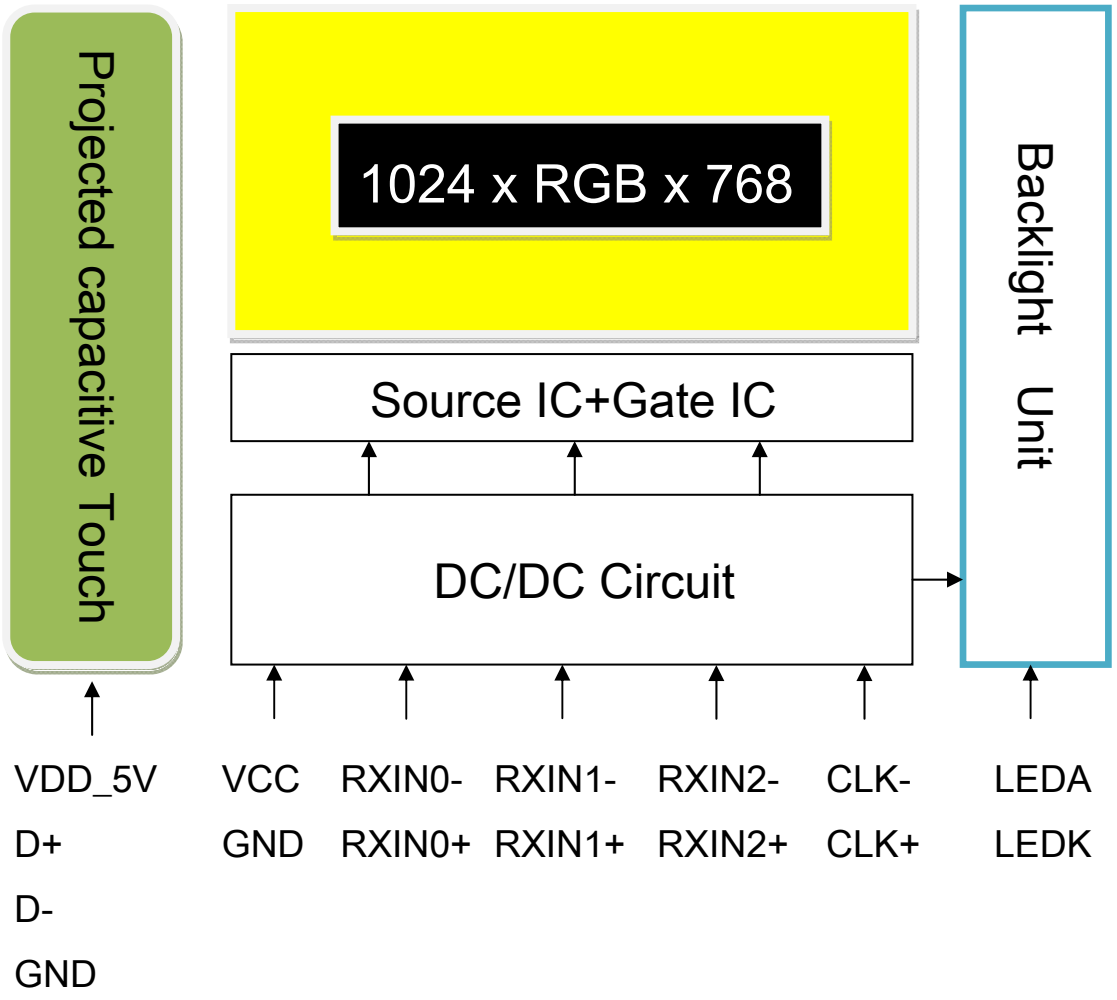
Item	Symbol	Values		Unit	Note
		Min	Max.		
Power supply voltage	VCC	-0.3	5.0	V	

4.1.2 Environment Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max.		
Operating Temperature	Topa	-20		70	°C	Ambient temperature
Storage Temperature	Tstg	-30		70	°C	

5. BLOCK DIAGRAM

5.1 TFT LCD Module



6. Relationship Between Displayed Color and Input

6.1 6 bit

	Color & Gray Scale	Data Signal																	
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(31)	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(31)	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(31)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

0 : Low level voltage, 1 :High level voltage

Each basic color can be displayed in 64 gray scales from 6 bit data signals. With the combination of total 18 bit data signals, the 262K-color display can be achieved on the screen.

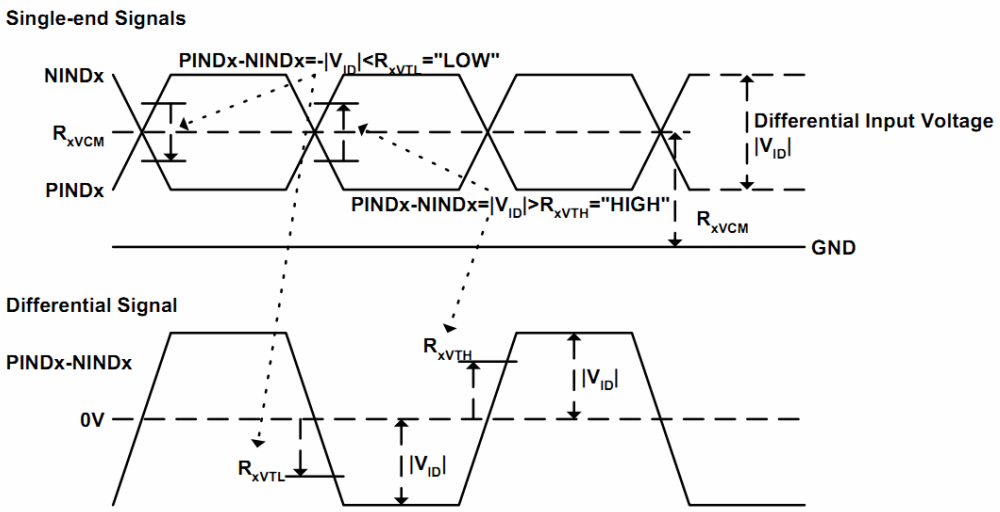
7. ELECTRICAL CHARACTERISTICS

7.1 TFT LCD Module

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Power supply		VCC	3.0	3.3	3.6	V	
Input Voltage for logic	Differential Input High Threshold	VTH			+100	mV	
	Differential Input Low Threshold	VTL	-100			mV	
Magnitude differential Input Voltage		[Vid]	200	-	600	mV	Note 2
Input voltage range (singled-end)		RxVIN	0	-	2.4	V	Note 2
Differential input common mode voltage		RxVcm	|VID|/2	-	2.4-|VID|/2	V	Note 2
Differential input leakage current		RVxliz	-10	-	+10	uA	
Power Supply current		ICC	-	(230)	(300)	mA	Note 1

Note 1: frame =60Hz, Ta=25°C, Display pattern : White pattern

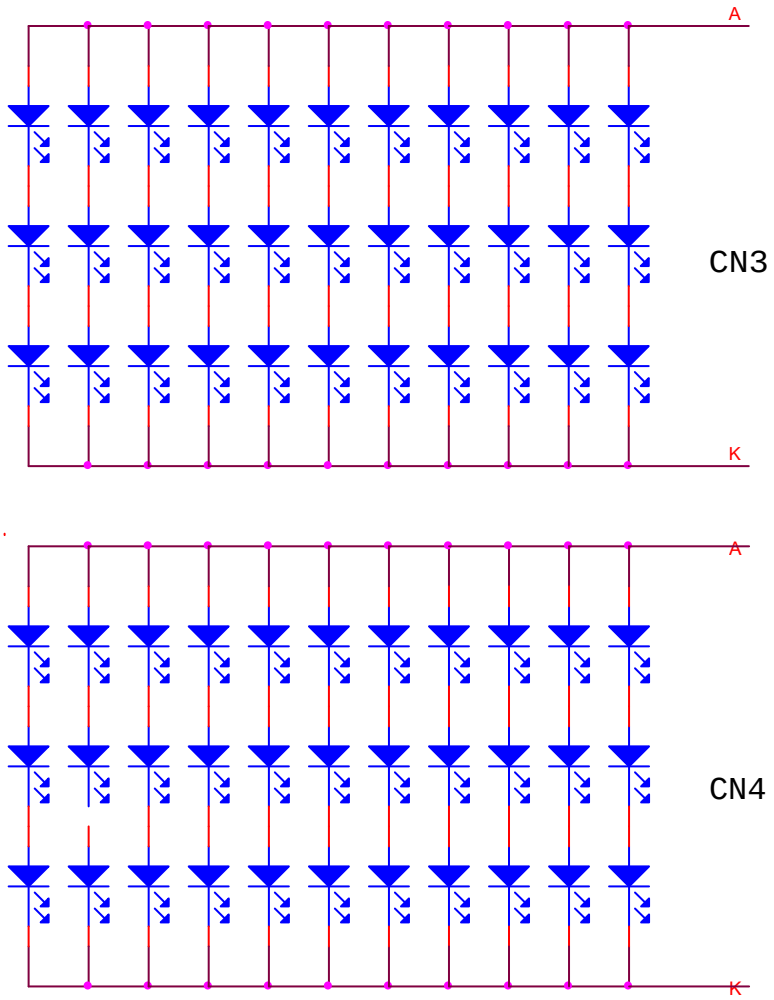
Note 2:



7.2 Backlight Unit(CN3,CN4)

Item	Symbol	Value			Unit	Condition
		Min.	Typ.	Max.		
LED Voltage	VL	(9.0)	(9.6)	(10.5)	V	
LED Current	IF	-	275	-	mA	3S11P
Power Consumption	PBL	-	2.64	-	W	
LED Life Time (25℃)	-	(40000)	-	-	hr	(1)

Note (1): The “LED life time” is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25℃ 60% RH.

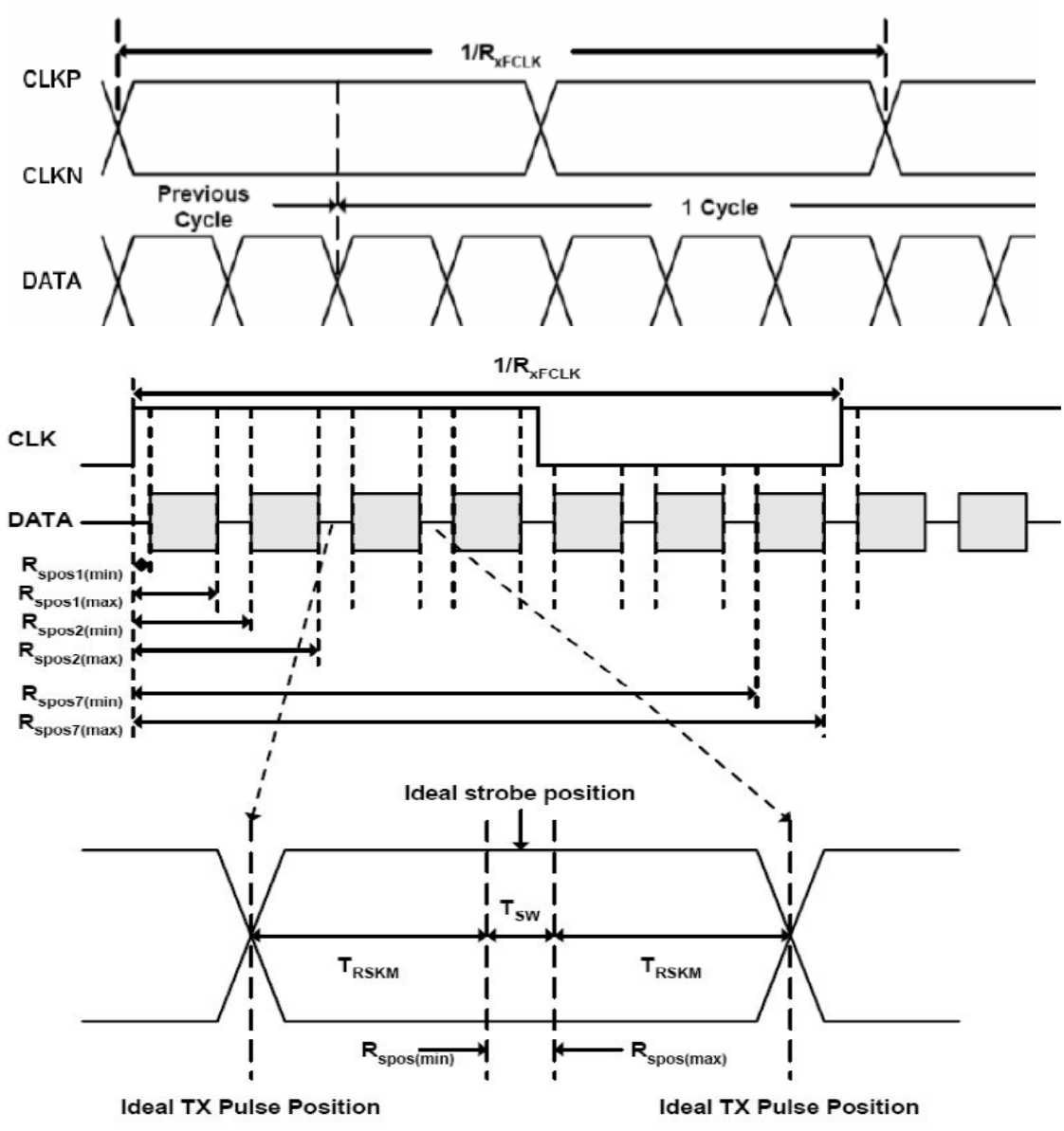


7.3 INTERFACE SPECIFICATIONS

7.3.1 AC Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max	Unit.	Note
Clock frequency	RxFCLK	20	-	71	MHz	
Input data skew margin	TRSKM	500	-	-	ps	
Clock high time	TLVCH	-	4/(7*RxFCLK)	-	ns	
Clock low time	TLVCL	-	3/(7* RxFCLK)	-	ns	

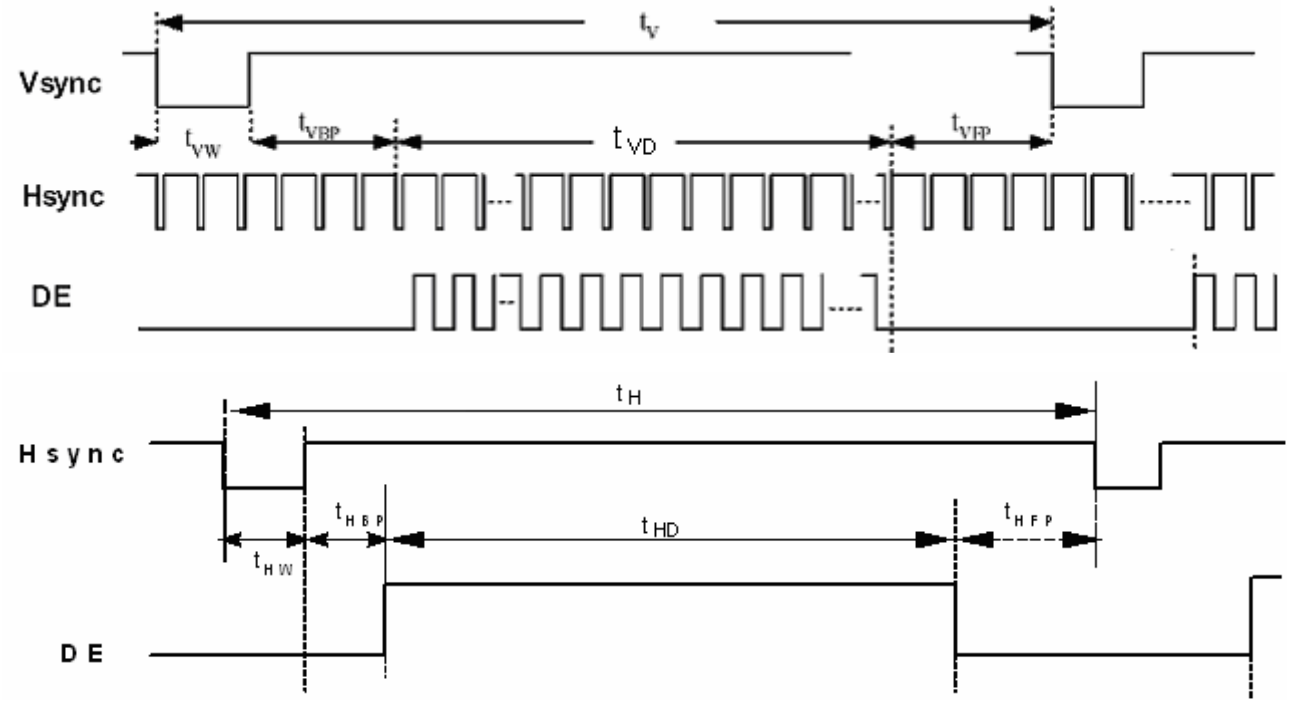
7.3.2 Input Clock and Data Timing Diagram



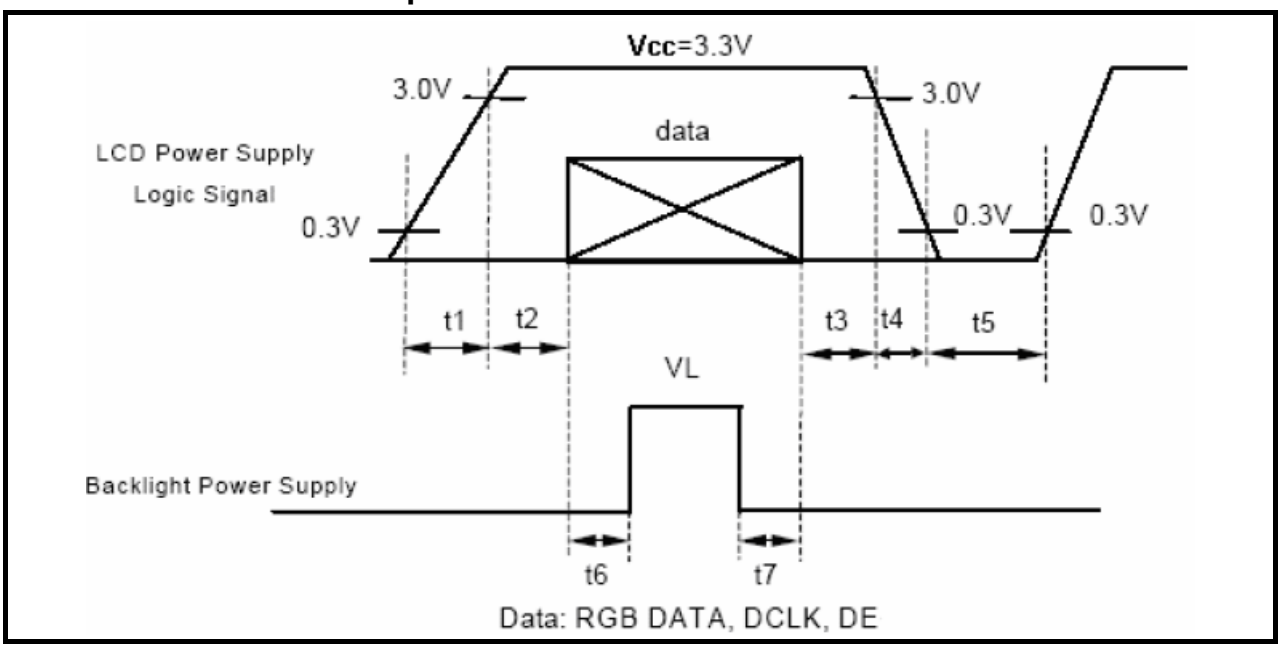
T_{RSKM}: Receiver strobe margin
R_{SPOS}: Receiver strobe position
T_{SW} : Strobe width (Internal data sampling window)

7.3.3 Timing

Signal	Parameter	Symbol	Min.	Typ.	Max.	Unit.	Remark
DCLK	CLK frequency	Fclk	52	65	71	MHz	
HSYNC	Horizontal Line	Th	1114	1344	1400	CLK	
	HS Display Area	Thd	-	1024	-	CLK	
	HS Blanking	Thb+thfp	90	320	376	CLK	
VSYNC	VS Period Time	Tv	778	806	845	th	
	VS Display Area	Tvd	-	768	-	th	
	VS Blanking	Tvb+Tvfp	10	38	77	th	



7.4 Power On / Off Sequence



t1 ≤10ms : 1 sec≤ t5

50ms≤ t2 : 200ms ≤t6

0<t3 ≤50ms: 200ms≤ t7

0<t4 ≤10ms

8. PROJECTED CAPACITIVE TOUCH PANEL

8.1 Main Feature

Item	Specification	Unit
Screen Size	8.0 inch	Diagonal
Type	Transparent Type Projected Capacitive	--
Input Mode	Human's Finger	--
Finger	5	--
Interface	USB	--
Cover glass Hardness	7H(min) by JIS K5400	--
Response time	≦25	ms
Driver IC	FT5826	

8.2 Pin Assignments and Definitions(CN2)

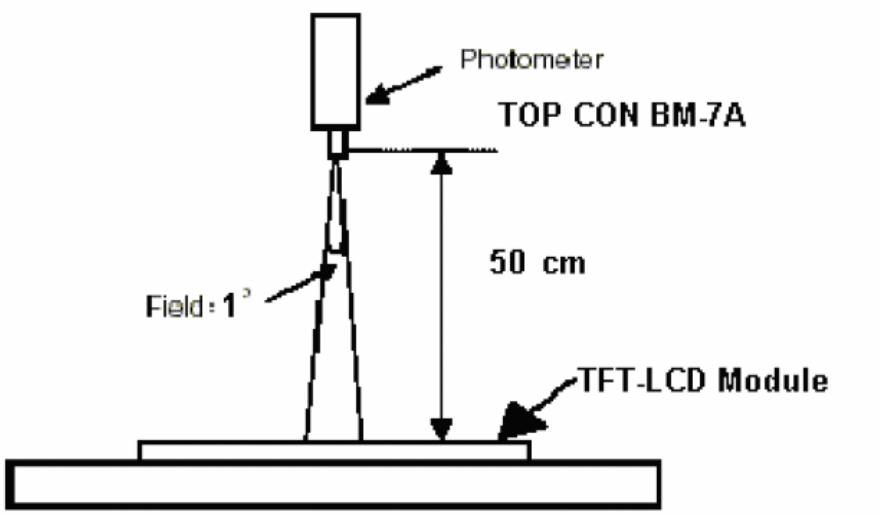
Item	Name	I/O	Unit
1	NC	-	No connection
2	NC	-	No connection
3	NC	-	No connection
4	NC	-	No connection
5	NC	-	No connection
6	NC	-	No connection
7	VDD_5V	P	Power supply
8	D+	I/O	D+
9	D-	I/O	D-
10	GND	P	Ground

9. OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Brightness		--	Note1, Note 3, ($\theta = 0^\circ$, Normal Viewing Angle)	880	1100	--	cd/m2
Uniformity		B-uni		70	75	-	%
Contrast Ratio		CR		600	800	--	--
Response Time		Tr		--	10	20	ms
		Tf		--	15	30	ms
Color Chromaticity	White	Wx		0.238	0.288	0.338	--
		Wy		0.276	0.326	0.376	--
View angle	Horizontal	θ x+	Center CR≥10	75	85	--	
		θ x-		75	85	--	
	Vertical	θ Y+		75	85	--	
		θ Y-		75	85	--	

Note：The following optical specifications shall be measured in a darkroom or equivalent state(ambient luminance ≤1 lux, and at room temperature). The operation temperature is 25°C±2°C. The measurement method is shown in Note1.

Note1: The method of optical measurement:

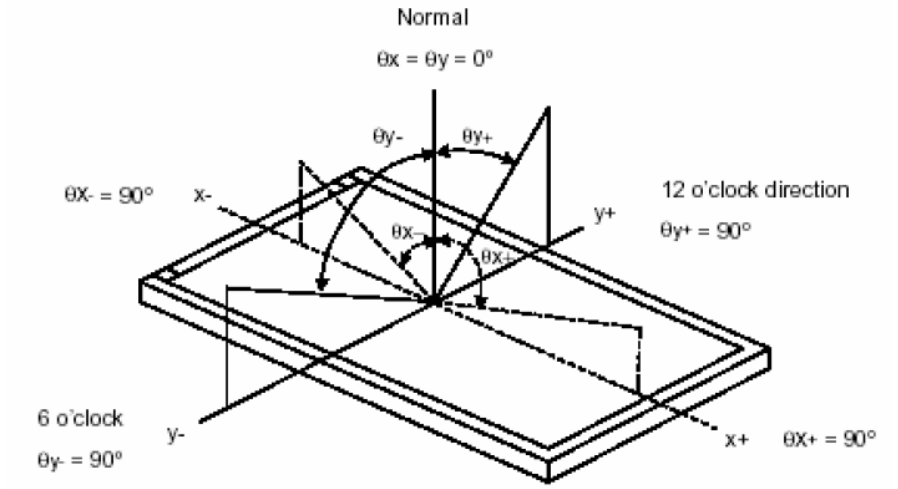


Note2: Measured at the center area of the panel and at the viewing angle of the θ x= θ y =0°

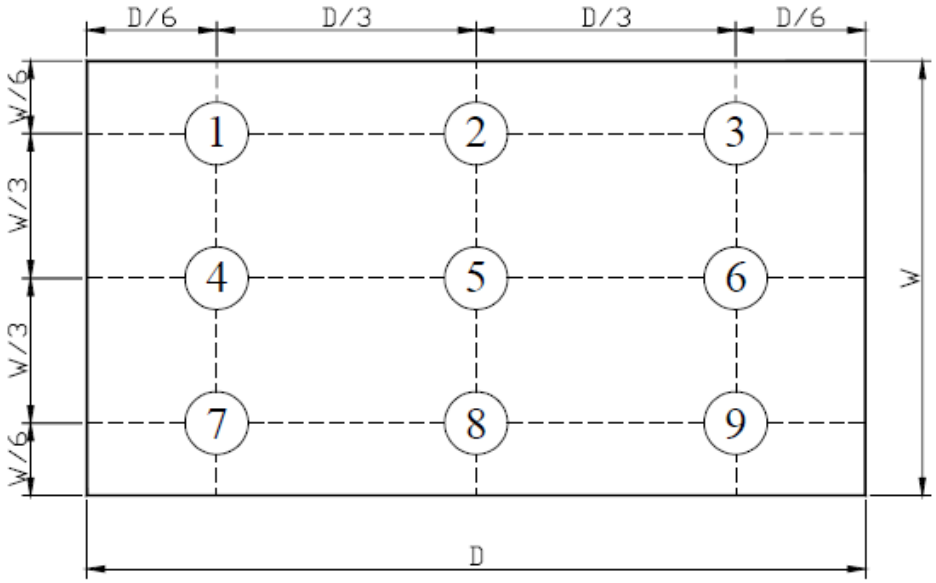
Note3: Definition of Contrast Ratio (CR):

CR = Luminance with all pixels in white state ÷ Luminance with all pixels in Black state

Note 4: Definition of Viewing Angle:



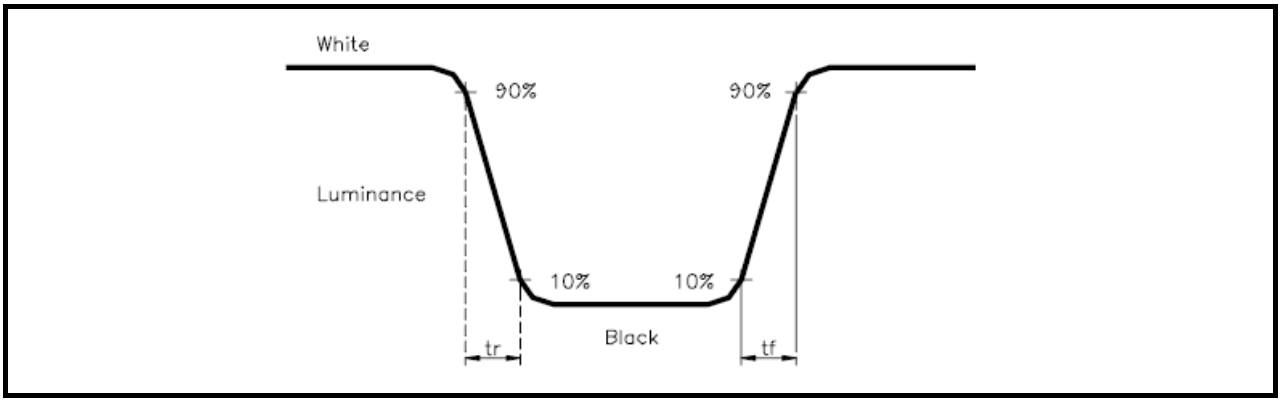
Note 5: Definition of Brightness Uniformity (B-uni):



B-uni ＝(Minimum luminance of 9 points÷Maximum luminance of 9points)X100%

Note 6: Definition of Response Time:

The Response Time is set initially by defining the “Rising Time (Tr)” and the “Falling Time (Tf)” respectively. Tr and Tf are defined as following figure



Note 7: Definition of Chromaticity:

The color coordinates (Wx,Wy),(Rx,Ry),(Gx,Gy),and (Bx,By) are obtained with all pixels in the viewing field at white, red, green, and blue states, respectively.

10. RELIABILITY

10.1 Test Condition

10.1.1 Temperature and Humidity(Ambient Temperature)

Temperature : 25 ± 5°C

Humidity : 65 ± 5%

10.1.2 Operation

Unless specified otherwise, test will be conducted under function state.

10.1.3 Container

Unless specified otherwise, vibration test will be conducted to the product itself without putting it in a container.

10.1.4 Test Frequency

In case of related to deterioration such as shock test. It will be conducted only once.

10.2 TESTS

No.	ITEM	CONDITION CRITERION
1	High Temperature Storage	70°C, 120 hrs
2	Low Temperature Storage	-30°C, 120 hrs
3	High Temperature Operating	70°C, 120 hrs
4	Low Temperature Operating	-20°C, 120 hrs
5	High Temperature/Humidity Non-Operating	40°C, 90%RH, 120 hrs
6	Temperature Shock Non-Operating	-10°C ←→ 50°C (0.5hr each), 25 cycles
7	Vibration Test Non-Operating	Frequency:0 ~ 55 Hz Amplitude:1.5 mm Sweep Time:11min Test Period:6 Cycles for each Direction of X,Y,Z

Note1: The test sample have recovery time for 24 hours at room temperature before the function check. In the standard conditions, there is no any touch panel function NG issue occurred.

10.3 JUDGMENT STANDARD

The judgment of the above test should be made as follow:

Pass: Normal display image with no obvious non-uniformity and no line defect. Partial transformation of the module parts should be ignored.

Fail: No display image, obvious non-uniformity, or line defects.

10.4 INCOMING INSPECTION STANDARDS

<table>
<tr><th>No.</th><th>Parameter</th><th>Criteria</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Operating</td><td>Display function: No Display malfunction (Major)
Contrast ratio (Black, White):
Does not meet specified range in the spec. (Major) (Note:3)
Line Defect: No obvious Vertical and Horizontal line defect in bright, dark and colored. (Major) (Note:1)
Point Defect : Active area ≤ 5 dots (Minor) (Note:1)
<table>
<tr><th rowspan="2">Item</th><th>Acceptable number</th><th rowspan="2">Total</th></tr>
<tr><th>Active Area</th></tr>
<tr><td>Bright</td><td>2</td><td rowspan="2">5</td></tr>
<tr><td>Dark</td><td>4</td></tr>
</table>
Non-uniformity: Visible through 5%ND filter. (Minor)
Foreign material in Black or White spots shape (W>1/4L)
<table>
<tr><th>Zone / Dimension</th><th>Acceptable number</th><th>Class Of Defects</th><th>AQL Level</th></tr>
<tr><td>D> 0.5</td><td>0</td><td rowspan="3">Minor</td><td rowspan="3">1.5</td></tr>
<tr><td>0.3 < D ≤ 0.5</td><td>5</td></tr>
<tr><td>D ≤ 0.3</td><td>*</td></tr>
</table>
D = (Long + Short) / 2 ＊ : Disregard
Foreign Material in Line or spiral shape (W≤1/4L) (Note: 4)
<table>
<tr><th>L (mm) / Zone W(mm)</th><th>Acceptable number</th><th>Class Of Defects</th><th>AQL Level</th></tr>
<tr><td>L >5</td><td>W>0.1</td><td>0</td><td rowspan="3">Minor</td><td rowspan="3">1.5</td></tr>
<tr><td>0.5 < L ≤ 5</td><td>0.03 < W≤0.1</td><td>5</td></tr>
<tr><td>L ≤0.5</td><td>W≤0.03</td><td>*</td></tr>
</table>
L : Length W : Width ＊ : Disregard</td></tr>
<tr><td>2</td><td>External Inspection (non-operating)</td><td>Dimension: Outline (Major)
Bezel appearance: uneven (Minor)
Scratch on the polarize: (Note:2)
<table>
<tr><th>L (mm) / Zone W(mm)</th><th>Acceptable number</th><th>Class Of Defects</th><th>AQL Level</th></tr>
<tr><td>--</td><td>W>0.1</td><td>0</td><td rowspan="2">Minor</td><td rowspan="2">1.5</td></tr>
<tr><td>L ≤ 3</td><td>W≤0.1</td><td>3</td></tr>
</table>
L : Length W : Width ＊ : Disregard
Dent or bubble on the polarize (Note:2)
<table>
<tr><th>Zone / Dimension</th><th>Acceptable number</th><th>Class Of Defects</th><th>AQL Level</th></tr>
<tr><td>D≤0.3</td><td>*</td><td rowspan="2">Minor</td><td rowspan="2">1.5</td></tr>
<tr><td>D≤0.5</td><td>3</td></tr>
</table>
D = (Long + Short) / 2 ＊ : Disregard</td></tr>
</table>

Class of defects	**Major**	AQL 0.65%	**Definition** It is a defect that is likely to result in failure or to reduce materially the usability of the product for the intended function.
	Minor	AQL 1.5%	It is a defect that will not result in functioning problem with deviation classified.

Note1:

(a)Bright point defect is defined as point defect of R,G,B with area >1/2 pixel respectively

(b)Dark point defect is defined as visible in full white pattern.

(c)Definition of distribution of point defect is as follows:

-minimum separation between dark point defects should be larger than 5mm.

-minimum separation between bright point defects should be larger than 5mm.

(d)Definition of joined bright point defect and joined dark point defect are as follows:

-Two or more joined bright point defects must be nil.

-Three joined dark point defects must be nil.

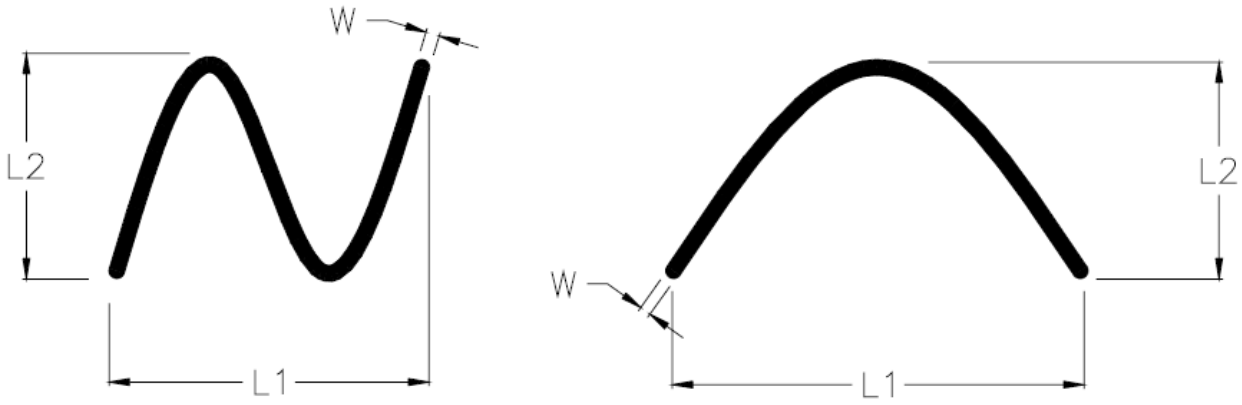
-Coupling of one dark and one bright point in junction is counted as one dark and bright spot with 1 pair maximum.

-Two Joined dark point is counted as two dark points with 2 pair maximum.

Note2: The external inspection should be conducted at the distance 30± 5cm between the eyes of inspector and the panel.

Note3: Luminance measurement for contrast ratio is at the distance 50± 5cm between the detective head and the panel with ambient luminance less than 1 lux. Contrast ratio is obtained at optimum view angle.

Note4: W-Width in mm , L-length of Max.(L1,L2) in mm.



10.5 Sampling Condition

Unless otherwise agree in written, the sampling inspection shall be applied to the incoming inspection of customer.

Lot size: Quantity of shipment lot per model.

Sampling type: normal inspection, single sampling

Sampling table: MIL-STD-105E

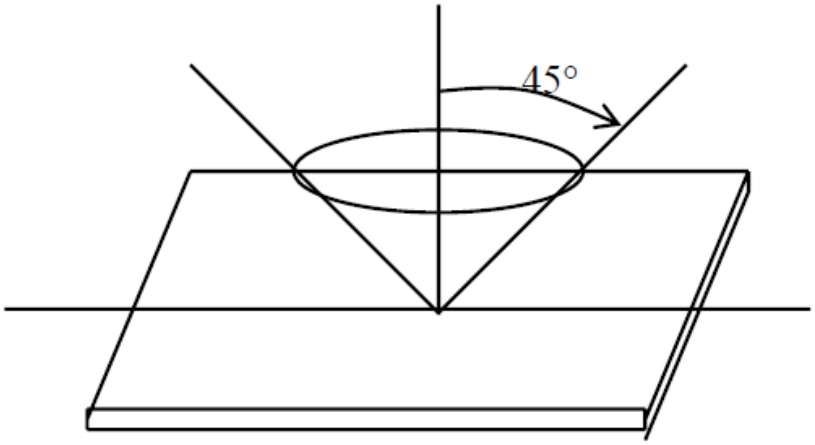
Inspection level: Level II

10.6 Inspection conditions

The LCD shall be inspected under 40W white fluorescent light.

$\theta \leq 45^{\circ}$ inspection under non-operating condition.

$\theta \leq 5^{\circ}$ inspection under operating condition



11. PRECAUTION RELATING PRODUCT HANDLING

11.1 SAFETY

11.1.1 If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.

11.1.2 If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

11.2 HANDLING

11.2.1 Avoid any strong mechanical shock which can break the glass.

11.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module, be sure to ground your body and any electrical equipment you may be using.

11.2.3 Do not remove the panel or frame from the module.

11.2.4 The polarizing plate of the display is very fragile. So , please handle it very carefully, Do not touch, push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)

11.2.5 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.

11.2.6 Do not touch the display area with bare hands , this will stain the display area.

11.2.7 Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.

11.2.8 To control temperature and time of soldering is 280 ± 10°C and 3-5 sec.

11.2.9 To avoid liquid (include organic solvent) stained on LCM.

11.3 STORAGE

11.3.1 Store the panel or module in a dark place where the temperature is 25°C ± 5°C and the humidity is below 65% RH.

11.3.2 Do not place the module near organics solvents or corrosive gases.

11.3.3 Do not crush, shake, or jolt the module.