

Microtips

TECHNOLOGY

TFT Module Specification

Model No: 13-104GIEBCAB1-S

< ◇ > PRELIMINARY SPECIFICATION
< ◆ > APPROVAL SPECIFICATION

Approved By	

Tel: 1 (888) 499-8477

Fax: (407) 273-0771

E-mail: mtusainfo@microtipsusa.com

Web: www.microtipsusa.com

RECORD OF REVISION

Version	Revised Date	Page	Content
V1.0	2020/02/10	--	First Issued

TABLE OF CONTENTS

No.	Content	Page
	TFT Module Specification	1
	TABLE OF CONTENTS	3
1.	GENERAL DESCRIPTION	4
2.	MECHANICAL SPECIFICATION	5
3.	PIN DESCRIPTION	6
4.	ABSOLUTE MAXIMUM RATINGS	7
5.	BLOCK DIAGRAM	8
6.	RELATIONSHIP BETWEEN DISPLAYED COLOR AND INPUT	9
7.	ELECTRICAL CHARACTERISTICS	10
8.	PROJECTED CAPACITIVE TOUCH PANEL SPECIFICATION.....	14
9.	OPTICAL CHARACTERISTICS	16
10.	RELIABILITY.....	19
11.	PRECAUTION RELATING PRODUCT HANDLING	24

1. GENERAL DESCRIPTION

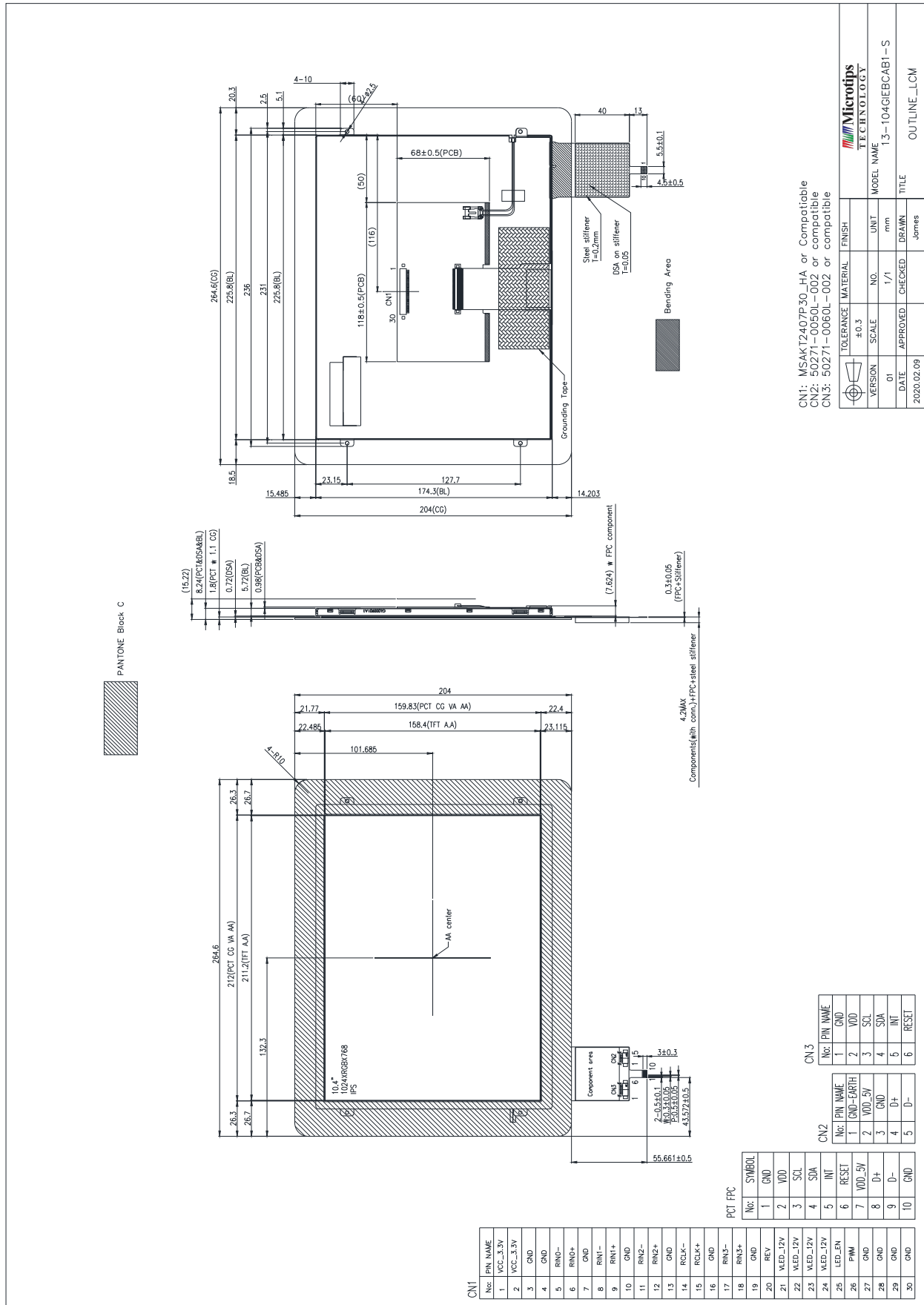
1.1 Description

The specification is model 13-104GIEBCAB1-S 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. This TFT LCD has a 10.4 (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	10.4"	Inch
2	Number of Pixels	1024 (W) x RGB x 768 (H)	Pixels
3	Active Area	211.2 (W) x 158.4 (H)	mm
4	Pixel Pitch	0.20625 (W) x 0.20625 (H)	mm
5	Outline Dimension	264.6 (W) x 204 (H) x 15.22 (T)	mm
6	Number of Colors	16.7M	- -
7	Display Mode	IPS / Normally Black / Transmissive	- -
8	Viewing Direction	Free direction	- -
9	Display Format	RGB vertical stripe	- -
10	Surface Treatment	Clear (7H)	- -
11	Contrast Ratio	900 (Typ.)	- -
12	Luminance (cd/m ²)	900 (Typ.)	cd/m2
13	Interface	LVDS 8 bit Interface	- -
14	Backlight	White LED	- -
15	Operation Temperature	-20 ~ 70	°C
16	Storage Temperature	-30 ~ 80	°C
17	Weight	TBD	g

2. MECHANICAL SPECIFICATION



3. PIN DESCRIPTION

3.1 TFT LCD Module (Connector Part No: MSAKT2407P30_HA or equivalent)

Pin No.	Symbol	I/O	Function	Note
1	VCC	P	Power Supply Logic voltage +3.3V	
2	VCC	P	Power Supply Logic voltage +3.3V	
3	GND	P	Ground	
4	GND	P	Ground	
5	RIN0-	I	Negative LVDS differential data input	
6	RIN0+	I	Positive LVDS differential data input	
7	GND	P	Ground	
8	RIN1-	I	Negative LVDS differential data input	
9	RIN1+	I	Positive LVDS differential data input	
10	GND	P	Ground	
11	RIN2-	I	Negative LVDS differential data input	
12	RIN2+	I	Positive LVDS differential data input	
13	GND	P	Ground	
14	RCLK-	I	Negative LVDS differential clock input	
15	RCLK+	I	Positive LVDS differential clock input	
16	GND	P	Ground	
17	RIN3-	I	Negative LVDS differential data input	
18	RIN3+	I	Positive LVDS differential data input	
19	GND	P	Ground	
20	REV	I	Select horizontal and vertical scanning direction (Normal: Low, Reverse: High)	
21	VLED_12V	P	Power Supply LED voltage +12V	
22	VLED_12V	P	Power Supply LED voltage +12V	
23	VLED_12V	P	Power Supply LED voltage +12V	
24	VLED_12V	P	Power Supply LED voltage +12V	
25	LED_EN	I	Back-light On/Off control	
26	PWM	I	Back-light Dimming control	
27	GND	P	Ground	
28	GND	P	Ground	
29	GND	P	Ground	
30	GND	P	Ground	

4. ABSOLUTE MAXIMUM RATINGS

4.1 Electrical Absolute Rating

4.1.1 TFT LCD Module

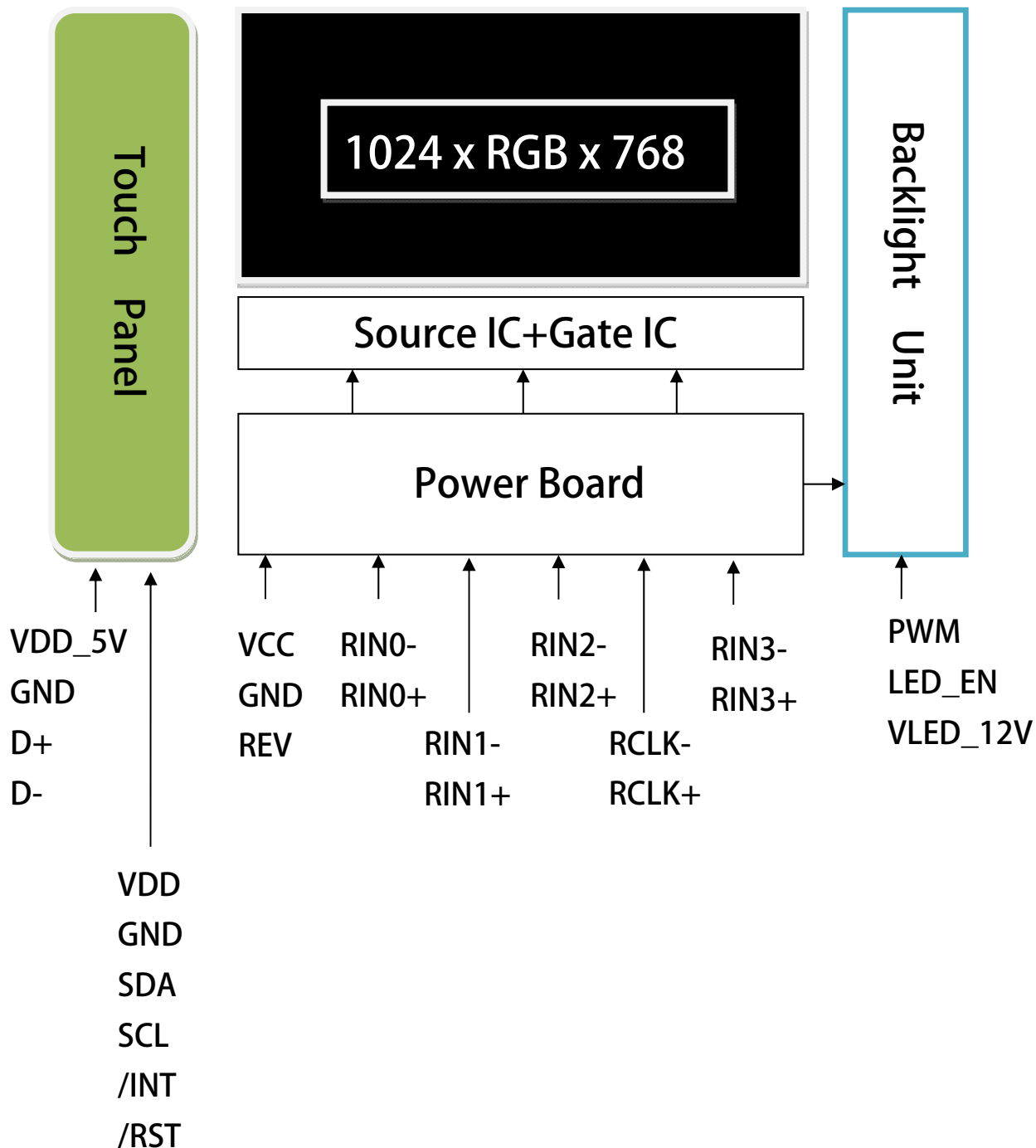
Item	Symbol	Values		Unit	Note
		Min	Max.		
Power supply voltage	VCC	-0.3	3.9	V	
	VLED_12V	11	13	V	

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		80	°C	

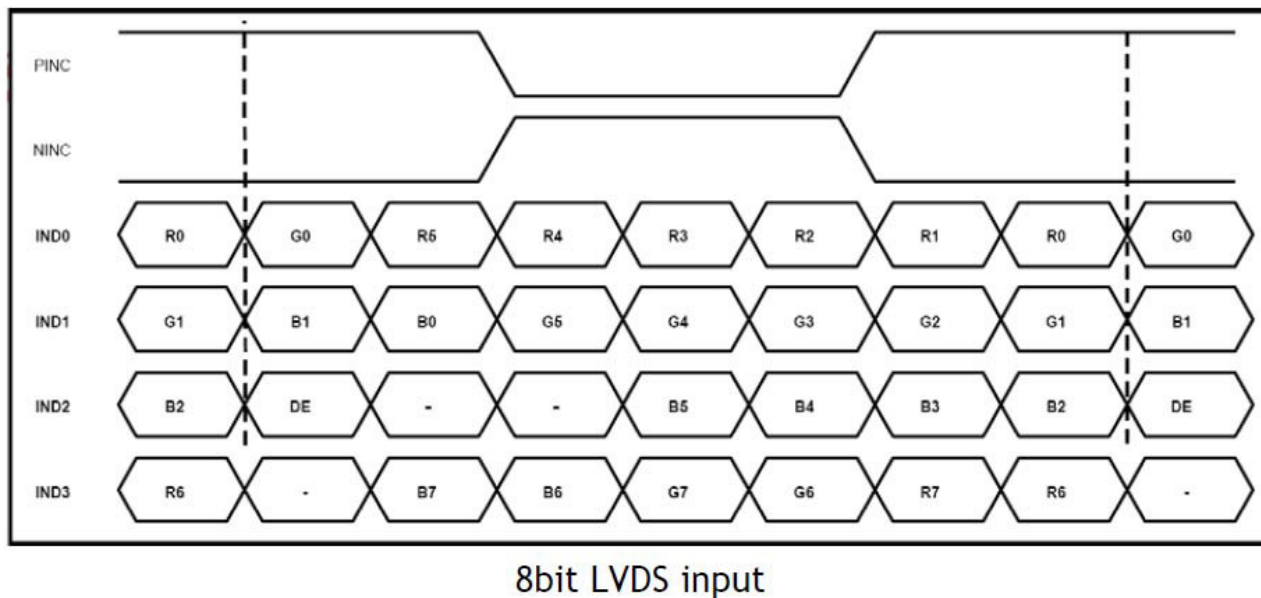
5. BLOCK DIAGRAM

5.1 TFT LCD Module



6. Relationship Between Displayed Color and Input

6.1 Data Mapping



7. ELECTRICAL CHARACTERISTICS

7.1 TFT LCD Module

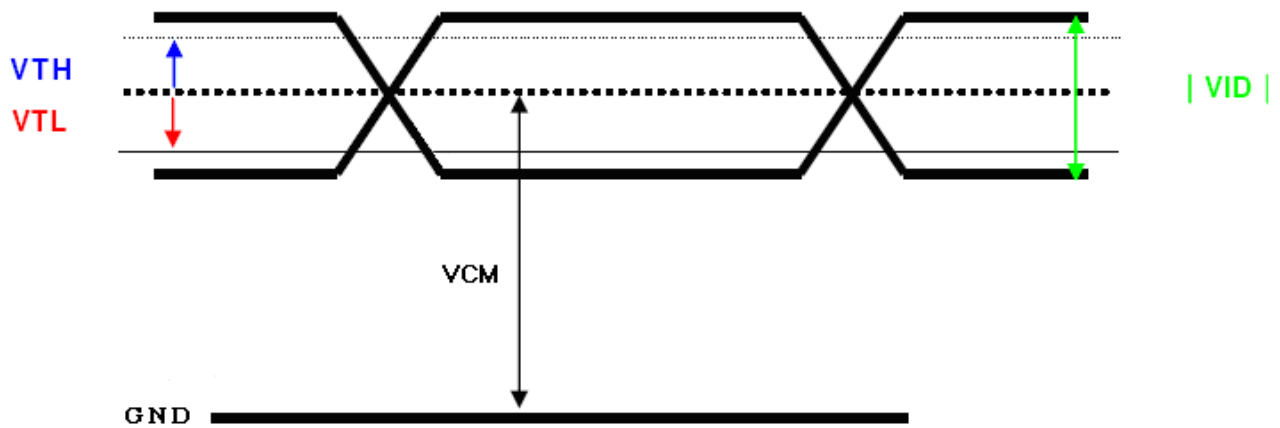
Item	Symbol	Values			Unit	Note
		Min	Typ.	Max.		
Supply Voltage	VCC	3.0	3.3	3.6	V	
	VLED_12V	-	12	-	V	
Differential Input High Threshold	RxVTH	-	-	+100	mV	RxVCM=+1.2V
Differential Input Low Threshold	RxVTL	-100	-	-	mV	RxVCM=+1.2V
Magnitude differential Input Voltage	VID	200	-	600	mV	(1)
Common Mode Voltage	RxVCM	0.7	-	1.6	V	
PWM frequency	-	100	-	10K	Hz	
PWM Duty ratio	-	25	-	100	%	
LED_EN Threshold Voltage	VIH	2	-	-	V	
	VIL	-	-	0.5	V	
Supply Current	ICC	-	380	420	mA	
	ILED	-	700	750	mA	
LED life time	-	-	50000	-	Hr	(2)

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



Note (2): The “LED life time” is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25°C 60% RH.

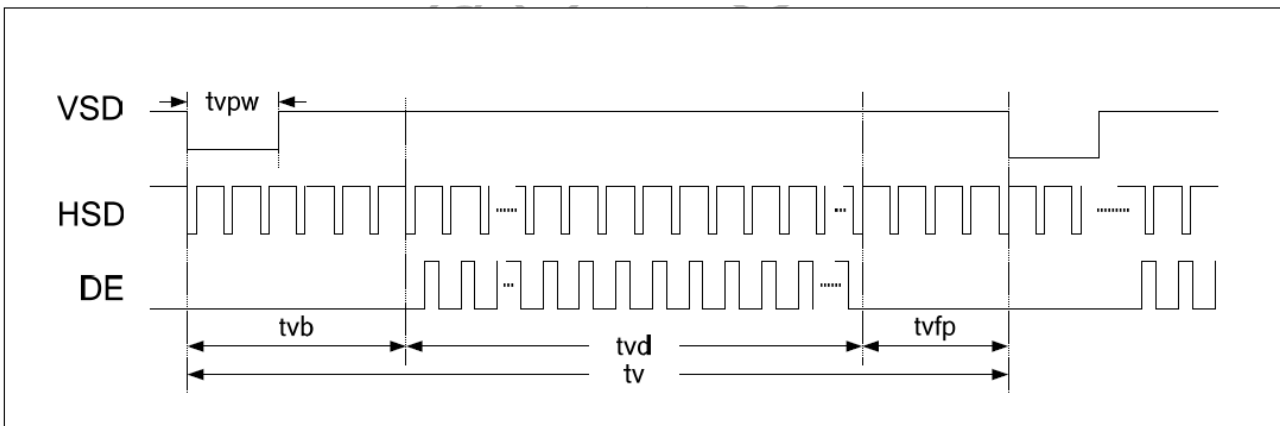
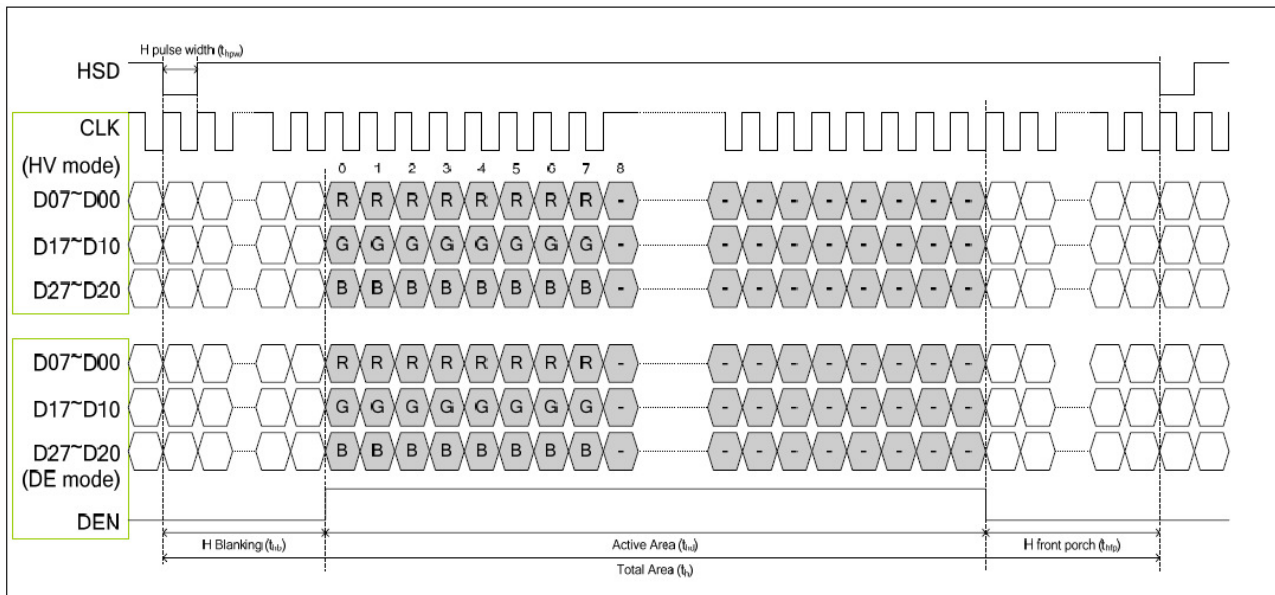
Note 2:



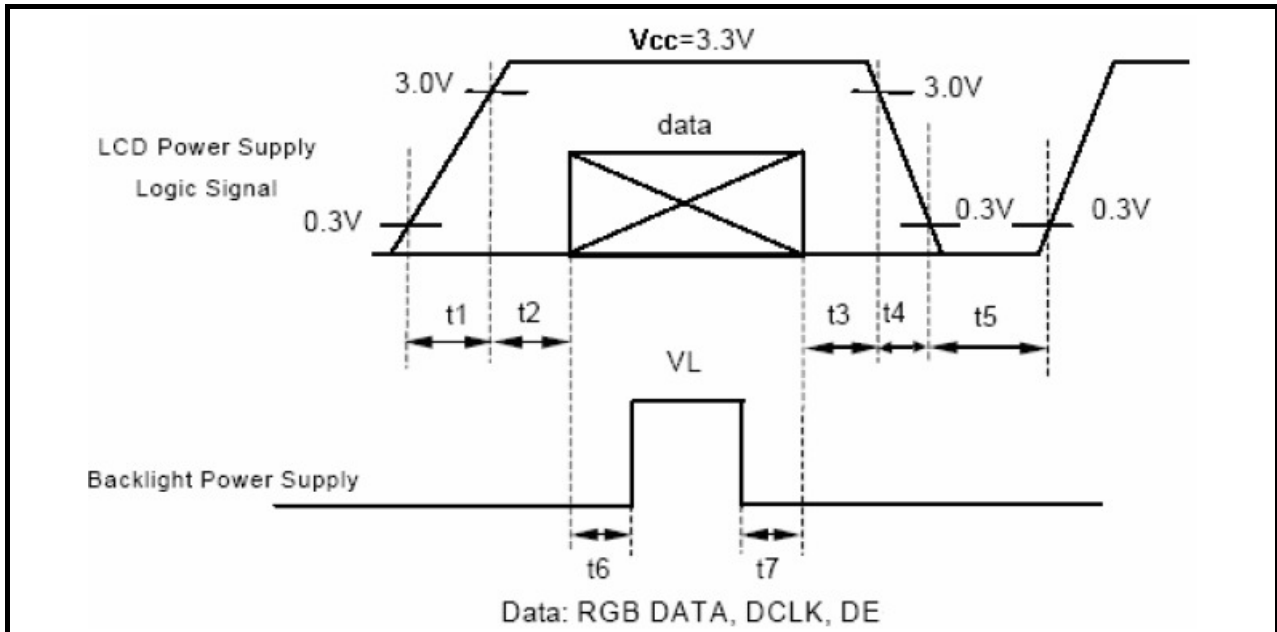
7.2 INTERFACE SPECIFICATIONS

7.2.1 DE mode Input signal characteristics

Signal	Parameter	Symbol	Min.	Typ.	Max.	Unit.	Note
DCLK	DCLK Frequency	fclk	52	65	71	MHz	
Horizontal	Horizontal display area	thd	-	1024	-	DCLK	
	HSD period time	th	1114	1344	1400	DCLK	
	HSD Blanking	thb+thfb	90	320	376	DCLK	
Vertical	Vertical display area	tvd	-	768	-	th	
	VSD period time	tv	778	806	845	th	
	VSD pulse width	tvb+tvfp	10	38	77	th	



7.3 Power On / Off Sequence



$t_1 \leq 10ms : 1 \text{ sec} \leq t_5$
 $50ms \leq t_2 : 200ms \leq t_6$
 $0 < t_3 \leq 50ms : 200ms \leq t_7$
 $0 < t_4 \leq 10ms$

8. PROJECTED CAPACITIVE TOUCH PANEL SPECIFICATION

8.1 Main Feature

Item	Specification	Unit
Screen Size	10.4 inch	Diagonal
Type	Transparent Type Projected Capacitive	--
Input Mode	Human's Finger	--
Finger	5	--
Interface	I2C or USB	--
Cover glass pencil-hardness	7H	--
Response time	25	ms
Driver IC	ILI2511	

8.2 Pin Assignments and Definitions

Item	Name	I/O	Unit
1	GND	P	Ground
2	VDD	P	Power supply for I2C
3	SCL	I	I2C clock
4	SDA	I/O	I2C data
5	INT	O	Interrupt signal to inform the host processor that touch data is ready for read
6	RESET	I	External low signal reset the chip.
7	VDD_5V	P	Power supply for USB I/F
8	D+	I/O	USB interface
9	D-	I/O	USB interface
10	GND	P	Ground

(CN2)

Item	Name	I/O	Unit
1	GND	P	Ground
2	VDD_5V	P	Power supply for USB I/F
3	GND	P	Ground
4	D+	I/O	USB interface
5	D-	I/O	USB interface

(CN3)

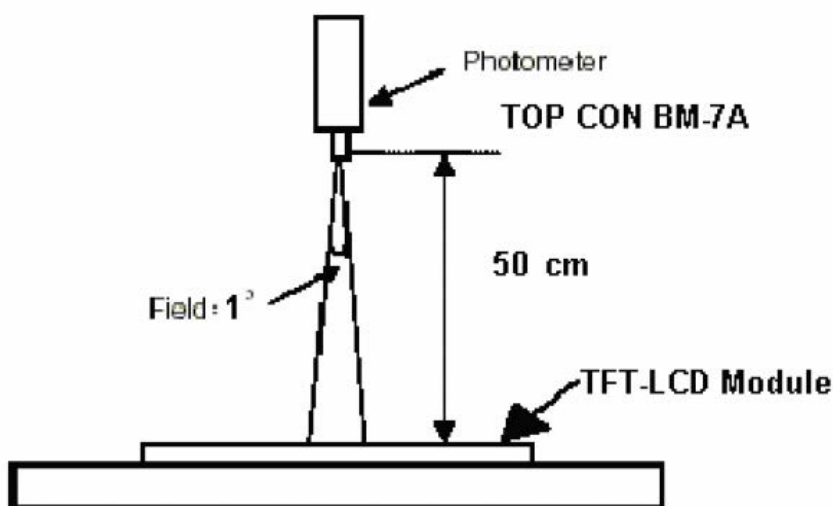
Item	Name	I/O	Unit
1	GND	P	Ground
2	VDD	P	Power supply for I2C
3	SCL	I	I2C clock
4	SDA	I/O	I2C data
5	INT	O	Interrupt signal to inform the host processor that touch data is ready for read
6	RESET	I	External low signal reset the chip.

9. OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Brightness	--	Note1, Note 3, ($\theta = 0^\circ$; Normal Viewing Angle)	720	900	--	cd/m ²
Uniformity	B-uni		70	80	-	%
Contrast Ratio	CR		600	900	--	--
Response Time	Tr		-	30	40	ms
	Tf					
Color Chromaticity	White	Wx	0.273	0.313	0.353	--
		Wy	0.289	0.329	0.369	--
View angle	Horizontal	$\theta x+$	80	85	--	
		$\theta x-$	80	85	--	
	Vertical	$\theta Y+$	80	85	--	
		$\theta Y-$	80	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 $25^\circ\text{C} \pm 2^\circ\text{C}$. The measurement method is shown in Note1.

Note1: The method of optical measurement:

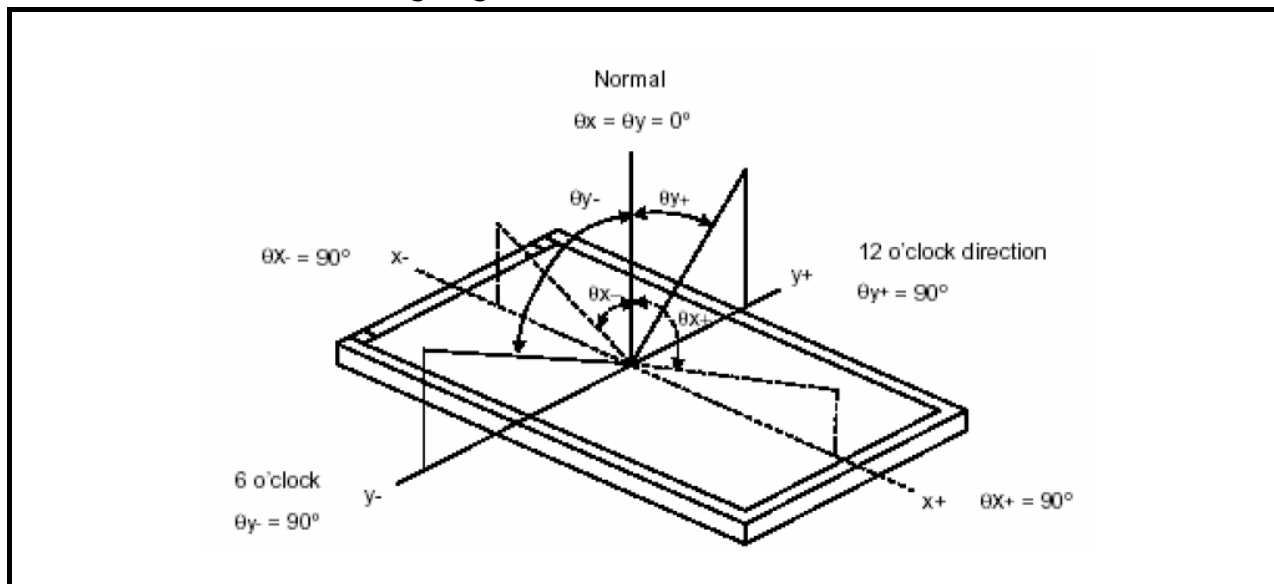


Note2: Measured at the center area of the panel and at the viewing angle of the $\theta x = \theta y = 0^\circ$

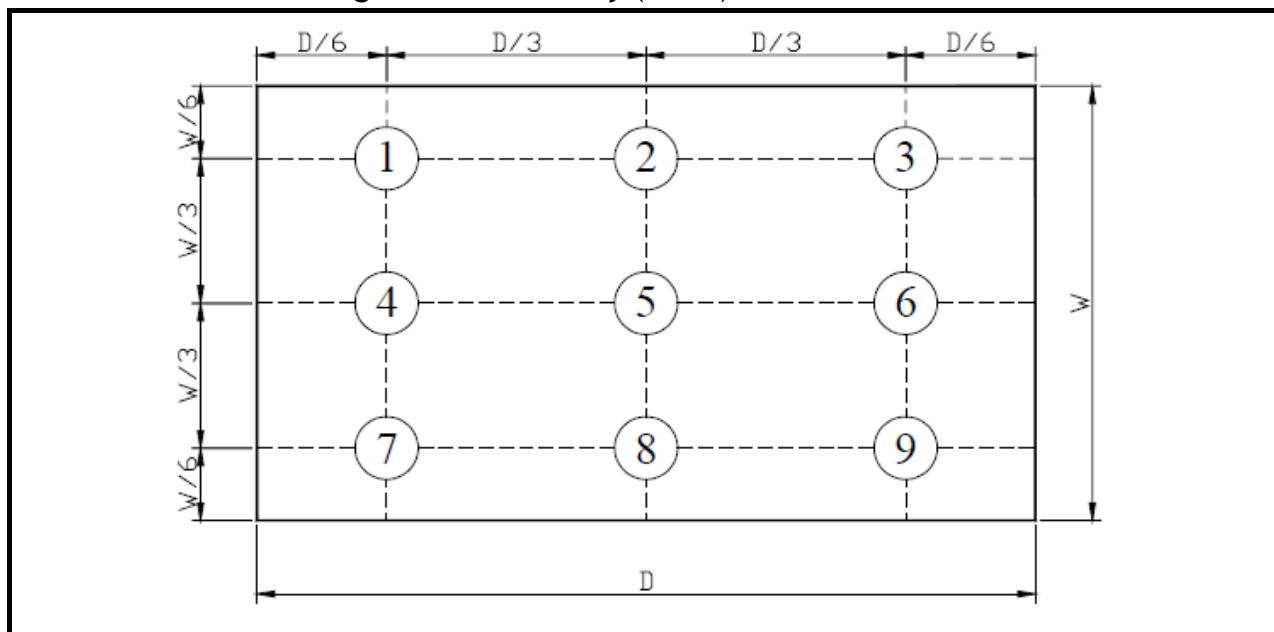
Note3: Definition of Contrast Ratio (CR):

CR = Luminance with all pixels in white state $\div$ Luminance with all pixels in Black state

Note 4: Definition of Viewing Angle:



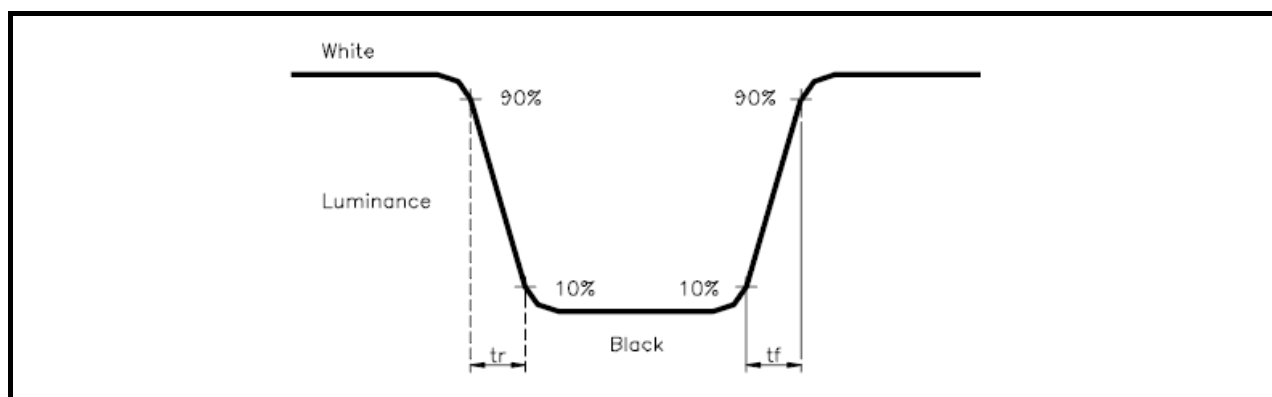
Note 5: Definition of Brightness Uniformity (B-uni):



$$B\text{-uni} = (\text{Minimum luminance of 9 points} \div \text{Maximum luminance of 9 points}) \times 100\%$$

Note 6: Definition of Response Time:

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



Note 7: Definition of Chromaticity:

The color coordinates (W_x, W_y), (R_x, R_y), (G_x, G_y), and (B_x, B_y) 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 : $25 \pm 5^{\circ}\text{C}$

Humidity : $65 \pm 5\%$

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	80°C, 240 hrs
2	Low Temperature Storage	-30°C, 240 hrs
3	High Temperature Operating	70°C, 240 hrs
4	Low Temperature Operating	-20°C, 240 hrs
5	High Temperature/Humidity Non-Operating	60°C, 90%RH, 240 hrs
6	Temperature Shock Non-Operating	-30°C $\longleftrightarrow$ 80°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
8	Electro-static Discharge Non-Operating	150pF,330Ω Air:± 8KV;Contact: ±6KV 10 times/point;4 points/panel face

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

No.	Parameter	Criteria														
1	Operating	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>	Item	Acceptable number	Total	Active Area	Bright	2	5	Dark	4					
		Item		Acceptable number		Total										
			Active Area													
		Bright	2	5												
		Dark	4													
		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>$0.3 < D \leq 0.5$</td><td>5</td></tr><tr><td>$D \leq 0.3$</td><td>*</td></tr></table> $D = (\text{Long} + \text{Short}) / 2$ * : Disregard	Zone Dimension	Acceptable number	Class Of Defects	AQL Level	$D>0.5$	0	Minor	1.5	$0.3 < D \leq 0.5$	5	$D \leq 0.3$	*				
Zone Dimension	Acceptable number	Class Of Defects	AQL Level													
$D>0.5$	0	Minor	1.5													
$0.3 < D \leq 0.5$	5															
$D \leq 0.3$	*															
Foreign Material in Line or spiral shape ($W \leq 1/4L$) (Note: 4)																
<table><tr><th>L (mm) \ W(mm)</th><th>Zone</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>$0.5 < L \leq 5$</td><td>$0.03 < W \leq 0.1$</td><td>5</td></tr><tr><td>$L \leq 0.5$</td><td>$W \leq 0.03$</td><td>*</td></tr></table> L : Length W : Width * : Disregard	L (mm) \ W(mm)	Zone	Acceptable number	Class Of Defects	AQL Level	$L > 5$	$W > 0.1$	0	Minor	1.5	$0.5 < L \leq 5$	$0.03 < W \leq 0.1$	5	$L \leq 0.5$	$W \leq 0.03$	*
L (mm) \ W(mm)	Zone	Acceptable number	Class Of Defects	AQL Level												
$L > 5$	$W > 0.1$	0	Minor	1.5												
$0.5 < L \leq 5$	$0.03 < W \leq 0.1$	5														
$L \leq 0.5$	$W \leq 0.03$	*														
2	External Inspection (non-operating)	Dimension: Outline (Major)														
		Bezel appearance: uneven (Minor)														
		Scratch on the polarize: (Note:2)														
		<table><tr><th>L (mm) \ W(mm)</th><th>Zone</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>$L \leq 3$</td><td>$W \leq 0.1$</td><td>3</td></tr></table> L : Length W : Width * : Disregard	L (mm) \ W(mm)	Zone	Acceptable number	Class Of Defects	AQL Level	--	$W > 0.1$	0	Minor	1.5	$L \leq 3$	$W \leq 0.1$	3	
		L (mm) \ W(mm)	Zone	Acceptable number	Class Of Defects	AQL Level										
		--	$W > 0.1$	0	Minor	1.5										
		$L \leq 3$	$W \leq 0.1$	3												
		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>$D \leq 0.3$</td><td>*</td><td rowspan="2">Minor</td><td rowspan="2">1.5</td></tr><tr><td>$D \leq 0.5$</td><td>3</td></tr></table> $D = (\text{Long} + \text{Short}) / 2$ * : Disregard	Zone Dimension	Acceptable number	Class Of Defects	AQL Level	$D \leq 0.3$	*	Minor	1.5	$D \leq 0.5$	3				
		Zone Dimension	Acceptable number	Class Of Defects	AQL Level											
$D \leq 0.3$	*	Minor	1.5													
$D \leq 0.5$	3															

Class of defects	Major	AQL 0.65%	Definition
	Minor	AQL 1.5%	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.
			It is a defect that will not result in functioning problem with deviation classified.

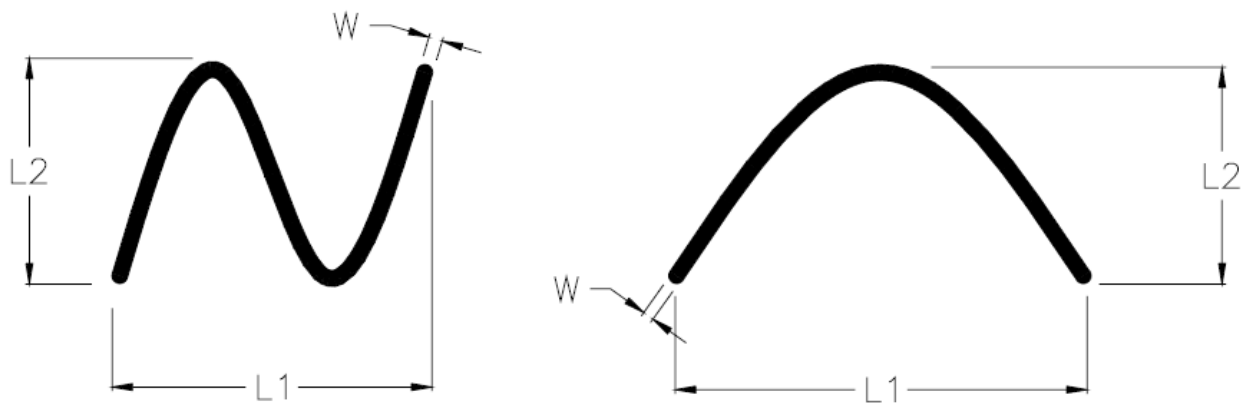
Note1:

- (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 ± 5 cm between the eyes of inspector and the panel.

Note3: Luminance measurement for contrast ratio is at the distance 50 ± 5 cm 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

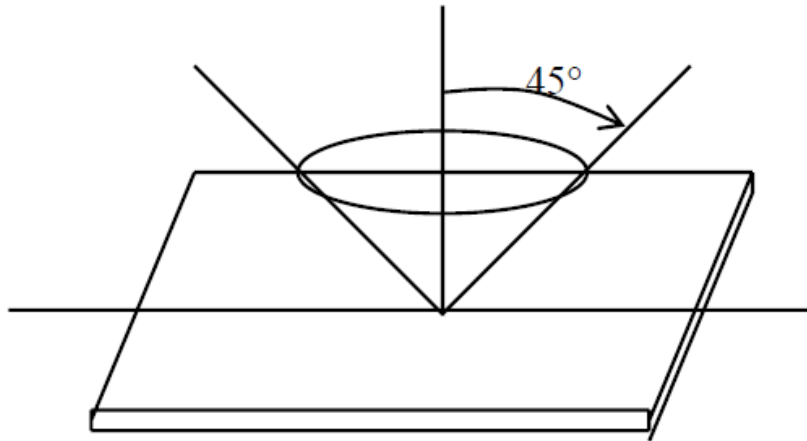
Inspection level: Level II

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 $280 \pm 10^{\circ}\text{C}$ 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 $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 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.**