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In-house Manufacturing

Cover glass

System solutions

OEM Solutions

Custom Display

Production
Custom designs
Installation

Mechanical design



Date : Apr.2nd, 2019

Specifications

Product Name	LPM055M508A

Approval Signature

Accepted by :

Date :

Japan Display Inc.

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Tentative
Confidential

Date	Sheet No.	Page	Summary
Feb.26, 2018	LPM055M508A	All page	Ver.1 Release

3. GENERAL DATA

(1) Part Name	LPM055M508A	
(2) Module Dimensions	70.268 (W) mm ×133.102 (H) mm × 1.728 (t) mm	*Except FPC
(3) Active Area Dimensions	67.068(W) mm ×122.202 (H) mm	
(4) Pixel Pitch	0.010350 (W) mm ×0.031050 (H) mm (818ppi)	
(5) Resolution	2160 ×3 (R,G,B) (W) ×1920 ×2 (H) dots	
(6) Color Pixel Arrangement	RGB Vertical Stripes	
(7) Display Mode	Transmissive Type, Normally Black Mode, In-Plane Switching Mode	
(8) Number of Colors	16,777,216 Colors	
(9) Viewing Direction	—	
(10) Backlight	Light Emitting Diode (LED), 10x2 LEDs (2in1) ; Backlight current : 60mA 10%duty LED (typ) LED NS2W266GT(4194C) (Nichia)	
(11) Weight	(33.8)	
(12) Power Supply Voltage	VSP +5.7V+/-0.1 V, VSN -5.7V+/-0.1 V	
(13) Interface I/O power supply Note (1)	IOVCC = 1.8 +/-0.1 V The same voltage as "H" level of a customer's interface signal must be supplied to VDDI.	
(14) LCD Driver IC	R63455-A1(cut2)	
(15) Interface	MIPI- DSI D-PHY 4Lane x 2 port	

Note (1) IOVCC is the reference voltage for adjusting the I/O signal level of R63455

IOVCC voltage must be determined according to a customer's system.

(2) VSP=AVDD, VSN=AVEE, IOVCC=VDDI=VDDIO=IOVDD=LCD_VDDIO

4. ABSOLUTE MAXIMUM RATINGS

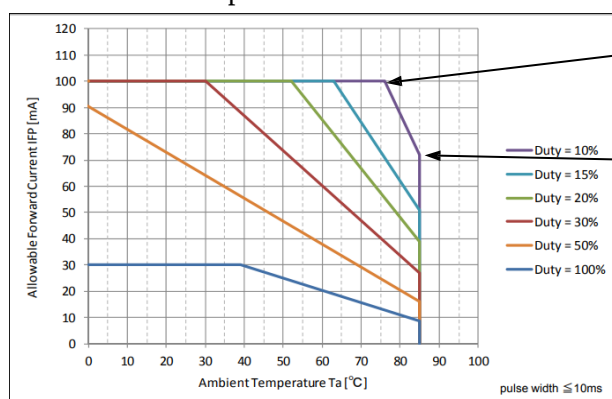
4.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS OF LCD

Ta=25 ℃

Item	Symbol	Min	Max	Unit	Note
Power Supply for Interface	IOVCC	-0.3	2.3	V	(2)
Power Supply for LCD	VSP	-0.3	6.5	V	(2)
Power Supply for LCD	VSN	-6.5	0.3	V	(2)
Input Voltage	Vt	-0.3	IOVCC+0.3	V	(1),(2)
LED Reverse Voltage	V _R	-		V	
LED Forward Current	I _{LED}	-	Note (2)	mA	per LED

Notes (1) Applies to the RESET pin.

(2) LED Ambient Temperatures vs. Allowable Forward Current IFP .



100mA 10%duty(76° C)

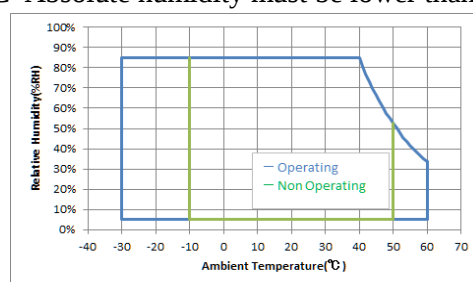
72mA 10%duty (85° C)

4.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

Item	Operating		Non-Operating (Note3)		Remarks
	Min	Max	Min	Max	
Ambient Temperature	-10 ℃	50 ℃	-30 ℃	60 ℃	Note (2)
Humidity	5%	85%	5%	85%	No condensation, Note (1)
Corrosive Gas	Not Acceptable		Not Acceptable		

Notes (1) Ta ≤ 40 ℃ 85%RH max.

Ta > 40 ℃ Absolute humidity must be lower than the humidity of 85%RH at 40 ℃.



(2) Background color slightly changes depending on ambient temperature and viewing angle.

The temperature for operating in the table above apply to operation only.

Visual qualities, such as contrast ratio and response time, to be evaluated at Ta=25 ℃ Operating.

(3) This is not for storing condition. When storing LCM for long term, please follow the condition mentioned in "11.5 STORAGE".

5. ELECTRICAL CHARACTERISTICS

LCD MODULE

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Power Supply Voltage for LCD	IOVCC	-	1.7	1.8	1.9	V	-
Power Supply Voltage for LCD	VSP	-	5.6	5.7	5.8	V	-
Power Supply Voltage for LCD	VSN	-	-5.8	-5.7	-5.6	V	-
Input Voltage for Logic Circuits	VIH	-	0.7 × IOVCC	-	IOVCC	V	(1),(2)
	VIL	-	0	-	0.3 × IOVCC		
Output Voltage for Logic Circuits	VOH1	IOH=-0.1mA	0.8 × IOVCC	-	-	V	(1),(3)
	VOL1	IOL=0.1mA	-	-	0.2 × IOVCC		
Power Supply Current	I_IOVCC	All White	-	123.7	164	mA	(4)
		Deep standby	-	2	50	uA	(4)
	I_VSP	All White	-	18.3	25	mA	(4)
		Deep standby	-	11.2	50	uA	(4)
	I_VSN	All White	-	-15.1	-21	mA	(4)
		Deep standby	-	-4.0	-50	uA	(4)
LED Forward Voltage	VLED	-	-	31.25		V	(5)
LED Forward Current	ILED	-	-	60mA 10%	-	mA	(5)(6)
LED Reverse Current	IR	-	-	-	-	μA	
Frame Frequency	fFLM	-	-	75	-	Hz	

Notes (1) IOVCC = 1.7V to 1.9V

(2) Input : RESET,PNSLV

(3) Output : BCKLIGHT0,BCKLIGHT1,TE

(4) IOVCC=1.8V, VSP=5.7V, VSN=-5.7V, fFLM=75Hz

The current is time averaged value even for Maximum criteria.

(5) Each value is the characteristics of one LED. @If=60mA Duty=10%

(6) The operating current of LED and the duty ratio should be determined within the maximum rating of the temperature environmental condition.

6. OPTICAL CHARACTERISTICS

LCD (BACKLIGHT ON)

Item		Symbol	Condition	Min	Typ	Max	Unit	Note
Brightness		B	$\varphi=0^{\circ}; \theta=0^{\circ}$	70	120	-	cd/m ²	(1),(2)
Brightness Uniformity		-	$\varphi=0^{\circ}; \theta=0^{\circ}$	80	85	-	%	
Viewing Angle		θ	$\varphi=0^{\circ}; CR_{\geq 10}$	80	-	-	deg	(4),(6),(7)
			$\varphi=90^{\circ}; CR_{\geq 10}$		-	-		
			$\varphi=180^{\circ}; CR_{\geq 10}$		-	-		
			$\varphi=270^{\circ}; CR_{\geq 10}$		-	-		
Contrast Ratio		CR	$\varphi=0^{\circ}; \theta=0^{\circ}$	500	700	-	-	(6)
Response Time		G to G	$\varphi=0^{\circ}; \theta=0^{\circ}$	-	(4)	-	ms	(8)
Color Tone (Primary Color)	Red	x	$\varphi=0^{\circ}; \theta=0^{\circ}$	0.633	0.663	0.693	-	-
		y		0.301	0.331	0.361		
	Green	x		0.262	0.292	0.322		
		y		0.632	0.662	0.692		
	Blue	x		0.123	0.153	0.183		
		y		0.026	0.056	0.086		
	White	x		0.280	0.300	0.320		
		y		0.300	0.320	0.340		
NTSC Ratio		-	-	-	85	-	%	-

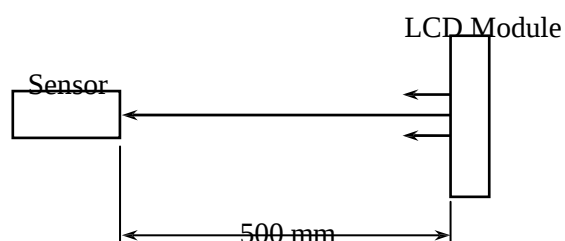
Measurement Conditions

Measurement environment : Dark room with illuminance < 0.1lux

Ambient temperature : Ta=25 ℃

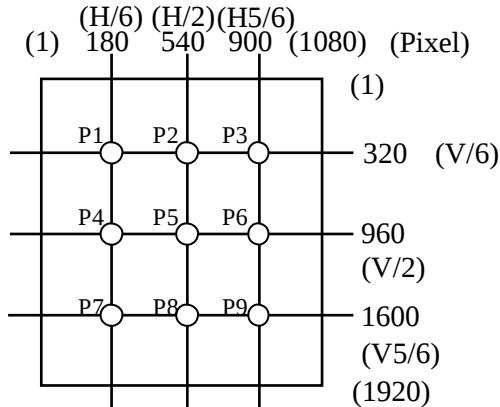
Backlight current : I_{LED}=60mA duty 10%

Notes (1) Definition of Brightness "B"



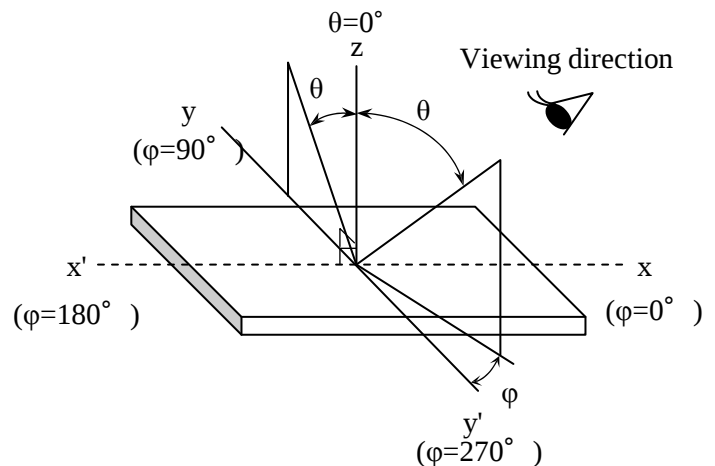
(2) Display image for measurement : All White

Notes (3) Each display area measurement point



H: A.A horizontal dimension
V: A.A vertical dimension

(4) Definition of θ and ϕ



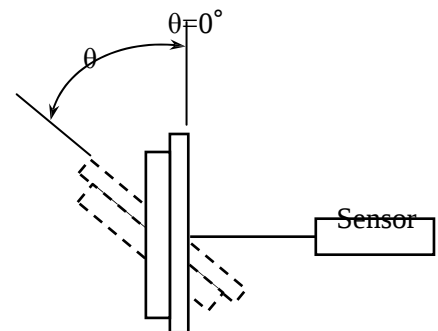
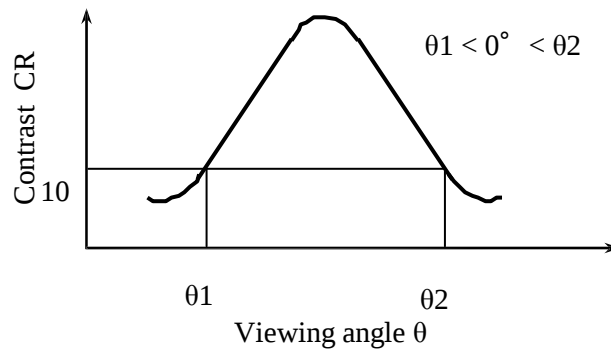
(5) Definition of brightness uniformity

$$\text{Brightness uniformity} = \frac{\text{Brightness (min)}}{\text{Brightness (max)}} \times 100 (\%)$$

(6) Definition of Contrast "CR"

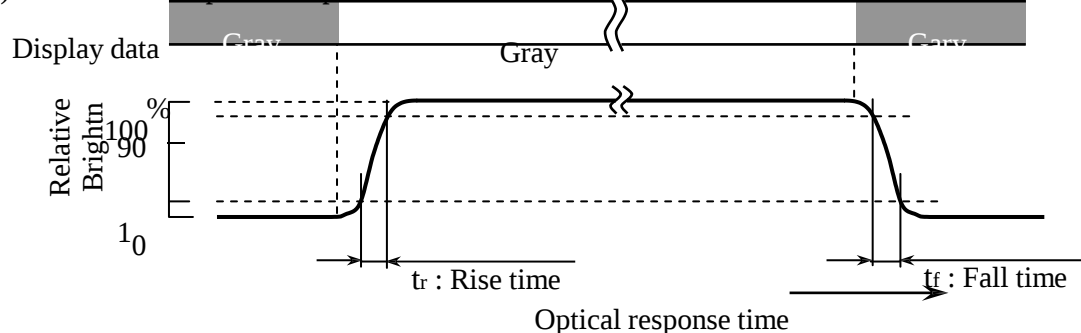
$$\text{CR} = \frac{\text{Brightness when displaying White raster}}{\text{Brightness when displaying Black raster}}$$

(7) Definition of Viewing Angle θ_1 and θ_2

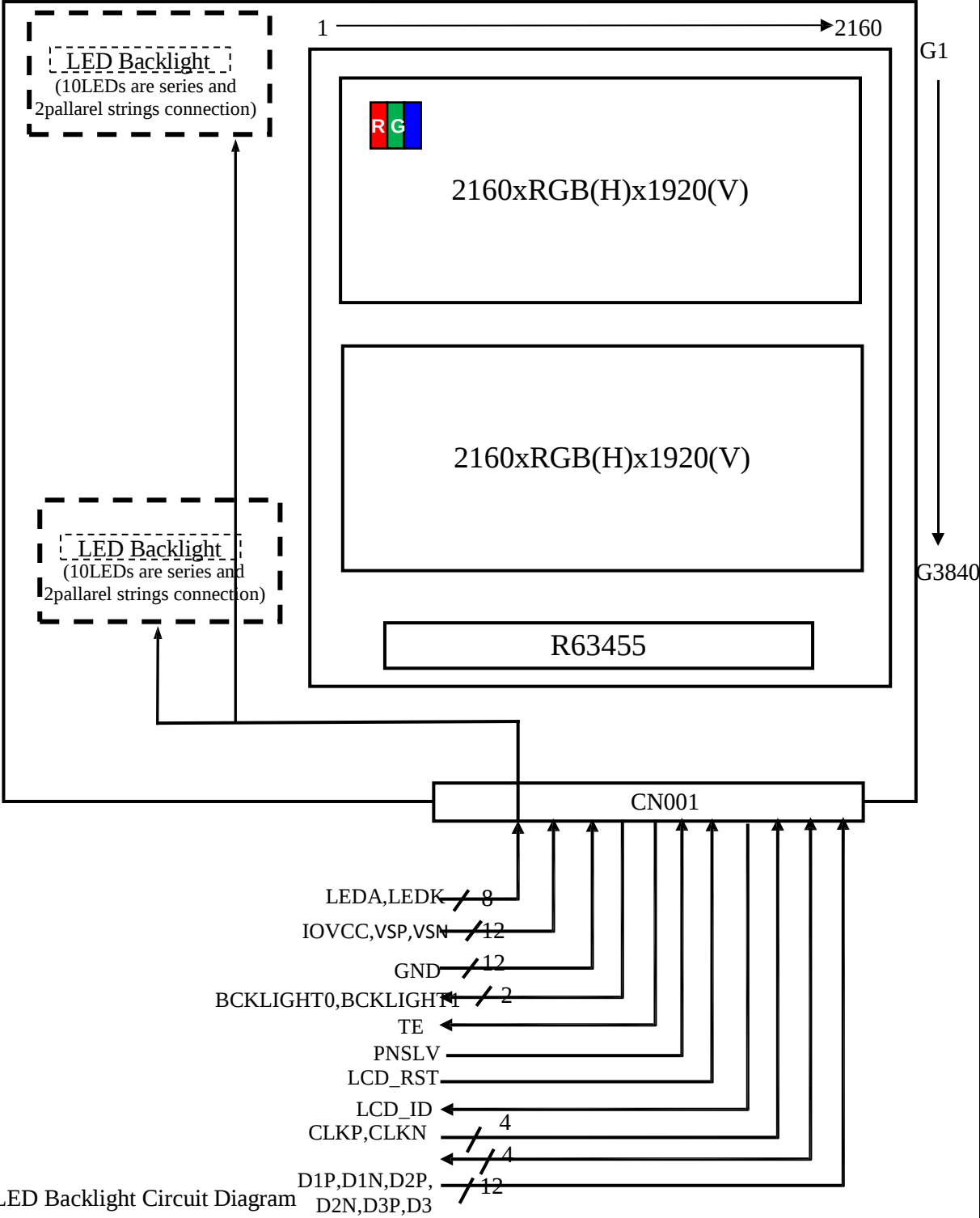


Sensor : TOPCON's BM-5A or equivalent

(8) Definition of Optical Response Time



7. BLOCK DIAGRAM



8. INTERFACE**8.1 INTERNAL PIN CONNECTION**

Pin No.	Signal	I/O	Function	Remarks
1	VSN	P	LCD Power	VSN
2	VSN	P	LCD Power	VSN
3	VSN	P	LCD Power	VSN
4	VSN	P	LCD Power	VSN
5	BCKLIGHT1	O	LED backlight control signal for brightness	BCKLIGHT1
6	BCKLIGHT0	O	LED backlight control signal for brightness	BCKLIGHT0
7	TE	O	LCD TE signal output	TE
8	PNSLV	I	Master port selection	PNSLV
9	GND	P	Ground	GND
10	DATA3N_B	I	MIPI DSI data-3 signal line(-)	D3N_B
11	DATA3P_B	I	MIPI DSI data-3 signal line(+)	D3P_B
12	GND	P	Ground	GND
13	CLKN_B	I	MIPI DSI Clock signal line(-)	CLKN_B
14	CLKP_B	I	MIPI DSI Clock signal line(+)	CLKP_B
15	GND	P	Ground	GND
16	DATA2N_B	I	MIPI DSI data-2 signal line(-)	D2N_B
17	DATA2P_B	I	MIPI DSI data-2 signal line(+)	D2P_B
18	GND	P	Ground	GND
19	DATA0N_A	I/O	MIPI DSI data-0 signal line(-)	D0N_A
20	DATA0P_A	I/O	MIPI DSI data-0 signal line(+)	D0P_A
21	GND	P	Ground	GND
22	DATA1N_A	I	MIPI DSI data-1 signal line(-)	D1N_A
23	DATA1P_A	I	MIPI DSI data-1 signal line(+)	D1P_A
24	GND	P	Ground	GND
25	RESET	I	LCD Reset signal	LCD_RST
26	ID(GND)	O	Ground	LCD_ID
27	VSP	P	LCD Power	VSP
28	VSP	P	LCD Power	VSP
29	VSP	P	LCD Power	VSP
30	VSP	P	LCD Power	VSP
31	LED_K1	P	LED Cathode	LEDK1
32	LED_K2	P	LED Cathode	LEDK2
33	NC	-	No connection	NC
34	LED_A1	P	LED Anode	LEDA1
35	LED_A2	P	LED Anode	LEDA2
36	IOVCC	P	I/O power (for LCDIC& TPIC)	IOVCC
37	IOVCC	P	I/O power (for LCDIC& TPIC)	IOVCC
38	IOVCC	P	I/O power (for LCDIC& TPIC)	IOVCC
39	IOVCC	P	I/O power (for LCDIC& TPIC)	IOVCC
40	GND	P	Ground	GND
41	DATA0N_B	I/O	MIPI DSI data-0 signal line(-)	D0N_B
42	DATA0P_B	I/O	MIPI DSI data-0 signal line(+)	D0P_B
43	GND	P	Ground	GND
44	DATA1N_B	I	MIPI DSI data-1 signal line(-)	D1N_B
45	DATA1P_B	I	MIPI DSI data-1 signal line(+)	D1P_B
46	GND	P	Ground	GND
47	DATA3N_A	I	MIPI DSI data-3 signal line(-)	D3N_A
48	DATA3P_A	I	MIPI DSI data-3 signal line(+)	D3P_A
49	GND	P	Ground	GND
50	CLKN_A	I	MIPI DSI Clock signal line(-)	CLKN_A
51	CLKP_A	I	MIPI DSI Clock signal line(+)	CLKP_A
52	GND	P	Ground	GND
53	DATA2N_A	I	MIPI DSI data-2 signal line(-)	D2N_A
54	DATA2P_A	I	MIPI DSI data-2 signal line(+)	D2P_A
55	GND	P	Ground	GND
56	LED_K3	P	LED Cathode	LEDK3
57	LED_K4	P	LED Cathode	LEDK4
58	NC	-	No connection	NC
59	LED_A3	P	LED Anode	LEDA3
60	LED_A4	P	LED Anode	LEDA4

Notes (1) P : Power supply, I : Input, O: Output, I/O: Input/Output
(2) LCM Connector : (HIROSE) BM20B(0.6)-60DP-0.4V(51) (Plug)

8.2 TIMING CHARACTERISTICS

(1) MIPI DSI Characteristics

Item		Symbol	Unit	Condition	Min	Typ	Max	Note
HS-RX	Differential input high threshold	VIDTH	mV	IOVCC=1.65~1.95V	-	-	70	
	Differential input low threshold	VIDTL	mV	IOVCC=1.65~1.95V	-70	-	-	
	Single-ended input low voltage	VILHS	mV	IOVCC=1.65~1.95V	-40	-	-	
	Single-ended input high voltage	VIHHS	mV	IOVCC=1.65~1.95V	-	-	460	
	Common-mode voltage HS receive mode	VCMRX(DC)	mV	IOVCC=1.65~1.95V	70	-	330	
	Differential input impedance	ZID	Ω	IOVCC=1.65~1.95V	-	100	-	
LP-RX	Logic 0 input voltage not in ULP State	VIL	mV	IOVCC=1.65~1.95V	-50	-	550	
	Logic 1 input voltage	VIH	mV	IOVCC=1.65~1.95V	880	-	1350	
	I/O leakage current	ILEAK	uA	Vin=-50mV-1350mV	-10	-	10	
LP-TX	Thevenin output low level	VOL	mV	IOVCC=1.65~1.95V	-50	-	50	
	Thevenin output high level	VOH	V	IOVCC=1.65~1.95V	1.1	1.2	1.3	
	Output impedance of LP transmitter	ZOLP	Ω	IOVCC=1.65~1.95V	110	-	-	
CD-RX	Logic 0 contention threshold	VILCD	mV	IOVCC=1.65~1.95V	0	-	200	
	Logic 1 contention threshold	VIHCD	mV	IOVCC=1.65~1.95V	450	-	-	

1. VCMRX (DC) = (VDP+VDN)/2

2. Excluding COG resistance (contact resistance and indium tin oxide (ITO) wiring resistance)

MIPI DSI HS-RX Clock and Data-Clock Specifications

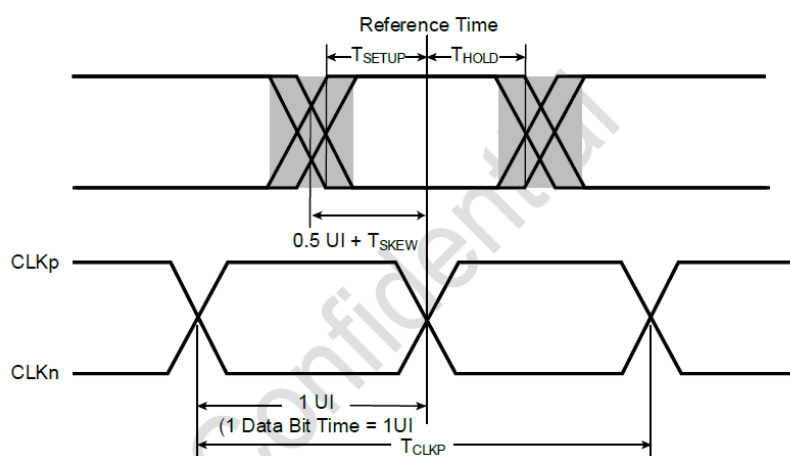
Item	Symbol	Unit	Condition	Min	Typ	Max	Note
DSICLK frequency	f_{DSICLK}	MHz	IOVCC=1.65~1.95V	250	-	750	1
DSICLK cycle time	T_{CLKP}	ns	IOVCC=1.65~1.95V	1.33	-	4	1
DSI data transfer rate	T_{DSIR}	Mbps	IOVCC=1.65~1.95V	500	-	1500	1
Data to Clock Setup Time [measured at receiver]	T_{SETUP}	UI	IOVCC=1.65~1.95V DSI DSI transfer rate $\leq$ 1000 Mbps	0.15	-	-	1,3
		ns		0.15	-	-	1,2,3
		UI	IOVCC=1.65~1.95V DSI DSI transfer rate $>$ 1000 Mbps	0.2	-	-	1,3
		ns		0.13	-	-	1,2,3
Clock to data hold time [measured at receiver]	T_{HOLD}	UI	IOVCC=1.65~1.95V DSI DSI transfer rate $\leq$ 1000 Mbps	0.15	-	-	1,3
		ns		0.15	-	-	1,2,3
		UI	IOVCC=1.65~1.95V DSI DSI transfer rate $>$ 1000 Mbps	0.2	-	-	1,3
		ns		0.13	-	-	1,2,3

- Notes 1. Minimum 110 mV/-110 mV HS differential swing is required for display data transfer.
2. tSETUP/tHOLD times are measured without HS-TX jitter.
3. Minimum tSETUP/tHOLD Time is 0.15 UI or 0.20 UI. This value may change according to the DSI transfer rate.

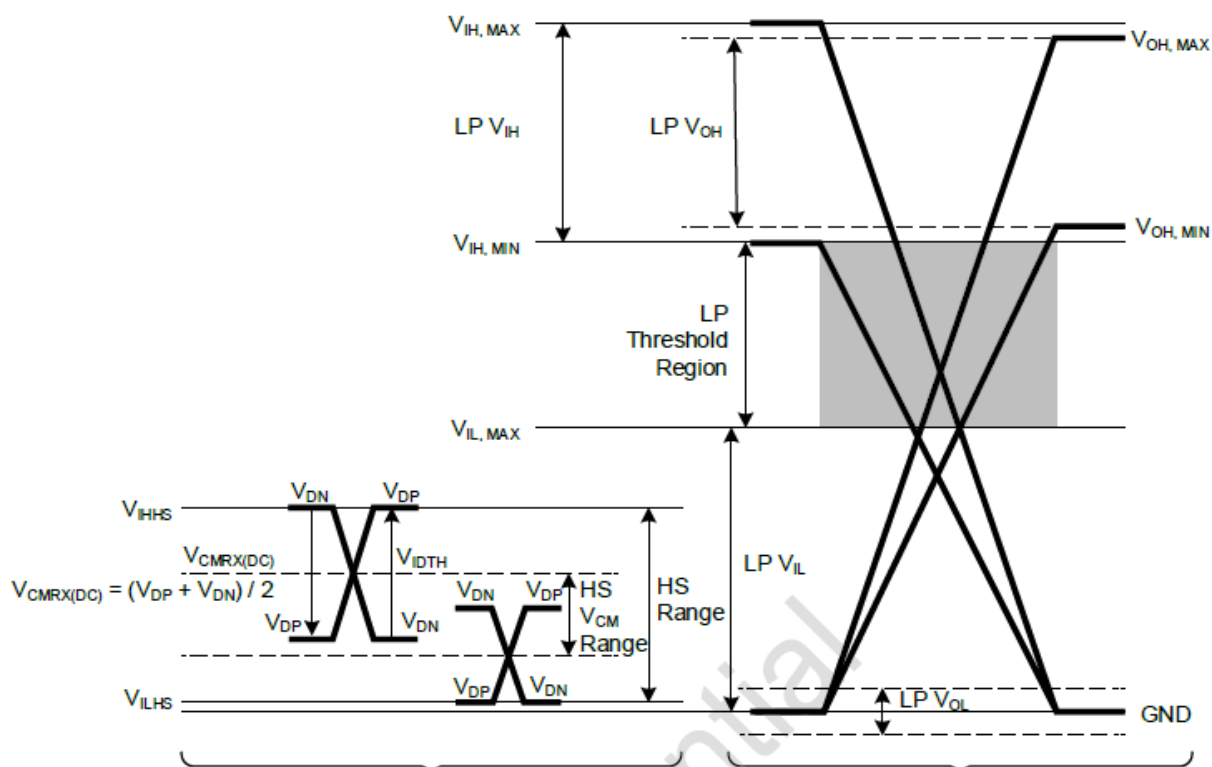
MIPI DSI LP-RX/TX Clock and Data-Clock Specifications

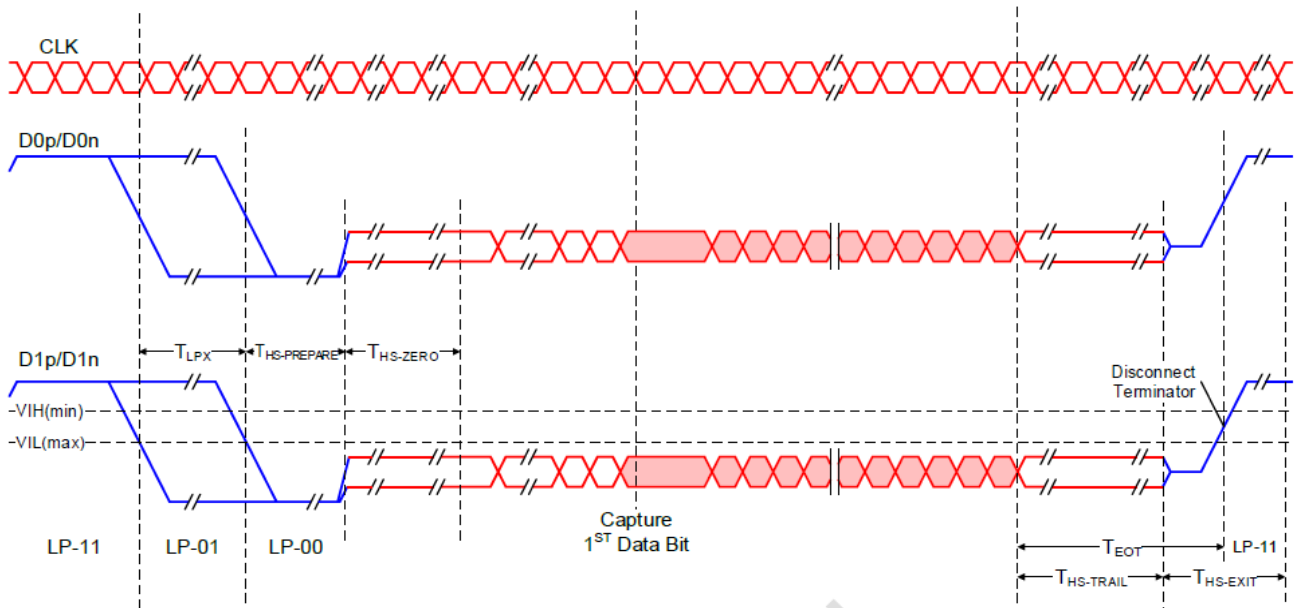
Item	Symbol	Unit	Condition	Min	Typ	Max	Note
Time to drive LP-00 to prepare for HS transmission	$T_{\text{HS-PREPARE}}$	-	IOVCC=1.65~1.95V	40ns +4*UI	-	85ns +6*UI	
Time to drive flipped differential state after last payload data bit of a HS transmission burst	$T_{\text{HS-TRAIL}}$	-	IOVCC=1.65~1.95V	$\max(n \cdot 8 \cdot UI, 60 \text{ ns} + n \cdot 4 \cdot UI)$	-	-	
Time to drive LP-11	$T_{\text{HS-EXIT}}$	ns	IOVCC=1.65~1.95V	100	-	-	
Time-out before new TX side starts driving	$T_{\text{TA-SURE}}$	-	IOVCC=1.65~1.95V	$1 \cdot T_{\text{LPTX}}$	-	$2 \cdot T_{\text{LPTX}}$	
Time to drive LP-00 by new TX	$T_{\text{TA-GET}}$	-	IOVCC=1.65~1.95V	-	$5 \cdot T_{\text{LPTX}}$	-	
Length of any Low-Power state period	T_{LPX}	ns	IOVCC=1.65~1.95V	50	-	-	
Ratio of $T_{\text{LPX(MASTER)}}$ / $T_{\text{LPX(SLAVE)}}$ between Master and Slave side	Ratio T_{LPX}	-	IOVCC=1.65~1.95V	2/3	-	3/2	
Time that the transmitter shall continue sending HS clock after the last associated Data Lane has transitioned to LP mode	$T_{\text{CLK-POST}}$	-	IOVCC=1.65~1.95V	60ns +52UI	-	-	
$T_{\text{CLK-PREPARE}}$ + Time for lead HS-0 drive period before starting Clock	$T_{\text{CLK-PREPARE}} + T_{\text{CLK-ZERO}}$	ns	IOVCC=1.65~1.95V	300	-	-	

Item	Symbol	Unit	Condition	Min	Typ	Max	Note
Time that the HS clock shall be driven prior to any associated Data Lane beginning the transition from LP to HS mode	$T_{CLK-PRE}$	UI	IOVCC=DPHYVCC =1.65~1.95V	8	-	-	
Time to drive LP-00 to prepare for HS clock transmission	$T_{CLK-PREPARE}$	ns	IOVCC=DPHYVCC =1.65~1.95V	38	-	95	
Time to drive HS differential state after last payload clock bit of an HS transmission burst	$T_{CLK-TRAIL}$	ns	IOVCC=DPHYVCC =1.65~1.95V	60	-	-	
Time from start of THS-TRAIL period to start of LP-11 state	T_{EOT}	-	IOVCC=DPHYVCC =1.65~1.95V	-	-	105ns +12*UI	

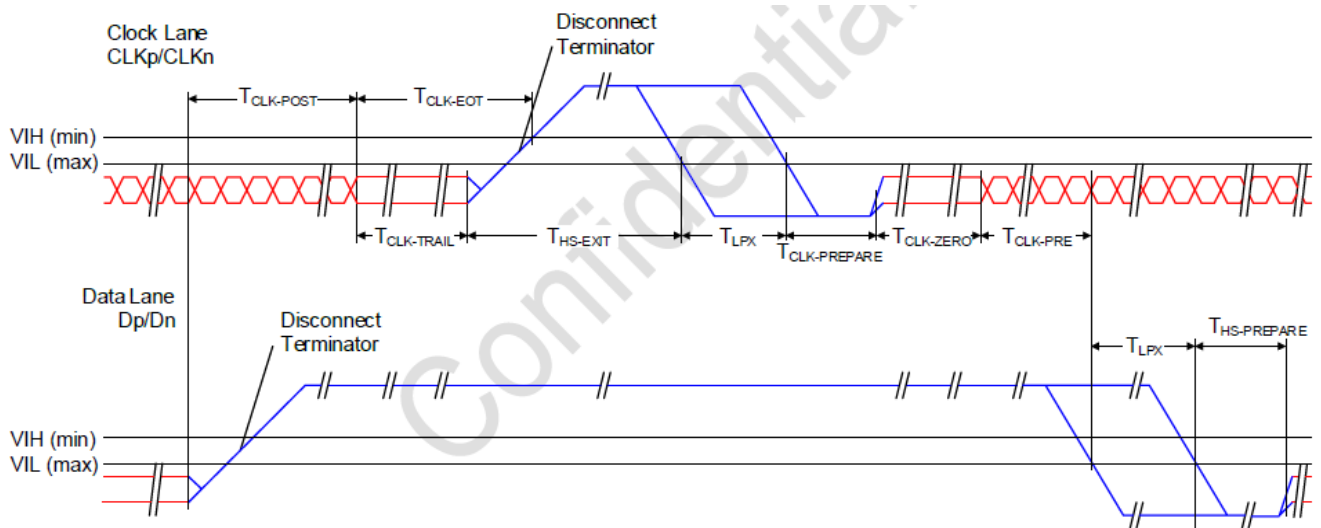


Data to Clock Timing Definitions

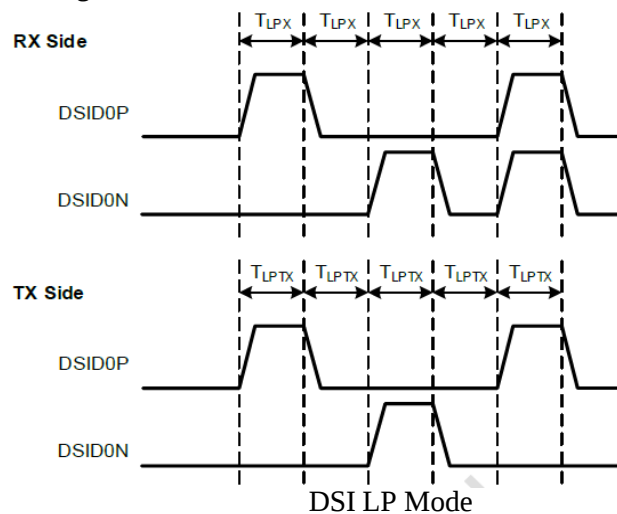




HS Data Transmission in Bursts



Switching the clock lane between clock Transmission and LP mode



DSI LP Mode

MIPI D-phy VideoMode 2port DSC(1:3)

Item		Specification	unit	Note
PHY	D/CPHY	DPHY	-	
	Lane/Trio	8Lane	-	
Comp.	VesaDSC	1/3comp	-	
	Slice width	540	pxl	Horizontal 4slice
	Slice height	divisor of V.resolution	line	typically 8 or 16
Resol.	H resolution	2160	pxl	
	H res + Hdmy	2160	pxl	
	V resolution	3840	pxl	
V	Frame rate	75	Hz	
	V total	4358	line	
	V back porch	20	line	
	V front porch	498	line	
H	1line time	3.06	us	
	H active	360	pxl	per port
	H active + Hdmy	360	pxl	per port
	H back porch	min. 20	byteclock	
	H front porch	min. 20	byteclock	
	MIPI rate	1000	Mbps	
Transmission packet sequence		non burst mode with sync events	-	

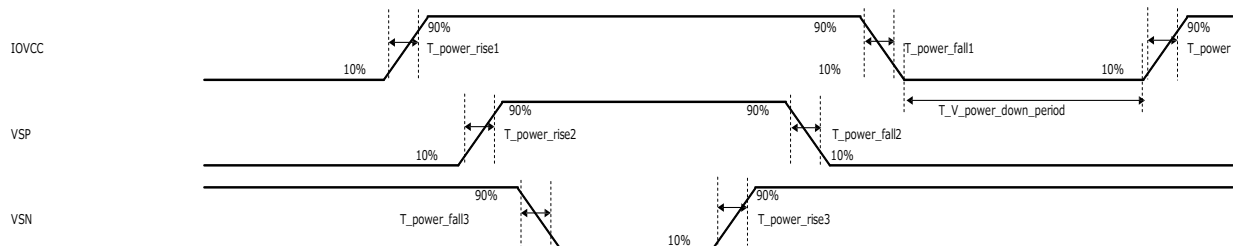
8.3 POWER ON/OFF SEQUENCE

1. Supply Power Voltage

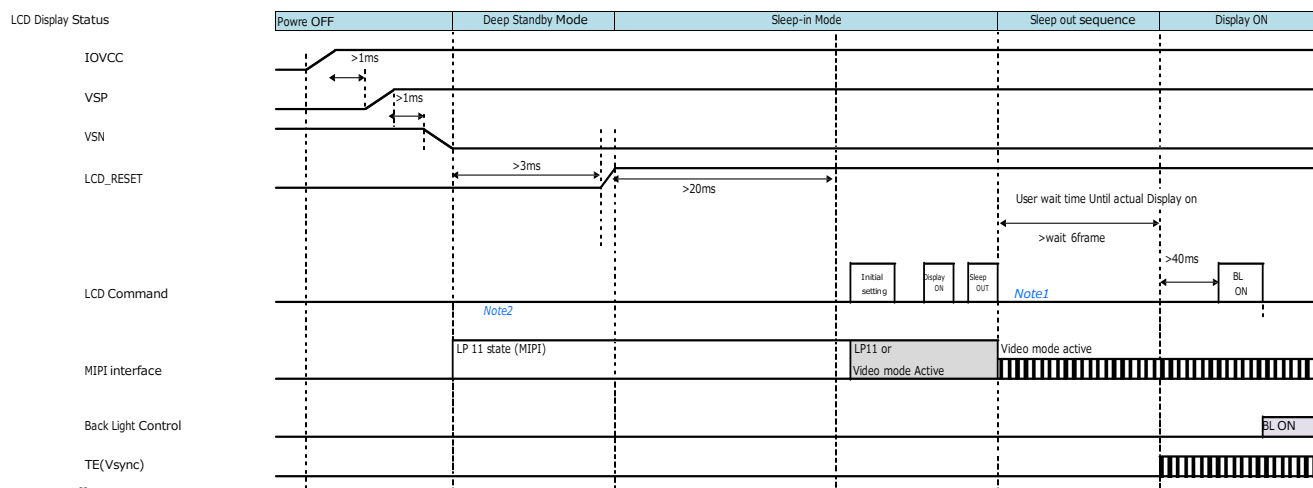
	Min	Typ	Max	Description
VSP	5.6	5.7	5.8	Analog power supply for LCD.
VSN	-5.8	-5.7	-5.6	Analog power supply for LCD.
IOVCC	1.7	1.8	1.9	Digital power supply for LCD

2. Supply Power Slew rate

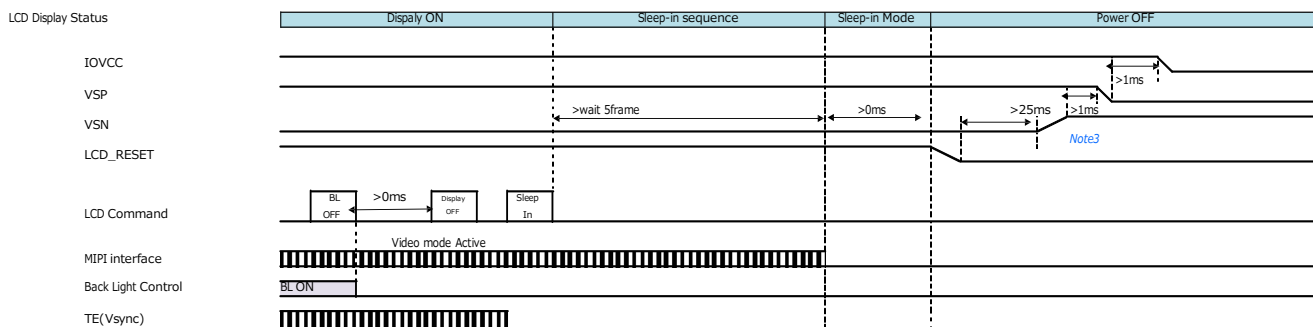
	Min	Typ	Max	Description
T _{power_rise1}	0.2ms	-	5ms	IOVCC from 10% to 90% target voltage
T _{power_fall1}	0.2ms	-	5ms	IOVCC from 90% to 10% target voltage
T _{power_rise2}	0.2ms	-	5ms	VSP from 10% to 90% target voltage
T _{power_fall2}	0.2ms	-	5ms	VSP from 90% to 10% target voltage
T _{power_rise3}	0.2ms	-	5ms	VSN from 10% to 90% target voltage
T _{power_fall3}	0.2ms	-	5ms	VSN from 90% to 10% target voltage
T _{V_power_down_period}	10ms	-	-	IOVCC < 100mV



3. Power On sequence



4. Power Off sequence



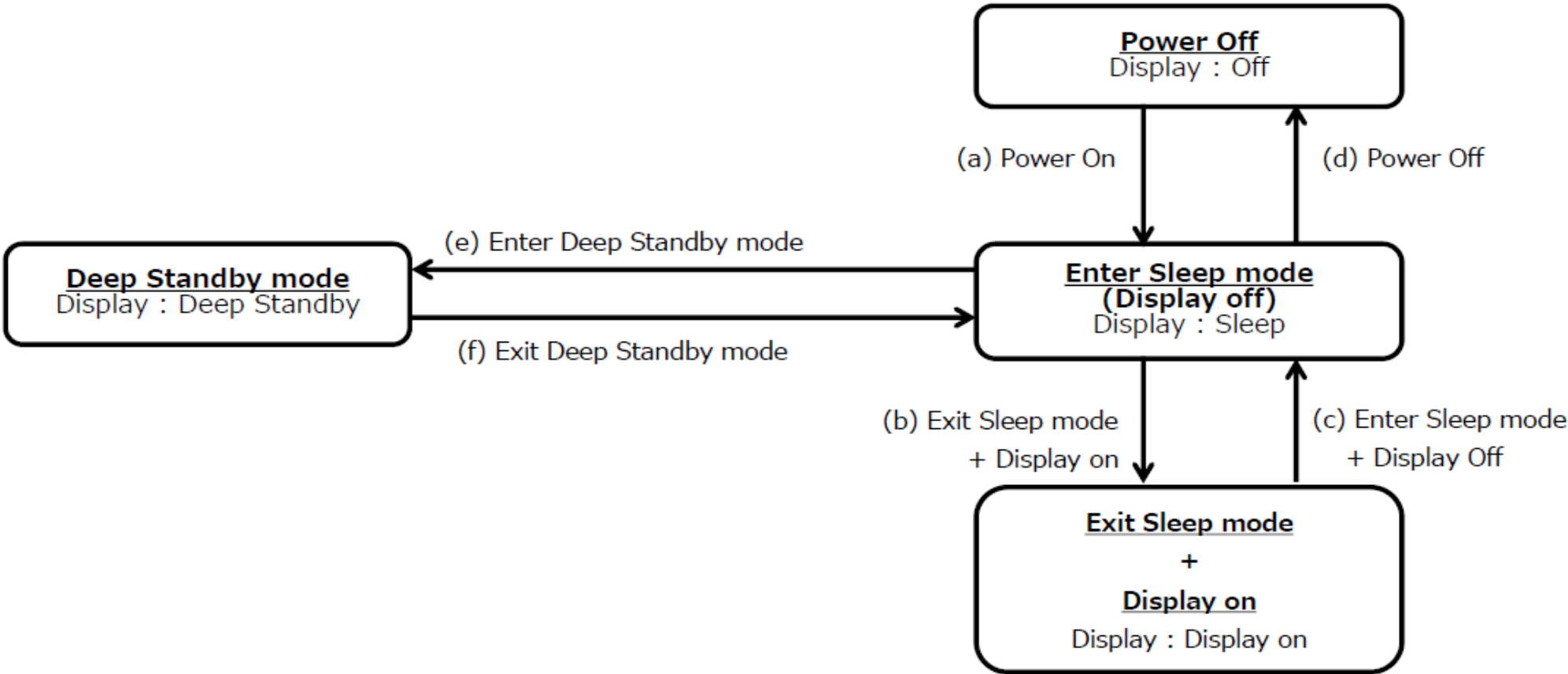
Note 1: After Sleep-out command, Driver IC will reload MTP regssiters and do internal power on action.

Therefore, any initial setting by MIPI should be set after Sleep-outcommand with minimum delay time 6frame.

Note 2: When use MIPI I/F, MIPI lanes must go to LP11 state during power-on and RESET sequece.

Note 3: After Sleep In sequence is completed, turn off power supply (at least VSN,VSP) to avoid flicker and sticking image issue.

State Transition Diagram



(a) Power On Sequence

Step	Action/Command	DSI Data Type (DDIC)	Address	Data	Note
1	RESET="L"				
2	IOVCC On				
3	Wait 1ms (min.)				Over 1ms from IOVCC=90% (depends on External Power Supply Circuit)
4	VSP On				
5	Wait 1ms (min.)				Over 0us from VSP=10%/50% to VSN=10%/50% (depends on External Power Supply Circuit)
6	VSN On				
7	Wait 3ms (min.)				Over 3ms from IOVCC=90% (depends on External Power Supply Circuit)
8	RESET="H"				
9	Wait 20ms (min.)				Wait Min. 20ms

(b) Exit Sleep mode + Display On Sequence (Initial setting & Exit Sleep mode & Display On)

Step	Action/Command	DSI Data Type (DDIC)		Address	Data	Note
1	Manufacture Command access protect	MCS	0x29	0xB0	0x04	Manufacture Command access protect off
2	Sequence control	MCS	0x29	0xD6	0x00	2port
3	DSI Control	MCS	0x29	0xB6	0x30	
					0x6B	
					0x00	
					0x06	
					0x33	
					0x8A	
					0x00	
4	Display Mode	MCS	0x29	0xB7	0x1A	FIFO mode
					0x7A	
					0x54	
					0x00	
					0x00	
5	Generic Outpin setting	MCS	0x29	0xB9	0x01	Generic pin start setting
					0x92	
					0x02	Generic pin pulse width setting
					0x4A	
					0x00	
					0x00	
					0x00	
					0x04	Generic pin start setting
					0xB8	Generic pin pulse width setting
					0x02	
					0x4A	
					0x4A	
6	Display setting1	MCS	0x29	0xC0	0x86	
					0x4A	
					0x04	
					0x0F	
					0x00	
					0x01	
					0x81	
7	Display setting2	MCS	0x29	0xF1	0x1E	
8	Display setting3	MCS	0x29	0xC6	0x70	
					0x08	
					0xD0	
					0x02	
					0x21	
					0xFF	
					0x0E	
					0x5A	
					0x00	
					0x00	
					0x00	
					0x00	
					0x00	
					0x00	
					0x00	
9	Display setting3	DCS	0x39	0xCD	0x00	
10	Display setting4	MCS	0x29	0xCF	0x8B	
					0x00	
					0x80	
					0x46	
					0x61	
					0x00	
					0x8B	
11	Display setting5	MCS	0x29	0xEC	0x01	
					0x68	
					0x00	
					0x00	
					0x00	
12	Additional setting (See, (add-1))					
13	PPS setting	MCS	0x29	0xE6	1st_para	PPS0_A[7:0] (*) Please set the PPS setting
					2nd_para	PPS1_A[7:0]
					93rd_para	PPS92_A[7:0]
					94th_para	PPS93_A[7:0]
14	get_compression_mode	DCS	0x39	0x03	0x01	Compression mode = Enable
15	set_tear_scanline	DCS	0x39	0x44	0x00	
					0x00	
16	set_tear_on	DCS	0x39	0x35	0x00	
17	set_address_mode	DCS	0x39	0x36	0x00	
18	set_pixel_format	DCS	0x39	0x3A	0x77	
19	Video stream Packect Start					
20	Wait 0 frames (min.)					
21	set_display_on	DCS	0x05	0x29	-	
22	exit_sleep_mode	DCS	0x05	0x11	-	
23	Wait 6frame (min.)					Do NOT input any command during ON sequence.
24	Sequence control	MCS	0x29	0xD6	0x80	
25	Manufacture Command access protect	MCS	0x29	0xB0	0x03	Manufacture Command access protect on

Additional setting

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(add-1) additional setting

Step	Action/Command	DSI Data Type (DDIC)		Address	Data	Note
1	Panel setting	MCS	0x29	0xF4	0x01	
					0x18	
					0x65	
					0xBD	
					0xD7	
					0xA9	
					0xFE	
					0x2C	
					0x01	
					0x00	
					0x02	
					0x00	
					0x00	
					0x00	
					0x00	
					0x02	
					0x40	
					0x00	
					0x4D	
					0x8B	
					0x4D	
					0x8B	
					0x4D	
					0x8B	
2	Panel setting	MCS	0x29	0xF1	0x30	
3	Panel setting	MCS	0x29	0xEF	0x15	
					0x01	
					0x00	
					0x00	
					0x00	
					0x01	

(c) Display off & Enter Sleep mode Sequence

Step	Action/Command	DSI Data Type (DDIC)		Address	Data	Note
1	set_display_off	DCS	0x05	0x28	-	
2	set_tear_off	DCS	0x05	0x34	-	
3	enter_sleep_mode	DCS	0x05	0x10	-	
4	Wait 5frame (min.)					

(d) Power Off Sequence

Step	Action/Command	DSI Data Type (DDIC)		Address	Data	Note
1	RESET="L"					
2	Wait 25ms(min.)					Wait Min. 25ms
3	VSN Off					
4	Wait 1ms					
5	VSP Off					
6	Wait 10ms					
7	IOVCC Off					

(e) Enter Deep Standby mode Sequence

Step	Action/Command	DSI Data Type (DDIC)		Address	Data	Note
1	RESET="L"					
2	Wait 25ms(min.)					Wait Min. 25ms

(f) Exit Deep Standby mode Sequence

Step	Action/Command	DSI Data Type (DDIC)		Address	Data	Note
1	RESET="H"					
2	Wait 20ms (min.)					

Information

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DDI version information

Step	Action/Command	DSI Data Type (DDIC)	Address	Data	Note
1	Manufacture Command access protect	MCS 0x29	0xB0	0x04	Manufacture Command access protect off
2	read BFh	MCS 0x14	0xBF	-	check if 5th parameter = 01h
3	Manufacture Command access protect	MCS 0x29	0xB0	0x00	Manufacture Command access protect on

updated
date

23.18. Read Device Code (BFh)

BFh	Read Device Code									
	W/R	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Hex
Command	—	1	0	1	1	1	1	1	1	BFh
1st Parameter	R	ALMID0[7]	ALMID0[6]	ALMID0[5]	ALMID0[4]	ALMID0[3]	ALMID0[2]	ALMID0[1]	ALMID0[0]	02h
2nd Parameter	R	ALMID1[7]	ALMID1[6]	ALMID1[5]	ALMID1[4]	ALMID1[3]	ALMID1[2]	ALMID1[1]	ALMID1[0]	3Ch
3rd Parameter	R	ALMID2[7]	ALMID2[6]	ALMID2[5]	ALMID2[4]	ALMID2[3]	ALMID2[2]	ALMID2[1]	ALMID2[0]	34h
4th Parameter	R	ALMID3[7]	ALMID3[6]	ALMID3[5]	ALMID3[4]	ALMID3[3]	ALMID3[2]	ALMID3[1]	ALMID3[0]	55h
5th Parameter	R	0	0	0	0	0	0	0	1	01h
6th-70th Parameters	R/W	0	0	0	0	0	0	0	0	00h

5th parameter = 01h (A1 version)

23.18. Read Device Code (BFh)

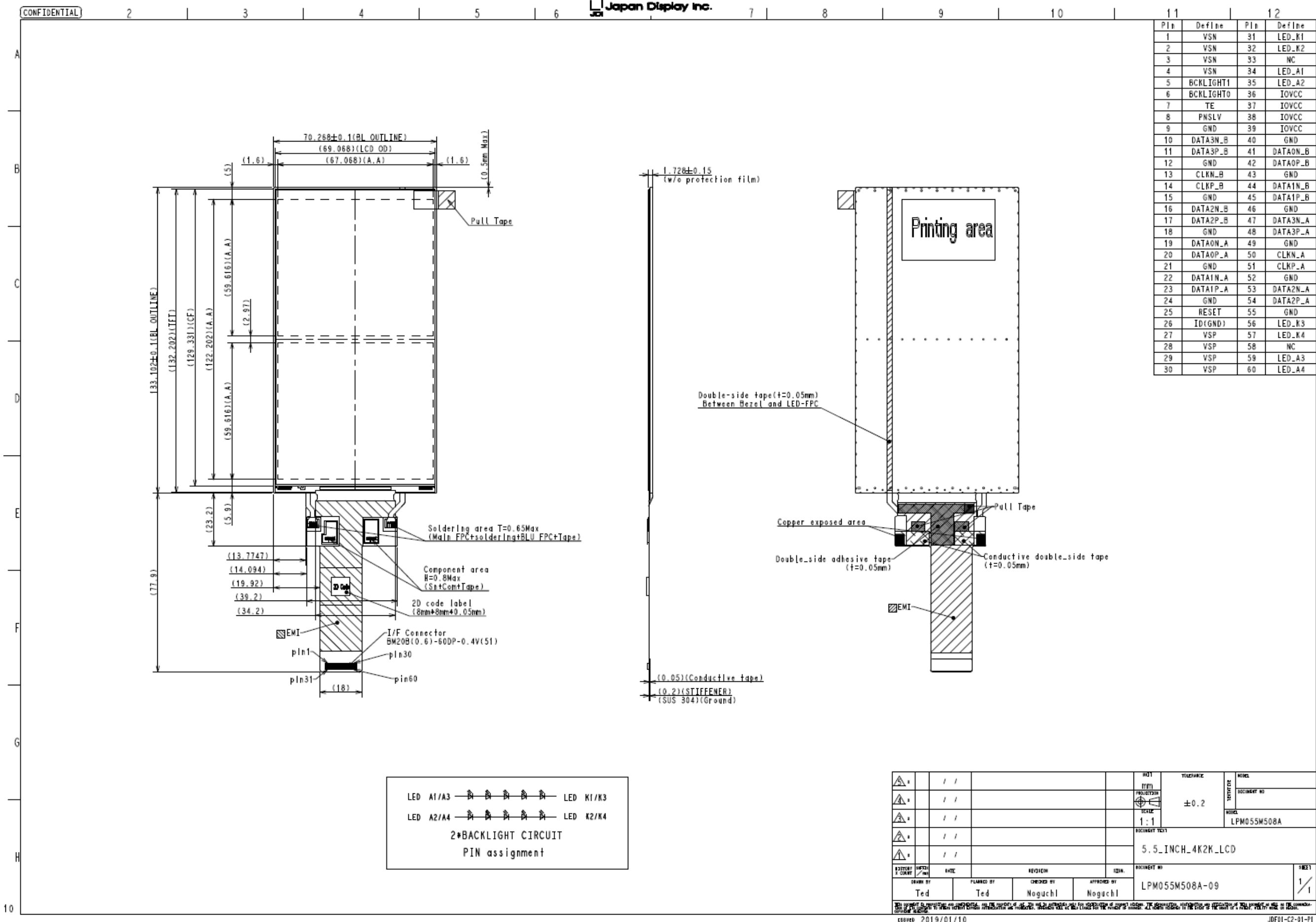
BFh	Read Device Code									
	W/R	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Hex
Command	—	1	0	1	1	1	1	1	1	BFh
1st Parameter	R	ALMID0[7]	ALMID0[6]	ALMID0[5]	ALMID0[4]	ALMID0[3]	ALMID0[2]	ALMID0[1]	ALMID0[0]	02h
2nd Parameter	R	ALMID1[7]	ALMID1[6]	ALMID1[5]	ALMID1[4]	ALMID1[3]	ALMID1[2]	ALMID1[1]	ALMID1[0]	3Ch
3rd Parameter	R	ALMID2[7]	ALMID2[6]	ALMID2[5]	ALMID2[4]	ALMID2[3]	ALMID2[2]	ALMID2[1]	ALMID2[0]	34h
4th Parameter	R	ALMID3[7]	ALMID3[6]	ALMID3[5]	ALMID3[4]	ALMID3[3]	ALMID3[2]	ALMID3[1]	ALMID3[0]	55h
5th Parameters	R	0	0	0	0	0	0	0	0	00h
6th-70th Parameters	R/W	0	0	0	0	0	0	0	0	00h

5th parameter = 00h (A0 version)

9. DIMENSIONAL OUTLINE

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Japan Display Inc.



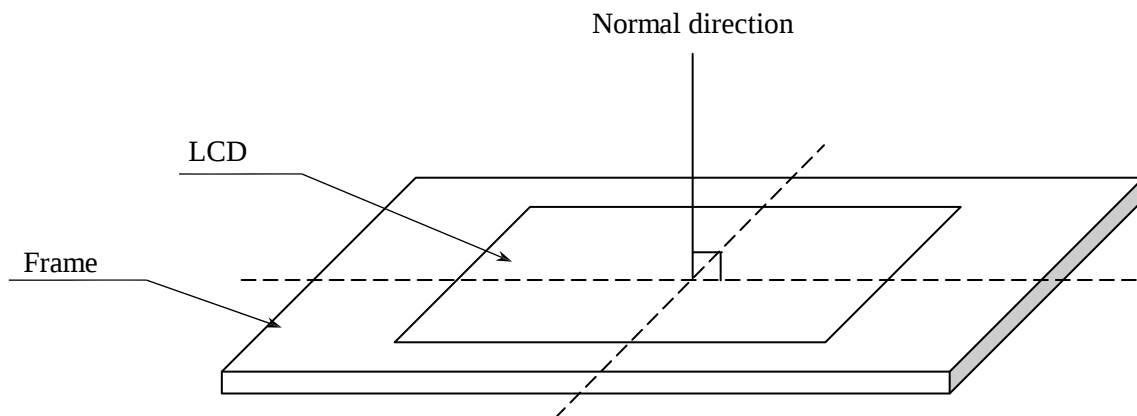
△	/	/	△	/	/	△	/	/	△	/	/
DRAWN BY				PLANNED BY				CHECKED BY			
Ted				Ted				Noguchi			
DATE				REVISION				SHEET			
11/8/2018				1				1/1			
LPM055M508A-09				LPM055M508A				5.5-INCH_4K2K_LCD			
JDF01-C2-01-01				JDF01-C2-01-01				JDF01-C2-01-01			

10. VISUAL INSPECTION

10.1 INSPECTION CONDITION

- | | |
|--|-------------------------------------|
| (1) Ambient illumination 1 | : 0 - 40[lx] for B/L ON item |
| (2) Ambient illumination 2 | : 1000 - 1200 [lx] for B/L OFF item |
| (3) Distance between inspector's eyes and LCD Module | : Approximately 20 [cm] |
| (4) Viewing angle | : 0 °(Normal direction) |
| (5) Ambient Temperature | : 25 °C |

Refer to the Measurement Conditions described
in Item 6 for the conditions other than specified here.



10.2 DEFINITION OF ZONE

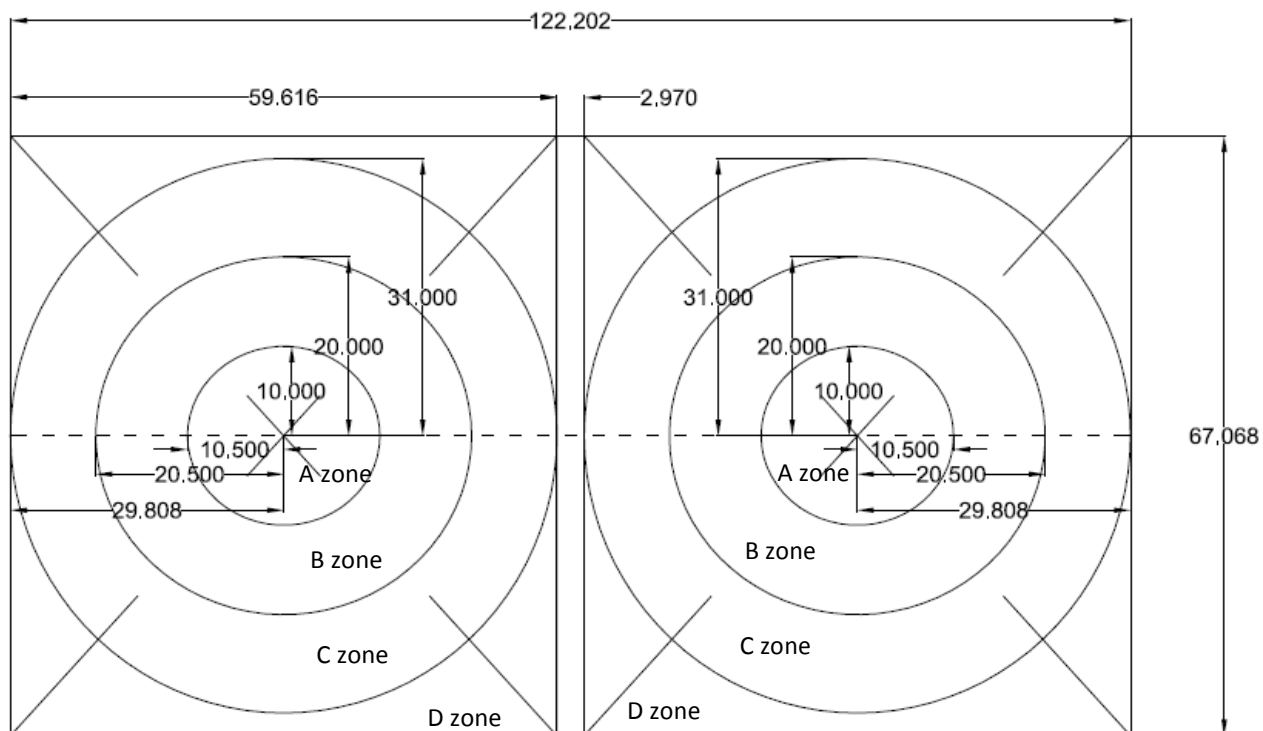
The visual inspection zones of LCD Module is divided into four as follows.

A zone : Inspection area for VR Active Area A

B zone : Inspection area for VR Active Area B

C zone : Inspection area for VR Active Area C

D zone : Whole LCD module except A, B and C zone (Including FPC and frame)

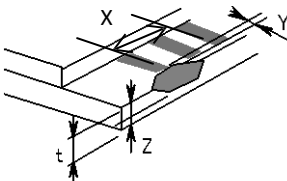
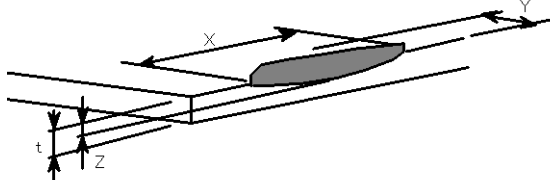
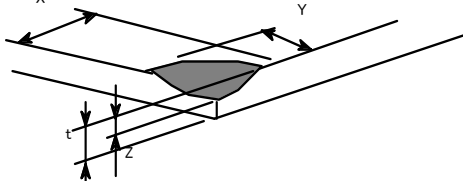
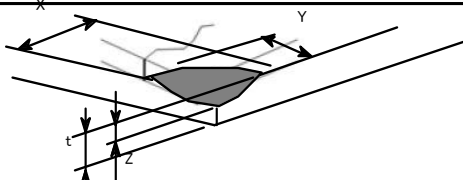


10.3 COSMETIC SPECIFICATION

10.3.1 Screen Defects Specification for LCD Module

No.	Item			Maximum Acceptable Number	Unit	Applied zone	LCD module	Back light	Note			
1	Bright Defect (Bright Dot, Bright Foreign Particles, Stain, Scratch, Air Bubble)			Ignored	PC	D	On		(1), (2), (4)			
				Defect size > D (White)	0/ per eye	PC				A, B, C		
				Defect size ≤ D (White), check the						-	-	-
					Brightness is equal to or darker than Bright Defect Limit Pattern (R,G,B,W)	Ignored				PC	A, B, C	
					Brightness brighter than Bright Defect Limit Pattern (R,G,B,W)	0/ per eye				PC	A	
						1/ per eye				PC	B	
						2/ per eye				PC	C	
2	Dark Defect (Dark Dot, Dark Foreign Particles, Stain, Scratch, Air Bubble) D:Average diameter [mm]			Ignored	PC	D	On		(3), (4)			
				Defect size > (L)	0/ per eye	PC				A, B, C		
				(SS) < Defect size ≤ (L)						2/ per eye	PC	C
					Defect size > (S)	0/ per eye				PC	A, B	
					Defect size ≤ (S)	0/ per eye				PC	A	
						2/ per eye				PC	B	
				Defect size ≤ (SS)						Ignored	PC	A, B,C
3	Total number = Bright defect + Dark defect			N<=4, DS>=4mm /per eye	PC	A, B, C	On	-				
4	Line Defect			0	PC	A, B, C	On	(4)				
5	Uneven Brightness (Linear)			Serious one is not allowed	-	A, B, C	On	(4), (6)				
6	Uneven Brightness (Circular)											
7	Scratch of Polarizer (Liner)[mm] W:Width, L:Length	W≤0.05	L≤5	Ignored	PC	A, B, C	ON	(5), (6), (7)				
			5<L	0								
		0.05<W	-	0								
8	Scratch of Polarizer (Circular)[mm] D:Average diameter	D≤0.25		Ignored	PC	A, B, C	ON	(5), (6), (7)				
		0.25<D		0								
		-		-								
9	Air Bubble [mm] D:Average diameter	D≤0.25		Ignored	PC	A, B, C	ON	(5), (6), (7)				
		0.25<D		0								
		-		-								
10	Scratch of FPC			Serious one is not allowed	-	D	Off	(7)				

10.3.2 Panel chipping Specification: It is internal standard, and this is not guaranteed SPEC.

Item	Criterion for Defects		Note
Glass Chipping [Pad Area]		Size (mm) $X \leq 3.0$ $Y \leq 0.5$ $Z \leq t$	
Glass Chipping [Except Pad Area]		Size (mm) $X \leq 3.0$ $Y \leq 1.0$ $Z \leq t$	
Glass Chipping [Corner PAD Area]		Size (mm) $X(\text{or } Y) \leq 2.5$ $Y(\text{or } X) \leq 2.5$ $Z \leq t$	
Glass Chipping [Corner No Pad Area]		Size (mm) $X(\text{or } Y) \leq 1.0$ $Y(\text{or } X) \leq 2.0$ $Z \leq t$	
Progressive crack is NG			

10.3 COSMETIC SPECIFICATION

10.3.3 FPC defects

No.	Item	Criterion for Defects	Note
1	FPC Bending	The significant defect is unacceptable	(6)
2	Stiffener Scratch	The significant defect is unacceptable	
3	Pin Stain	The significant defect is unacceptable	
4	Dent	The significant defect is unacceptable	
5	Pinch	The significant defect is unacceptable	
6	Connector Pin Bending	Not allowed	-
7	Connector Abrasion	Not allowed	-
8	Connector Deformation	Not allowed	-
9	Connector Model Crack	Not allowed	-
10	Solder Defect	Not allowed including solder paste etc.	-
11	Solder Height	Refer to outline drawing	-

10.3.4 B/L defects

No.	Item	Criterion for Defects	Note
1	Scratch	The significant defect is unacceptable	(6)
2	Deformation	The significant defect is unacceptable	
3	Stain	The significant defect is unacceptable	
4	Dent	The significant defect is unacceptable	
5	Assembly misalignment	Not allowed	-
6	Printing defects	Cha(?)	-
		Must be within specified position	-

Notes (1) Bright defects are judged the condition below.

Bright defect judgment pattern

Item	White	Red	Green	Blue	D(white)
Bright Defect Limit Pattern	50	105	50	110	-
Dummy White Dot of Limit Pattern	-	-	-	-	135

Display screen : Black (W0)

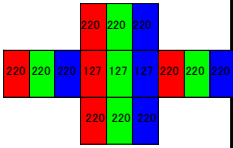
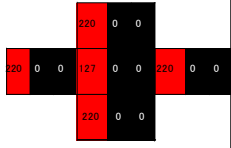
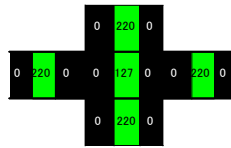
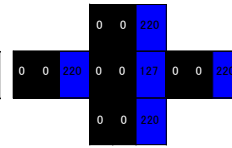
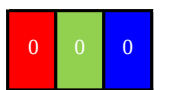
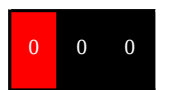
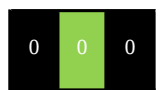
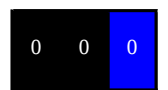
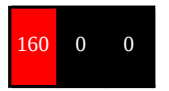
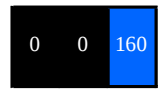
The defect size is judged by visual comparison with the dummy white dot pattern.

(2) Defective dots which are not adjacent are taken as a single Dot Defect each.

Two adjacent defective dots are considered as a single Dot Defect.

(3) Dark defects are judged the condition below.

Dark defect judgment pattern

Display screen	White (W255)	Red (R255)	Green (G255)	Blue (B255)
Dummy Dark Dot of Limit Pattern (L)				
Dummy Dark Dot of Limit Pattern (S)				
Dark Defect Limit Pattern (SS)				

Display screen : White (W255), Red(R255), Green(G255), Blue(B255)

The defect size is judged by visual comparison with each dummy dot pattern.

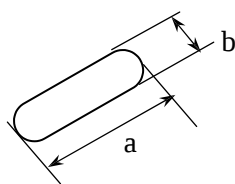
(4) Defect is judged with the Lupe (10x) (or other equivalent method) and it is disregarded if it can not be recognized through the lens.

(5) Something which can be easily wiped off is disregarded as a defect.

(6) In case a problem arises, both parties should discuss needed items such as limit samples.

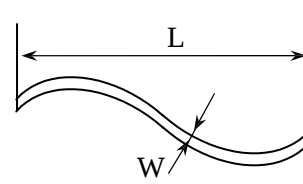
(7) Definitions for D, W and L are as follows.

Definition of D

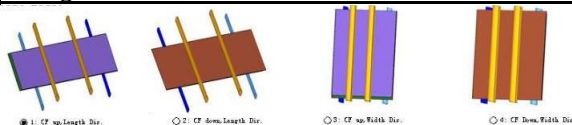


$$D = \frac{a + b}{2} (\text{mm})$$

Definition of W and L



10.4 RELIABILITY TEST

100% RELIABILITY TEST			Confidential	
No.	Test Items	Conditions		Note
1	High temperature, operating	70℃	240h	(1), (2)
2	Low temperature, operating	-30℃	240h	
3	High temperature & high humidity, operating	60℃, 90%RH	240h	
4	High temperature, Non-operating	80℃	240h	(2)
5	Low temperature, Non-operating	-40℃	240h	
6	High temperature & high humidity, Non-operating	60℃, 90%RH	240h	
7	Thermal shock, Non-operating	-40℃ (0.5h) / +80℃ (0.5h)	100cyc	
8	Static Electricity	1. HBM(Power off) C=100pF, R=1.5kΩ V=+/-1kV (discharge on I/F connector pins) 2. Contact discharge(Power off) C=150pF, R=330Ω V=+/-4kV (Contact discharge)		(2),(4)
9	Packing vibration	Random vibration frequency:5-500Hz, PSD:0.04-0.000006G^2/Hz Time: X(18min), Y(18min), Z(101min) Condition on the stage: Fixed		(3),(5)
	Packaging drop	Drop height : 80 cm, Dropping the package on 1 corner, 3 edges, 6 surfaces, once		
10	Tray compression	w/o products, strength ≥120kg		(5)
	Tray load	w/ products, 72h		(6)
	Tray portion press	w/ products, strength:10kg, 20kg, 30kg		(7)
11	Afterimage test1	25℃, 6h, operation		(8)
12	Afterimage test2	60℃, 1h, operation		(9)
13	FPC drag test	Vertical tension: FOG strength ≥5N/cm Horizontal tension: FOG strength ≥10N/cm		(10)
14	FPC bend test	After 20 times bending, no defects occurred		(11)
15	FOF(LED-FPC) drag test	Strength ≥2N		(10)
16	4PB Test for panel	 Down span L1=30mm, L2=60mm. B10≥110		(12)

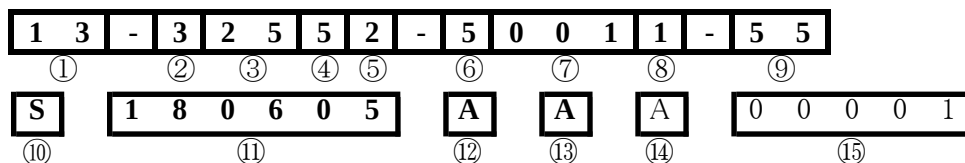
Notes

- (1) Operation conditions : IOVCC=1.8V, VSP=5.7V, VSN=-5.7V, fFLM=75Hz.
- (2) To be no defective functions related to electrical and/or optical characteristics when the tested module operates.
- (3) One set includes 2 inner bags and each inner bag has 10 trays which contain 160 pieces of LCD modules each and an empty tray as the cover.

11. DESIGNATION OF LOT MARK

11.1 BLU MARK

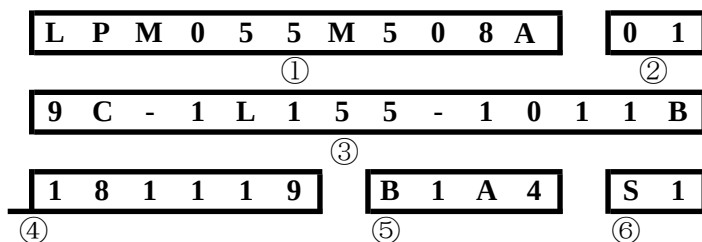
BLU lot mark is printed on the back of the LCD module.



Mark	digit	Item	Note
①	2	Material Category	DJN internal material category. "11"=LCD, "13"=BLU, "15"=FPC, ...
②	1	Brightness Level	"1"=Low Brightness, "2"=High Brightness, "3"=With ESR
③	2	Size	5.5" inch. ("55"=5.5" inch)
④	1	LED Quantity	1~9, 0=10, A=11, B=12, ...
⑤	1	LED Connection	"1"=Parallel connection, "2"=Series connection, "3"=Series-Parallel connection.
⑥	1	Structure	"5"=Rubber-iron integrated structure of BLU back plate.
⑦	3	Serial (Decimal)	Serial No. from 000 to 999.
⑧	1	Version	Version No. (1, 2, ...)
⑨	2	Vendor Code	M508A case is "55".
⑩	1	Supplier code	"S".
⑪	6	Production Date	1-2 digit: Last two digit of year 3-4 digit: Month 5-6 digit: Day
⑫	1	Dept	"A"=制四, "B"=制五, "C"=制九, "D"=制十
⑬	1	Line	"A"= #1, "B"= #2, "C"= #3
⑭	1	Shift	"A"= Day shift, "B"= Night shift
⑮	1	Serial (Decimal)	Serial No. from 00001 to 99999.

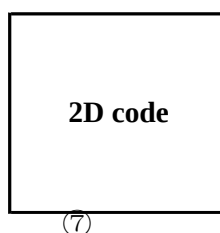
11. DESIGNATION OF LOT MARK**11.2 PRODUCT LOT MARK**

Product lot mark is also printed on the back of the LCD module, below the BLU lot mark.



Mark	digit	Item	Note
①	11	JDI Part No.	LPM055M508A
②	2	External Rev.	Write last 2 digit of JDI product code. 200124601 case, write "01".
③	14	DJN Part No.	9C-1L155-1011B
④	6	Production Date	1-2 digit: Last two digit of year 3-4 digit: Month 5-6 digit: Day
⑤	4	Production info	1st digit: DJN Building No. 2nd digit: Floor No. 3rd digit: Shift No. ("A" or "B") 4th digit: Line No. (1~7)
⑥	2	Bom Version	1st digit: "S" as trial run / "A" as MP 2nd digit: definition is "1".

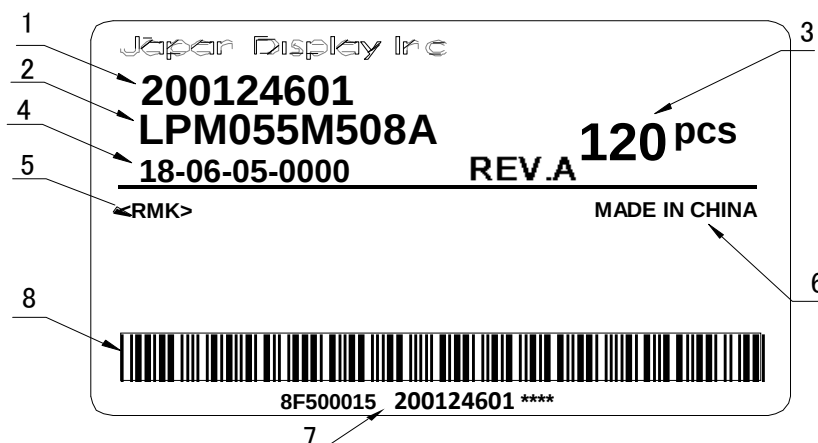
2D code label stucked on FPC



⑦	10	2D code	1-3 digit: 508 4-5 digit: last 2 digit of JDI product code.as "01" 6-10 digit: serial number start from "00000"
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11.3 Outer box LABEL FORMAT

Outer Label format:



Label content

	Item	Content
1	Product Code	Trial code is "2001246T2/T3/T4..."; MP code is "200124601"
2	Product Name	"LPM055M508A".
3	Quantity	n=1~120 pcs
4	Date Code	"Year-Month-Day-0000"
5	RMK	Currentlt no need
6	Production Country	Made in China
7	Barcode	Refer to below

Barcode content

	Item	Content
8	Barcode Text	LOT No.(8 digits) + Product Code(11 digits) + Quantity(4 digits) + Space(2 digits)

Detail of Barcode

LOT No.

Product Code

Quantity

Space

8

B

5

0001

5

U U

200124601

U U

-Total: 25 digits

- Space:2 digits

- Quantity:4 digits

- Space+Code:11 digits

- Random:1 digit

※0~9,A~Z(I,O not include)

- Serial:4 digits

- Day:1 digit

※0~9,A~X(I,O not include)

- Month:1 digit

※A~M(I not include)

- Year:1 digits

12. PRECAUTIONS IN DESIGN

12.1 GENERAL ATTENTION

- (1) The LCD module covered by this specification has been designed specifically for a mobile phone application. When used for other applications, we do not warrant any of the content of these specifications including quality and safety sections. Furthermore, this module has not been explicitly developed for medical equipment critically related to human life such as life support apparatus.
- (2) Never attempt to disassemble this LCD module. There is a danger of burns, electric shock, and injury. If the module is disassembled, we do not warrant any of these specifications including quality and safety sections.

12.2 PRECAUTIONS AGAINST ELECTROSTATIC DISCHARGE

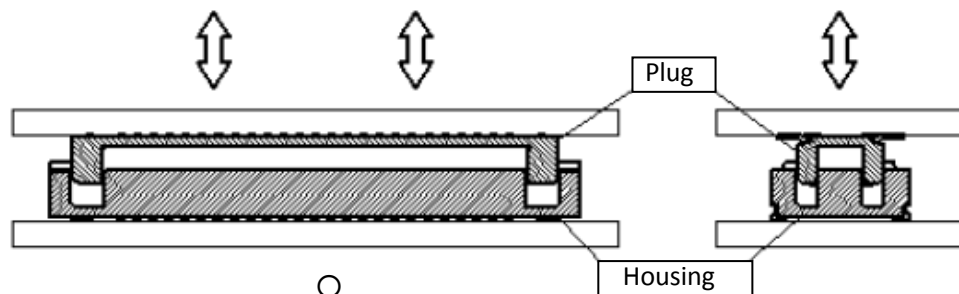
This module includes C-MOS LSI(s), which are sensitive and vulnerable to electrostatic discharge. Any operator should be grounded with suitable anti-ESD equipment such as a wrist band when handling the module. Avoid touching terminal pins directly.

12.3 HANDLING PRECAUTIONS

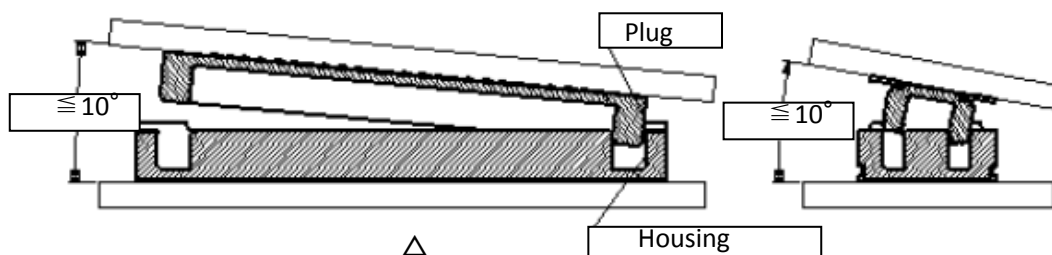
- (1) Do not subject the LCD module to a humid environment for any extended period. If the ambient storage temperature is over 35 °C, steps should be taken to avoid high humidity. The polarizer can deteriorate under high temperatures and high humidity. Additionally, this can also cause the polarizer to bubble and peel. Please store/operate the LCD module within the specified temperatures and humidity ranges.
- (2) As polarizer material tends to be easily scratched, the LCD module must be handled with due care to avoid touching, pressure or rubbing by any material which is harder than 3H pencil lead (e.g. metal fixings, tweezers, glass, etc.)
- (3) No pressure more than 19.6 kPa must be applied to the LCD module surface. If pressure is exerted over an area of less than 1 cm², the maximum pressure must not exceed 1.96 N.
- (4) As adhesives containing organic materials are used for securing upper and lower polarizers, these can be deteriorated by chemical reaction with chemicals such as acetone, toluene, ethanol and isopropyl alcohol (IPA). The following solvent is recommended for use : Normal Heptane. Please contact us if it is necessary to use chemicals other than these mentioned above.
- (5) Lightly wipe the surface with a clean, soft material such as a cotton swab or cleaning cloth for glasses, dampened with the recommended chemical. Always wipe the surface horizontally or vertically. Never wipe using a circular motion and avoid excess pressure or scrubbing. To prevent the display surface from damage and to maintain in a good state, it is generally sufficient, to wipe the surface with a cotton swab.
- (6) If spittle or a water drop comes in contact with the display area, immediately wipe it off. Liquids can damage the LCD module resulting in deformation and faded color.
- (7) Condensation on the LCD module may cause staining, dirtying or damage to the polarizer. If it is necessary to move the LCD module from an area of lower ambient temperature to a higher one, it is required to let it normalize to the new ambient temperature before unpacking or use.

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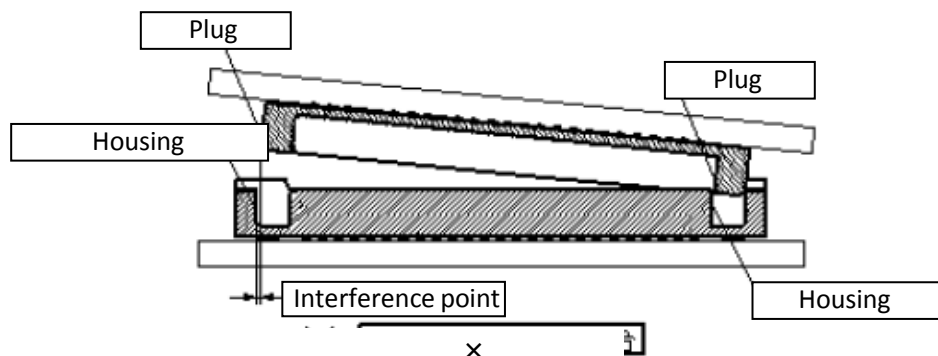
- (8) Touching the display area or the terminal pins with bare hands or contaminating them should be avoided. In our experience, staining on the display area and poor insulation between terminals are often caused by being touched with bare hands. (Some cosmetics are detrimental to polarizers.)
- (9) As the display is made of glass, it is possible to break under shock loads, especially the periphery can be easily cracked or chipped in handling. Please handle the module with care and prevent it from being dropped.
- (10) Never bend nor scratch the interface part. These actions can cause poor electrical contact.
- (11) Since the top and bottom areas of bent FPC tend to be easily damaged, be very careful not to push or hold in those areas.
- (12) Be careful not to apply local stress to the back of the LCD module. This will potentially cause scratching to the backlight guide, or result in a non-uniformity issue. Pay extra attention to the interface connector portion at the time of connector insertion.
- (13) Never hold the LCD module by the FPC when handling.
- (14) Please insert the FPC into the connector first, keeping the FPC parallel to the connector's opening. Be sure to lock the connector before securing the module.
- (15) Connector inserting operation
Please mate BM20 connectors by hands.
Manual for inserting operation
- 1) Please mate the connector with parallel manner



- 2) Please locate the inside wall of rec. housing and plug before mating.
In the case of skew mating, please do not mate the connector at more than 10° in angle. (Figure-2)

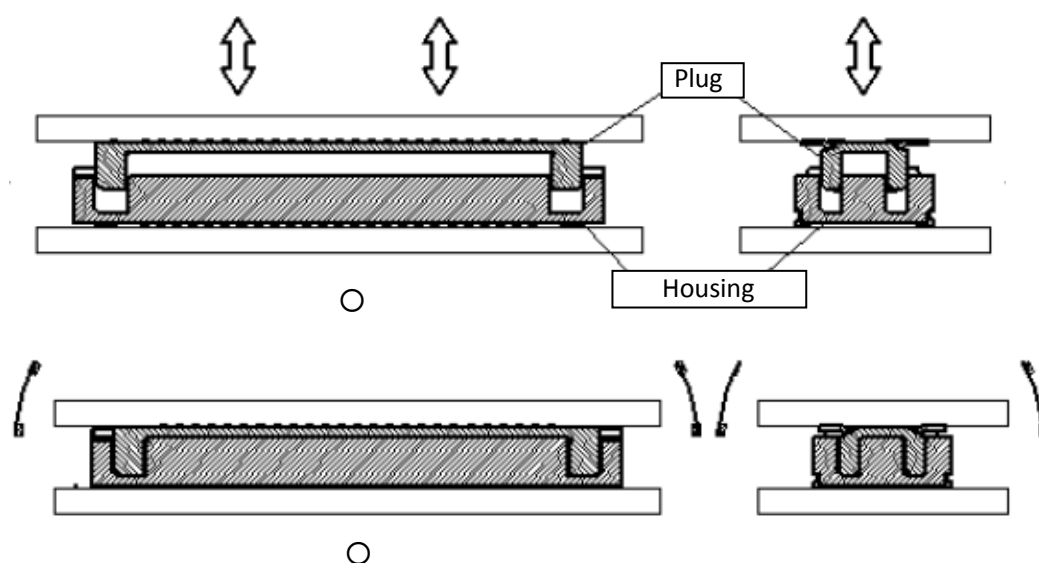


3) Please do not mate connector at an angle as this manner. Because the housing might be broken.

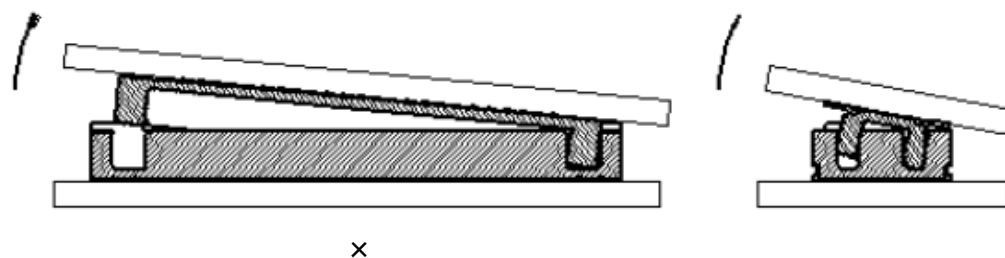


(16) Connector withdrawing operation

1) Please extract the connector with parallel manner .or swing them right to left slightly.



2) Please take care of excess twist extraction.



12.4 OPERATION PRECAUTION

(1) Noise spikes can cause a malfunction of the circuit. Recommended condition of spike noise level is:
 $V_{cc} = \pm 200 \text{ mV}$ (over and under shoot voltage).

(2) Response time depends on temperature (at a lower temperature, it becomes longer).
 Brightness and color are also temperature dependant.

- (3) Be aware of the possibility of condensation under a sudden temperature change. Formation of dewdrops can cause damage to polarizer or electrical contacts and result inferior displaying or malfunction. And even after the condensation has dispersed, smears or spots may occur on the display surface.
- (4) When a fixed pattern is displayed for a long period, afterimage is likely to occur.
- (5) As the LCD module provides a high frequency circuit, sufficient countermeasures against electromagnetic noise, such as shielding, may be required.
- (6) Do not connect nor disconnect the module to or from main system with power applied.
- (7) Provide light shielding so that the driver is not exposed to light. Exposure to strong light may cause malfunction of the driver.

12.5 STORAGE

The following precautions are necessary in long-term storage for the LCD modules.
(e.g., stock as spare parts)

- (1) Store the LCD modules in a dark place; do not expose them to sunlight or fluorescent light. Keep the temperature between 10 and 30 °C, and the humidity between 55% and 75%RH.
- (2) The polarizer surface should not come in contact with any other object. It is recommended that the LCD modules are stored in the container in which they were shipped.

12.6 SAFETY

This LCD module is a glass product. In case of damage, ensure operators wear a pair of protective gloves whilst handling it. Additionally, if any liquid (liquid crystal) accidentally comes into contact with skin, immediately wash it off with soap and water.

12.7 MECHANICAL DESIGN

- (1) The design of the mobile phone case and other components for this LCD module should be well studied so that any shock will not be transferred to the LCD module. When the mobile phone is dropped and the case provides insufficient shock absorption, the LCD module may become damaged.
- (2) Providing a cushion material (e.g. PORON) in the case will help to reduce shock load transfer to the LCD driver.
- (3) To prevent foreign substances from entering the display area, please apply a polyurethane foam cushion (e.g. PORON) around the LCD.
- (4) To prevent display defect caused by LCD module deformation, warpage and excess pressure to LCD module, fully-considered phone design and well-controlled lamination and assembly process are required.

12.8 ENVIRONMENTAL PROTECTION

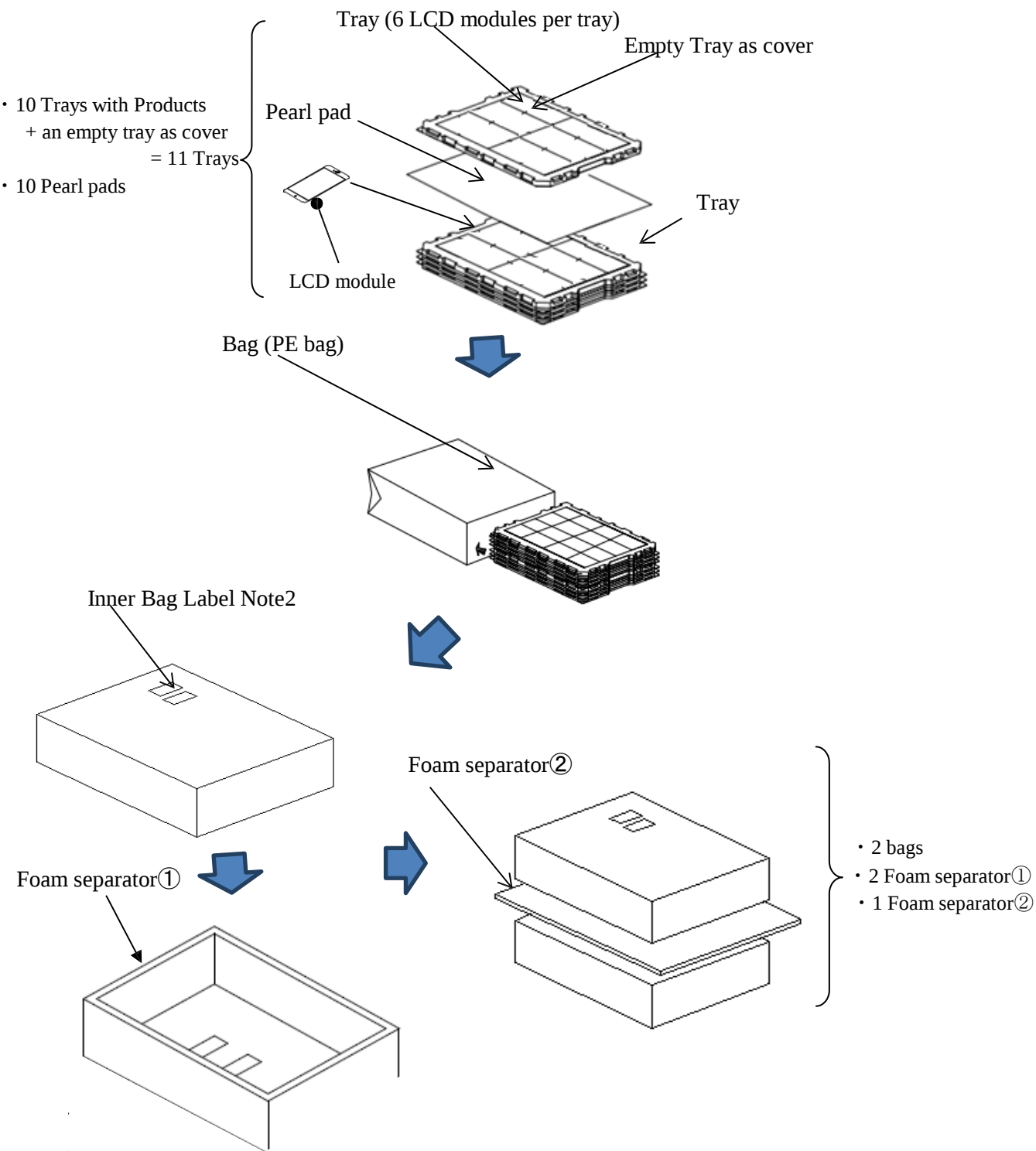
- (1) Abide by national laws, legislation and local regulations when disposing of this LCD module.
- (2) This LCD module complies with RoHS Directive.

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13. PACKING SPECIFICATIONS

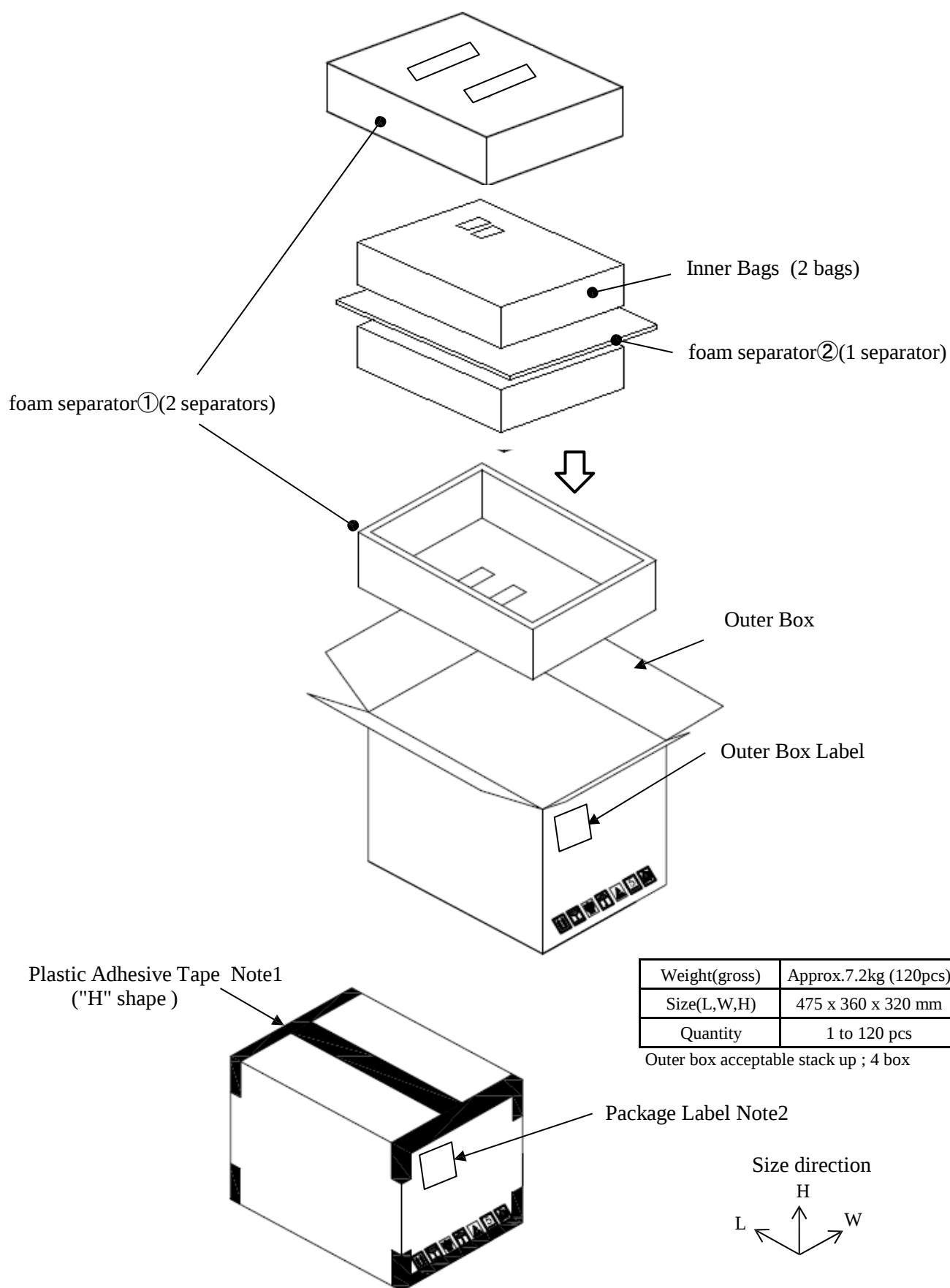
13.1 INNER BOX SPECIFICATIONS

- (1) Tray packing
- 11 trays are stacked up
The top tray has no LCD modules; it is used as cover.
 - The pearl pad is put in every two trays .
 - The stacked 11trays are put in a PE bag.
 - * Please be careful not to damage the bag.
 - The pack is put in Foam separator①.



(2) Packing into an outer box

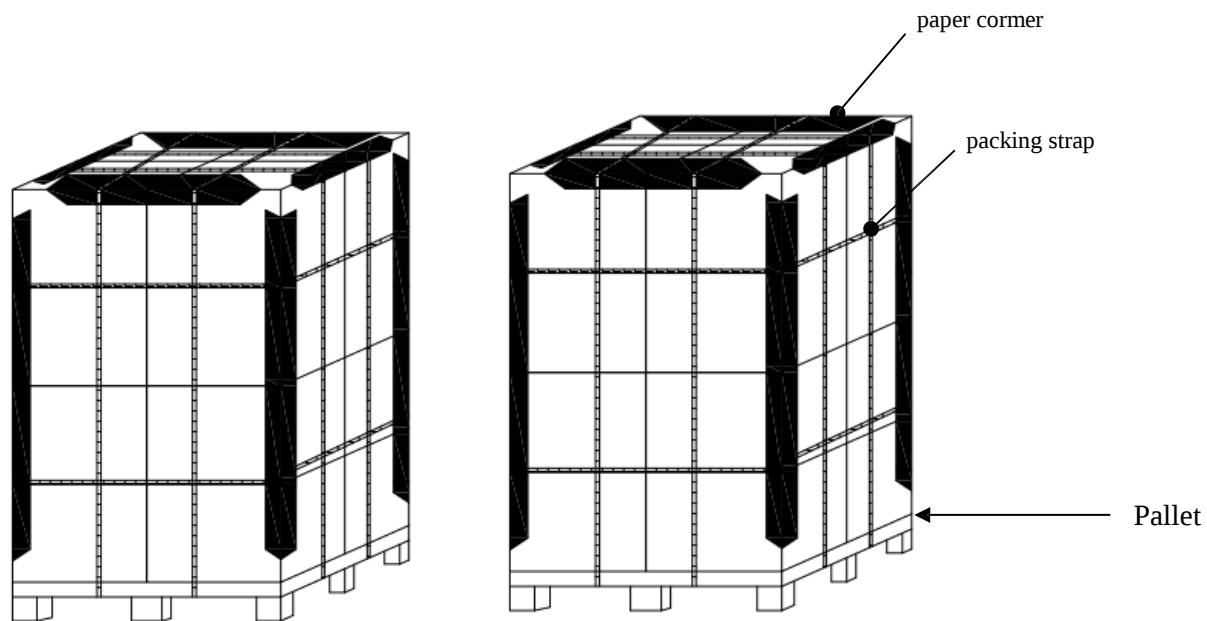
- 2 inner bags, 2 foam separator① and 1 foam separator② to be packed in one outer box.
- In case no enough LCD modules in inner bag, foam separator① will be filled with foam.



13.2 PALLET SPECIFICATIONS

Outer boxes are packed by stretchable film, corrugated cardboard and corner angles.

Stacking pattern of Outer Boxes



4 Outer Boxes per Layer * 4 Layers
=16 Outer Boxes

Weight (gross)	Approx.240kg (1920pcs)
Size (L, W, H)	1100 ×900 ×100 mm(Plywood Pallet) 1100 ×900 ×100 mm (Plastic Pallet)
Quantity	1920 pcs Max.

Pallet acceptable stack up ; 1 pallet

