PRODUCT SPECIFICATION

MODEL: ZTM936BOEM1416-1

<◇>PRELIMINARY SPECIFICATION

<◆>APPROVAL SPECIFICATION

CUSTOMER
APPROVED BY
DATE:

DESIGNED	CHECKED	APPROVED

PREPAREDBY:

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REVISION STATUS

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深圳市正通仁禾科技有限公司

SHEN ZHEN CITY ZTRH TECHNOLOGY CO., LTD

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SHEN ZHEN CITY ZTRH TECHNOLOGY CO., LTD

1. GENERAL DESCRIPTION

1.1 DESCRIPTION

   This LCM is a color active matrix thin film transistor (TFT) IPS liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, Driver IC, FPC and Backlight.This TFT LCD has a 9.36-inch diagonally measured active display area with (320 horizontal by 1280 vertical pixel) resolution.

1.2 FEATURES:

No.	Item	Specification	Unit
1	Panel Size	9.36"	inch
2	Number of Pixels	320×RGB (3)×1280	pixels
3	Active Area	58.08(H)x 232.32(V)	mm
4	Pixel Pitch	0.1815(H)×0.1815(V) x RGB	mm
5	Outline Dimension	65.02(W)×247.56(H)×4.5(D)	mm
6	Number of Colors	16.7M	-
7	Display Mode	Transmission mode, normally black	-
8	Viewing Direction	Full viewing	-
9	Display Format	RGB vertical stripe	-
10	Surface Treatment	Glare	-
11	Interface	MIPI	-
12	Backlight	White LED	-
13	Operation Temperature	-20~70	℃
14	Storage Temperature	-30~80	℃
15	Weight	-	g
16	Driver IC	FL7707N	-

2. MECHANICAL SPECIFICATION

NOTES:

1. Do not scale drawing.
2. ⚠ Modification rev.number.
3. Genral Tolerance:±0.20,( ) reference dimension.
4. Draft angle 1.5°。
5. Operating Temperature:-20~+70,°Storage Temperature:-30~+80°c
6. ESD:R≥20M Open circuit
   Reverse resistanceThe test instrument :Fluke187
7. possession materials are insulated (ex FPC，LED)
8. 带（）的尺寸代表参考尺寸，带*的尺寸代表关键尺寸。
9. B/L整体平整度<=0.6mm。

背光电路原理图

7*2=14LED 60*2=120mA

A+

K-

ZTM936BOEM1416 D XXXXXX

BACK

FRONT

65.02±0.3 OUTLINE
60.08±0.2 POL
58.08 AA
(2.38)
(3.38)
(32.6)
(6.68)
(5.38)

(122.78)

ACTIVE AREA CENTER
Full viewing

9.36"TFT
320(RGB)*1280

235.32 AA
234.92±0.2 POL
247.56±0.3

易撕贴位置

PPC input

24.94±1

46

21.41±0.5

4.5±0.2
6.3±0.3

FIELD	TOLERANCES
L<=6.00	±0.05
6.0<L<=18.0	±0.10
L>18.0	±0.15
Angle	1°

	REV	DATE	REVISED	REVISE CAUSE	REVISED DESCRIPTIONS

正式图

REV 版本	B	DESCRIPTION 描述
PART No. 料号		ZTM936BOEM1416
SCALE 比例	1:1	MATERIAL 材质
		COLOR 颜色
	a	UNIT 单位 mm

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APPROVED BY 核准	CHECKED BY 审核	DRAWN BY 绘图
DATE 日期		

3. PIN DESCRIPTION

FPC Connector is used for the module electronics interface.

No.	Symbol	Function	Remark
1	GND	Ground	
2	D0P	Positive MIPI differential data input	
3	D0N	Negative MIPI differential data input	
4	GND	Ground	
5	D1P	Positive MIPI differential data input	
6	D1N	Negative MIPI differential data input	
7	GND	Ground	
8	CLKP	Positive MIPI differential clock input	
9	CLKN	Negative MIPI differential clock input	
10	GND	Ground	
11	D2P	Positive MIPI differential data input	
12	D2N	Negative MIPI differential data input	
13	GND	Ground	
14	D3P	Positive MIPI differential data input	
15	D3N	Negative MIPI differential data input	
16	GND	Ground	
17	GND		
18	IOVCC	A power supply for the logic power and I/O circuit.	
19	IOVCC		
20	NC	No connection	
21	NC	No connection	
22	NC	No connection	
23	NC	No connection	
24	RSTB	Reset pin.	
25	NC	No connection	
26	NC	No connection	
27	GND	Ground	
28	K	LED Cathode	
29	K		
30	GND	Ground	
31	NC	No connection	
32	GND	Ground	
33	GND	Ground	
34	NC	No connection	
35	A	LED Anode	
36	A		
37	GND	Ground	
38	VDD(3.3V)	A power supply for the analog power.	
39	VDD(3.3V)		
40	NC	No connection	

Notes：Reset and Stbyb voltage needs bring into correspondence with Iovcc voltage.

4. ELECTRICAL CHARACTERISTICS

4.1 ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Digital Supply Voltage	VCI	-	3.6	V	
Digital Supply Voltage	IOVCC	-	3.6	V	

4.2 TFT LCD MODULE

4.2.1 Operating Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Digital Supply Voltage	VDD	3.0	3.3	3.6	V	
Digital Supply Voltage	IOVCC	-0.3	-	3.6	V	
Logic Input Voltage	VIH	0.8VDD	-	VDD	V	
	VIL	GND	-	0.2VDD	V	

4.2.2 Current Consumption

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Digital Current	IVCI	VDD= 3.3V	-	-	130	mA	Note1

Note1: Typ. specification：Gray-level test Pattern

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4.3 BACKLIGHT UNIT

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LED Current	Iled	-	120	-	mA	Total LED
Forward voltage	VF	-	21	-	V	IF=120mA
Reverse current	IR	-	-	50	µA	VR=5V,1LED
Power dissipation	Pd	2520			mW	Total LED
Peak forward current	IFP	100			mA	1LED
Reverse Voltage	VR	5			V	1LED

A+   K−
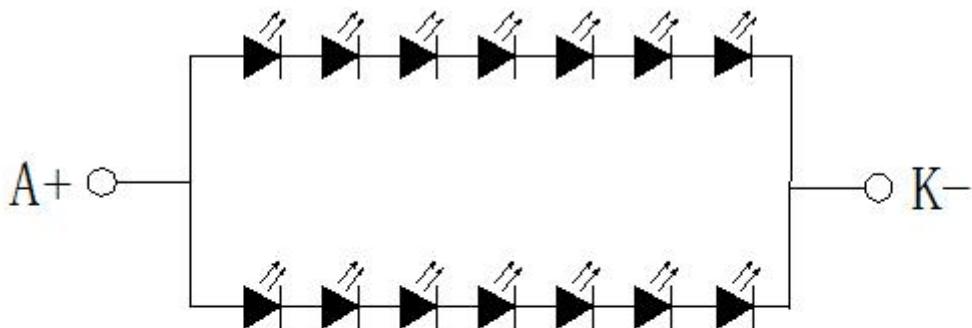
7*2=14LED 60*2=120mA

背光电路原理图

4.4 POWER ON/OFF SEQUENCE

4.4.1 Power On Sequence

Note: MIPI Data lane and CLK lane must set LP-11 before HW reset go high
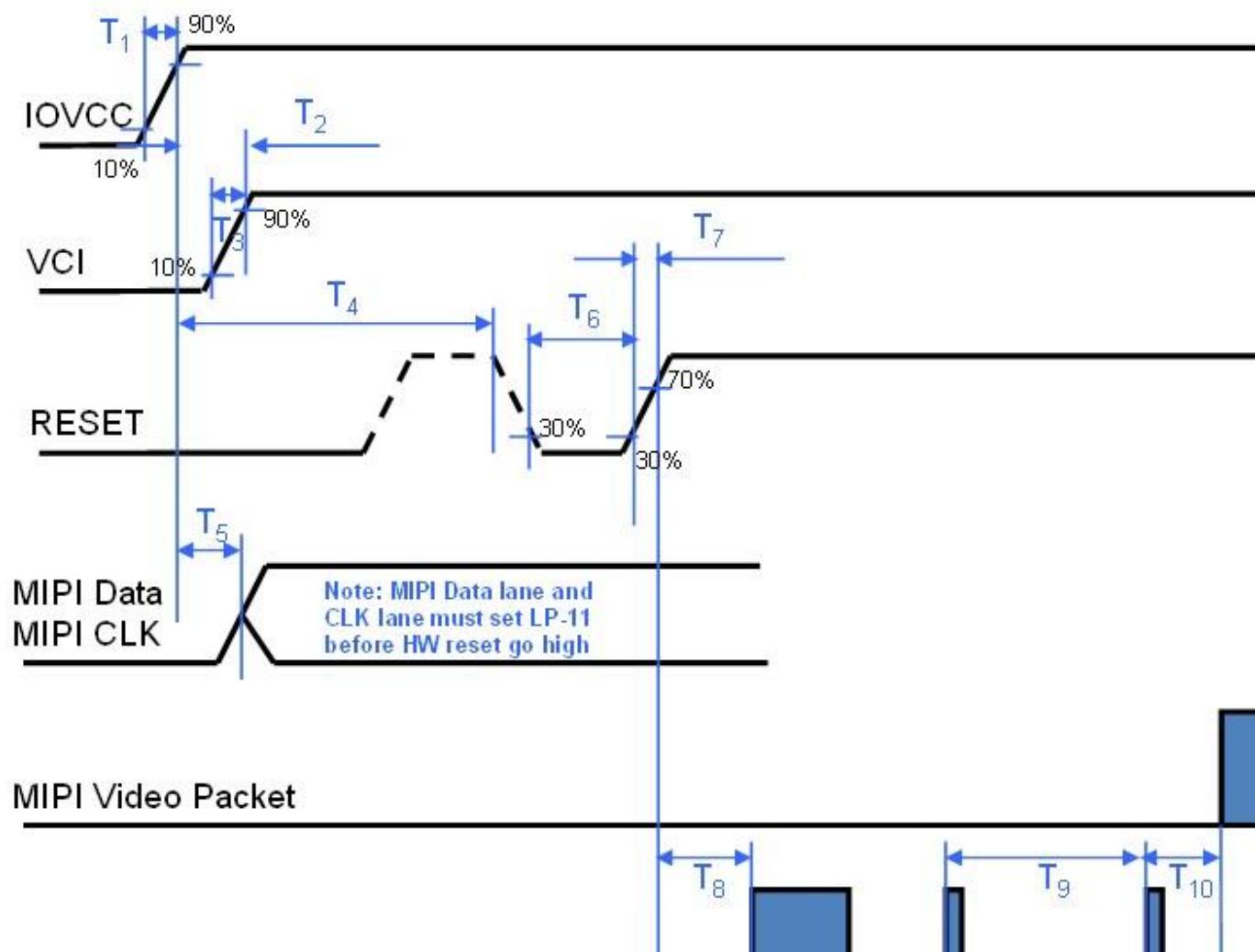
	Min.	Typ.	Max.	Unit
T1	0.01	-	10	ms
T2	No Limit			ms
T3	0.01	-	10	ms
T4	1	-	-	ms
T5	1	-	-	ms
T6	10	-	-	us
T7	No Limit			ns
T8	15	-	-	ms
T9	120	-	-	ms
T10	No Limit			ms
T11	100	150	-	ms

4.4.2 Power Off Sequence
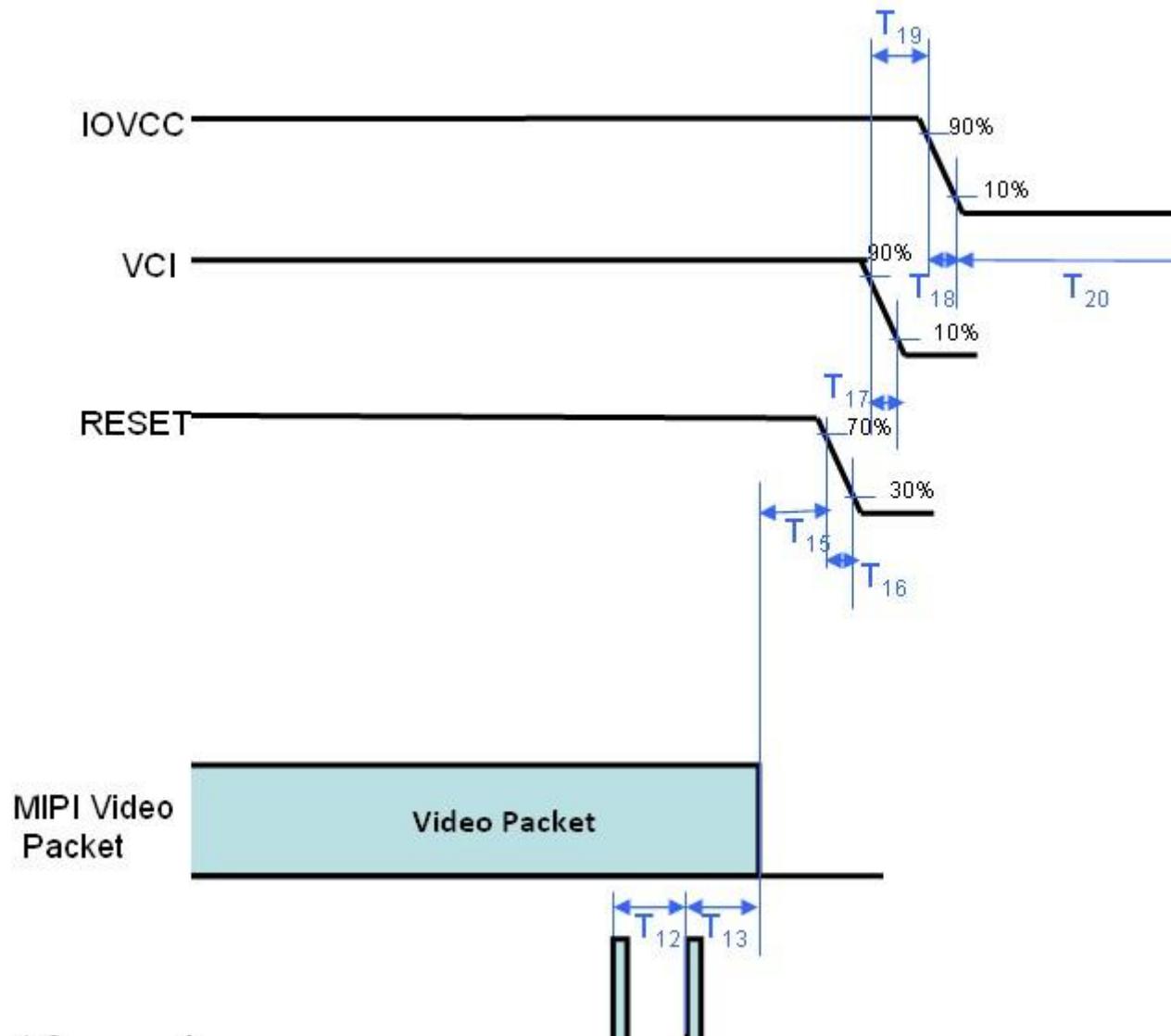
	Min.	Typ.	Max.	Unit
T12	2	-	-	Frame
T13	2	-	-	Frame
T14	40	100	-	ms
T15	10	-	-	ms
T16	No Limit			ms
T17	No Limit			ms
T18	No Limit			ms
T19	No Limit			ms
T20	100			ms

5. INPUT SIGNAL TIMING

5.1 MODE DC ELECTRICAL CHARACTERISTICS

< Table 3. DC Specification >

Condition : Ta =25℃,IOVCC =1.6V~3.6V, VCI =2.6V~3.6V.

Parameter	Symbol	Conditions	Specification			Unit	Notes
			MIN	TYP	MAX		
Logic high level input voltage	VIHLPCD	LP-CD	450		1350	mV	
Logic Low level input voltage	VILLPCD	LP-CD	0		200	mV	
Logic high level input voltage	VIHLPRX	LP-RX (CLK,D0)	880		1350	mV	
Logic Low level input voltage	VILLPRX	LP-RX (CLK,D0)	0		550	mV	
Logic Low level input voltage	VILLPRXULP	LP-RX(CLK ULP mode)	0		300	mV	
Logic high level input voltage	VOHLPTX	LP-TX(D0)	1.1		1.3	V	
Logic Low level input voltage	VOLLPTX	LP-TX(D0)	-50		50	mV	
Logic high level input voltage	IIH	LP-RX,Vin =0~1.3V			10	uA	
Logic Low level input voltage	IIL	LP-RX,Vin =0~1.3V	-10			uA	
Input pulse rejection	SGD	DSI-CLK+/-,DSI Dn+/-			300	Vps	1

Note 1: Peak interference amplitude max. 200mV and interference frequency min. 450MHz

5.2 AC CHARACTERISTICS
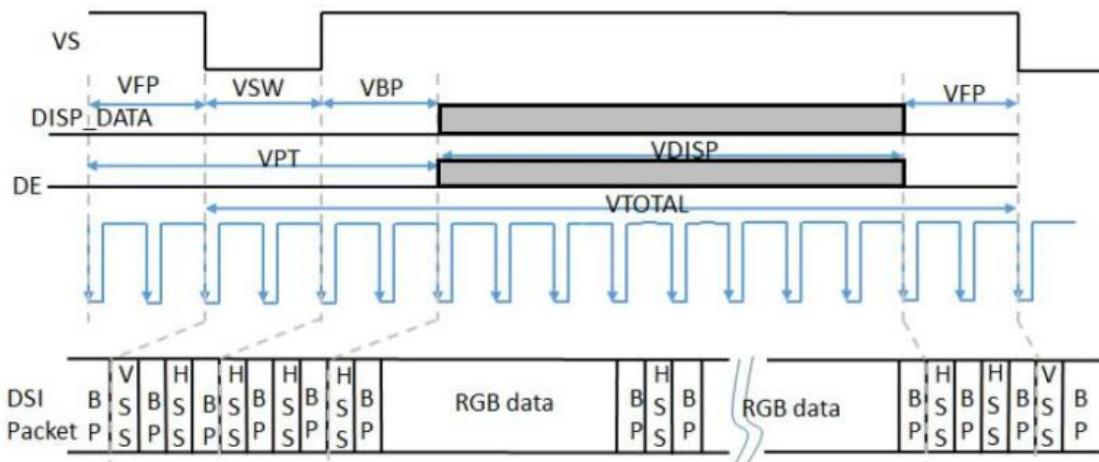
Parameter	Symbol	Conditions	Specification			Unit	Notes
			MIN	TYP	MAX		
Vertical Total	VTOTAL		(TBD)		(TBD)	Line	
Vertical low pulse width	VSW		(TBD)		(TBD)	Line	1
Vertical front porch	VFP		(TBD)		(TBD)	Line	
Vertical back porch	VBP		(TBD)		(TBD)	Line	1
Vertical data start point		VSW+VBP	(TBD)		(TBD)	Line	1
Vertical blanking period	VPT	VSW+VBP+VFP	(TBD)		(TBD)	Line	
Vertical active area		VDISP		1280	(TBD)	Line	
Vertical Frame rate	VFR			60		Hz	

Note 1: The VSW and VBP pulse width are related to panel GOA timing. The GOA timing must be set at corresponding position for LCM normal display.

5.3 PARALLEL RGB INPUT TIMING TABLE

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Horizontal Display Area	thd		640		DCLK
One Horizontal Line	th	-	750	-	DCLK
HS pulse width	thpw	-	30	-	DCLK
Hs Back Porch(Blanking)	thd		40		DCLK
Hs Front Porch	thfp		40		DCLK

Vertical Timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd		1280		TH
VS Period	tv	-	1312	-	TH
VS Pulse Width	tvpw	-	4	-	TH
VS Back Porch(Blanking)	tvb		12		TH
VS Front Porch	tvfp	-	16	-	TH

6.OPTICAL CHARACTERISTICS

Ta=25±2℃

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	800	1000	-		Note1 Note3
Luminance(center)		L	750	800	-	cd/m2	Note1 Note5 Note7
Luminous tolerance		LU	80	85		%	Note7
Response Time		Rising + Falling	-	30	35	ms	Note1 Note4
Viewing Angle K=Contrast Ratio>10	Horizontal	θx^+	80	85	-	degree	Note2
		θx^-	80	85	-		
	Vertical	θy^+	80	85	-		
		θy^-	80	85	-		
Color Chromaticity (CIE1931)	Red	x	Typ-0.05	0.63	Typ+0.05		Note1 Note5 Note7
		y		0.35			
	Green	x		0.28			
		y		0.63			
	Blue	x		0.18			
		y		0.05			
	White	x		0.25			
		y		0.26			
Color gamut (NTSC ratio)			65	72		%	

Note1: Definition of optical measurement system (CA-310)
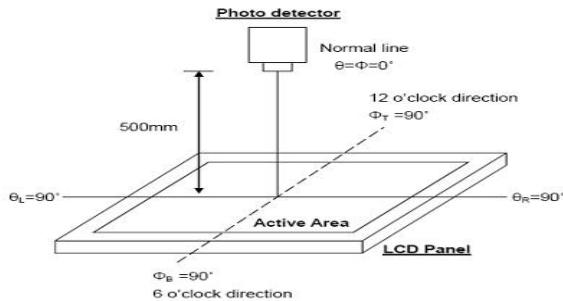
Note2: Definition of viewing angle range and measurement system
Viewing angle is measured at the center point of the LCD by CONOSCOPE (ergo-80).
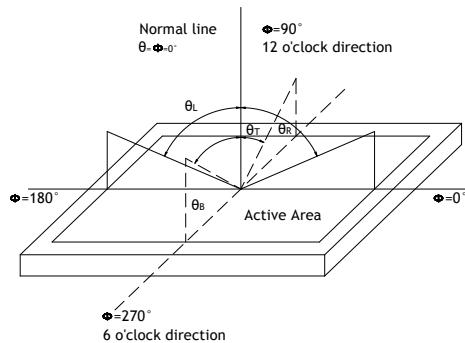
Note3: Definition of Response time
The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.
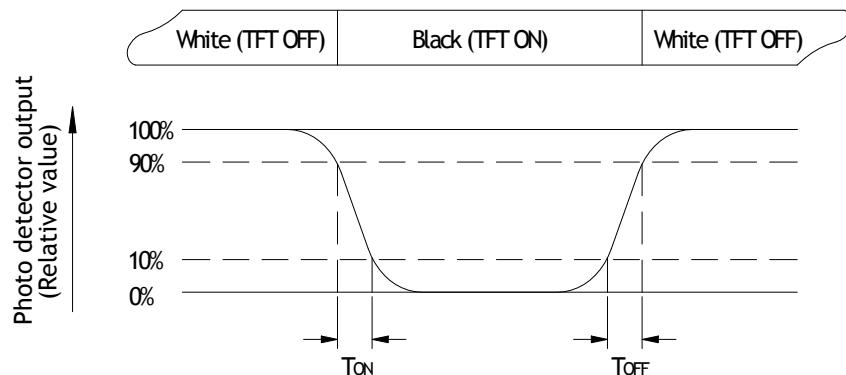
Fig. 6-3 Definition of response time

Note4: Definition of contrast ratio

$$Contrast\ ratio(CR)=\frac{Luminance\ measured\ when\ LCD\ on\ the\ Whitestate}{Luminance\ measured\ when\ LCD\ on\ the\ Blackstate}$$

"White state ": The state is that the LCD should drive by Vwhite.
"Black state": The state is that the LCD should drive by Vblack.
Vwhite: To be determined Vblack: To be determined.

Note5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.

Note6: All input terminals LCD panel must be ground while measuring the center area of the

panel. The LED driving condition is IL=120mA

Note7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas.Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = Lmin/ Lmax

L----Active area length, W---- Active area width
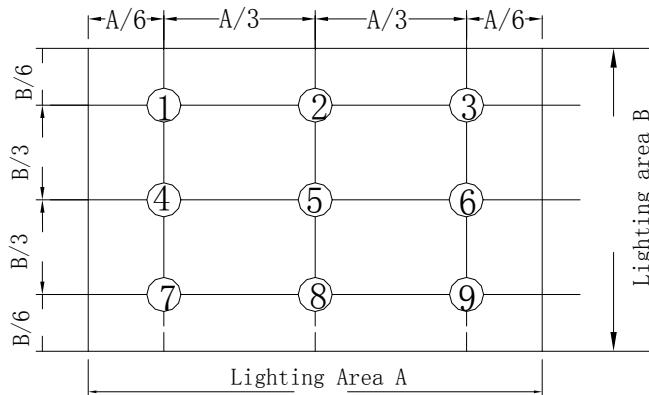
Bmax: The measured maximum luminance of all measurement position.

Bmin: The measured minimum luminance of all measurement position.

7. RELIABILITY TEST ITEMS

7.1 TEMPERATURE AND HUMIDITY

Test Item	Test Condition	Remark
High Temperature Storage	Ta=80℃；96hrs	IEC60068-2-1：2007 GB2423.2-2008
Low Temperature Storage	Ta=-30℃;96hrs	IEC60068-2-1：2007 GB2423.1-2008
High Temperature Operation	Ta=70℃；96Hrs	IEC60068-2-1：2007 GB2423.2-2008
Low Temperature Operation	Ta=-20℃；96hrs	IEC60068-2-1：2007 GB2423.1-2008
High Temperature High Humidity Operation	Ta=60℃，90%RH，96Hrs(no condensation)	IEC60068-2-78：2001 GB/T2423.3-2006
Thermal Shock	-30℃(0.5h) ~ 80℃(0.5h) / 72 cycles	Start with cold temperature，End with high temperature，IEC60068-2-14:1984,GB2423.22-2002
Image Sticking	25℃；1hrs	Note1

Note1:Condition of image sticking test :25℃±2℃

Operation with test pattern sustained for 1 hrs,then change to gray pattern immediately.after 5 mins,the mura must be disappeared completely
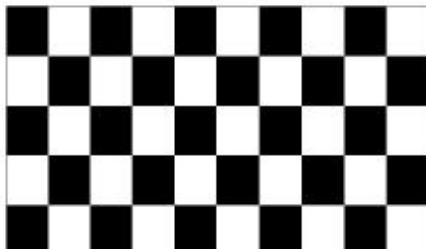
(a) Test Pattern (chess board Pattern)   (b) Gray Pattern

7.2 VIBRATION&SHOCK

Test item	Conditions	Remark
Packing Shock (non-operation)	980m/s2,6ms, ±x,y,z 3times for direction	IEC60068-2-27：1987 GB/T2423.5-1995
Packing Vibration (non-operation)	Frequency range:10 HZ~50HZ Stroke:1.0mm,sweep:10 HZ ~50HZ x,y,z 2 hours for each direction	IEC60068-2-32：1990 GB/T2423.8-1995

7.3 ESD

Test item	Conditions		Remark
Electro Static Discharge Test (non-operation)	150pF，330Ω， Contact:±4KV,Air:±8KV	1	Class C
	200pF，0Ω，±200V contact test	2	

Note: Measure point :

1. LCD glass and metal bezel
2. IF connector pins
3. ESD class C:some performance degradation allowed. Reboot Self-recoverable.
    No data lost,no hardware failures.

8. GENERAL PRECAUTION

8.1 SAFETY

 1. Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
 2. If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
 3. If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

8.2 STORAGE CONDITIONS

 1. Store the panel or module in a dark place where the temperature is 23±5° C and The humidity is below 50±20%RH.
 2. Store in anti-static electricity container.
 3. Store in clean environment, free from dust, active gas, and solvent.
 4. Do not place the module near organics solvents or corrosive gases.
 5. Do not crush, shake, or jolt the module.

8.3 HANDLING PRECAUTIONS

 1. Avoid static electricity which can damage the CMOS LSI.
 2. The polarizing plate of the display is very fragile. So, please handle it very carefully.
 3. Do not give external shock.
 4. Do not apply excessive force on the surface.
 5. Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the Surface of plate.
 6. Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a

cleaning naphtha solvent.

7. Do not operate it above the absolute maximum rating.

8. Do not remove the panel or frame from the module.

9. When the module is assembled, it should be attached to the system firmly, Be careful not to twist and bend the module.

10. Wipe off water droplets or oil immediately. If you leave the droplets for a long time, staining and discoloration may occur.

11. 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.

8.4 WARRANTY

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

2. Do not repaired or modified the LCM. It may cause function to lose efficacy, Starry does not warrant the LCM.

3. All process and material comply ROHS.