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Custom Display

Production Custom designs Installation

Mechanical design



MODEL NO : ET094BA02-T

MODEL VERSION: 01

SPEC VERSION : 1.0

ISSUED DATE: 2020-06-16

- ☐ 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 320xRGBx1280.

As to basic specification of the driver IC, refer to the IC (Orise: ICNL9707) 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;

ALL O'CLOCK Type LCD

320 dot-segment and 1280 dot-common outputs;

16.7M Color can be selected by software;

White LED back light;

4Line 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)X1280(V)	Dots
Pixel arrangement	RGB stripe	--
Active area	58.08H) ×232.6962 (V)	mm
Module Size(W*H*T)	64.48(W) x246. 15(H) x4.50(T)	mm
Viewing direction	ALL O'CLOCK	
TFT Driver IC	ICNL9707	-
TFT interface	4Line 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
Humidity	RH	10	90	%

4. Electrical Characteristics

4.1 TFT DC Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
TFT OperationFrame rate	Hz	..	60	..	Hz	
Supply Voltage for(DC/DC)	VDD	3.1	3.3	6.6	V	
TFT Common Voltage	Vcom				V	Note 1

Note 1: VCOM value should be adjusted by different condition to optimize Flicker Value.

Note 2: VGH and VGL are the operating voltages of TFT gate.

4.2 Back-Light Unit Characeristics

The back-light system is an edge-lighting type with 24 white LEDs. The characteristics of the back-light are shown in the following tables.

Characteristics	Symbol	Min.	Type	Max.	Unit	Notes
Forward Voltage	V _F	21V	--	25V	V	-
Forward current	I _F	90	110	130	mA	-
Luminance(With LCD)	L _v	700	750	850	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=30mA/LED. The LED life time could be decreased ifoperating I_L is larger than 45mA/LED.

5. Module Function Description

Pin No	Symbol	Description
1	GND	Ground
2	DSI- D0P	DSI Data differential signal input pins. (Data lane0)
3	DSI- D0N	DSI Data differential signal input pins. (Data lane 0)
4	GND	Ground
5	DSI- D1P	DSI Data differential signal input pins. (Data lane 1)
6	DSI- D1N	DSI Data differential signal input pins. (Data lane 1)
7	GND	Ground
8	DSI-CLK P	DSI CLOCK differential signal input pins
9	DSI-CLK N	DSI CLOCK differential signal input pins
10	GND	Ground
11	DSI- D2P	DSI Data differential signal input pins. (Data lane 2)
12	DSI- D2N	DSI Data differential signal input pins. (Data lane 2)
13	GND	Ground
14	DSI- D3P	DSI Data differential signal input pins. (Data lane 3)
15	DSI- D3N	DSI Data differential signal input pins. (Data lane 3)
16-17	GND	Ground
18-19	NC	NC
20-23	NC	NC
24	RESET	Reset Signal pin ("Low" is enable)
25	STBYB	Ground
26	NC	NC
27	GND	Ground
28-29	LEDK	Backlight LED Cathode
30	GND	Ground
31	NC	NC
32-33	GND	Ground

6. Timing Characteristics

High Speed Mode - Clock Timings

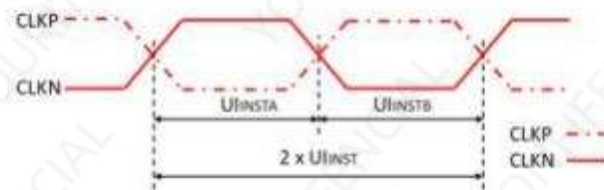


Figure 4-5 Clock Timing

Signal	Symbol	Parameter	Specification			Unit	Notes
			MIN	TYP	MAX		
CLK P/N	$2 \times U_{INST}$	Double UI instantaneous	4		18.2	nS	
CLK P/N	U_{INSTA}, U_{INSTB}	UI instantaneous Half	2		9.1	nS	1

Note 1: $UI = U_{INSTA} = U_{INSTB}$

High Speed Mode - Clock / Data Timings

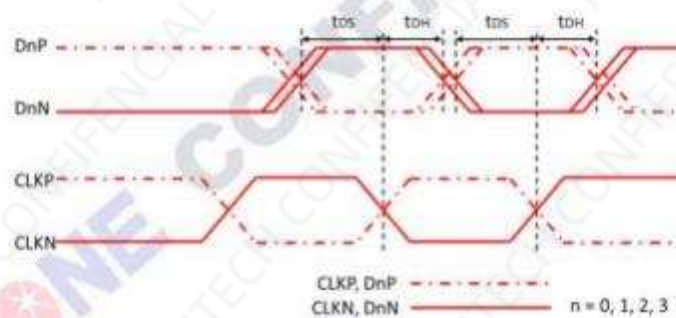


Figure 4-6 DSI Clock / Data Timings

Signal	Symbol	Parameter	Specification			Unit	Notes
			MIN	TYP	MAX		
Dn P/N (n=0,1,2 and 3)	tDS	Data to Clock Setup time	$0.15 \times UI$			UI	
	tDH	Clock to Data Hold time	$0.15 \times UI$			UI	

High Speed Mode - Rising and Falling Timings

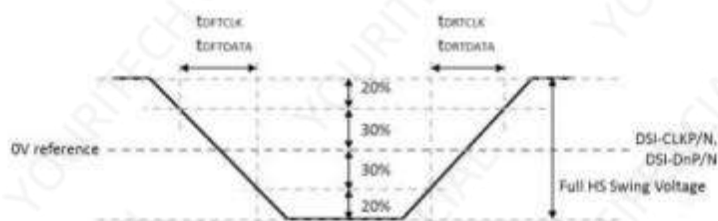


Figure 4.7 Rsing and Falling Timings

Parameter	Symbol	Conditions	Specification			Unit	Notes
			MIN	TYP	MAX		
Differential Rise Time for Clock	t_{ORTCLK}	CLKP/N	150pS		$0.3 \cdot UI$		2,3
Differential Rise Time for Data	$t_{ORTDATA}$	DnP/N	150pS		$0.3 \cdot UI$		1,2,3
Differential Fall Time for Clock	t_{ORTCLK}	CLKP/N	150pS		$0.3 \cdot UI$		2,3
Differential Fall Time for Data	$t_{ORTDATA}$	DnP/N	150pS		$0.3 \cdot UI$		1,2,3

Note 1: DnP/N, n = 0, 1, 2 and 3

Note 2: The display module has to meet timing requirements, which are defined for the transmitter (MCU) on MIPI D-PHY standard.

Note 3: DSI-CLK+ = CLKP, DSI-CLK- = CLKN, DSI-D0+ = D0P, DSI-D0- = D0N

Reset Input Timing:



Figure 4-13 Reset Input Timing

Table 4-2 Reset Input Timing

Signal	Symbol	Parameter	Description	Specification			Unit	Notes
				MIN	TYP	MAX		
RESET	tRESW	Reset "L" pulse width		10			μs	1
	tRESET	Reset complete time	When reset applied during Sleep in mode			5	ms	2
			When reset applied during Sleep Out mode			120	ms	5

Note 1: Condition : Ta =25℃

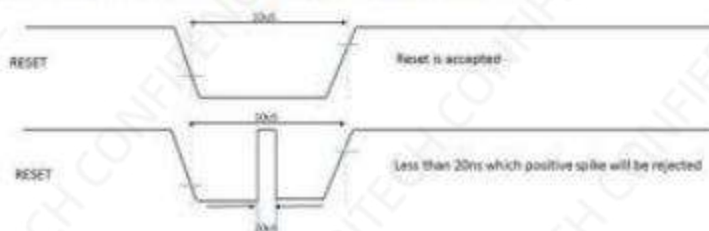
Note 2: Spike due to an electrostatic discharge on RESET line does not cause irregular system reset according to the table below.

RESET Pulse	Action
Less than 5us	Reset Rejected
More than 10uS	Reset
Between 5us and 10uS	Reset Start

Note 2: During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120ms, when Reset Starts in sleep out mode. The display remains the blank state in sleep in mode) and then return to Default condition for H/W RESET.

Note3: During Reset Complete Time, values in OTP memory will be latched to internal register during this period. This loading is done every time when there is H/W RESET complete time (tRESET) within 5ms after a rising edge of RESET.

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



Note 5: It is necessary to wait 5ms after releasing RESET when sending commands, and Sleep Out command can not be sent within 120ms.

7. Optical Characteristics

320*RGBx1280(4 Data Lanes)					
Parameter		Symbol	Min.	Typ.	Max.
MIPI data frequency		FDATA	300	320	600
Clock frequency		FRAME	50	60	70
Hertical Section	Active	THD		320	
	HBP	THBP		50	
	HFP	THFP		50	
	HSYNC	THPW		30	
Vorizontal Section	Active	TVD		1280	
	VBP	TVBP		30	
	VFP	TVFP		30	
	VSYNC	FTPW		20	
					Unit

Note 1: Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L63 / L0$$

L63: Luminance of gray level 63

L0: Luminance of gray level 0

$$\text{CR} = \text{CR} (10)$$

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

Note 2: Definition of Response Time (TR, TF):

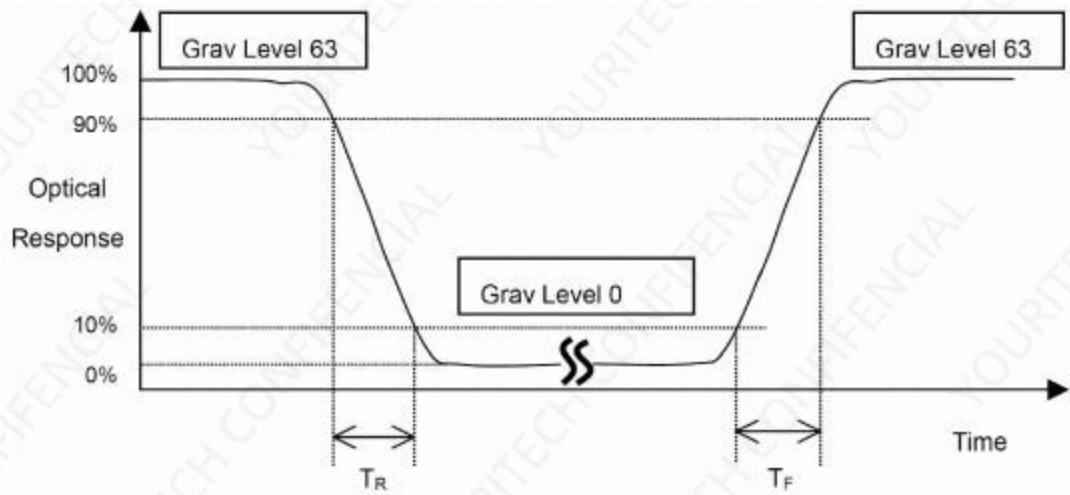


Figure 3

Note 3: Viewing Angle

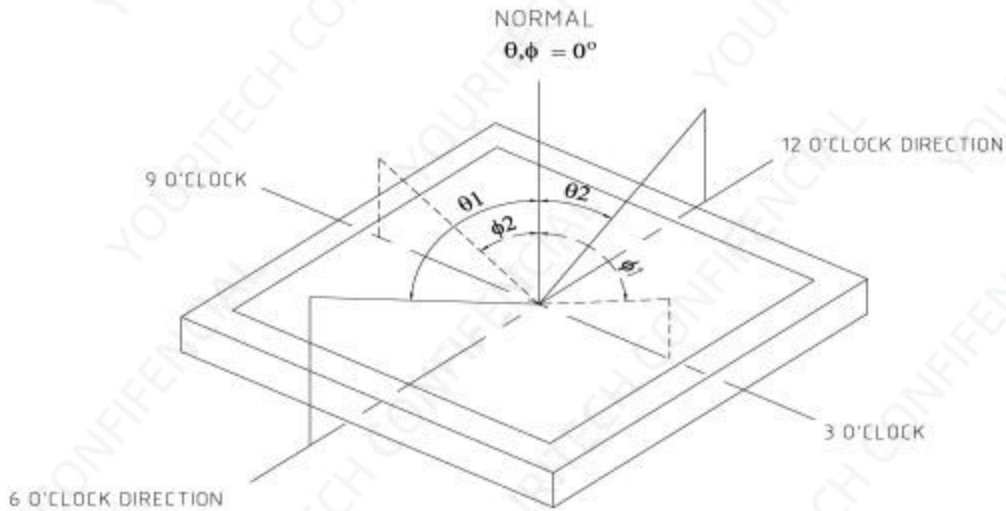


Figure 4

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.

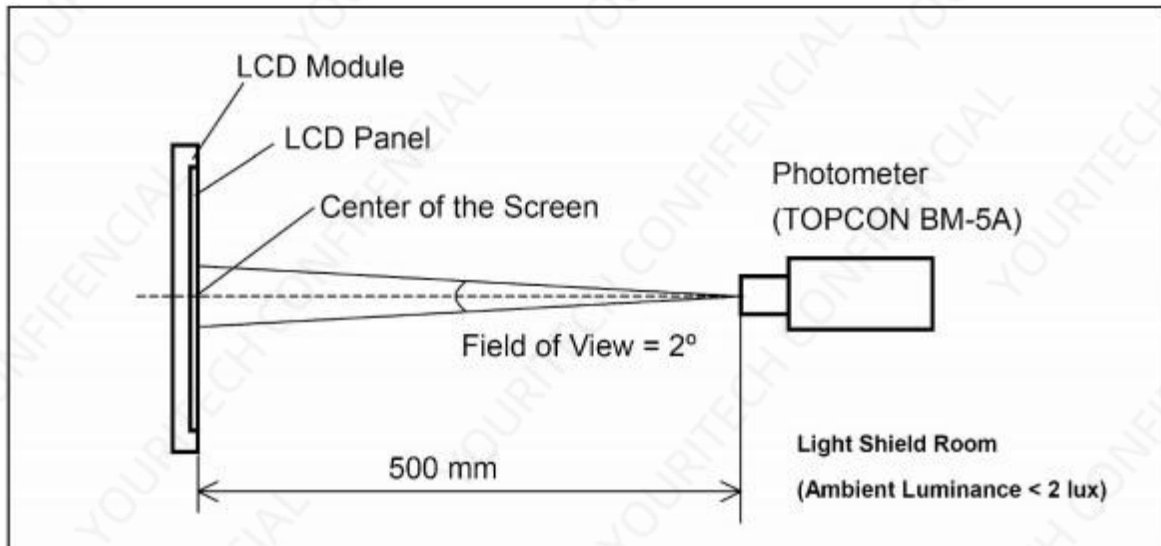


Figure 5

8. Reliability Test Item

No.	Test Item	Test Condition	Notes
1	High Temp. Storage	+80°C / 48H	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 / 48H	
3	High Temp. Operating	+70°C / 48H	
4	Low Temp. Operating	-20°C / 48H	
5	High Temperature / Humidity storage	60°C x 90%RH / 48H	
6	Thermal and cold shock	Static state , -30°C (30min) ~80°C (30min), 10 cycles	

9. Packing Method----TBD

- END -