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Mechanical design



- Preliminary Specifications
- Final Specifications

Title	15.6-inch LCM Product Specifications
Model Name	ET156FH02-R
Version	0

Customer

Approved by

Date

Notice: This Specification is subject to change without notice.

Approved By	Prepared By
Leo 2025-03-31	William 2025-03-31



REVISION HISTORY

(√) Preliminary Specification

() Final Specification

Revision No.	Page	Description of Changes	Date	Prepared
0	30	Preliminary Product Specification	2025.03.31	William



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1.0 GENERAL DESCRIPTION

1.1 Introduction

ET156FH02-R is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 15.6 inch diagonally measured active area with Full-HD resolutions (1920 horizontal by 1080 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.2M(6bit+2FRC) colors and color gamut NTSC TYP 45% @CIE 1931. The TFT-LCD panel used for this module is a low reflection and higher color type. Therefore, this module is suitable for Notebook PC. The LED driver for back-light driving is built in this model. All input signals are eDP1.2 interface compatible.

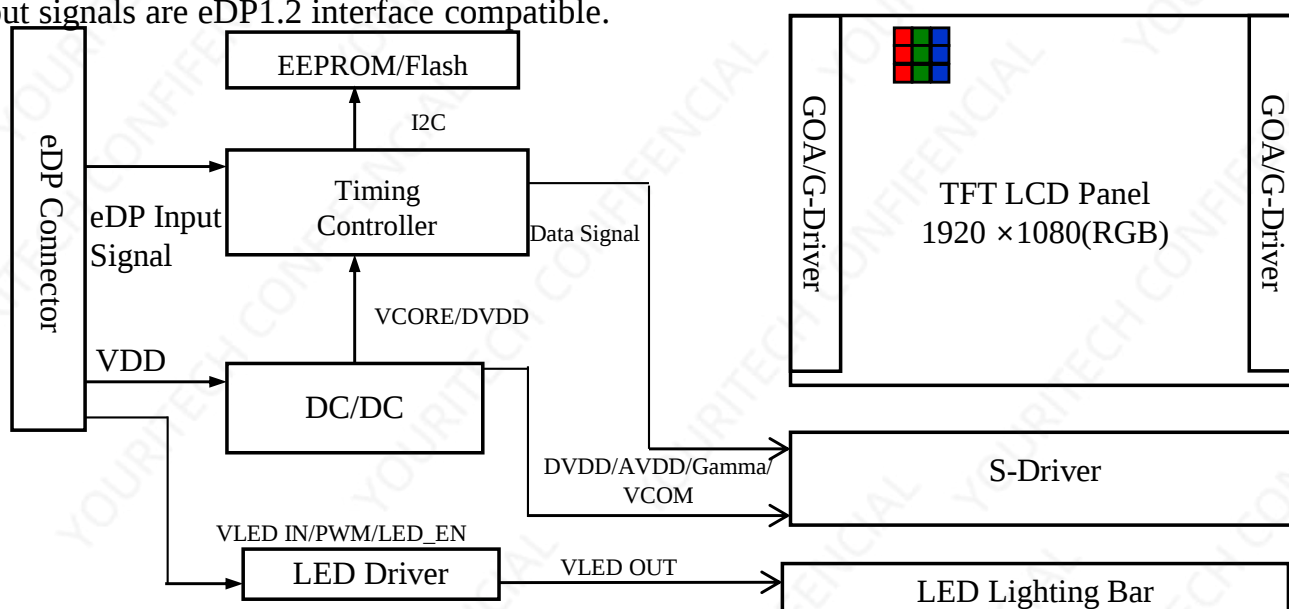


Figure 1. Drive Architecture

1.2 Features

- 2 lane eDP interface with 2.7Gbps link rates
- 16.2M(6bit+2FRC) color depth, color gamut 45%
- Data enable signal mode
- Green product (RoHS & Halogen free product)
- On board LED driving circuit
- Low driving voltage and low power consumption
- On board EDID chip



1.0 GENERAL DESCRIPTION

1.2 Features

DPCD Ver.	sDRRS	DCR	DMRRS	PSR	LRR	MBO
1.1	on	no	on	no	no	no
VESA DSC	MSO	AMD Free-sync	HDR	Dimming	OD	BIST
no	no	no	no	PWM in DC out	no	off
FRC	DDS	G-sync	AMD Repaly	AMD FT	AMD AUPI	Corlor calibration
on	no	no	no	no	no	no
DSC						
no						



1.3 Application

- HMI

1.4 General Specification

The followings are general specifications at the model ET156FH02-R (listed in Table 1)

<Table 1. General Specifications>

Parameter	Specification	Unit	Remarks
Active area	344.16(H) × 193.59(V)	mm	
Number of pixels	1920 (H) × 1080 (V)	pixels	
Pixel pitch	179.25(H) × 179.25(V)	um	
Pixel arrangement	RGB Vertical stripe		
Display colors	16.2M(6bit+2FRC)		
Color gamut	NTSC TYP 45% MIN 42%@CIE 1931		
Display mode	Normally Black		
Dimensional outline	359.5*206.74*3.0 (Typ.)	mm	
Weight	TBD	g	
Surface treatment	Anti-Glare		
Surface hardness	3H		
LCM Power consumption	P _D : 9.09(Max.)	W	@Mosaic



2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

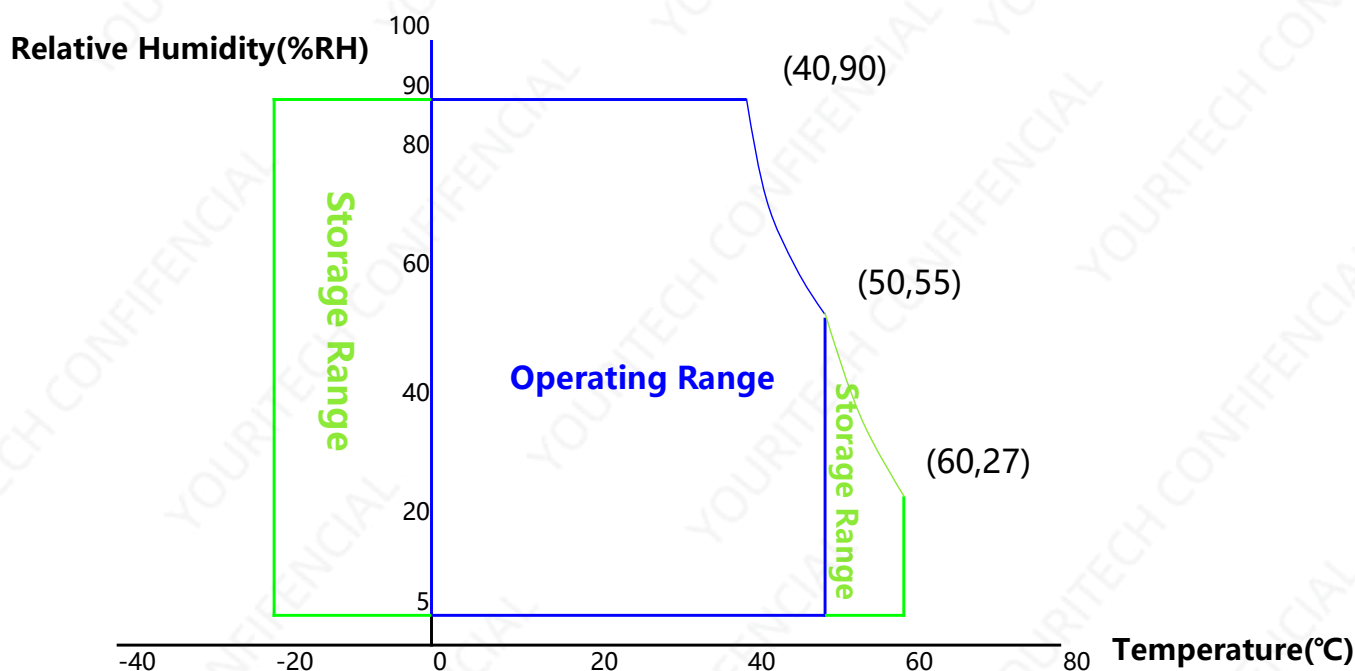
< Table 2. Absolute Maximum Ratings >

Ta=25+/-2°C

Parameter	Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	V _{DD}	-0.3	4.0	V	Note 1
eDP input Voltage	V _{eDP}	0	2.0	V	
Logic Supply Voltage	V _{IN}	V _{SS} -0.3	V _{DD} +0.3	V	
Operating Temperature	T _{OP}	0	+50	°C	Note 2
Storage Temperature	T _{ST}	-20	+60	°C	

Notes :

1. Permanent damage to the device may occur if maximum values are exceeded functional operation should be restricted to the condition described under normal operating conditions.
2. Temperature and relative humidity range are shown in the figure below.
90 % RH Max. (40 °C ≥ Ta) Maximum wet - bulb temperature at 39 °C or less. (Ta > 40 °C) No condensation.



3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

< Table 3. Electrical Specifications >

Ta=25+/-2°C

Parameter			Min.	Typ.	Max.	Unit	Remarks
Power Supply Voltage		V _{DD}	3.0	3.3	3.6	V	Note 1
Permissible Input Ripple Voltage		V _{RF}	-10% VDD	-	+10% VDD	V	Note 4
Power Supply Inrush Current		I _{rush}	-	-	2	A	Note3
Power Supply Current	Mosaic	I _{DD}	-	-	273	mA	Note 1
	RGB		-	-	545	mA	
Power Consumption	Mosaic	P _M	-	-	0.9	W	
	RGB	P _{RGB}	-	-	1.8	W	



3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

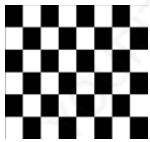
Notes :

1. The supply voltage is measured and specified at the interface connector of LCM.

The current draw and power consumption specified is for 3.3V at 25 °C.

a) Mosaic pattern 8*8

b) R/G/B patterns



(a)



(b)

Figure 3. Power Measure Patterns

2. Measure condition (Figure 4)

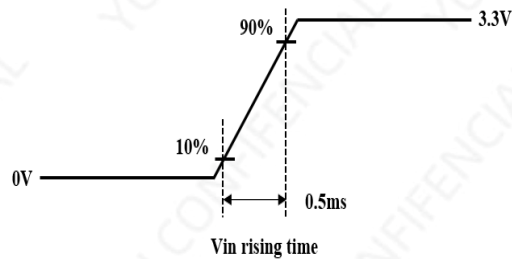


Figure 4. Inrush Measure Condition

4. Input voltage range:3.0~3.6V.Test condition: Oscilloscope bandwidth 20MHz, AC coupling



3.2 Backlight Unit

< Table 4. LED Lightbar Specifications >

Ta=25+/-2°C

Parameter		Min.	Typ.	Max.	Unit	Remarks
LED Power Voltage	VLED	-	24	25.6	V	
LED Power Current	ILED	-	320	-	mA	
PD -BL		-	7.68	8.19	W	



4.0 OPTICAL SPECIFICATION

4.1 Overview

The test of optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = $25\pm 2^{\circ}\text{C}$) with the equipment of luminance meter system (PR730&PR810) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0° . We refer to $\theta=0$ ($=\theta_3$) as the 3 o'clock direction (the "right"), $\theta=90$ ($=\theta_{12}$) as the 12 o'clock direction ("upward"), $\theta=180$ ($=\theta_9$) as the 9 o'clock direction ("left") and $\theta=270$ ($=\theta_6$) as the 6 o'clock direction ("bottom"). While scanning θ and/or Φ , the center of the measuring spot on the display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement. VDD shall be $3.3\pm 0.3\text{V}$ at 25°C . Optimum viewing angle direction is 6 'clock.

4.2 Optical Specifications

<Table 5. Optical Specifications>

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	Horizontal	Θ_3	CR > 10	80	85	-	Deg.	Note 1
		Θ_9		80	85	-	Deg.	
	Vertical	Θ_{12}		80	85	-	Deg.	
		Θ_6		80	85	-	Deg.	
Luminance Contrast Ratio		CR	$\Theta = 0^\circ$	800	1000	max		Note 2
Luminance(ceter)				1000			nits	
Uniformity(13piont)				65	74	-	%	
White Chromaticity		W_x	$\Theta = 0^\circ$	0.283	0.323	0.363		Note 3
		W_y		0.319	0.349	0.389		
Reproduction of Color o	Red	R_x	$\Theta = 0^\circ$	Typ.-0.03	0.588	Typ.+0.03		
		R_y			0.368			
	Green	G_x			0.348			
		G_y			0.570			
	Blue	B_x			0.160			
		B_y			0.130			
Color gummut				42	45	-	%	CIE1931
Respns Time (Rising + Falling)		T_{RT}	Ta= 25°C $\Theta = 0^\circ$	-	25	30	ms	Note 4
Cross Talk		CT	$\Theta = 0^\circ$	-	-	2.0	%	Note 5
Gamma		-	-	2.0	2.2	2.4	-	



Notes :

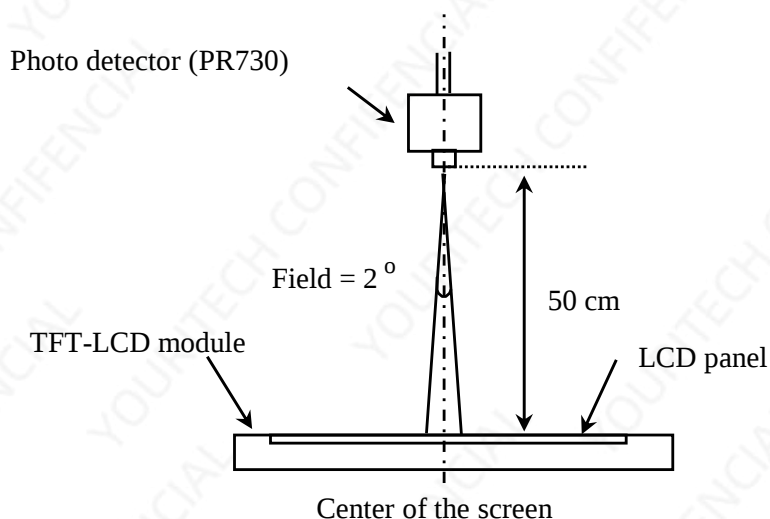
1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see Figure 7).
2. Contrast measurements shall be made at viewing angle of $\Theta = 0$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see Figure 7) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. The color chromaticity coordinates specified in Table 5 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.
4. The electro-optical response time measurements shall be made as Figure 10 by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 90% to 10% is T_f , and 10% to 90% is T_r .
5. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (YA) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (YB) of that same area when any adjacent area is driven dark. (See Figure 11).



4.3 Optical Measurements



Optical characteristics measurement setup

Figure 7. Measurement Set Up

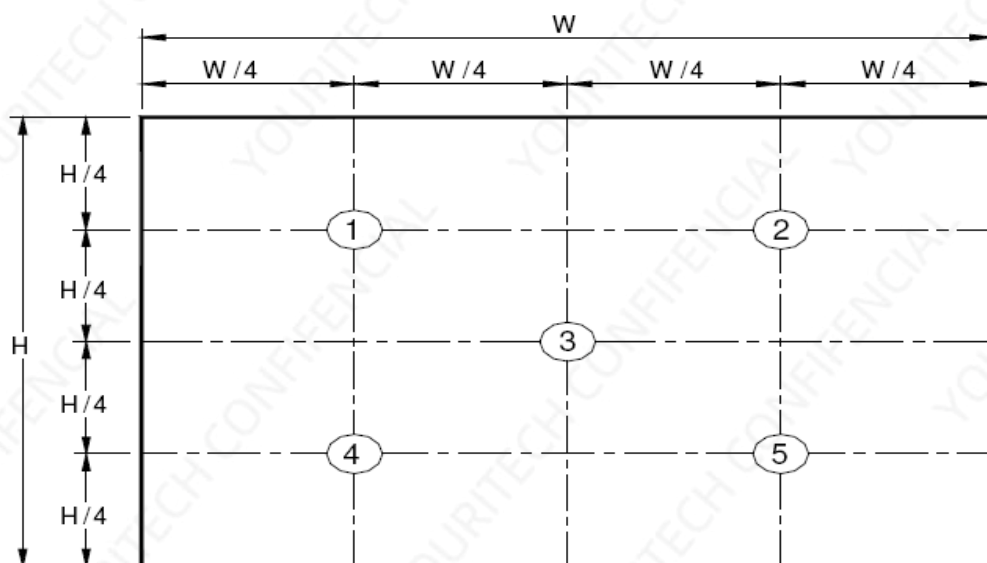


Figure 8. White Luminance and Uniformity Measurement Locations (5 points)

Center Luminance of white is defined as luminance values of center 5 points across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in Figure 7 for a total of the measurements per display.



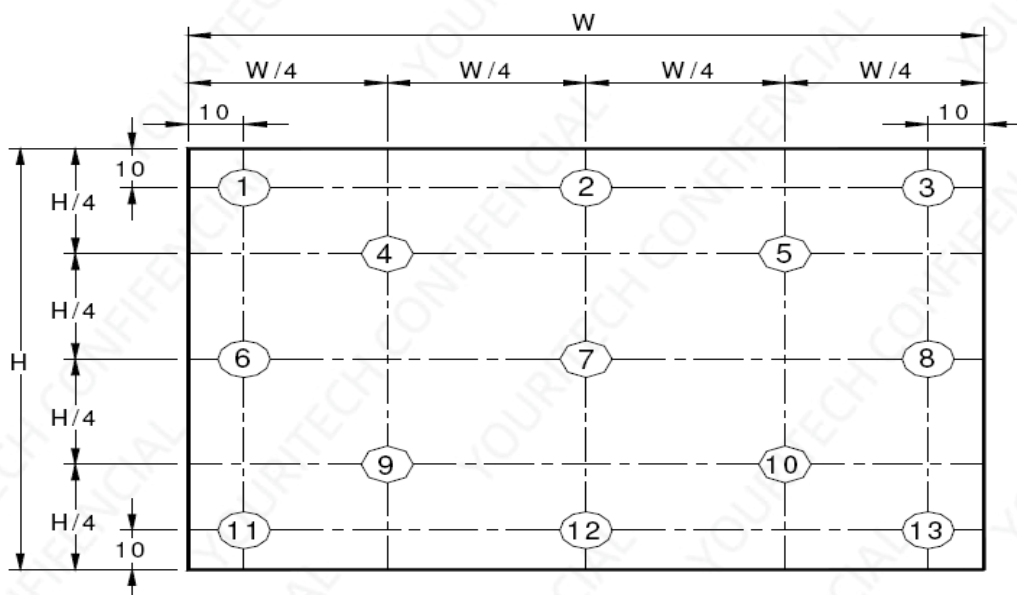


Figure 9. Uniformity Measurement Locations (13 points)

The White luminance uniformity on LCD surface is then expressed as : $\Delta Y5$ = Minimum Luminance of five points / Maximum Luminance of five points (see Figure 8) , $\Delta Y13$ = Minimum Luminance of 13 points /Maximum Luminance of 13 points (see Figure 9).

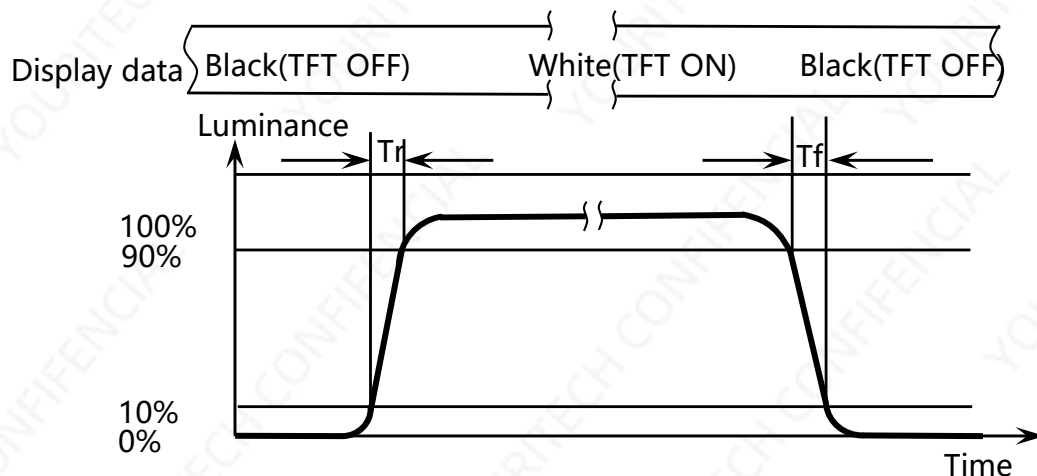
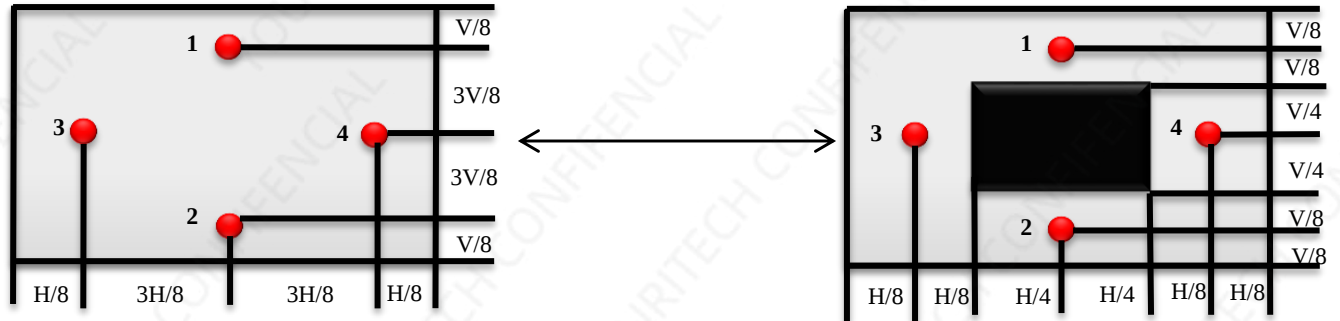


Figure 10. Response Time Testing

The electro-optical response time measurements shall be made as shown in Figure 10 by switching the “data” input signal ON and OFF. T_r : The luminance to change from 10% to 90% , T_f : The luminance to change from 90% to 10% .

The test system : LMS PR810





$$\text{Cross Talk (\%)} = \left| \frac{Y_B - Y_A}{Y_A} \right| \times 100$$

Figure 11. Cross Talk Modulation Test Description

Where:

Y_A = Initial luminance of measured area (cd/m^2)

Y_B = Subsequent luminance of measured area (cd/m^2)

The location 1/2/3/4 measured will be exactly the same in both patterns. The test background gray is from L64 to L192. Take the largest data as the result.

Cross Talk of one area of the LCD surface by another shall be measured by comparing the luminance (Y_A) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (Y_B) of that same area when any adjacent area is driven dark. (Refer to Figure 11)

The test system: PR730



5.0 INTERFACE CONNECTION

5.1 Electrical Interface Connection

The electronics interface connector is STM MSAK24025P30.

The connector interface pin assignments are listed in Table 6.

<Table 6. Pin Assignments for the Interface Connector>

Terminal	Symbol	Functions
Pin No.	Symbol	Description
1	CABC_EN	Disable
2	H_GND	Ground
3	LANE1_N	eDP RX Channel 1 Negative
4	LANE1_P	eDP RX Channel 1 Positive
5	H_GND	Ground
6	LANE0_N	eDP RX Channel 0 Negative
7	LANE0_P	eDP RX Channel 0 Positive
8	H_GND	Ground
9	AUX_CH_P	eDP AUX CH Positive
10	AUX_CH_N	eDP AUX CH Negative
11	H_GND	Ground
12	LCD_VCC	Power Supply, 3.3V (typ.)
13	LCD_VCC	Power Supply, 3.3V (typ.)
14	BIST	Panel Self Test Enable
15	H_GND	Ground
16	H_GND	Ground
17	HPD	Hot Plug Detect Output
18	BL_GND	LED Ground
19	BL_GND	LED Ground
20	BL_GND	LED Ground
21	BL_GND	LED Ground
22	BL_ENABLE	LED Enable Pin(+3.3V Input)
23	BL_PWM	System PWM Signal Input
24	NC	No Connection
25	NC	No Connection
26	BL_POWER	LED Power Supply 5V-21V
27	BL_POWER	LED Power Supply 5V-21V
28	BL_POWER	LED Power Supply 5V-21V
29	BL_POWER	LED Power Supply 5V-21V
30	NC	No Connection



5.2 eDP Interface

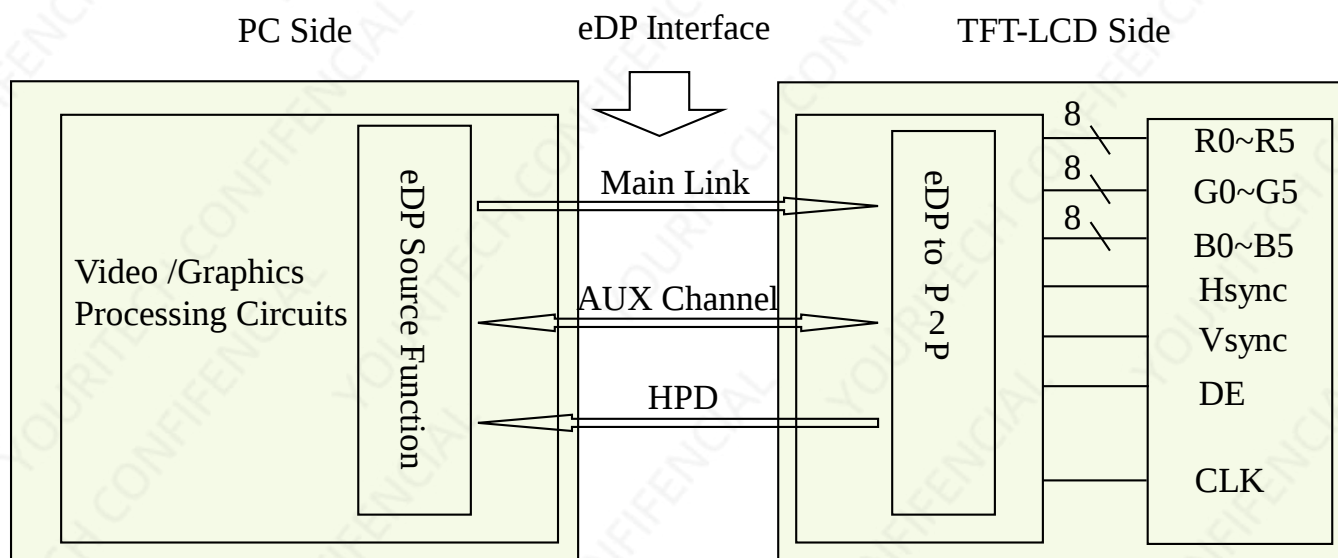


Figure 12. eDP Interface Architecture

Note:

Transmitter : ESWIN EPT9501B or equivalent.

Transmitter is not contained in module.





6.0 SIGNAL TIMING SPECIFICATION

6.1 The NV156FHB-N4Q Is Operated By The DE Only

< Table 8. Signal Timing Specification >

Item		Symbols	Min	Typ	Max	Unit
Clock	Frequency	1/Tc	148.91	149.59	150.27	MHz
Frame Period		Tv	1139	1140	1141	lines
			-	60	-	Hz
			-	16.67	-	ms
Vertical Display Period		Tvd	-	1080	-	lines
One line Scanning Period		Th	2179	2187	2195	clocks
Horizontal Display Period		Thd	-	1920	-	clocks

Note : The above is as optimized setting.



6.2 eDP Rx Interface Timing Parameter

The specification of the eDP Rx interface timing parameter is shown in Table 9.

<Table 9. eDP Main-Link RX TP4 Package Pin Parameters>

Item	Symbol	Min	Typ	Max	Unit	Remark
Spread spectrum clock (Link clock down-spreading)	SSC	-	-	0.5	%	
Differential peak-to-peak input voltage at package pins	VRX-DIFFp-p	120	-	1200	mV	
Rx input DC common mode voltage	VRX_DC_CM	0	-	2	V	
Differential termination resistance	RRX-DIFF	80	-	100	Ω	
Single-ended termination resistance	RRX-SE	40	-	60	Ω	
Rx short circuit current limit	IRX_SHORT	-	-	20	mA	
Intra-pair skew at Rx package pins (HBR) RX intra-pair skew tolerance at HBR	LRX_SKEW_ INTRA_PAIR	-	-	60	ps	
AC Coupling Capacitor	CSOURCE_ML	75		200	nF	Source side

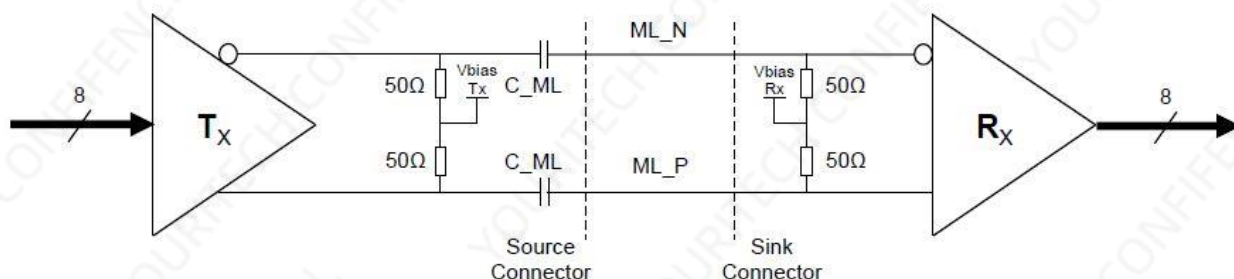


Figure 14. Main link differential pair



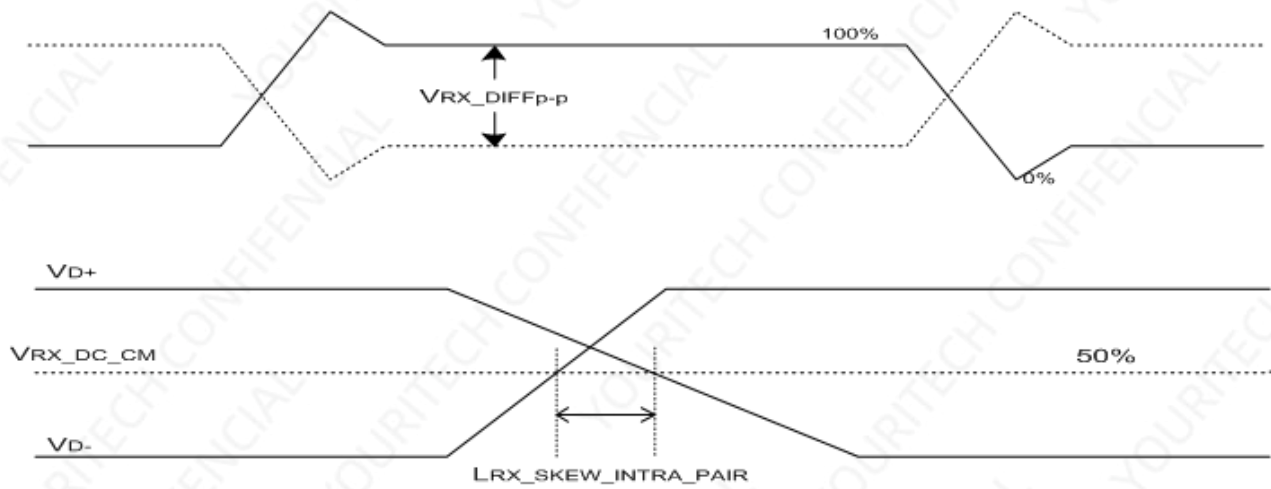


Figure 15. VRX-DIFFp-p & LRX_SKEW_INTRA_PAIR



<Table 10. HPD Characteristics>

Item	Symbol	Min	Typ	Max	Unit	Remark
HPD voltage	V _{HPD}	2.25	-	3.6	V	
Hot Plug Detection Threshold	-	2.0	-	-	V	Source side Detecting
Hot Unplug Detection Threshold	-	-	-	0.8V	V	
HPD_IRQ Pulse Width	HPD_IRQ	0.5	-	1	ms	
HPD_TimeOut	-	2.0	-	-	ms	

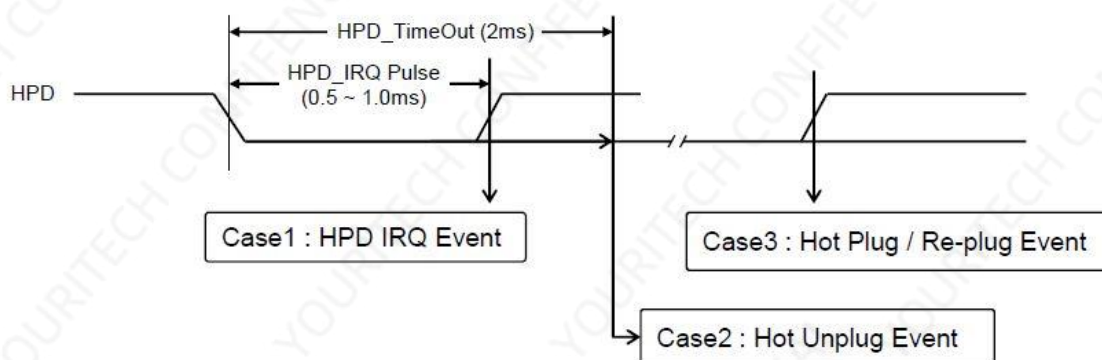


Figure 16. HPD Events



<Table 11. AUX Characteristics>

Item	Symbol	Min	Typ	Max	Unit	Remark
AUX unit interval	UIAUX	0.4	0.5	0.6	Us	
AUX peak-to-peak input differential voltage	VAUX-RX-DIFFp-p	0.29	-	1.38	V	
AUX CH termination DC resistance	RAUX-TERM	80	100	120	Ohm	
AUX DC common mode voltage	VAUX-DC-CM	0	-	2	V	
AUX turn around common mode voltage	VAUX-TURN-CM	-	-	0.3	V	
AUX short circuit current limit	IAUX-SHORT	-	-	90	mA	
AUX AC Coupling Capacitor	CSOURCE-AUX	75	-	200	nf	Source side

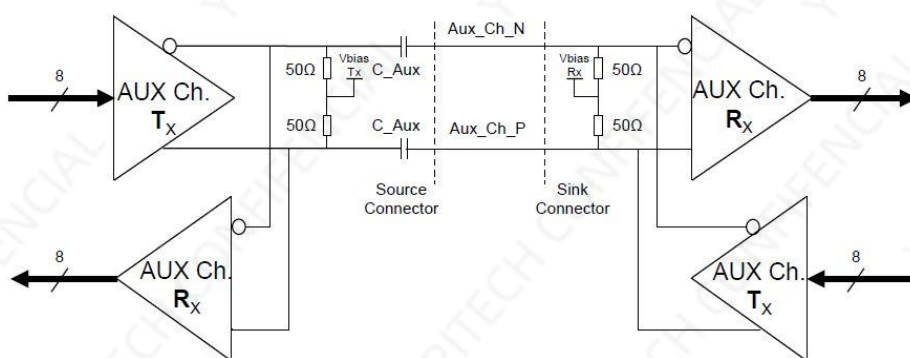


Figure 17. AUX differential pair



7.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

<Table 12. Input Signal & Basic Display Colors & Gray Scale of Colors >

	Colors & Gray scale	Data signal																							
		R0	R1	R2	R3	R4	R5	R6	R7	G0	G1	G2	G3	G4	G5	G6	G7	B0	B1	B2	B3	B4	B5	B6	B7
Basic colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Light Blue	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Purple	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	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	1	1	1	1	1	1
Gray scale of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	▽	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray scale of Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	▽	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray scale of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1
	▽	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Gray scale of White& Black	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	Darker	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1
	▽	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	



8.0 POWER SEQUENCE

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below.

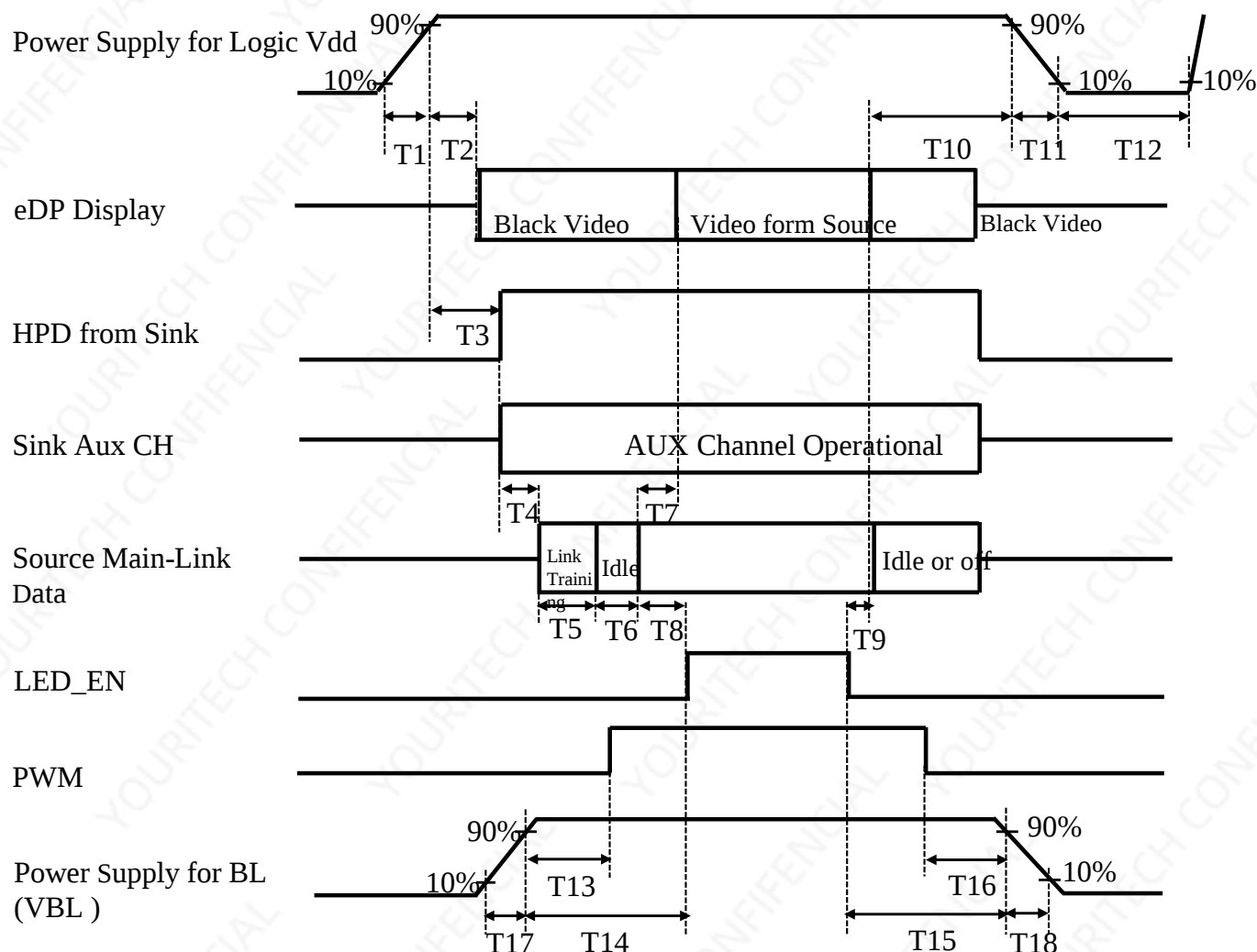


Figure 18. Power Sequence

- $0.5\text{ms} \leq T1 \leq 10\text{ ms}$
- $0\text{ms} < T2 \leq 200\text{ ms}$
- $0\text{ms} < T3 \leq 200\text{ ms}$
- $T4+T5+T6+T8 > 80\text{ms}$
- $0\text{ms} < T7 \leq 50\text{ms}$
- $50\text{ms} < T8$
- $0\text{ms} < T9$
- $0\text{ms} < T10 < 500\text{ ms}$
- $0.5\text{ms} \leq T11 \leq 10\text{ ms}$
- $500\text{ms} \leq T12$
- $0\text{ms} < T13$
- $0\text{ms} < T14$
- $0\text{ms} < T15$
- $0\text{ms} < T16$
- $0.5\text{ms} \leq T17$
- $0.5\text{ms} \leq T18$

Notes:

1. When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on. Back Light must be turn on after power for logic and interface signal are valid.



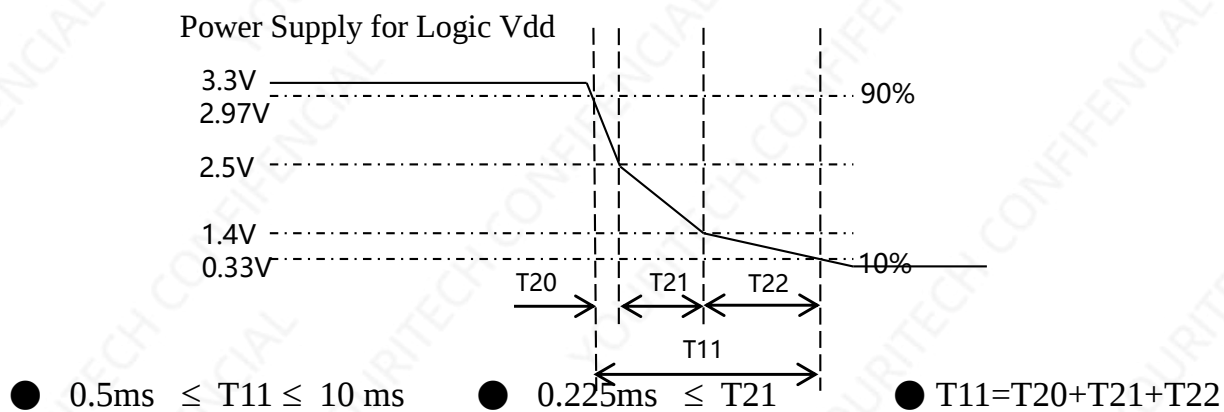


Figure 19. T11 timing requirements



9.0 Connector Description

Physical interface is described as for the connector on LCM.

These connectors are capable of accommodating the following signals and will be following components.

9.1 TFT LCD Module

< Table 13. Signal Connector >

Connector Name /Description	For Signal Connector
Manufacturer	STM
Type/ Part Number	MSAK24025P30
Mating Housing/ Part Number	I-PEX 20454-030T



10.0 RELIABILITY TEST(LCM)

The reliability test items and its conditions are shown in below.

<Table 15. Reliability Test>

No	Test Items	Conditions	Remark
1	High temperature storage test	Ta = 60°C , 60%RH, 240 hrs	
2	Low temperature storage test	Ta = -20°C , 240 hrs	
3	High temperature & high humidity operation test	Ta = 50°C , 80%RH, 240 hrs	
4	High temperature operation test	Ta = 50°C , 60%RH, 240 hrs	
5	Low temperature operation test	Ta = 0°C , 240 hrs	
6	Thermal shock	Ta = -20 °C ↔ 60 °C (0.5 hr), 60%±3%RH, 100 cycle	
7	Vibration test (non-operating)	Ta = 25°C , 60%RH, 1.5G, 10~500Hz, Sine X,Y,Z / Sweep rate : 1 hour	Note 1
8	Shock test (non-operating)	Ta = 25°C , 60%RH, 220G, Half Sine Wave 2msec±X,±Y,±Z Once for each direction	Note 1
9	Electro-static discharge test (operating)	Air : 150 pF, 330Ω, ±15 KV Contact : 150 pF, 330Ω, ±8 KV Ta = 25°C , 60%RH,	Note 2

Notes :

1. The fixture must be hard enough , so that the module would not be twisted or bent.
2. Self- recovery and restart recovery is allowed. No hardware failures.
3. This test condition applies only to LCM modules



11.0 HANDLING & CAUTIONS

- (1) Cautions when taking out the module
 - Pick the pouch only, when taking out module from a shipping package.
- (2) Cautions for handling the module
 - As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
 - As the LCD panel and back - light element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.
 - As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
 - Do not pull the interface connector in or out while the LCD module is operating.
 - Put the module display side down on a flat horizontal plane.
 - Handle connectors and cables with care.
- (3) Cautions for the operation
 - When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the LCD panel would be damaged.
 - Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.
- (4) Cautions for the atmosphere
 - Dew drop atmosphere should be avoided.
 - Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer packing pouch and under relatively low temperature atmosphere is recommended.
- (5) Cautions for the module characteristics
 - Do not apply fixed pattern data signal to the LCD module at product aging.
 - Applying fixed pattern for a long time may cause image sticking.
- (6) Other cautions
 - Do not disassemble and/or re-assemble LCD module.
 - Do not re-adjust variable resistor or switch etc.
 - When returning the module for repair or etc. Please pack the module not to be broken. We recommend to use the original shipping packages.



12.0 MECHANICAL OUTLINE DIMENSION

