EXAMINED BY : Kevin Kuo	EMERGING DISPLAY TECHNOLOGIES CORPORATION	FILE NO . CAS-0009049
		ISSUE : AUG.03, 2021
APPROVED BY:		TOTAL PAGE : 28
		VERSION : 6

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :

ETML070023UDRA

(RoHS)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

RECORDS OF REVISION

DOC . FIRST ISSUE

AUG.03, 2020

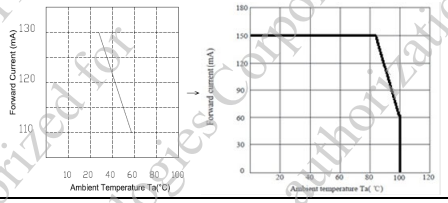
DATE	REVISED PAGE NO.	SUMMARY
SEP.04, 2020	3	3.3 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS AMBIENT TEMPERATURE: REMARK: DELETE NOTE (4) DELETE NOTE (4)
	4	4.1 LCD MODULE ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	—	3.15	3.30	3.45	V	
POWER SUPPLY VOLTAGE FOR LED DRIVER	VBL+-VSS	—	9.0	12.0	15.0	V	
POWER SUPPLY CURRENT FOR LED DRIVER	IBL	VBL+-VSS=12.0V	—	(496)	(645)	mA	

↓

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	—	3.0	3.3	3.6	V	
POWER SUPPLY VOLTAGE FOR LED DRIVER	VBL+-VSS	—	5.0	12.0	15.0	V	
POWER SUPPLY CURRENT FOR LED DRIVER	IBL	VBL+-VSS=5.0V	—	(951)	(1240)	mA	
		VBL+-VSS=12.0V	—	(496)	(645)		

NOTE (3) :



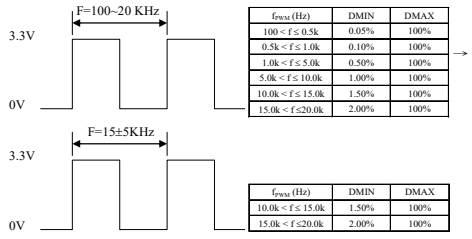
	12	7. OUTLINE DIMENSIONS MARK △1 : ADD X,Y ORIGIN & MODIFY FPC PAD WIDTH TOLERANCE
	13	8. BLOCK DIAGRAM 45.NC→45.CS(NC)/ID1, 46.NC→46.SDIN(NC)/ID2, 47.NC→47.SCK(NC)/ID3, 48.NC→48.DISPLAY CONTROL/ID4
	16	10.1 IF1

PIN NO.	SYMBOL	FUNCTION
45	NC	NON CONNECTION (THIS PIN IS RESERVED FOR CSB, AND CLIENT SIDE SHOULD NOT CONNECT TO THIS PIN)
46	NC	NON CONNECTION (THIS PIN IS RESERVED FOR SDA, AND CLIENT SIDE SHOULD NOT CONNECT TO THIS PIN)
47	NC	NON CONNECTION (THIS PIN IS RESERVED FOR SCL, AND CLIENT SIDE SHOULD NOT CONNECT TO THIS PIN)
48	NC	NON CONNECTION (THIS PIN IS RESERVED FOR VDDOTP, AND CLIENT SIDE SHOULD NOT CONNECT TO THIS PIN)

↓

PIN NO.	SYMBOL	FUNCTION
45	CS(NC)/ID1	CS FOR LCM-DRIVER SPI-PORT/ID1(NC)
46	SDIN(NC)/ID2	SDIN FOR LCM-DRIVER SPI-PORT/ID2(PULL HIGH TO VDD)
47	SCK(NC)/ID3	SCK FOR LCM-DRIVER SPI-PORT/ID3(PULL HIGH TO VDD)
48	DISPLAY CONTROL/ID4	DISPLAY ENABLE/ID4(NC)

	17	11.1 POWER SUPPLY FOR LCM NOTE (2)：PWM SIGNAL=0~3.3V，OPERATION FREQUENCY： 100~20KHz→OPERATION FREQUENCY：15±5KHz



f_{PWM} (Hz)	DMIN	DMAX
100 < f ≤ 0.5k	0.05%	100%
0.5k < f ≤ 1.0k	0.10%	100%
1.0k < f ≤ 5.0k	0.50%	100%
5.0k < f ≤ 10.0k	1.00%	100%
10.0k < f ≤ 15.0k	1.50%	100%
15.0k < f ≤20.0k	2.00%	100%

f_{PWM} (Hz)	DMIN	DMAX
10.0k < f ≤ 15.0k	1.50%	100%
15.0k < f ≤20.0k	2.00%	100%

	26	15.1 STANDARD SPECIFICATIONS FOR RELIABILITY OF LCD MODULE DELETE NOTE (2)
	26	15.2 TESTING CONDITIONS AND INSPECTION CRITERIA→ NOTE (2): TESTING CONDITIONS AND INSPECTION CRITERIA

RECORDS OF REVISION

DOC . FIRST ISSUE

AUG.03, 2020

DATE	REVISED PAGE NO.	SUMMARY
OCT.28, 2020	4	4.1 LCD MODULE ELECTRICAL CHARACTERISTICS

ITEM	CONDITION	TYP.	MAX.
POWER SUPPLY CURRENT FOR LED DRIVER	VBL+-VSS=5.0V	(951)	(1240)
	VBL+-VSS=12.0V	(496)	(645)
LED LIFE TIME	I_{LED}=60mA (PER LED)	—	—

→

ITEM	CONDITION	TYP.	MAX.
POWER SUPPLY CURRENT FOR LED DRIVER	VBL+-VSS=5.0V	(871)	(1133)
	VBL+-VSS=12.0V	(416)	(541)
LED LIFE TIME	I_{LED}=40mA (PER LED)	—	—

4.2 CAPACITIVE TOUCH PANEL ELECTRICAL CHARACTERISTICS

ITEM	CONDITION	TYP.	MAX.
POWER SUPPLY CURRENT	VDD1-VSS1 =3.30V	(100)	(130)

→

ITEM	CONDITION	TYP.	MAX.
POWER SUPPLY CURRENT	VDD1-VSS1=3.30V REPORT RATE : 125Hz	(75)	(98)

	12	7. OUTLINE DIMENSIONS MARK △2 : MODIFY C/L OUTLINE DIMENSION
	16	10. INTERFACE SIGNALS

PIN NO.	SYMBOL	FUNCTION
45	CS(NC)/ID1	CS FOR LCM-DRIVER SPI-PORT/ID1(NC)
46	SDIN(NC)/ID2	SDIN FOR LCM-DRIVER SPI-PORT/ID2(PULL HIGH TO VDD)
47	SCK(NC)/ID3	SCK FOR LCM-DRIVER SPI-PORT/ID3(PULL HIGH TO VDD)
48	DISPLAY CONTROL/ID4	DISPLAY ENABLE/ID4(NC)

PIN NO.	SYMBOL	FUNCTION
45	CS/ ID1	CS FOR SERIAL PORT/ ID1(SIZE INFO, NOT USED)
46	SDIN/ ID2	SDIN FOR SERIAL PORT/ ID2(SIZE INFO, PULL HIGHT TO VDD, INTERAL:10KΩ)
47	SCK/ ID3	SCK FOR SERIAL PORT/ ID3(SIZE INFO, PULL HIGHT TO VDD, INTERAL:10KΩ)
48	DISPLAY CONTROL (STAND BY)/ ID4	DISPLAY CONTROL(STAND BY)/ ID4(SIZE INFO, NOT USED)

NOV.10, 2020	3	3.1 LCD MODULE ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.
POWER SUPPLY VOLTAGE	VDD-VSS	-0.3	+4.0
POWER SUPPLY VOLTAGE FOR LED DRIVER	VBL+-VSS	+9.0	+15.0

↓

ITEM	SYMBOL	MIN.	MAX.
POWER SUPPLY VOLTAGE	VDD-VSS	-0.3	4.0
POWER SUPPLY VOLTAGE FOR LED DRIVER	VBL+-VSS	5.0	15.0

MAY.19, 2021	12	7. OUTLINE DIMENSIONS MARK △3 : MODIFY LCM & CTP FPC OUTLINE DIMENSION & BENDING AREA
AUG.03, 2021	1	2.1 TFT LCD MODULE MECHANICAL SPECIFICATIONS ADD(13) WEIGHT: TBD
	10	6.1 OPTICAL CHARACTERISTICS THE BRIGHTNESS OF MODULE (CENTER): TYP.= (800)→(850)
	12	7. OUTLINE DIMENSIONS MARK △4 : ADD CTP & LCM FPC BENDING AREA DIMENSION

TABLE OF CONTENTS

1. GENERAL SPECIFICATIONS

1.1 DATA SHEETS FOR LCD PANEL CONTROLLER/DRIVER

PLEASE REFER TO :

HIMAX HX8249-A
HIMAX HX8678-C

1.2 DATA SHEET FOR CAPACITIVE TOUCH PANEL CONTROLLER/DRIVER

PLEASE REFER TO：

ILITEK ILI2130

1.3 MATERIAL SAFETY DESCRIPTION

ASSEMBLIES SHALL COMPLY WITH EUROPEAN ROHS REQUIREMENTS, INCLUDING PROHIBITED MATERIALS/COMPONENTS CONTAINING LEAD, MERCURY, CADMIUM, HEXAVALENT CHROMIUM, POLYBROMINATED BIPHENYLS (PBB) AND POLYBROMINATED
DIPHENYL ETHERS (PBDE), BIS(2-ETHYLHEXYL) PHTHALATE (DEHP), BUTYL BENZYL PHTHALATE (BBP), DIBUTYL PHTHALATE (DBP), DIISOBUTYL PHTHALATE (DIBP).

2. MECHANICAL SPECIFICATIONS

2.1 TFT LCD MODULE MECHANICAL SPECIFICATIONS

(1) DISPLAY SIZE	7 inch
(2) NUMBER OF DOTS	800W * (RGB) * 480H DOTS
(3) MODULE SIZE	188W * 127.04H *8.46D mm (NOT INCLUDED FPC)
(4) VIEWING AREA	153.2W * 92.24H mm
(5) ACTIVE AREA	152.4W * 91.44H mm
(6) DOT SIZE	0.0635W * 0.1905H mm
(7) PIXEL SIZE	0.1905W * 0.1905H mm
(8) LCD TYPE	TFT, IPS, TRANSMISSIVE, NORMALLY BLACK
(9) COLOR	16.7M
(10) VIEWING DIRECTION	SUPER WIDE VIEW
(11) BACK LIGHT	LED , COLOR : WHITE
(12) INTERFACE MODE	RGB 24BIT PARALLEL (DE MODE ONLY)
(13) WEIGHT	TBD

2.2 CAPACITIVE TOUCH PANEL MECHANICAL SPECIFICATIONS

(1) TOUCH PANEL SIZE	7.0 inch
(2) OUTER DIMENSION	188W * 127.04H * 2.8D mm (NOT INCLUDED FPC)
(3) ACTIVE AREA	153.2W * 92.24H mm
(4) INPUT TYPE	MULTI TOUCH
(5) NUMBER OF TOUCH SENSOR	27*16 SENSORS
(6) RESOLUTION	16384 * 9600
(7) INTERFACE MODE	I2C

3. ABSOLUTE MAXIMUM RATINGS

3.1 LCD MODULE ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	-0.3	4.0	V	
POWER SUPPLY VOLTAGE FOR LED DRIVER	VBL+-VSS	5.0	15.0	V	
STATIC ELECTRICITY	—	—	—	V	NOTE (1)

NOTE (1)：LCM SHOULD BE GROUND DURING LCM HANDLING.

NOTE (2)：THE ABSOLUTE MAXIMUM RATING VALUES OF THIS PRODUCT ARE NOT ALLOWED TO BE EXCEEDED AT ANY TIMES. SHOULD A MODULE BE USED WITH ANY OF THE ABSOLUTE MAXIMUM RATINGS EXCEEDED, THE CHARACTERISTICS OF THE MODULE MAY NOT BE RECOVERED, OR IN AN EXTREME CASE, THE MODULE MAY BE PERMANENTLY DESTROYED.

3.2 CAPACITIVE TOUCH PANEL ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD1-VSS1	-0.3	3.6	V	

3.3 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	-30 °C	80 °C	-30 °C	80 °C	NOTE (1), (2), (3)
HUMIDITY	NOTE (2)		NOTE (2)		WITHOUT CONDENSATION
VIBRATION	—	2.45 m /s^2 (0.25 G)	—	11.76 m /s^2 (1.2 G)	10~100 Hz XYZ DIRECTIONS 1 HR EACH
SHOCK	—	29.4 m /s^2 (3 G)	—	490.0 m /s^2 (50 G)	10 ms XYZ DIRECTIONS 1 TIME EACH

NOTE (1)：THE ABSOLUTE MAXIMUM RATINGS OF THIS PRODUCT SHOULD NOT BE EXCEEDED AT ANY TIME. IF THESE RATINGS ARE EXCEEDED, THE PRODUCT'S PERFORMANCE IS NOT GUARANTEED AND THE PRODUCT MAY EXPERIENCE PERMANENT DAMAGE.

NOTE (2)：Ta ≤ 60°C：90%RH MAX. (96HRS MAX.)

Ta > 60°C：ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 90%RH AT 60°C. (96HRS MAX.)

NOTE (3)：BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT TEMPERATURE THIS PHENOMENON IS REVERSIBLE.

4. ELECTRICAL CHARACTERISTICS

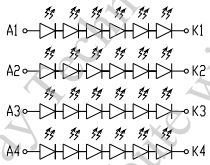
4.1 LCD MODULE ELECTRICAL CHARACTERISTICS

Ta = 25 °C

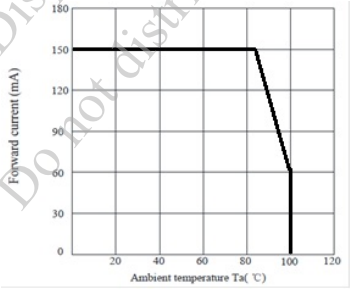
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REMARK
POWER SUPPLY VOLTAGE	VDD-VSS	—	3.0	3.3	3.6	V	
POWER SUPPLY CURRENT	IDD	VDD-VSS=3.3V	—	(250)	(400)	mA	NOTE (1)
LOGIC HIGH INPUT VOLTAGE	VIH	—	0.7*VDD	—	VDD+0.3	V	
LOGIC LOW INPUT VOLTAGE	VIL	—	VSS-0.3	—	0.3*VDD	V	
LOGIC HIGH OUTPUT VOLTAGE	VOH	—	VDD-0.4	—	—	V	
LOGIC LOW OUTPUT VOLTAGE	VOL	—	VSS	—	VSS+0.4	V	
POWER SUPPLY VOLTAGE FOR LED DRIVER	VBL+-VSS	—	5.0	12.0	15.0	V	
POWER SUPPLY CURRENT FOR LED DRIVER	IBL	VBL+-VSS=5.0V	—	(871)	(1133)	mA	
		VBL+-VSS=12.0V	—	(416)	(541)		
LED LIFE TIME	—	I_{LED}=40mA (PER LED)	50K	—	—	hrs	NOTE (4) NOTE (5)

NOTE (1)：THE DISPLAY PATTERN IS ALL “WHITE”.

NOTE (2)：INTERNAL CIRCUIT DIAGRAM OF BACKLIGHT



NOTE (3)：AMBIENT TEMP. VS. ALLOWABLE FORWARD CURRENT.(PER LED)



NOTE (4)：CONDITIONS; TA=25 °C, CONTINUOUS LIGHTING.

NOTE (5)：DEFINITIONS OF LIFE TIME

LCD LUMINANCE BECOMES HALF OF THE INITIAL VALUE.

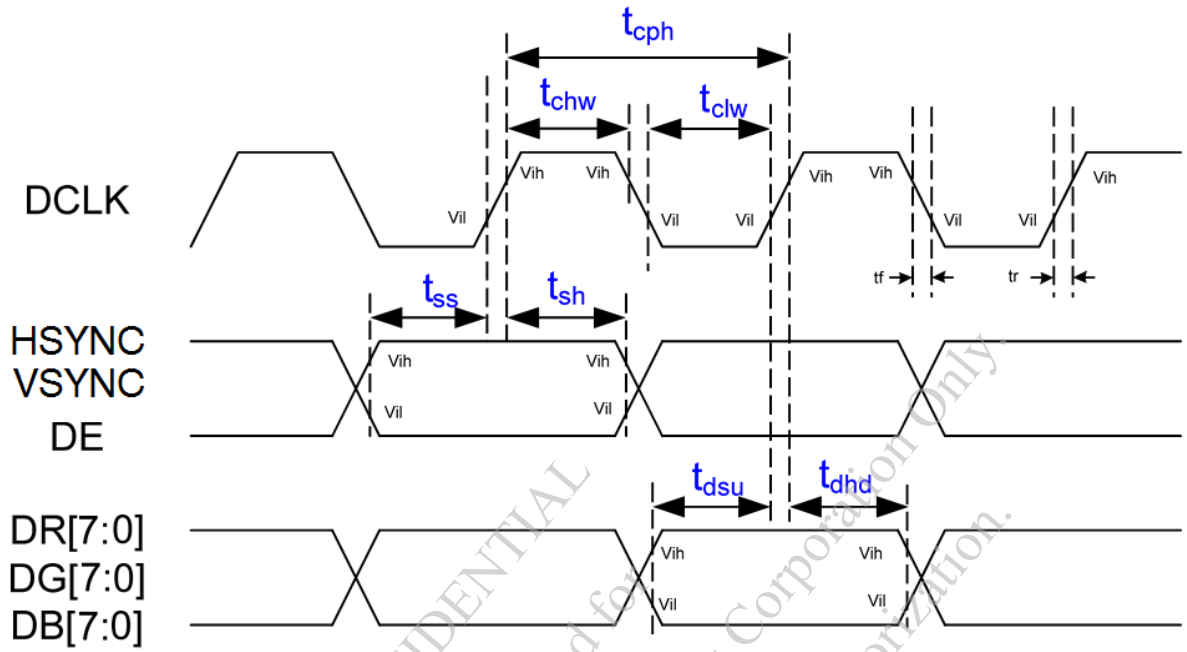
4.2 CAPACITIVE TOUCH PANEL ELECTRICAL CHARACTERISTICS

Ta = 25 °C

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE	VDD1-VSS1	—	3.15	3.30	3.45	V
LOGIC HIGH INPUT VOLTAGE	VIH	—	—	0.7*VDD1	—	V
LOGIC LOW INPUT VOLTAGE	VIL	—	—	0.3*VDD1	—	V
POWER SUPPLY CURRENT	IDD1	VDD1-VSS1=3.30V REPORT RATE:125Hz	—	(75)	(98)	mA

5. TIMING CHARACTERISTICS

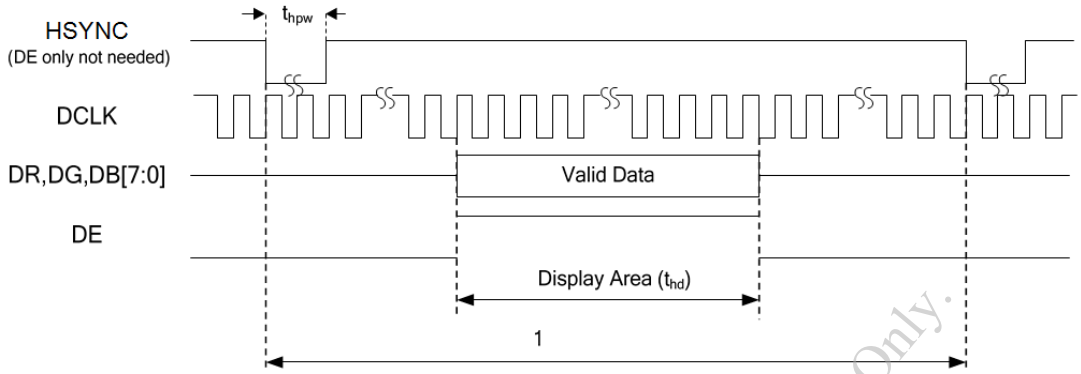
5.1 INPUT SIGNAL TIMING



ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK PERIOD	Tcph	16.8	—	—	ns
DCLK CLOCK HIGH WIDTH	Tchw	6	—	—	ns
DCLK CLOCK LOW WIDTH	Tclw	6	—	—	ns
VSYNC SETUP TIME	Tss	5	—	—	ns
VSYNC HOLD TIME	Tsh	5	—	—	ns
HSYNC SETUP TIME	Tss	5	—	—	ns
HSYNC HOLD TIME	Tsh	5	—	—	ns
DE SETUP TIME	Tss	5	—	—	ns
DE HOLD TIME	Tsh	5	—	—	ns
DATA SETUP TIME	Tdsu	5	—	—	ns
DATA HOLD TIME	Tdhd	5	—	—	ns
INPUT SIGNAL RISING TIME	Tr	—	—	10	ns
INPUT SIGNAL FALLING TIME	Tf	—	—	10	ns

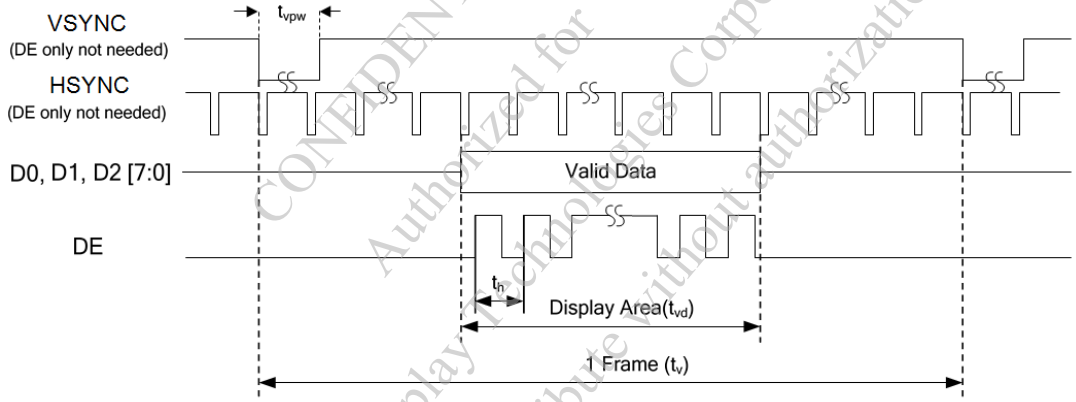
5.2 DE MODE SIGNAL CHARACTERISTICS

HORIZONTAL



HORIZONTAL INPUT TIMING AT DE ONLY MODE

VERTICAL

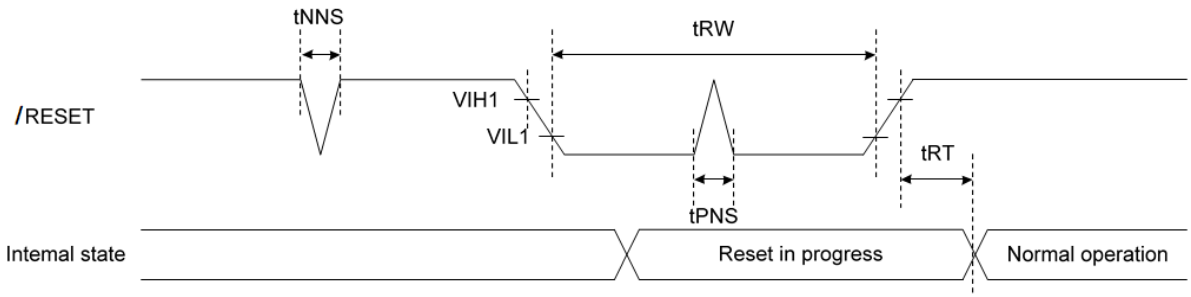


VERTICAL INPUT TIMING AT DE ONLY MODE

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
DCLK FREQUENCY	F_{DCLK}	25.2	27.2	30.5	MHz
HORIZONTAL VALID DATA	t_{hd}		800		DCLK
1 HORIZONTAL LINE	t_h	856	860	920	DCLK
VERTICAL VALID DATA	t_{vd}		480		H
1 VERTICAL FIELD	t_v	490	528	552	H

NOTE (1) : DCLK FREQUENCY MIN/MAX VALUE IS BASE ON FRAME RATE 60 Hz.

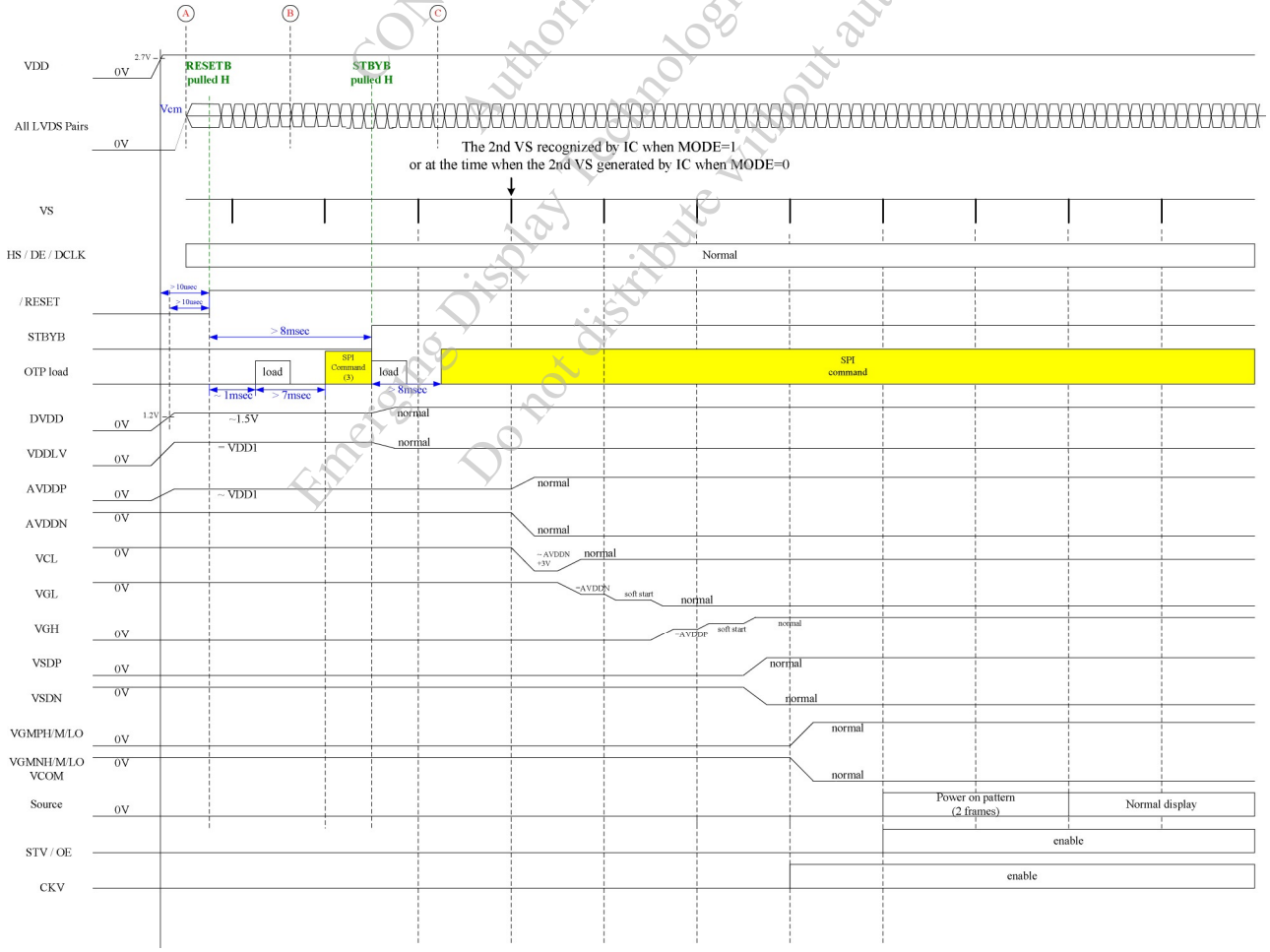
5.3 RESET TIMING



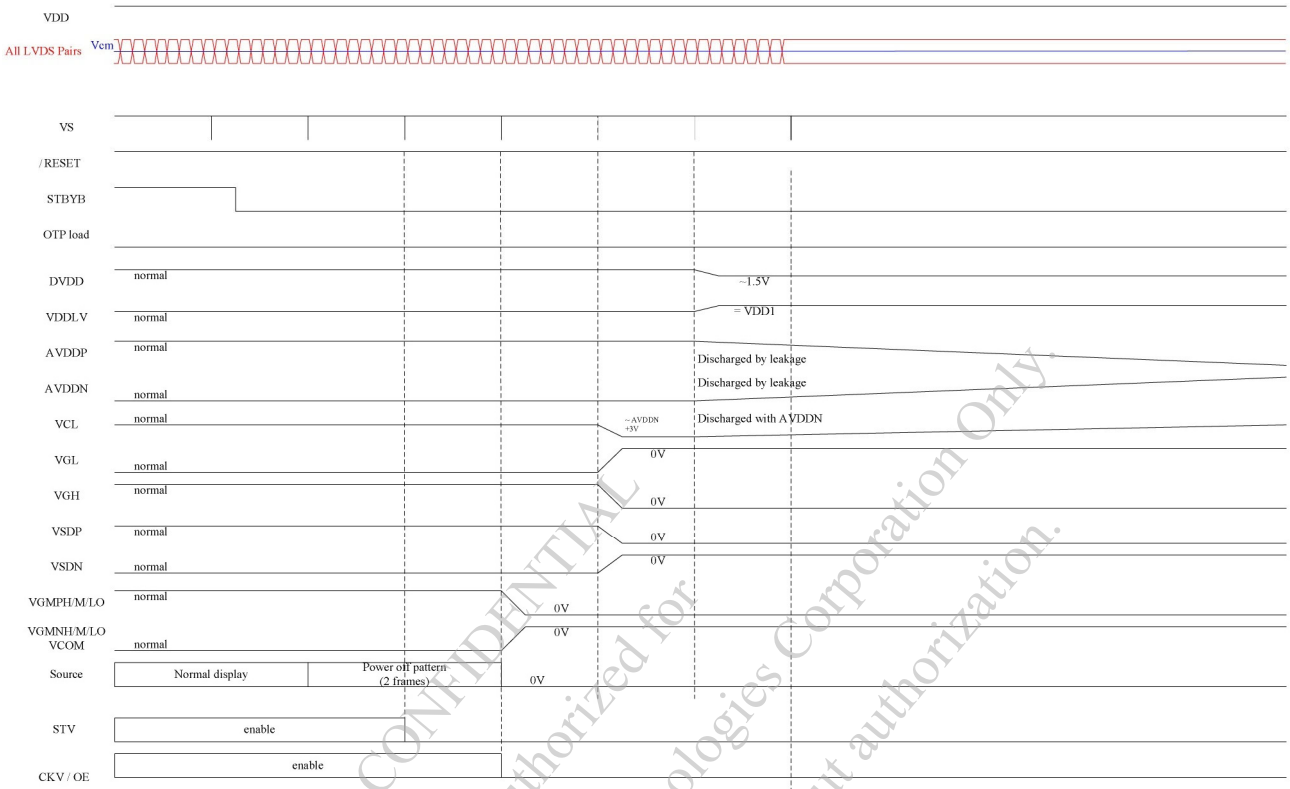
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
RESET PULSE WIDTH	tRW	10	—	—	µs
RESET COMPLETE TIME	tRT	—	—	5	µs
POSITIVE SPIKE NOISE WIDTH	tPNS	—	—	100	ns
NEGATIVE SPIKE NOISE WIDTH	tNNS	—	—	100	ns

5.4 POWER ON/OFF SEQUENCE

POWER ON SEQUENCE

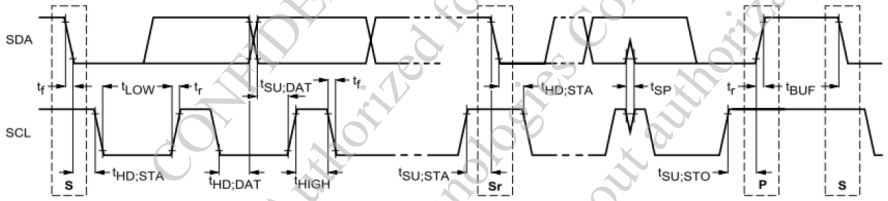


POWER OFF SEQUENCE



5.5 CAPACITIVE TOUCH PANEL I2C INTERFACE TIMING CHARACTERISTICS

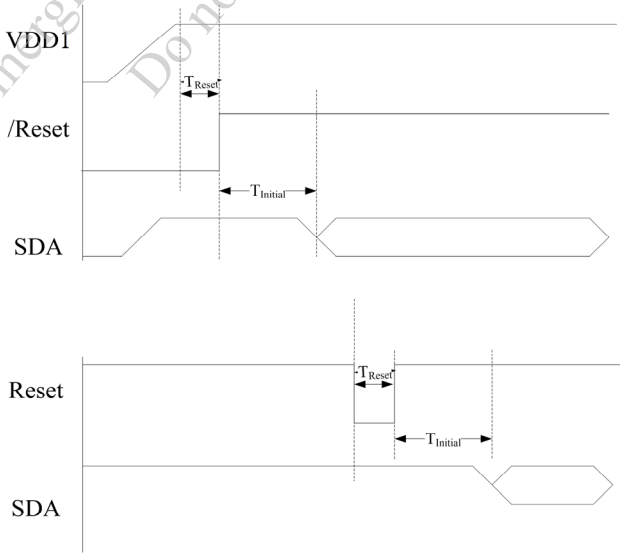
ITEM	SYMBOL	STANDARD MODE			FAST MODE		
		MIN.	MAX.	UNIT	MIN.	MAX.	UNIT
SCL CLOCK FREQUENCY	f_{SCL}	0	100	kHz	0	400	kHz
HOLD TIME (REPEATED) START CONDITION. AFTER THIS PERIOD, THE FIRST CLOCK PULSE IS GENERATED	$t_{HD;STA}$	4.0	—	µs	0.6	—	µs
LOW PERIOD OF THE SCL CLOCK	t_{LOW}	4.7	—	µs	1.3	—	µs
HIGH PERIOD OF THE SCL CLOCK	t_{HIGH}	4.0	—	µs	0.6	—	µs
SET-UP TIME FOR A REPEATED START CONDITION	$t_{SU;STA}$	4.7	—	µs	0.6	—	µs
DATA HOLD TIME	$t_{HD;DAT}$	5.0	—	µs	0	0.9	µs
DATA SET-UP TIME	$t_{SU;DAT}$	250	—	ns	100	—	ns
RISE TIME OF BOTH SDA AND SCL SIGNALS	t_r	—	1000	ns	—	300	ns
FALL TIME OF BOTH SDA AND SCL SIGNALS	t_f	—	300	ns	—	300	ns
SET-UP TIME FOR STOP CONDITION	$t_{SU;STO}$	4.0	—	µs	0.6	—	µs
BUS FREE TIME BETWEEN A STOP AND START CONDITION	t_{BUF}	4.7	—	µs	1.3	—	µs



THE TIMING OF I2C INTERFACE

5.6 CAPACITIVE TOUCH PANEL POWER SEQUENCE

ITEM	SYMBOL	MIN.	MAX.	UNIT
AFTER POWERING-ON OR RESETTING THE DEVICE, THE DEVICE NEEDS INITIAL TIME TO CONFIGURE THE SYSTEM.	$T_{Initial}$	—	100	ms
/RESET PIN LOW HOLD TIME	T_{Reset}	50	—	us



POWER UP SEQUENCE AND RESET DIAGRAM

6. OPTICAL CHARACTERISTICS

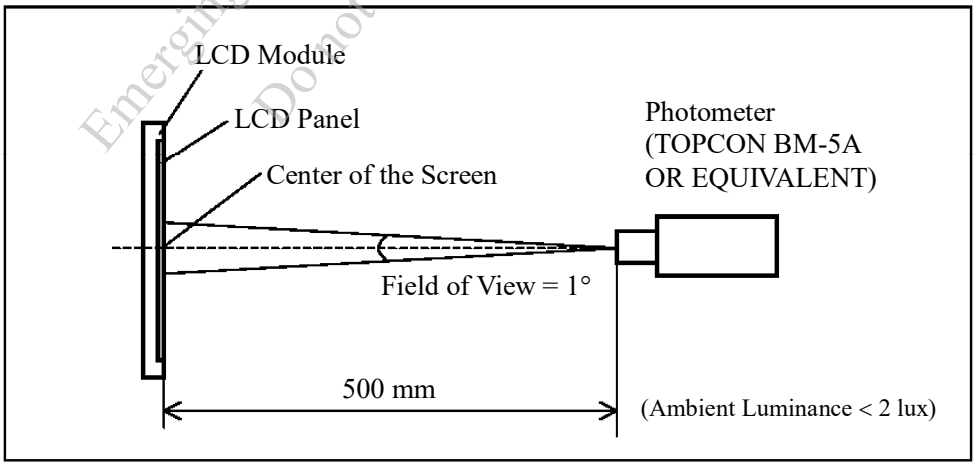
6.1 OPTICAL CHARACTERISTICS

Ta = 25 ± 2 °C

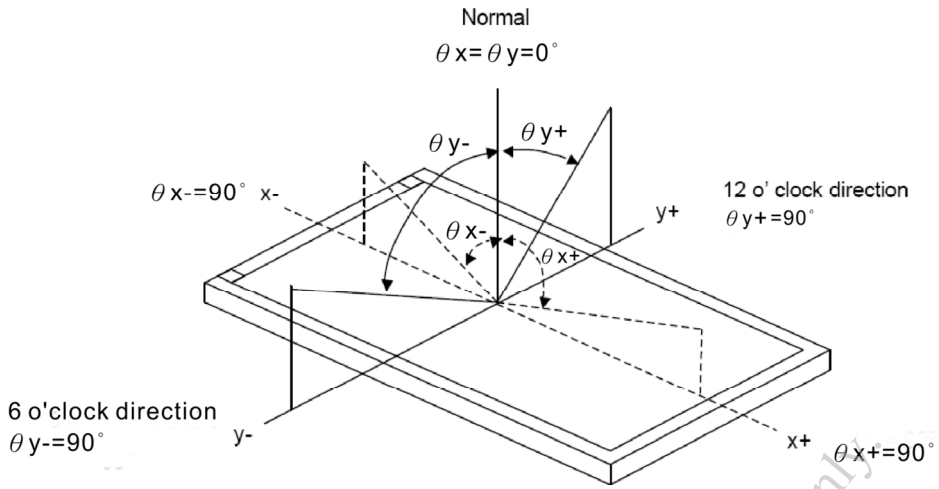
ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	REMARK
VIEWING ANGLE		θ_{y+}	CR ≥ 10	θ_x=0°	70	80	—	deg.	NOTE (2) NOTE (3)
		θ_{y-}			70	80	—		
		θ_{x+}		θ_y=0°	70	80	—		
		θ_{x-}			70	80	—		
CONTRAST RATIO (CENTER)		CR	θx=0° , θy=0°		800	1000	—	—	NOTE (3)
RESPONSE TIME		T_R (rise)+ T_F (fall)	θx=0° , θy=0°		—	25	35	msec	NOTE (4)
COLOR CHROMATICITY (CENTER)	WHITE	Wx	θx=0° , θy=0° VDD-VSS=3.3V VBL+-VSS=12V NTSC : (68%)		(0.30)	(0.35)	(0.40)	—	NOTE (5)
		Wy			(0.30)	(0.35)	(0.40)		
	RED	Rx			(0.58)	(0.63)	(0.68)	—	
		RY			(0.30)	(0.35)	(0.40)		
	GREEN	Gx			(0.27)	(0.32)	(0.37)	—	
		Gy			(0.60)	(0.65)	(0.70)		
	BLUE	Bx			(0.12)	(0.17)	(0.22)	—	
		By			(0.02)	(0.07)	(0.12)		
THE BRIGHTNESS OF MODULE (CENTER)		B			(680)	(850)	—	cd/m^2	NOTE (6)
THE UNIFORMITY OF MODULE		—			(70)	—	—	%	NOTE (7)

NOTE (1)：TEST CONDITION：

AFTER STABILIZING AND LEAVING THE PANEL ALONE AT A GIVEN TEMPERATURE FOR 30 MINUTES. MEASUREMENT SHOULD BE EXECUTED IN A STABLE, WINDLESS, AND DARK ROOM.



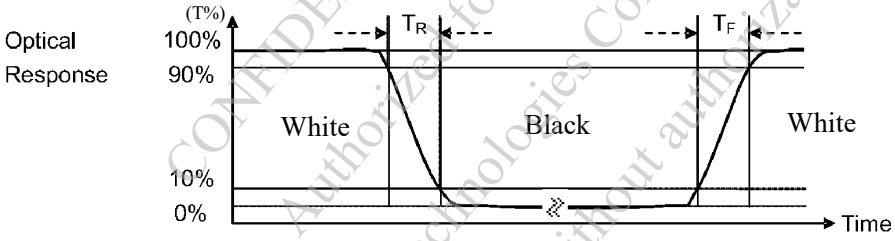
NOTE (2)：DEFINITION OF VIEWING ANGLE :



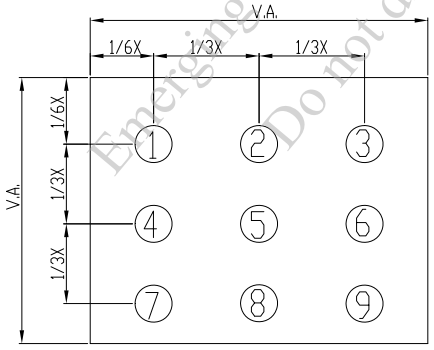
NOTE (3)：DEFINITION OF CONTRAST RATIO (CR) :
MEASURED AT THE CENTER POINT OF MODULE

$$\text{CONTRAST RATIO(CR)} = \frac{\text{BRIGHTNESS MEASURED WHEN LCD IS AT "WHITE STATE"}}{\text{BRIGHTNESS MEASURED WHEN LCD IS AT "BLACK STATE"}}$$

NOTE (4)：DEFINITION OF RESPONSE TIME : T_R AND T_F
THE FIGURE BELOW IS THE OUTPUT SIGNAL OF THE PHOTO DETECTOR.



NOTE (5)：DEFINITION OF COLOR CHROMATICITY
(a)100% RGB PIXEL DATA TRANSMISSION WHEN ALL THE INPUT TERMINALS OF MODULE ARE ELECTRICALLY POWERED ON.
(b)MEASURED AT THE CENTER POINT OF MODULE
NOTE (6)：MEASURED THE BRIGHTNESS OF WHITE STATE AT CENTER POINT.
NOTE (7)：(a)DEFINITION OF BRIGHTNESS UNIFORMITY

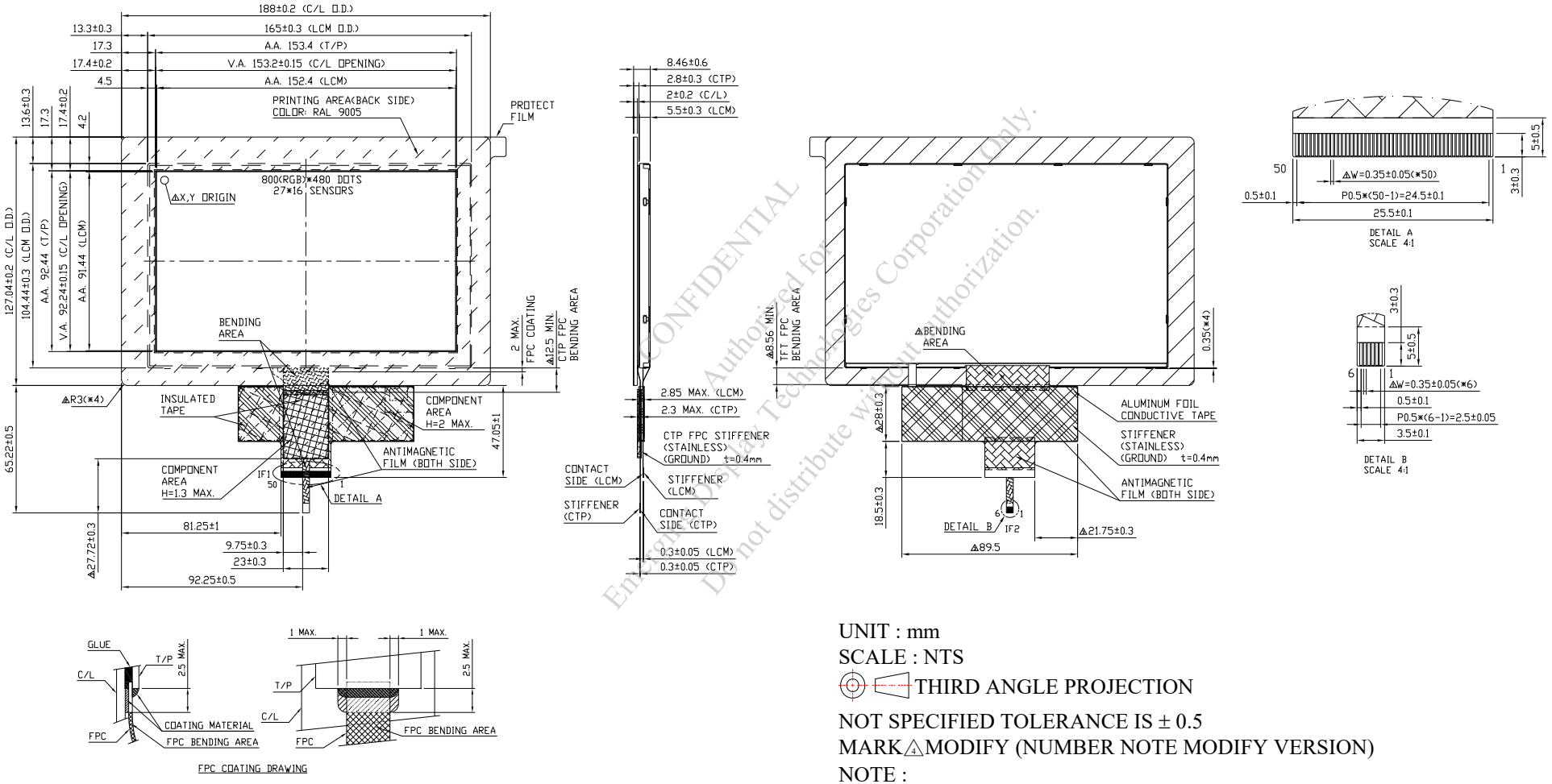


UNIT：mm

(b)THE BRIGHTNESS UNIFORMITY CALCULATING METHOD

$$\text{UNIFORMITY：} \frac{\text{MINIMUM BRIGHTNESS}}{\text{MAXIMUM BRIGHTNESS}} * 100\%$$

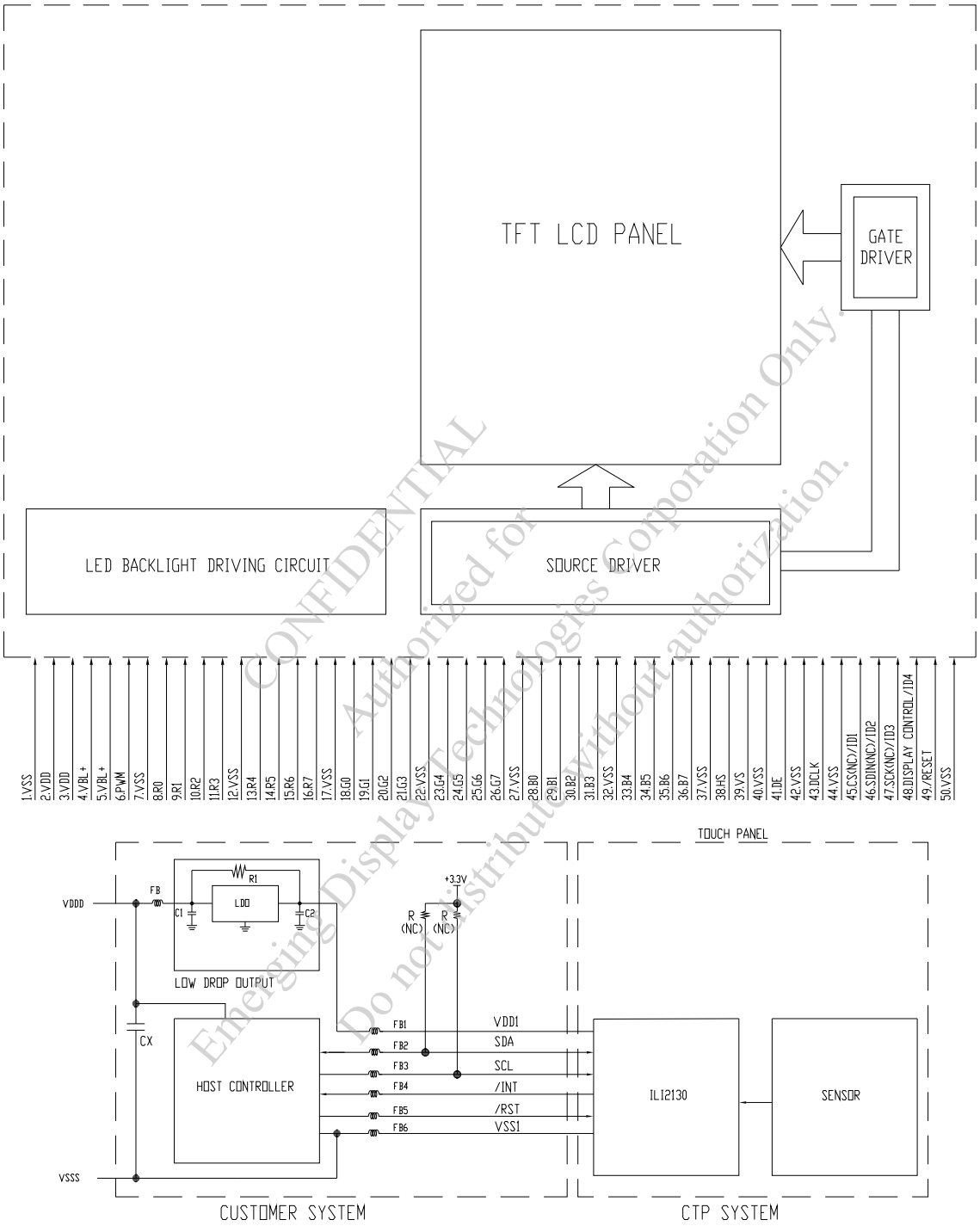
7. OUTLINE DIMENSIONS



UNIT : mm
SCALE : NTS
THIRD ANGLE PROJECTION

NOT SPECIFIED TOLERANCE IS ± 0.5
MARK△MODIFY (NUMBER NOTE MODIFY VERSION)
NOTE :
C/L GLASS : SODA LIME , CHEMICAL STRENGTH , CHAMFERED EDGES
IF1: RECOMMEND MATCH CONNECTOR KYOCERA : 04 6240 050 SERIES
IF2: RECOMMEND MATCH CONNECTOR KYOCERA : 04 6240 006 SERIES

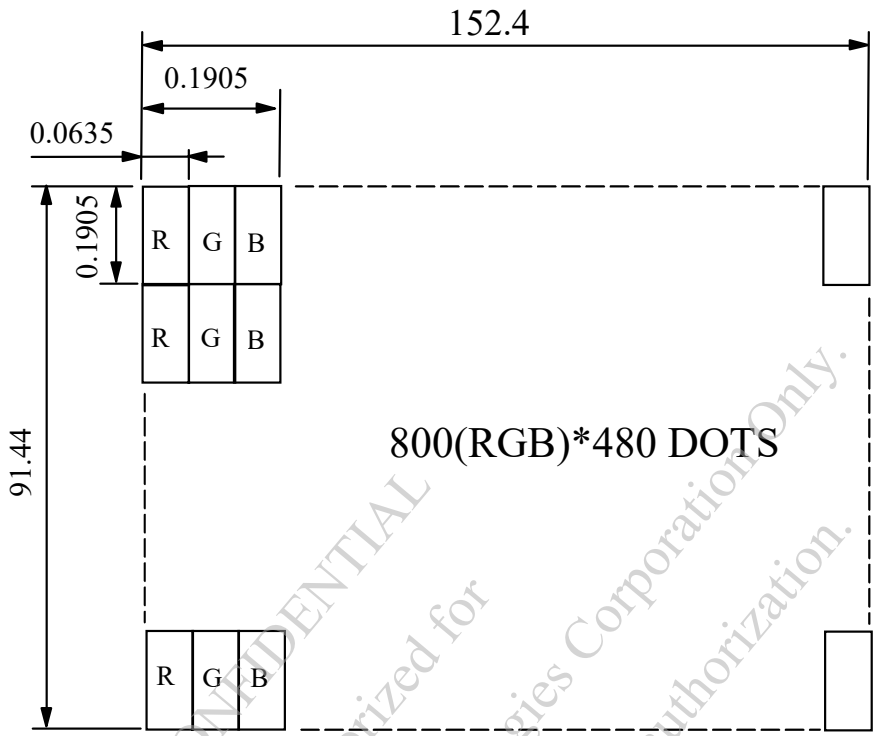
8. BLOCK DIAGRAM



NOTE (1)：THE STANDARD IIC COMMUNICATION INTERFACE, SUPREME SCL CLOCK IS 400 KHz, SLAVE ADDRESS CAN BE SET UP, SUPPORTS VDD1 LEVEL POWER, NEEDS PULL HIGH RESISTANCE AND WE RECOMMEND THE PULL HIGH RESISTANCE IS 2.0K OHM.

NOTE (2)：POWER SUPPLY SHALL BE CLEAN AND NOISE FREE. ADDITIONAL FILTERING OR A SEPARATE LDO (LOW DROP OUT) REGULATOR CAN BE REQUIRED. C1 AND C2 CAPACITORS RECOMMENDATION：4.7μF OR 10 μF

9. DETAIL DRAWING OF DOT MATRIX



UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.1
DOTS MATRIX TOLERANCE IS ± 0.01

10. INTERFACE SIGNALS

10.1 IF1

PIN NO.	SYMBOL	FUNCTION
1	VSS	POWER GROUND.
2	VDD	POWER FOR DIGITAL CIRCUIT.
3	VDD	POWER FOR DIGITAL CIRCUIT.
4	VBL+	POWER SUPPLY FOR LED DRIVER CIRCUIT
5	VBL+	POWER SUPPLY FOR LED DRIVER CIRCUIT
6	PWM	DIMMING CONTROL INPUT FOR BACKLIGHT. DO NOT ALLOW THIS PIN TO FLOAT.
7	VSS	POWER GROUND.
8	R0	RED DATA.
9	R1	RED DATA.
10	R2	RED DATA.
11	R3	RED DATA.
12	VSS	POWER GROUND.
13	R4	RED DATA.
14	R5	RED DATA.
15	R6	RED DATA.
16	R7	RED DATA.
17	VSS	POWER GROUND.
18	G0	GREEN DATA.
19	G1	GREEN DATA.
20	G2	GREEN DATA.
21	G3	GREEN DATA.
22	VSS	POWER GROUND.
23	G4	GREEN DATA.
24	G5	GREEN DATA.
25	G6	GREEN DATA.
26	G7	GREEN DATA.
27	VSS	POWER GROUND.
28	B0	BLUE DATA.
29	B1	BLUE DATA.
30	B2	BLUE DATA.
31	B3	BLUE DATA.
32	VSS	POWER GROUND.
33	B4	BLUE DATA.
34	B5	BLUE DATA.
35	B6	BLUE DATA.
36	B7	BLUE DATA.
37	VSS	POWER GROUND.
38	HS	LINE SYNCHRONIZATION SIGNAL. HORIZONTAL SYNC INPUT.
39	VS	FRAME SYNCHRONIZATION SIGNAL. VERTICAL SYNC INPUT.
40	VSS	POWER GROUND.

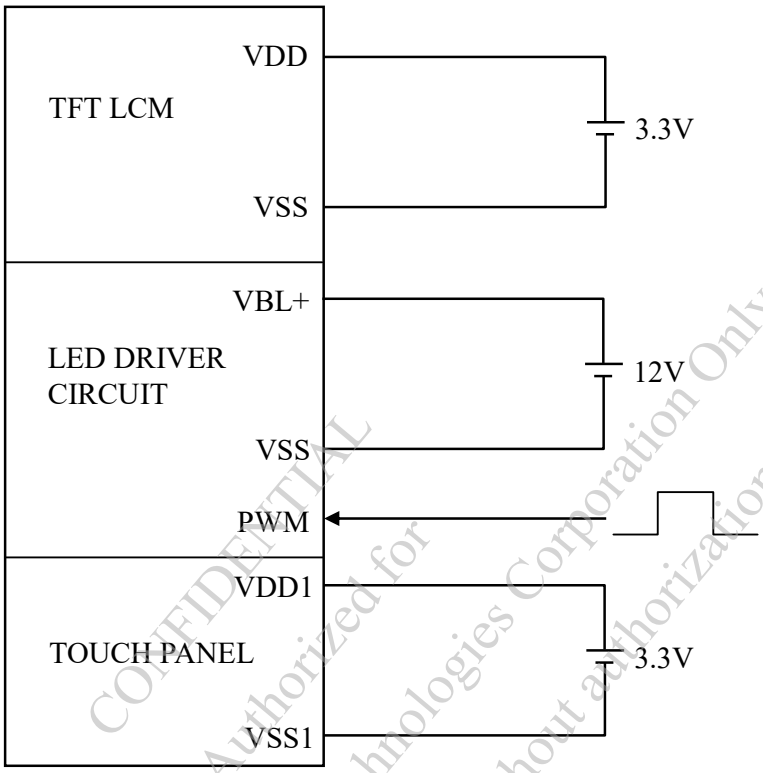
PIN NO.	SYMBOL	FUNCTION
41	DE	DISPLAY ENABLE PIN FROM CONTROLLER. DATA INPUT ENABLE.
42	VSS	POWER GROUND.
43	DCLK	DOT DATA CLOCK
44	VSS	POWER GROUND.
45	CS/ ID1	CS FOR SERIAL PORT/ ID1(SIZE INFO, NOT USED)
46	SDIN/ ID2	SDIN FOR SERIAL PORT/ ID2(SIZE INFO, PULL HIGHT TO VDD, INTERAL :10KΩ)
47	SCK/ ID3	SCK FOR SERIAL PORT/ ID3(SIZE INFO, PULL HIGHT TO VDD, INTERAL :10KΩ)
48	DISPLAY CONTROL (STAND BY)/ ID4	DISPLAY CONTROL(STAND BY)/ ID4(SIZE INFO, NOT USED)
49	/RESET	GLOBAL RESET(LOW ACTIVE).
50	VSS	POWER GROUND.

10.2 IF2

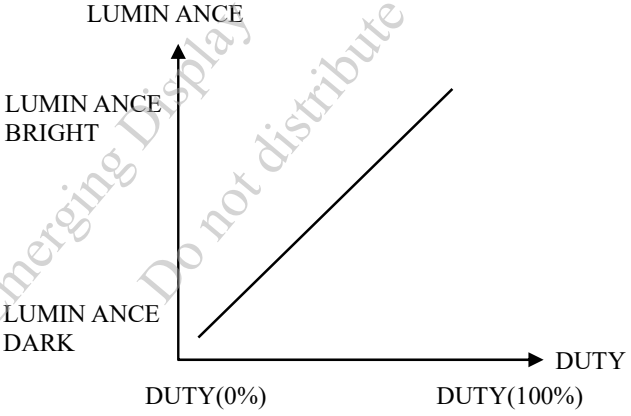
PIN NO.	SYMBOL	FUNCTION
1	VSS1	GROUND
2	VDD1	POWER SUPPLY VOLTAGE
3	SCL	I2C CLOCK INPUT
4	SDA	I2C DATA INPUT AND OUTPUT
5	/INT	EXTERNAL INTERRUPT TO THE HOST
6	/RST	EXTERNAL RESET, LOW IS ACTIVE

11. POWER SUPPLY

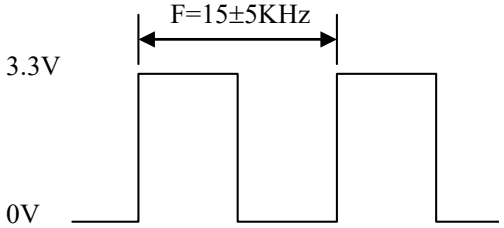
11.1 POWER SUPPLY FOR LCM



NOTE (1)：ADJUST THE PWM SIGNAL IN ORDER TO CONTROL LED BACKLIGHT'S BRIGHTNESS. THE HIGHER THE DUTY CYCLE, THE HIGHER THE BRIGHTNESS



NOTE (2)：OPERATION FREQUENCY：15±5KHz



f_{PWM} (Hz)	DMIN	DMAX
10.0k < f ≤ 15.0k	1.50%	100%
15.0k < f ≤20.0k	2.00%	100%

12. PROTOCOL

CMD	NAME	SET/GET	DESCRIPTION
0x20	GET_PANEL_INFORM ATION	GET	THE MAXIMUM REPORT VALUE AND CHANNEL NUMBER.
0x40	GET_FIRMWARE_VERSION	GET	FIRMWARE VERSION
0x61	GET_KERNEL_VERSION	GET	KERNEL VERSION
0xF0	MODE_CONTROL	SET	ENABLED/DISABLE TEST MODE
0xF1	SET_CDC_INITIAL	SET	INITIAL COMMAND FOR READ ALL NODE DATA.
0xF2	GET_CDC_DATA	GET	READ DATA
0x80	GET_SYSTEM_STATUS	GET	READ SYSTEM BUSY STATUS
0x60	RESET	SET	WHOLE CHIP RESET
0xC0	GET_MODE_CHECK	GET	READ FW CURRENT MODE
0xC1	SET_AP_MODE	SET	SWITCH FW INTO AP MODE
0xC2	SET_BL_MODE	SET	SWITCH FW INTO BL MODE
0xC3	SET_ROM_CODE	SET	WRITE DATA INTO ROM
0xCC	SET_FLASH_ENABLED	SET	UNLOCK AND SET ADDRESS OF FLASH
0xC7	GET_AP_CRC	GET	READ AP CODE CRC
0xCD	GET_BLOCK_CRC	GET	READ BLOCK CODE CRC
0x30	SET_SLEEP	SET	INTO SLEEP MODE
0x31	SET_WAKEUP	SET	TOUCH DEVICE WAKEUP

13. CAPACITIVE TOUCH PANEL SPECIFICATION

13.1 OPTICAL CHARACTERISTICS

ITEM	CONDITION	MIN.	TYP.	MAX.	UNIT
TRANSPARENCY NOTE (1)	Ta = 25°C λ = 550nm	85	—	—	%

NOTE (1) : OPTICAL MEASUREMENT SHOULD BE EXECUTED AFTER PANEL IS SECURED. MEASUREMENT PROCESS SHOULD BE EXECUTED IN A STABLE, WINDLESS, AND DARK ROOM. OPTICAL SPECIFICATIONS SHOULD BE MEASURED BY SPECTROPHOTOMETER.

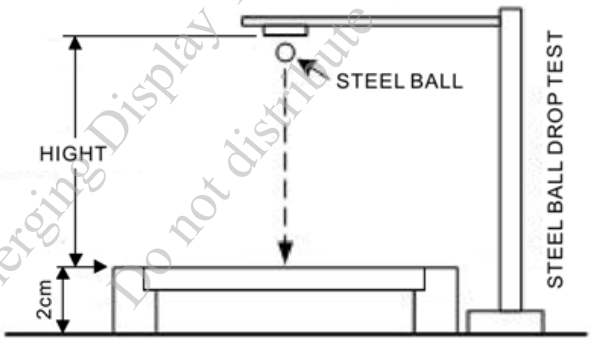
13.2 HARDNESS

ITEM	DESCRIPTION
SURFACE HARDNESS	7H (MIN.)

13.3 DURABILITY

USING STEEL BALL AND FALLING ON TOUCH PANEL SURFACE, FROM THE HEIGHT MUST PASS BELOW CONDITIONS：

ITEM	CONDITION	INSPECTION METHOD	DESCRIPTION
STEEL BALL DROP TEST	WEIGHT：67g HEIGHT OF FALL：30 cm	VISUAL INSPECTION	SIGN OF FRACTURE OR DAMAGE IS NOT ACCEPTABLE 3 TIMES/ 1 POINTS, 25°C



14. INSPECTION CRITERIA

14.1 APPLICATION

THIS INSPECTION STANDARD IS TO BE APPLIED TO THE LCD MODULE DELIVERED FROM EMERGING DISPLAY TECHNOLOGIES CORP.(E.D.T) TO CUSTOMERS

14.2 INSPECTION CONDITIONS

14.2.1 (1)OBSERVATION DISTANCE：45±5cm

(2)VIEWING ANGLE：±45°

±45° (FOR SECTION WITHIN VIEWING AREA), REFER TO FIG.A

90° (FOR SECTION OUTSIDE OF VIEWING AREA), REF TO FIG.B

PERPENDICULAR TO MODULE SURFACE

VIEWING ANGLE SHOULD BE SMALLER THAN 45°

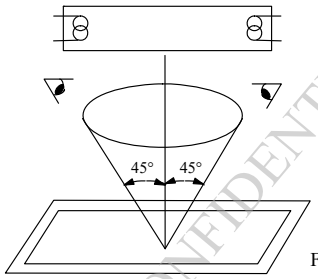


FIG.A

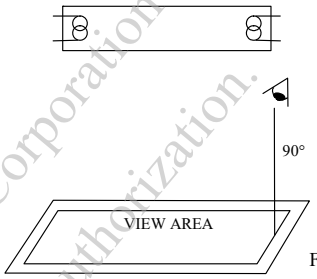


FIG.B

THE INSPECTION CRITERIA IS ACCORDING TO LINE OF SIGHT. INSPECTION SHALL BE MADE WITHIN THE HALF SECTION OF THE VIEWING CONE GENERATED BY LINE SEGMENT OF 45° WITH RESPECT TO THE VERTICAL AXIS FROM CENTER VERTEX OF LCD, THE FLUORESCENT LAMP AND THE CONE AXIS MUST BE PERPENDICULAR TO THE LCD SURFACE.

IF THE DEFECTS ARE OUTSIDE OF VIEWING AREA, IT SHALL BE INSPECTED BY 90° WITH RESPECT TO THE VERTICAL AXIS FROM EDGE OF VIEWING AREA.

14.2.2 ENVIRONMENT CONDITIONS：

AMBIENT TEMPERATURE		25±5°C
AMBIENT HUMIDITY		65 ± 20%RH
AMBIENT ILLUMINATION	COSMETIC INSPECTION	600~800 lux
	FUNCTIONAL INSPECTION	300~500 lux
INSPECTION TIME		15 secs

14.2.3 INSPECTION LOT

QUANTITY PER DELIVERY LOT FOR EACH MODEL

14.2.4 INSPECTION METHOD

A SAMPLING INSPECTION SHALL BE MADE ACCORDING TO THE FOLLOWING PROVISIONS TO JUDGE THE ACCEPTABILITY

(a)APPLICABLE STANDARD：

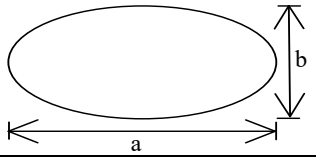
ANSI/ ASQ Z1.4 NORMAL INSPECTION LEVEL II

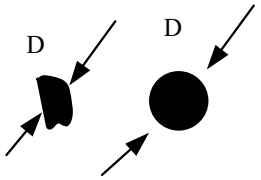
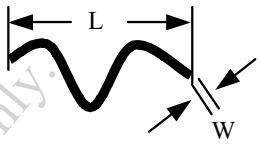
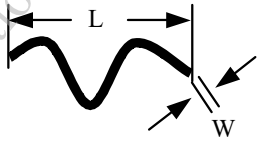
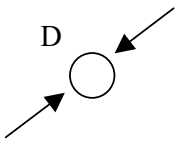
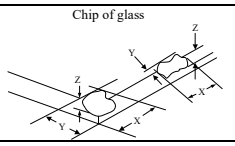
(b)AQL：MAJOR DEFECT：AQL 0.65

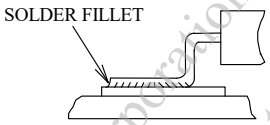
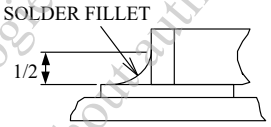
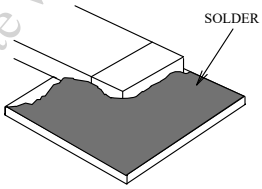
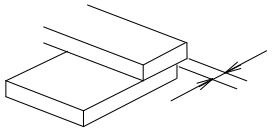
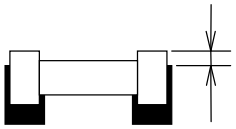
MINOR DEFECT：AQL 1.0

14.3 DEFECTS CLASSIFICATION

TYPE OF DEFECT	INSPECTION ITEM	DEFECT FEATURE	AQL
MAJOR DEFECT	1.DISPLAY ON	• DEFECT TO MISS SPECIFIED DISPLAY FUNCTION, FOR ALL AND SPECIFIED DOTS EX: DISCONNECTION, SHORT CIRCUIT ETC	0.65
	2.CTP FUNCTION	• NO FUNCTION • BROKEN LINE • FALSE TOUCH	
	3.BACKLIGHT	• NO LIGHT • FLICKERING AND OTHER ABNORMAL ILLUMINATION	
	4.DIMENSIONS	• SUBJECT TO INDIVIDUAL ACCEPTANCE SPECIFICATIONS	
MINOR DEFECT	1.DISPLAY ZONE (VIEWING AREA)	• BLACK/WHITE SPOT / CIRCULAR TYPE • BUBBLES ON POLARIZER • NEWTON RING • BLACK/WHITE LINE / LINEAR TYPE • SCRATCH • CONTAMINATION • UNEVEN COLOR SPREAD	1.0
	2.BEZEL ZONE	• STAINS • SCRATCHES • FOREIGN MATTER	
	3.SOLDERING	• INSUFFICIENT SOLDER • SOLDERED IN INCORRECT POSITION • CONVEX SOLDERING SPOT • SOLDER BALLS • SOLDER SCRAPS	
	4.DISPLAY ON (ALL ON)	• LIGHT LINE	

<table>
<tr><th>NO.</th><th>ITEM</th><th>CRITERIA</th></tr>
<tr><td>1</td><td>DISPLAY ON INSPECTION</td><td>1. INCORRECT PATTERN
2. MISSING SEGMENT
3. DIM SEGMENT
4. OPERATING VOLTAGE BEYOND SPEC</td></tr>
<tr><td>2</td><td>OVERALL DIMENSIONS</td><td>1. OVERALL DIMENSION BEYOND SPEC</td></tr>
<tr><td>3</td><td>DOT DEFECT</td><td>1. INSPECTION PATTERN: FULL WHITE, FULL BLACK, RED, GREEN AND BLUE SCREENS.
2.
<table>
<tr><th colspan="2">ITEM</th><th>ACCEPTABLE COUNT</th></tr>
<tr><td rowspan="3">BRIGHT DOT</td><td>RANDOM</td><td>N = 3</td></tr>
<tr><td>2 DOTS ADJACENT (PAIR)</td><td>N = 0</td></tr>
<tr><td>3 DOTS ADJACENT OR MORE</td><td>N = 0</td></tr>
<tr><td rowspan="3">DARK DOT</td><td>RANDOM</td><td>N ≤ 5</td></tr>
<tr><td>2 DOTS ADJACENT (PAIR)</td><td>N = 0</td></tr>
<tr><td>3 DOTS ADJACENT OR MORE</td><td>N = 0</td></tr>
<tr><td colspan="2">TOTAL BRIGHT AND DARK DOT</td><td>N ≤ 5</td></tr>
</table>
NOTE：
1. THE DEFINITION OF DOT：
THE SIZE OF A DEFECTIVE DOT OVER 1/2 OF WHOLE DOT IS REGARDED AS ONE DEFECTIVE DOT.
THE BRIGHT DOT DEFECT MOST BE VISIBLE THROUGH A 5% ND FILTER
2. BRIGHT DOT：
DOTS APPEAR BRIGHT AND UNCHANGED IN SIZE IN WHICH LCD PANEL IS DISPLAYING UNDER BLACK PATTERN.
3. DARK DOT：
DOTS APPEAR DARK AND UNCHANGED IN SIZE IN WHICH LCD PANEL IS DISPLAYING UNDER PURE RED, GREEN, BLUE PICTURE.</td></tr>
<tr><td>4</td><td>BUBBLES ON POLARIZER /SURFACE STAINS /DIRT/CF FAIL/SPOT</td><td>
<table>
<tr><th></th><th>AVERAGE DIAMETER (mm)：D</th><th>NUMBER OF PIECES PERMITTED</th></tr>
<tr><td rowspan="3">BUBBLE ON THE POLARIZER</td><td>D ≤ 0.25</td><td>IGNORE</td></tr>
<tr><td>0.25 < D ≤ 0.5</td><td>N ≤ 5</td></tr>
<tr><td>0.5 < D</td><td>NONE</td></tr>
<tr><td rowspan="3">SURFACE STAINS</td><td>D ≤ 0.1</td><td>IGNORE</td></tr>
<tr><td>0.1 < D ≤ 0.5</td><td>N ≤ 4</td></tr>
<tr><td>0.5 < D</td><td>NONE</td></tr>
<tr><td rowspan="3">CF FAIL / SPOT</td><td>D ≤ 0.1</td><td>IGNORE</td></tr>
<tr><td>0.1 < D ≤ 0.5</td><td>N ≤ 4</td></tr>
<tr><td>0.5 < D</td><td>NONE</td></tr>
</table>
NOTE : (1)POLARIZER BUBBLE IS DEFINED AS THE BUBBLE APPEARS ON ACTIVE DISPLAY AREA. THE DEFECT OF POLARIZER BUBBLE SHALL BE IGNORED IF THE POLARIZER BUBBLE APPEARS ON THE OUTSIDE OF ACTIVE DISPLAY AREA.
(2)THE EXTRANEOUS SUBSTANCE IS DEFINED AS IT CAN BE OBSERVED WHEN THE MODULE IS POWER ON.
(3)THE DEFINITION OF AVERAGE DIAMETER, D IS DEFINED AS FOLLOWING.
AVERAGE DIAMETER (D)=(a+b)/2
 
</td></tr>
</table>

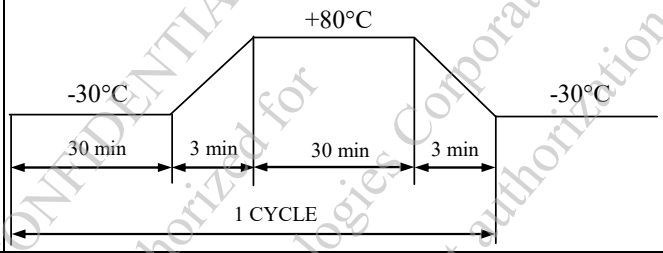
<table>
<tr><th>NO.</th><th>ITEM</th><th>CRITERIA</th></tr>
<tr><td>5</td><td>BLACK/WHITE SPOT CIRCULAR TYPE</td><td>THE FOLLOWING BLACK/WHITE SPOT ARE WITHIN THE VIEWING AREA. AVERAGE DIAMETER：D (mm)
<table><tr><th>SIZE D</th><th>PERMISSIBLE NO.</th></tr><tr><td>D≤0.15</td><td>IGNORE</td></tr><tr><td>0.15<D≤0.3</td><td>5</td></tr><tr><td>0.3<D≤0.5</td><td>5</td></tr><tr><td>D>0.5</td><td>0</td></tr></table>NOTE (1)：THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART.
  </td></tr>
<tr><td>6</td><td>SCRATCH</td><td>THE FOLLOWING SCRATCH IS WITHIN THE VIEWING AREA. WIDTH：W (mm) , LENGTH : L (mm)
<table><tr><th>SIZE W & L</th><th>PERMISSIBLE NO.</th></tr><tr><td>W≤0.05</td><td>IGNORE</td></tr><tr><td>0.05<W≤0.08, L≤8</td><td>3</td></tr><tr><td>0.08<W≤0.1, 8<L≤5</td><td>2</td></tr><tr><td>W>0.1</td><td>0</td></tr></table>NOTE (1)：THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART.
  </td></tr>
<tr><td>7</td><td>BLACK / WHITE LINE LINEAR TYPE / FOREIGN FIBER</td><td>THE FOLLOWING BLACK LINE, WHITE LINE IS WITHIN THE VIEWING AREA. WIDTH：W (mm) , LENGTH : L (mm)
<table><tr><th>SIZE W & L</th><th>PERMISSIBLE NO.</th></tr><tr><td>W≤0.05</td><td>IGNORE</td></tr><tr><td>0.05<W≤0.08, L≤8</td><td>3</td></tr><tr><td>0.08<W≤0.1, 8<L≤10</td><td>2</td></tr><tr><td>W>0.1</td><td>0</td></tr></table>NOTE (1)：THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART.
  </td></tr>
<tr><td>8</td><td>BUBBLE / DENT FOR OPTICAL BONDING</td><td>BUBBLES WITHIN VIEWING AREA.
AVERAGE DIAMETER：D (mm)
<table><tr><th>SIZE D</th><th>PERMISSIBLE NO.</th></tr><tr><td>D≤0.2</td><td>IGNORE</td></tr><tr><td>0.2<D≤0.3</td><td>3</td></tr><tr><td>0.3<D≤0.5</td><td>2</td></tr><tr><td>D>0.5</td><td>0</td></tr></table>NOTE (1)：THE DISTANCE BETWEEN DEFECTS SHOULD BE MORE THAN 10mm APART.
  </td></tr>
<tr><td>9</td><td>CHIPPING</td><td><table><tr><td>CORNER</td><td>X ≤ 3 mm , Y ≤ 3mm、Z ≤ t (t : THICKNESS)</td></tr><tr><td>EDGE</td><td>X ≤ 6mm , Y ≤ 1mm , Z < t (t : THICKNESS)</td></tr></table>  </td></tr>
<tr><td>10</td><td>CRACKED GLASS</td><td>NOT ACCEPTABLE</td></tr>
<tr><td>11</td><td>LINE DEFECT ON DISPLAY</td><td>OBVIOUS VERTICAL OR HORIZONTAL LINE DEFECT IS NOT ALLOWED</td></tr>
<tr><td>12</td><td>MURA ON DISPLAY</td><td>IT’S OK IF MURA IS SLIGHT VISIBLE THROUGH 5% ND FILTER</td></tr>
<tr><td>13</td><td>UNEVEN COLOR SPREAD, COLORATION</td><td>TO BE DETERMINED BASED UPON THE LIMITED SAMPLE.</td></tr>
<tr><td>14</td><td>BEZEL APPEARANCE</td><td>1. BEZEL MAY NOT HAVE RUST, BE DEFORMED OR HAVE FINGER PRINTS STAINS OF OTHER CONTAMINATION.
2. BEZEL MUST COMPLY WITH JOB SPECIFICATIONS.</td></tr>
</table>

NO.	ITEM	CRITERIA
15	PCB	1. THERE MAY NOT BE MORE THAN 2mm OF SEALANT OUTSIDE THE SEAL AREA ON THE PCB, AND THERE SHOULD BE NO MORE THAN THREE PLACES. 2. NO OXIDATION OR CONTAMINATION PCB TERMINALS. 3. PARTS ON PCB MUST BE THE SAME AS ON THE PRODUCTION CHARACTERISTIC CHART. THERE SHOULD BE NO WRONG PARTS, MISSING PARTS OR EXCESS PARTS. 4. THE JUMPER ON THE PCB SHOULD CONFORM TO THE PRODUCT CHARACTERISTIC CHART. 5. IF SOLDER GETS ON BEZEL TAB PADS, LED PAD, ZEBRA PAD OR SCREW HOLD PAD; MAKE SURE IT IS SMOOTHED DOWN.
16	SOLDERING	1. NO SOLDERING FOUND ON THE SPECIFIED PLACE 2. INSUFFICIENT SOLDER (a)LSI, IC A POOR WETTING OF SOLDER IS BETWEEN LOWER BEND OR "HEEL" OF LEAD AND PAD  (b)CHIP COMPONENT · SOLDER IS LESS THAN 50% OF SIDES AND FRONT FACE WETTING  · SOLDER WETS 3 SIDES OF TERMINAL, BUT LESS THAN 25% OF SIDES AND FRONT SURFACE AREA ARE COVERED  3. PARTS ALIGNMENT (a)LSI, IC LEAD WIDTH IS MORE THAN 50% BEYOND PAD OUTLINE  (b)CHIP COMPONENT COMPONENT IS OFF CENTER, AND MORE THAN 50% OF THE LEADS IS OFF THE PAD OUTLINE  4. NO UNMELTED SOLDER PASTE MAY BE PRESENT ON THE PCB. 5. NO COLD SOLDER JOINTS, MISSING SOLDER CONNECTIONS, OXIDATION OR ICICLE. 6. NO RESIDUE OR SOLDER BALLS ON PCB. 7. NO SHORT CIRCUITS IN COMPONENTS ON PCB.

NO.	ITEM	CRITERIA
17	BACKLIGHT	1. NO LIGHT 2. FLICKERING AND OTHER ABNORMAL ILLUMINATION 3. SPOTS OR SCRATCHES THAT APPEAR WHEN LIT MUST BE JUDGED USING LCD SPOT, LINES AND CONTAMINATION STANDARDS. 4. BACKLIGHT DOESN'T LIGHT OR COLOR IS WRONG.
18	GENERAL APPEARANCE	1. NO OXIDATION, CONTAMINATION, CURVES OR, BENDS ON INTERFACE PIN (OLB) OF TCP. 2. NO CRACKS ON INTERFACE PIN (OLB) OF TCP. 3. NO CONTAMINATION, SOLDER RESIDUE OR SOLDER BALLS ON PRODUCT. 4. THE IC ON THE TCP MAY NOT BE DAMAGED, CIRCUITS. 5. THE UPPERMOST EDGE OF THE PROTECTIVE STRIP ON THE INTERFACE PIN MUST BE PRESENT OR LOOK AS IF IT CAUSE THE INTERFACE PIN TO SEVER. 6. THE RESIDUAL ROSIN OR TIN OIL OF SOLDERING (COMPONENT OR CHIP COMPONENT) IS NOT BURNED INTO BROWN OR BLACK COLOR. 7. SEALANT ON TOP OF THE ITO CIRCUIT HAS NOT HARDENED. 8. PIN TYPE MUST MATCH TYPE IN SPECIFICATION SHEET. 9. LCD PIN LOOSE OR MISSING PINS. 10. PRODUCT PACKAGING MUST BE THE SAME AS SPECIFIED ON PACKAGING SPECIFICATION SHEET. 11. PRODUCT DIMENSION AND STRUCTURE MUST CONFORM TO PRODUCT SPECIFICATION SHEET. 12. THE APPEARANCE OF HEAT SEAL SHOULD NOT ADMIT ANY DIRT AND BREAK.

15. RELIABILITY TEST

15.1 STANDARD SPECIFICATIONS FOR RELIABILITY OF LCD MODULE

NO.	ITEM	DESCRIPTION
1	HIGH TEMPERATURE OPERATION	THE SAMPLE SHOULD BE ALLOWED TO STAND AT +80°C FOR 240 HRS
2	LOW TEMPERATURE OPERATION	THE SAMPLE SHOULD BE ALLOWED TO STAND AT -30°C FOR 240 HRS
3	HIGH TEMPERATURE STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT +80°C FOR 240 HRS
4	LOW TEMPERATURE STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT -30°C FOR 240 HRS
5	HIGH TEMPERATURE / HUMIDITY TEST STORAGE	THE SAMPLE SHOULD BE ALLOWED TO STAND AT 60°C, 90% RH 240 HRS
6	THERMAL SHOCK (NOT OPERATED)	THE SAMPLE SHOULD BE ALLOWED TO STAND THE FOLLOWING 10 CYCLES OF OPERATION: 
7	ESD (ELECTROSTATIC DISCHARGE) (NOT OPERATED)	AIR DISCHARGE ± 12KV CONTACT DISCHARGE ± 8KV ACCORDING TO IEC-61000-4-2

NOTE (1)：THE TEST SAMPLES HAVE RECOVERY TIME FOR 2 HOURS AT ROOM TEMPERATURE BEFORE THE FUNCTION CHECK. IN THE STANDARD CONDITIONS, THERE IS NO DISPLAY FUNCTION NG ISSUE OCCURRED.

NOTE (2)：TESTING CONDITIONS AND INSPECTION CRITERIA

NO.	ITEM	TEST MODEL	INSPECTION CRITERIA
1	CURRENT CONSUMPTION	REFER TO SPECIFICATION	THE CURRENT CONSUMPTION SHOULD CONFORM TO THE PRODUCT SPECIFICATION.
2	CONTRAST	REFER TO SPECIFICATION	AFTER THE TESTS HAVE BEEN EXECUTED, THE CONTRAST MUST BE LARGER THAN HALF OF ITS INITIAL VALUE PRIOR TO THE TESTS.
3	APPEARANCE	VISUAL INSPECTION	DEFECT FREE

16. CAUTION

16.1 OPERATION

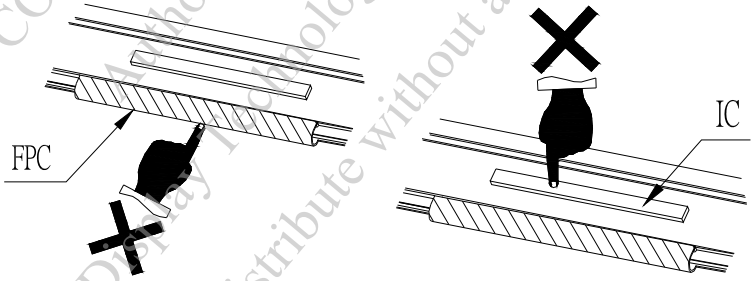
16.1.1 DO NOT CONNECT OR DISCONNECT MODULES TO OR FROM THE MAIN SYSTEM WHILE POWER IS BEING SUPPLIED .

16.1.2 USE THE MODULE WITHIN SPECIFIED TEMPERATURE ; LOWER TEMPERATURE CAUSES THE RETARDATION OF BLINKING SPEED OF THE DISPLAY ; HIGHER TEMPERATURE MAKES OVERALL DISPLAY DISCOLOR . WHEN THE TEMPERATURE RETURNS TO NORMALITY, THE DISPLAY WILL OPERATE NORMALLY.

16.1.3 ADJUST THE LC DRIVING VOLTAGE TO OBTAIN THE OPTIMUM CONTRAST .

16.1.4 POWER ON SEQUENCE INPUT SIGNALS SHOULD NOT BE SUPPLIED TO LCD MODULE BEFORE POWER SUPPLY VOLTAGE IS APPLIED AND REACHES THE SPECIFIED VALUE.
IF ABOVE SEQUENCE IS NOT FOLLOWED , CMOS LSIS OF LCD MODULES MAY BE DAMAGED DUE TO LATCH - UP PROBLEM.

16.1.5 NOT ALLOWED TO INFLICT ANY EXTERNAL STRESS AND TO CAUSE ANY MECHANICAL INTERFERENCE ON THE BENDING AREA OF FPC DURING THE TAIL BENDING BACKWARDS!
DO NOT STRESS FPC AND IC ON THE MODULE!



16.2 NOTICE

16.2.1 USE A GROUNDED SOLDERING IRON WHEN SOLDERING CONNECTOR I/O TERMINALS . FOR SOLDERING OR REPAIRING, TAKE PRECAUTION AGAINST THE TEMPERATURE OF THE SOLDERING IRON AND THE SOLDERING TIME TO PREVENT PEELING OFF THE THROUGH-HOLE-PAD .

16.2.2 DO NOT DISASSEMBLE . EDT SHALL NOT BE HELD RESPONSIBLE IF THE MODULE IS DISASSEMBLED AND UPON THE REASSEMBLY THE MODULE FAILED.

16.2.3 DO NOT CHARGE STATIC ELECTRICITY, AS THE CIRCUIT OF THIS MODULE CONTAINS CMOS LSIS. A WORKMAN'S BODY SHOULD ALWAYS BE STATIC-PROTECTED BY USE OF AN ESD STRAP. WORKING CLOTHES FOR SUCH PERSONNEL SHOULD BE OF STATIC-PROTECTED MATERIAL.

16.2.4 ALWAYS GROUND THE ELECTRICALLY-POWERED DRIVER BEFORE USING IT TO INSTALL THE LCD MODULE. WHILE CLEANING THE WORK STATION BY VACUUM CLEANER, DO NOT BRING THE SUCKING MOUTH NEAR THE MODULE ; STATIC ELECTRICITY OF THE ELECTRICALLY-POWERED DRIVER OR THE VACUUM CLEANER MAY DESTROY THE MODULE.

16.2.5 DON'T GIVE EXTERNAL SHOCK.

16.2.6 DON'T APPLY EXCESSIVE FORCE ON THE SURFACE.

16.2.7 LIQUID IN LCD IS HAZARDOUS SUBSTANCE. MUST NOT LICK AND SWALLOW.
WHEN THE LIQUID IS ATTACH TO YOUR, SKIN, CLOTH ETC. WASH IT OUT THOROUGHLY AND IMMEDIATELY.

16.2.8 DON'T OPERATE IT ABOVE THE ABSOLUTE MAXIMUM RATING.

16.2.9 STORAGE IN A CLEAN ENVIRONMENT, FREE FROM DUST, ACTIVE GAS, AND SOLVENT.

16.2.10 STORE WITHOUT ANY PHYSICAL LOAD.

16.2.11 REWIRING: NO MORE THAN 3 TIMES.