LCD Module Specification

EE-0350ET-2CP-B R003

Version: 1.2
Date: Mai 17, 2022

Preliminary

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History

Date	V	Platform	A,M,R	Chapter	Description	Au
May 14, 2020	1.0		A	All	Initial Version	JG
June 02, 2020	1.1		M	2, 7	Change Dimension Pictures; Add Connector Type	MW
September 01,2020	1.1		A	4, 8	Complete power consumption	JG
May 11, 2022	1.2		M		Changed to F&S Layout	MW

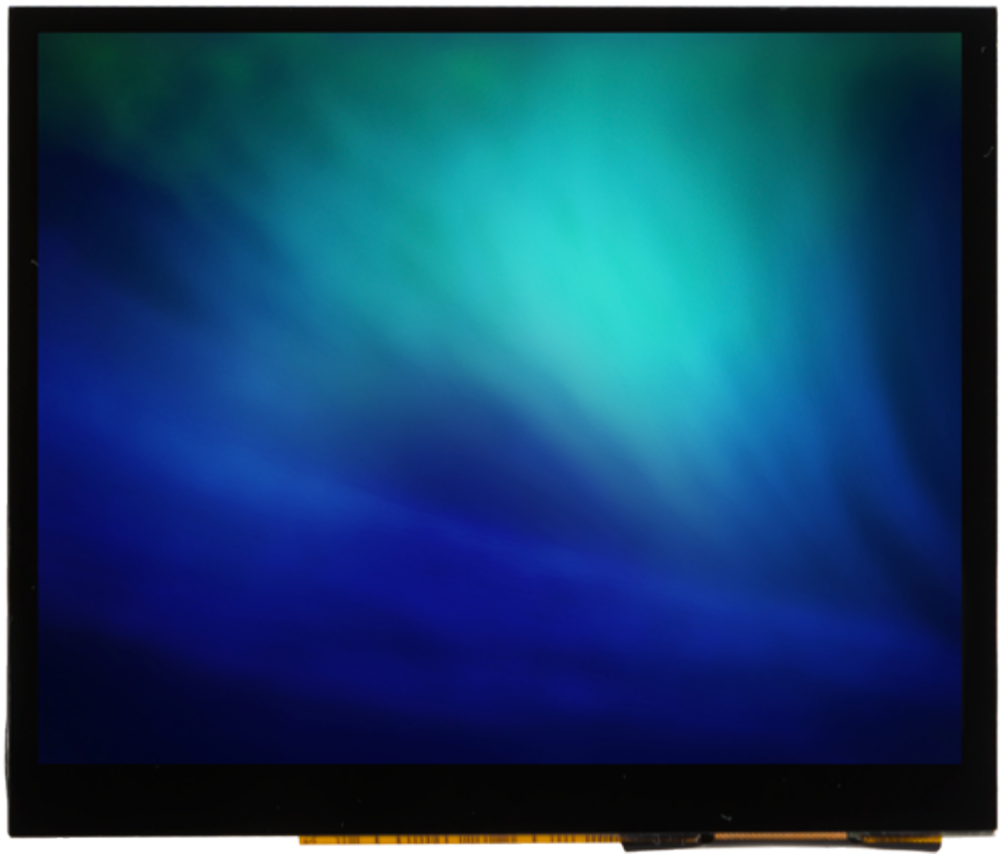
V	Version
A,M,R	Added, Modified, Removed
Au	Author

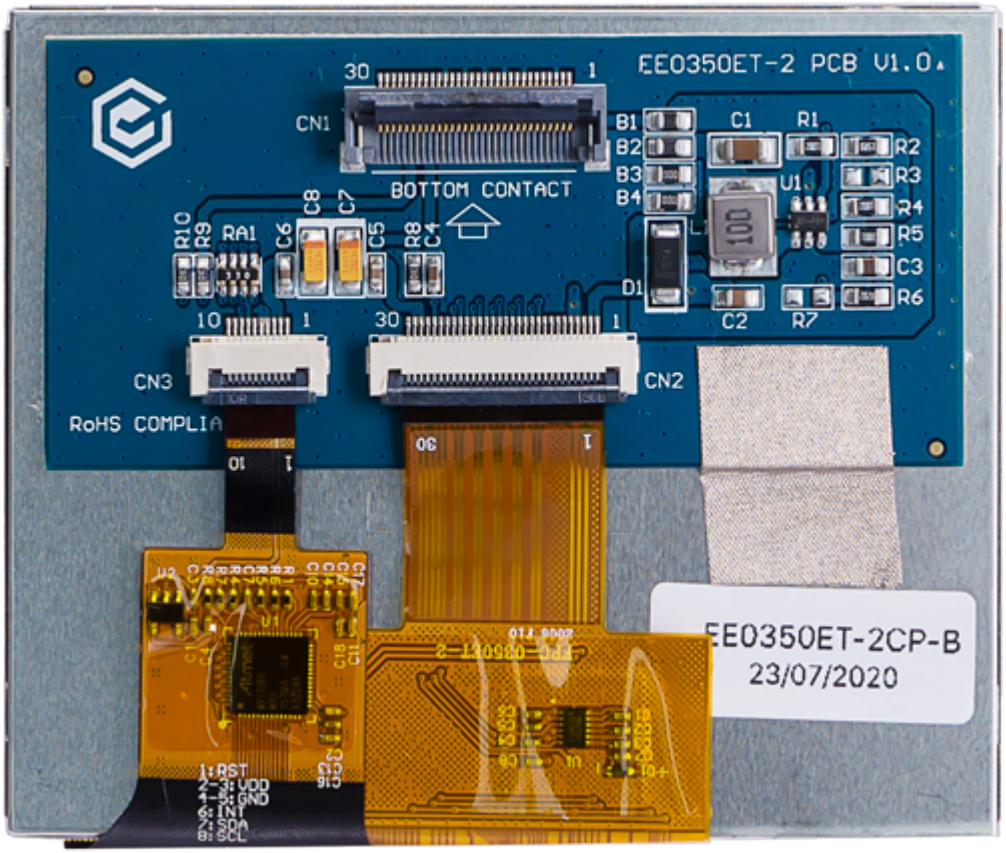
Table of Contents

1 General Information

Item	Content	Unit
LCD type	TFT/Transmissive/Normally Black	/
Size	3.5	Inch
Viewing Direction	Full viewing angle	O'clock
Gray Scale Inversion Direction	NA	O'clock
LCM(W x H x D)	76.74x63.74x9.2	mm²
Active Area(W x H)	70.08 x 52.56	mm²
Dot Pitch(W x H)	0.1095 x 0.1095	mm²
Number of Dots	640(RGB) x 480	/
Driver IC	TFT:NV3051D, CTP:MXT336U	/
Backlight Type	6 White LEDs	/
Surface Luminance	420	cd/m²
Interface Type	TFT:4-lane MIPI, CTP:IIC.	/
Color Depth	16.7M	/
Pixel Arrangement	RGB Vertical Stripe	/
Surface Treatment	Anti-glare	/
Input Voltage	3.3	v
With/Without TSP	With CTP	/
Weight	NA	g

Note 1: RoHS compliant
Note 2: LCM weight tolerance: ±5%

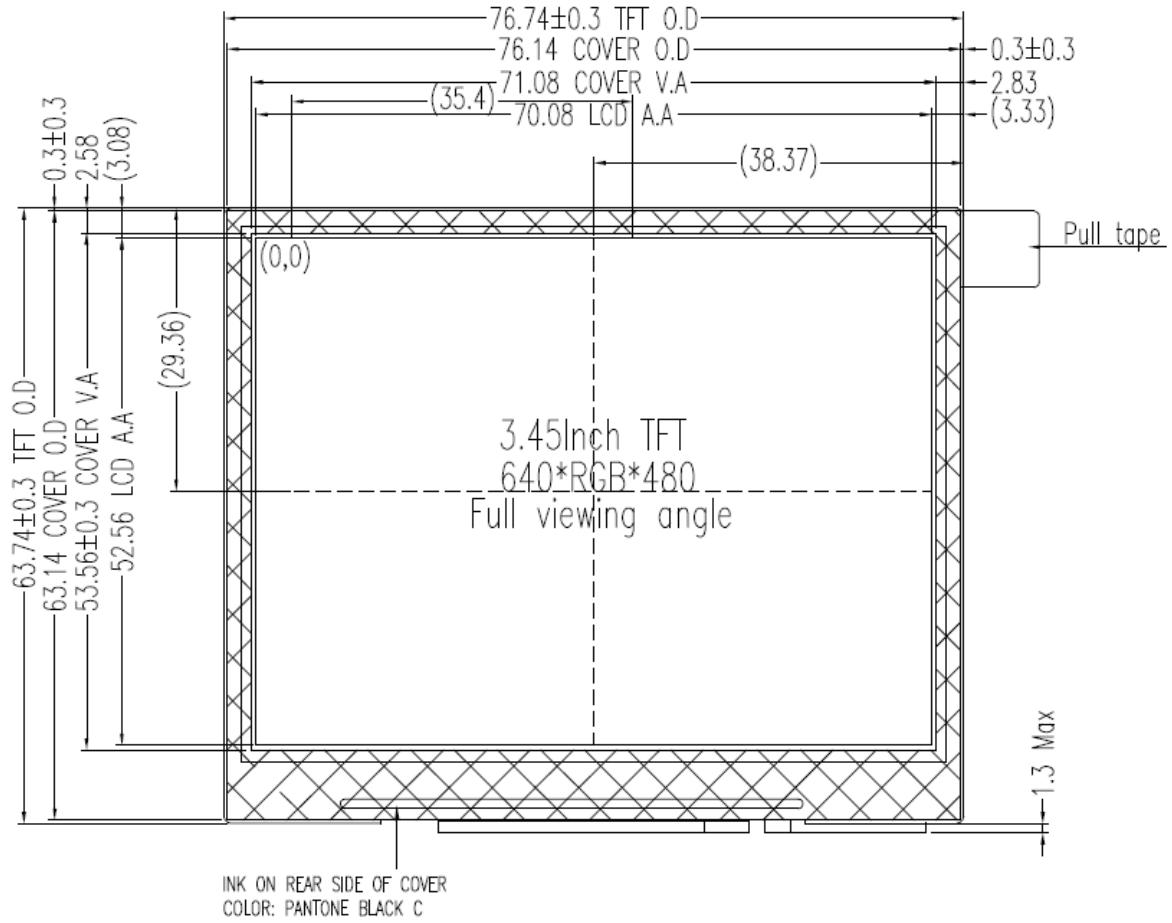



EE0350ET-2 PCB V1.0
CN1
BOTTOM CONTACT
CN3
CN2
RoHS COMPLIA
EE0350ET-2CP-B
23/07/2020

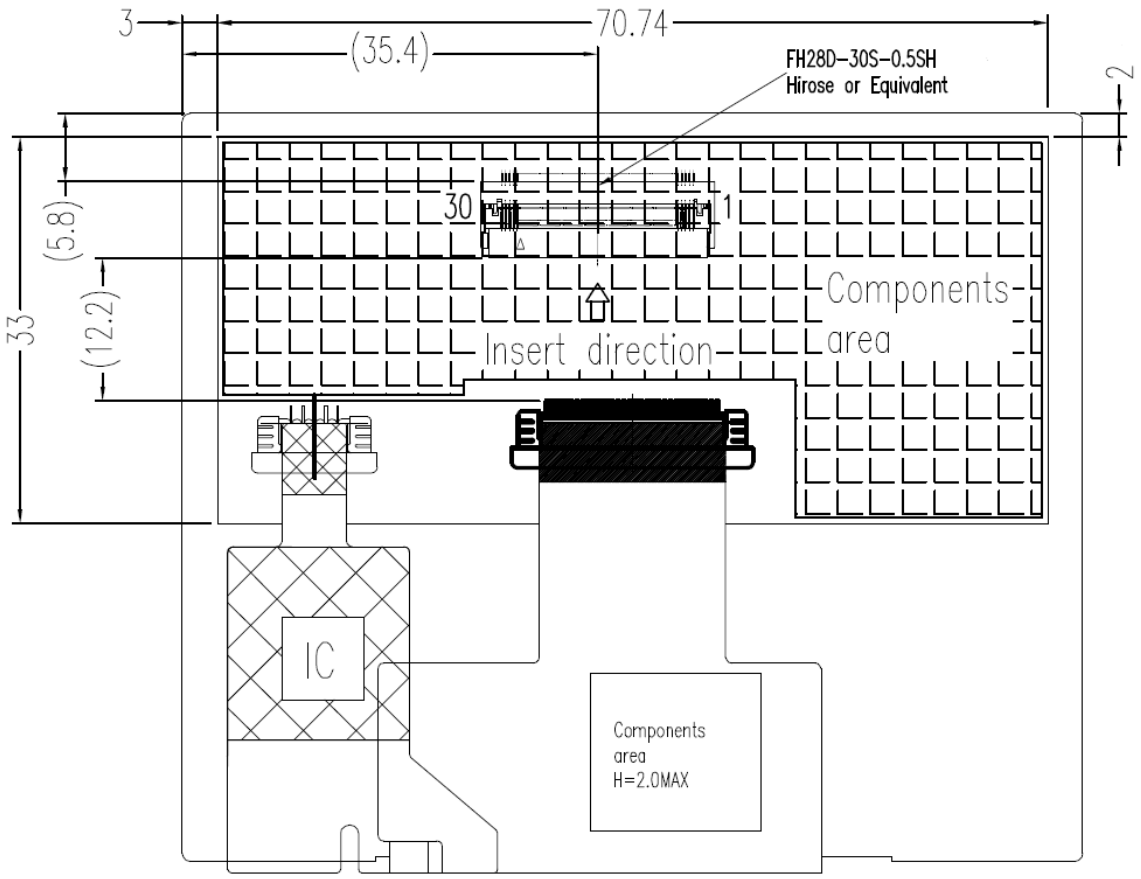
2 Mechanical Dimension

All Dimensions in Unit: MM

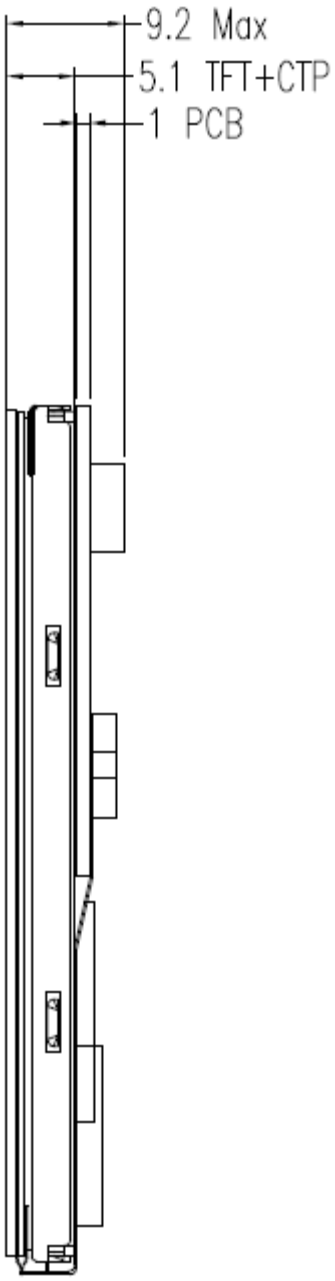
2.1 Front



2.2 Back


3
70.74
(35.4)
FH28D-30S-0.5SH
Hirose or Equivalent
2
30
1
(5.8)
(12.2)
33
Components
area
Insert direction
IC
Components
area
H=2.0MAX

2.3 Side



3 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Power supply voltage	VDDTFT	-0.3	6.6	V
Power supply for VLED	VDD_LED	-0.3	6.0	V
Operating temperature	TOP	-20	70	°C
Storage temperature	TST	-30	80	°C

4 Electrical Characteristics

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply voltage		VDDTFT	Ta=25°C	2.5	3.3	6.0	V	
Input voltage	`H`	VIH	VCI=2.8V	0.7VDD	-	VDD	V	
	`L`	VIL	VCI=2.8V	GND	-	0.3VDD	V	
Panel Power Consumption		Pvdd	Normal mode	-	10.6	-	mA	1, 2
Module power Consumption		Plcm	Normal mode	-	32.5	-	mA	1, 2

Note 1: Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normal operating conditions.
Note 2: Ta =25±2°C

5 Backlight Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Note
Power voltage(driver)	VDD_LED	-	3.3	5.5	V	
IVCC	Current for driver	-	137	-	mA	
Diming control for LED backlight	LEDCTRL ANALOG	0	-	3.0	V	
	LEDCTRL DIGITAL	-	3.3	-	V	PWMSignal, 2
		200	1k	20K	HZ	
Power enable	PWCTRL	-	3.3	-	V	Power On
Voltage for LED backlight	VF	-	19.2	-	V	1
Current for LED backlight	IF	-	20	-	mA	
LED life time	-	30k	50k	-	Hr	2

Note1: LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3℃, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃. and IL=20mA. The LED lifetime could be decreased if operating IL is larger than 20mA. The constant current driving method is suggested.

6 Electro-Optical Characteristics

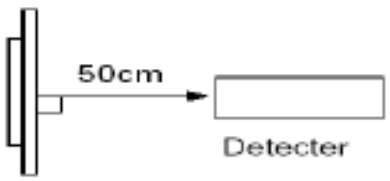
Item	Symbol		Condition	Min	Typ	Max	Unit	Note
Brightness	Bp		θ=0° Φ =0°	350	420	-	Cd/m2	1
Uniformity	⊿Bp			70	80	-	%	1,2
Viewing Angle	3:00		Cr ≥10	80	85	-	Deg	3
	6:00							
	9:00							
	12:00							
Contrast Ratio	Cr		θ=0° Φ=0°	600	800		-	4
Response Time	Tr+Tf		θ=0° Φ=0°	-	25	50	ms	5
Color of CIE Coordinate (CIE1931)	W	x	θ=0° Φ=0°	-0,5	-	+0.05	-	1,6
		y						
	R	x						
		y						
	G	x						
		y						
	B	x						
		y						
NTSC Ratio	S		θ=0° Φ=0°	-	60	-	%	1,6

The parameter is slightly changed by temperature, driving voltage and materiel

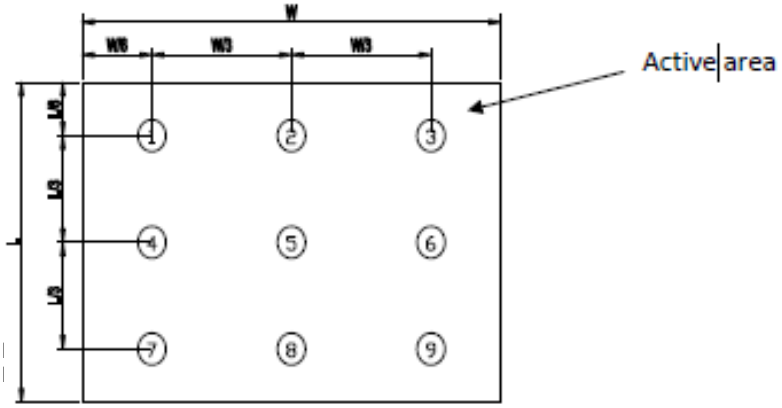
Note1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment BM-7 (Φ5mm)

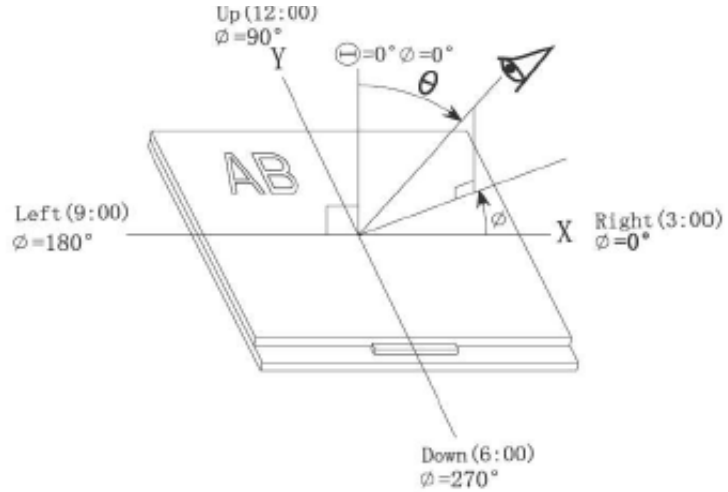
Measuring condition:
- Measuring surroundings: Dark room.
- Measuring temperature: Ta=25℃.
- Adjust operating voltage to get optimum contrast at the center of the display.

Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.

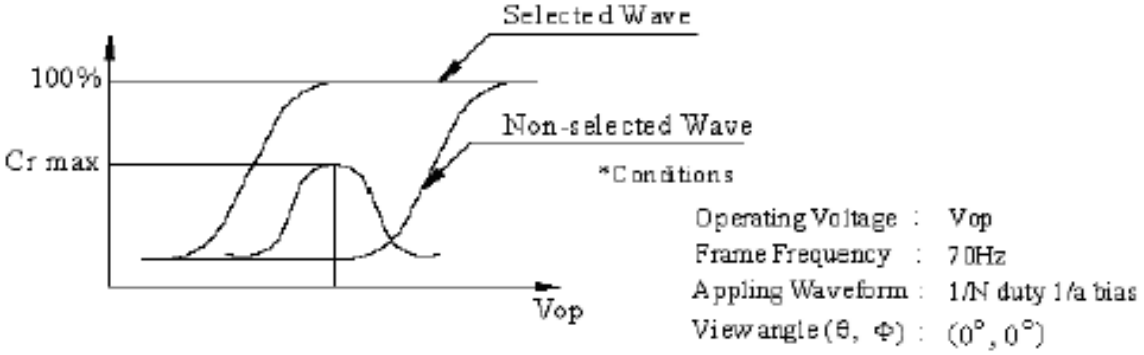


Note 2: The luminance uniformity is calculated by using following formula.
⊿Bp = Bp (Min.) / Bp (Max.)×100 (%)
Bp (Max.) = Maximum brightness in 9 measured spots
Bp (Min.) = Minimum brightness in 9 measured spots.



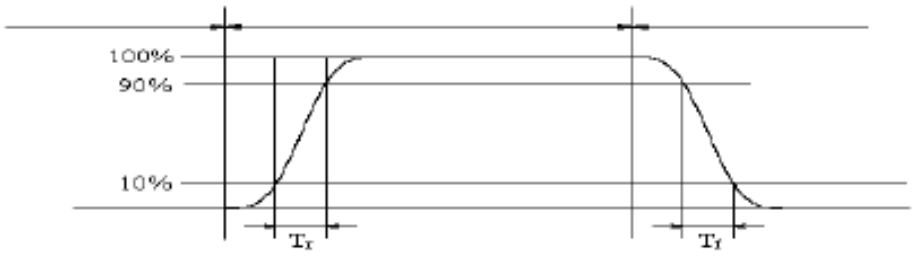


Note 4: Definition of contrast ratio.(Test LCD using DMS501)



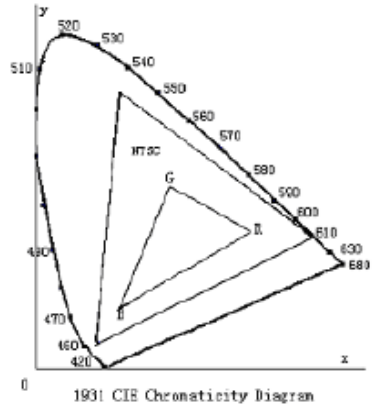
$$Contrast\ ratio(Cr) = \frac{Brightness\ of\ selected\ dots}{Brightness\ of\ non-selected\ dots}$$

Note 5: Definition of Response time. (Test LCD using DMS501):
The output signals of photo detector are measured when the input signals are changed from “black” to “white”(falling time) and from “white” to “black”(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes.Refer to figure as below.



The definition of response time

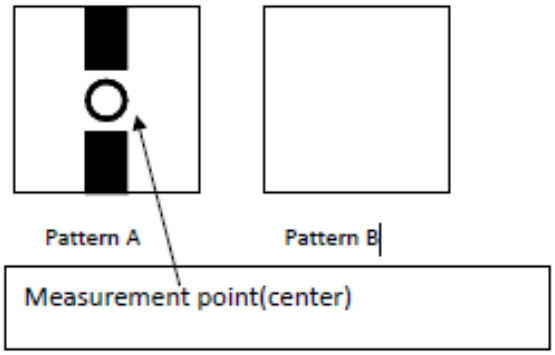
Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.



Color gamut:

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 7: Definition of cross talk.
Cross talk ratio(%)=|pattern A Brightness-pattern B Brightness|/pattern A Brightness*100



Electric volume value=3F+/-3Hex

7 Interface Description

Connector Type:
FH28D-30S-0.5SH

Pin No.	Symbol	I/O	Function		
1	VDD_LED	P	Power supply for LED driver (default)		
2					
3	GND	P	Ground		
4					
5	BL_PWM	I	Brightness controls for LED backlight (PWM)	BL_PWM	Brightness
				L (0V)	Highest Brightness
				H (3.3V)	Lowest Brightness
6	BL_ON	I	Enable Signal for LED Backlight	BL_ON	Backlight
				H	Power on
				L	Power off
7	GND	P	Ground		
8	RXIN3P	I	+MIPI differential data input		
9	RXIN3N	I	-MIPI differential data input		
10	GND	P	Ground.		
11	RXIN2P	I	+MIPI differential data input		
12	RXIN2N	I	-MIPI differential data input		
13	GND	P	Ground.		
14	RXCLKP	I	+MIPI differential clock input		
15	RXCLKN	I	-MIPI differential clock input		
16	GND	P	Ground.		
17	RXIN1P	I	+MIPI differential data input		
18	RXIN1N	I	-MIPI differential data input		
19	GND	P	Ground.		
20	RXIN0P	I	+MIPI differential data input		
21	RXIN0N	I	-MIPI differential data input		
22	GND	P	Ground.		
23	!RST_TFT	I	TFT Reset; Active Low		
24	VDDTFT	P	Power supply for TFT and CTP		
25					
26	NC		No connection		
27	SCL_CTP	I	I²C clock signal		
28	SDA_CTP	I	I²C data signal		
29	!RST_CTP	I	CTP Reset; Active Low		
30	!INT_CTP	I	CTP interrupt signal; Active Low		

8 Application Notes

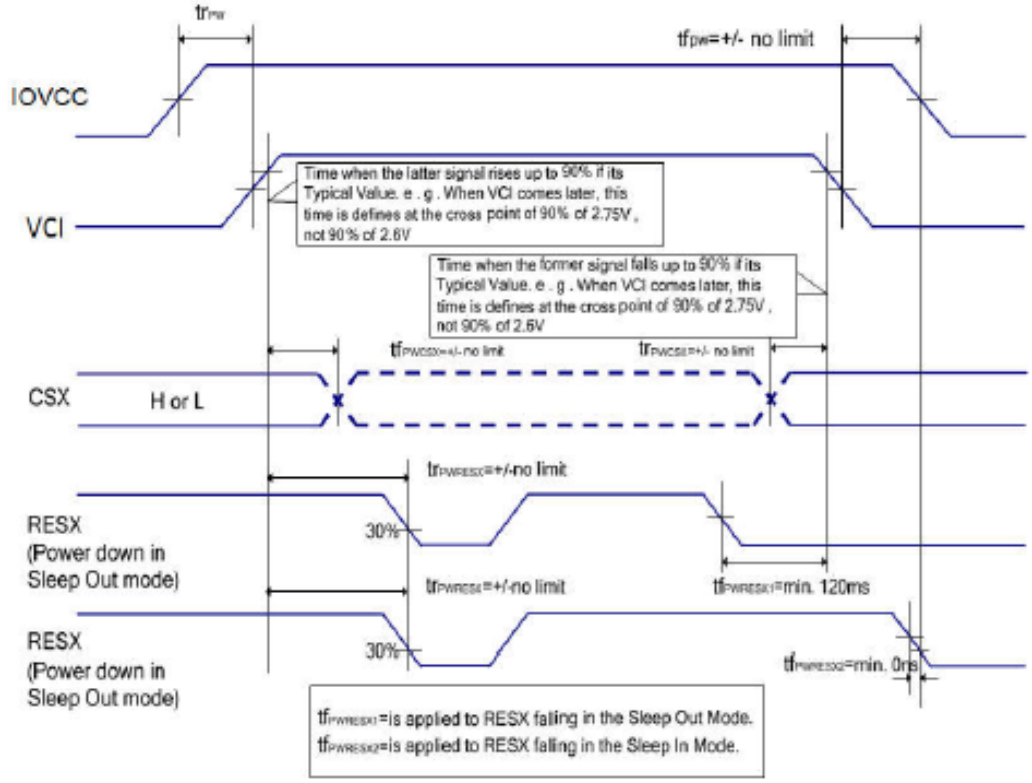
8.1 Power on/off sequence

IOVCC and VCI can be applied in any order. IOVCC and VCI can be powered down in any order. During power off, if LCD is in the Sleep Out mode, VCI and IOVCC must be powered down minimum 120msec after RESX has been released. During power off, if LCD is in the Sleep In mode, IOVCC or VCI can be powered down minimum 0msec after RESX has been released. CSX can be applied at any timing or can be permanently grounded. RESX has priority over CSX.

Note 1: There will be no damage to the display module if the power sequences are not met.
Note 2: There will be no abnormal visible effects on the display panel during the Power On/Off Sequences.
Note 3: There will be no abnormal visible effects on the display between end of Power On Sequence and before receiving Sleep Out command.

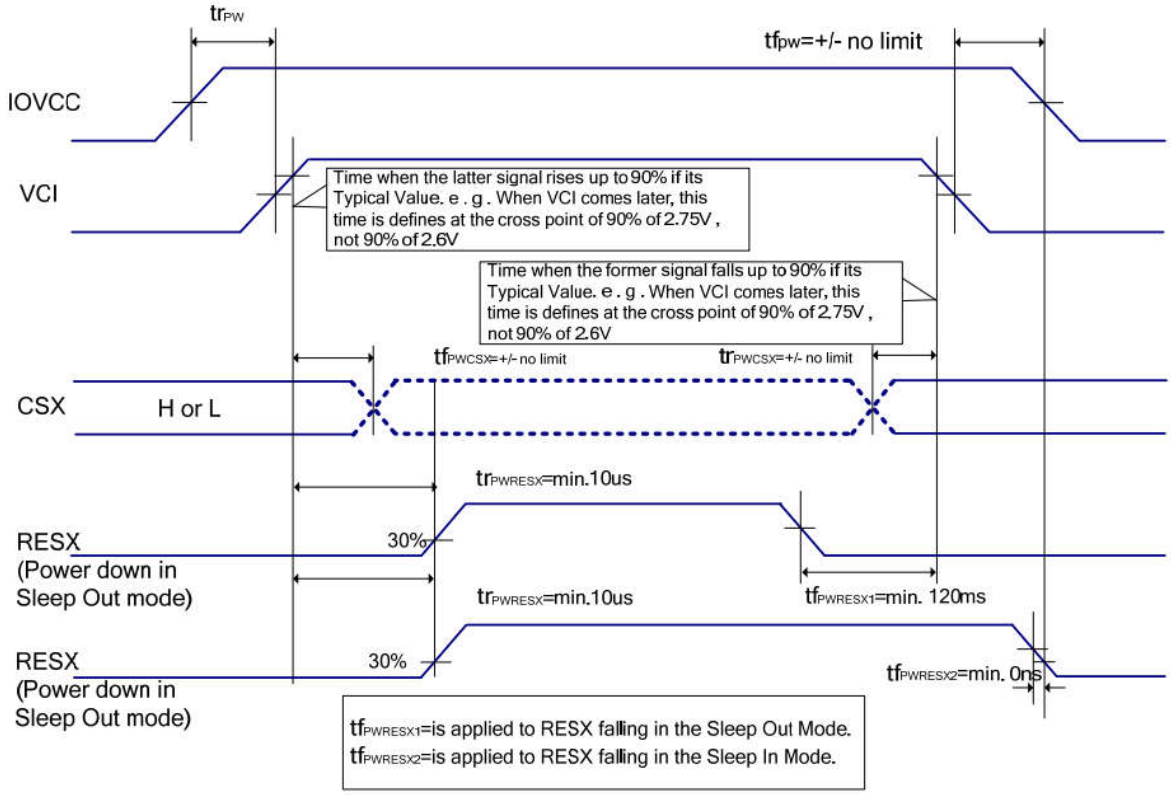
Also between receiving Sleep In command and Power Off Sequence.
If RESX line is not held stable by host during Power On Sequence, then it will be necessary to apply a Hardware Reset (RESX) after Host Power On Sequence is complete to ensure correct operation. Otherwise function is not guaranteed. The power on/off sequence is illustrated below:

1.1 Case 1 – RESX line is held high or unstable by host at power on
If RESX line is held High or unstable by the host during Power On, then a Hardware Reset must be applied
after both VCI and IOVCC have been applied – otherwise correct functionality is not guaranteed.
There is no timing restriction upon this hardware reset.



1.2 Case 2 – RESX line is held low or unstable by host at power on
If RESX line is held Low (and stable) by the host during Power On, then the RESX must be held low for minimum 10sec after both VCI and IOVCC have been applied.

If RESX line is held Low (and stable) by the host during Power On, then the RESX must be held low for minimum 10sec after both VCI and IOVCC have been applied.

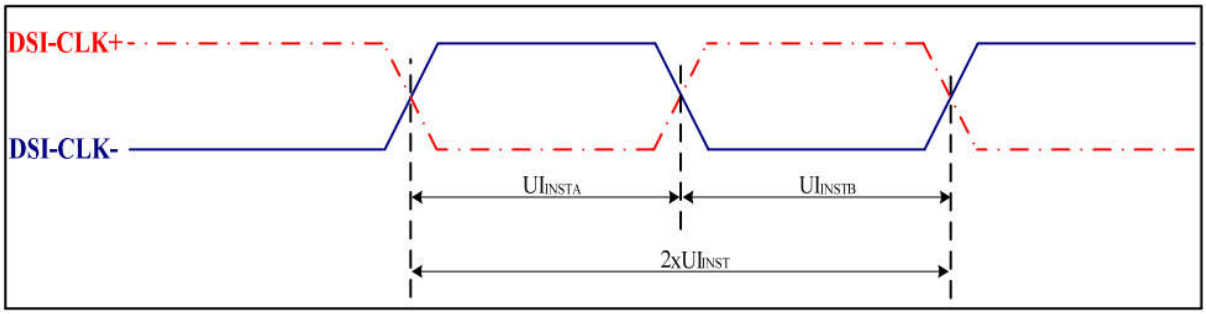


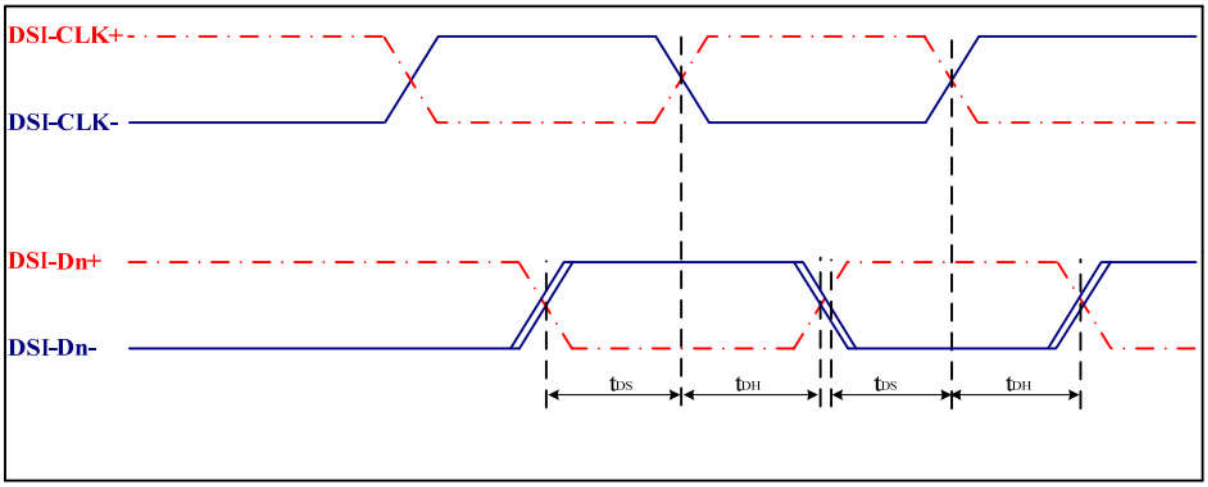
8.2 Uncontrolled power off

The uncontrolled power off means a situation when e.g. there is removed a battery without the controlled power off sequence. There will not be any damages for the display module or the display module will not cause any damages for the host or lines of the interface.
At an uncontrolled power off the display will go blank and there will not be any visible effects within some seconds on the display (blank display) and remains blank until “Power On Sequence” powers it up.

2. High Speed mode.

Parameter	Symbol	Parameter	Specification			Unit
			MIN	TYP	MAX	
High Speed Mode						
DSI-CLK+/-	2xUI$_{INST}$	Double UI instantaneous	2.22	-	25	ns
DSI-CLK+/-	UI$_{INSTA}$, UI$_{INSTB}$	UI instantaneous Halfs	1.11	-	12.5	ns
DSI-Dn+/-	t$_{DS}$	Data to clock setup time	0.15	-	-	UI
DSI-Dn+/-	t$_{DH}$	Data to clock hold time	0.15	-	-	UI
DSI-CLK+/-	t$_{DRTCLK}$	Differential rise time for clock	150	-	0.3UI	ps
DSI-Dn+/-	t$_{DRTDATA}$	Differential rise time for data	150	-	0.3UI	ps
DSI-CLK+/-	t$_{DFTCLK}$	Differential fall time for clock	150	-	0.3UI	ps
DSI-Dn+/-	t$_{DFTDATA}$	Differential fall time for data	150	-	0.3UI	ps





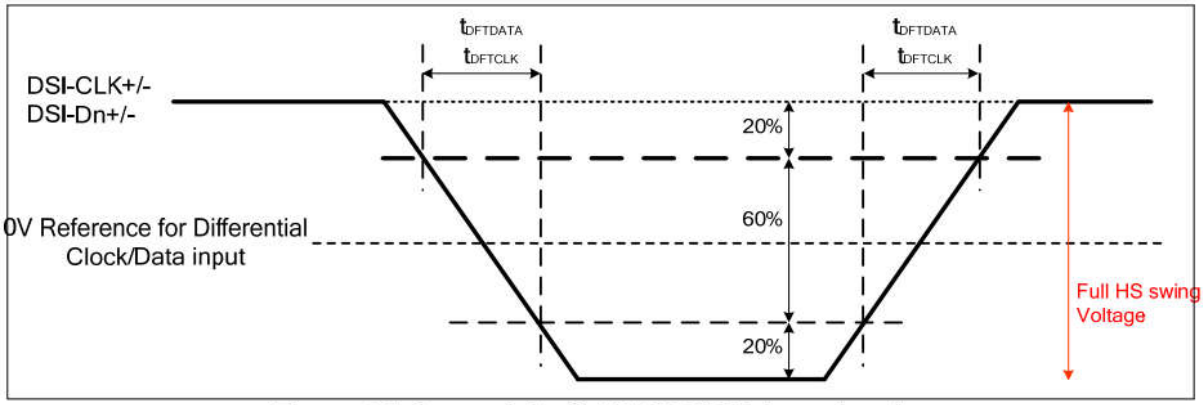


Figure: AC characteristics for MIPI-DSI High speed mode

3. Other info.

Please refer to the IC specification.

9 CTP Specification

9.1 General Specifications

Item	Specification	Unit
Type	Type Project capacitive type touch panel	-
Structure	Cover glass + sensor glas + FPCA	-
Input mode	Humans finger	-
Finger	Up to 5	-
Resolution	640x480	dots
Cover V.A.	71.08x53.56	mm
Hardness	>=6H	Pressure 750g force, 45°
Driver IC	MXT336U	-

9.2 Absolute Maximum Ratings

Symbol	Description	Min	Typ	Max	Unit	Notes
VDDTFT	Supply voltage Capacitive Touch Panel	2.7	3.3	3.47	V	
ICTP	Supply current Capacitive Touch Panel	-	1.5	-	mA	Witch out Touches, Depends on Acquisition Rate
VIH	Input high-level voltage	0.7Vcc	-	Vcc	V	
VIL	Input low-level voltage	-0.3	-	0.3Vcc	V	
VOH	Output high -level voltage	0.7Vcc	-	-	V	
VOL	Output low-level voltage	-	-	0.3Vcc	V	

9.3 CTP TIMING

I²C Communications

The device can use an I²C interface for communication.

The I²C interface is used in conjunction with the $\overline{CHG}$ line. The $\overline{CHG}$ line going active signifies that a new data packet is available. This provides an interrupt-style interface and allows the device to present data packets when internal changes have occurred.

I²C Address

The device supports one I²C device address – 0x4A.

The I²C address is shifted left to form the SLA+W or SLA+R address when transmitted over the I²C interface, as shown in Table 9-1.

Table 9-1. Format of an I²C Address

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Address: 0x4A							Read/write

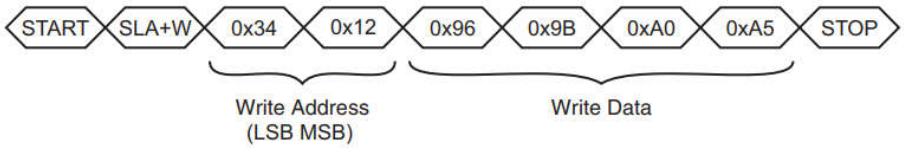
Writing To the Device

A WRITE cycle to the device consists of a START condition followed by the I²C address of the device (SLA+W). The next two bytes are the address of the location into which the writing starts. The first byte is the Least Significant Byte (LSByte) of the address, and the second byte is the Most Significant Byte (MSByte). This address is then stored as the address pointer.

Subsequent bytes in a multi-byte transfer form the actual data. These are written to the location of the address pointer, location of the address pointer + 1, location of the address pointer + 2, and so on. The address pointer returns to its starting value when the WRITE cycle STOP condition is detected.

Figure 9-1 shows an example of writing four bytes of data to contiguous addresses starting at 0x1234.

Figure 9-1. Example of a Four-byte Write Starting at Address 0x1234

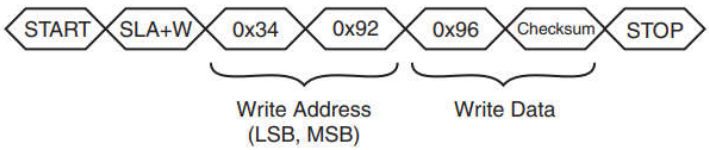


I²C Writes in Checksum Mode

In I²C checksum mode an 8-bit CRC is added to all I²C writes. The CRC is sent at the end of the data write as the last byte before the STOP condition. All the bytes sent are included in the CRC, including the two address bytes. Any command or data sent to the device is processed even if the CRC fails.

To indicate that a checksum is to be sent in the write, the most significant bit of the MSByte of the address is set to 1. For example, the I²C command shown in Figure 9-2 writes a value of 150 (0x96) to address 0x1234 with a checksum. The address is changed to 0x**9**234 to indicate checksum mode.

Figure 9-2. Example of a Write To Address 0x1234 With a Checksum



Reading From the Device

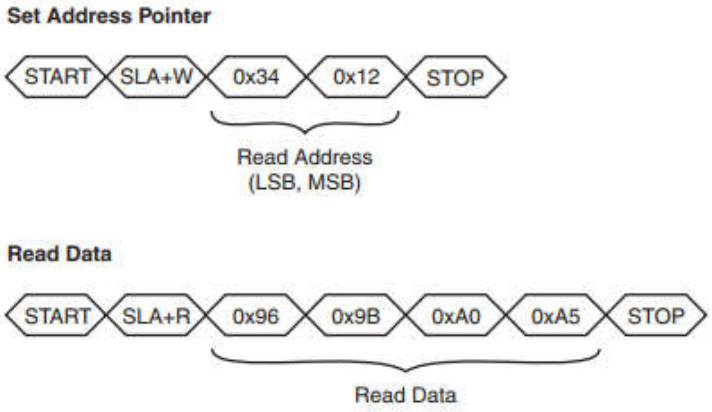
Two I²C bus activities must take place to read from the device. The first activity is an I²C write to set the address pointer (LSByte then MSByte). The second activity is the actual I²C read to receive the data. The address pointer returns to its starting value when the read cycle NACK is detected.

It is not necessary to set the address pointer before every read. The address pointer is updated automatically after every read operation. The address pointer will be correct if the reads occur in order. In particular, when reading multiple messages from the Message Processor T5 object, the address pointer is automatically reset to allow continuous reads (see Section 9.5).

The WRITE and READ cycles consist of a START condition followed by the I²C address of the device (SLA+W or SLA+R respectively). Note that in this mode, calculating a checksum of the data packets is not supported.

Figure 9-3 shows the I²C commands to read four bytes starting at address 0x1234.

Figure 9-3. Example of a Four-byte Read Starting at Address 0x1234



10 Reliability Test

No.	Test Item	Test Condition	Note
1	High Temperature Storage Test	80±2℃/240Hrs	2
2	Low Temperature Storage Test	-30±2℃/240Hrs.	1, 2
3	High Temperature Operation Test	70±2℃/240Hrs.	
4	Low Temperature Operation Test	-20±2℃/240Hrs.	1
5	High Temperature and High Humidity Operation Test	60±℃, 90%RH 240Hrs.	1, 2
6	Thermal Shock Test (Non-operating)	-30±2℃(30Min.)~25±2℃(5Min.)~80±2℃ (30Min.) 10Cycles	
7	Vibration Test (Non-operating)	Frequency:10~55Hz Amplitude: 1.5mm Sweep Time: 11Mins Test Period: 6 Cycles For Each Direction Of X, Y, Z (Packing Condition)	
8	Shock Test (Non-operating)	Cycle: 3 Times 100G, 6Ms Direction: ±X, ±Y, ±Z	
9	Electronic Static Discharge Test (Non-operating)	Voltage: ±4KV(Contact), ±8KV(Air), R:330, C:150pF, Air Discharge, 10 Times. (Packing Condition)	

Note 1: Without water condensation
Note 2: The function test shall be conducted after 2 hours storage at the room temperature and humidity after removed from the test chamber.

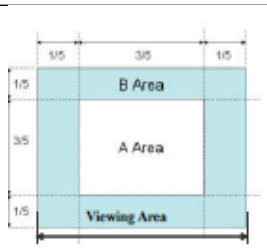
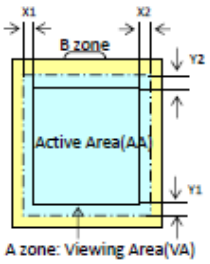
11 Inspection Criteria

11.1 Classification of defects

Major defects (MA): A major defect refers to a defect that may substantially degrade usability for product applications, including all functional defects (such as no display, abnormal display, open or missing segment, short circuit, missing component), outline dimension beyond the drawing, progressive defects and those affecting reliability.

Minor defects (MI): A minor defect refers to a defect which is not considered to be able to substantially degrade the product application or a defect that deviates from existing standards almost unrelated to the effective use of the product or its operation, such as black spot, white spot, bright spot, pinhole, black line, white line, contrast variation, glass defect, polarizer defect, etc.

11.2 Definition of inspection range

For dot defect of TFT LCD which is not smaller than 3 inches, dividing three areas to make a judgment (according to figure 1). A area : center of viewing area B area : periphery of viewing area C area : Outside viewing area For other defects, dividing two areas to make a judgment (according figure 2). A zone : Inside Viewing area B zone : Outside Viewing area X1(A.A~V.A): 2mm X2(A.A~V.A): 2mm Y1(A.A~V.A): 2mm Y2(A.A~V.A): 2mm	 Figure 1  Figure 2

11.3 Inspection items and general notes

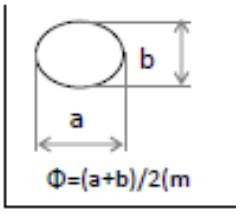
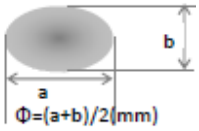
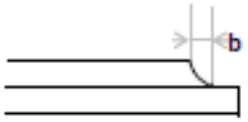
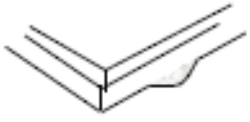
<table>
<tr><td>General notes</td><td colspan="2">Should any defects which are not specified in this standard happen, additional standard shall be determined by mutual agreement between customer and our company.
Viewing area should be the area which our company guarantees.
Limit sample should be prior to this Inspection standard.
Viewing judgment should be under static pattern.

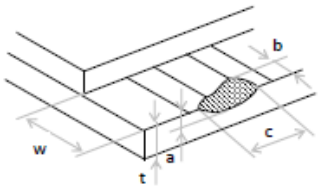
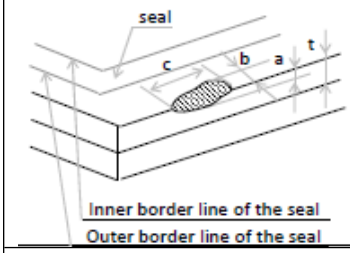
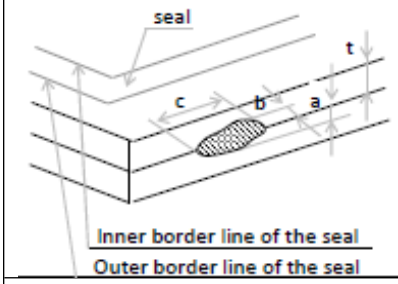
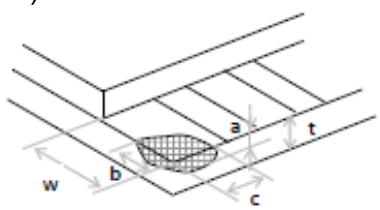
Inspection conditions
Inspection distance: 250 mm (from the sample)
Temperature : 25±5 ºC
Inspection angle : 45 degrees in 6 o′clock direction (all defects in viewing area should be inspected from this direction)</td></tr>
<tr><td rowspan="7">Inspection items</td><td>Pinhole, Bright spot, Black spot, White spot, Black line, White Line, Foreign particle, Bubble</td><td>The color of a small area is different from the remainder. The phenomenon doesn’t change with voltage</td></tr>
<tr><td>Contrast variation</td><td>The color of a small area is different from the remainder. The phenomenon changes with voltage</td></tr>
<tr><td>Polarizer defect</td><td>Scratch, Dirt, Particle, Bubble on polarizer or between polarizer and glass</td></tr>
<tr><td>Dot defect (TFT LCD)</td><td>The pixel appears bright or dark abnormally when display</td></tr>
<tr><td>Functional defect</td><td>No display, Abnormal display, Open or missing segment, Short circuit, False viewing direction</td></tr>
<tr><td>Glass defect</td><td>Glass crack, Shaved corner of glass, Surplus glass</td></tr>
<tr><td>PCB defect</td><td>Components assembly defect</td></tr>
</table>

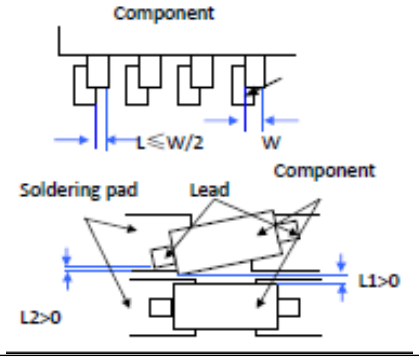
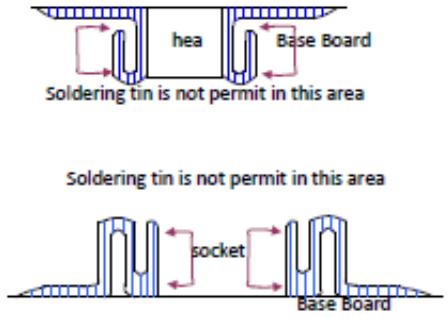
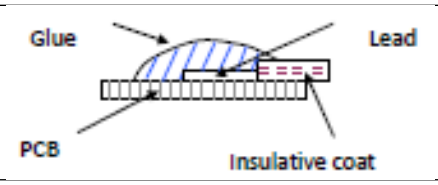
4 Outgoing Inspection level

Outgoing Inspection standard	Inspection conditions	Inspection				
		Min.	Max.	Unit	IL	AQL
Major Defects	See 9.3 general notes	See 9.5			II	0.65
Minor Defects	See 9.3 general notes	See 9.5			II	0.65
Note：Sampling standard conforms to GB2828						

11.4 Inspection Items and Criteria

<table>
<tr><td colspan="3" rowspan="3">Inspection items</td><td colspan="3">Judgment standard</td></tr>
<tr><td colspan="2" rowspan="2">Category</td><td colspan="2">Acceptable number</td></tr>
<tr><td>A zone</td><td>B zone</td></tr>
<tr><td rowspan="6">1</td><td rowspan="6">Black spot, White spot, Pinhole, Foreign Particle, Particle in or on glass, Scratch on glass</td><td rowspan="6"> 
</td><td>A</td><td>Φ<=0.10</td><td>Neglected</td><td rowspan="6">Neglected</td></tr>
<tr><td>B</td><td>0.10<Φ<=0.2</td><td>1</td></tr>
<tr><td>C</td><td>0.2<Φ</td><td>0</td></tr>
<tr><td>D</td><td>-</td><td>-</td></tr>
<tr><td colspan="2">Total defective point(B,C)</td><td>1</td></tr>
<tr><td rowspan="5">2</td><td rowspan="5">Black line, White line, and Particle Between Polarizer and glass, Scratch on glass</td><td rowspan="5"> 
</td><td>A</td><td>W<=0.02</td><td>Neglected</td><td rowspan="5">Neglected</td></tr>
<tr><td>B</td><td>0.02<W<=0.03
L<=1.0</td><td>1</td></tr>
<tr><td>C</td><td>- 0.03<W<=0.05
L>1.0</td><td>0</td></tr>
<tr><td>D</td><td>0.05<W, 1.0<L</td><td>0</td></tr>
<tr><td colspan="2">Total defective point(B,C)</td><td>1</td></tr>
<tr><td>3</td><td colspan="2">Bright spot</td><td colspan="2">Any size</td><td>none</td><td>none</td></tr>
<tr><td rowspan="5">4</td><td rowspan="5">Contrast variation</td><td rowspan="5"> 
</td><td>A</td><td>Φ<0.2</td><td>Neglected</td><td rowspan="4">Neglected</td></tr>
<tr><td>B</td><td>0.2<Φ<=0.3</td><td>2</td></tr>
<tr><td>C</td><td>0.3<Φ<=0.4</td><td>1</td></tr>
<tr><td>D</td><td>0.4<Φ</td><td>0</td></tr>
<tr><td colspan="2">Total defective point(B,C)</td><td>3</td><td></td></tr>
<tr><td>5</td><td colspan="2">Bubble inside cell</td><td colspan="2">Any size</td><td>none</td><td>none</td></tr>
<tr><td rowspan="4">6</td><td rowspan="4">Polarizer defect (if Polarizer is used)</td><td>Scratch ,damage on polarizer, Particle on polarizer or between polarizer and glass.</td><td colspan="4">Refer to item 1 and item 2.</td></tr>
<tr><td rowspan="3">Bubble, dent and convex</td><td>A</td><td>Φ<=0.1</td><td>Neglected</td><td rowspan="3">Neglected</td></tr>
<tr><td>B</td><td>0.1 <Φ<=0.2</td><td>1</td></tr>
<tr><td>C</td><td>0.2 <Φ</td><td>0</td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">Surplus glass</td><td>Stage surplus glass
 
</td><td colspan="4">B<=0.3mm</td></tr>
<tr><td>Surrounding surplus glass
  </td><td colspan="4">Should not influence outline dimension and assembling.</td></tr>
<tr><td>8</td><td colspan="2">Open segment or open common</td><td colspan="4">Not permitted</td></tr>
<tr><td>9</td><td colspan="2">Short circuit</td><td colspan="4">Not permitted</td></tr>
<tr><td>10</td><td colspan="2">False viewing direction</td><td colspan="4">Not permitted</td></tr>
</table>

<table>
<tr><td>11</td><td colspan="2">Contrast ratio uneven</td><td colspan="3">According to the limit specimen</td></tr>
<tr><td>12</td><td colspan="2">Crosstalk</td><td colspan="3">According to the limit specimen</td></tr>
<tr><td>13</td><td colspan="2">Black /White spot(display)</td><td colspan="3">Refer to item 1</td></tr>
<tr><td>14</td><td colspan="2">Black /White line(display)</td><td colspan="3">Refer to item 2</td></tr>
<tr><td colspan="3" rowspan="2">Inspection items</td><td colspan="3">Judgment standard</td></tr>
<tr><td colspan="2">Category(application: B zone)</td><td>Acceptable number</td></tr>
<tr><td rowspan="4">15</td><td rowspan="4">Glass defect crack</td><td>i)The front of lead terminals
 
</td><td>A</td><td>a≤ t, b≤1/5W, c≤3mm</td><td rowspan="4">Max.3 defects allowed</td></tr>
<tr><td>B</td><td>Crack at two sides of lead terminals should not cover patterns and alignment mark</td></tr>
<tr><td>ii)Surrounding crack-non-contact side
 
</td><td colspan="2">b < Inner borderline of the seal</td></tr>
<tr><td>iii) Surrounding crack-contact side
 
</td><td colspan="2">b < Outer borderline of the seal</td></tr>
<tr><td rowspan="2">iv)Corner
 
</td><td>A</td><td>a <= t, b <= 3.0, c <= 3.0</td></tr>
<tr><td>B</td><td>Glass crack should not cover patterns u and alignment mark and patterns.</td></tr>
</table>

Inspection items			Judgment standard Category(application: B zone)
16	PCB defect	Component soldering: No cold soldering、short、open circuit、burr、tin ball The flat encapsulation component position deviation must be less than 1/3 width of the pin (Pic.1) ; the sheet component deviation: Pin deviates from the pad and contact with the near components is not permitted（Pic.2）	
		lead defect: The lead lack must be less than 1/3 of its width; The lead burr must be less than 1/3 of the seam; Impurities connect with the near leads is not permitted	
		Connector soldering: Soldering tin is at contact position of the plug and socket is not permitted No foundation is scald Serious cave distortion on plug and socket contact pin is not permitted	
		Glue on root of the speaker receiver and motor lead: The insulative coat of the lead must join into the PCB; the protected glue must envelop to the insulative coat.	

12 PRECAUTIONS FOR USING LCD MODULES

12.1 Handling Precautions

1.) The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
2.) If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.
3.) Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
4.) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
5.) If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry
cloth. If still not completely clear, moisten cloth with one of the following solvents:
－ Isopropyl alcohol
－ Ethyl alcohol
Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:
－ Water
－ Ketone
－ Aromatic solvents
6.) Do not attempt to disassemble the LCD Module.
7.) If the logic circuit power is off, do not apply the input signals.
8.) To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
9.) Be sure to ground the body when handling the LCD Modules.
10.) Tools required for assembly, such as soldering irons, must be properly ground.
11.) To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
12.) The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

12.2 Storage Precautions

1) When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.
2) The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:
Temperature : 0℃ ～ 40 Relatively humidity: ≤80% ℃
3) The LCD modules should be stored in the room without acid, alkali and harmful gas.

12.3 Transportation Precautions

The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.

13 Appendix

Important Notice

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