

SPECIFICATION FOR LCM Module

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MODULE No:	KD020LQFMA014
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APPROVED BY		

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NO MOQ品种齐全
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* Description

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This module is composed of a Transmissive type TFT-LCD Panel, driver circuit, back-light unit. The resolution of a 2.0 " TFT-LCD contains 320x240 pixels, and can display up to 262K colors.

* Features

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	40.80(H)*30.60(V) (2.0 inch)	mm	
Driver element	TFT active matrix	-	
Display colors	65K/262K	colors	
Number of pixels	320(RGB)*240	dots	
Pixel arrangement	RGB vertical stripe	-	
Pixel pitch	0.1275(H)*0.1275(V)	mm	
Viewing angle	Free	o'clock	
Controller IC	ILI9342C	-	
LCM Interface	8/9/16/18Bit MCU 3/4SPI+16/18Bit RGB Interface 3-line/4-line Serial	-	
Display mode	Transmissive /Normally Black	-	
Operating temperature	-20~+70	°C	
Storage temperature	-30~+80	°C	

* Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)	-	46.50	-	mm	
	Vertical(V)	-	41.56	-	mm	
	Depth(D)	-	2.5	-	mm	
Weight		-	10	-	g	

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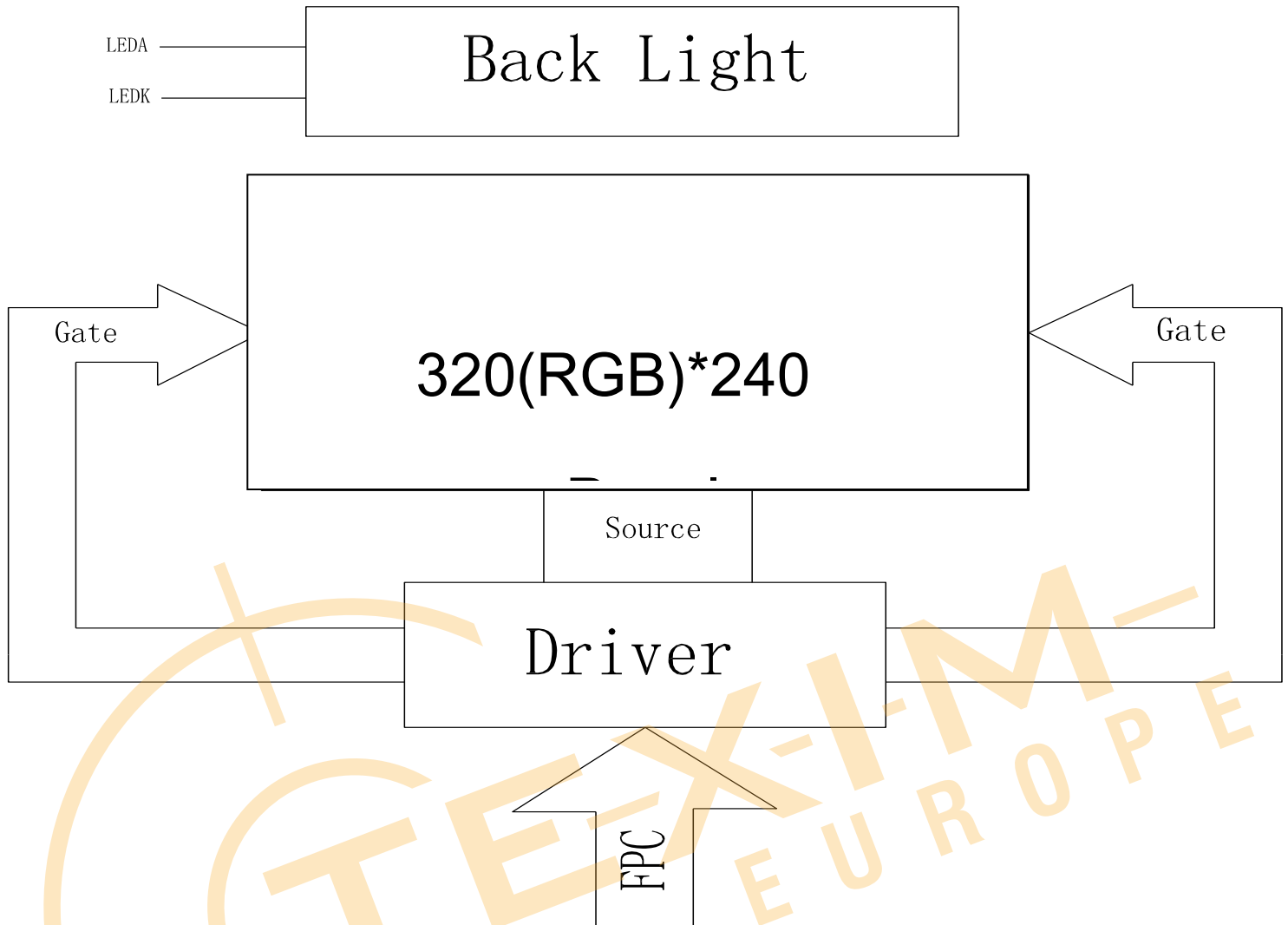
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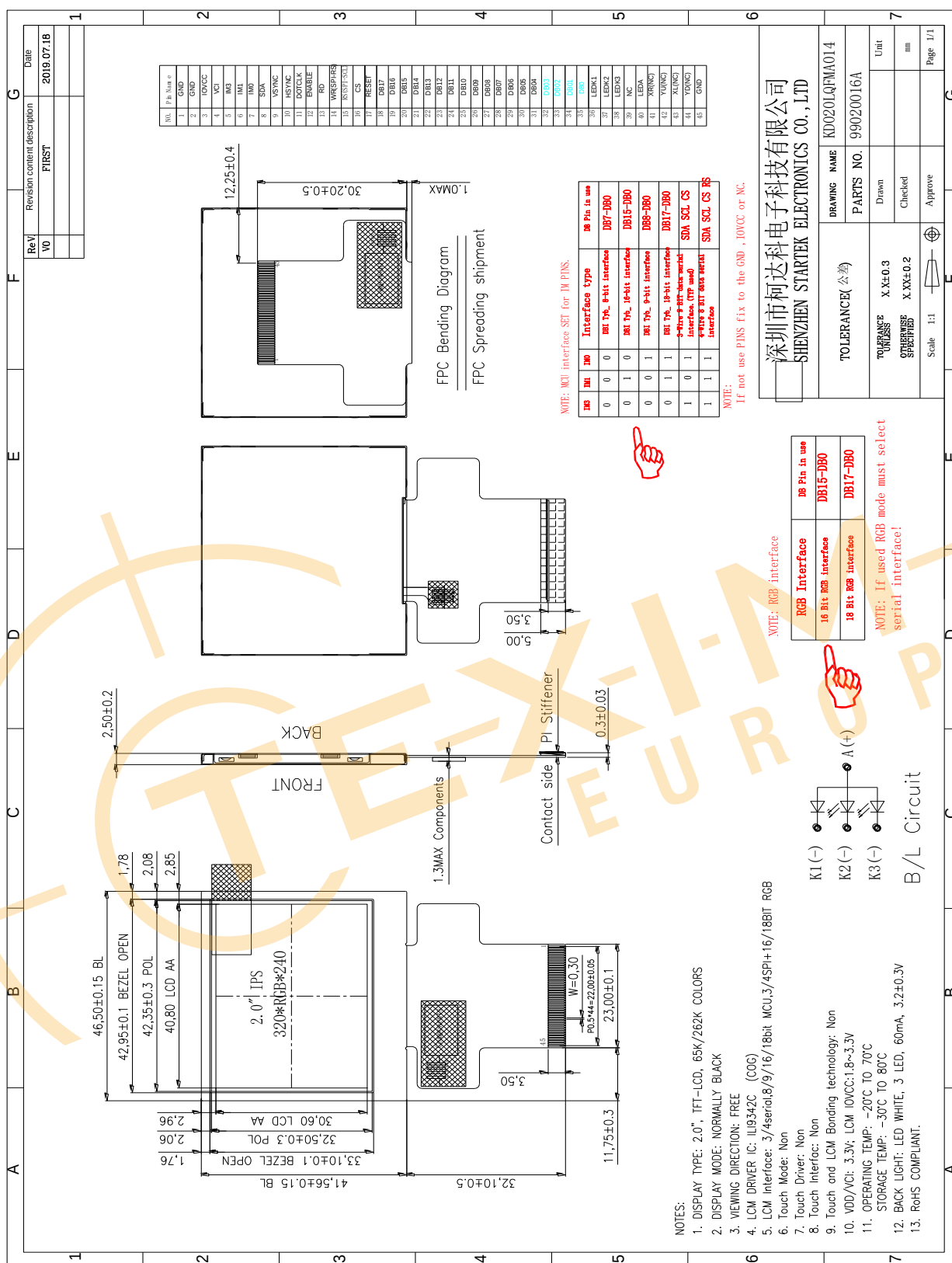
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1. Block Diagram



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2. Outline dimension



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3. Input terminal Pin Assignment

NO.	SYMBOL	DISCRIPTION	I/O																																								
1	GND	Ground.	P																																								
2	GND	Ground.	P																																								
3	IOVCC	Supply voltage(1.65-3.3V)	P																																								
4	VCI	Supply voltage(3.3V).	P																																								
5	IM3	<table><tr><th colspan="5">Interface Selection</th></tr><tr><th>IM3</th><th>IM2</th><th>IM0</th><th>Interface type</th><th>DB Pin in use</th></tr><tr><td>0</td><td>0</td><td>0</td><td>DBI Tyb_ 8-bit interface</td><td>DB7-DB0</td></tr><tr><td>0</td><td>1</td><td>0</td><td>DBI Tyb_ 16-bit interface</td><td>DB15-DB0</td></tr><tr><td>0</td><td>0</td><td>1</td><td>DBI Tyb_ 9-bit interface</td><td>DB8-DB0</td></tr><tr><td>0</td><td>1</td><td>1</td><td>DBI Tyb_ 18-bit interface</td><td>DB17-DB0</td></tr><tr><td>1</td><td>0</td><td>1</td><td>3-Wire 9 BIT data serial interface.</td><td>SDA SCL CS</td></tr><tr><td>1</td><td>1</td><td>1</td><td>4-Wire 8 BIT data serial interface</td><td>SDA SCL CS RS</td></tr></table>	Interface Selection					IM3	IM2	IM0	Interface type	DB Pin in use	0	0	0	DBI Tyb_ 8-bit interface	DB7-DB0	0	1	0	DBI Tyb_ 16-bit interface	DB15-DB0	0	0	1	DBI Tyb_ 9-bit interface	DB8-DB0	0	1	1	DBI Tyb_ 18-bit interface	DB17-DB0	1	0	1	3-Wire 9 BIT data serial interface.	SDA SCL CS	1	1	1	4-Wire 8 BIT data serial interface	SDA SCL CS RS	I
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1	1	1	4-Wire 8 BIT data serial interface	SDA SCL CS RS																																							
6	IM2		I																																								
7	IM0		I																																								
8	SDA	Serial input signal.The data is applied on the rising edge of the SCL signal. If not used, fix this pin at VCI or GND.	I																																								
9	VSYNC	Frame synchronizing signal for RGB interface operation. fix this pin at VCI or GND when not in use.	I																																								
10	HSYNC	Line synchronizing signal for RGB interface operation. fix this pin at VCI or GND when not in use	I																																								
11	DOTCLK	Dot clock signal for RGB interface operation Fix this pin at VCI or GND when not in use.	I																																								
12	ENABLE	Data enable signal for RGB interface operation. fix this pin at VCI or GND when not in use.	I																																								
13	RD	Serves as a read signal and MCU read data at the rising edge. fix this pin at VCI or GND when not in use.	I																																								
14	WR(SPI-RS)	(WR): Serves as a write signal and writes data at the rising edge. 4-line system (RS): Serves as command or parameter select. Fix to IOVCC or GND level when not in use.	I																																								
15	RS(SPI-SCL)	This pin is used to select “Data or Command” in the parallel interface. When RS = ‘1’, data is selected.	I																																								

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		When RS = '0', command is selected. This pin is used serial interface clock in 3-wire 9-bit / 4-wire 8-bit serial data interface. If not used, this pin should be connected to IOVCC or GND. RS_SCL1 is equal to RS(SCL).	
16	CS	Chip select input pin ("Low" enable). This pin can be permanently fixed "Low" in MPU interface mode only. CSX1 is equal to CSX.	I
17	RESET	This signal will reset the device and must be applied to properly initialize the chip. Signal is active low. RESX1 is equal to RESX.	I
18-35	DB17-DB0	18-bit parallel bi-directional data bus for MCU system and RGB interface mode Fix to GND level when not in use	I/O
36	LEDK1	Cathode pin OF backlight	P
37	LEDK2	Cathode pin OF backlight	P
38	LEDK3	Cathode pin OF backlight	P
39	LEDK4	Cathode pin OF backlight	P
40	LEDA	Anode pin of backlight	P
41	XR	Touch panel Right Glass Terminal	A/D
42	YU	Touch panel Top Film Terminal	A/D
43	XL	Touch panel LIFT Glass Terminal	A/D
44	YD	Touch panel Bottom Film Terminal	A/D
45	GND	Ground.	P

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4. LCD Optical Characteristics

4.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Contrast Ratio		CR	$\Theta=0$ Normal viewing angle	1000	1500	--		(1)(2)
Response time	Rising	T_{R+T_F}		--	30	40	msec	(1)(3)
	Falling							
Color Gamut		S(%)		55	(60)	--	%	
Color Filter Chromaticity	White	W_X		0.2599	0.2999	0.3399		(1)(4) CF glass
		W_Y		0.2858	0.3258	0.3658		
	Red	R_X		0.5889	0.6089	0.6289		
		R_Y		0.3441	0.3641	0.3841		
	Green	G_X		0.3068	0.3268	0.3468		
		G_Y		0.5607	0.5807	0.6007		
	Blue	B_X		0.1308	0.1508	0.1708		
		B_Y		0.0640	0.0840	0.1040		
Viewing angle	Hor.	Θ_L	CR>10	70	80	--		(1)(4)
		Θ_R		70	80	--		
	Ver.	Θ_U		70	80	--		
		Θ_D		70	80	--		
Option View Direction		Free						

*The data comes from the LCD specification.

Measuring Condition

Measuring surrounding : dark rooms

Ambient temperature : $25 \pm 2^\circ\text{C}$

15min. warm-up time.

Measuring Equipment

FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

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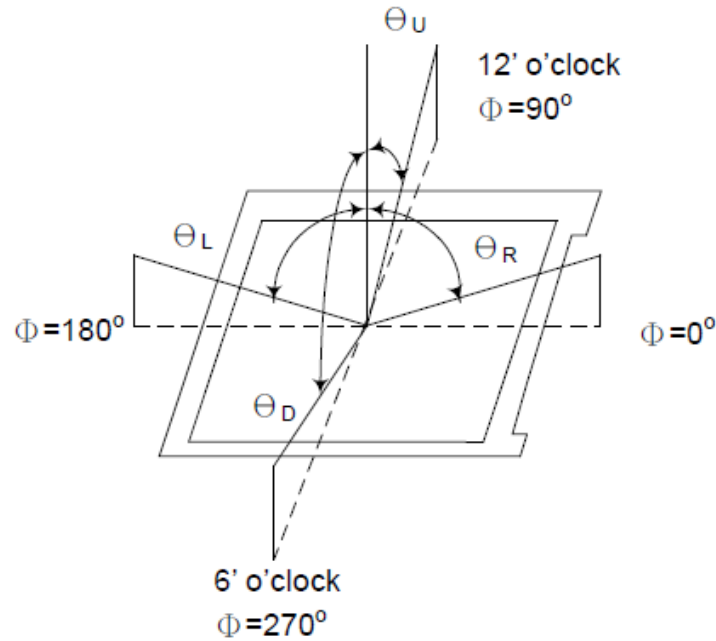
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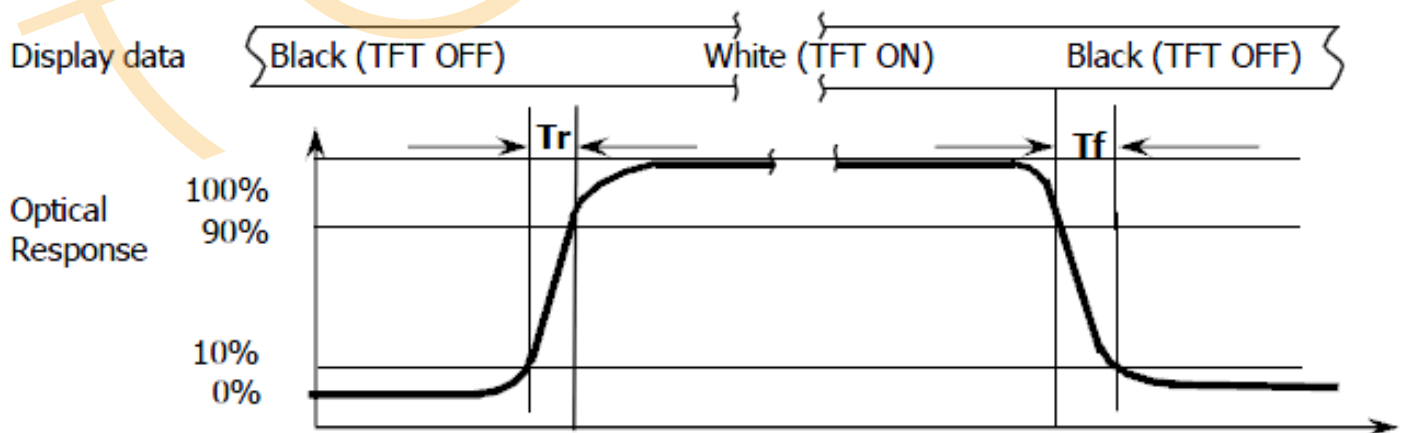
Note (1): Definition of Viewing Angle :



Note (2): Definition of Contrast Ratio(CR) :measured at the center point of panel

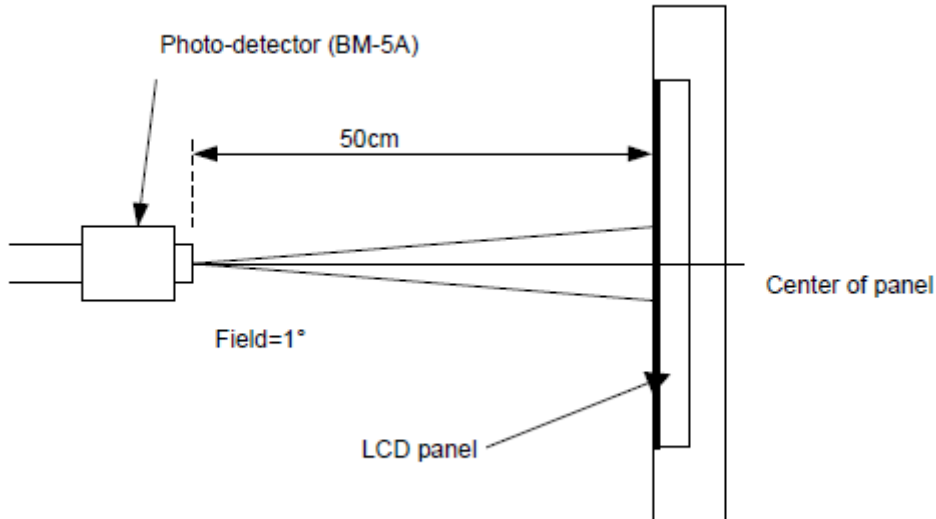
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note (3): Response Time



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Note (4): Definition of optical measurement setup



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5. Electrical Characteristics

5.1 Absolute Maximum Rating

Characteristics	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	V _{CI}	-0.3	4.2	V	Note1
Digital interface supply Voltage	IOVCC	-0.3	3.3	V	Note1
Operating temperature	T _{OP}	-20	+70	°C	
Storage temperature	T _{ST}	-30	+80	°C	

NOTE1: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

5.2 DC Electrical Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	V _{CI}	2.5	2.8/3.3	3.6	V	
Digital interface supply Voltage	IOVCC	1.65	1.8	3.3	V	
Normal mode Current	I _{DD}	--	5	--	mA	
Level input voltage	V _{IH}	0.7*IOVCC	--	IOVCC+0.3	V	
	V _{IL}	GND-0.3	--	0.3*IOVCC	V	
Level output voltage	V _{OH}	IOVCC-0.4	--	--	V	
	V _{OL}	GND	--	GND+0.4	V	

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5.3 LED Backlight Characteristics

The back-light system is edge-lighting type with 3 chips LED

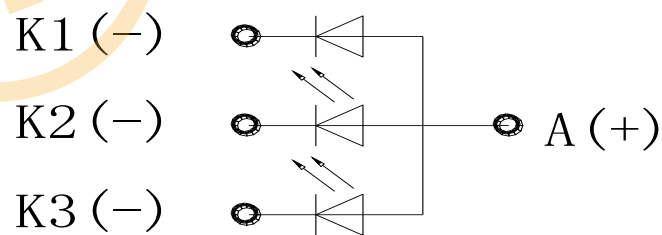
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I_F		60	--	mA	
Forward Voltage	V_F	--	3.2	--	V	
LCM Luminance	LV	550	600	--	cd/m ²	Note3
LED life time	Hr	--	50000	--	Hour	Note1,2
Uniformity	Avg	80	--	--	%	Note3

Note1: LED life time (Hr) can be defined as the time in which it continues to operate under the condition:

$T_a = 25 \pm 3^\circ \text{C}$, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at

$T_a = 25^\circ \text{C}$ and $I_L = 60 \text{mA}$. The LED lifetime could be decreased if operating I_L is larger than 60mA. The constant current driving method is suggested.



B/L Circuit

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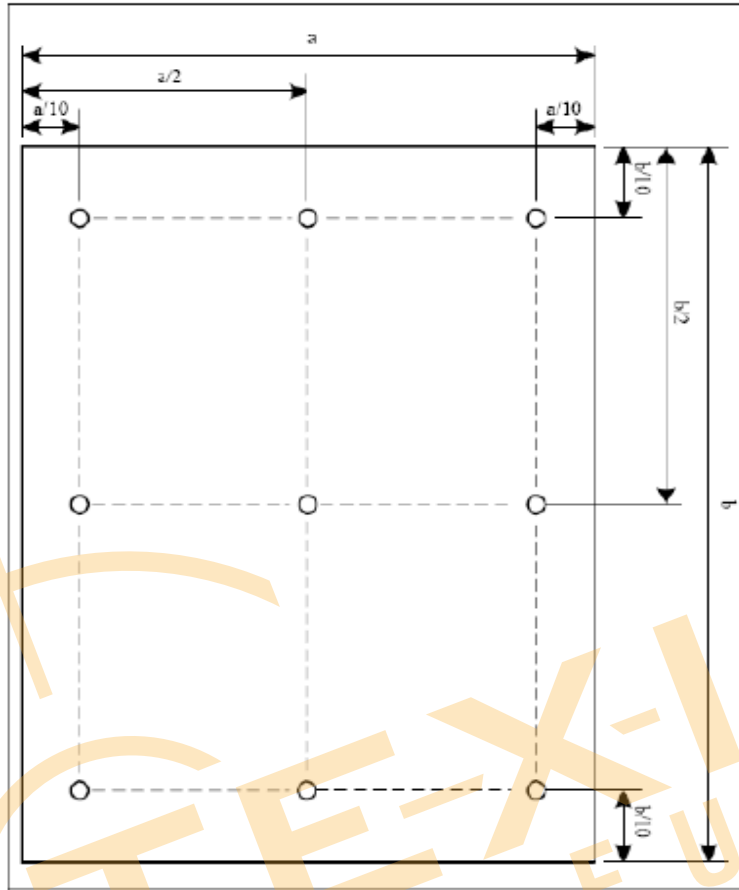
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Note (3) Luminance Uniformity of these 9 points is defined as below:sss



$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}$$

$$\text{Luminance} = \frac{\text{Total Luminance of 9 points}}{9}$$

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6. AC Characteristics

6.1 Timings for DSI Video mode

Vertical Timings

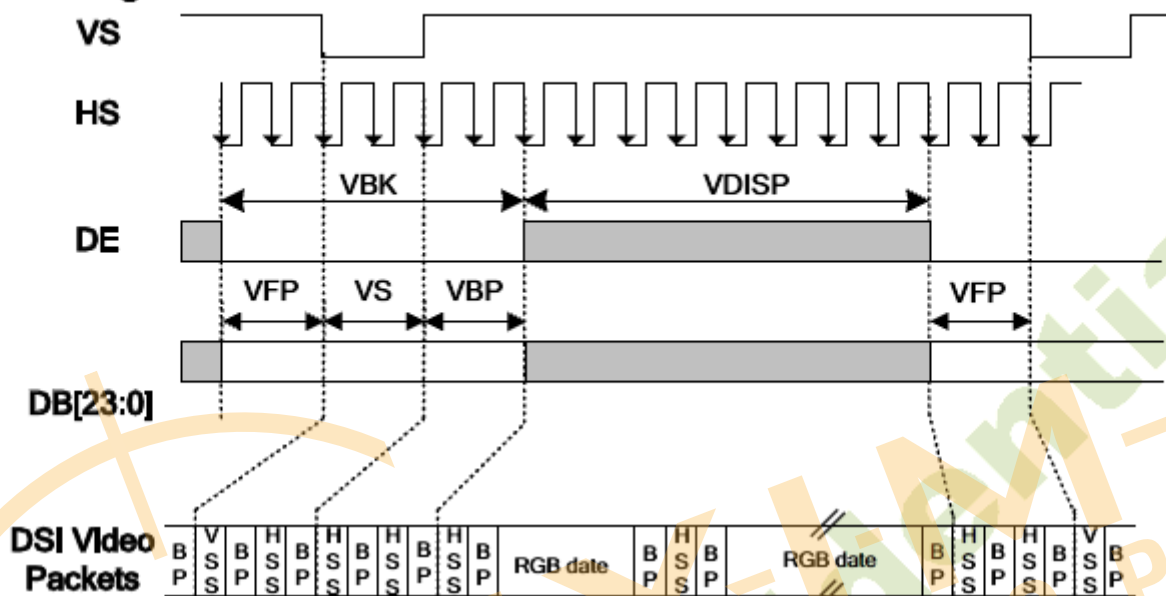


Figure. 10.11 Vertical Timings for DSI Video mode I/F

Resolution=240x320 (TA=25°C, IOVCC=1.8V, VCI=2.8V)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Vertical low pulse width	VS	-	2	-	Note(1)	Line
Vertical front porch	VFP	-	2	-	-	Line
Vertical back porch	VBP	-	2	-	Note(1)	Line
Vertical blanking period	VBK	VS+VBP+VFP	6	-	-	Line
Vertical active area	-	VDISP	-	320	-	Line
Vertical Refresh rate	VRR	-	-	60	-	Hz

Figure. 10.12 Vertical Timings for DSI Video mode I/F

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Horizontal Timings

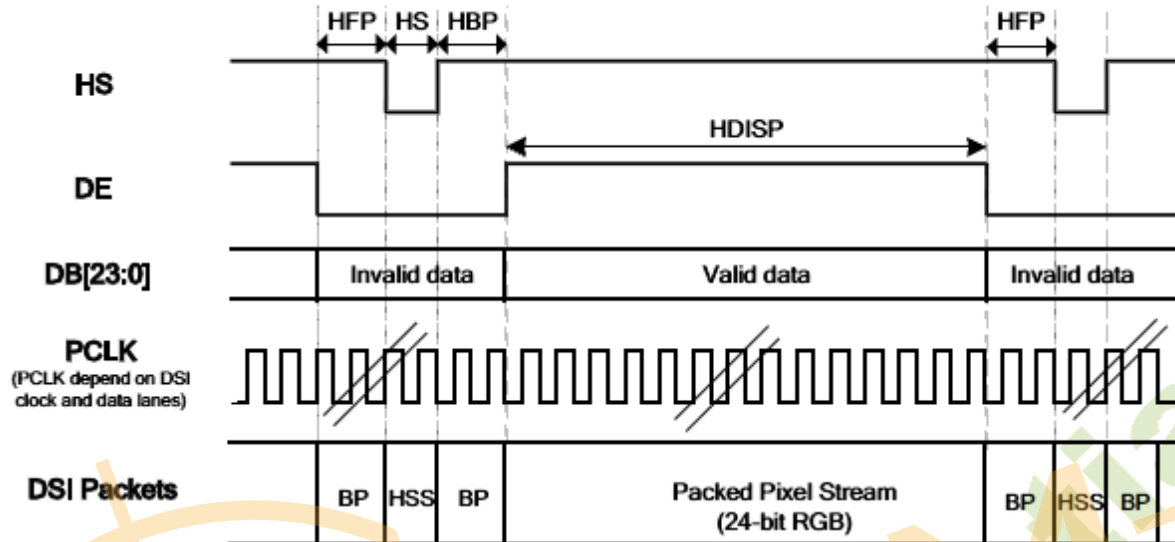


Figure. 10.13 Horizontal Timing for DSI Video mode I/F

Resolution=240x320 (TA=25°C, IOVCC=1.8V, VCI=2.8V)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
HS low pulse width	HS	-	6	-	78	DCK
Horizontal back porch	HBP	-	5	-	78	DCK
Horizontal front porch	HFP	-	5	-	78	DCK
Horizontal blanking period	HBLK	HS+HBP+HFP	16	-	88	DCK
Horizontal active area	HDISP	-	-	240	-	DCK

Note: (1) HS+HBP>0.5uS.

(2) HFP>0.5uS.

Table 10.11 Horizontal Timings for DSI Video mode I/F

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6.2 Reset Input Timing

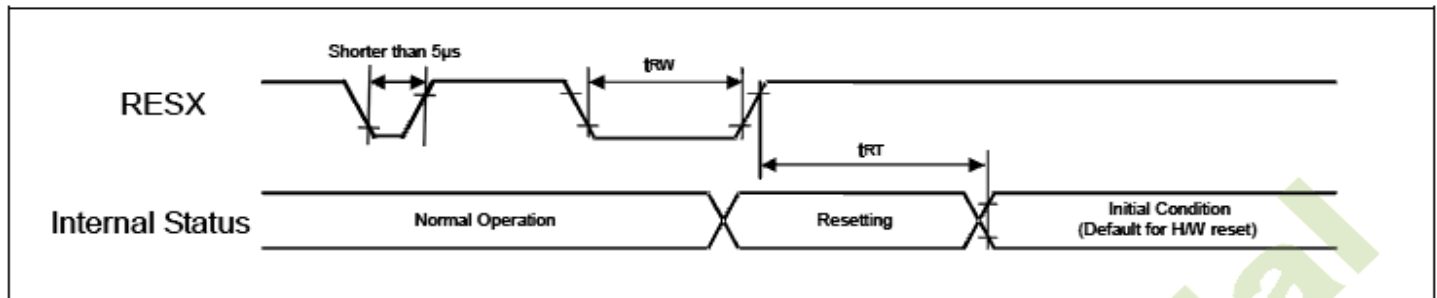


Figure. 10.5 Reset input timings

Symbol	Parameter	Related pins	Min.	Max.	Unit
t_{RW}	Reset pulse width ⁽²⁾	RESX	10	-	μs
t_{RT}	Reset complete time ⁽³⁾	-	-	5 (Note 5)	ms
		-	-	120 (Note 6, 7)	ms

Note: (1) The reset complete time also required time for loading ID bytes from OTP to registers. This loading is done every time when there is HW reset cancel time (t_{RT}) within 5 ms after a rising edge of RESX.

(2) Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.

RESX Pulse	Action
Shorter than 5 μs	Reset Rejected
Longer than 10 μs	Reset
Between 5 μs and 10 μs	Reset Start

(3) During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode) and then returns to Default condition for H/W reset.

(4) Spike Rejection also applies during a valid reset pulse as shown below:

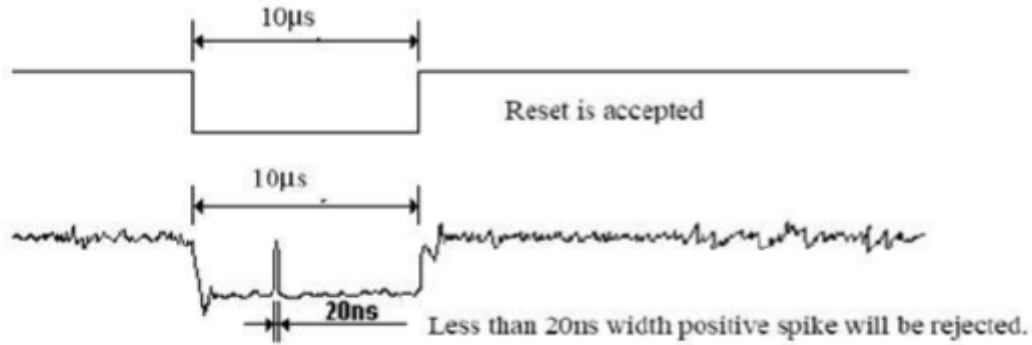
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(5) When Reset is applied during Sleep In Mode.

(6) When Reset is applied during Sleep Out Mode.

(7) It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

7. LCD Module Out-Going Quality Level

7.1 VISUAL & FUNCTION INSPECTION STANDARD

7.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

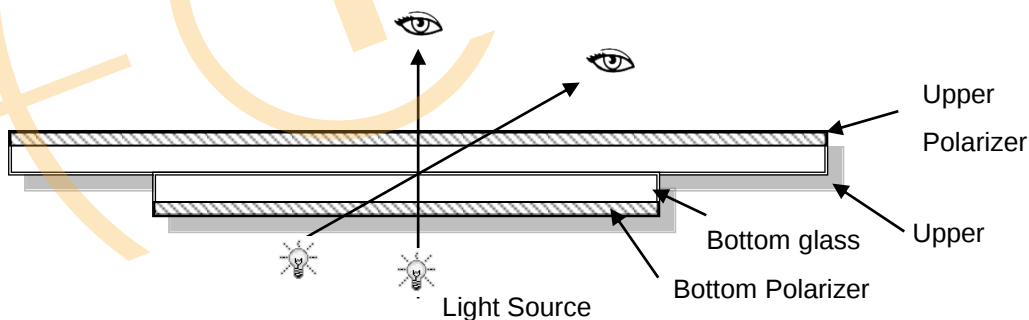
Temperature : $25 \pm 5^\circ\text{C}$

Humidity : $65\% \pm 10\% \text{RH}$

Viewing Angle : Normal viewing Angle.

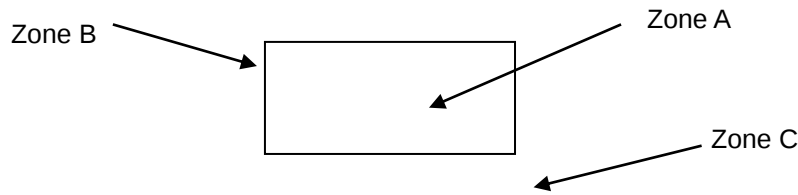
Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance: 30-50cm



7.1.2 Definition

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		Zone D			



Zone A : Effective Viewing Area(Character or Digit can be seen)

Zone B : Viewing Area except Zone A

Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)

Zone D : IC Bonding Area

Note:As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer

7.1.3 Sampling Plan

According to GB/T 2828.1-2003 ; , normal inspection, Class II

AQL:

Major defect	Minor defect
0.65	1.5

LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Spot Line defect	Light dot, Dim spot,Polarizer Bubble ; Polarizer accidented spot.	

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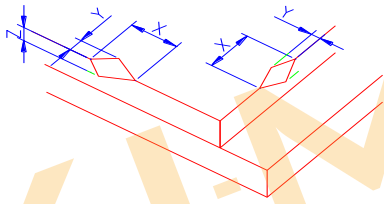
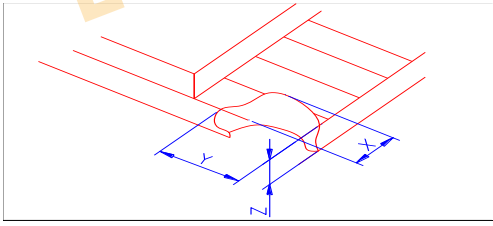
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6	Soldering appearance	Good soldering , Peeling off is not allowed.	
7	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	

7.1.4 Criteria (Visual)

Number	Items	Criteria(mm)						
1.0 LCD Crack/Broken NOTE: X: Length Y: Width Z: Height L: Length of ITO, T: Height of LCD	(1) The edge of LCD broken	 <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td><Inner border line of the seal</td><td>≤T</td></tr></table>	X	Y	Z	≤3.0mm	<Inner border line of the seal	≤T
X	Y	Z						
≤3.0mm	<Inner border line of the seal	≤T						
	(2)LCD corner broken	 <table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr></table>	X	Y	Z	≤3.0mm	≤L	≤T
X	Y	Z						
≤3.0mm	≤L	≤T						

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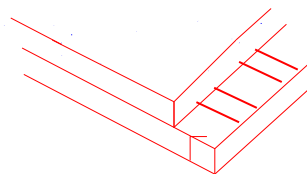
长期供货
Long Time supply

支持小量
NO MOQ

品种齐全
In Full Range



(3) LCD crack

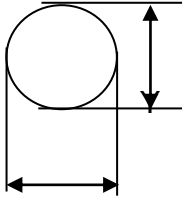
Crack
Not allowed

TEXIM-
EUROPE

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Spot defect



X

$$\Phi = (X+Y)/2$$

① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.10$	Ignore		Ignore
$0.10 < \Phi \leq 0.20$	3(distance $\geq 10\text{mm}$)		
$0.20 < \Phi \leq 0.25$	2		
$\Phi > 0.3$	0		

② Dim spot (LCD/TP/Polarizer dim dot, light leakage, dark spot)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.1$	Ignore		Ignore
$0.10 < \Phi \leq 0.20$	3(distance $\geq 10\text{mm}$)		
$0.20 < \Phi \leq 0.25$	2		
$\Phi > 0.3$	0		

③ Polarizer accidented spot

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.2$	Ignore		Ignore
$0.3 < \Phi \leq 0.5$	2(distance $\geq 10\text{mm}$)		
$\Phi > 0.5$	0		

④ Pixel bad points (light dot, Dim dot, color dot)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.1$	Ignore	Ignore	
$0.15 < \Phi \leq 0.2$	2(distance $\geq 10\text{mm}$)		
$\Phi > 0.2$	0		

⑤ Polarizer Bubble

Zone Size (mm)		Acceptable Qty		
		A	B	C
014	$\phi \leq 0.2$	REV	V1.0	Ignore

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 $\Phi \leq 0.2$

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V1.0

Ignore

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常备库存
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0.3期0.4

Long Time supply

 $0.6 < \Phi$ 3(distance $\geq 10\text{mm}$)

NO MOQ

0

品种齐全
In Full Range

Ignore

3.0	Line defect (LCD/TP /Polarizer backlight black/white line, scratch, stain)	<table><tr><td rowspan="2">Width(mm)</td><td rowspan="2">Length(m m)</td><td colspan="3">Acceptable Qty</td></tr><tr><td>A</td><td>B</td><td>C</td></tr><tr><td>$\Phi \leq 0.03$</td><td>Ignore</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr><tr><td>$0.03 < W \leq 0.04$</td><td>$L \leq 3.0$</td><td colspan="2">$N \leq 2$</td></tr><tr><td>$0.04 < W \leq 0.05$</td><td>$L \leq 2.0$</td><td colspan="2">$N \leq 1$</td></tr><tr><td>$0.05 < W$</td><td colspan="4">Define as spot defect</td></tr></table>	Width(mm)	Length(m m)	Acceptable Qty			A	B	C	$\Phi \leq 0.03$	Ignore	Ignore		Ignore	$0.03 < W \leq 0.04$	$L \leq 3.0$	$N \leq 2$		$0.04 < W \leq 0.05$	$L \leq 2.0$	$N \leq 1$		$0.05 < W$	Define as spot defect			
		Width(mm)			Length(m m)	Acceptable Qty																						
			A	B		C																						
		$\Phi \leq 0.03$	Ignore	Ignore		Ignore																						
		$0.03 < W \leq 0.04$	$L \leq 3.0$	$N \leq 2$																								
$0.04 < W \leq 0.05$	$L \leq 2.0$	$N \leq 1$																										
$0.05 < W$	Define as spot defect																											
4.0	Electronic Comp onents SMT	Not allow missing parts, solderless connection, cold solder joint, mis match, The positive and negative polarity opposite																										
5.0	Display color& B rightness	1. Color: Measuring the color coordinates, The measurement standar d according to the datasheet or samples. 2. Brightness: Measuring the brightness of White screen, The meas urement standard according to the datasheet or Samples.																										
6.0	LCD Mura	By 5% ND filter invisible.																										

7.0	CTP Related	CTP Cover sensor accidented black/white spot	Size Φ (mm)	Acceptable Qty		
			A	B	C	
			$\Phi \leq 0.1$	Ignore		Ignore
			$0.1 < \Phi \leq 0.2$			
			$0.20 < \Phi \leq 0.25$	2		
			$\Phi > 0.3$	0		



			<table><tr><th rowspan="2">Width(mm)</th><th rowspan="2">Ignore(mm)</th><th colspan="3">Acceptable Qty</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>$\Phi\leq0.03$</td><td>Ignore</td><td colspan="3">Ignore</td></tr><tr><td>$0.03<W\leq0.04$</td><td>$L\leq3.0$</td><td colspan="3">$N\leq2$</td></tr><tr><td>$0.04<W\leq0.05$</td><td>$L\leq2.0$</td><td colspan="3">$N\leq1$</td></tr><tr><td>$0.05<W$</td><td colspan="3">Define as spot defect</td></tr></table>	Width(mm)	Ignore(mm)	Acceptable Qty			A	B	C	$\Phi\leq0.03$	Ignore	Ignore			$0.03<W\leq0.04$	$L\leq3.0$	$N\leq2$			$0.04<W\leq0.05$	$L\leq2.0$	$N\leq1$			$0.05<W$	Define as spot defect		
Width(mm)	Ignore(mm)	Acceptable Qty																												
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$0.04<W\leq0.05$	$L\leq2.0$	$N\leq1$																												
$0.05<W$	Define as spot defect																													
		CTP Cover Pinhole/ Lack of ink	<table><tr><th>Zone Size (mm)</th><th>Acceptable Qty</th></tr><tr><td>$\Phi\leq0.1$</td><td>Ignore</td></tr><tr><td>$0.1<\Phi\leq0.2$</td><td>3(distance $\geq 10\text{mm}$)</td></tr><tr><td>$0.2<\Phi\leq0.25$</td><td>2</td></tr><tr><td>$\Phi>0.3$</td><td>0</td></tr></table>	Zone Size (mm)	Acceptable Qty	$\Phi\leq0.1$	Ignore	$0.1<\Phi\leq0.2$	3(distance $\geq 10\text{mm}$)	$0.2<\Phi\leq0.25$	2	$\Phi>0.3$	0																	
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$\Phi>0.3$	0																													
		CTP Bonding bubble/ accident spot	<table><tr><th rowspan="2">Size $\Phi(\text{mm})$</th><th colspan="2">Acceptable Qty</th></tr><tr><th>A</th><th>B</th></tr><tr><td>$\Phi\leq0.1$</td><td colspan="2">Ignore</td></tr><tr><td>$0.1<\Phi\leq0.15$</td><td colspan="2">3(distance $\geq 10\text{mm}$)</td></tr><tr><td>$0.15<\Phi\leq0.2$</td><td colspan="2">1</td></tr><tr><td>$\Phi>0.2$</td><td colspan="2">0</td></tr></table>	Size $\Phi(\text{mm})$	Acceptable Qty		A	B	$\Phi\leq0.1$	Ignore		$0.1<\Phi\leq0.15$	3(distance $\geq 10\text{mm}$)		$0.15<\Phi\leq0.2$	1		$\Phi>0.2$	0											
Size $\Phi(\text{mm})$	Acceptable Qty																													
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$0.15<\Phi\leq0.2$	1																													
$\Phi>0.2$	0																													
		Assembly deflection	beyond the edge of backlight $\leq0.2\text{mm}$																											
		TP cover broken	<table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>$X\leq0.5\text{mm}$</td><td>$Y\leq0.5\text{mm}$</td><td>$Z<\text{cover thickness}$</td></tr></table> Circuitry broken is not allowed.	X	Y	Z	$X\leq0.5\text{mm}$	$Y\leq0.5\text{mm}$	$Z<\text{cover thickness}$																					
X	Y	Z																												
$X\leq0.5\text{mm}$	$Y\leq0.5\text{mm}$	$Z<\text{cover thickness}$																												

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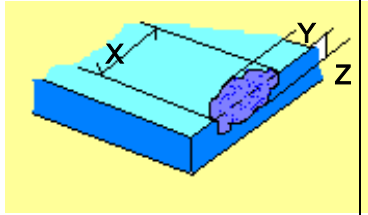
常备库存
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品种齐全
In Full Range



		TP cover broken	X	Y	Z	
			$X \leq 0.3\text{mm}$	$Y \leq 0.3\text{mm}$	$Z < \text{LCD thickness}$	
		X : length	* Circuitry broken is not allowed.			
		Y : width				
		Z : height				

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	TP no function	Not allowed

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8. Reliability Test Result

Item	Condition	Inspection after test
High Temperature Operating	70°C, 96H	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1. Air bubble in the LCD; 2. Non-display; 3. Missing segments/line; 4. Glass crack; 5. Current IDD is twice higher than initial value.
Low Temperature Operating	-20°C, 96HR	
High Temperature Storage	80°C, 96HR	
Low Temperature Storage	-30°C, 96HR	
High Temperature & High Humidity Operating	+60°C, 90% RH, 96 hours.	
Thermal Shock (Non-operation)	-30°C, 30 min ↔ +80°C, 30 min, Change time: 5min 20CYC.	
ESD test	C=150pF, R=330, 5 points/panel Air: ±8KV, 5 times; Contact: ±6KV, 5 times; (Environment: 15°C~35°C, 30%~60%).	
Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.5mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total) (Package condition).	
Box Drop Test	1 Corner 3 Edges 6 faces, 80cm (MEDIUM BOX)	

Remark:

1. The test samples should be applied to only one test item.
2. Sample size for each test item is 5~10 pcs.
3. For Damp Proof Test, Pure water (Resistance > 10MΩ) should be used.
4. In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.
5. Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

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9. Cautions and Handling Precautions

9.1 Handling and Operating the Module

- (1) When the module is assembled, it should be attached to the system firmly.
Do not warp or twist the module during assembly work.
- (2) Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
- (3) Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.
- (4) Do not allow drops of water or chemicals to remain on the display surface.
If you have the droplets for a long time, staining and discoloration may occur.
- (5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
- (6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane.
Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
- (7) 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, legs, or clothes, it must be washed away thoroughly with soap.
- (8) Protect the module from static; it may cause damage to the CMOS ICs.
- (9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (10) Do not disassemble the module.
- (11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
- (12) Pins of I/F connector shall not be touched directly with bare hands.
- (13) Do not connect, disconnect the module in the "Power ON" condition.

9.2 Storage and Transportation.

- (1) Do not leave the panel in high temperature, and high humidity for a long time.
It is highly recommended to store the module with temperature from 0 to 35 °C and relative humidity of less than 70%
- (2) Do not store the TFT-LCD module in direct sunlight.
- (3) The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.
- (4) It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module.
In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.
- (5) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.

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10. Packing

---TBD-----



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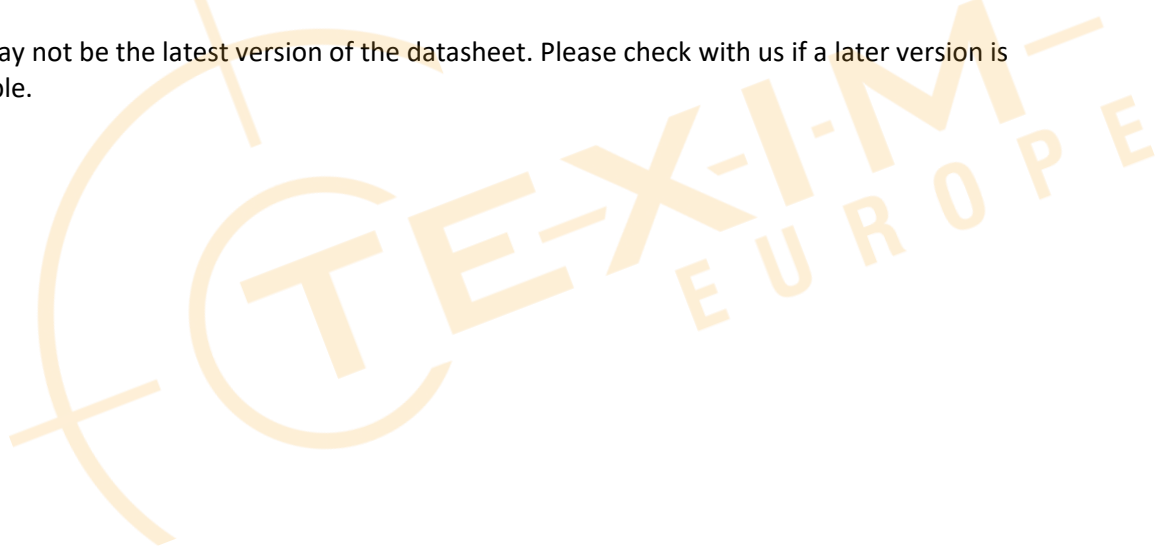
It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application.

Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time.

All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts.

Please contact us if you have any questions about the contents of the datasheet.

This may not be the latest version of the datasheet. Please check with us if a later version is available.





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