

Doc. Number:

- Tentative Specification
- Preliminary Specification
- Approval Specification

MODEL NO.: DD080IA
SUFFIX: 20A

Customer:	
APPROVED BY	SIGNATURE
Name / Title	
Note :	
Please return 1 copy for your confirmation with your signature and comments.	

Approved By	Checked By	Prepared By
KJ Cheng	Pam Liang	Phoebe Huang

Contents

1. General Specifications	1
1.1 Overview.....	1
1.2 TFT LCD Module General Specifications	1
1.3 Touch General Specifications.....	1
2. Module construction	2
3. Input / output pinning and connector description	4
3.1 Input Connector	4
3.2 Backlight.....	6
3.3 Backlight NTC Resistor	6
4. Absolute Ratings of Environment	7
4.1 Absolute Ratings of TFT LCD Module.....	7
4.2 Absolute Ratings of Backlight.....	7
5. Electrical characteristics	8
5.1 Recommended operation conditions (based on GND=0V; Ta 25°C±2°C)	8
5.2 Backlight Unit (based on GND=0V; Ta 25°C±2°C).....	8
5.3 Self-Protection Function	9
6. LCM Interface Timing	10
6.1 LVDS Interface DC characteristics	10
6.2 LVDS Interface AC characteristics	11
6.3 LVDS input format	12
6.4 Data Input format (DE mode).....	12
6.5 Data Input Timing.....	13
6.6 Power on/off sequence.....	14
7. I2C communication protocol : I2C Event Buffer format	15
8. Optical Specifications	21
9. Reliability Test Items	24
10. General Precautions	25
9.1 Safety	25
9.2 Handling	25
9.3 Static Electricity.....	25
9.4 Storage	25
9.5 Cleaning.....	25
11. Quality Requirement	26
10.1 Inspection conditions and test patterns	26
10.2 Classification of defects.....	26
10.3 Inspection Criteria	27
10.4 External Appearance Inspection Criteria (power off)	27
12. Package Drawing	29
13. Label	31

1. General Specifications

1.1 Overview

DD080IA-20A is a normally black IPS TFT Liquid Crystal Display module. This panel has a 8inches diagonally measured active display area with 1280RGB x 720 resolution. This product is composed of a TFT LCD panel, Polarizer, IC, FPCA, backlight, cover glass and ASF. The following describes the features of this product.

1.2 TFT LCD Module General Specifications

No.	Item	Specification	Remark
1	LCD size	8.0 inch (Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1280 x 3(RGB) x 720	
4	Display mode	Normally Black, Transmissive, AAS	
5	Dot pitch	0.138(W) x 0.138(H) mm	
6	Active area	176.64 x 99.36 mm	
7	Module size	200.6 x 127.4 mm	Note 1
8	Surface treatment	AG	
9	Color arrangement	RGB-stripe	
10	Interface	1-port LVDS (DE mode only)	
11	Backlight power consumption	(4.84)W	Note 2
12	Panel power consumption	0.75W	
13	Weight	255g(Max.)	

Note 1: Refer to Mechanical Drawing.

Note 2: Base on $I_L = 65 \text{ mA}$

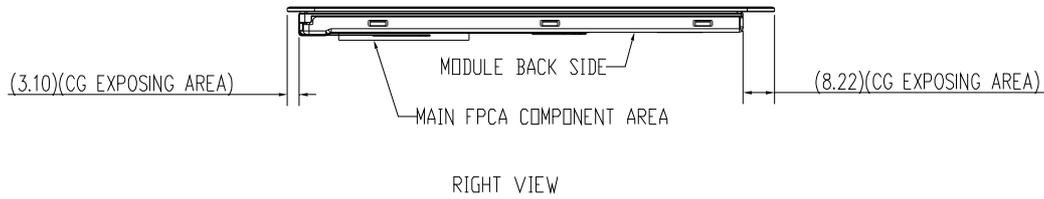
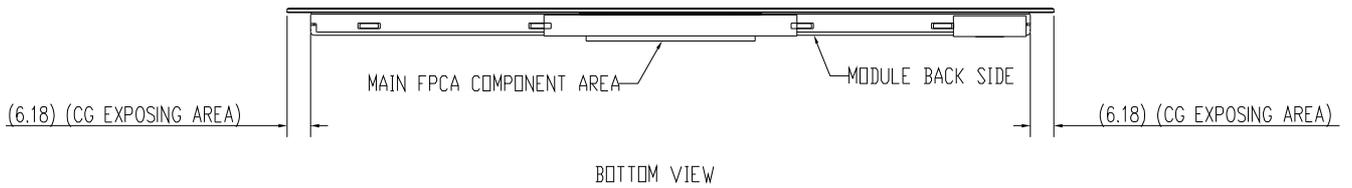
1.3 Touch General Specifications

Key Parameters	Description	Unit
Touch Technology	Capacitive Multi-Touch	
Numbers of Channels	960 [X=40, Y=24]	Ch
Touch Method	Finger / Glove	-
Numbers of Touch	5	point
Accuracy of Finger(non-border)	± 1.0	mm
Accuracy of Finger (border)	± 2.0	mm
Linearity of Finger (non-border)	≤ 1	mm
Linearity of Finger (border)	≤ 2	mm
Finger Separation (Horizontal/Vertical)	<14	mm
Reporting rate	120	Hz
Response time	≤ 30	ms
Glove (12mm acrylic)	2	mm

<Note> 1.Border is defined as the distance 5mm to the edge of AA

2. Materials used in gloves are silk, cotton and leather

INTERFACE BETWEEN CUSTOMER REAR COVER AND LCM



NOTES?

1. CG EXPOSING AREA MUST BE INDEED LAMINATED BY DSA.
2. MODULE BACK SIDE MUST BE INDEED SUPPORTED BY SPONGE, AND THE AIR GAP BETWEEN SPONGE AND MODULE SHOULD BE ZERO.
3. NEED KEEP CLEARANCE AREA FOR FPCA COMPONENT.

3. Input / output pinning and connector description

3.1 Input Connector

Recommended connector type : IRISO IMSA-12003S-40Y901 (40 pins).

Pin No.	Symbol	I/O	Function	Remark
1	GND	Power	Ground	
2	NC	dummy	Keep floating	
3	NC	dummy	Keep floating	
4	NC	dummy	Keep floating	
5	GND	Power	Ground	
6	UPDN	Input	Vertical shift direction selection	Vertical shift direction Up or Down sequence control. UPDN = "H", shift from up to down. (Default) UPDN = "L", shift from down to up.
7	SHLR	Input	Horizontal shift direction selection	Horizontal shift direction Right or Left sequence control. SHLR = "H", shift from left to right. (Default) SHLR = "L", shift from right to left.
8	MUTEB	Input	MUTE mode control	MUTE mode control. MUTEB = "H", Normal operation. (Default) MUTEB = "L", Source output black pattern.
9	IND_OUT	Output	Error signal	Abnormal indicator pin. This pin output high when abnormal.
10	SDI	Input	SPI data in	Serial communication data input pin. 4/3-wire mode normally pulled low. CUX internal use. If no used, please keep floating
11	SCL	Input	SPI clock	Serial communication clock input. 4/3-wire mode normally pulled low. CUX internal use. If no used, please keep floating
12	SDO	Output	SPI data out	Serial communication data output pin. Note: Output enable controlled by 4-wire interface. CUX internal use. If no used, please keep floating
13	CSB	Input	SPI chip select	Serial communication chip selection. Normally pulled high. CUX internal use. If no used, please keep floating
14	STBYB	Input	Standby mode setting pin	Standby mode control. STBYB = "H", normal operation. STBYB = "L", standby mode, source output AVSS(GND) level.
15	RESET	Input	Global reset pin	Global reset pin.(GRB) GRB= "H", normal operation. GRB = "L", The controller is in reset state.

16	GND	Power	Ground	
17	LVD3P	Input	LVDS data3(+)	
18	LVD3N	Input	LVDS data3(-)	
19	GND	Power	Ground	
20	LVCLKP	Input	LVDS clock(+)	
21	LVCLKN	Input	LVDS clock(-)	
22	GND	Power	Ground	
23	LVD2P	Input	LVDS data2(+)	
24	LVD2N	Input	LVDS data2(-)	
25	GND	Power	Ground	
26	LVD1P	Input	LVDS data1(+)	
27	LVD1N	Input	LVDS data1(-)	
28	GND	Power	Ground	
29	LVD0P	Input	LVDS data0(+)	
30	LVD0N	Input	LVDS data0(-)	
31	GND	Power	Ground	
32	NC	dummy	Keep floating	
33	TCH_SCL	Input	Touch I2C clock	Serial communication clock input. I2C mode normally pulled high.
34	TCH_SDA	In/Out	Touch I2C data	Serial communication data input pin. I2C input mode normally pulled high, output mode open drain
35	TCH_ATTEN	Output	Touch attention output	Touch Interrupt Pin.
36	GND	Power	Ground	
37	VDDI	Power	+3.3V power	
38	VDDI	Power	+3.3V power	
39	VDDI	Power	+3.3V power	
40	GND	Power	Ground	

3.2 Backlight

Recommended connector type : IRISO IMSA-12001S-12Y900 (12 pins).

Thermistor used: MURATA NCU15XH103F6SRC

Pin No.	I/O	Function	Remark
1	Power	LED Anode 1	
2	Power	LED Anode 2	
3	Power	LED Anode 3	
4	Power	LED Anode 4	
5	dummy	Floating	
6	Power	LED cathode 1	
7	Power	LED cathode 2	
8	Power	LED cathode 3	
9	Power	LED cathode 4	
10	dummy	Floating	
11	Output	NTC1	
12	Output	NTC2	



3.3 Backlight NTC Register

To limit the heat dissipation under high ambient temperature (T_a). The LED string has a NTC (Negative Temperature Coefficient) to detect the ambient temperature of LED string. This NTC was located in the middle of FPC mounted with LED that acts as an indicator to show if the module is operated under safe operation region without overheating and damage. The detail application for this NTC, please refer to data sheet of Murata P/N : NCU15XH103F6SRC. About Murata NCU15XH103F6SRC application. Please follow component data sheet.

4. Absolute Ratings of Environment

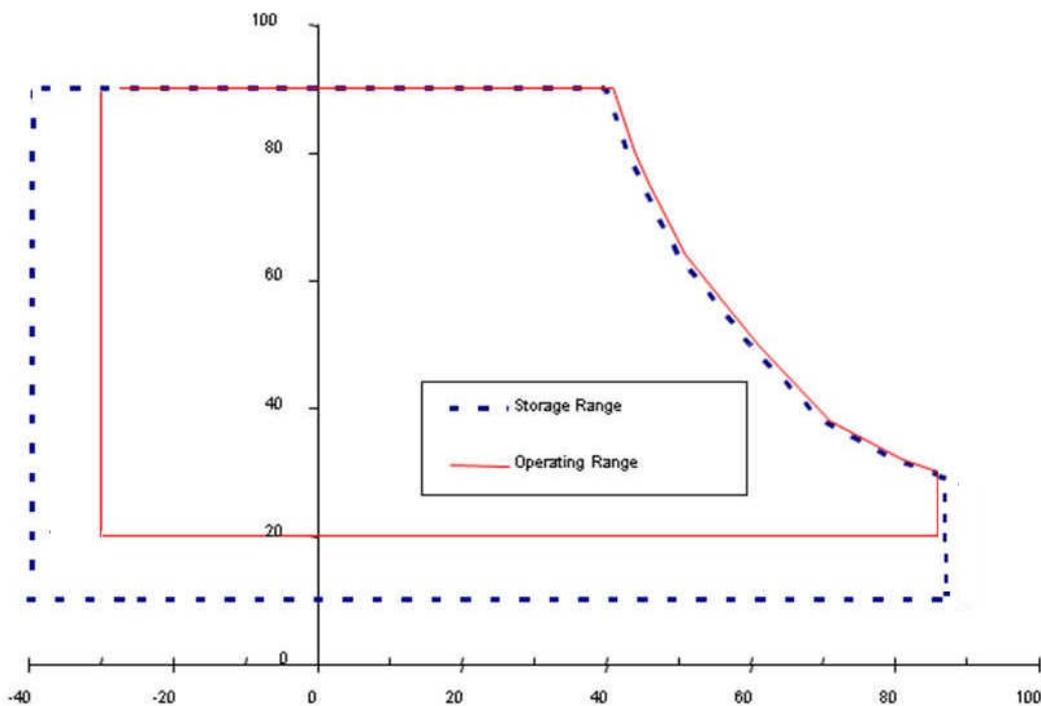
There is a difference between the maximum value of a parameter's specification and its absolute maximum value. The maximum value indicates that the performance will be reduced when you go beyond this value, but this is reversible. Where the absolute maximum value as indicated in this section is a value beyond which permanent damage to the product or its function may be expected.

Function operation should be restricted to the conditions described under Normal Operating Conditions

Item	Symbol	Min.	Max.	Unit	Remark
Operating Temperature	OTR	-30	+85	℃	Note 1,2
Storage Temperature	STR	-40	+90	℃	Note 1

Note 1: Panel surface temperature, no condensation allowed under any condition.

Note 2: Operating from -40/-30℃ possible, readable to some extent, cosmetic defects can happen.



4.1 Absolute Ratings of TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Remark
Power Supply(+3.3V)	VDDI	-0.5	3.8	V	

4.2 Absolute Ratings of Backlight

Item	Symbol	Min.	Max.	Unit	Remark
LED Light Bar Power Supply Current	LED	10	150	mA	Per chain

Note: LED device characteristics (for micro module only)

5. Electrical characteristics

5.1 Recommended operation conditions (based on GND=0V; Ta 25°C±2°C)

Item	Symbol	Min.	Typ	Max.	Unit	Remark
Power Supply Input Voltage	VDDI	3.1	3.3	3.6	V	
Power Supply Input Current	IVDDI	155	190	230	mA	Note
Power GND	GND	-0.2	0	0.3	V	
High Level Input Voltage	VIH	0.7*VDDI	-	VDDI	V	
Low Level Input Voltage	VIL	GND	-	0.3*VDDI	V	

Note : VDDI=3.3V, fv=60Hz, fCLK=75MHz, 25°C, Test Pattern : Red Pattern

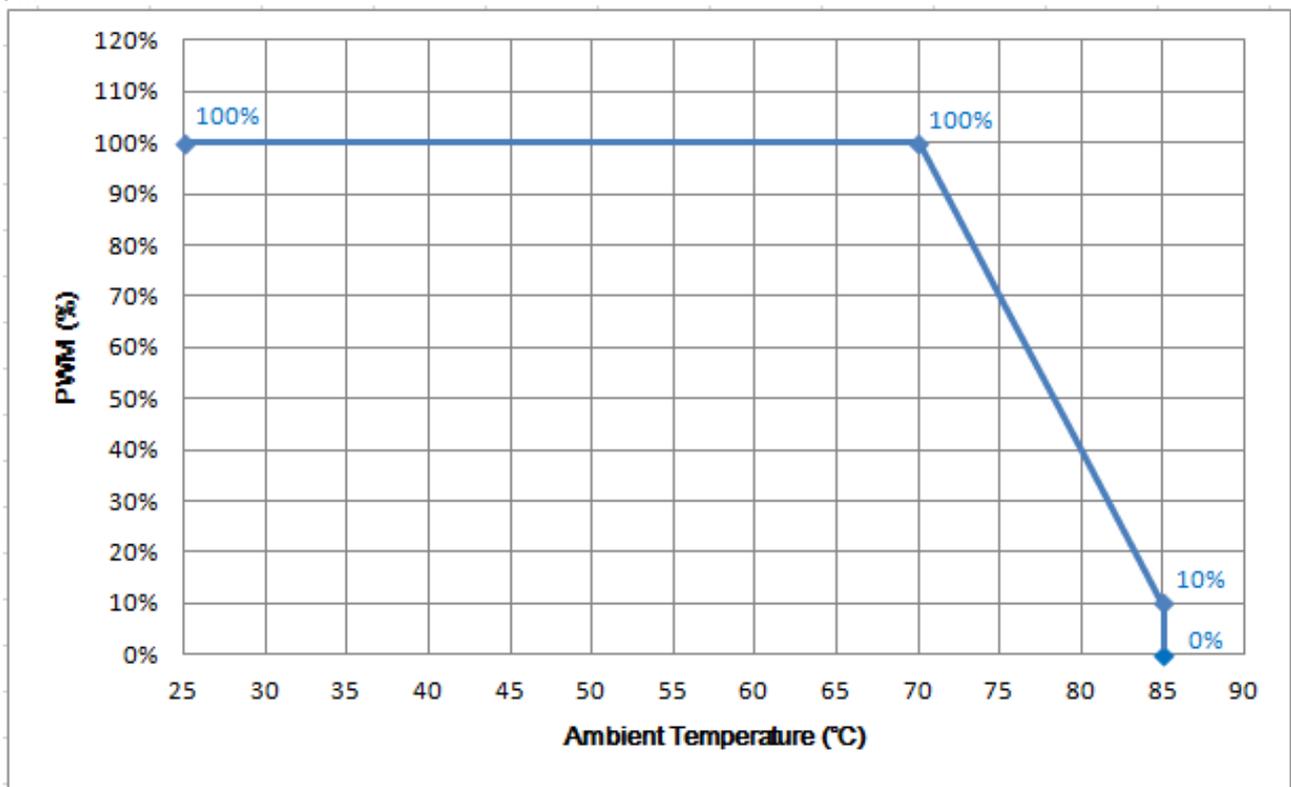
5.2 Backlight Unit (based on GND=0V; Ta 25°C±2°C)

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
LED Power Supply Voltage		16.8	18.6	19.8	V	Per chain
LED Power Supply Voltage		2.8	3.1	3.3	V	Per LED *
LED Power Supply current			65		mA	Per chain, Control by fixed current mode
Power Consumption	P	4.37	4.84	5.15	W	Total backlight
LED Life Time	Lbl	10000			hours	
Number of Chains		-	4	-		
LEDs per Chain		-	6	-		

Note: The lifetime of LED is defined as the time when it continues to operate under the conditions at Ta = 25 ±2 °C and IL = 65mA setting (Per EA) until the brightness becomes 70% of its original value.

De-rating diagram (Recommended)

LED power de-rating has to start at 70°C linear down to PWM 10% at 85°C before switching off, see diagram as below.



5.3 Self-Protection Function

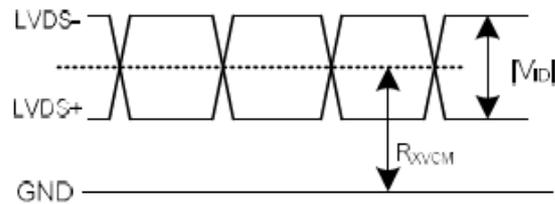
Item	Failure mode detection	Condition of IND_OUT=H	IC detection OK	IC detection NG
Power	Low voltage detection	AVDD error VDD error	IND_out: Low level	IND_out: High level
Interface	Clock	Clock signal error	IND_out: Low level	IND_out: High level
	H_sync	H_sync error	IND_out: Low level	IND_out: High level
	V_sync	V_sync error	IND_out: Low level	IND_out: High level
	DE	DE error	IND_out: Low level	IND_out: High level
Gate driver	STV_R	STV_R error	IND_out: Low level	IND_out: High level

6. LCM Interface Timing

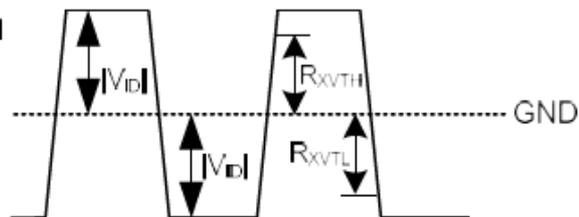
6.1 LVDS Interface DC characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Differential input high threshold voltage	RxVTH	+100	-	-	mV	RxVCM = 1.2V
Differential input low threshold voltage	RxVTL	-	-	-100	mV	RxVCM = 1.2V
Differential input common mode voltage	RxVCM	1.0	1.2	1.5	V	
Differential input voltage	VID	0.4	-	0.6	V	

Single-end Signal

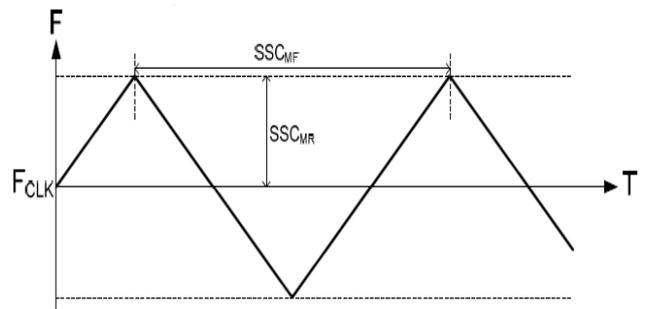
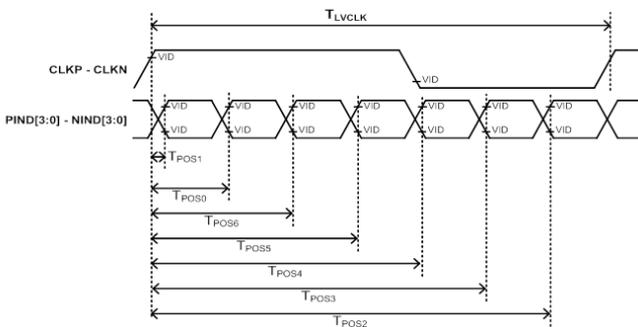
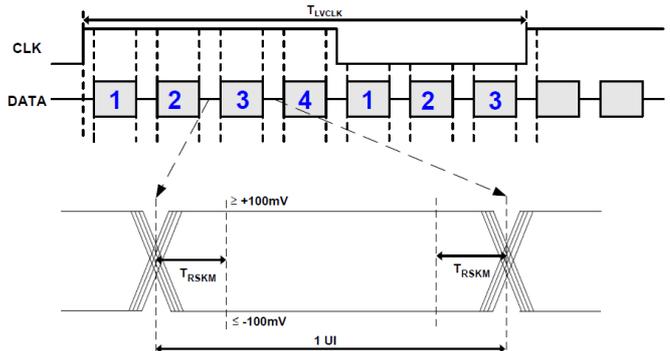
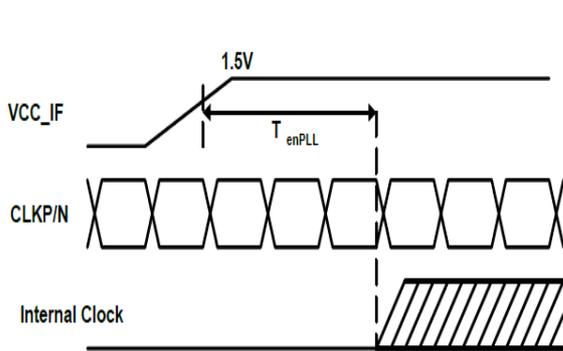


Differential Signal

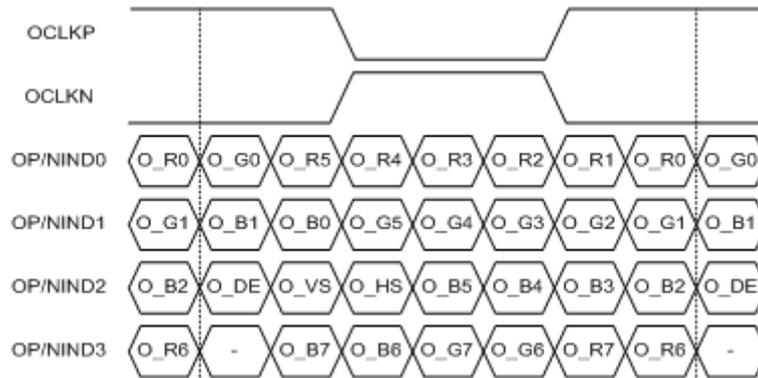


6.2 LVDS Interface AC characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Clock frequency	RXFCLK	25	-	110	MHz	Refer to input timing table for each display resolution
Input data skew margin	TRSKM	-	-	0.25	UI	
Clock high time	TLVCH	-	$(4/7)*T_{LVCLK}$	-	ns	
Clock low time	TLVCL	-	$(3/7)*T_{LVCLK}$	-	ns	
PLL wake-up time	TenPLL	-	-	500	us	
1 data bit time	UI	-	1/7	-	T_{LVCLK}	
Position 1	T_{POS1}	-0.25	0	0.25	UI	
Position 0	T_{POS0}	0.75	1	1.25	UI	
Position 6	T_{POS6}	1.75	2	2.25	UI	
Position 5	T_{POS5}	2.75	3	3.25	UI	
Position 4	T_{POS4}	3.75	4	4.25	UI	
Position 3	T_{POS3}	4.75	5	5.25	UI	
Position 2	T_{POS2}	5.75	6	6.25	UI	
SSC Modulation Frequency	SSCMF	30	-	93	KHz	LVDS clock = 85MHz SSCMR ≤ 3%
SSC Modulation Rate	SSCMR	-3	-	3	%	LVDS clock = 85MHz center spread SSCMF = 30~93KHz

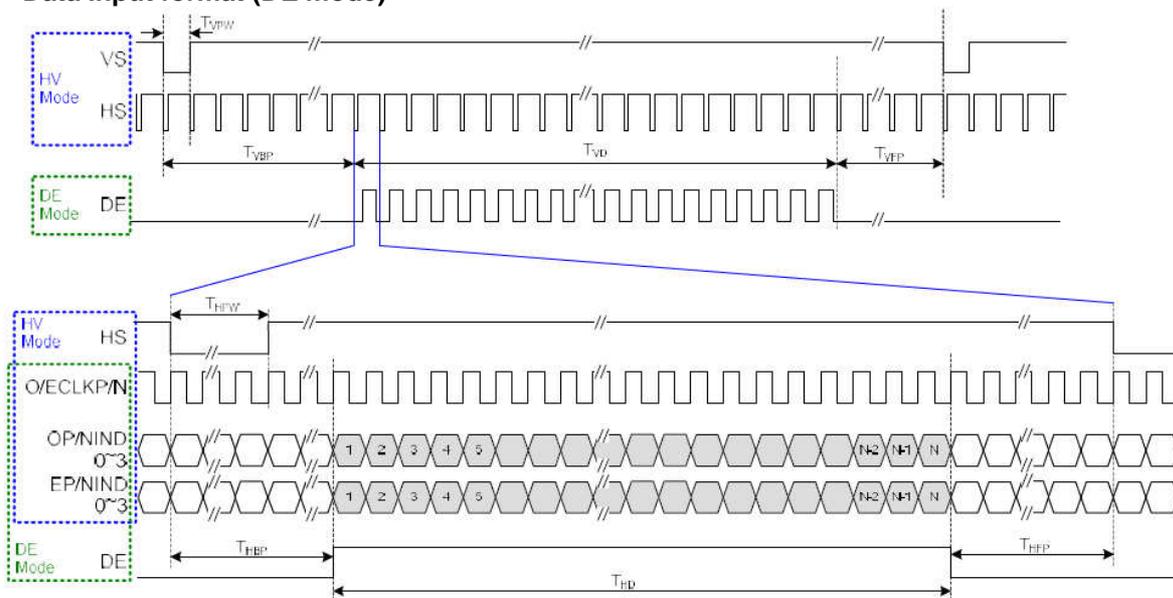


6.3 LVDS input format



VESA format (8bit)

6.4 Data Input format (DE mode)



6.5 Data Input Timing

Table 1. HV mode for 1280RGBx720

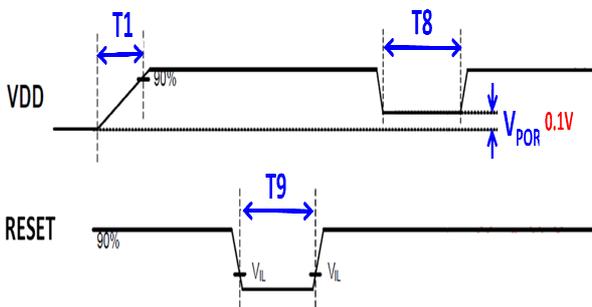
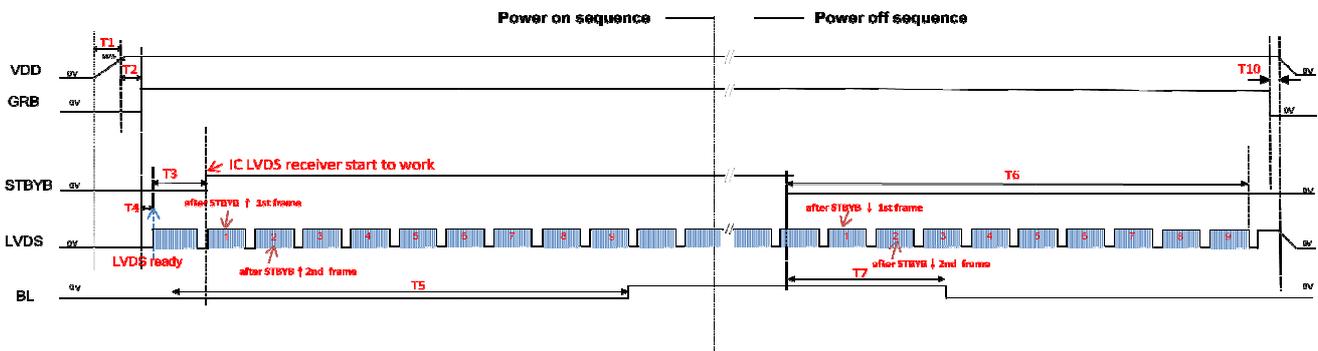
Parameter	Symbol	Min.	Typ.	Max.	Unit
DCLK frequency	FDCLK	72.76	74.96	99.3	MHz
Horizontal display area	THD	1280			DCLK
HS period time	TH	1420	1436	1616	DCLK
HS pulse width	THPW	25	--	40	DCLK
HS back porch	THBP	128	140	150	DCLK
HS front porch	THFP	12	16	186	DCLK
Vertical display area	TVD	720			H
VS period time	TV	854	870	1024	H
VS pulse width	TVPW	1	--	20	H
VS back porch	TVBP	4	6	152	H
VS front porch	TVFP	130	144	152	H

Table 2. DE mode for 1280RGBx720

Parameter	Symbol	Min.	Typ.	Max.	Unit
DCLK frequency	FDCLK	72.76	74.96	99.3	MHz
Horizontal display area	THD	1280			DCLK
HS period time	TH	1420	1436	1616	DCLK
HS blanking	THFP +THBP	140	156	336	DCLK
Vertical display area	TVD	720			H
VS period time	TV	854	870	1024	H
VS blanking	TVBP +TVFP	134 Note	150 Note	304 Note	H

Note: VS blanking - VBP register setting ≥ 3 .

6.6 Power on/off sequence



Symbol	Min.	Typ.	Max.	Unit
T1	1	--	20	ms
T2	5	--	--	ms
T3	40	--	--	ms
T4	0	--	T3-8	ms
T5	10	--	--	frame
T6	10	--	--	frame
T7	1.5	--	--	frame
T8	1	--	--	S
T9	1	--	--	ms
T10	1	--	--	frame

7. I2C communication protocol : I2C Event Buffer format

Touch I2C Addr	0x01
Touch report	Should support polling mode. Make sure the data is ready for read.
Touch INT	1. no move no trigger after touch down 2. Always trigger after touch down.
Status	Touch down, touch stable, touch move, touch leave

	Address	R/W	Def. Value	B7	B6	B5	B4	B3	B2	B1	B0	
1	0x00	R	0xFF	Protocol version[1:0]		DP ASIL ERR	TP ASIL ERR	Number of touches[3:0]				
2	0x01	R	0xFF	ID				Touch type	Status			
3	0x02	R	0xFF	Coord_X[11:4]								
4	0x03	R	0xFF	Coord_Y[11:4]								
5	0x04	R	0xFF	Coord_X[3:0]				Coord_Y[3:0]				
6	0x05	R	0xFF	Touch delta[7:0]								
7	0x06	R	0xFF	Touch delta[15:8]								
8	0x07	R	0xFF	Area[7:0]								
9	0x08	R	0xFF	ID				Touch type	Status			
10	0x09	R	0xFF	Coord_X[11:4]								
11	0x0A	R	0xFF	Coord_Y[11:4]								
12	0x0B	R	0xFF	Coord_X[3:0]				Coord_Y[3:0]				
13	0x0C	R	0xFF	Touch delta[7:0]								
14	0x0D	R	0xFF	Touch delta[15:8]								
15	0x0E	R	0xFF	Area[7:0]								
16	0x0F	R	0xFF	ID				Touch type	Status			
17	0x10	R	0xFF	Coord_X[11:4]								
18	0x11	R	0xFF	Coord_Y[11:4]								
19	0x12	R	0xFF	Coord_X[3:0]				Coord_Y[3:0]				
20	0x13	R	0xFF	Touch delta[7:0]								
21	0x14	R	0xFF	Touch delta[15:8]								
22	0x15	R	0xFF	Area[7:0]								
23	0x16	R	0xFF	ID				Touch type	Status			
24	0x17	R	0xFF	Coord_X[11:4]								
25	0x18	R	0xFF	Coord_Y[11:4]								
26	0x19	R	0xFF	Coord_X[3:0]				Coord_Y[3:0]				
27	0x1A	R	0xFF	Touch delta[7:0]								
28	0x1B	R	0xFF	Touch delta[15:8]								

29	0x1C	R	0xFF	Area[7:0]		
30	0x1D	R	0xFF	ID	Touch type	Status
31	0x1E	R	0xFF	Coord_X[11:4]		
32	0x1F	R	0xFF	Coord_Y[11:4]		
33	0x20	R	0xFF	Coord_X[3:0]	Coord_Y[3:0]	
34	0x21	R	0xFF	Touch delta[7:0]		
35	0x22	R	0xFF	Touch delta[15:8]		
36	0x23	R	0xFF	Area[7:0]		
37	0x24	R	0xFF	ID	Touch type	Status
38	0x25	R	0xFF	Coord_X[11:4]		
39	0x26	R	0xFF	Coord_Y[11:4]		
40	0x27	R	0xFF	Coord_X[3:0]	Coord_Y[3:0]	
41	0x28	R	0xFF	Touch delta[7:0]		
42	0x29	R	0xFF	Touch delta[15:8]		
43	0x2A	R	0xFF	Area[7:0]		
44	0x2B	R	0xFF	ID	Touch type	Status
45	0x2C	R	0xFF	Coord_X[11:4]		
46	0x2D	R	0xFF	Coord_Y[11:4]		
47	0x2E	R	0xFF	Coord_X[3:0]	Coord_Y[3:0]	
48	0x2F	R	0xFF	Touch delta[7:0]		
49	0x30	R	0xFF	Touch delta[15:8]		
50	0x31	R	0xFF	Area[7:0]		
51	0x32	R	0xFF	ID	Touch type	Status
52	0x33	R	0xFF	Coord_X[11:4]		
53	0x34	R	0xFF	Coord_Y[11:4]		
54	0x35	R	0xFF	Coord_X[3:0]	Coord_Y[3:0]	
55	0x36	R	0xFF	Touch delta[7:0]		
56	0x37	R	0xFF	Touch delta[15:8]		
57	0x38	R	0xFF	Area[7:0]		
58	0x39	R	0xFF	ID	Touch type	Status
59	0x3A	R	0xFF	Coord_X[11:4]		
60	0x3B	R	0xFF	Coord_Y[11:4]		
61	0x3C	R	0xFF	Coord_X[3:0]	Coord_Y[3:0]	
62	0x3D	R	0xFF	Touch delta[7:0]		
63	0x3E	R	0xFF	Touch delta[15:8]		
64	0x3F	R	0xFF	Area[7:0]		
65	0x40	R	0xFF	ID	Touch type	Status
66	0x41	R	0xFF	Coord_X[11:4]		

67	0x42	R	0xFF	Coord_Y[11:4]								
68	0x43	R	0xFF	Coord_X[3:0]				Coord_Y[3:0]				
69	0x44	R	0xFF	Touch delta[7:0]								
70	0x45	R	0xFF	Touch delta[15:8]								
71	0x46	R	0xFF	Area[7:0]								
72	0x47	R	0xFF	Button Status (0xF8)								
73	0x48	R	0xFF	Button Status								
74	0x49	R	0xFF	Noise Effect [2:0]		short	open	FW status				
75	0x4A	R	0xFF	FLASH CRC ERR	OTP CRC ERR	Reserved						rawdata
76	0x4B	R	0xFF	IC BONDING ERR	PANEL BROKEN	VDDI LVD	VCOM LVD	VGLO LVD	VGHO LVD	AVEE LVD	AVDD LVD	
77	0x4C	R	0xFF	GATE ERR	SOURCE ERR	VDDI OVD	VCOM OVD	VGL OVD	VGH OVD	AVEE OVD	AVDD OVD	
78	0x4D	R	0xFF	OVER TEMP.	HSVSDE short	VIDEO CRC ERR	LVDS FAIL SAFE	LVDS LOCK ERR	NO HSDE	NO VS	NO CLOCK	
79	0x4E	R	0xFF	Read valid pass word								
80	0x4F	R	0xFF	CRC Value [7:0]								
81	0x50	R/W	0xFF	INX reserve								
82	0x51	R/W	0xFF	INX reserve								
83	0x52	R	0xFF	Reserved								
84	0x53	R	0xFF	Reserved								
85	0x54	R	0xFF	Reserved								
86	0x55	R	0xFF	Reserved								
87	0x56	R	0xFF	Reserved								
88	0x57	R	0xFF	Reserved								
89	0x58	R	0xFF	Reserved								
90	0x59	R	0xFF	Reserved								
91	0x5A	R	0xFF	Reserved								
92	0x5B	R	0xFF	Reserved								
93	0x5C	R	0xFF	Reserved								
94	0x5D	R	0xFF	Reserved								
95	0x5E	R	0xFF	Reserved								
96	0x5F	R	0xFF	Reserved								
97	0x60	R	0xFF	INX reserve								
98	0x61	R	0xFF	Reserved								
99	0x62	R	0xFF	Reserved								
100	0x63	R	0xFF	Reserved								
101	0x64	R	0xFF	Reserved								
102	0x65	R	0xFF	Reserved								

103	0x66	R	0xFF	Reserved
104	0x67	R	0xFF	Reserved
105	0x68	R	0xFF	Reserved
106	0x69	R	0xFF	Reserved
107	0x6A	R	0xFF	Reserved
108	0x6B	R	0xFF	Reserved
109	0x6C	R	0xFF	Reserved
110	0x6D	R	0xFF	Reserved
111	0x6E	R	0xFF	Reserved
112	0x6F	R	0xFF	Reserved
113	0x70	R	0xFF	Reserved
114	0x71	R	0xFF	Reserved
115	0x72	R	0xFF	Reserved
116	0x73	R	0xFF	Reserved
117	0x74	R	0xFF	Reserved
118	0x75	R	0xFF	Reserved
119	0x76	R	0xFF	Reserved
120	0x77	R	0xFF	Reserved
121	0x78	R	0xFF	INX reserve
122	0x79	R	0xFF	INX reserve
123	0x7A	R	0xFF	INX reserve
124	0x7B	R	0xFF	INX reserve
125	0x7C	R	0xFF	INX reserve
126	0x7D	R	0xFF	INX reserve
127	0x7E	R	0xFF	INX reserve
128	0x7F	R	0xFF	INX reserve
129	0x80	R	0xFF	INX reserve
130	0x81	R	0xFF	INX reserve
131	0x82	R	0xFF	INX reserve
132	0x83	R	0xFF	INX reserve
133	0x84	R	0xFF	INX reserve
134	0x85	R	0xFF	INX reserve
135	0x86	R	0xFF	INX reserve
136	0x87	R	0xFF	INX reserve
137	0x88	R	0xFF	INX reserve
138	0x89	R	0xFF	INX reserve
139	0x8A	R	0xFF	INX reserve
140	0x8B	R	0xFF	INX reserve
141	0x8C	R	0xFF	INX reserve

142	0x8D	R	0xFF	INX reserve
143	0x8E	R	0xFF	INX reserve
144	0x8F	R	0xFF	INX reserve
145	0x90	R	0xFF	INX reserve
146	0x91	R	0xFF	INX reserve
147	0x92	R	0xFF	INX reserve
148	0x93	R	0xFF	INX reserve
149	0x94	R	0xFF	INX reserve
150	0x95	R	0xFF	INX reserve
151	0x96	R	0xFF	INX reserve
152	0x97	R	0xFF	Reserved
153	0x98	R	0xFF	Reserved
154	0x99	R	0xFF	Reserved
155	0x9A	R	0xFF	Reserved
156	0x9B	R	0xFF	Reserved
157	0x9C	R	0xFF	Reserved
158	0x9D	R	0xFF	Reserved
159	0x9E	R	0xFF	Reserved
160	0x9F	R	0xFF	Reserved
161	0xA0	R	0xFF	Open fail pad1 X axis
162	0xA1	R	0xFF	Open fail pad1 Y axis
163	0xA2	R	0xFF	Open fail pad2 X axis
164	0xA3	R	0xFF	Open fail pad2 Y axis
165	0xA4	R	0xFF	Open fail pad3 X axis
166	0xA5	R	0xFF	Open fail pad3 Y axis
167	0xA6	R	0xFF	Open fail pad4 X axis
168	0xA7	R	0xFF	Open fail pad4 Y axis
169	0xA8	R	0xFF	Open fail pad5 X axis
170	0xA9	R	0xFF	Open fail pad5 Y axis
171	0xAA	R	0xFF	Short fail pad1 X axis
172	0xAB	R	0xFF	Short fail pad1 Y axis
173	0xAC	R	0xFF	Short fail pad2 X axis
174	0xAD	R	0xFF	Short fail pad2 Y axis
175	0xAE	R	0xFF	Short fail pad3 X axis
176	0xAF	R	0xFF	Short fail pad3 Y axis
177	0xB0	R	0xFF	Short fail pad4 X axis
178	0xB1	R	0xFF	Short fail pad4 Y axis
179	0xB2	R	0xFF	Short fail pad5 X axis
180	0xB3	R	0xFF	Short fail pad5 Y axis
181	0xB4	R	0xFF	Rawdata fail pad1 X axis

182	0xB5	R	0xFF	Rawdata fail pad1 Y axis
183	0xB6	R	0xFF	Rawdata fail pad2 X axis
184	0xB7	R	0xFF	Rawdata fail pad2 Y axis
185	0xB8	R	0xFF	Rawdata fail pad3 X axis
186	0xB9	R	0xFF	Rawdata fail pad3 Y axis
187	0xBA	R	0xFF	Rawdata fail pad4 X axis
188	0xBB	R	0xFF	Rawdata fail pad4 Y axis
189	0xBC	R	0xFF	Rawdata fail pad5 X axis
190	0xBD	R	0xFF	Rawdata fail pad5 Y axis

8. Optical Specifications

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Luminance	L		570	700	-	cd/m ²	Note 1
Contrast ratio	CR		1000	1300	-	-	Note 2 Note 3
Viewing angle (CR ≥ 10)	θ_L	$\Phi=180^\circ$ (9 o'clock)	80	85	-	degree	Note 4
	θ_R	$\Phi=0^\circ$ (3 o'clock)	80	85	-		
	θ_T	$\Phi=90^\circ$ (12 o'clock)	80	85	-		
	θ_B	$\Phi=270^\circ$ (6 o'clock)	80	85	-		
Luminance uniformity	Y_U		75	80	-	%	Note 5 Note 6
Response time (Gray to gray)	25 °C	Normal $\theta=\Phi=0^\circ$	-	(26.6)	-	msec	Note 7
	-20 °C		-	(227.6)	-		
	-30 °C		-	(490.4)	-		
Color chromaticity (CIE 1931)	W_X		0.27	0.31	0.35	-	Note 1
	W_Y		0.29	0.33	0.37	-	Note 2
NTSC (CIE 1931)				72	-	-	%

Test Conditions:

1. $DV_{DD}=3.1V$, $I_L=65\text{ mA}$ (Backlight current), the temperature is 25°C.
2. The test systems refer to Note 2.
3. The temperature stands for ambient temperature.

Note 1: Color chromaticity is defined by CIE1931.

Note 2: Definition of optical measurement system. The backlight has been light on for 30 minutes then measured the optical properties at the center point of the LCD screen in dark room. The color chromaticity, contrast ratio are measured by DMS 803.

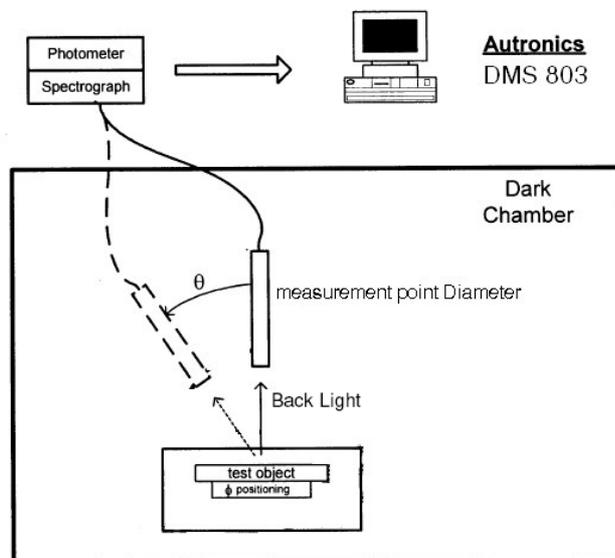


Fig. 7-1 Optical measurement system setup

Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 4: Definition of viewing angle range.

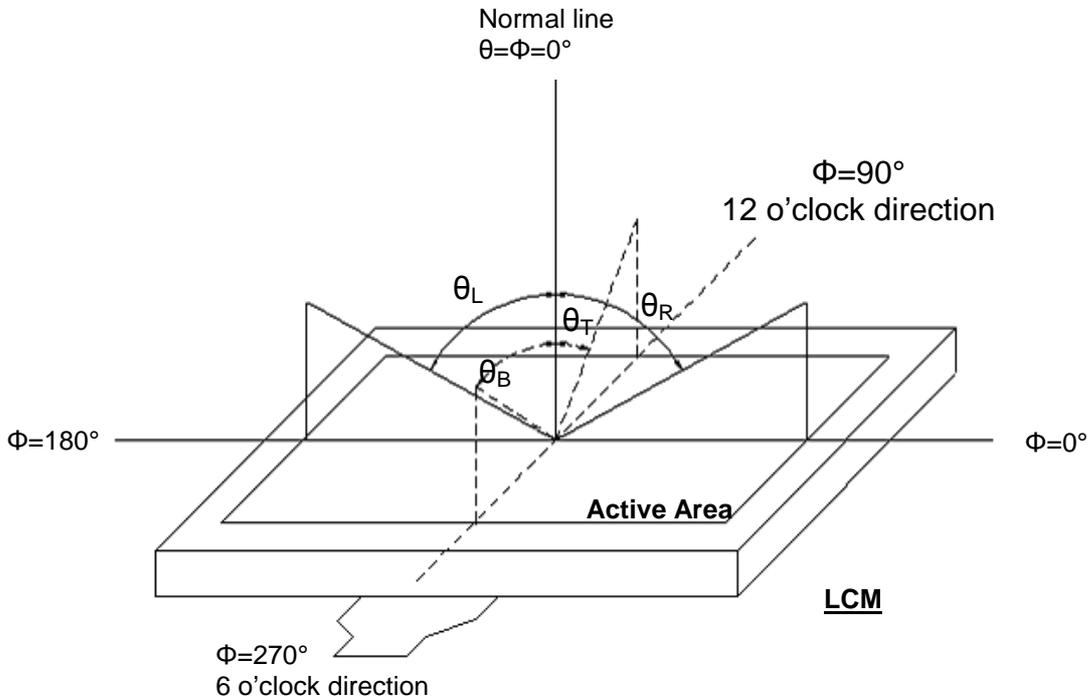


Fig. 7-2 Definition of viewing angle

Note 5: All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is based on 5.2 content.

Note 6: Definition of luminance uniformity

Active area is divided into 9 measuring areas (Refer to Fig. 7-3).

L----- Active area length W----- Active area width

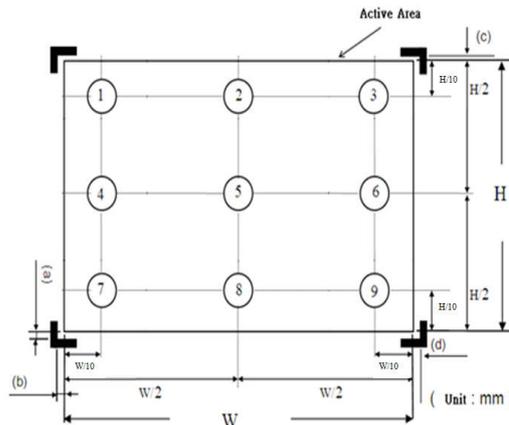


Fig. 7-3 Definition of measuring points

$$\text{Luminance Uniformity (Yu)} = \frac{B_{\min}}{B_{\max}}$$

Bmax: The measured maximum luminance of all measurement position.

Bmin : The measured minimum luminance of all measurement position.

Note 7: Definition of response time. The response time is measured by photo detector of oscilloscope.

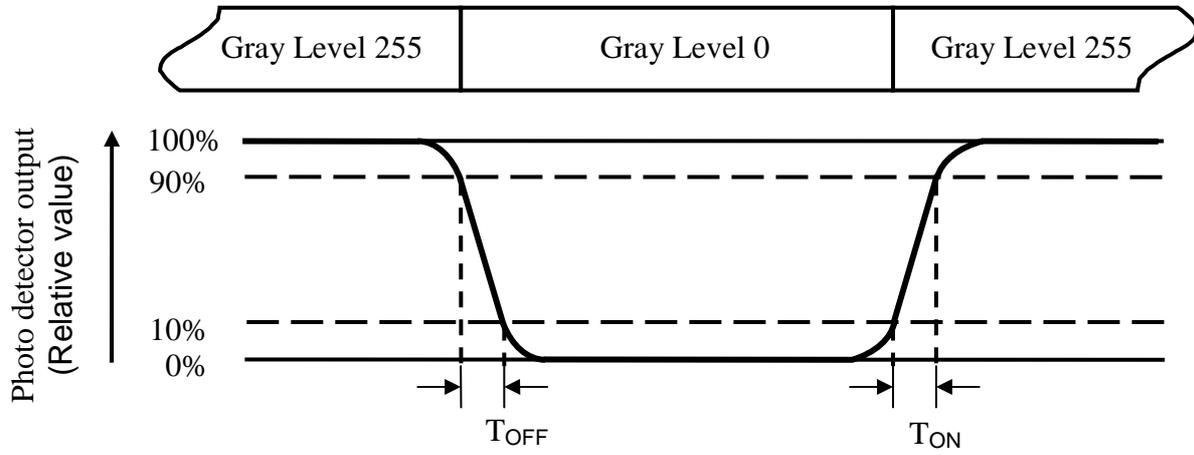


Fig. 4-3 Definition of response time

9. Reliability Test Items

Item	Test Conditions	Remark
High Temperature Storage Test	Ta=90°C, 500 hours	Note 1 Note 2 Note 3 Note 5
Low Temperature Storage Test	Ta=-40°C, 500 hours	
High Temperature Operation Test	Tp=85°C, 500 hours	
Low Temperature Operation Test	Tp=-30°C, 500 hours	
High Temperature & High Humidity Operation/ Storage Test	Ta=60°C, RH 90%, 500 hours	
Thermal Shock	[(Ta=-40°C 30min)~(Ta=85°C 30min)]/cycle , (Ramp rate ≥ 16°C/min) , 100cycles	
ESD Test (Operation)	Condition 1 : C = 150pF, R = 330Ω Contact Discharge, ± 8KV Condition 2 : C = 150pF, R = 330Ω, Air Discharge, ± 15KV	Note 6
Mechanical Shock	100G, 6ms, half sine wave, 3 times for each direction of ±X, ±Y, ±Z	Note 2 Note 4
Mechanical Vibration	Frequency: 10 ~55~10Hz; Sweep Mode: Log Sweep Sweep time: 1Oct/min; Acceleration: 1.5G; Test time: 2 hr for each direction of X, Y, Z.	Note 2 Note 4
Packaging Vibration Test	1.14Grms X, Y, Z three axes (30min /axis) [Frequency : 5Hz(0.015G ² /Hz) , 100Hz(0.015G ² /Hz) , 200Hz(0.0037G ² /Hz)]	
Packaging Drop Test	1corner, 3edges, 6faces (1 time/direction) <follow ISTA(1A) Height> 0kg ≤ W <10kg : 76cm, 10kg ≤ W <19kg : 61cm, 19kg ≤ W <28kg : 46cm,	

Note 1: Ta = Ambient Temperature, Tp = Panel Surface Temperature.

Note 2: Criteria: Normal display image with no Function NG, or line defects.

Note 3: Evaluation should be tested after storage at room temperature for more than two hour

Note 4: At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

Note 5: A certain level of Mura (non-uniformity) of dark / black image will happen several days after high temperature testing (H.T.T.). There is a slowly part recovery over a long time (several months). Such a long exposure time like in H.T.T. will normally not happen in a real application. Therefore the test H.T.T. was introduced to simulate cycles with normal conditions in-between but with the same total exposure time what show a significant reduced Mura.

The root cause is related to tension generated due to different amount of shrinking in the stack of layers in the polarizer sheet. The effect is more significant on larger displays like this size. An investigation into alternative polarizer material showed that there is no better alternative currently available.

Note 6 : Criteria Class B

10. General Precautions

9.1 Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or cloths, wash it off immediately by using soap and water.

9.2 Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

9.3 Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

9.4 Storage

1. Store the module in a dark room where must keep at $25\pm 10^{\circ}\text{C}$ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

9.5 Cleaning

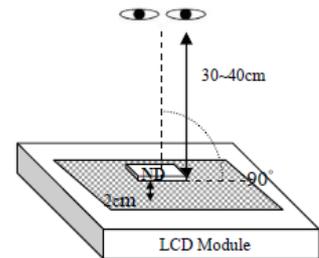
1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

11. Quality Requirement

The defect categories covered in this specification are comprised of defects in the active area such as dot defects, blemishes and partly completely mal functioning displays as well as visual appearance of the complete product and packaging of the product.

10.1 Inspection conditions and test patterns

Item	Condition	
Lighting	Equivalent Illumination. Ambient Illumination: 800 ~ 1200 Lux for external appearance inspection Ambient Illumination: 300 ~ 500 Lux for light on inspection	
Temperature	20~30°C	
Humidity	25~75 %RH	
Driving condition	Equipment	Product specific test tool
	Test pattern	Black, White, R, G, B
	Supply voltage	Typical voltages as given in the specification
Inspection method	Time	≤ 1 minute
	Distance	Panel visual inspection on the operation condition for cosmetic shall be conducted at the distance 40~50cm or more between the LCD module and eyes of inspector.
	Viewing angle	±15 degree to the front surface of display panel in vertical direction. ±15 degree to the front surface of display panel in horizontal direction.
ND Filter	When using ND Filter for judging Mura, placing ND Filter near Mura defect and get close to the surface of LCD Panel (its distance shall be 1~2cm between the surface of Panel and ND Filter). Don't touch the surface of polarizer to avoid scratching polarizer, and then move to the defect position to judge mura by view angle 0 degree within 3 seconds.	



10.2 Classification of defects

Defects are classified two types, major defect and minor defect according to the defect. And, the definition of defects is classified as below.

(1) Major defect

Any defect may result in functional failure, or reduce the usability of product for its purpose. For example, electrical failure, deformation and etc..

(2) Minor defect

A defect that is not to reduce the usability of product for its intended purpose and un-uniformity, sub-pixel defect and etc..

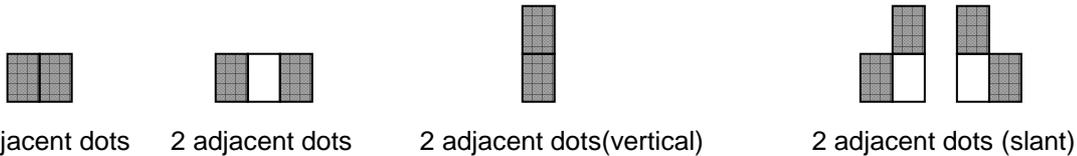
The criteria on major and/or minor judgment will be according with the classification of defects.

Inspection Item	Criteria and Description	Defect type
Vertical line	Signal input, vertical line off or irregular V-line appears	Major
Horizontal line	Signal input, horizontal line off or irregular H-line appears	Major
Cross line	Pattern signal input, a correct display is not obtained	Major
No display	Signal input, display is dead	Major
Irregular display	Pattern signal input, a correct display is not obtained	Major
Sub-pixel defect	Exceed specified standards	Minor
Scratch and Dent on polarizer	Exceed specified standards	Minor
Foreign material	Exceed specified standards	Minor
Mura	The Mura criteria follows: 10.3 Inspection Criteria (2) Display Inspection items "Mura"	Minor
External Appearance	Deformation, irregular plating, coating missing etc.	Minor

	A appearance defect that do not affect function or performance	
Bezel claw	Bezel claw missing or not bent	Major
Polarizer bubble	Exceed specified standards	Minor

10.3 Inspection Criteria

- (1) Definition of dot defect induced from the panel inside
- a) Full bright dot : Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.
 - b) Full dark dot : Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture.
 - c) 2 adjacent dots = 1pair = 2 sub-pixel
- Picture:

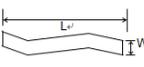


- (2) Display Inspection standards when power on

For all below Inspection Items the 1st criteria is visibility through a 5%ND Filter:

Not Visible: Ignore

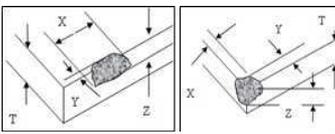
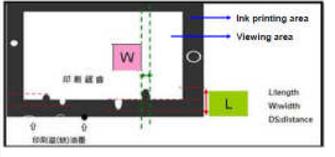
Visible: Apply below table

Items		Acceptable count
Full Bright dot	Random	$N \leq 0$
	2 adjacent dots	$N \leq 0$
	3 adjacent dots or more	$N \leq 0$
Full Dark dot	Random	$N \leq 4$
	2 adjacent dots	$N \leq 0$
	3 adjacent dots or more	$N \leq 0$
Total bright and dark dots		$N \leq 4$
Distance	Minimum Distance Between Dark dots	$\geq 5\text{mm}$
Foreign Black/White/Bright Spot	 $D = (a+b)/2$	$D < 0.15\text{mm}$, ignore $0.15\text{mm} \leq D \leq 0.3\text{mm}$, $N \leq 4$ $D > 0.3\text{mm}$, $N = 0$
Foreign Black/White/Bright Lint	 W : width, L : length	$W \leq 0.05\text{mm}$, ignore $0.05 < W \leq 0.10\text{mm}$, $L \leq 3.0\text{mm}$, $N \leq 4$ $W > 0.10\text{mm}$, $L > 3.0\text{mm}$, $N = 0$
Display failure (V-line/H-line/Cross line etc.)		Not allowable
Mura/ Waving/ Hot spot	Not visible through 5% ND filter in 50% Gray pattern or judge by limit sample if necessary	

Note : Defect which is on the Black Matrix (outside of Active Area) are not considered as a defect

10.4 External Appearance Inspection Criteria (power off)

Item	Contents
Line Shape in display area (Particle / Scratch / Lint / Bubble)	$W \leq 0.05\text{mm}$, ignore $0.05 < W \leq 0.10\text{mm}$, $L \leq 3.0\text{mm}$, $N \leq 4$ $W > 0.10\text{mm}$, $L > 3.0\text{mm}$, $N = 0$
Dot Shape in display area (Particle / Dent / Bubble)	$D < 0.15\text{mm}$, ignore $0.15\text{mm} \leq D \leq 0.3\text{mm}$, $N \leq 4$ $D > 0.3\text{mm}$, $N = 0$
Protective Film	Any defects on the protective film are ignored, such as protective film scratches, protective film bubbles and particles on protective film.
FPC	Break-off 、Connector Break-off / Burn-off is not permitted

Metal frame (Bezel)	Assembly NG or Function fail caused by deformation is not permitted	
Backlight	Scratch	The scratch which may causes a problem in practical use is not permitted.
	Break-off	Breaking off is not permitted.
	Crack	The crack is not permitted.
Tape/Label	Incorrect position, missed label is not permitted.	
Connector	Assembly NG or Function fail caused by deformation is not permitted	
Outline size	Spec. out is not permitted.	
ASF edge bubble line/ glue peeling	Area inside from ASF edge to inner 1.0mm, ignore. Area outside from ASF edge to inner 1.0mm, not allowed.	
Touch panel	Broken & chipping	 <p>(1) For Edge type: a. $Y \leq 0.15\text{mm}$, $N / X / \text{Distance}$, Ignore b. $X \leq 0.3\text{mm}$, $0.15 < Y \leq 0.3\text{mm}$, $Z \leq 1/2 T$, $N \leq 6$ (2) For Corner type: $X \leq 0.3\text{mm}$, $0.15 < Y \leq 0.3\text{mm}$, $Z \leq 1/2 T$, $N \leq 3$ Distance Ignore</p>
	BM Printing Pinhole	$D \leq 0.3\text{mm}$, Ignore $0.3\text{mm} < D \leq 0.5\text{mm}$, $N \leq 4$, $\text{Distance} \geq 5\text{mm}$ If RoHS-Qualified oil pen can fix it, ignore
	BM Printing sawtooth	 <p>$L \leq 0.1 \text{ mm}$, Ignore $0.1\text{mm} < L \leq 0.15 \text{ mm}$, $W \leq 1\text{mm}$, $N \leq 2$ Distance $> 5\text{mm}$</p>

Notes: 1. Any defect can be wiped off, ignore.

2. If any specific defect is not included in the above defect table, this defect should be judged by INX/ODM/Brand customer discussion.

3. Defect was ignored if invisible at the user side.

12. Package Drawing

DD080IA-20A Module delivery packing method.

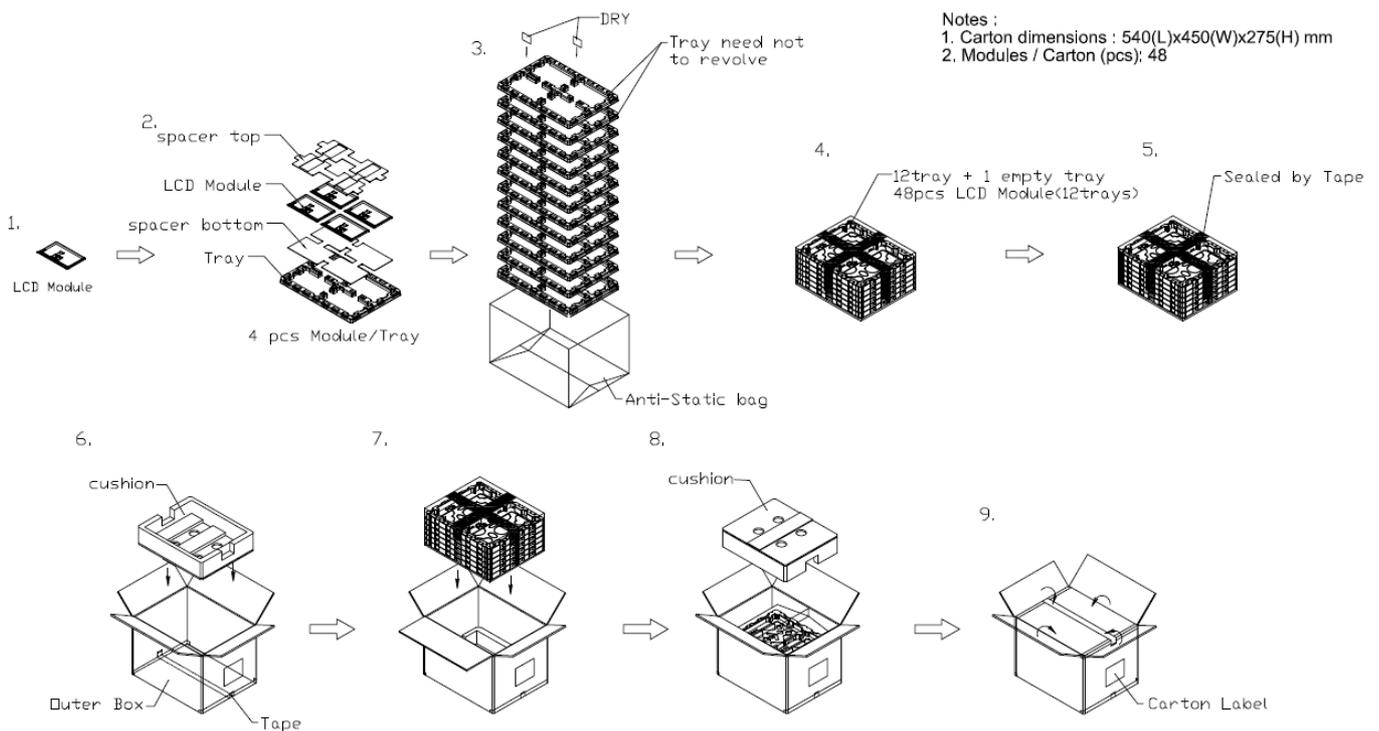
(1) First Level: Inner box level packing method – 13 layer PET Tray in box. INX packing method on this level for this product is 540 x 450 x 275mm.

- Put 4 pieces module into one Tray.
- 12 pieces PET trays contains of 48 pieces modules. The top layer for one PET Tray. Total PET Trays are 13 pieces. Size is 492x342x190mm.
- Put 13 PET Trays into an Anti-static Bag, seal the Anti-static Bag with 2 rolls of tape.
- Put 13 PET Trays into a carton.
- The packing quantity per box is 48 pieces.
- Gross weight per carton is 18.36 kg

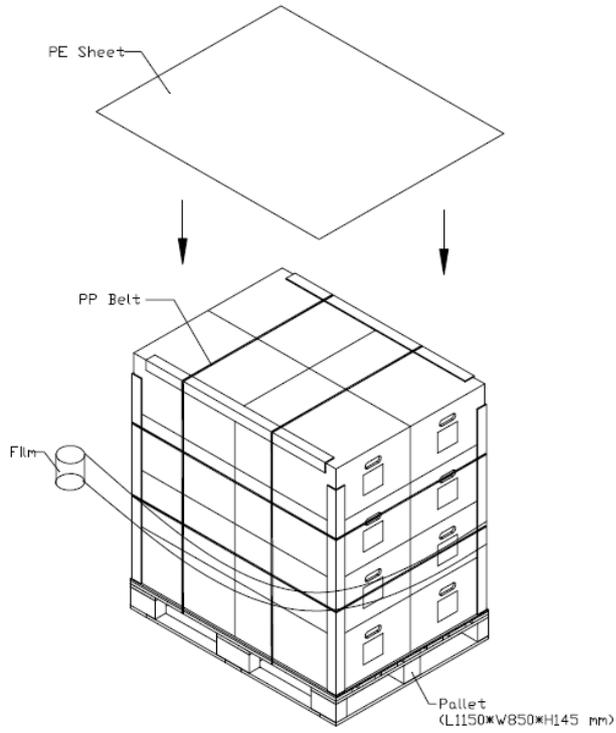
(2) Second Level: Pallet box level. INX packing method on this level for this product is 1150 x 850 x 1520 mm(air transportation) or 1150 x 850 x 2486 mm(Sea and Land transportation) .

- Altogether 20 pieces boxes on one pallet (5 layers and 4 pieces boxes in each layer).
- The full packing quantity per pallet box of air transportation is 20 x 48 = 960 pieces.
- Altogether 16+16 pieces boxes on two pallets (4+4 layers and 4 pieces boxes in each layer).
- The full packing quantity two pallets boxes of sea & land transportation is 32 x 48 = 1536 pieces.

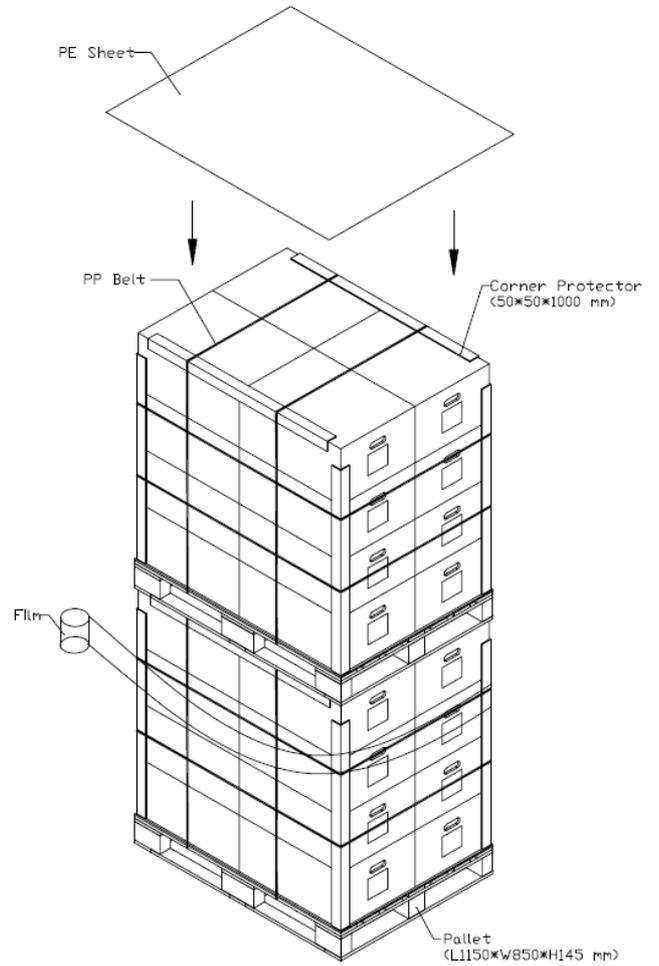
Gross weight per pallet is 383.04 kgs



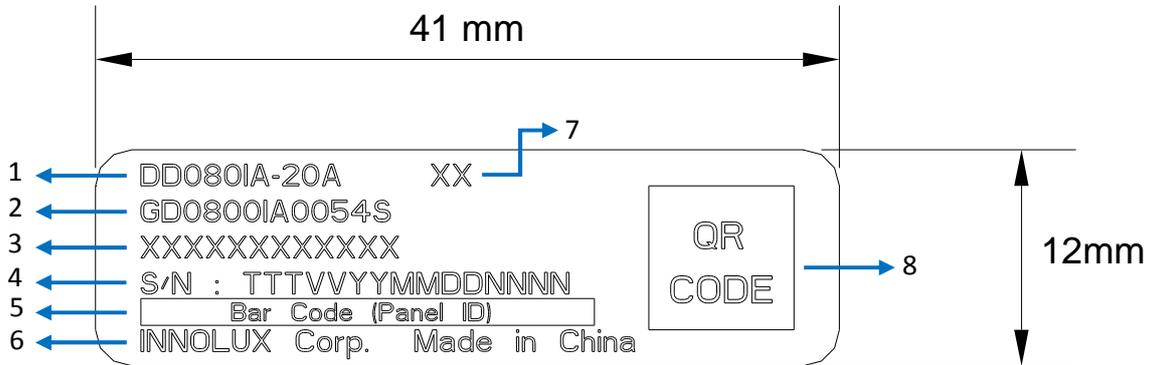
Sea & Land Transportation



Air Transportation



13. Label



Item	Value	Remark
1	DD080IA-20A	INX Model Name
2	GD0800IA0054S	INX Product ID
3	XXXXXXXXXXXXXX	INX internal use
4	S/N: T T T V V Y Y M M D D N N N N	TTT: INX internal use VV: INX internal use YYMMDD Year, Month, Date Manufactured Date: Year: 20~27, for 2020~2027 Month: 1~12, for Jan. ~ Dec Date: 1~31 NNNN: Serial No. (4 digits)
5	Bar code	INX internal use
6	INNOLUX Corp. Made in China	INNOLUX Corp. Made in China
7	XX	Sample version
8	2D QR code	S/N