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Optical Bonding

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Cover glass

System solutions

OEM Solutions

Custom Display

Production Custom designs Installation

Mechanical design



MODEL NO : ET015HV01-T

MODEL VERSION: 01

SPEC VERSION : 1.0

ISSUED DATE: 2019-04-19

☐ Preliminary Specification

☒ Final Product Specification

Customer : _____

Approved by	Notes

Youri Confirmation

Prepared by	Reviewed by	Approved by
John	Johnny	Wang

1. Introduction

1.1 Scope of application

LCD specification: Dots 320xRGBx320

As to basic specification of the driver IC, refer to the IC (Sitronix:ST7796S) specification and data book.

All material & processing of the LCD module should be Lead Free.

1.2 TFT features:

Structure: TFT PANNEL+IC +FPC+BL;

IPS Type LCD

320 dot-segment and 320 dot-common outputs;

262K Color can be selected by software;

White LED back light;

MIPI interface

1.3 Applications:

2. LCM General specification

ITEM	Standard value	Unit
LCD Type	Normally black	--
Drive element	TFT active matrix	--
Number of pixels	320*3RGB(H)X320(V)	Dots
Pixel arrangement	RGB stripe	--
Pixel Pitch (W*H)	0.0867(H) x0.0867 (V)	mm
Active area	27.744(H) × 27.744(V)	mm
Module Size(W*H*T)	31.52 x 33.72 x 1.6	-
Viewing direction	ALL O'CLOCK	
TFT Driver IC	ST7796S	-
TFT interface	MIPI Interface	-
Approx. Weight	TBD	g
Touch structure		
Touch Driver IC		-
Touch Interface		

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3.Absolute Maximum Rating

Characteristics	Symbol	Min.	Max.	Unit
LCM Operating Temperature	T _{OPR}	-20	+70	°C
LCM Storage Temperature	T _{STG}	-30	+80	°C
TP Operating Temperature & Humidity(20% ~ 90%RH)	T _{OPR}			°C
TP SStorage Temperature & Humidity(20% ~ 90%RH)	T _{STG}			°C
Humidity	RH	-	90	%

4.Electrical Characteristics

4.1 TFT DC Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage for I/O	VDDIO	1.65	1.8	3.3	V
Supply Voltage for(DC/DC)	VDD	2.5	2.8	3.6	V
Supply Voltage for(DC/DC)					V
Supply Voltage for(DC/DC)					V
Current Consumption	I _{DD}	-	TBD	-	mA
	I _{DD-SLEEP}		TBD		uA

4.2 Back-Light Unit Characeristics

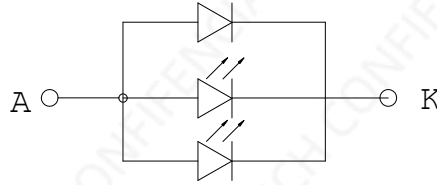
The back-light system is an edge-lighting type with 3 white LEDs. The characteristics of the back-light are shown in the following tables.

Characteristics	Symbol	Min.	Type	Max.	Unit	Notes
Forward Voltage(one LED)	V _F	2.9	--	3.2	V	-
Forward current(one LED)	I _F	--	20	-	mA	-
Luminance(With LCD)	L _v	600	700	800	cd/m ²	-
LED life time	N/A	----	30,000	--	Hr	Note 1

Note:

- (1) The “LED life time” is defined as the module brightness decrease to 50% of original brightness at $I_L=20\text{mA/LED}$. The LED life time could be decreased if operating I_L is larger than 25mA/LED.

Backlight circuit diagram shown in below:



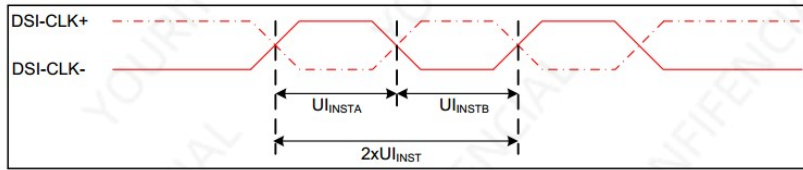
$$I_f=60\text{mA} \quad V_f=2.9\sim 3.5\text{V}$$

5. Module Function Description

Pin No.	Symbol	Functional	Notes
1	TCP	Positive polarity of low voltage differential clock signal	
2	TCN	Negative polarity of low voltage differential clock signal	
3	GND	System ground	
4	TDP0	Positive polarity of low voltage differential data signal	
5	TDN0	Negative polarity of low voltage differential data signal	
6	GND	System ground	
7	RESET	Reset signal input terminal. Active at 'L'.	
8	TE	Tearing effect output	
9	NC	NC	
10	IOVCC	I/O Voltage 1.65V ~ 3.3V	
11	VCI	Power supply 2.5V ~ 3.3V	
12	NC	NC	
13	NC	NC	
14	NC	NC	
15	LED-	Power supply for backlight cathode input terminal.	
16	LED+	Power supply for backlight anode input terminal.	

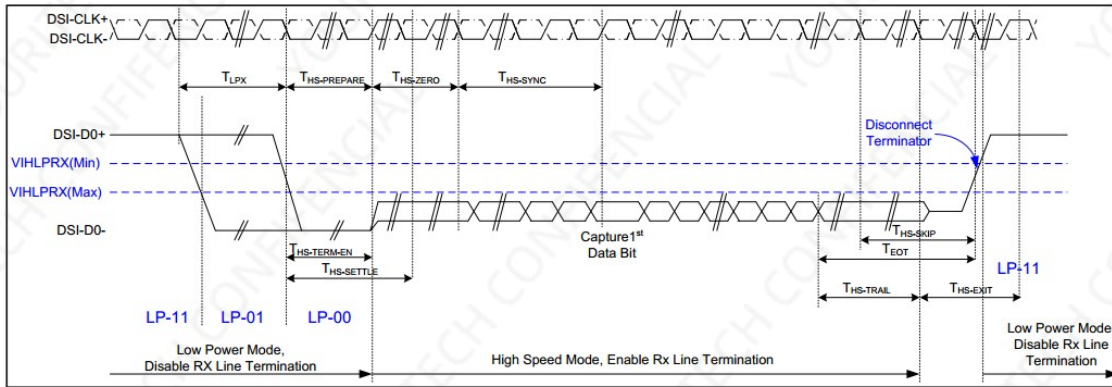
6. Timing Characteristics

High Speed Mode – Clock Channel Timing



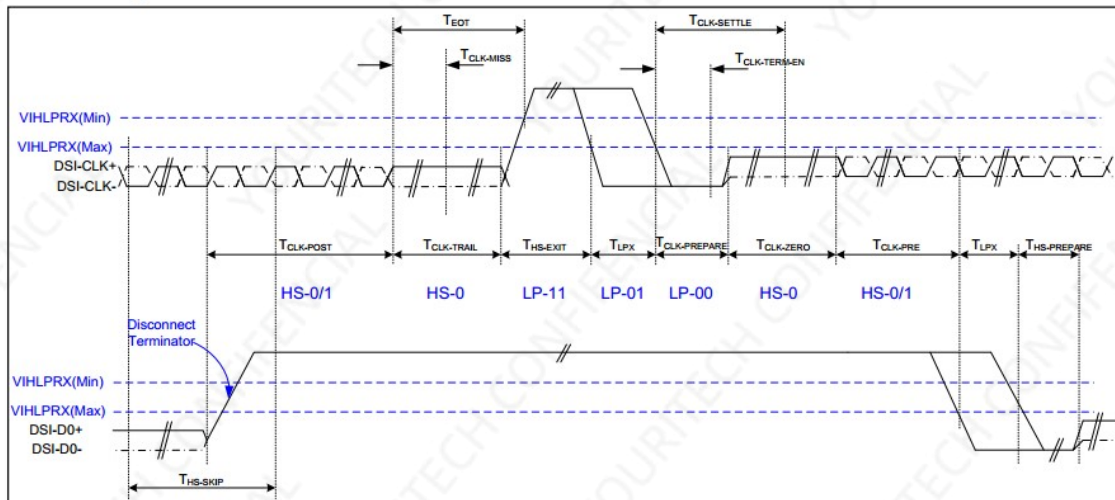
Signal	Symbol	Parameter	MIN	MAX	Unit	Description
DSI-DATA_P/N	2xUI INST	Double UI instantaneous	4	25	ns	
DSI-DATA_P/N	UI INSTA ,UI INSTB	UI instantaneous Half	2	12.5	ns	

High-Speed Data Transmission



Parameter	Symbol	MIN	TYP	MAX	Unit
Time to drive LP-00 to prepare for HS transmission	$T_{HS-PREPARE}$	40+4UI		85+6UI	ns
Time from start of t HS-TRAIL or t CLK-TRAIL period to start of LP-11 state	T_{EOT}			105+12UI	ns
Time to enable data receiver line termination measured from when Dn crosses VILMAX	$T_{HS-TERM-EN}$			35+4UI	ns
Time to drive flipped differential state after last payload data bit of a HS transmission	$T_{HS-TRAIL}$	60+4UI			ns
Time-out at RX to ignore transition period of EoT	$T_{HS-SKIP}$	40		55+4UI	ns
Time to drive LP-11 after HS burst	$T_{HS-EXIT}$	100			ns
Length of any Low-Power state period	T_{LPX}	50			ns
Sync sequence period	$T_{HS-SYNC}$		8UI		ns
Minimum lead HS-0 drive period before the Sync sequence	$T_{HS-ZERO}$	105+6UI			ns

Switching the Clock Lane between Clock Transmission and Low-Power Mode



Parameter	Symbol	MIN	TYP	MAX	Unit
Time that the transmitter shall continue sending HS clock after the last associated Data Lane has transitioned to LP mode	$T_{CLK-POST}$	60+52UI			ns
Detection time that the clock has stopped toggling	$T_{CLK-MISS}$			60	ns
Time to drive LP-00 to prepare for HS clock transmission	$T_{CLK-PREPARE}$	38		95	ns
Minimum lead HS-0 drive period before starting Clock	$T_{CLK-PREPARE} + T_{CLK-ZERO}$	300			ns
Time to enable Clock Lane receiver line termination measured from when Dn cross VIL,MAX	$T_{HS-TERM-EN}$			38	ns
Minimum time that the HS clock must be set prior to any associated data lane beginning the transmission from LP to HS mode	$T_{CLK-PRE}$	8			UI
Time to drive HS differential state after last payload clock bit of a HS transmission burst	$T_{CLK-TRAIL}$	60			ns

7.Optical Characteristics

Items		Symbol	Condition	Specifications			Unit
				Min.	Typ.	Max.	
Contrast Ratio		CR		-	900	-	-
Response Time		T _R +T _F		-	35	50	ms
				-			
Chromaticity	Red	X _R			/		-
		Y _R			/		-
	Green	X _G			/		-
		Y _G			/		-
	Blue	X _B			/		-
		Y _B			/		-
	White	X _W		0.28	0.31	0.34	-
		Y _W	0.29	0.32	0.35	-	
Viewing angle	Hor.	φ1(3 o'clock)	Center CR≥10	75	80	-	deg.
		φ2(9 o'clock)		75	80	-	
	Ver.	θ2(12 o'clock)		75	80	-	
		θ1(6 o'clock)		75	80	-	
Uniformity					--		%

All left side data are based on TIAN XIAN WEI product reference only

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Note 1: Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{63} / L_0$$

L_{63} : Luminance of gray level 63

L_0 : Luminance of gray level 0

$$CR = CR(10)$$

$CR(X)$ is corresponding to the Contrast Ratio of the point X at Figure in Note 5.

Note 2: Definition of Response Time (T_R , T_F):

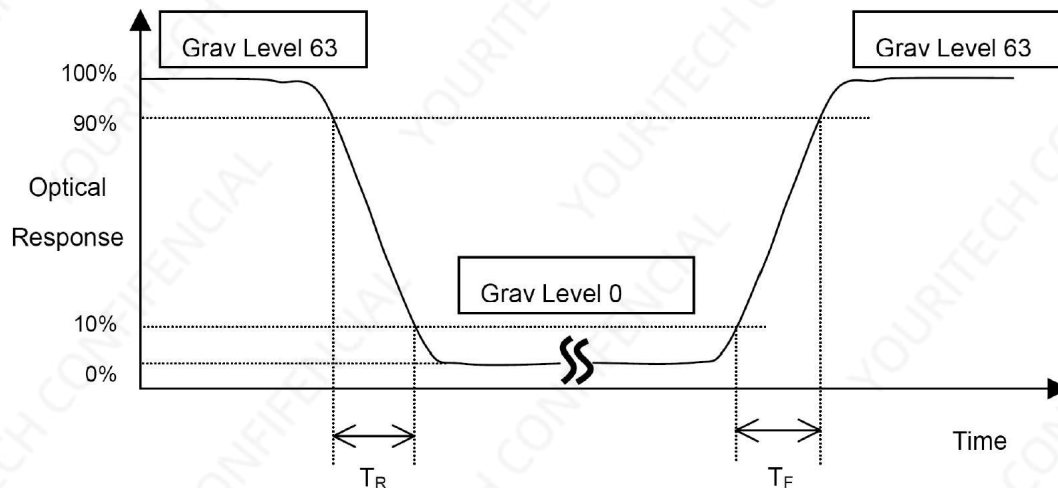


Figure 3

Note 3: Viewing Angle

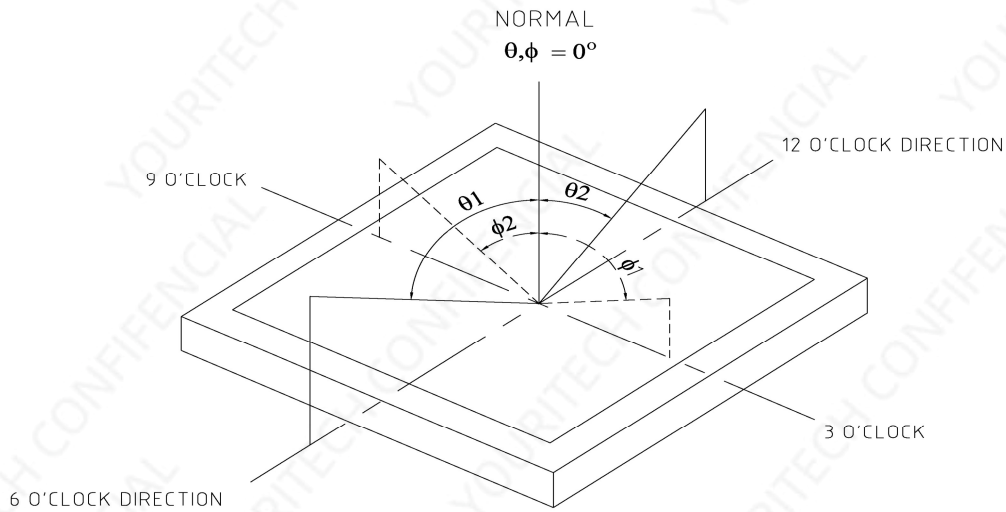


Figure 4

The above “Viewing Angle” is the measuring position with Largest Contrast Ratio; not for good image quality. View Direction for good image quality is 6 O’clock. Module maker can increase the “Viewing Angle” by applying Wide View Film.

Note 4: Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.

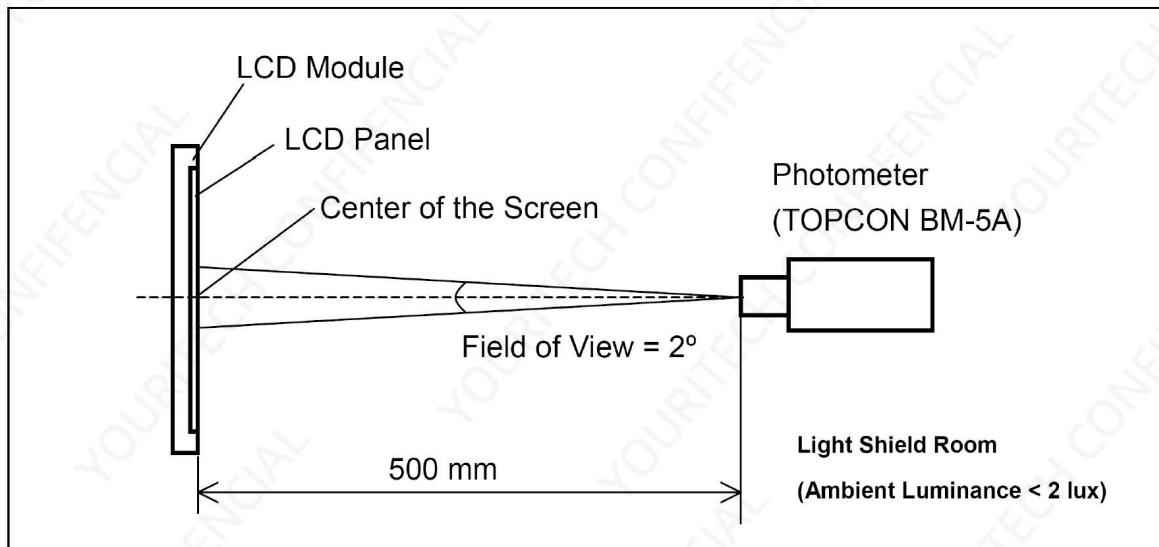


Figure 5

8. Reliability Test Item

No.	Test Item	Test Condition	Notes
1	High Temp. Storage	+80°C / 240H	1. Functional test is OK. Missing Segment, short, unclear segment non-display, display abnormally and liquid crystal leakage un-allowed. 2. No low temperature bubbles, end seal loose and fall, frame rainbow.
2	Low Temp. Storage	-30°C / 240H	
3	High Temp. Operating	+70°C / 240H	
4	Low Temp. Operating	-20°C / 240H	
5	High Temperature / Humidity storage	50±5°C x 90%RH / 48H	
6	Thermal and cold shock	Static state, -30°C (1 hour) ~ 80°C (1 hour) ~ -30°C (1 hour), packaging, 10 cycles	

9. Packing Method----TBD

- END -