億力光電股份有限公司

EVERVISION ELECTRONICS CO., LTD.

Product Specification For LCD Module

(KVPF-7B-002-16)

Model NO. : VGG322433-6UFLWB(RoHS)

REVISION : 5

☐APPROVAL FOR SPECIFICATIONS ONLY

■APPROVAL FOR SPECIFICATIONS AND SAMPLE

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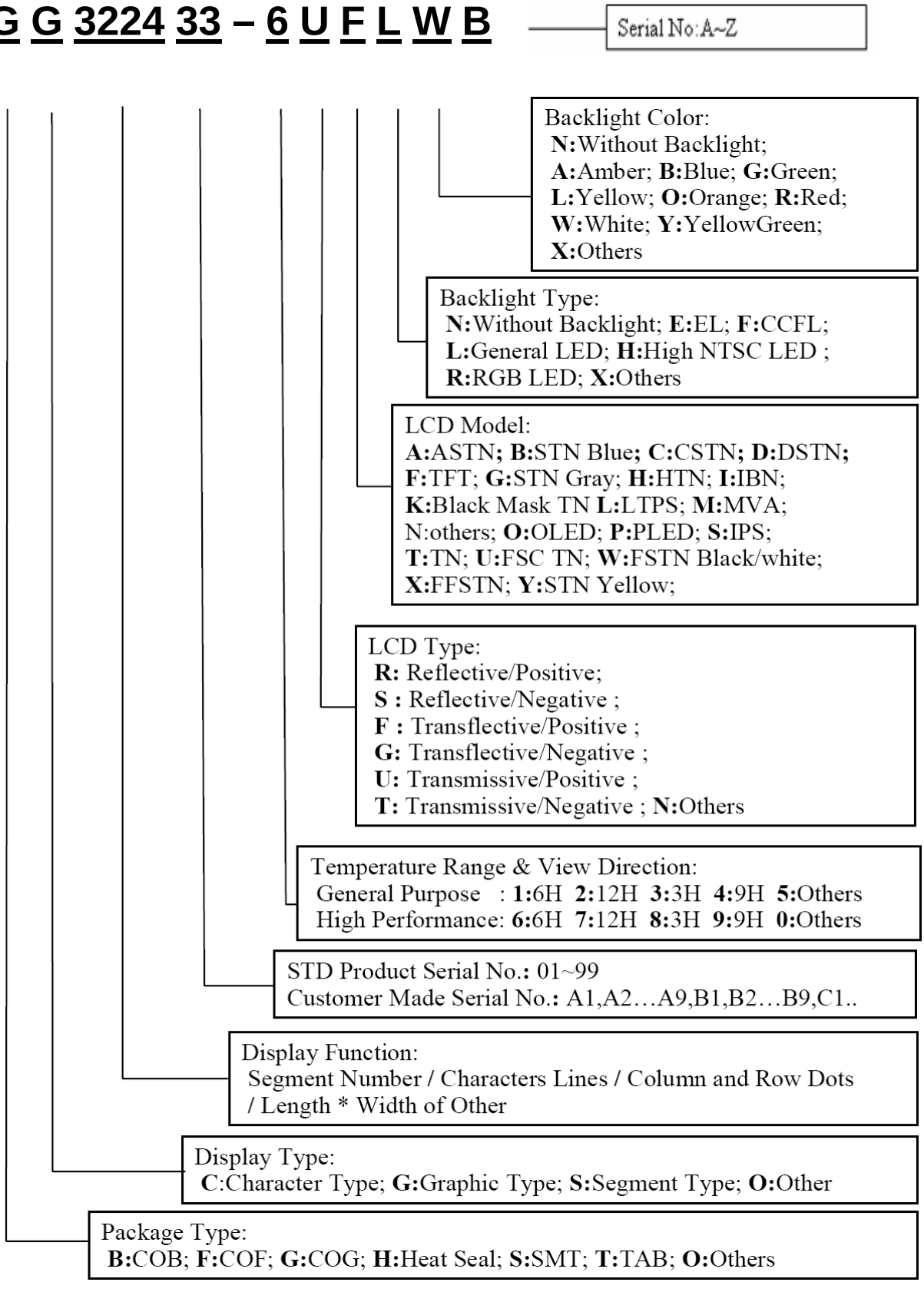
2. Record of Revisions

Rev.	Comments	Page	Date
1	Preliminary Specification was first issued	All	5/13’13
2	Modify 18.3 Inspection Parameters	34	9/4’13
3	Modify 8.3 Projected Capacitive Touch	8	3/17’14
3	Modify 17 Definition of Labels	31	3/17’14
4	Modify 4 Application	5	11/2’16
4	Modify 5 Features	5	11/2’16
4	Modify 6 General Specifications	5	11/2’16
4	Modify 8.3 Projected Capacitive Touch	8	11/2’16
4	Add 15.5 Caution	29	11/2’16
4	Add 15.6 Cautions for LCM installation	30	11/2’16
4	Modify 18.3 Inspection Parameters	36	11/2’16
4	Modify 18.3 Inspection Parameters	38	11/2’16
5	Modify 5. Features	5	6/8’17
5	Modify 8.2 Backlight Unit	8	6/8’17
5	Modify 10.2 Projected Capacitive Touch	12	6/8’17
5	Add 11.5 POWER ON/Reset/Wake Sequence	22	6/8’17
5	Modify 12 Optical Characteristics	24	6/8’17
5	Modify 18. Incoming Inspection Standards	35	6/8’17

3. Module Numbering System

V G G 3224 33 – 6 U F L W B



4. Application

This specification is applied to the 3.5 inch QVGA supported TFT-LCD module With projected capacitive touch (PCT), and can display 16M colors with dithering. The module is designed for PMP, GPS application and other electronic products which require flat panel display of digital signal interface and used as the input devices for general electric appliances via both finger and Capacitive stylus pen.

5. Features

- QVGA (320×240 pixels) resolution.
- Display in 16M colors with dithering
- Line inversion mode with stripe type.
- On-chip voltage generator
- SYNC mode is supported for digital RGB input data format.
- Ultra Wide View Polarizer
- Projected Capacitive Touch
  - I^2C Interface
  - Multi Touch (Ten points)
  - 2048 x 2048 resolution

6. General Specifications

Item	Specifications	Unit
Screen Size	3.5 (Diagonal)	inch
Display Format	320RGB(H)×240(V)	dot
Active Area	70.08(H)×52.56(V)	mm
Dot Pitch	0.073(H)×0.219(V)	mm
Pixel Configuration	RGB Vertical Stripe	-
Display Mode	TN Type Transmissive Mode Normally White	-
Surface Treatment	Clear(7H)	-
Viewing Direction	6 O'clock (The Gray Inversion will appear at this direction)	-
Outline Dimension	76.9(W)×63.9(H)×4.85(D)	mm
DC to DC circuit	Build-in	-
Weight	46.7	g
RoHS Compliance	Eversion certifies this product to be in compliance with European Union Directive 2011/65/EU on the restriction of certain hazardous substances in electrical and electronic equipment.	-

7. Absolute Maximum Ratings

7.1 Absolute Ratings of Environment

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-30	+80	°C	(1)(2)
Operating Ambient Temperature	T_{OP}	-20	+70	°C	(1)(2)

Note1: Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

Note2: Please refer to item of RELIABILITY.

7.2 Electrical Absolute Ratings

7.2.1 TFT-LCD Module

(Ta=25±2°C, GND=V_{SS}=0V)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Digital Power Supply Voltage	V_{CC}	V_{SS}-0.3	5.0	V	-

7.2.2 Backlight Unit

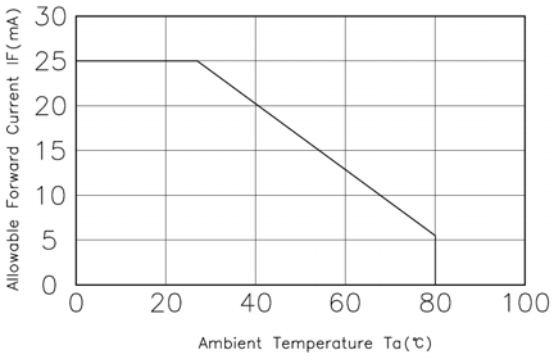
(Ta=25±2°C)

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Forward current	If	-	(50)	mA	(1)(2)
Reverse voltage	V_R	-	(25)	V	(1)

Note (1) Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded.

Note (2) Relation between maximum LED forward current and ambient temperature is showed as bellow.(a string of LEDs)

Ambient Temperature vs. Allowable Forward Current



8. Electrical Characteristics

8.1 TFT-LCD Module

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	V_{CC}	2.5	3.3	3.6	V	-
Power Supply Current	I_{CC}	-	15.6	22.0	mA	(1)
Input High Threshold Voltage	V_{IH}	$0.8V_{CC}$	-	V_{CC}	V	-
Input Low Threshold Voltage	V_{IL}	0	-	$0.2V_{CC}$	V	-
Power Consumption	P_L	-	51.48	72.6	mW	(1)
VSYNC Frequency	F_V	-	60	90	Hz	-
HSYNC Frequency	F_H	-	15.72	22.35	KHz	-
DCLK Frequency	DCLK	-	6.5	10	MHz	-

Note (1) The specified power consumption is under the conditions at V_{CC}=3.3V, F_V=60Hz, whereas a power dissipation check pattern below is displayed.

Black Pattern / 0 Gray

Active Area

8.2 Backlight Unit

(Ta=25±2°C)

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Voltage	VL	-	(16.5)	-	V	(1),(3)
LED Current	IL	-	40	-	mA	(1)
Power Consumption	P_{BL}	-	(660)	-	mW	(1),(3)
LED Life Time(25℃)	-	10000	30000	-	hr	(2)

Note (1) The driving design of backlight unit is dependent on serial consideration of 5S2P LEDs.

Note (2) LED life time is defined as under 25±2℃, when the average brighten decrease to 50% of original brightness

Note (3) The module is driven by constant current, the voltage value is for reference only.

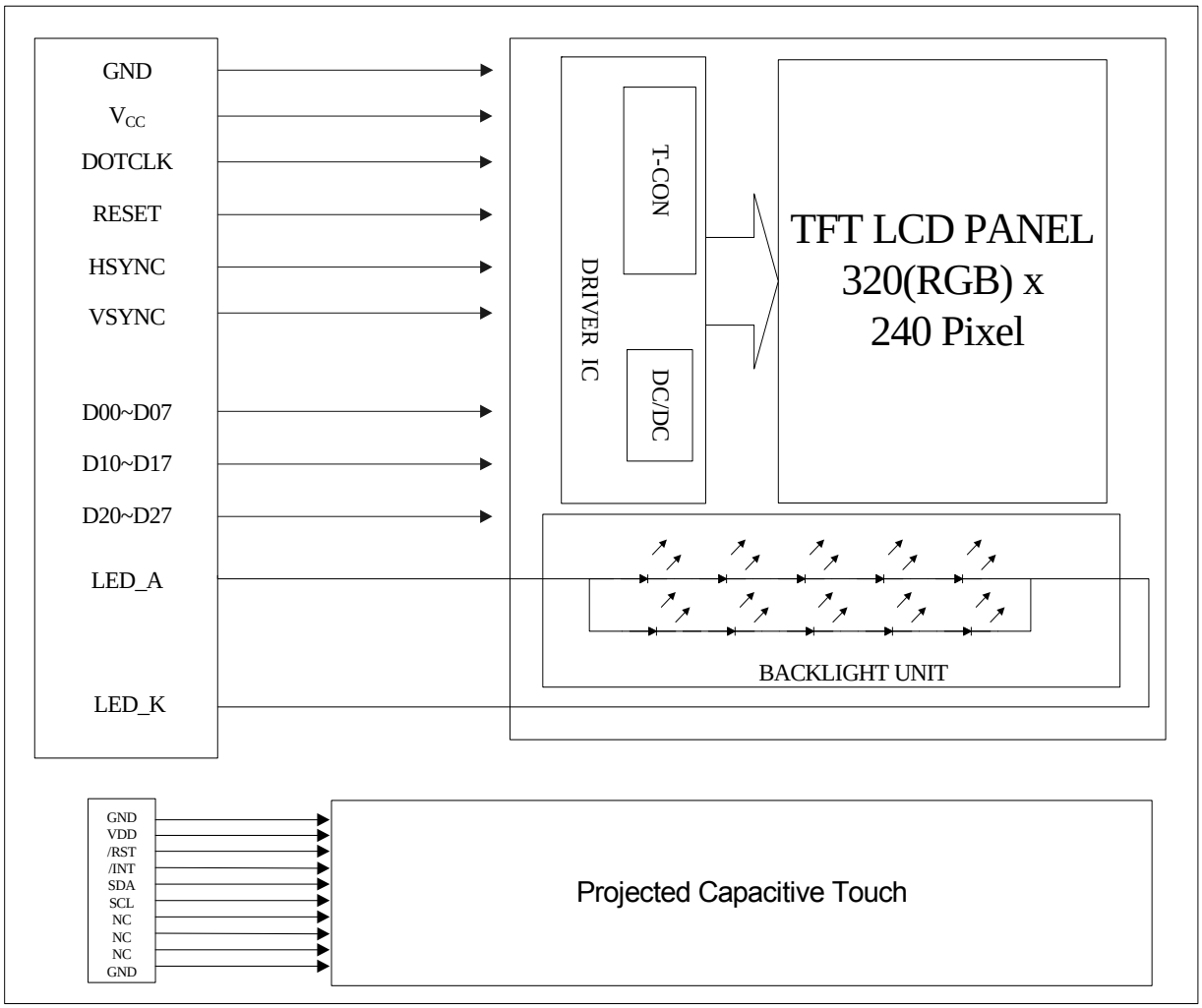
8.3 Projected Capacitive Touch

Item	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Operating Voltage	VDD	3.0	3.3	3.6	V	-
Power Supply Current	IDD	-	9.4	13.2	mA	(1)
Input High Threshold Voltage	V_{IH}	0.7VDD	-	VDD	V	-
Input Low Threshold Voltage	V_{IL}	-0.3	-	0.3VDD	V	-
Output High Threshold Voltage	V_{OH}	0.7VDD	-	-	V	-
Output Low Threshold Voltage	V_{OL}	-	-	0.3VDD	V	-
Power Consumption	P_L	-	31.02	43.56	mW	@3.3V
Report Rate	R_R	-	60	-	Hz	-
Interface		I^2C				-
Function		Multi Touch				-

Note (1) This test condition is touched with 10 points.

9. Block Diagram

TFT-LCD Module with Backlight Unit



10. Input / Output Terminals Pin Assignment

10.1 TFT-LCD Module (CVILUX CF25541D0R0-05)

Pin No.	Symbol	I/O	Description
1	LED_K	I	LED_cathode
2	LED_K	I	LED_cathode
3	LED_A	I	LED_anode
4	LED_A	I	LED_anode
5	NC	I	No connection
6	NC	I	No connection
7	NC	I	No connection
8	RESET	I	Reset
9	NC	I	No connection
10	NC	I	No connection
11	NC	I	No connection
12	D20	I	Blue data(LSB)
13	D21	I	Blue data
14	D22	I	Blue data
15	D23	I	Blue data
16	D24	I	Blue data
17	D25	I	Blue data
18	D26	I	Blue data
19	D27	I	Blue data(MSB)
20	D10	I	Green data(LSB)
21	D11	I	Green data
22	D12	I	Green data
23	D13	I	Green data
24	D14	I	Green data
25	D15	I	Green data
26	D16	I	Green data
27	D17	I	Green data(MSB)
28	D00	I	Red data(LSB)
29	D01	I	Red data
30	D02	I	Red data

Pin No.	Symbol	I/O	Description
31	D03	I	Red data
32	D04	I	Red data
33	D05	I	Red data
34	D06	I	Red data
35	D07	I	Red data(MSB)
36	HSYNC	I	Line synchronization signal.
37	VSYNC	I	Frame synchronization signal.
38	DOTCLK	I	Dot Colck signal
39	NC	I	No connection
40	NC	I	No connection
41	V_{CC}	I	For system power supply.
42	V_{CC}	I	For system power supply.
43	NC	I	No connection
44	NC	I	No connection
45	NC	I	No connection
46	NC	I	No connection
47	NC	I	No connection
48	NC	I	No connection
49	NC	I	No connection
50	NC	I	No connection
51	NC	I	No connection
52	NC	I	No connection
53	GND	I	Ground
54	GND	I	Ground

10.2 Projected Capacitive Touch

Connector: CVILUX CF25101D0R0-05

Pin No.	Symbol	I/O	Description
1	GND	I	System ground.
2	VDD	I	+3.3V power supply.
3	/RST	I	External reset signal, active low.
4	/INT	O	Interrupt signal, active low, asserted to request Host start a new transcation.
5	SDA	I/O	I^2C data signal.
6	SCL	I	I^2C clock signal.
7	/WAKE	I	Wakeup signal
8	NC	-	Not Connection
9	NC	-	Not Connection
10	GND	I	System ground.

10.3 Color Data Input Assignment

The brightness of each primary color(red, green and blue) is based on the 8 bit gray scale data input for the color. The higher the binary input, the brighter the color. The table provides the assignment of color versus data input.

Color		Data Signal																							
		Red								Green								Blue							
		D07	D06	D05	D04	D03	D02	D01	D00	D17	D16	D15	D14	D13	D12	D11	D10	D27	D26	D25	D24	D23	D22	D21	D20
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of RED	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
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	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
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	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

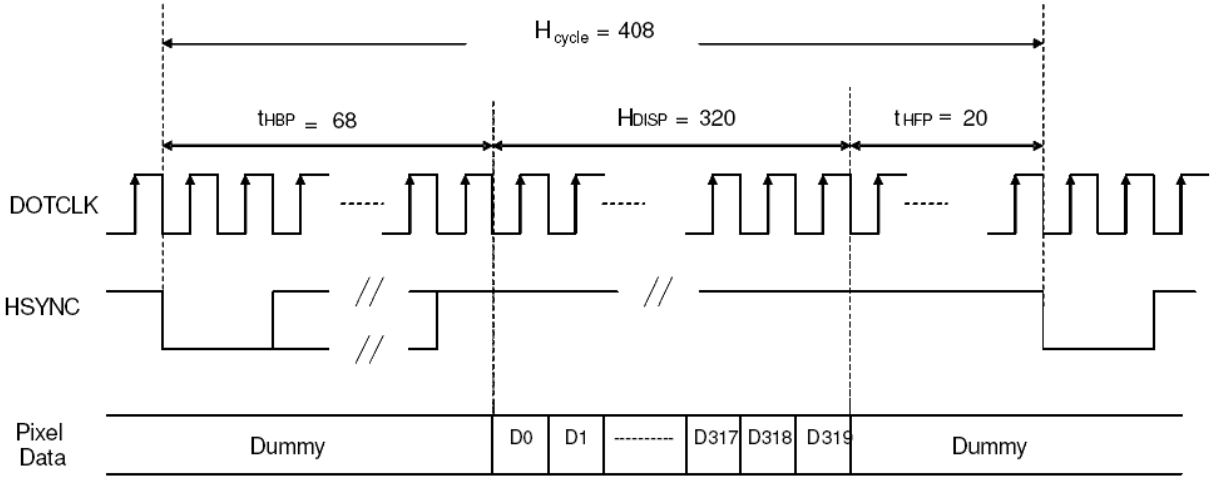
11. Interface Timing

11.1 Input Signal Characteristics

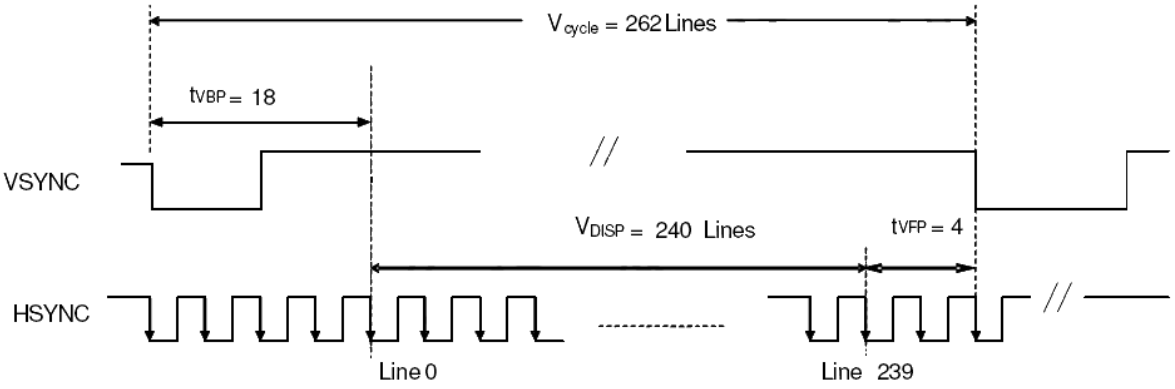
11.1.1 Digital Parallel RGB Interface (960×240 resolution)

Characteristics		Symbol	Min. 24 bit	Typ. 24 bit	Max. 24 bit	Unit
DOTCLK Frequency		fDOTCLK	-	6.5	10	MHz
DOTCLK Period		tDOTCLK	100	154	-	ns
Horizontal Frequency (Line)		fH	-	14.9	22.35	KHz
Vertical Frequency (Refresh)		fV	-	60	90	Hz
Horizontal Back Porch		tHBP	-	68	-	tDOTCLK
Horizontal Front Porch		tHFP	-	20	-	tDOTCLK
Horizontal Data Start Point		tHBP	-	68	-	tDOTCLK
Horizontal Blanking Period		tHBP + tHFP	-	88	-	tDOTCLK
Horizontal Display Area		HDISP	-	320	-	tDOTCLK
Horizontal Cycle		Hcycle	-	408	450	tDOTCLK
Vertical Back Porch		tVBP	-	18	-	Lines
Vertical Front Porch		tVFP	-	4	-	Lines
Vertical Data Start Point		tVBP	-	18	-	Lines
Vertical Blanking Period		tVBP + tVFP	-	22	-	Lines
Vertical Display Area	NTSC	VDISP	-	240	-	Lines
	PAL			280(PALM=0)		
				288(PALM=1)		
Vertical Cycle	NTSC	Vcycle	-	262	350	Lines
	PAL			313		

11.2 Waveform



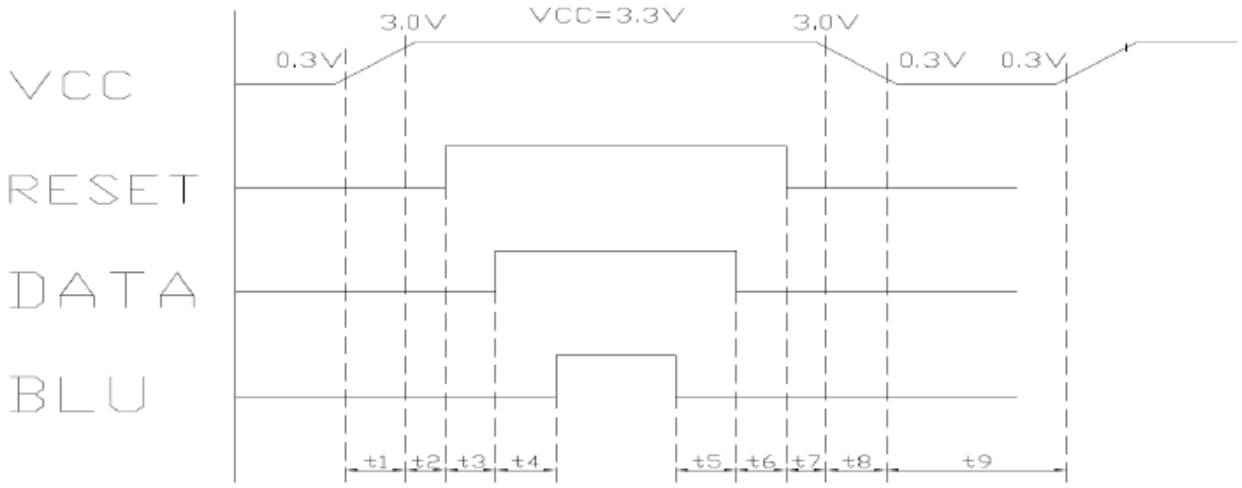
Horizontal Data Transaction Timing



Vertical Data Transaction Timing

Data Transaction Timing in Parallel RGB (24 bit) Interface (SYNC Mode)

11.3 Power On / Off Sequence



T1≦10ms　　200ms≦T5　　1 sec≦T9

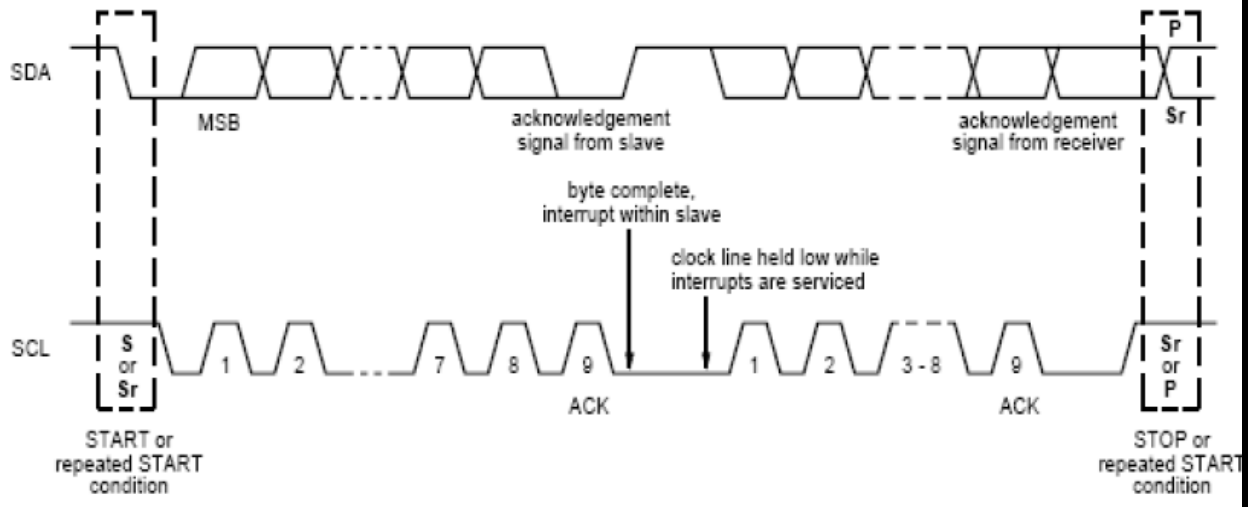
10us≦T2　　50ms≦T6

50ms≦T3　　10us≦T7

200ms≦T4　　T8≦10ms

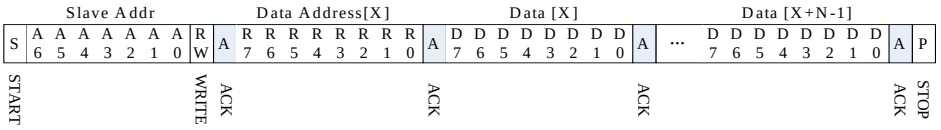
11.4 Timing Requirement of Projected Capacitive Touch

11.4.1 I2C Data Transfer Format

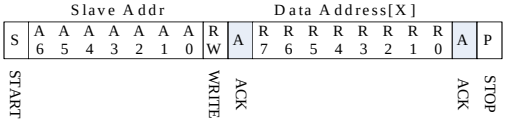


Mnemonics	Description
S	I^2C Start or I^2C Restart
A[6:0]	Slave Address = 7'b0111000
W	1'b0: Write
R	1'b1: Read
C	ACK
P	STOP: the indicate the end of a packet (if this bit is missing, S will indicate the end of the current packet and the beginning of the next packet)

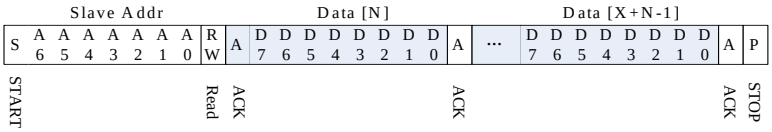
Write N bytes to I2C slave



Set Data Address



Read X bytes from I^2C Slave

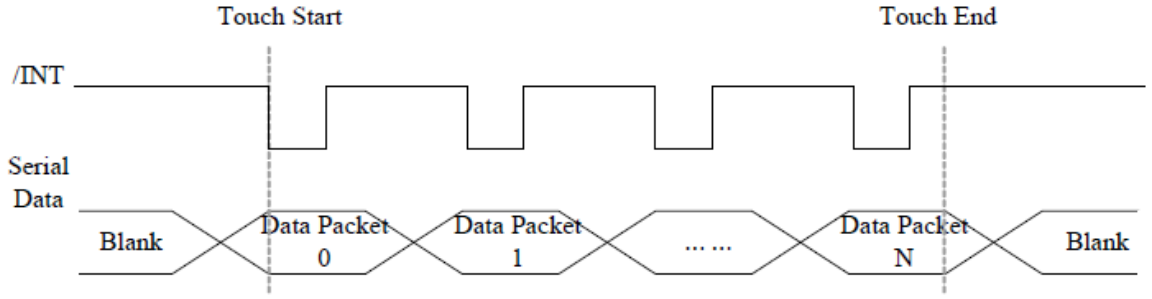


11.4.2 I2C Timing Characteristics

(Ta=25±2°C)

Parameter	Min	Max	Unit
SCL frequency	-	400	kHz
Bus free time between a STOP and START condition	4.7	-	μs
Hold time (repeated) START condition	4.0	-	μs
Data setup time	250	-	ns
Setup time for a repeated START condition	4.7	-	μs
Setup time for STOP condition	4.0	-	μs

11.4.3 Interrupt Trigger Mode



11.4.4 I2C Operating Mode Register Map

Address	Name	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Host Access
Op,00h	DEVICE_MODE		Device Mode[2:0]							RW
Op,01h	Reserved									R
Op,02h	TD_STATUS					Number of touch points[3:0]				R
Op,03h	TOUCH1_YH	1st Event Flag				1st Touch Y Position[11:8]				R
Op,04h	TOUCH1_YL	1st Touch Y Position[7:0]								R
Op,05h	TOUCH1_XH	1st Touch ID[3:0]				1st Touch X Position[11:8]				R
Op,06h	TOUCH1_XL	1st Touch X Position[7:0]								R
Op,07h	Reserved									R
Op,08h	Reserved									R
Op,09h	TOUCH2_YH	2nd Event Flag				2nd Touch Y Position[11:8]				R
Op,0Ah	TOUCH2_YL	2nd touch Y Position[7:0]								R
Op,0Bh	TOUCH2_XH	2nd Touch ID[3:0]				2nd Touch				R

				X Position[11:8]	
Op,0Ch	TOUCH2_XL	2nd Touch X Position[7:0]			R
Op,0Dh	Reserved				R
Op,0Eh	Reserved				R
Op,0Fh	TOUCH3_YH	3rdEvent Flag		3rd Touch Y Position[11:8]	R
Op,10h	TOUCH3_YL	3rd Touch Y Position[7:0]			R
Op,11h	TOUCH3_XH	3rd Touch ID[3:0]		3rd Touch X Position[11:8]	R
Op,12h	TOUCH3_XL	3rd Touch X Position[7:0]			R
Op,13h	Reserved				R
Op,14h	Reserved				R
Op,15h	TOUCH4_YH	4thEvent Flag		4th Touch Y Position[11:8]	R
Op,16h	TOUCH4_YL	4th Touch Y Position[7:0]			R
Op,17h	TOUCH4_XH	4th Touch ID[3:0]		4th Touch X Position[11:8]	R
Op,18h	TOUCH4_XL	4th Touch X Position[7:0]			R
Op,19h	Reserved				R
Op,1Ah	Reserved				R
Op,1Bh	TOUCH5_YH	5thEvent Flag		5th Touch Y Position[11:8]	R
Op,1Ch	TOUCH5_YL	5thTouch Y Position[7:0]			R
Op,1Dh	TOUCH5_XH	5th Touch ID[3:0]		5th Touch X Position[11:8]	R
Op,1Eh	TOUCH5_XL	5th Touch X Position[7:0]			R
Op,1Fh	Reserved				R
Op,20h	Reserved				R
Op,21h	TOUCH6_YH	6thEvent Flag		6th Touch Y Position[11:8]	R
Op,22h	TOUCH6_YL	6thTouch Y Position[7:0]			R
Op,23h	TOUCH6_XH	6th Touch ID[3:0]		6th Touch X Position[11:8]	R
Op,24h	TOUCH6_XL	6th Touch X Position[7:0]			R

Op,25h	Reserved				R
Op,26h	Reserved				R
Op,27h	TOUCH7_YH	7th Event Flag		7th Touch Y Position[11:8]	R
Op,28h	TOUCH7_YL	7th Touch Y Position[7:0]			R
Op,29h	TOUCH7_XH	7th Touch ID[3:0]		7th Touch X Position[11:8]	R
Op,2Ah	TOUCH7_XL	7th Touch X Position[7:0]			R
Op,2Bh	Reserved				R
Op,2Ch	Reserved				R
Op,2Dh	TOUCH8_YH	8th Event Flag		8th Touch Y Position[11:8]	R
Op,2Eh	TOUCH8_YL	8th Touch Y Position[7:0]			R
Op,2Fh	TOUCH8_XH	8th Touch ID[3:0]		8th Touch X Position[11:8]	R
Op,30h	TOUCH8_XL	8th Touch X Position[7:0]			R
Op,31h	Reserved				R
Op,32h	Reserved				R
Op,33h	TOUCH9_YH	9th Event Flag		9th Touch Y Position[11:8]	R
Op,34h	TOUCH9_YL	9th Touch Y Position[7:0]			R
Op,35h	TOUCH9_XH	9th Touch ID[3:0]		9th Touch X Position[11:8]	R
Op,36h	TOUCH9_XL	9th Touch X Position[7:0]			R
Op,37h	Reserved				R
Op,38h	Reserved				R
Op,39h	TOUCH10_YH	10th Event Flag		10th Touch Y Position[11:8]	R
Op,3Ah	TOUCH10_YL	10th Touch Y Position[7:0]			R
Op,3Bh	TOUCH10_XH	10th Touch ID[3:0]		10th Touch X Position[11:8]	R
Op,3Ch	TOUCH10_XL	10th Touch X Position[7:0]			R
Op,3Dh	Reserved				R
Op,3Eh	Reserved				R

11.4.5 DEVICE_MODE

This register is the device mode register, configure it to determine the current mode of the chip.

Address	Bit Address	Register Name	Description
Op,00h	6:4	Device Mode [2:0]	000b Normal operating Mode 001b System Information Mode (Reserved) 100b Test Mode – read raw data (Reserved)

11.4.6 TD_STATUS

This register is the Touch Data status register.

Address	Bit Address	Register Name	Description
Op,02h	3:0	Number of touch points[3:0]	How many points detected. 1-10 is valid.

11.4.7 TOUCHn_YH (n:1-10)

This register describes MSB of the Y coordinate of the nth touch point and the corresponding event flag.

Address	Bit Address	Register Name	Description
Op,03h ~ Op,39h	7:6	Event Flag	00b: Put Down 01b: Put Up 10b: Contact 11b: No event
	5:4		Reserved
	3:0	Touch Y Position [11:8]	MSB of Touch Y Position in pixels

11.4.8 TOUCHn_YL (n:1-10)

This register describes LSB of the Y coordinate of the nth touch point.

Address	Bit Address	Register Name	Description
Op,04h ~ Op,3Ah	7:0	Touch Y Position [7:0]	LSB of the Touch Y Position in pixels

11.4.9 TOUCHn_XH (n:1-10)

This register describes MSB of the X coordinate of the nth touch point and corresponding touch ID.

Address	Bit Address	Register Name	Description
Op,05h ~ Op,3Bh	7:4	Touch ID[3:0]	Touch ID of Touch Point
	3:0	Touch X Position [11:8]	MSB of Touch X Position in pixels

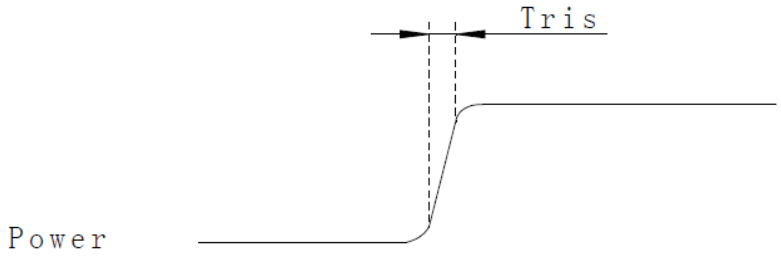
11.4.10 TOUCHn_XL (n:1-10)

This register describes LSB of the X coordinate of the nth touch point.

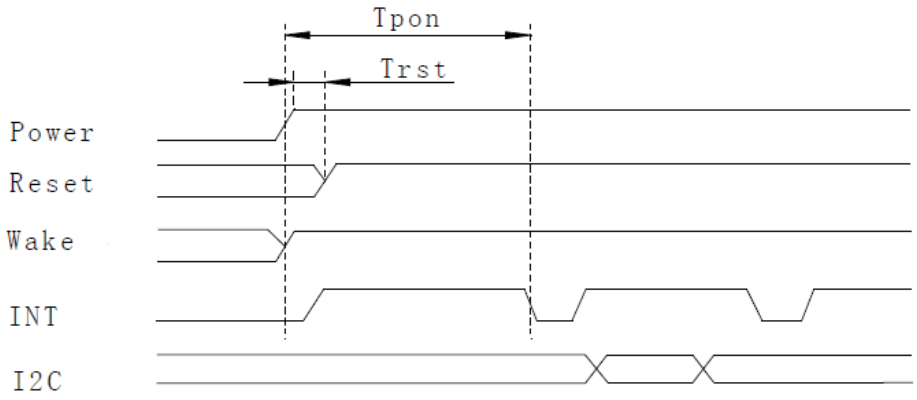
Address	Bit Address	Register Name	Description
Op,06h ~ Op,3Ch	7:0	Touch X Position [7:0]	LSB of The Touch X Position in pixels

11.5 POWER ON/Reset/Wake Sequence

Reset and GPIO such as /WAKE, /INT and I2C are advised to be low before powering on. The signal of waking up should be set to be high after powering on. /INT signal will be sent to the host after initializing all parameters and then start to report points to the host.



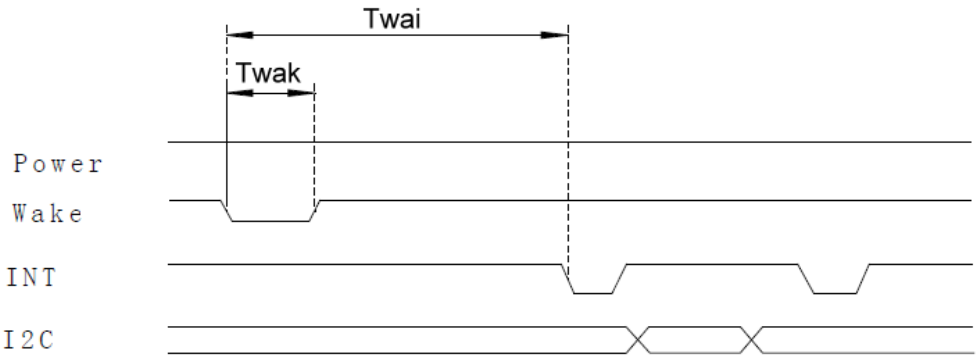
Power on time



Power on Sequence

Reset time must be enough to guarantee reliable reset, the time of starting to report point after resetting approach to the time of starting to report point after powering on.

Wake time must be enough to wake up the system, the time of starting to report point after waking approach to the time of starting to report point after powering on.



Wake Sequence

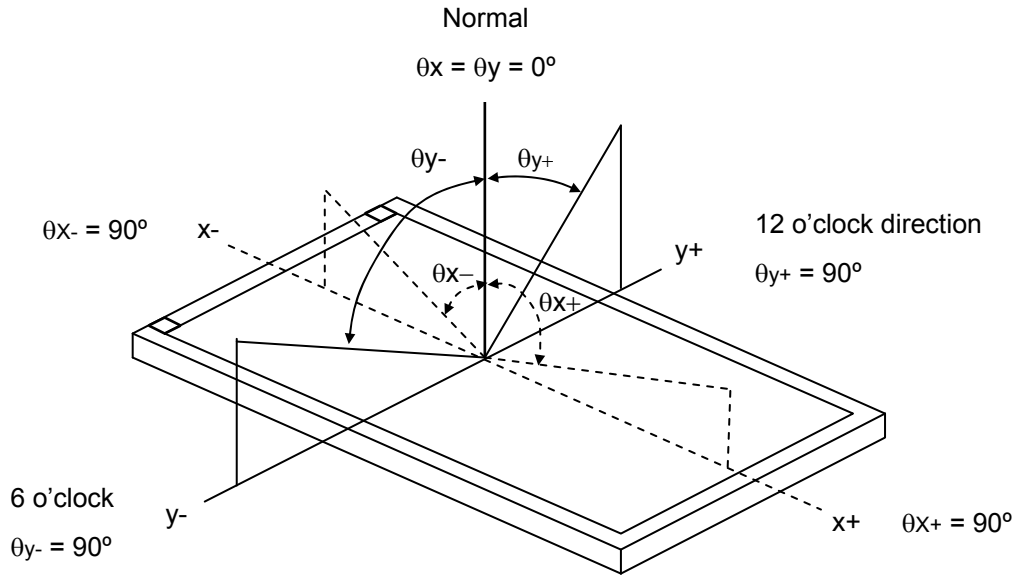
Parameter	Description	Min	Max	Units
Tris	Rise time from 0.1VDD to 0.9VDD	--	10	ms
Tpon	Time of starting to report point after powering on	300	--	ms
Trsi	Time of starting to report point after resetting	300	--	ms
Trst	Reset time	5	--	ms
Twai	Time of starting to report point after waking	300	--	ms
Twak	Wake up time	5	--	ms

12. Optical Characteristics

The optical characteristics should be measured in a dark environment (≦ 1 lux) or equivalent state with the methods shown in Note (4).

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	θ_x=0°, θ_Y =0° Viewing Normal Angle	300	（450）	-	-	(2)
Response Time		$T_{R+}T_F$		-	50	-	ms	(3)
Luminance(Center)		Y		430	（500）	-	cd/m^2	(4)
Brightness uniformity		B_{UNI}		75	（80）	-	%	(5)
Color Chromaticity	Red	Rx		0.585	0.635	0.685	-	(1),(4)
		Ry		0.305	0.355	0.405	-	
	Green	Gx		0.300	0.350	0.400	-	
		Gy		0.525	0.575	0.625	-	
	Blue	Bx		0.090	0.140	0.190	-	
		By		0.040	0.090	0.140	-	
	White	Wx		0.29	0.34	0.39	-	
		Wy		0.305	0.355	0.405	-	
Viewing Angle	Horizontal	θ_x+	CR≥10	60	（80）	-	deg.	
		θ_x-		60	（80）	-		
	Vertical	θ_Y+		60	（80）	-		
		θ_Y-		60	（80）	-		

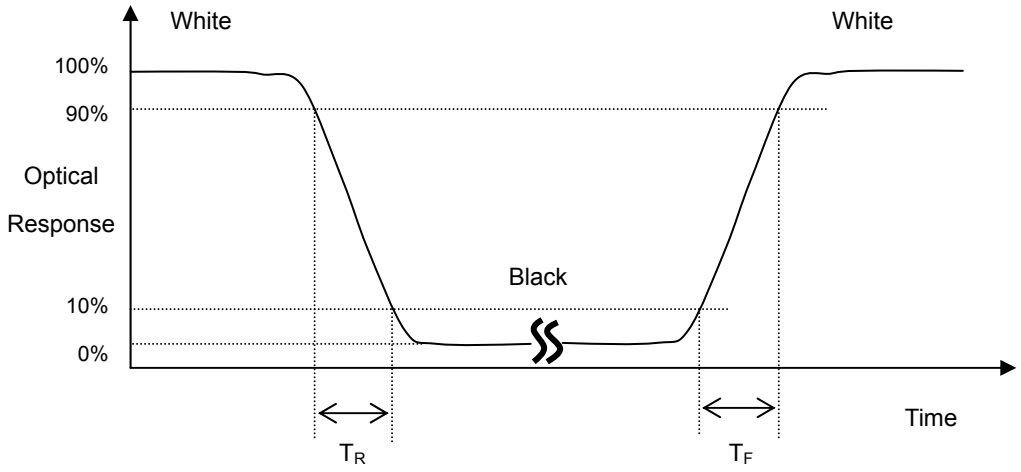
Note (1) Definition of Viewing Angle (θx, θy):



Note (2) Definition of Contrast Ratio (CR):

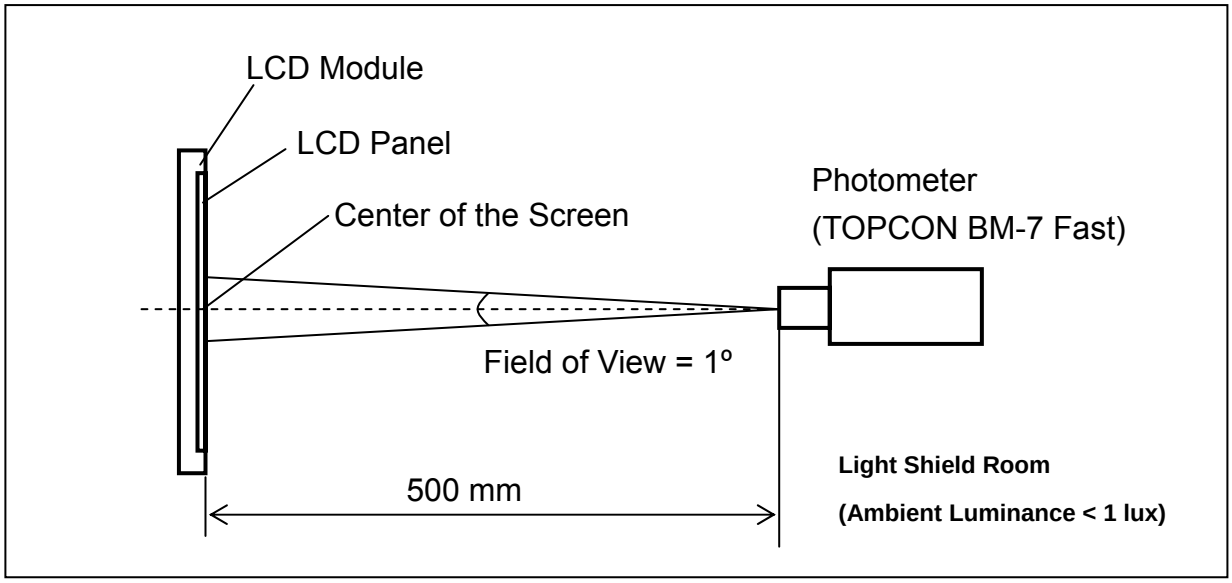
$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note (3) Definition of Response Time (T_R, T_F):



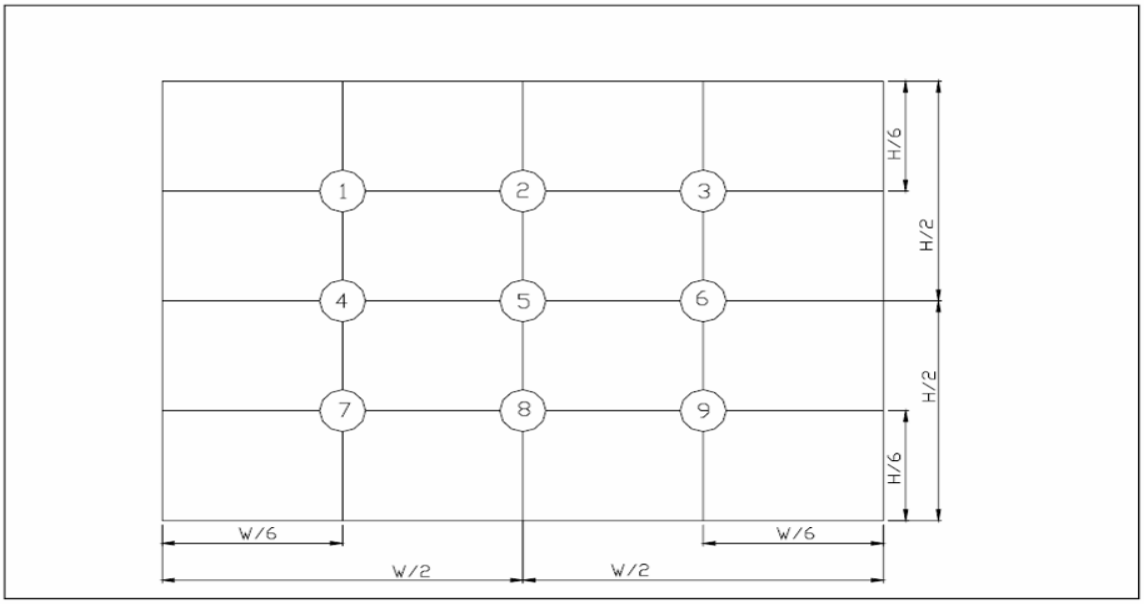
Note (4) Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a dark room or equivalent condition.



Note (5) Definition of brightness uniformity

Brightness uniformity=(Min Luminance of 9 points)/(Max Luminance of 9 points)×100%



(單位 ：mm)

13. Reliability Test

No.	Test Items	Test Condition	Remark
1	High Temperature Storage Test	T_a= 80℃ 240 hours	(1) (3),(4)
2	Low Temperature Storage Test	T_a= -30℃ 240 hours	(1),(3),(4)
3	High Temperature Operation Test	T_S= 70℃ 240 hours	(2),(3),(4)
4	Low Temperature Operation Test	T_a= -20℃ 240 hours	(1),(3),(4)
5	High Temperature and High Humidity Operation Test	T_a=60℃ 90%RH 240 hours	(3),（4）
6	Electro Static Discharge Test （non-operating）	-Panel Surface/Top Case ：150pF, 330Ω Air：±15kV, Contact: ±8kV	（3）
7	Mechanical Shock Test （non-operating）	Half sine wave, 100G, 6ms 3 times shock of each six surfac s	（3）
8	Vibration Test （non-operating）	Sine wave:10 ~ 55 ~ 10Hz amplitude:1.5mm 3 axis, 2 hours/axis	（3）
9	Thermal Shock Test （non-operating）	-20℃（30min）~ 70℃（30min）, 10 cycles	（3）,（4）
10	Drop Test(with Carton)	Height：80㎝ 1 corner, 3 edges, 6 surfaces	（3）

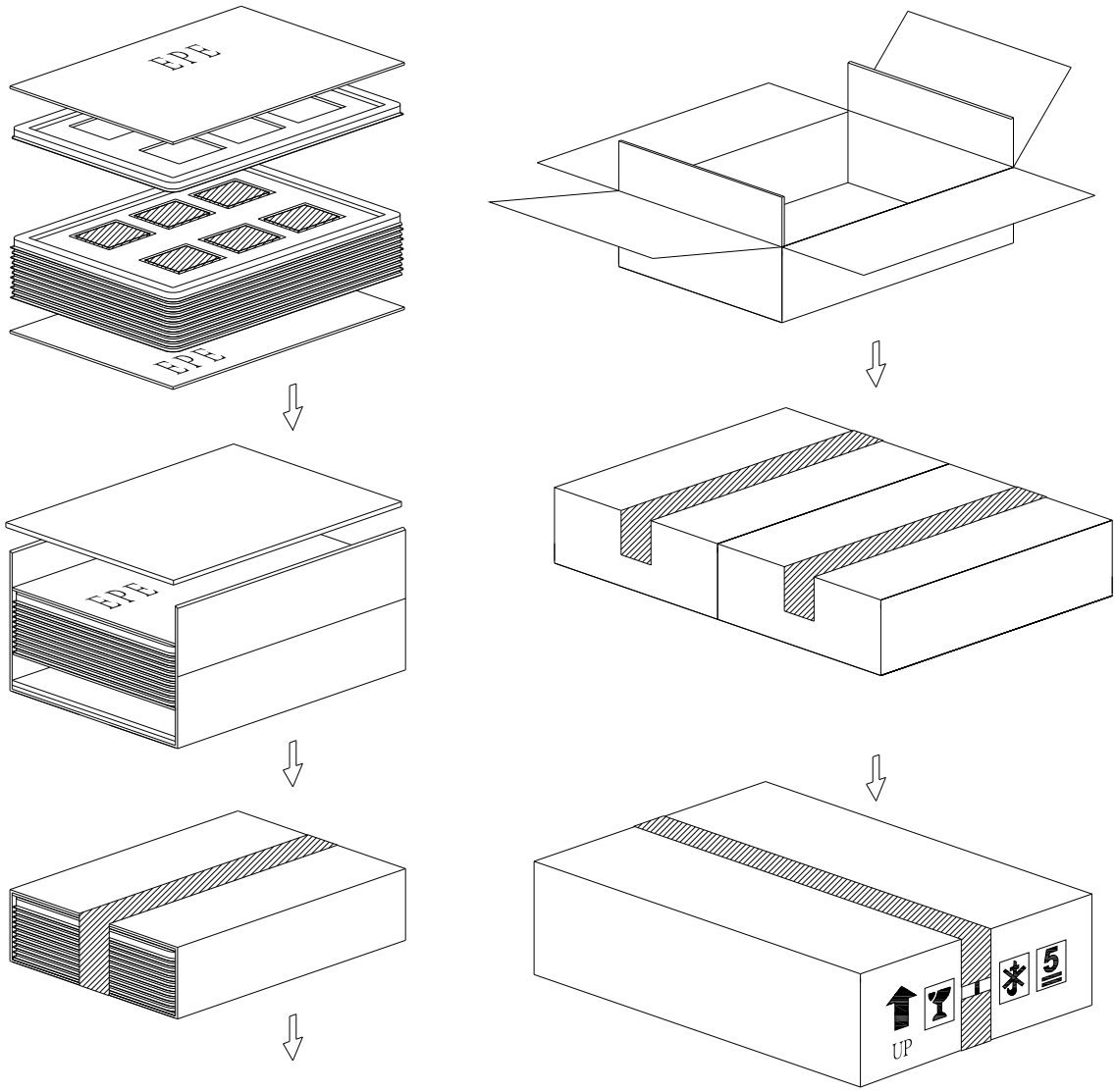
Note 1：Ta is the ambient temperature of samples.

Note 2：Ts is the temperature of panel’ s surface.

Note 3：In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don’ t guarantee all of the cosmetic specification.

Note 4：Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

14. Packaging



	PARTS LIST				
	ITEM	SIZE(LxWxH) unit:mm	MATERIAL	Q.T.Y	NOTE
1	TRAY	372.0x262.0x16.6		26	
2	EPE(J46)	372.0x262.0x5.0	EPE	4	
3	CARD BOARD(P01)	816.0x375.0x3.5	CARTON	2	
4	CARD BOARD(P02)	945.0x275.0x3.5	CARTON	2	
5	CARD BOARD(P03)	375.0x265.0x3.5	CARTON	4	
6	INTERNAL BOX(S01)	400.0x290.0x150.0	CARTON	2	
7	EXTERNAL BOX(L28)	600.0x420.0x180.0		1	
8	PRODUCT	76.9x63.9x4.85		144	

15. Precautions

15.1 Assembly and Handling Precautions

(1) Do not apply rough force such as bending or twisting to the module during assembly.

(2) It's recommended to assemble or to install a module into the user's system in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.

(3) Don't apply pressure or impulse to the module to prevent the damage of LCD panel and Backlight.

(4) Always follow the correct power-on sequence when the LCD module is turned on. This can prevent the damage and latch-up of the CMOS LSI chips.

(5) Do not plug in or pull out the I/F connector while the module is in operation.

(6) Do not disassemble the module.

(7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.

(8) Moisture can easily penetrate into LCD module and may cause the damage during operation.

(9) High temperature or humidity may deteriorate the performance of LCD module. Please store LCD module in the specified storage conditions.

(10) When ambient temperature is lower than 10ºC, the display quality might be reduced. For example, the response time will become slow.

15.2 Safety Precautions

(1) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.

(2) After the module's end of life, it is not harmful in case of normal operation and storage.

15.3 Terms of Warrant

(1) Acceptance inspection period

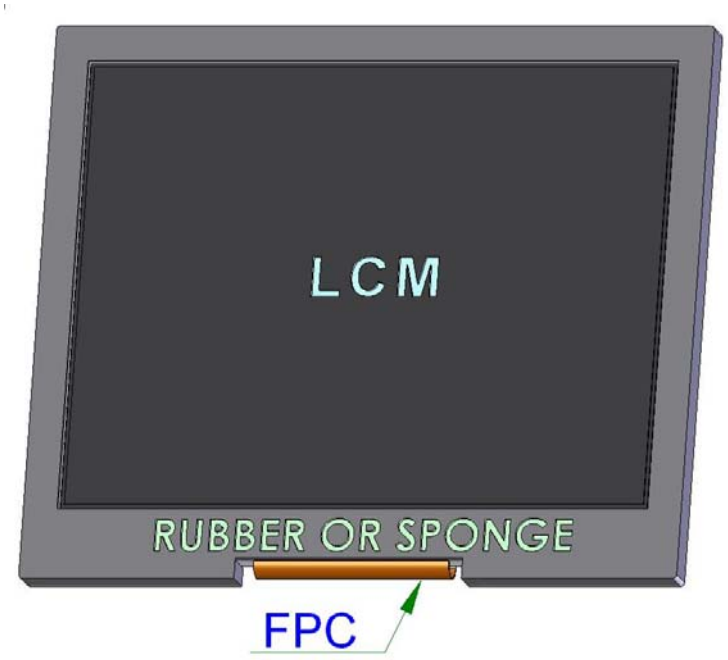
The period is within one month after the arrival of contracted commodity at the buyer's factory site.

(2) Applicable warrant period

The period is within twelve months since the date of shipping out under normal using and storage conditions.

15.4 Cautions for LCM's installing and assembling

Please keep away the FPC while assembling or fixing the LCM to avoid FPC being damaged or extruded or other related problems. Please see below picture.

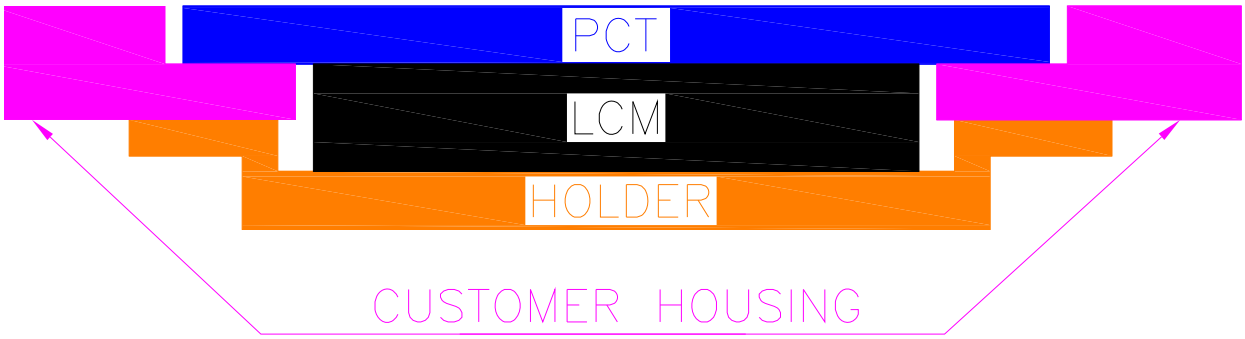


15.5 Caution

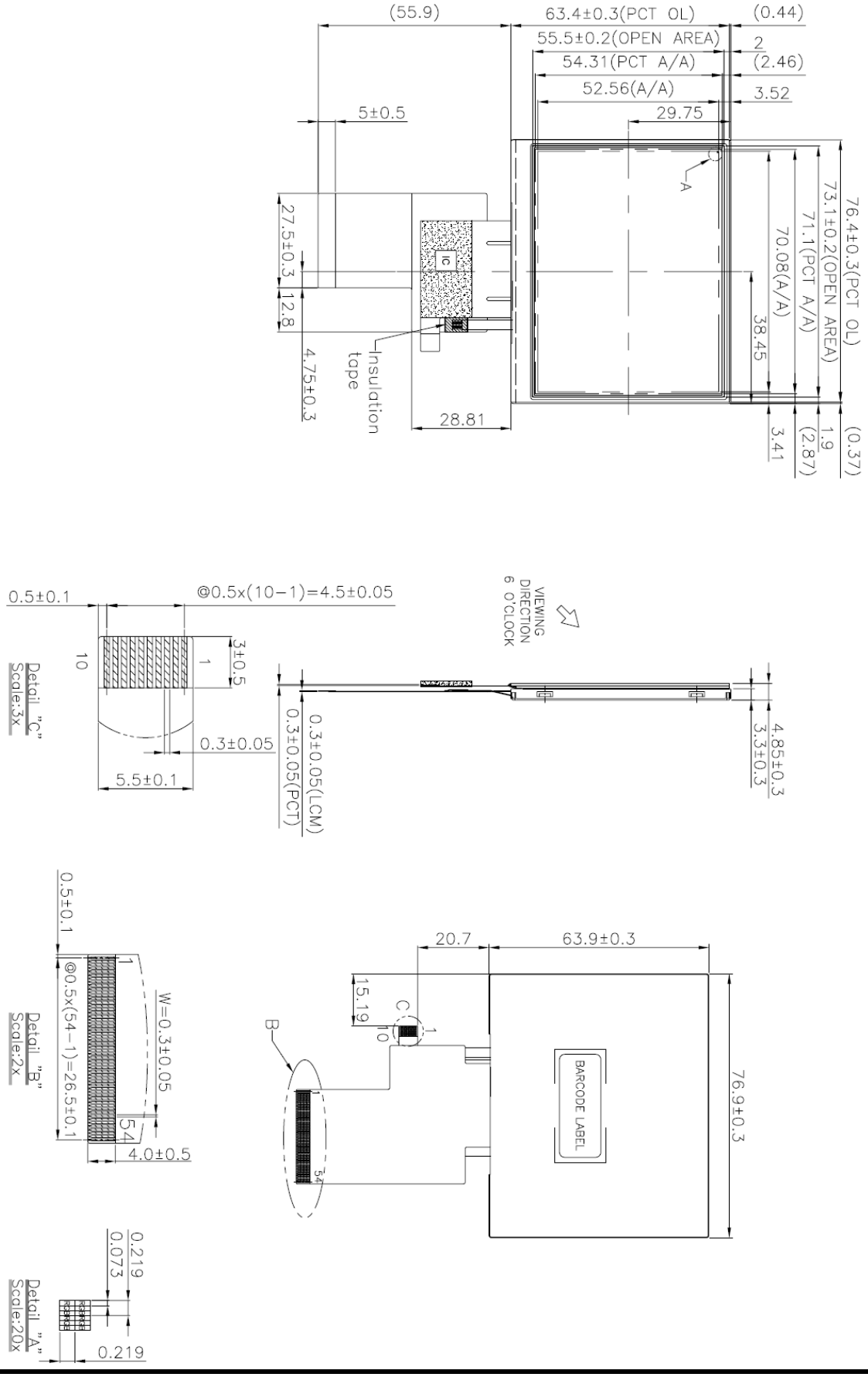
This Eversion LCD module has been specifically designed for use only in electronic devices in the areas of audio control, office automation,industrial control, home appliances, etc. The modules should not be used in applications where module failure could result in physical harm or loss of life, and Eversion expressly disclaims any and all liability relating in any way to the use of the module in such applications.

15.6 Cautions for LCM installation

To secure the LCM within customer housing, having appropriate structural support underneath the LCM is a must. The recommended LCM installation with a holder type of the structure into the customer housing is shown below figure. By attaching ONLY the protruding edges of the PCT with cover lens onto the customer housing does not provide a proper structural support required for the LCM. Such construction may deteriorate the adhesivity between the PCT with cover lens and the TFT module, especially after a long period of time or from the vibrations encountered during product transportation.



16.Outline Drawing



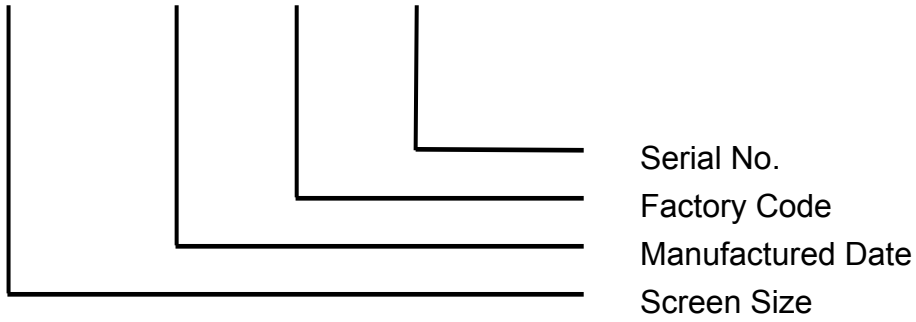
17.Definition of Labels

The bar code nameplate is pasted on each module as illustration, and its definitions are as following explanation.

(a) Module Name：VGG322433-6UFLWB

(b) Serial ID：

A B C D E F G H I J K L



Serial ID includes the information as below:

(a) Screen size (Diagonal): Inch Code (ABCD)

3.5” → 0350

10.4” → 1040

(b) Manufactured Date: Year, Month, Day (EFG)

Year (E)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Mark	0	1	2	3	4	5	6	7	8	9
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Mark	A	B	C	D	E	F	G	H	I	J

Month (F)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Mark	1	2	3	4	5	6	7	8	9	A	B	C

Day (G)

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mark	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	G
Day	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Mark	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	

(c) Factory Code (H):

For EVERVISION internal use.

(d) Serial No. (IJKL):

Manufacturing sequence of product, for example: 0001~9999.

18. Incoming Inspection Standards

18.1 The environmental condition of inspection

The environmental condition and visual inspection shall be conducted as below.

(1) Ambient temperature 25 ± 5℃

(2) Humidity: 45 ~ 65 % RH

(3) Viewing distance is approximately 30 ~ 40 cm

(4)Viewing angle is normal to the LCD panel as Fig _1 (± 45°)

(5) Ambient Illumination: 300 ~ 500 Lux for external appearance inspection

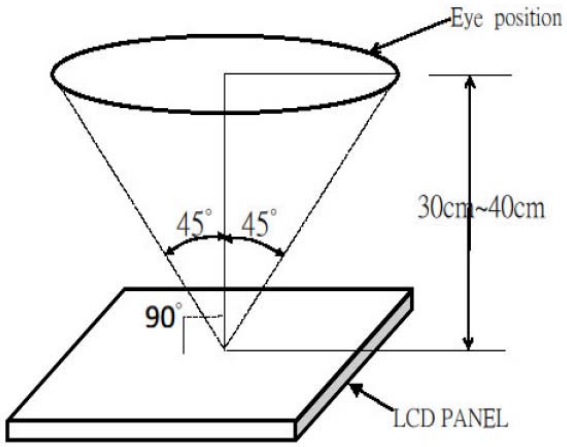


Fig_1

18.2 The defects classify of AQL as following:

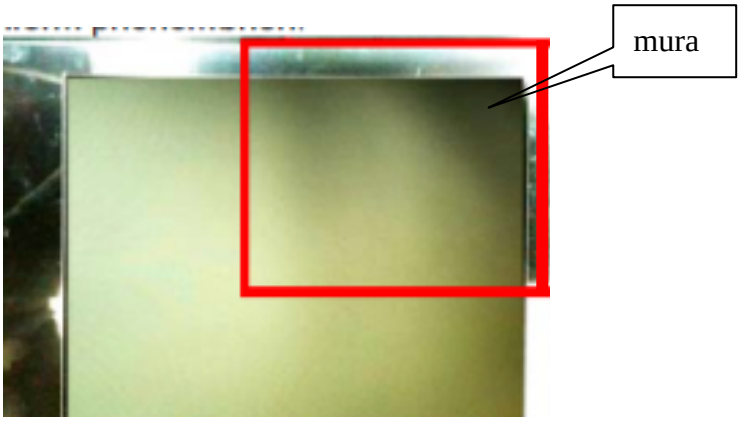
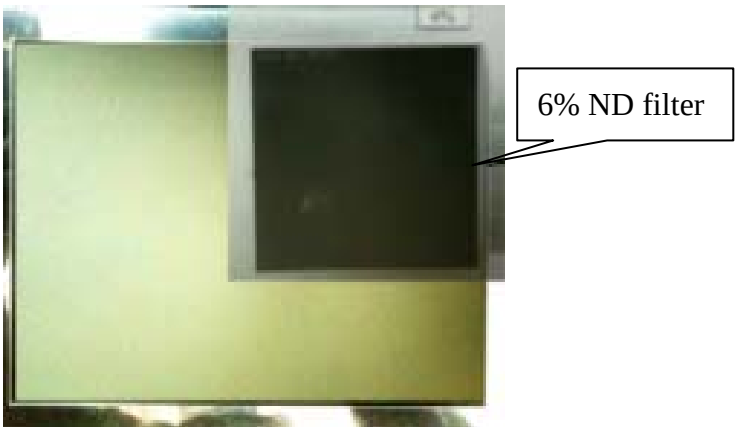
(1) Test method :According to ANSI/ASQC Z 1.4 .General Inspection Level Ⅱ take a single time

(2) The defects classify of AQL as following:

Class of defects	AQL	Definition
Major	0.65%	It is defect that is likely to result in failure or to reduce materially the usability of the intended function.
Minor	1.5%	It is a defect that will not result in functioning problem with deviation classified.

18.3 Inspection Parameters

<table>
<tr><th colspan="2">Item</th><th>Specification/Description</th><th>Note</th></tr>
<tr><td rowspan="2">Display</td><td>Function</td><td>No Display</td><td>-</td></tr>
<tr><td></td><td>Malfunction</td><td>-</td></tr>
<tr><td rowspan="2">Operating</td><td>Contrast ratio</td><td>Out of Spec</td><td>-</td></tr>
<tr><td>Line defect</td><td>No obvious Vertical and Horizontal line defect in bright , dark and colored.</td><td>-</td></tr>
<tr><td>Operating</td><td>Point Defect (red,green,blue, dark， white)</td><td>
<table>
<tr><td rowspan="2">Item</td><td colspan="3">Acceptable number</td></tr>
<tr><td>A</td><td>B</td><td>Total</td></tr>
<tr><td>BRIGHT DOT</td><td>N≦0</td><td>N≦2</td><td rowspan="3">N≦6</td></tr>
<tr><td>DARK DOT</td><td>N≦2</td><td>N≦4</td></tr>
<tr><td>TOTAL DOT</td><td>N≦2</td><td>N≦4</td></tr>
<tr><td>TWO ADJACENT DOT</td><td colspan="3">NOT ALLOWED</td></tr>
<tr><td>THREE OR MORE ADJACENT DOT</td><td colspan="3">NOT ALLOWED</td></tr>
</table>
</td><td>Note: 1、4、5、6</td></tr>
<tr><td rowspan="4">External Inspection (non-operating)</td><td>Scratch on the polarizer</td><td>
<table>
<tr><td>L(mm)</td><td>W(mm)</td><td>Acceptable number</td></tr>
<tr><td>L≦2.5</td><td>W≦0.1</td><td>3</td></tr>
<tr><td>L＞2.5</td><td>W＞0.1</td><td>0</td></tr>
</table>
</td><td>Note:2</td></tr>
<tr><td>Dent or bubble on the polarizer</td><td>
<table>
<tr><td>Dimension(mm)</td><td>Acceptable number</td></tr>
<tr><td>D≦0.3</td><td>3</td></tr>
<tr><td>D≦0.15</td><td>Disregard</td></tr>
</table>
</td><td>Note:3</td></tr>
<tr><td>Line Criteria or Dot Criteria on the polarizer</td><td>
<table>
<tr><td>Inactive dot</td><td>Acceptable number</td></tr>
<tr><td>D≦0.2</td><td>Disregard</td></tr>
<tr><td>0.2≦D≦0.3mm
L≦1.8mm,W≦0.1mm</td><td>Line &dot number N≦6</td></tr>
</table>
</td><td>Note:2、3</td></tr>
<tr><td>Missing figure on the polarizer</td><td>
<table>
<tr><td>Inactive dot</td><td>Acceptable number</td></tr>
<tr><td>D<0.2mm</td><td>Disregard</td></tr>
<tr><td>0.2≦D≦0.3mm
L≦1mm,W≦0.1mm</td><td>Line &dot number N≦4</td></tr>
</table>
</td><td>Note:2、3</td></tr>
</table>

Item		Specification/Description	Note
External Inspection (non-operating or operating)	mura	Has the non-uniform phenomenon  	
		Weak defect will be defined as mura if it can be observed through ND filter 6%  	

Incoming Inspection Touch Panel

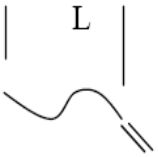
Circular Defects
Linear Defects
Scratch
Air Bubble
Crack

(1) Circular Defects

ϕ=(L+W)/2

Diameter(mm)	Spec
$\phi \leqq 0.2$	No quantity limit
$0.2 < \phi < 0.4$	Max 5defect
$0.4 \leqq \phi$	Reject

(2) Linear Defects



Length	Width	Acceptable
6.0≧L	0.06≧W	Accept
L≧6.0	W≧0.06	Reject

(3)Scratch

Length	Width	Acceptable
12.0≧L	0.06≧W	Accept
L≧12.0	W≧0.06	Reject
The Min distance of defects must be above 5.0mm.		

(4) Air Bubble

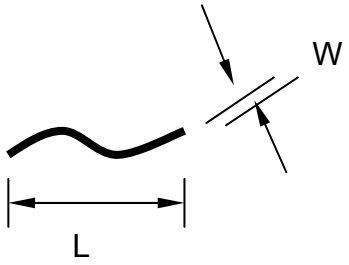
Diameter(mm)	Spec
$\phi \leqq 0.2$	No quantity limit
$0.2 < \phi \leqq 0.6$	Max 5 defect
The Min distance of defects must be above 5.0mm.	

(5)Crack Reject

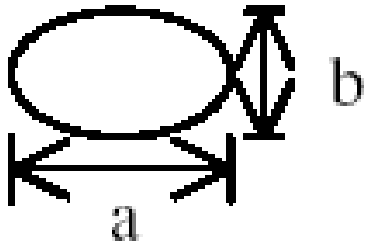
Note1. The definition of dot defect :

The dot defect was judged after repair and the size of a defective dot over 1/2 of whole dot is regarded as one defective dot.

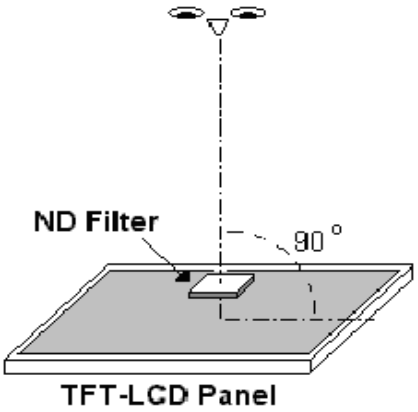
Note2.

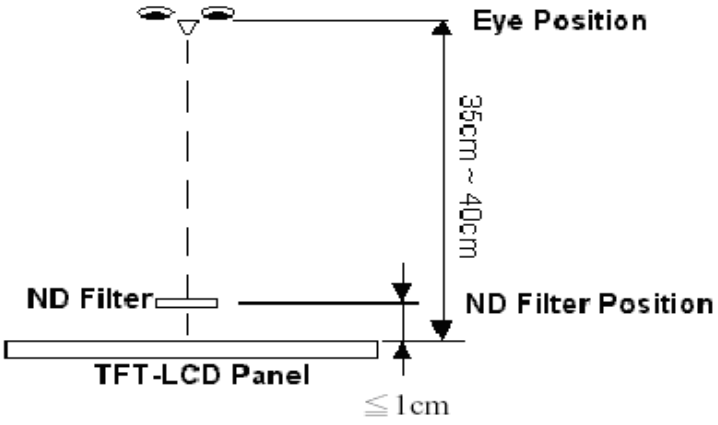


Note3. D：Diameter D=(a+b)/2



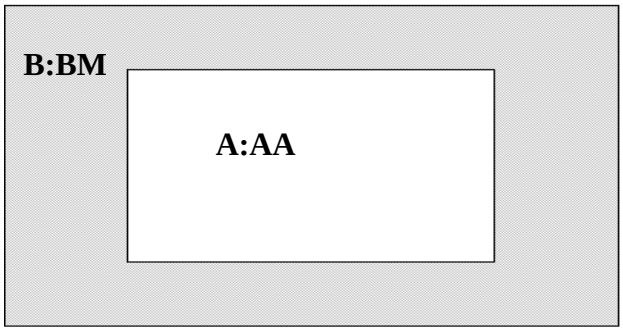
Note4. Bright dot is defined through 2% transmission ND Filter as following.





Note5. ADJACENT DOT

Note6.



18.4 Handling of LCM

(1)Don't give external shock.

(2)Don't apply excessive force on the surface.

(3)Liquid in LCD is hazardous substance. Must not lick and swallow. when the liquid is attach to your hand, skin, cloth etc. Wash it out thoroughly and immediately.

(4)Don't operate it above the absolute maximum rating.

(5)Don't disassemble the LCM.