



SPECIFICATION FOR TFT LCD MODULE

CUSTOMER : _____

CUSTOMER MODULE : _____

HG MODEL : HG116FH008-V1

Preliminary Specification

Final Specification

Customer Confirmation column:

Approved by : _____ Dept. : _____ Data : _____

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Designed by	Checked by	Approved by



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Revision History

Version	Date	Page (New)	Section	Description	Revision by
01	2022/05/07	-	All	Preliminary Specification first update	
	2022/06/06			Modify BLU connector pin definition	



1. GENERAL DESCRIPTION

1.1 General Description

The specification is applied to 11.6inch model (HG116FH008) TFT Liquid Crystal Display.

The matrix uses a-Si Thin Film Transistor as a switching device. This TFTLCD has a 11.6 inch diagonally measured active display area with FHD resolution (1920 horizontal by 1080 vertical pixels array). All input signals are eDP1.2 interface compatible.

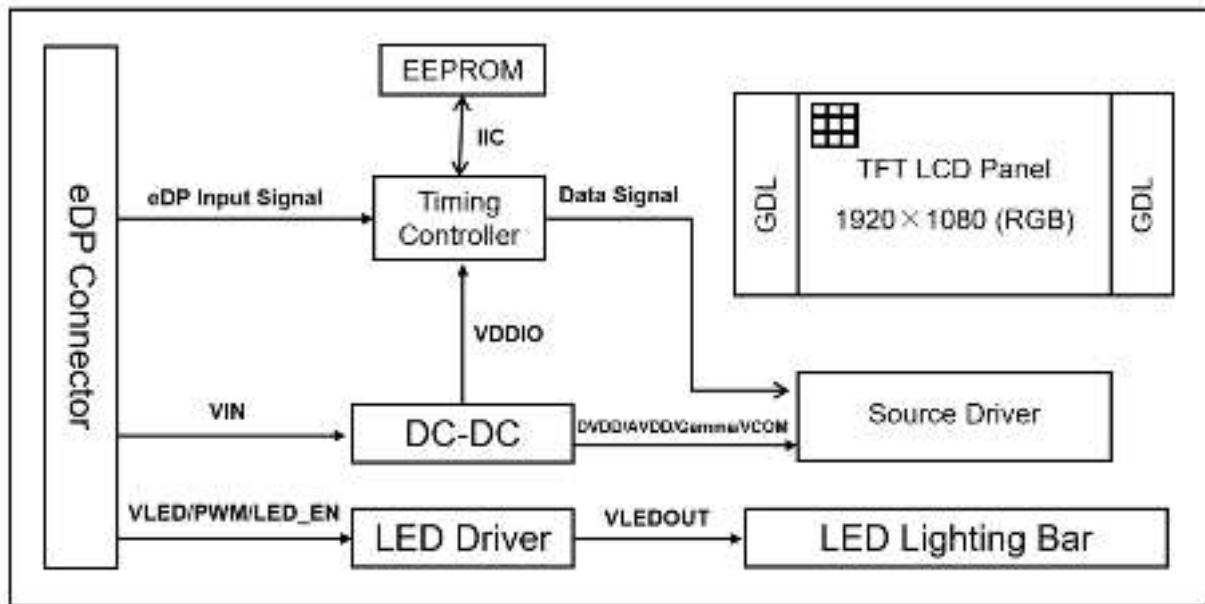


Figure 1. Drive Architecture

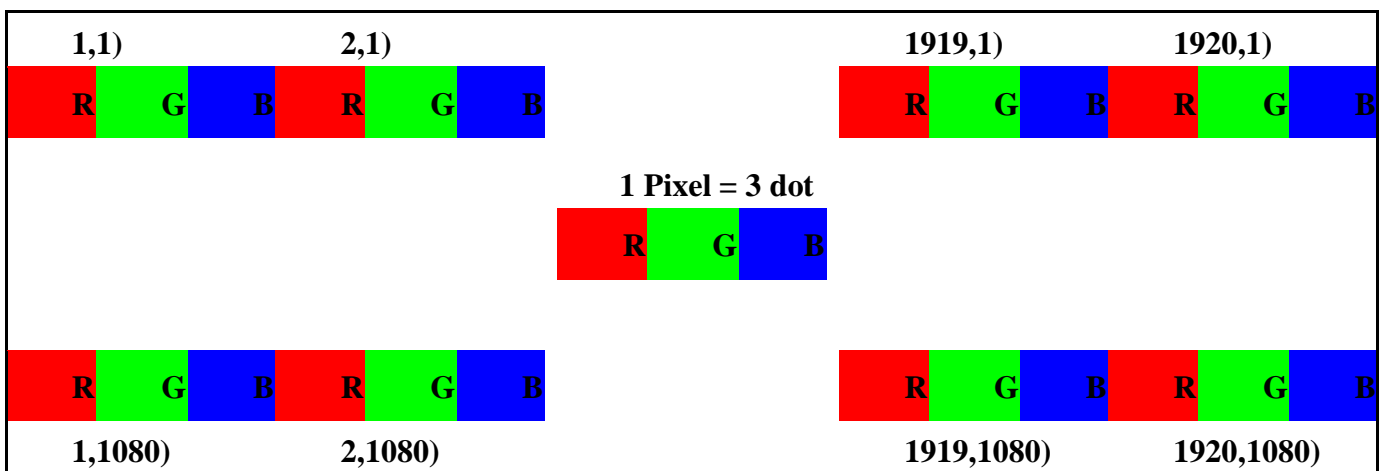


Figure 2. Pixel Mapping



1.2 Features

- (1) 2 lane eDP interface with 2.7 Gbps link rates
- (2) 16.7M color depth, color gamut 68%
- (3) Green product (RoHS & Halogen free product)
- (4) On board LED driving circuit
- (5) LED Dimming Mode DC

1.3 General Specifications

The followings are general specifications.

Table 1.General Specifications

Item	Specification	Unit	Note
Active area	256.32(H) × 144.18(V)	mm	-
Number of pixels	1920(H) × 1080(V)	pixels	-
Pixel pitch	0.1335(H) × 0.1335(V)	mm	-
Pixel arrangement	RGB Vertical stripe	-	-
Display colors	6 bit+Hi-FRC	-	-
Color gamut	65% Typ. @CIE1931	-	-
Display mode	Normally Black	-	-
Outline Dimension	263.4*157.22*2.55	mm	WithoutPCBA
Luminance	280Typ 250Min	nit	Center
Surface treatment	Anti-Glare 25%	-	-
Surface hardness	3H	-	-
Power consumption	3.5 Max	W	
Weight	TBD	g	

2. ABSOLUTE MAXIMUM RATINGS

2.1 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

T_a=25+/-5°C

Parameter	Symbol	Min.	Max.	Unit	Remarks
Logic Supply Voltage	V _{CC}	-0.3	3.6	V	(1),(2),(3),(4)
Logic Input Signal Voltage	V _{Signal}	-0.3	V _{CC}	V	
B/L Supply Voltage	V _{LED}	- 0.3	24	V	
Operating Temperature	T _{OP}	-20	60	°C	
Storage Temperature	T _{ST}	-30	70	°C	

Note (1) All the parameters specified in the table are absolute maximum rating values that may cause faulty operation or unrecoverable damage, if exceeded.

Note (2) All the contents of electro-optical specifications and display fineness are guaranteed under Normal Conditions. All the display fineness should be inspected under normal conditions. Normal conditions are defined as follow: Temperature: 25°C, Humidity: 50± 10%RH.

Note (3) Unpredictable results may occur when it was used in extreme conditions. T_a= Ambient Temperature, T_{gs}= Glass Surface Temperature. All the display fineness should be inspected under normal conditions.

Note (4) Temperature and relative humidity range are shown in the figure below.

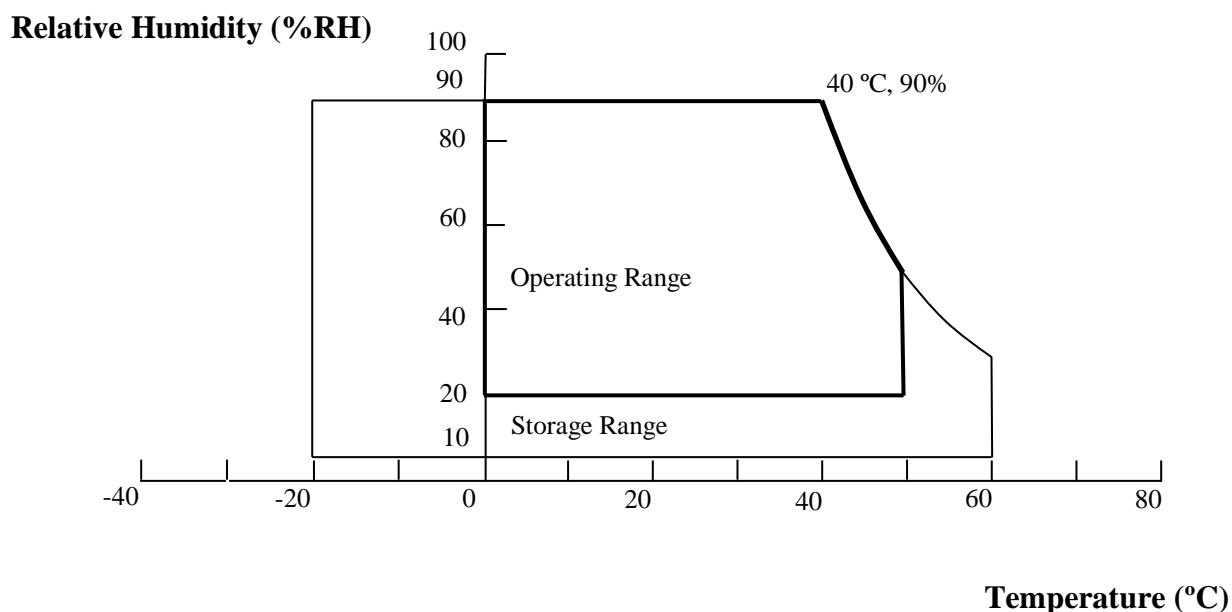


Figure 3. Absolute Ratings of Environment of the LCD Module

3. ELECTRICAL SPECIFICATIONS

3.1 Interface Connector

Table 3. Signal Connector Type

Item	Description
Manufacturer / Type	Starconn/ 300E30-0010RA-G3

Table 4. Signal Connector Pin Assignment

PIN No.	SIGNAL NAME	DESCRIPTION
1	CABC-EN	NC, Reserved for CD
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, 3V~3.6V,3.3V (typ.)
13	LCD_VCC	Power Supply, 3V~3.6V ,3.3V(typ.)
14	NC_Reserved	Reserved for LCD manufacturer's use
15	GND	Ground
16	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
23	BL_PWM	System PWM Signal Input
24	NC	No Connection (Fordebug)
25	NC	No Connection (Fordebug)
26	BL_POWER	LED Power Supply 5V-21V, 12V(typ.)
27	BL_POWER	LED Power Supply 5V-21V, 12V(typ.)
28	BL_POWER	LED Power Supply 5V-21V, 12V(typ.)
29	BL_POWER	LED Power Supply 5V-21V, 12V(typ.)
30	NC	No Connection

3.2 Signal Electrical Characteristics

Table 5. Display Port Main Link

Parameter	Description	Min.	Typ.	Max.	Unit
V_{CM}	Differential Common Mode Voltage	-	0	-	V
$V_{Diff\ P-P}$ Level	Differential Peak to Peak Voltage Level 1	0.4	-	1.3	V

Note: (1) Input signals shall be low or Hi- resistance state when V_{CC} is off.

(2) It is recommended to refer the specifications of VESA Display Port Standard.

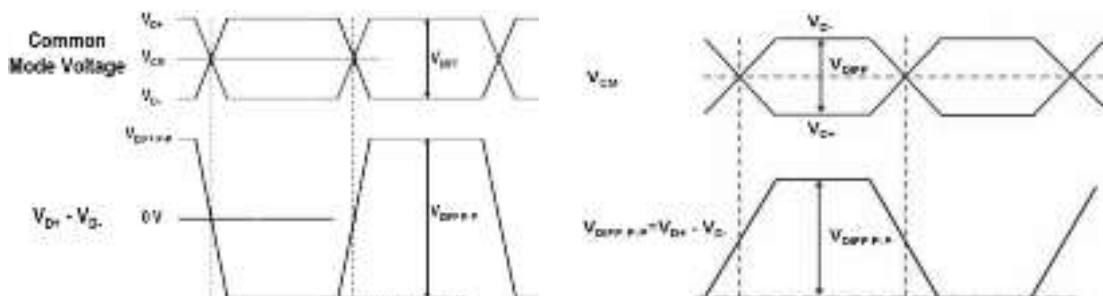




Figure 4. Display Port Main Link Signal

Figure 5. Display Port AUX_CH Signal

Table 6. Display Port AUX_CH

Parameter	Description	Min.	Typ.	Max.	Unit
V _{CM}	Common Mode Voltage When receiving	0	-	2.0	V
	Common Mode Voltage When transmitting	-	-	0.4	V
V _{Diff P-P}	Differential Peak to Peak Voltage	0.29	-	1.38	V

Note: Follow as VESA Display Port standard.

Table 7. Display Port V_{HPD}

Parameter	Description	Min.	Typ.	Max.	Unit
V _{HPD}	HPD Voltage	2.25	-	2.75	V

Note: Follow as VESA Display Port standard.

3.3 Interface Timings

Table 8. Interface Timings

Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock Frequency	F _{clk}	122.1	152.57	165.3	MHz
H Total Time	HT	-	2,192	-	Clocks
H Active Time	HA	1,920			Clocks
V Total Time	VT	-	1,160	-	Lines
V Active Time	VA	1,080			Lines
Frame Rate	F _v	-	60	-	Hz

Note1: HT *VT *Frame Frequency ≤ 165.3 MHz

Note2: All reliabilities are specified for timing specification based on refresh rate of 60Hz.

3.4 Input Power Specifications

Input power specifications are as follows.

Table 9. Input Power Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
System Power Supply						
LCD Drive Voltage (Logic)	V _{CC}	3.0	3.3	3.6	V	(1),(2)
V _{CC} Current	I _{VCC}	-	0.277	-	A	(1),(3)
V _{CC} Power Consumption	P _{VCC}	-	-	0.9	W	
Rush Current	I _{rush}	-	-	1.5	A	(1),(4)

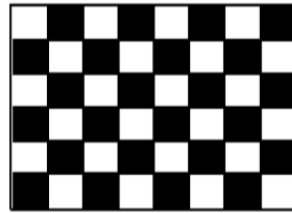


Allowable Logic/LCD Drive Ripple Voltage	V_{VCC-RP}	-	-	200	mV	(1)
LED Power Supply						
LED Driver Input Voltage	V_{LED}	5	12	21	V	(1),(2)
PWM Signal Voltage	High	V_{PWM}	3.0	-	V_{CC}	V
	Low		0	-	0.4	
LED Enable Voltage	High	V_{LED_EN}	3.0	-	V_{CC}	
	Low		0	-	0.4	
Input PWM Frequency	F_{PWM}	200	-	2000	Hz	(1),(2),(5)
Duty Ratio	PWM	5	-	100	%	(1),(6)

Note (1) All of the specifications are guaranteed under normal conditions. Normal conditions are defined as follow: Temperature: 25°C, Humidity: 50± 10%RH.

Note (2) All of the absolute maximum ratings specified in the table, if exceeded, may cause faulty operation or unrecoverable damage. It is recommended to follow the typical value.

Note (3) The specified V_{CC} current and power consumption are measured under the $V_{CC}=3.3V$, $F_v=60Hz$ condition and 8*6 mosaic Pattern.



Note (4) The figures below is the measuring condition of V_{CC} Rush current can be measured when T_{rush} is 0.5ms.

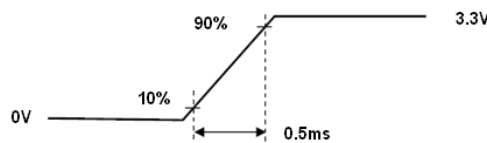
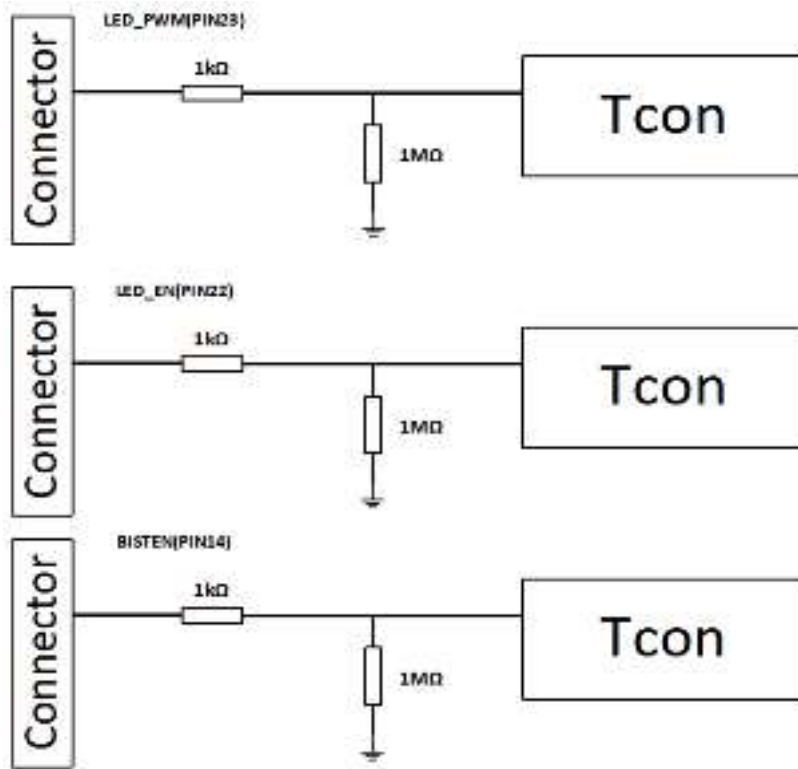


Figure 4. V_{CC} Rising Time

Note (5) Although acceptable range as defined, the dimming ratio is not effective at all conditions. The PWM frequency should be fixed and stable for more consistent luminance control at any specific level desired.

Note (6) The operation of LED Driver below minimum dimming ratio may cause flickering or reliability issue.

Note (7) Because there are voltage dividers on some control signal lines of the connector, please pay special attention when using it.



3.5 Power ON/OFF Sequence

Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when V_{CC} voltage is off.

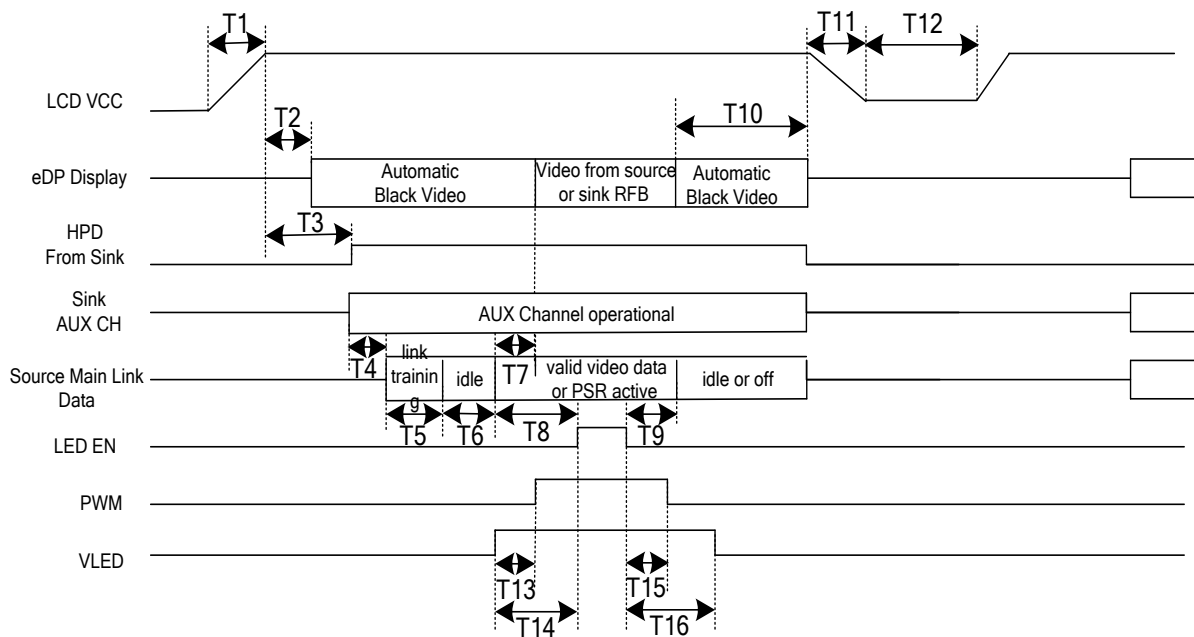


Figure 5. Power Sequence



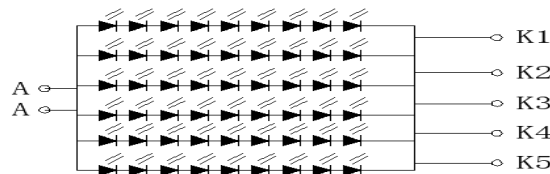
Parameter	Symbol	Min.	Typ.	Max.	Unit
V _{CC} Rise Time (10% to 90%)	T1	(0.5)	-	(10)	ms
Delay from V _{CC} to automatic Black Video generation	T2	(0)	-	(200)	ms
Delay from V _{CC} to HPD high	T3	(0)	-	(200)	ms
Delay from HPD high to link training initialization	T4	-	-	-	ms
Link training duration	T5	-	-	-	ms
Link idle	T6	-	-	-	ms
Delay from valid video data from Source to video on display	T7	(0)	-	(50)	ms
Delay from valid video data from Source to backlight enable	T8	(200)	-	-	ms
Delay from backlight disable to end of valid video data	T9	-	-	-	ms
Delay from end of valid video data from Source to V _{CC} off	T10	(0)	-	(500)	ms
V _{CC} fall time (90% to 10%)	T11	(0.5)	-	(10)	ms
V _{CC} off time	T12	(500)	-	-	ms
Delay from V _{LED} to PWM	T13	0	-	-	ms
Delay from V _{LED} to backlight enable	T14	0	-	-	ms
Delay from backlight disable to V _{LED} off	T15	0	-	-	ms
Delay from PWM off to V _{LED} off	T16	0	-	-	ms

3.6 Backlight Unit

Table 11. Recommended LED Driving Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
LED OVP Voltage	OVP	25.2	27	32	V	
LED Forward Current	IF	-	120	-	mA	

电气原理图：



9串6并 BLU I_f=120mA

Table 12. Pin Assignments of BLU Connector

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	VOUT	LED anode connection	6	LED	LED cathode connection
2	VOUT	LED anode connection	7	LED	LED cathode connection
3	NC	No Connection	8	LED	LED cathode connection
4	LED	LED cathode connection	9	LED	LED cathode connection
5	LED	LED cathode connection	10	NC	No Connection



4.OPTICAL SPECIFICATION

4.1 The table below is the test condition of optical measurement.

Table 13. Test condition of optical measurement

Item	Symbol	Value	Unit
Ambient Temperature	TA	25±5	°C
Ambient Humidity	HA	50±10	% RH
Supply Voltage	V _{CC}	3.3±0.3	V
Driving Signal	Refer to the typical value in Chapter 3: ELECTRICAL SPECIFICATIONS		
Vertical Refresh Rate	F _v	60	Hz
Warm up time	T _{warm}	>15 min	min
Dark room	-	<1 lux	lux



4.2 Optical Specifications

Table 14. Optical Specifications

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Only CF Color Chromaticity(CIE1931) Under C-light	Red	Rx	$\theta_x=0^\circ, \theta_y=0^\circ$	Typ. -0.03	(0.653)	Typ. +0.03	-	(1)
		Ry			(0.324)			
	Green	Gx			(0.262)			
		Gy			(0.581)			
	Blue	Bx			(0.131)			
		By			(0.116)			
	White	Wx			(0.296)			
		Wy			(0.355)			
Uniformity(9 dots)		-		75	80	-	%	
Luminance		-		250	280	-	nit	
Contrast Ratio		CR	$\theta_x=0^\circ, \theta_y=0^\circ$	1000:1	1200:1	-	-	(2)
Response Time		Tg		-		(35)	ms	(3)
Viewing Angle	Horizontal	θ_{x+}	CR \geq 10	-	85	-	Deg.	(4)
		θ_{x-}		-	85	-		
	Vertical	θ_{y+}		-	85	-		
		θ_{y-}		-	85	-		

Notes:

(1)The color chromaticity coordinates specified in Table 14 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.

(2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression,

$$\text{Contrast Ratio (CR): } CR = \frac{CR_w}{CR_D}$$

CRW : Luminance of LCD module with full screen white pattern (255,255,255) at center point.

CRD : Luminance of LCD module with full screen Dark pattern (0,0,0) at center point.

Where the measure point of to the Contrast Ratio is the center of the panel.

(3) Definition of Response time (RT):

The response time is defined as the LCD optical switching time interval between “Bright state” and “Dark state”, T_R is the rise time between Luminance rate changed from 10% to 90%, T_F is the fall time between Luminance rate changed from 90% to 10%.



Table 15. Switching time of luminance ratios matrix

Measured Response time		To	
		10%	90%
From	10%		$T_{10\% \text{ to } 90\%}$
	90%	$T_{90\% \text{ to } 10\%}$	

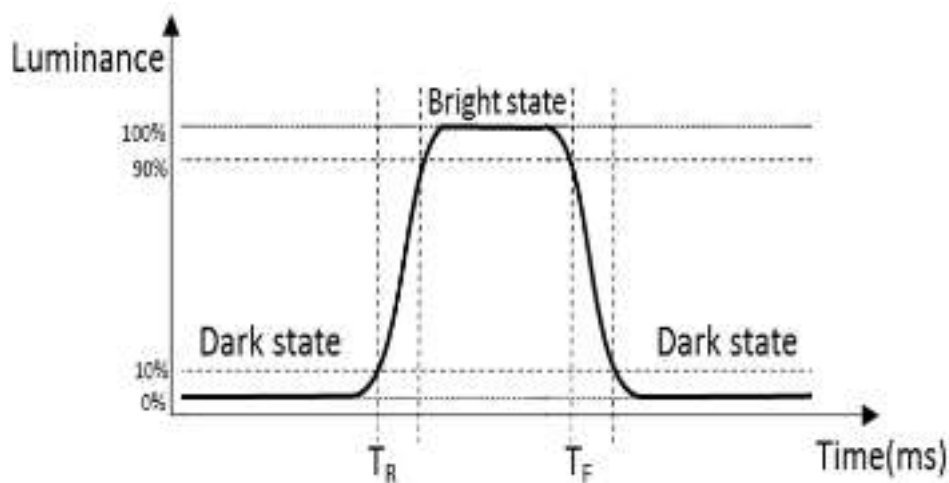


Figure 7. The definition of T_R and T_F

Measured response time is determined by rise time (T_R) and fall time (T_F), and shown in Figure 7.

(4) Definition of Viewing angle:

As CR definition is stated in Note(2), the viewing angles are defined when the viewing angle is larger than 10° in four directions relative to the perpendicular direction of the VTK's module (two vertical angles: up θ_{y+} and down θ_{y-} ; and two horizontal angles: right θ_{x+} and left θ_{x-}). The standard setup of measurement is shown in Figure 8

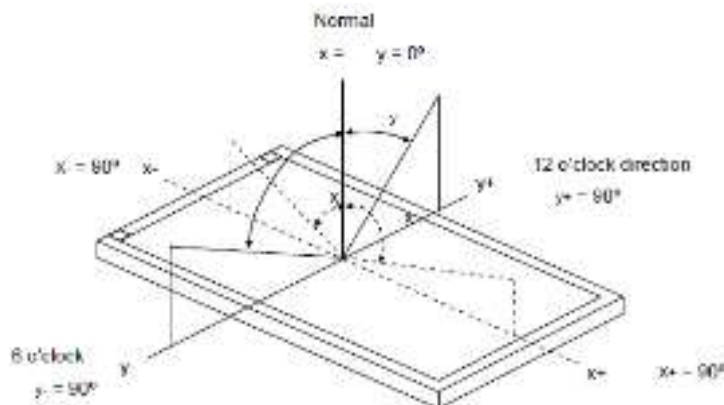
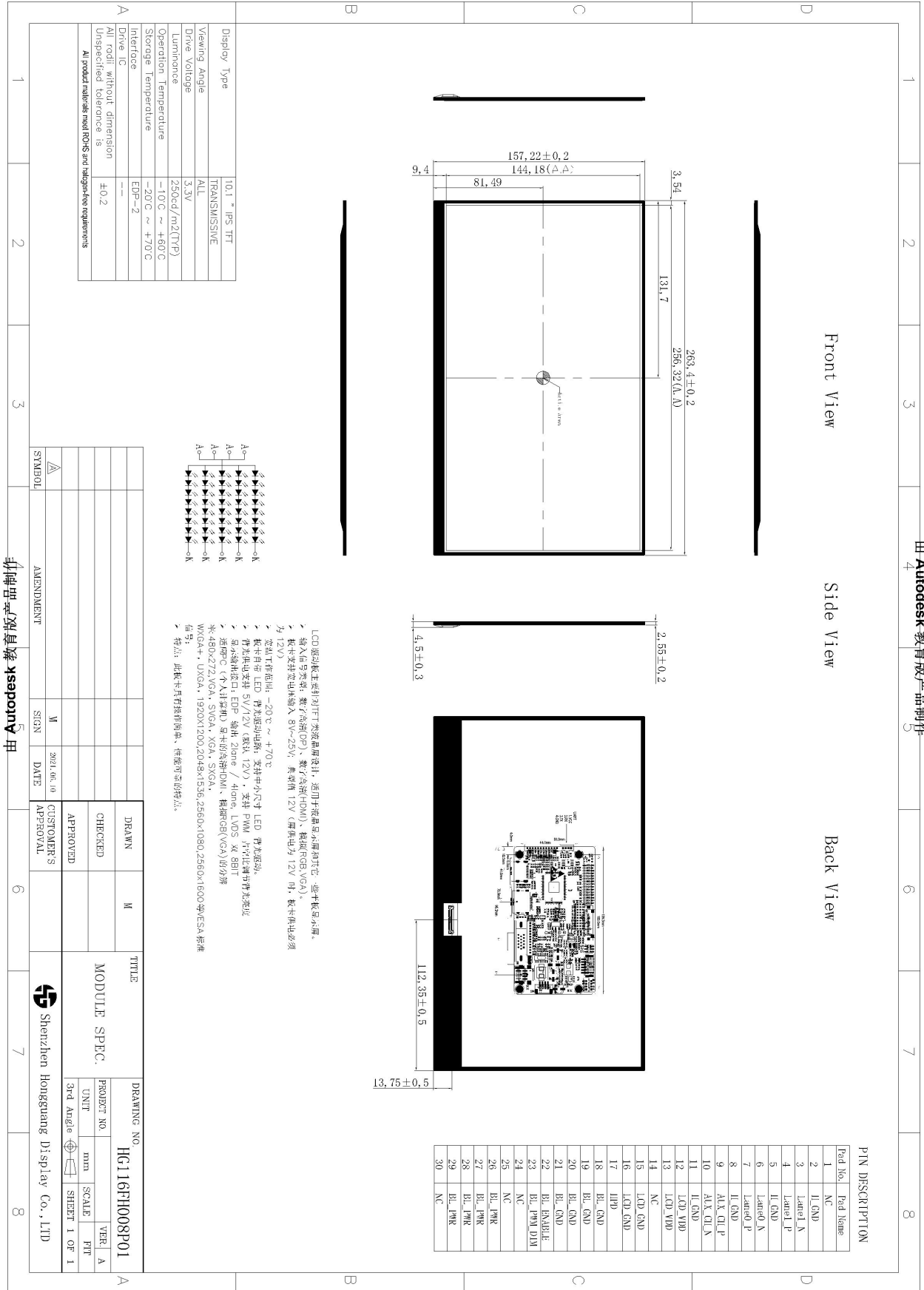


Figure 8. Definition of Viewing angle



5. MECHANICAL OUTLINE DIMENSION

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6. EDID TABEL

Address (Decimal)	Address (HEX)	Field Name & Comments	Value (HEX)	Value (BIN)	Value (DEC)
0	0	Header	00	00000000	0
1	1	Header	FF	11111111	255
2	2	Header	FF	11111111	255
3	3	Header	FF	11111111	255
4	4	Header	FF	11111111	255
5	5	Header	FF	11111111	255
6	6	Header	FF	11111111	255
7	7	Header	00	00000000	0
8	8	manufacture code	21	00100001	33
9	9		63	01100011	99
10	0A	Product Code	FC	11111100	252
11	0B		3C	00111100	60
12	0C	LCD module Serial No – (“0” if not used)	00	00000000	0
13	0D	LCD module Serial No – (“0” if not used)	00	00000000	0
14	0E	LCD module Serial No – (“0” if not used)	00	00000000	0
15	0F	LCD module Serial No – (“0” if not used)	00	00000000	0
16	10	Week of manufacture	12	00010010	18
17	11	Year of manufacture	20	00100000	32
18	12	EDID Structure Ver #	01	00000001	1
19	13	EDID revision #	04	00000100	4
20	14	Video I/P definition = Digital I/P (80h)	A5	10100101	165
21	15	Max H image size = (Rounded to cm)	1A	00011010	26
22	16	Max V image size = (Rounded to cm)	0E	00001110	14
23	17	Display Gamma	78	01111000	120
24	18	Feature support (no DPMS, Active off, RGB, timing BLK 1)	E3	11100011	227
25	19	Red/Green Low bits (RxRy/GxGy)	32	00110010	50
26	1A	Blue/White Low bits (BxBY/WxWy)	AF	10101111	175
27	1B	Red X Rx	A7	10100111	167
28	1C	Red Y Ry	52	01010010	82
29	1D	Green X Gx	43	01000011	67



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30	1E	Green Y Gy	94	10010100	148
31	1F	Blue X Bx	21	00100001	33
32	20	Blue Y By	1D	00011101	29
33	21	White X Wx	4B	01001011	75
34	22	White Y Wy	5A	01011010	90
35	23	Established timings 1 (00h if not used)	00	00000000	0
36	24	Established timing 2 (00h if not used)	00	00000000	0
37	25	Manufacturer's timings (00h if not used)	00	00000000	0
38	26	Standard timing ID1 (01h if not used)	01	00000001	1
39	27	Standard timing ID1 (01h if not used)	01	00000001	1
40	28	Standard timing ID2 (01h if not used)	01	00000001	1
41	29	Standard timing ID2 (01h if not used)	01	00000001	1
42	2A	Standard timing ID3 (01h if not used)	01	00000001	1
43	2B	Standard timing ID3 (01h if not used)	01	00000001	1
44	2C	Standard timing ID4 (01h if not used)	01	00000001	1
45	2D	Standard timing ID4 (01h if not used)	01	00000001	1
46	2E	Standard timing ID5 (01h if not used)	01	00000001	1
47	2F	Standard timing ID5 (01h if not used)	01	00000001	1
48	30	Standard timing ID6 (01h if not used)	01	00000001	1
49	31	Standard timing ID6 (01h if not used)	01	00000001	1
50	32	Standard timing ID7 (01h if not used)	01	00000001	1
51	33	Standard timing ID7 (01h if not used)	01	00000001	1
52	34	Standard timing ID8 (01h if not used)	01	00000001	1
53	35	Standard timing ID8 (01h if not used)	01	00000001	1
54	36	Pixel Clock LSB	98	10011000	152
55	37	Pixel Clock HSB	3B	00111011	59
56	38	Horizontal Active (lower 8 bits)	80	10000000	128
57	39	Hor blanking (lower 8 bits)	10	00010000	16
58	3A	Horizontal Active/Horizontal blanking (upper4:4 bits)	71	01110001	113
59	3B	Vertical active(lower 8 bits)	38	00111000	56
60	3C	Vertical blanking(lower 8 bits)	50	01010000	80
61	3D	Vertical Active : Vertical Blanking (upper4:4 bits)	40	01000000	64
62	3E	Horizontal Sync Offset	30	00110000	48



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63	3F	Horizontal Sync Pulse Width	20	00100000	32
64	40	Vertical Sync Offset , Sync Width	36	00110110	54
65	41	Horizontal Vertical Sync Offset/Width upper 2 bits	00	00000000	0
66	42	Horizontal Image Size	00	00000000	0
67	43	Vertical image Size	90	10010000	144
68	44	Horizontal Image Size / Vertical image size	10	00010000	16
69	45	Horizontal Border = (0 for Notebook LCD)	00	00000000	0
70	46	Vertical Border = (0 for Notebook LCD)	00	00000000	0
71	47	Non-interlaced, Normal, no stereo, Separate sync, H/V pol Negatives,	19	00011001	25
72	48	Reserved for definition	00	00000000	0
73	49	Reserved for definition	00	00000000	0
74	4A	Reserved for definition	00	00000000	0
75	4B	ASCII String	00	00000000	0
76	4C	Vertical Rate Offdet	00	00000000	0
77	4D	Minimum Vertical Rate	00	00000000	0
78	4E	Maximum Vertical Rate	00	00000000	0
79	4F	Minimum Horizontal Rate	00	00000000	0
80	50	Maximum Horizontal Rate	00	00000000	0
81	51	Maximum Pixel Clock	00	00000000	0
82	52	Video Timing Support Flag 01h	00	00000000	0
83	53	Line Feed	00	00000000	0
84	54	Space	00	00000000	0
85	55	Space	00	00000000	0
86	56	Space	00	00000000	0
87	57	Space	00	00000000	0
88	58	Space	00	00000000	0
89	59	Space	00	00000000	0
90	5A	Panel Supplier Manufacture Code	00	00000000	0
91	5B		00	00000000	0
92	5C		00	00000000	0
93	5D		FE	11111110	254
94	5E		00	00000000	0
95	5F		48	01001000	72



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96	60		4B	01001011	75
97	61		43	01000011	67
98	62		20	00100000	32
99	63		4D	01001101	77
100	64		59	01011001	89
101	65		20	00100000	32
102	66		20	00100000	32
103	67		20	00100000	32
104	68		20	00100000	32
105	69	New line character indicates end of ASCII	0A	00001010	10
106	6A	string	20	00100000	32
107	6B		20	00100000	32
108	6C	Detailed timing/monitor descriptor #4	00	00000000	0
109	6D		00	00000000	0
110	6E		00	00000000	0
111	6F	FE (hex) defines ASCII string	FE	11111110	254
112	70	Flag	00	00000000	0
113	71	Manufacture P/N	50	01010000	80
114	72	Manufacture P/N	47	01000111	71
115	73	Manufacture P/N	31	00110001	49
116	74	Manufacture P/N	31	00110001	49
117	75	Manufacture P/N	36	00110110	54
118	76	Manufacture P/N	43	01000011	67
119	77	Manufacture P/N	53	01010011	83
120	78	Manufacture P/N	30	00110000	48
121	79	Manufacture P/N	31	00110001	49
122	7A	Manufacture P/N	27	00100111	39
123	7B	Manufacture P/N	32	00110010	50
124	7C	Manufacture P/N	20	00100000	32
125	7D	Manufacture P/N	20	00100000	32
126	7E	Extension Flag = 00	00	00000000	0
127	7F	Checksum	4B	01001011	75



7. RELIABILITY TEST

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

Table 17. Reliability Test

No	Test Items	Conditions
1	High temperature storage test	78°C, 300hrs
2	Low temperature storage test	-30°C, 300hrs
3	High temperature & high humidity operation test	55 °C, 90%RH, 300hrs
4	High temperature operation test	60°C, 300hrs
5	Low temperature operation test	-20°C, 300hrs
6	Thermal shock	-30°C ~ 70°C , 65min/each cycle , 100 cycles , time for Temp. change : 5min
7	Vibration Test	0.015G ² /Hz from 5-200Hz -6dB/octave from 200-500Hz 1hrs for X/Y/Z, total 3hrs
8	ESD (Electro-static discharge)	OC ESD: Air : ±4KV ; Contact : ±2KV , limit test

8. PACKAGE SPECIFICATION

TBD



9. LABEL

TBD

10. GENERAL PRECAUTION

10.1 Using Restriction

This product is not authorized for using in life supporting systems, aircraft navigation control systems, military systems and any other appliance where performance failure could be life-threatening or lead to be catastrophic.

10.2 Operation Precaution

(1) The LCD product should be operated under normal conditions.

Normal conditions are defined as below:

Temperature: 25°C

Humidity: 50±10%

Display pattern: continually changing pattern (Not stationary)

(2) Brightness and response time depend on the temperature. (It needs more time to reach normal brightness in low temperature.)

(3) It is necessary for you to pay attention to condensation when the ambient temperature drops suddenly. Condensate water would damage the polarizer and electrical contacted parts of the module. Besides, smear or spot will remain after condensate water evaporating.

(4) If the absolute maximum rating value was exceeded, it may damage the module.

(5) Do not adjust the variable resistor located on the module.

(6) Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding may be important to minimize the interference.

(7) Image sticking may occur when the module displayed the same pattern for long time.

(8) Do not connect or disconnect the module in the “power on” condition. Power supply should always be turned on/off by the “power on/off sequence”

(9) Ultra-violet ray filter is necessary for outdoor operation.

10.3 Mounting Precaution

(1) All the operators should be electrically grounded and with Ion-blown equipment turning on when mounting or handling. Dressing finger-stalls out of the gloves is important for keeping the panel



clean during the incoming inspection and the process of assembly.

- (2) It is unacceptable that the material of cover case contains acetic or chloric. Besides, any other material that could generate corrosive gas or cause circuit break by electro-chemical reaction is not desirable.
- (3) The case on which a module is mounted should have sufficient strength so that external force is not transmitted to the module directly.
- (4) It is obvious that you should adopt radiation structure to satisfy the temperature specification.
- (5) It should be attached to the system tightly by using all holes for mounting, when the module is assembled. Be careful not to apply uneven force to the module, especially to the PCB on the back.
- (6) A transparent protective film needs to be attached to the surface of the module.
- (7) Do not press or scratch the polarizer exposed with anything harder than HB pencil lead. In addition, don't touch the pin exposed with bare hands directly.
- (8) Clean the polarizer gently with absorbent cotton or soft cloth when it is dirty.
- (9) Wipe off saliva or water droplet as soon as possible. Otherwise, it may cause deformation and fading of color.
- (10) Desirable cleaners are IPA (Isopropyl Alcohol) or hexane. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
- (11) Do not disassemble or modify the module. It may damage sensitive parts in the LCD module, and cause scratches or dust remains.

10.4 Handling Precaution

- (1) Static electricity will generate between the film and polarizer, when the protection film is peeled off. It should be peeled off slowly and carefully by operators who are electrically grounded and with Ion-blown equipment turning on. Besides, it is recommended to peel off the film from the bonding area.
- (2) The protection film is attached to the polarizer with a small amount of glue. When the module with protection film attached is stored for a long time, a little glue may remain after peeling.
- (3) If the liquid crystal material leaks from the panel, keep it away from the eyes and mouth. In case of contact with hands, legs or clothes, it must be clean with soap thoroughly.

10.5 Storage Precaution

When storing modules as spares for long time, the following precautions must be executed.

- (1) Store them in a dark place. Do not expose to sunlight or fluorescent light. Keep the temperature between 5°C and 35°C at normal humidity.



- (2) The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.
- (3) It is recommended to use it in a short-time period, after it's unpacked. Otherwise, we would not guarantee the quality.

10.6 Others

When disposing LCD module, obey the local environmental regulations.