Product Specification Sheet

Customer: _____

Model Name: **MNG007DA2-3**

Date: **2022/08/17**

Version： **V02**

Customer's Approval		**CSOT**	
Signature	Date	Approved By	Date
		Reviewed By	Date
		Prepared By:	Date

Record of Revision

Version	Revise Date	Page	Content
V01	2022/07/19	All	Preliminary Specification
V02	2022/08/17	Page5 Page17 Page29,32	1. Update Specifications Summary, panel function 2. Update Display Timing Specifications 3. Update EDID table format

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1. General Description

1.1 Overview

MNG007DA2-3 is a 16” TFT Liquid Crystal Display Low blue light module with LED Backlight unit and 40 pins eDP 1.4 interface. This module supports 2560 x 1600 mode and can display 1073.7M colors.

1.2 Specifications Summary

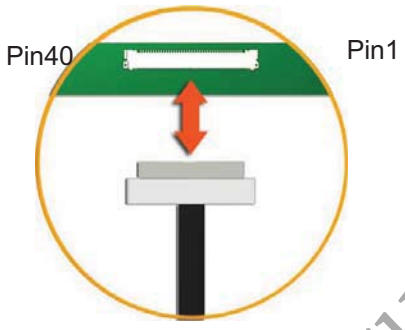
No.	Item	Specification	Unit	Note
1	LCD size	16.0	inch	
2	Resolution	2560 x RGB x 1600		WQXGA
3	Pixel Arrangement	RGB		
4	Model Type	LCM		
5	TFT Technology	LTPS		
6	Display mode	FFS, Normally Black		
7	Active Area	344.6784 (H) × 215.424 (V)	mm	
8	pixel pitch	134.64(H)×134.64V)	um	
9	Display Colors	1073.7M		@ 10bit
10	Contrast Ratio	1200:1(Typ)		
11	Color Gamut	SRGB 100% (typ) / 98% (min)	CIE1976	SRGB
12	LCM Outline Dimension	349.68×224.42×2.45	mm	Typical
13	Luminance	500(Typ)	nits	5 Points Average
14	Low blue light ratio	50	%	Max
15	Surface treatment(AP)	Anti-Glare	--	Pol.
16	Interface	eDP 1.4		
17	Refresh Rate	240	Hz	
18	Panel Function	OD, DDS, GSYNC, Freesync, HDR400, DSC, FEC, VRR, ASSR,SDRRS,DPST		
19	Method of Inversion	Column Inversion		
20	Power consumption of Panel	2.15(Max)	W	3.3V@Mosaic 240Hz
	Power consumption of Backlight	4.68	W	Max
21	Weight	325	g	Max

Note (1) The specified power consumption (with converter efficiency) is under the conditions at VCCS =3.3 V, LED_VCCS = Typ, fPWM = 200 Hz, Duty=100% and Ta = 25 ± 2 ºC, whereas mosaic pattern is displayed.

2. Mechanical Specifications

Parameter		Min.	Typ.	Max.	Unit	Note
Unit outline dimensions	Width	349.38	349.68	349.98	mm	
	Height	223.92	224.42	224.92	mm	
	Depth	2.3	2.45	2.6	mm	
Weight		-	-	325	g	

2.1 Interface Connection



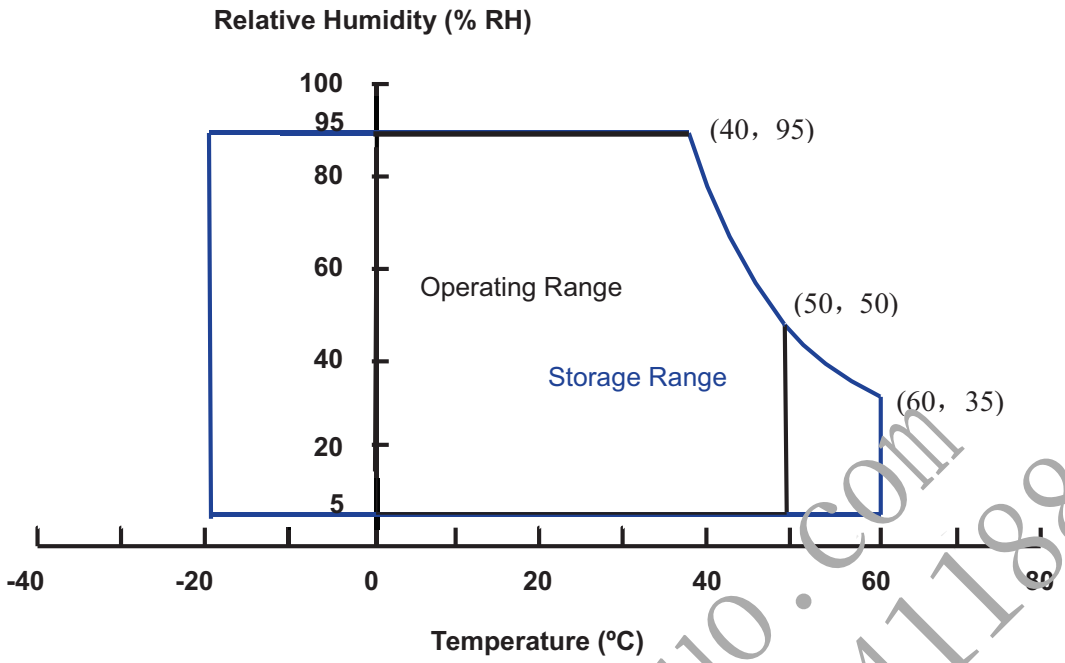
Please refer Appendix Outline Drawing for detail design.

Connector Part No.: IPEX-20455-040E-66

3. Absolute Maximum Ratings

3.1 Absolute Ratings of Environment

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	+60	ºC	(1)
Operating Ambient Temperature	T_{OP}	0	+50	ºC	(1), (2)



Note (1)

(a) 95% RH Max. (Ta <= 40 ºC).

(b) Wet-bulb temperature should be 39 ºC Max. (Ta > 40 ºC).

(c) No condensation.

Note (2) The temperature of panel surface should be 0 ºC min. and 60 ºC max.

3.2 Electrical Absolute Ratings

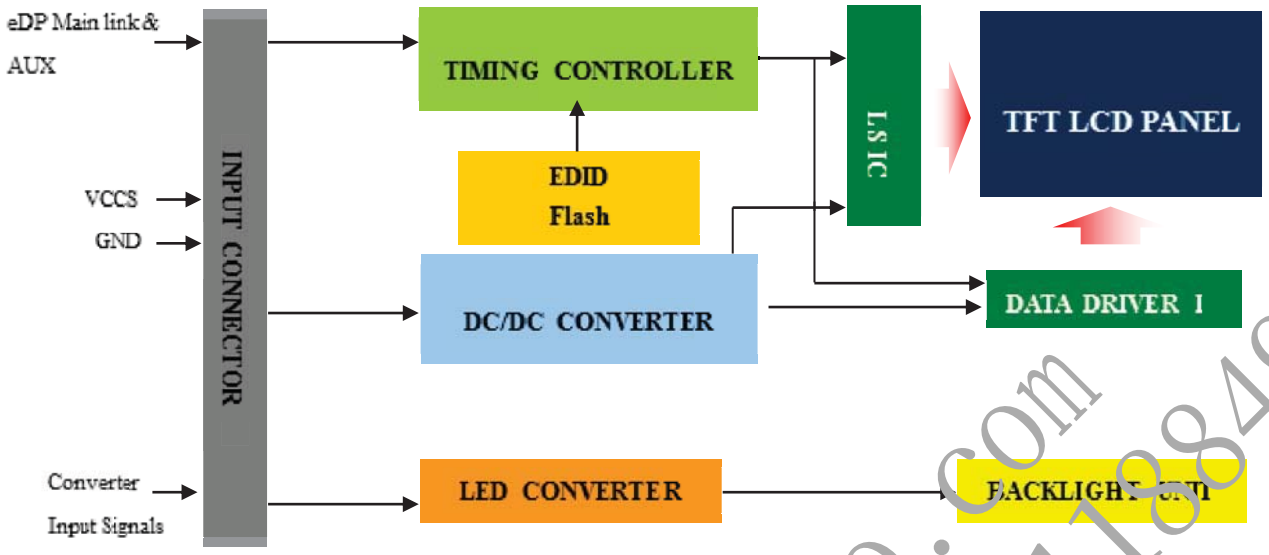
3.2.1 TFT LCD Module

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	VCCS	-0.3	+4	V	(1)
Logic Input Voltage	V_{IN}	-0.3	+3.6	V	
Converter Input Voltage	LED_VCCS	-0.3	26	V	(1)
Converter Control Signal Voltage	LED_PWM,	-0.3	+3.6	V	(1)
Converter Control Signal Voltage	LED_EN	-0.3	+3.6	V	(1)

Note (1) Stresses beyond those listed in above “ELECTRICAL ABSOLUTE RATINGS” may cause permanent damage to the device. Normal operation should be restricted to the conditions described in “ELECTRICAL CHARACTERISTICS”.

4. Electrical Specifications

4.1 Function Block Diagram



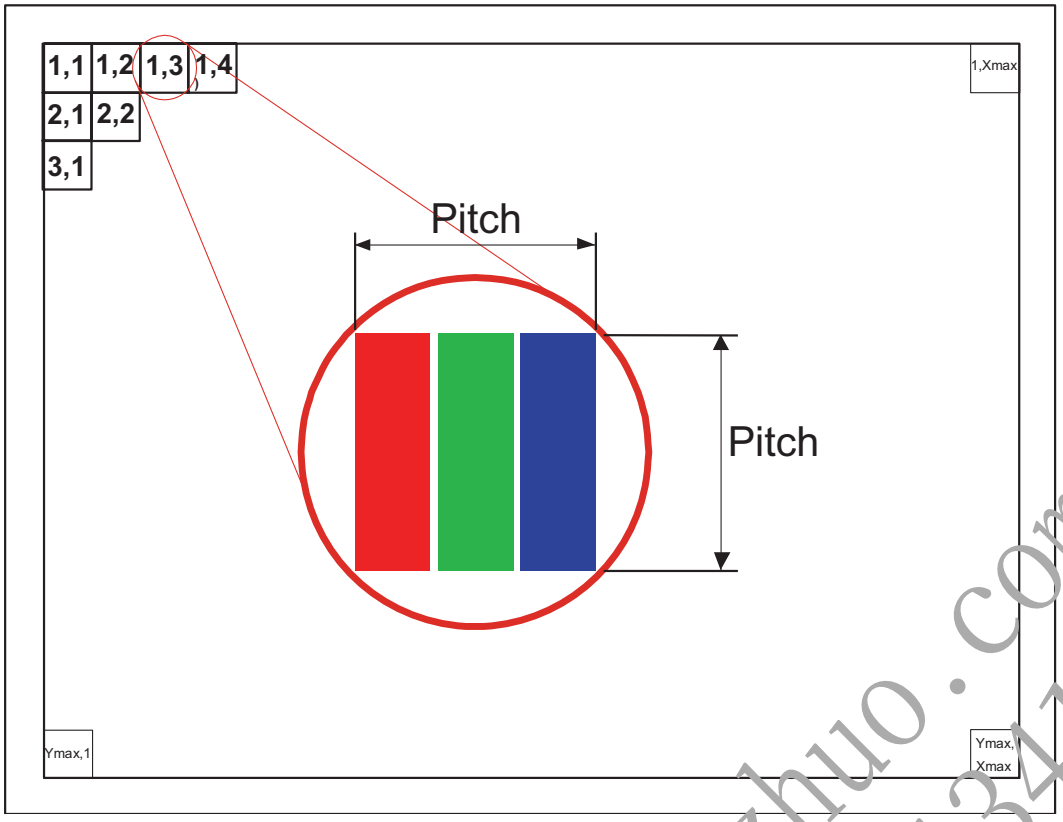
4.2 Interface Connections

PIN Assignment

Pin	Symbol	Description	Note
1	#01	I2C SCL	For DDS function
2	#02	H_GND	
3	#03	Lane3_N	
4	#04	Lane3_P	
5	#05	H_GND	
6	#06	Lane2_N	
7	#07	Lane2_P	
8	#08	H_GND	
9	#09	Lane1_N	
10	#10	Lane1_P	
11	#11	H_GND	
12	#12	Lane0_N	
13	#13	Lane0_P	
14	#14	H_GND	
15	#15	AUX_CH_P	
16	#16	AUX_CH_N	
17	#17	H_GND	
18	#18	LCD_VCC	
19	#19	LCD_VCC	

20	#20	LCD_VCC	
21	#21	LCD_VCC	
22	#22	LCD Self-Test	
23	#23	LCD_GND	
24	#24	LCD_GND	
25	#25	LCD_GND	
26	#26	LCD_GND	
27	#27	HPD	
28	#28	BL_GND	
29	#29	BL_GND	
30	#30	BL_GND	
31	#31	BL_GND	
32	#32	BL_Enable	
33	#33	BL_PWM_DIM	
34	#34	I2C_SDA	For DDS function
35	#35	NC	For CSOT use
36	#36	BL_PWR	
37	#37	BL_PWR	
38	#38	BL_PWR	
39	#39	BL_PWR	
40	#40	Over Drive enable Pull high (1): OD on; Pull low(0): OD off	Suggest to pull low at the system

Note (1) The pixel is shown in the following figure.



4.3 Electrical Characteristics

4.3.1 LCD Electronics Specification

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		VCCS	3.0	3.3	3.6	V	(1)
BIST Control Level		BIST on	2.2	3.3	3.6	V	(1)
		BIST off	0	-	0.5	V	(1)
Ripple Voltage		V_{RP}	-	-	100	mV	(1)
Inrush Current		I_{RUSH}	-	-	1.5	A	(1)(2)
Power Supply Current	Mosaic	I_{LCD}	-	TBD	TBD	mA	(3)
Power consumption	Mosaic	P_{LCD}	-	TBD	TBD	W	(3)

Note (1) The ambient temperature is Ta = 25 ± 2 ºC.

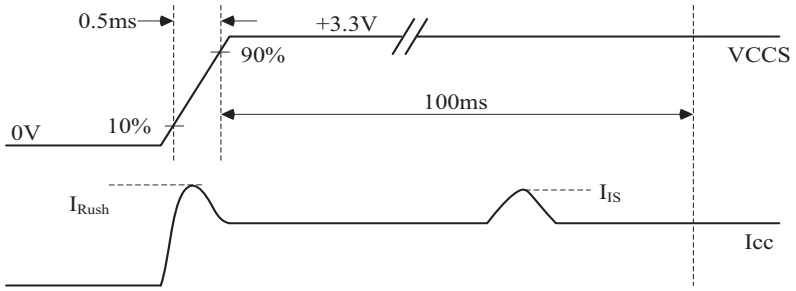
Note (2) I_{RUSH}: the maximum current when VCCS is rising

I_{IS}: the maximum current of the first 100ms after power-on

Measurement Conditions: Shown as the following figure.

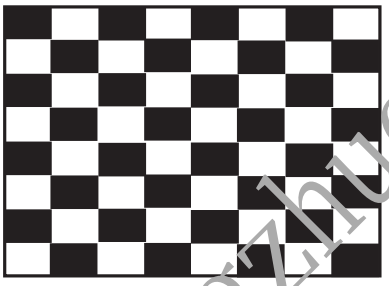
Test pattern: Mosaic

VCCS rising time is 0.5ms



Note (3) The specified power supply current is under the conditions at VCCS = 3.3 V, Ta = 25 ± 2 ºC, DC Current and f_v = 240 Hz, whereas a power dissipation check pattern below is displayed.

Mosaic Pattern



Active Area

LED CONVERTER SPECIFICATION

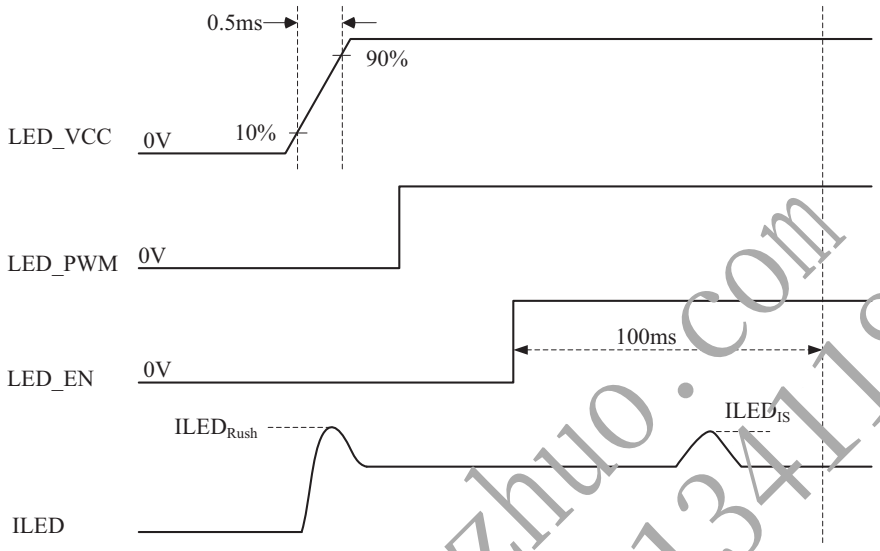
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Converter Input power supply voltage		LED_Vccs	5.0	12.0	21.0	V	
Converter Inrush Current		$ILED_{RUSH}$	-	-	1.5	A	(1)
EN Control Level	Backlight		1.5	-	3.6	V	
	Backlight Off		0	-	0.5	V	
PWM Control Level	PWM High Level		1.5	-	3.6	V	
	PWM Low Level		0	-	0.5	V	
PWM Control Duty Ratio			1	-	100	%	
PWM Control Permissive Ripple Voltage		VPWM_pp	-	-	100	mV	
PWM Control Frequency		f_{PWM}	250	-	2000	Hz	
LED Power consumption		P_L	-	4.52	4.68	W	(2)
LED Power Current	LED_VCCS =Typ.	-	-	377	390	mA	(3)

Note (1) $ILED_{RUSH}$: the maximum current when LED_VCCS is rising,

$ILED_{IS}$: the maximum current of the first 100ms after power-on,

Measurement Conditions: Shown as the following figure. LED_VCCS = Typ, Ta = 25 ± 2 ºC, f_{PWM} = 250 Hz, Duty=100%.

VLED rising time is 0.5ms

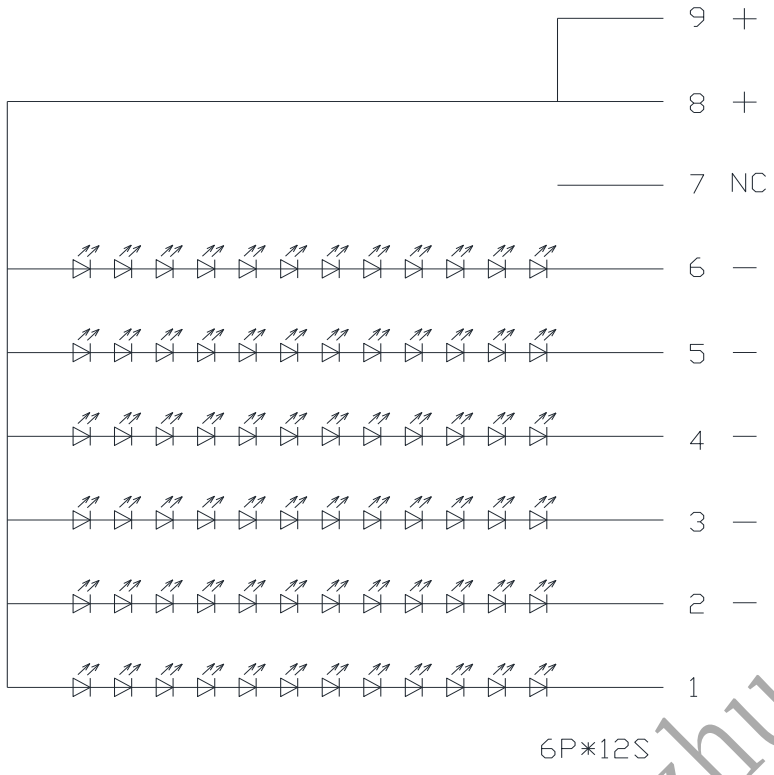


Note(2) $P_L = I_L \times V_L$ (With LED converter transfer efficiency):

Note (3) The specified LED power supply current is under the conditions at "LED_VCCS = Typ.", Ta = 25 ± 2 ºC, fPWM = 250 Hz, Duty=100%.

4.3.2 Backlight Unit

72 LED PIN MAP



Ta = 25 ± 2 ºC

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Light Bar Power Supply Voltage	VL	-	-	34.2	V	(1)(2) (Duty100%)
LED Light Bar Power Supply Current	IL	-	120	-	mA	
Power Consumption	PL	-	-	4.104	W	(3)
LED Life Time	LBL	15000	-	-	Hrs	(4)

Note (1) LED current is measured by utilizing a high frequency current meter :

Note (2) For better LED light bar driving quality, it is recommended to utilize the adaptive boost converter with current balancing function to drive LED light-bar.

Note (3) $P_L = I_L \times V_L$ (Without LED converter transfer efficiency)

Note (4) The lifetime of LED is defined as the time when it continues to operate under the conditions at Ta = 25 ±2 ºC and I_L = 20 mA(Per EA) until the brightness becomes ≦ 50% of its original value.

4.4 Input Signal Timing Specification

4.4.1 eDP AUX Channel Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Unit Interval for AUX channel	UI_{AUX}	0.4	-	0.6	μS	
Peak-to-peak voltage at TP1	$V_{AUX-DIFF-pp}$	0.18	0.2	1.38	V	
AUX DC Common mode Voltage	$V_{AUX-DC-CM}$	0	-	1.2	V	
AUX Short current limit	I_{AUX_SHORT}	-	-	90	mA	
AUX CH termination DC resistor	R_{AUX_TERM}	80	100	120	Ω	Differential input
AUX AC coupling capacitor	C_{AUX}	75	-	200	nF	
Number of pre-charge pulses	Pre-charge pulses	10	-	16		

4.4.2 eDP Main Link Receiver Characteristics

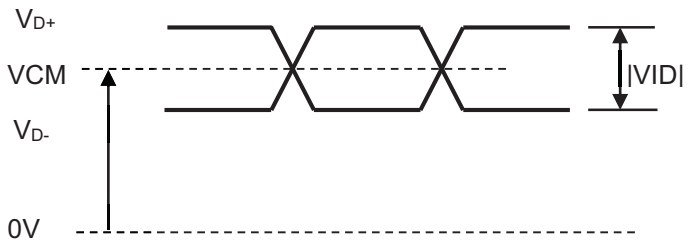
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Link clock down spreading	Down_Spread_Amplitude	0		0.5	%	
Differential Peak-to-peak Input Voltage at Rx package pins	$V_{RX-DIFFp-p}$	100	-	1320	mV	
Differential termination resistance	$R_{RX-TERM}$	80	100	120	Ω	
RX short circuit Current Limit	$I_{RX-SHORT}$	-	-	50	mA	
Lane Intra-pair Skew at RX package pins	$T_{RX-SKEW-INTRA-PAIR-High-Bit-Rate}$	-	-	50	ps	

4.4.3 eDP AUX Channel Characteristics

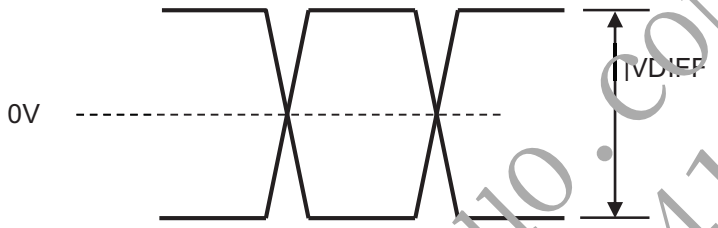
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Hot plug Detect	VHPD	2.5	-	2.8	V	

Note (1) Display port interface related AC coupled signals are following VESA Display Port Standard V1.4b.

Single Ended



Differential



4.4.4 Color Data Input Assignment

The brightness of each primary color (red, green and blue) based on the 10-bit gray scale data input for the color. The higher the binary input the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																													
		Red										Green										Blue									
		R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
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	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	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	0	0	0	0	1	1	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	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	1	1	1	1	0	0	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	1	1	1	1	1	1

	Red(0)/Dark	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
	Red(1)	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
Gray	Red(2)	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
Scale	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Of	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Red	Red(1021)	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1022)	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1023)	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(0)/Dark	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
	Green(1)	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
Gray	Green(2)	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
Scale	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
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Green	Green(1021)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0
	Green(1022)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1023)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
	Blue(0)/Dark	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
	Blue(1)	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
Gray	Blue(2)	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
Scale	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
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Blue	Blue(1021)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1
	Blue(1022)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0
	Blue(1023)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1

Note (1) 0: Low Level Voltage. 1: High Level Voltage

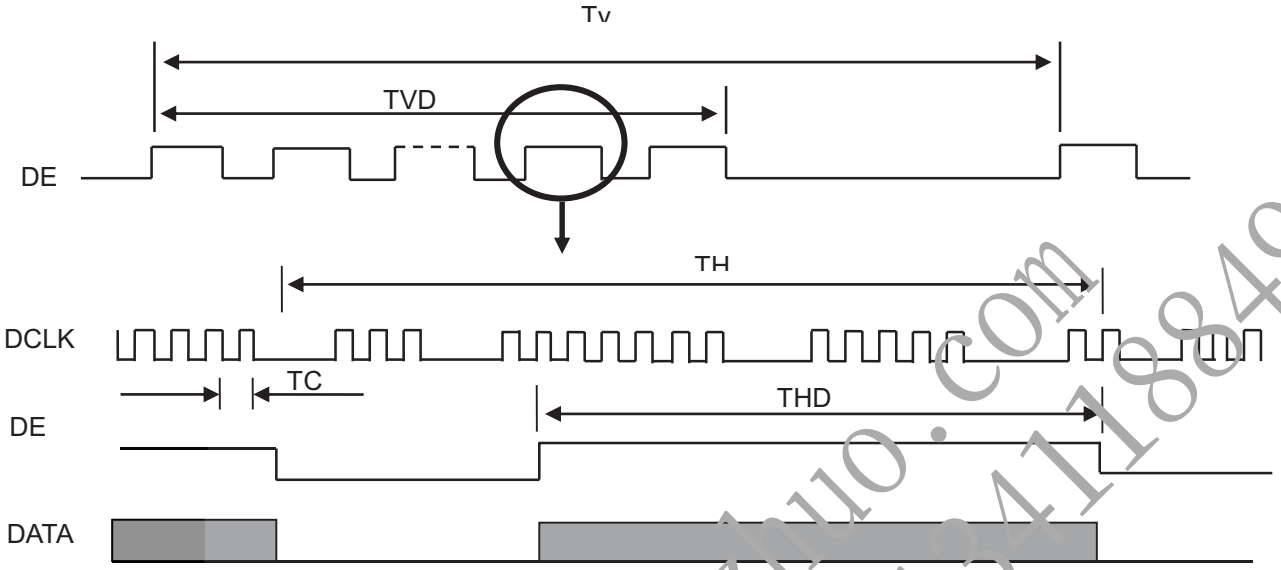
4.5 Display Timing Specifications

The input signal timing specification is showed as the following table and timing diagram.

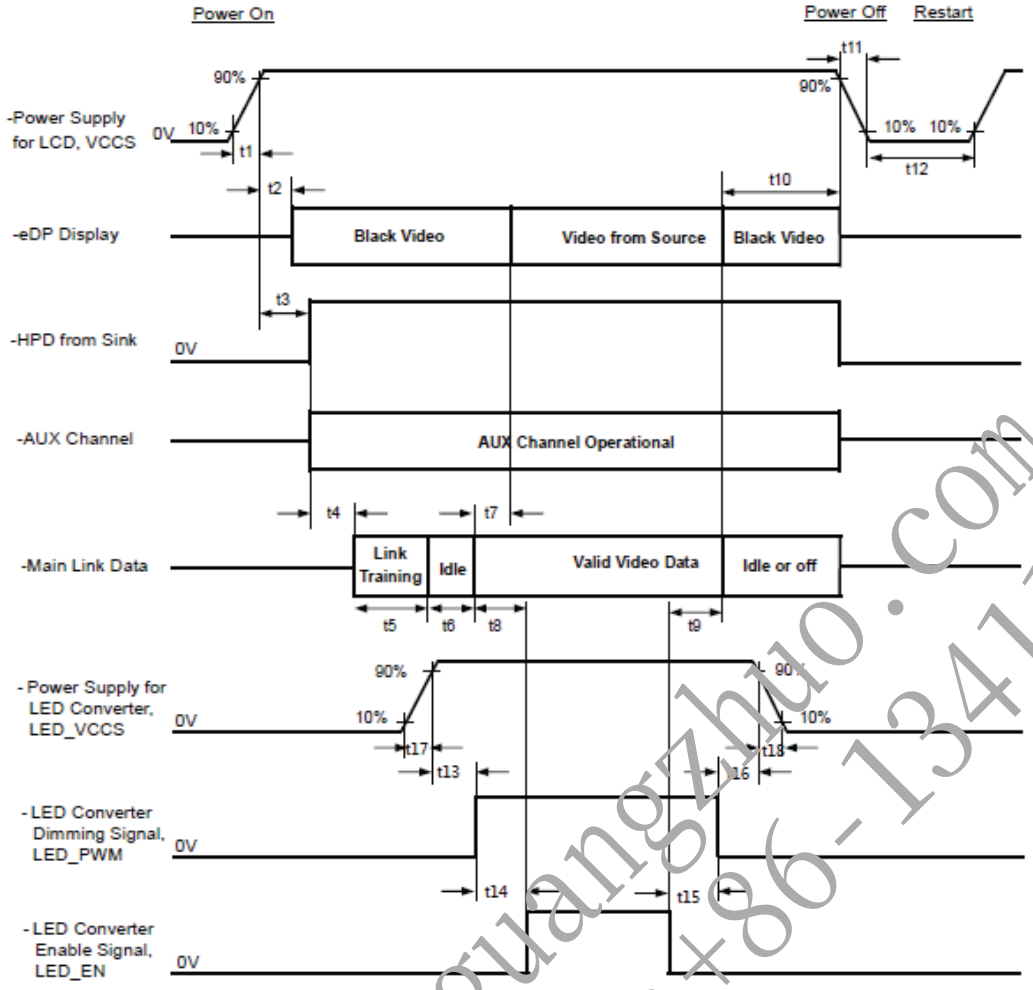
Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
	Frame	TV	/	240	/	Hz	
DCLK	Frequency	1/Tc	/	1175.04	/	MHz	-
DE	Vertical Total Time	TV	/	1800	/	TH	-
	Vertical Active Display Period	TVD	/	1600	/	TH	-
	Vertical Active Blanking Period	TVB	/	200	/	TH	-
	Horizontal Total Time	TH	/	2720	/	Tc	-
	Horizontal Active Display Period	THD	/	2560	/	Tc	-
	Horizontal Active Blanking Period	THB	/	160	/	Tc	-

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
	Frame	TV	/	60	/	Hz	
DCLK	Frequency	1/Tc	/	293.76	/	MHz	-
DE	Vertical Total Time	TV	/	1800	/	TH	-
	Vertical Active Display Period	TVD	/	1600	/	TH	-
	Vertical Active Blanking Period	TVB	/	200	/	TH	-
	Horizontal Total Time	TH	/	2720	/	Tc	-
	Horizontal Active Display Period	THD	/	2560	/	Tc	-
	Horizontal Active Blanking Period	THB	/	160	/	Tc	-

Note (1) Display timing signal should be contained and transferred by Display Port Main Link stream data packing described in VESA Display Port Standard V1.4b.



4.6 Power ON/OFF Sequence



Symbol	Description	Min	Typ.	Max	Unit	Note
t1	Power rail rise time, 10% to 90%	0.5		10	ms	
t2	Delay from LCD,VCCS to eDP Display	0		200	ms	
t3	Delay from LCD,VCCS to HPD high	0		200	ms	
t4	Delay from Sink AUX to link training initialization	-		-	ms	
t5	Link training duration	-		-	ms	
t6	Link idle	-		-	ms	
t7	Delay from valid video data from Source to video on display	0		50	ms	
t8	Delay from valid video data from Source to backlight on	-		-	ms	

t9	Delay from backlight off to end of valid video data	-		-	ms	
t10	Delay from end of valid video data from Source to power off	0		500	ms	
t11	VCCS power rail fall time, 90% to 10%	1		10	ms	(1)
t12	VCCS Power off time	500		-	ms	
t13	Delay from VCC to PWM	0		-	ms	
t14	Delay from PWM to LED ENABLE	0		-	ms	
t15	Delay from LED ENABLE to PWM Disable	0		-	ms	
t16	Delay from PWM Disable to VBL 90%	0		-	ms	
t17	Delay from VBL 10% to VBL 90%	0		-	ms	
t18	VBL power rail fall time, 90% to 10%	0		-	ms	

Note (1) Please follow the power on/off sequence described above. Otherwise, the LCD module might abnormal display or be damaged.

Note (2) Please avoid floating state of interface signal at invalid period. When the interface signal is invalid, be sure to pull down the power supply of LCD VCCS to 0 V.

Note (3) The backlight must be turned on after the power supply for the logic and the interface signal is valid. The backlight must be turned off before the power supply for the logic and the interface signal is invalid.

Note (4) Please follow the LED backlight power sequence as above. If the customer could not follow, it might cause backlight flash issue during display ON/OFF or damage the LED backlight controller

5. Optical characteristics

Ta=25°C

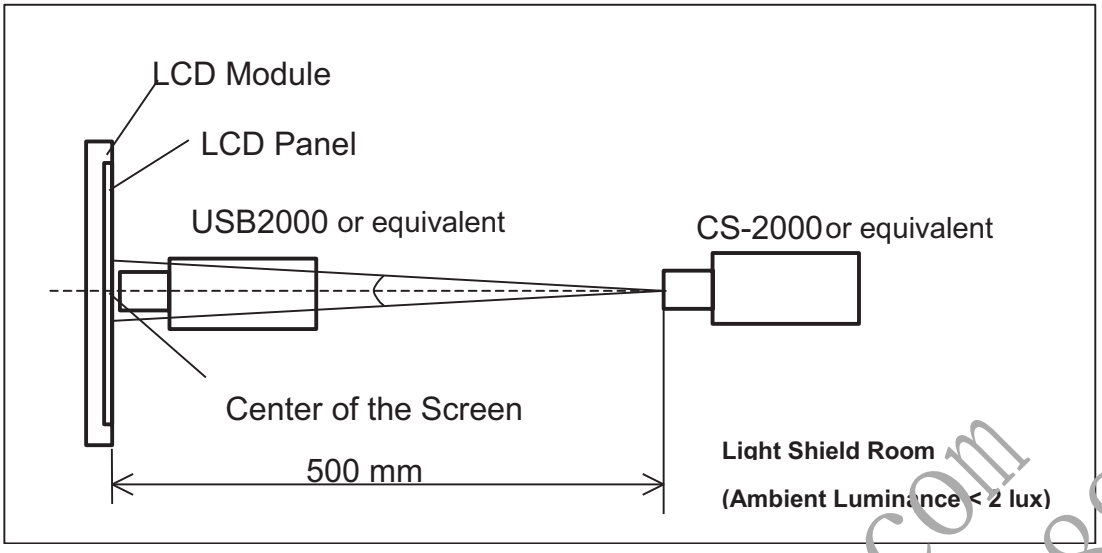
	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing angle range	Left/Right	CR＞10	-	89	-	Deg.	(1), (3), (4), (6)
	Upper/Low		-	89	-		
	Left/Right	CR＞100	-	80	-	Deg.	
	Upper/Low		-	80	-	Deg.	
Contrast ratio	CR	θ=0 deg.	1000	1200	-	-	(2), (4), (6)
Response time	GTG wi OD		-	3	4	ms	(5)
	GTG wo		-	5	6	ms	
	Tr+Tf		-	9	-	ms	
Chromaticity of white	x		Typ. -0.025	0.313	Typ. +0.025	-	(2), (6) Normal operation
	y			0.329		-	
Chromaticity of red	x			0.645		-	
	y			0.330		-	
Chromaticity of green	x			0.295		-	
	y			0.614		-	
Chromaticity of blue	x			0.144		-	
	y			0.054		-	
CT	K		5500	-	7000	--	
Gamut	%		98%	100%.		sRGB	
Luminance of White	Y_{LI}		425	500	598	cd/m^2	(7)
Half brigthness viewing	--		-	20/20	-	[deg]	(3)
Half brigthness viewing	-	-	-	20/20	-	[deg]	(3)
gamma	-	-	-	2.2	-	-	-
Surface hardness	[H]	-	-	3	-	H	-
White uniformity 5pt	δW	θ=0 deg.	80	-	-	%	(8)
White uniformity 13pt	δW	θ=0 deg.	60	-	-	%	(2), (8)
Low blue light ratio	%	(415nm~455nm)/(400nm~500nm)	-	-	50	%	-
Reflection ratio	%	-	-	-	6.5	%	-

※The measurement shall be taken 5 minutes after lighting the LCM at the following rating.

※The optical characteristics shall be measured in a dark room or equivalent.

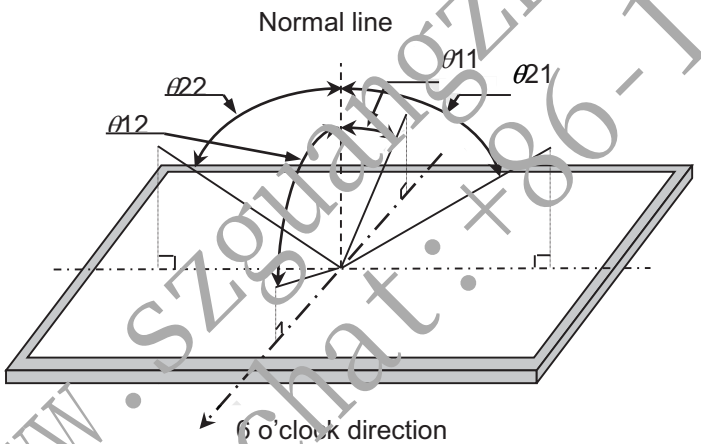
Note (1) Measurement of viewing angle range

Note (2) Measurement of luminance and Chromaticity and Contrast.



Measurement of Contrast, Luminance, Chromaticity, White variation, Crosstalk and Color temperature variation

Note (3) Definitions of viewing angle range:

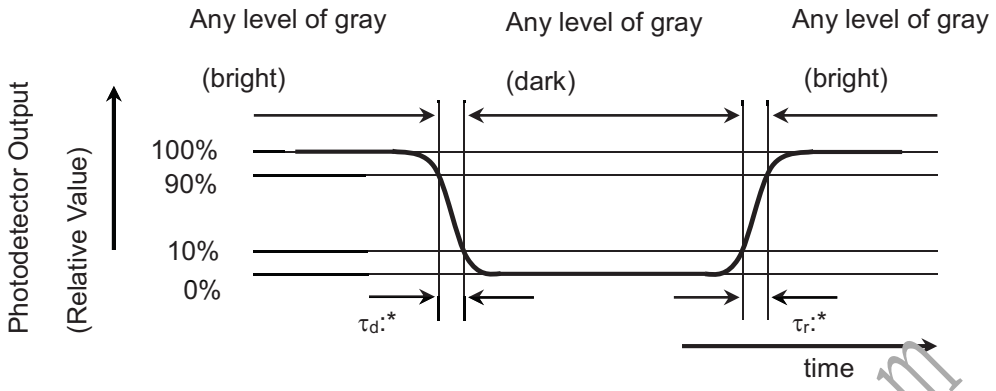


Viewing angle

Note (4) Definition of contrast ratio:

The contrast ratio is defined as the following.

$$\text{Contrast Ratio} = \frac{\text{Luminance(Brightness) with all pixels white}}{\text{Luminance(Brightness) with all pixels Black}}$$



		Start Gray								
		0	31	63	95	127	159	191	223	255
End Gray	0	■								
	31		■							
	63			■						
	95				■					
	127					■				
	159						■			
	191							■		
	223								■	
	255									■

Response time

Note (5) Definition of response time:

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white" ,

$$GTG\ ave = \frac{t_{0-31} + t_{31-0} + t_{0-63} + t_{63-0} + \cdots + t_{223-255} + t_{255-223}}{8 * 9}$$

Note (6) This shall be measured at center of the screen.

Note (7) The Luminance of White is the average of 5 points measurements (4,5,7,9,10) showing in the Fig.9-5.

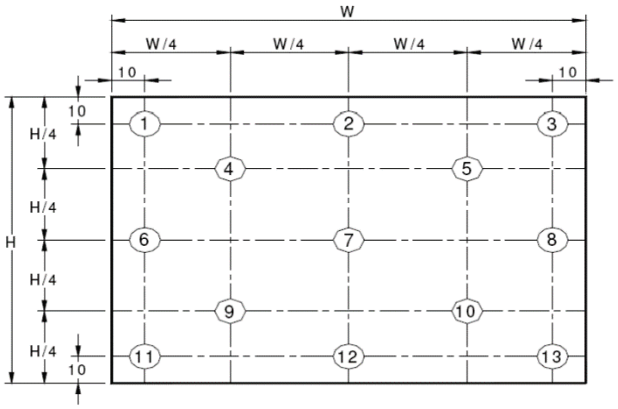


Fig.9-5

The co ɔ., LTd.

Note (8) Definition of white uniformity:

White uniformity of 5 points is defined as the

following with 5 measurements(4,5,7,9,10).

$$\delta_{W1} = \frac{\text{Maximum Luminance of 5 Points(Brightness)}}{\text{Minimum Luminance of 5 Points(Brightness)}}$$

White uniformity of 13 points is defined as the following with 13 measurements(1~13).

$$\delta_{W2} = \frac{\text{Maximum Luminance of 13 Points(Brightness)}}{\text{Minimum Luminance of 13 Points(Brightness)}}$$

6. Reliability Test Items

No.	Test Item	Conditions
1	High temperature storage test	60℃，240h
2	Low temperature storage test	-20℃，240h
3	Low temperature operation test	0℃，500h
4	High temperature & high humidity operation test	50℃，80%RH，1000hrs±48hrs
5	Thermal shock test	-20℃/30min、60℃/30min 100cycles
6	TC	-20±2℃/18minutes±5%、60±2℃/18minutes±5%　40cycles
7	Altitude test （Alt）	53.3±5% KPa (altitude 5000m)，24±2 hours
8	ON/OFF Test （OnOff）	室温 (25±3℃), 500 hours (30sec. On / 30sec. Off, 30,000 cycles)；
9	Life Test （Life）	室温（25±3℃），2000hrs±72hrs；
10	ESD	150pF[330Ω],Contact:±8KV,Air:±17KV
11	IS	Room temp.(25±3℃) ,Test pattern：Black window pattern (background L32 white) and Full-screen L32 white Room ambient　0 - 500 lux Viewing distance　30 - 50cm 0min/5min/10min/15min/20min/25min/30min/2h/4h/10h 分别检查，30S 内切换完成；

12	Vibration	1.5G，10->200Hz，x,，y，z 轴，30min 每个轴向
13	shock	1. 50G 18msec. trapezoidal (2) 210G 3msec. half-sine 1 for each ± x, y, z direction, total 6 times for (1),(2) 2.210G 3msec. half-sine, ± x, y, z axis total 6 times for (1),(2)

7. Display Quality

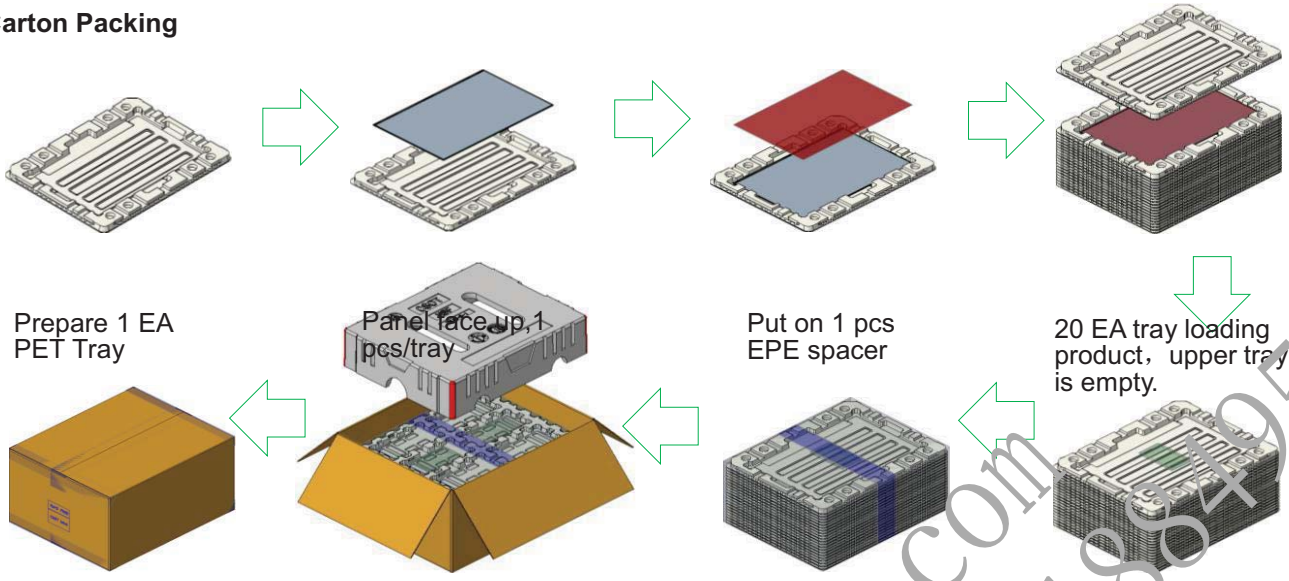
The display quality of the color TFT-LCD Module shall be in compliance with the Incoming Inspection Standard.

8. Packaging Condition

Item	Specification	Remark
Carton(Box) Packing	20 PCS/Carton(Box)	
Carton(Box) Packing Size	445mm(L)x375mm(W)x220mm(H)	Length x With x Height
Pallet Packing	36 Carton(Box)/Pallet	
Pallet Packing Size	1140mm(L) x 945mm(W) x 1450mm(H)	Length x With x Height

8.1 Packing Method

Carton Packing



“工”-shaped packing carton, attach carton label。

Whole inner package place to EPS cover(top and bottom)

Whole trays place to an vacuum bag, vacuum and seal ,than bind tapes in the center. attach in box label.

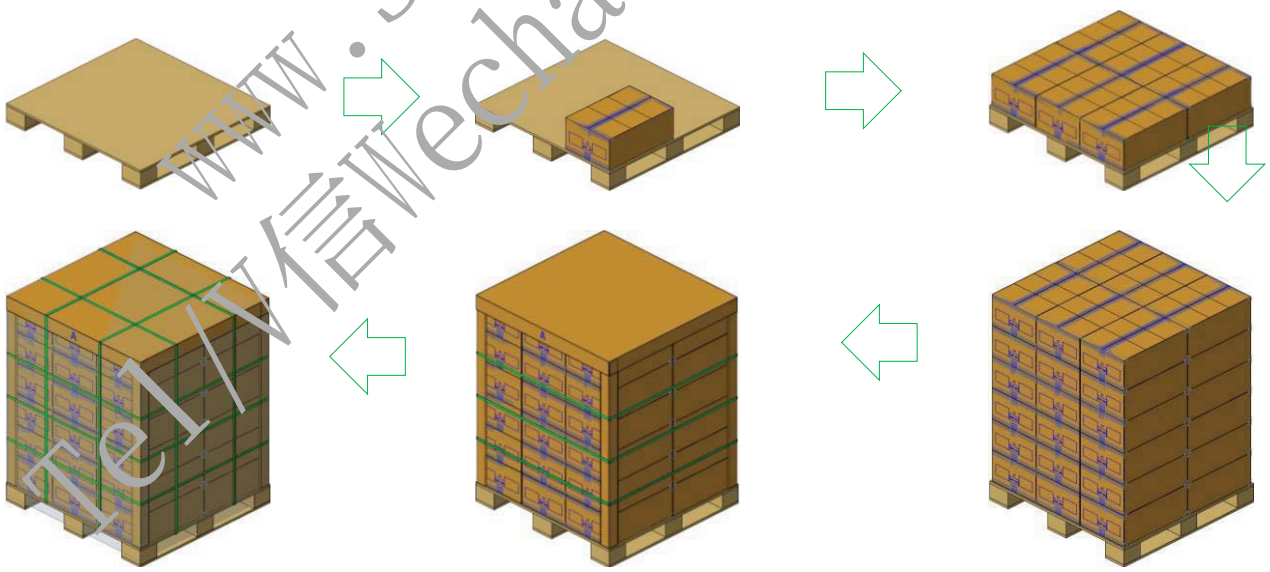
put one packs of desiccant in handle channel.

Pallet Packing

1pcs plywood pallet ,“川”-shape, carton label face out

1*paper cover&4*corner paper wrap the PE film around.

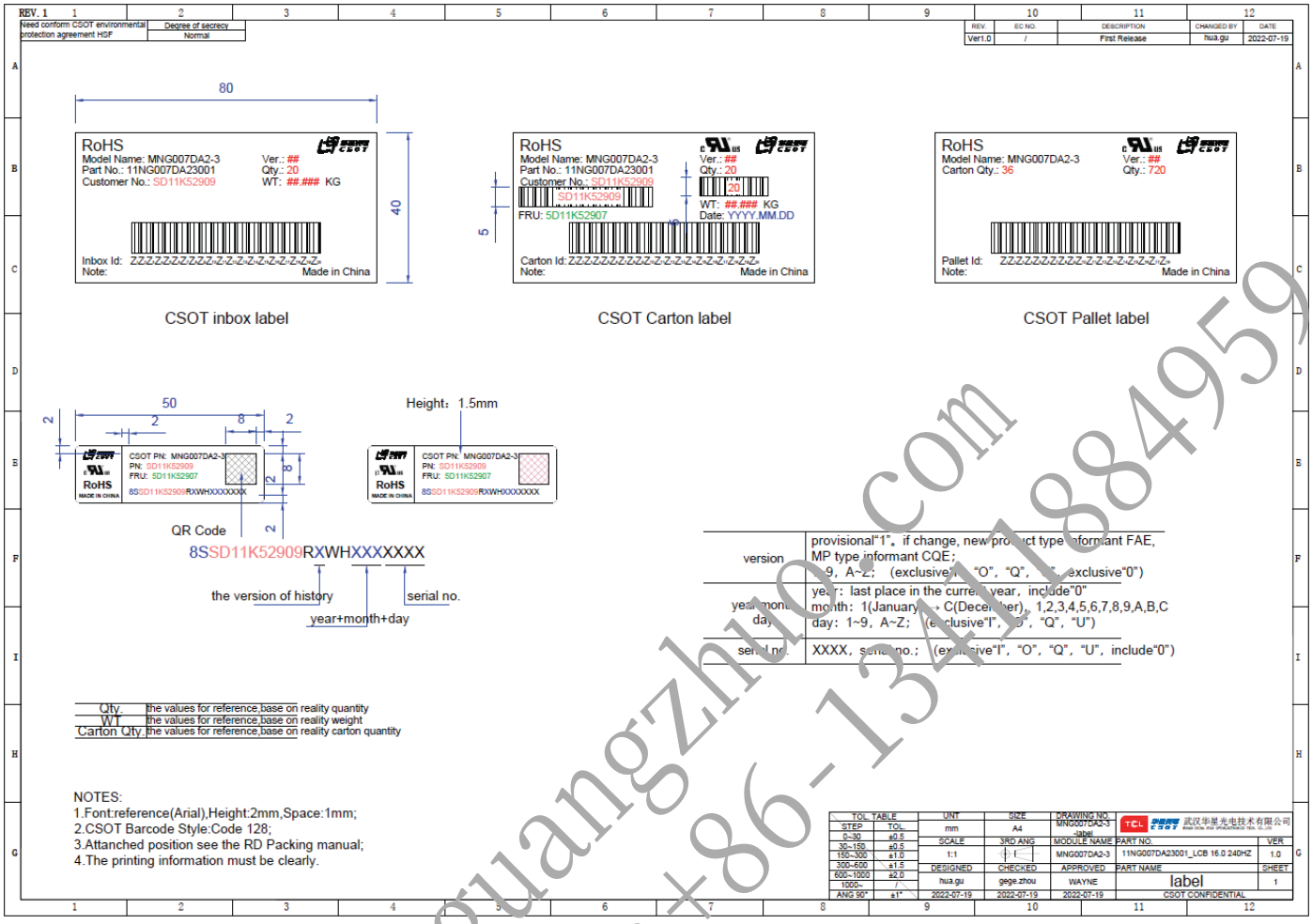
6 carton/layer



“井”-shape bind PP belt ,attach pallet label

6 layers/pallet

8.2 Label



9. RoHS Directive

This LCD Module is compliant with RoHS Directive.

10. Handling Precautions

a) Be sure to turn off the power supply when inserting or disconnecting the cable .Please insert for too much stress not to join a connector in the case of insertion of a connector.

b) Be sure to design the cabinet so that the Module can be installed without any extra stress such as warp or twist.

c) Since the front polarizer is easily damaged, pay attention not to scratch it.

d) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.

e) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.

f) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface. Handle with care.

g) Since CMOS LSI is used in this Module, take care of static electricity and injure the human earth when handling. Observe all other precautionary requirements in handling components.

h) This Open-cell has its circuitry PCBs on the side and should be handled carefully in order not to be stressed.

i) Laminate film is attached to the Module surface to prevent it from being scratched. Peel the laminate film off slowly just before the use with strict attention to electrostatic charges. Ionized air shall be blown over during the action. Blow off the 'dust' on the polarizer by using an ionized nitrogen gun, etc. Working under the following environments is desirable.

- All workers wear conductive shoes, conductive clothes, conductive fingerstalls and grounding belts without fail.
- Use Ionized blower for electrostatic removal, and peel of the laminate film with a constant speed. (Peeling of it at over 2 seconds)

j) The polarizer surface on the panel is treated with Anti Glare . In case of attaching protective board over the LCD, be careful about the optical interface fringe etc. which degrades display quality.

k) Do not expose the LCD Module to a direct sunlight, for a long period of time to protect the Module from the ultra violet ray.

l) When handling LCD Modules and assembling them into cabinets, please be noted that long-term storage in the environment of oxidization or deoxidization gas and the use of such materials as reagent, solvent, adhesive, resin, etc. which generate these gasses, may cause corrosion and discoloration of the Modules.

m) Liquid crystal contained in the panel may leak if the LCD is broken. Rinse it as soon as possible if it gets inside your eye or mouth by mistake.

n) Disassembling the Module can cause permanent damage and should be strictly avoided.(Except for protection film of the panel.)

o) Be careful when using it for long time with fixed pattern display as it may cause afterimage.(Please use a screen saver etc. in order to avoid an afterimage.)

p) If a minute particle enters in the Module and adheres to an optical material, it may cause display non-uniformity issue, etc. Therefore, fine-pitch filters have to be installed to cooling and inhalation hole if you intend to install a fan.

q) Epoxy resin (amine series curing agent), silicone adhesive material (dealcoholization series and oxime series), tray forming agent (azo compound) etc, in the cabinet or the packing materials may induce abnormal display with polarizer film deterioration regardless of contact or noncontact to polarizer film.Be sure to confirm the component of them.

r) Do not use polychloroprene. If you use it, there is some possibility of generating Cl2 gas that influences the reliability of the connection between LCD panel and driver IC.

s) Do not put a laminate film on LCD Module, after peeling of the original one. If you put on it, it may cause discoloration or spots because of the occurrence of air gaps between the polarizer and the film.

t) Ground module bezel to stabilize against EMI and external noise.

Appendix. EDID Data Structure

EDID Table Format						
Address (DEC)	Address (HEX)	Field Name & Comments		Set Value (HEX)	Set Value (BIN)	Set Value (DEC)
0	00	Header		00	00000000	0
1	01	Header		FF	11111111	255
2	02	Header		FF	11111111	255
3	03	Header		FF	11111111	255
4	04	Header		FF	11111111	255
5	05	Header		FF	11111111	255
6	06	Header		FF	11111111	255
7	07	Header		00	00000000	0
8	08	EISA Manuf. Code LSB		0E	00001110	14
9	09	Compressed ASCII		6F	01101111	111
10	0A	Product Code		28	001010100	40
011	0B	hex, LSB first		16	00010110	22
12	0C	32-bit ser #		00	00000000	0
13	0D	ID S/N - option		60	01100000	96
14	0E	ID S/N - option		00	00000000	0
15	0F	ID S/N - option		00	00000000	0
16	10	Week of manufacture		00	00000000	0
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 input def.		B5	10110101	181
21	15	Max H image size		22	00100010	34
22	16	Max V image size		16	00010110	22
23	17	Display Gamma		78	01111000	120
24	18	Feature support (no DPMS, Active off, RGB, timing BLK 1)		03	00000011	3
25	19	Red/Green Low bits	Default Value.	29	00101001	25
26	1A	Blue/White Low bits		F5	11110101	26
27	1B	Red X Rx		A5	10100101	27
28	1C	Red Y Ry		54	01010100	28
29	1D	Green X Gx		4B	01001011	29
30	1E	Green Y Gy		9D	10011101	30
31	1F	Blue X Bx		24	00100100	31

32	20	Blue Y By		0D	00001101	32
33	21	White X Wx		50	01010000	33
34	22	White Y Wy		54	01010100	34
35	23	Established timings 1		00	00000000	0
36	24	Established timing 2		00	00000000	0
37	25	Established timing 3		00	00000000	0
38	26	Standard timing #1		01	00000001	1
39	27	Standard timing #1		01	00000001	1
40	28	Standard timing #2		01	00000001	1
41	29	Standard timing #2		01	00000001	1
42	2A	Standard timing #3		01	00000001	1
43	2B	Standard timing #3		01	00000001	1
44	2C	Standard timing #4		01	00000001	1
45	2D	Standard timing #4		01	00000001	1
46	2E	Standard timing #5		01	00000001	1
47	2F	Standard timing #5		01	00000001	1
48	30	Standard timing #6		01	00000001	1
49	31	Standard timing #6		01	00000001	1
50	32	Standard timing #7		01	00000001	1
51	33	Standard timing #7		01	00000001	1
52	34	Standard timing #8		01	00000001	1
53	35	Standard timing #8		01	00000001	1
54	36	Pixel Clock LSB		C0	11000000	192
55	37	Pixel Clock HSB		72	01110000	114
56	38	Horizontal Active (lower 8 bits)		00	00000000	0
57	39	Hor blanking (lower 8 bits)		A0	10100000	160
58	3A	Horizontal Active/Horizontal blanking		A0	10100000	160
59	3B	Vertcal active(lower 8 bits)		40	01000000	64
60	3C	Vertical Blanking(lower 8 bits)		C8	11001000	200
61	3D	Vertical Active : Vertical Blanking		60	01100000	96
62	3E	Horizontal Sync Offset		30	00110000	48
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		00	00000000	0
66	42	Horizontal Image Size		58	01011000	88
67	43	Vertical image Size		D7	11010111	215
68	44	Horizontal Image Size / Vertical image		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	Signal (non-intr, norm, no stero, sep sync, neg pol)	18	00011000	24
72	48	MRL(Monitor Range Limits)	00	00000000	0
73	49		00	00000000	0
74	4A		00	00000000	0
75	4B		FD	11111101	253
76	4C		0C	00001100	12
77	4D		3C	00111100	60
78	4E		F0	11110000	240
79	4F		B1	10110001	177
80	50		B1	10110001	177
81	51		76	01110110	118
82	52		01	00000001	1
83	53		0A	00001010	10
84	54		20	00100000	32
85	55		20	00100000	32
86	56		20	00100000	32
87	57		20	00100000	32
88	58		20	00100000	32
89	59		20	00100000	32
90	5A	descriptor#3	00	00000000	0
91	5B	Reserved for definition	00	00000000	0
92	5C	Reserved for definition	00	00000000	0
93	5D	ASCII String	FE	11111110	254
94	5E	Reserved for definition	00	00000000	0
95	5F	Manufacture	43	01000011	67
96	60	Manufacture	53	01010011	83
97	61	Manufacture	4F	01001111	79
98	62	Manufacture	54	01010100	84
99	63	Manufacture	20	00100000	32
100	64	Manufacture	54	01010100	84
101	65	Manufacture	33	00110011	51
102	66	Reserved for definition	0A	00001010	10
103	67	Reserved for definition	20	00100000	32
104	68	Reserved for definition	20	00100000	32
105	69	Reserved for definition	20	00100000	32
106	6A	Reserved for definition	20	00100000	32
107	6B	Reserved for definition	20	00100000	32
108	6C	descriptor #4	00	00000000	0

109	6D	Reserved for definition	00	00000000	0
110	6E	Reserved for definition	00	00000000	0
111	6F	Reserved for definition	FE	11111110	254
112	70	Reserved for definition	00	00000000	0
113	71	Manufacture P/N	4D	01001101	77
114	72	Manufacture P/N	4E	01001110	78
115	73	Manufacture P/N	47	01000111	71
116	74	Manufacture P/N	30	00110000	48
117	75	Manufacture P/N	30	00110000	48
118	76	Manufacture P/N	37	00110111	55
119	77	Manufacture P/N	44	01000100	68
120	78	Manufacture P/N	41	01000001	65
121	79	Manufacture P/N	32	00110010	50
122	7A	Manufacture P/N	2D	00001010	45
123	7B	Manufacture P/N	33	00101101	51
124	7C	Reserved for definition	0A	00110011	10
125	7D	Reserved for definition	20	00100000	32
126	7E	Extension Flag	02	00000010	2
127	7F	Checksum Default Value.	A9	00001001	9
128	80	Tag	02	00000010	2
129	81	Revision Number	03	00000011	3
130	82	Length of Info Frame	1D	00011101	29
131	83	Global Declarations	00	00000000	0
132	84	Tag Code [7:5], Length of data [4:0]	E3	11100011	227
133	85	Extended Tag Code	05	00000101	5
134	86	Colorimetry Support Flags	80	10000000	128
135	87	Colorimetry Metadata Support Flags	00	00000000	0
136	88	Tag Code [7:5], Length of data [4:0]	E6	11100110	230
137	89	Extended Tag Code	06	00000110	6
138	8A	Supported Electro-Optical Transfer	05	00000101	5
139	8B	SM_0 =1: Static Metadata Type 1	01	00000001	1
140	8C	Desired Content Max Luminance data	6A	01101010	106
141	8D	Desired Content Max Frame-average	6A	01101010	106
142	8E	Desired Content Min Luminance data	24	00100100	36
143	8F	AMD HDR definition	6D	01101101	109
144	90	AMD HDR definition	1A	00011010	26
145	91	AMD HDR definition	00	00000000	0
146	92	AMD HDR definition	00	00000000	0
147	93	AMD HDR definition	02	00000010	2

148	94	AMD HDR definition	03	00000011	3
149	95	AMD HDR definition	3C	00111100	60
150	96	AMD HDR definition	F0	11110000	240
151	97	AMD HDR definition	00	00000000	0
152	98	AMD HDR definition	04	00000100	4
153	99	AMD HDR definition	6A	01101010	106
154	9A	AMD HDR definition	24	00100100	36
155	9B	AMD HDR definition	6A	01101010	106
156	9C	AMD HDR definition	24	00100100	36
157	9D	Reserved for definition	00	00000000	0
158	9E	Reserved for definition	00	00000000	0
159	9F	Reserved for definition	00	00000000	0
160	A0	Reserved for definition	00	00000000	0
161	A1	Reserved for definition	00	00000000	0
162	A2	Reserved for definition	00	00000000	0
163	A3	Reserved for definition	00	00000000	0
164	A4	Reserved for definition	00	00000000	0
165	A5	Reserved for definition	00	00000000	0
166	A6	Reserved for definition	00	00000000	0
167	A7	Reserved for definition	00	00000000	0
168	A8	Reserved for definition	00	00000000	0
169	A9	Reserved for definition	00	00000000	0
170	AA	Reserved for definition	00	00000000	0
171	AB	Reserved for definition	00	00000000	0
172	AC	Reserved for definition	00	00000000	0
173	AD	Reserved for definition	00	00000000	0
174	AE	Reserved for definition	00	00000000	0
175	AF	Reserved for definition	00	00000000	0
176	B0	Reserved for definition	00	00000000	0
177	B1	Reserved for definition	00	00000000	0
178	B2	Reserved for definition	00	00000000	0
179	B3	Reserved for definition	00	00000000	0
180	B4	Reserved for definition	00	00000000	0
181	B5	Reserved for definition	00	00000000	0
182	B6	Reserved for definition	00	00000000	0
183	B7	Reserved for definition	00	00000000	0
184	B8	Reserved for definition	00	00000000	0
185	B9	Reserved for definition	00	00000000	0
186	BA	Reserved for definition	00	00000000	0
187	BB	Reserved for definition	00	00000000	0

188	BC	Reserved for definition	00	00000000	0
189	BD	Reserved for definition	00	00000000	0
190	BE	Reserved for definition	00	00000000	0
191	BF	Reserved for definition	00	00000000	0
192	C0	Reserved for definition	00	00000000	0
193	C1	Reserved for definition	00	00000000	0
194	C2	Reserved for definition	00	00000000	0
195	C3	Reserved for definition	00	00000000	0
196	C4	Reserved for definition	00	00000000	0
197	C5	Reserved for definition	00	00000000	0
198	C6	Reserved for definition	00	00000000	0
199	C7	Reserved for definition	00	00000000	0
200	C8	Reserved for definition	00	00000000	0
201	C9	Reserved for definition	00	00000000	0
202	CA	Reserved for definition	00	00000000	0
203	CB	Reserved for definition	00	00000000	0
204	CC	Reserved for definition	00	00000000	0
205	CD	Reserved for definition	00	00000000	0
206	CE	Reserved for definition	00	00000000	0
207	CF	Reserved for definition	00	00000000	0
208	D0	Reserved for definition	00	00000000	0
209	D1	Reserved for definition	00	00000000	0
210	D2	Reserved for definition	00	00000000	0
211	D3	Reserved for definition	00	00000000	0
212	D4	Reserved for definition	00	00000000	0
213	D5	Reserved for definition	00	00000000	0
214	D6	Reserved for definition	00	00000000	0
215	D7	Reserved for definition	00	00000000	0
216	D8	Reserved for definition	00	00000000	0
217	D9	Reserved for definition	00	00000000	0
218	DA	Reserved for definition	00	00000000	0
219	DB	Reserved for definition	00	00000000	0
220	DC	Reserved for definition	00	00000000	0
221	DD	Reserved for definition	00	00000000	0
222	DE	Reserved for definition	00	00000000	0
223	DF	Reserved for definition	00	00000000	0
224	E0	Reserved for definition	00	00000000	0
225	E1	Reserved for definition	00	00000000	0
226	E2	Reserved for definition	00	00000000	0
227	E3	Reserved for definition	00	00000000	0

228	E4	Reserved for definition	00	00000000	0
229	E5	Reserved for definition	00	00000000	0
230	E6	Reserved for definition	00	00000000	0
231	E7	Reserved for definition	00	00000000	0
232	E8	Reserved for definition	00	00000000	0
233	E9	Reserved for definition	00	00000000	0
234	EA	Reserved for definition	00	00000000	0
235	EB	Reserved for definition	00	00000000	0
236	EC	Reserved for definition	00	00000000	0
237	ED	Reserved for definition	00	00000000	0
238	EE	Reserved for definition	00	00000000	0
239	EF	Reserved for definition	00	00000000	0
240	F0	Reserved for definition	00	00000000	0
241	F1	Reserved for definition	00	00000000	0
242	F2	Reserved for definition	00	00000000	0
243	F3	Reserved for definition	00	00000000	0
244	F4	Reserved for definition	00	00000000	0
245	F5	Reserved for definition	00	00000000	0
246	F6	Reserved for definition	00	00000000	0
247	F7	Reserved for definition	00	00000000	0
248	F8	Reserved for definition	00	00000000	0
249	F9	Reserved for definition	00	00000000	0
250	FA	Reserved for definition	00	00000000	0
251	FB	Reserved for definition	00	00000000	0
252	FC	Reserved for definition	00	00000000	0
253	FD	Reserved for definition	00	00000000	0
254	FE	Reserved for definition	00	00000000	0
255	FF	Checksum	B4	10110100	180
Block3					
0	00	EDID Extension Block Tag	70	01110000	112
1	01	Display ID version	12	00010001	18
2	02	section size	79	01111001	121
3	03	product Type identifier	00	00000000	0
4	04	extension count	00	00000000	0
5	05	block tag	03	00000011	3
6	06	block rev	01	00000001	1
7	07	Payload	14	00010100	20
8	08	pixel clock	00	00000000	0
9	09		CB	11001011	203
10	0A		01	00000001	1

011	0B	timing options	85	10000101	133
12	0C	H-Active	FF	11111111	255
13	0D		09	00001001	9
14	0E	H-Blanking	9F	10011111	159
15	0F		00	00000000	0
16	10	H-offset	2F	00101111	47
17	11		00	00000000	0
18	12	H-sync pulse width	1F	00011111	31
19	13		00	00000000	0
20	14	V-Active	3F	00111111	63
21	15		06	00000110	6
22	16	V-Blanking	C7	11000111	199
23	17		00	00000000	0
24	18	V-offset	02	00000010	2
25	19		00	00000000	0
26	1A	V-sync pulse width	05	00000101	5
27	1B		00	00000000	0
28	1C	Reserved for definition	00	00000000	0
29	1D	Reserved for definition	00	00000000	0
30	1E	Reserved for definition	00	00000000	0
31	1F	Reserved for definition	00	00000000	0
32	20	Reserved for definition	00	00000000	0
33	21	Reserved for definition	00	00000000	0
34	22	Reserved for definition	00	00000000	0
35	23	Reserved for definition	00	00000000	0
36	24	Reserved for definition	00	00000000	0
37	25	Reserved for definition	00	00000000	0
38	26	Reserved for definition	00	00000000	0
39	27	Reserved for definition	00	00000000	0
40	28	Reserved for definition	00	00000000	0
41	29	Reserved for definition	00	00000000	0
42	2A	Reserved for definition	00	00000000	0
43	2B	Reserved for definition	00	00000000	0
44	2C	Reserved for definition	00	00000000	0
45	2D	Reserved for definition	00	00000000	0
46	2E	Reserved for definition	00	00000000	0
47	2F	Reserved for definition	00	00000000	0
48	30	Reserved for definition	00	00000000	0
49	31	Reserved for definition	00	00000000	0
50	32	Reserved for definition	00	00000000	0

51	33	Reserved for definition	00	00000000	0
52	34	Reserved for definition	00	00000000	0
53	35	Reserved for definition	00	00000000	0
54	36	Reserved for definition	00	00000000	0
55	37	Reserved for definition	00	00000000	0
56	38	Reserved for definition	00	00000000	0
57	39	Reserved for definition	00	00000000	0
58	3A	Reserved for definition	00	00000000	0
59	3B	Reserved for definition	00	00000000	0
60	3C	Reserved for definition	00	00000000	0
61	3D	Reserved for definition	00	00000000	0
62	3E	Reserved for definition	00	00000000	0
63	3F	Reserved for definition	00	00000000	0
64	40	Reserved for definition	00	00000000	0
65	41	Reserved for definition	00	00000000	0
66	42	Reserved for definition	00	00000000	0
67	43	Reserved for definition	00	00000000	0
68	44	Reserved for definition	00	00000000	0
69	45	Reserved for definition	00	00000000	0
70	46	Reserved for definition	00	00000000	0
71	47	Reserved for definition	00	00000000	0
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	Reserved for definition	00	00000000	0
76	4C	Reserved for definition	00	00000000	0
77	4D	Reserved for definition	00	00000000	0
78	4E	Reserved for definition	00	00000000	0
79	4F	Reserved for definition	00	00000000	0
80	50	Reserved for definition	00	00000000	0
81	51	Reserved for definition	00	00000000	0
82	52	Reserved for definition	00	00000000	0
83	53	Reserved for definition	00	00000000	0
84	54	Reserved for definition	00	00000000	0
85	55	Reserved for definition	00	00000000	0
86	56	Reserved for definition	00	00000000	0
87	57	Reserved for definition	00	00000000	0
88	58	Reserved for definition	00	00000000	0
89	59	Reserved for definition	00	00000000	0
90	5A	Reserved for definition	00	00000000	0

91	5B	Reserved for definition	00	00000000	0
92	5C	Reserved for definition	00	00000000	0
93	5D	Reserved for definition	00	00000000	0
94	5E	Reserved for definition	00	00000000	0
95	5F	Reserved for definition	00	00000000	0
96	60	Reserved for definition	00	00000000	0
97	61	Reserved for definition	00	00000000	0
98	62	Reserved for definition	00	00000000	0
99	63	Reserved for definition	00	00000000	0
100	64	Reserved for definition	00	00000000	0
101	65	Reserved for definition	00	00000000	0
102	66	Reserved for definition	00	00000000	0
103	67	Reserved for definition	00	00000000	0
104	68	Reserved for definition	00	00000000	0
105	69	Reserved for definition	00	00000000	0
106	6A	Reserved for definition	00	00000000	0
107	6B	Reserved for definition	00	00000000	0
108	6C	Reserved for definition	00	00000000	0
109	6D	Reserved for definition	00	00000000	0
110	6E	Reserved for definition	00	00000000	0
111	6F	Reserved for definition	00	00000000	0
112	70	Reserved for definition	00	00000000	0
113	71	Reserved for definition	00	00000000	0
114	72	Reserved for definition	00	00000000	0
115	73	Reserved for definition	00	00000000	0
116	74	Reserved for definition	00	00000000	0
117	75	Reserved for definition	00	00000000	0
118	76	Reserved for definition	00	00000000	0
119	77	Reserved for definition	00	00000000	0
120	78	Reserved for definition	00	00000000	0
121	79	Reserved for definition	00	00000000	0
122	7A	Reserved for definition	00	00000000	0
123	7B	Reserved for definition	00	00000000	0
124	7C	Reserved for definition	00	00000000	0
125	7D	Reserved for definition	00	00000000	0
126	7E	Reserved for definition	04	00000100	4
127	7F	Checksum	90	10010000	144

Appendix. Outline Drawing