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TFT | OLED | CHARACTER | GRAPHIC | UWVD | SEGMENT | CUSTOM

TFT Display Module

Part Number E50RE-I-LS750-C

Overview:

- 5.0-inch TFT (132.72x87.8mm)
- 800x480 Pixels
- LVDS Interface
- -30C to 85C Operating Temperature
- Viewing Angle: All

- Transmissive, IPS
- Capacitive Touch Panel
- 750 NITS
- TFT IC: ST7262
- RoHS Compliant



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 model is composed of a transmissive type TFT-LCD panel, driver circuit, capacitive touch panel, and backlight unit. The resolution of the 5.0" TFT-LCD contains 800(RGB)x480 pixels and can display up to 16.7M colors.

Features

Input Voltage: 3.3V

TFT Interface: 4-Lane LVDS / 8BIT LVDS

CTP Interface: I2C

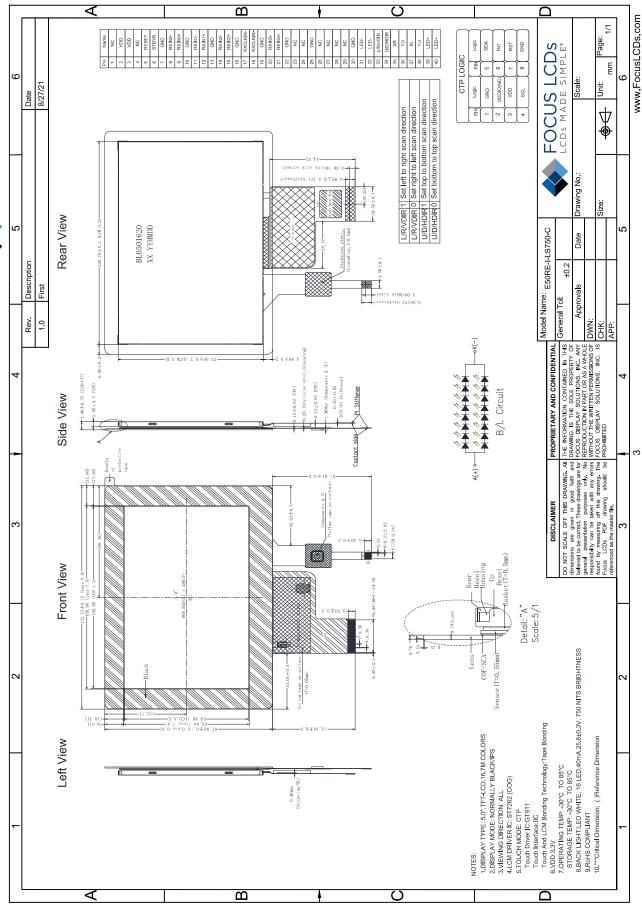
General Information Items	Specification	Unit
TFT Display Area (AA)	108.0 (H) x 64.8 (V) (5.0-Inch)	mm
CTP View Area	109.0 (H) x 65.8 (V)	mm
Driver Element	TFT Active Matrix	
Display Colors	16.7M	Colors
Number of Pixels	800(RGB)x480	Dots
TFT Pixel Arrangement	RGB Vertical Stripe	
Pixel Pitch	0.135 (H) x 0135 (V)	mm
Viewing Angle	ALL	O'clock
TFT IC	ST7262	
CTP IC	GT911	
Display Mode	Transmissive / Normally Black	
Touch Points	5-Points and Gestures	
Operating Temperature	-30 to +85	°C
Storage Temperature	-30 to +85	°C

Mechanical Information

Item		Min.	Тур.	Max.	Unit
	Horizontal (H)		132.72	-	mm
Module Size	Vertical (V)		87.8		mm
	Depth (D)		4.9		mm
W	/eight		TBD		g



11. Outline Dimensions





2. Input Terminal Pin Assignment

2.1 TFT Pin Assignment

Recommended TFT Connector: FH12S-40S-0.5SH(55)

NO.	Symbol	Description	I/O
1	NC		
2	VDD	Supply voltage(3.3V).	Р
3	VDD	Supply voltage(3.3V).	Р
4	NC		
5	RESET	Reset pin. The chip is in reset state when RESETB=0.	I
6	STBYB	Display power control PIN. H: Power ON. L: Power OFF. Internal pull down resistor 100K.	1
7	GND	Ground.	Р
8	RXIN0-	- LVDS differential data input	1
9	RXIN0+	+ LVDS differential data input	I
10	GND	Ground.	Р
11	RXIN1-	- LVDS differential data input	I
12	RXIN1+	+ LVDS differential data input	I
13	GND	Ground.	Р
14	RXIN2-	- LVDS differential data input	I
15	RXIN2+	+ LVDS differential data input	I
16	GND	Ground.	Р
17	RXCLKIN-	- LVDS differential clock input	1
18	RXCLKIN+	+ LVDS differential clock input	I
19	GND	Ground.	Р
20	RXIN3-	- LVDS differential data input	I
21	RXIN3+	+ LVDS differential data input	I
22	GND	Ground.	Р
23	NC		
24	NC		
25	GND	Ground.	Р
26	NC		



27	NC		
28	NC		
29	NC		
30	GND	Ground.	ı
31	LED-	LED Cathode	Р
32	LED-	LED Cathode	Р
33	L/R/VDIR	Horizontal shift direction (source output) selection(NOTE1)	I
34	U/D/HDIR	Vertical shift direction (gate output) selection(NOTE1)	I
35	XR(NC)	Touch panel Right Glass Terminal	A/D
36	YD(NC)	Touch panel Bottom Film Terminal	A/D
37	XL(NC)	Touch panel LIFT Glass Terminal	A/D
38	YU(NC)	Touch panel Top Film Terminal	A/D
39	LED+	LED Anode	Р
40	LED+	LED Anode	Р

I: Input, P: Power, O: Output

2.2 CTP Pin Assignment

Recommended CTP Connector: FH12-8S-1SH(55)

NO.	Symbol	Description	I/O
1	GND	Ground	Р
2	VDDIO	Supply voltage for I/O.	Р
3	VDD	Supply voltage	Р
4	SCL	I2C clock input	Ι
5	SDA	I2C data input and output	Ι
6	INT	External interrupt to the host	Ι
7	RST	External Reset, Low is active	I
8	GND	Ground	Р

5

I: Input, P: Power, O: Output



3. LCD Optical Characteristics

3.1 Optical Specifications

Item		Symbol	Condition	Min.	Тур.	Max.	Unit	Note		
Color Gam	ut	S(%)		42	46		%	-		
Contrast Ra	itio	CR		800	1200			(1)(2)		
Posnonso Timo	Rising	T _R		-	30	40	mc	(4)		
Response Time	Falling	T _F		-	30	40	ms	(4)		
	White	Wx			0.306					
	vviille	W _Y	Θ = 0		0.325					
	Dod	R _X	Normal Viewing Angle	-0.04	0.592	+0.04				
Color Filter	Red				0.357			(E)(G)		
Chromaticity	Green	Gx			0.357			(5)(6)		
		G _Y						0.548		
	Blue	By			0.148					
	Blue	Bx			0.099					
	Hor.	ΘL		70	80					
Viewing Angle	Hor.	ΘR	OD > 10	70	80		D	(4)(6)		
Viewing Angle	\/o#	Θτ	CR ≥ 10	70	80		Degree	(1)(6)		
	Ver.	Θв		70	80					
Option View Dir	ection			ALL				(1)		

Measuring Conditions

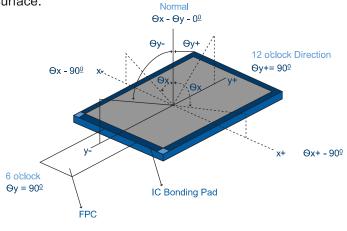
- 1. Dark Room
- 2. Ambient Temperature of 25±2°C
- 3. 15 Minute Warm Up



Optical Specification Reference Notes:

(1) Definition of Viewing Angle:

The viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3,9 o'clock direction and the vertical or 6,12 o'clock direction with respect to the optical axis which is normal to the LCD surface.



(2) Definition of Contrast Ratio:

Measured at the center point of panel. The contrast ratio (Cr) measured on a module, is the ratio between the luminance (Lw) in a full white area (R=G=B=1) and the luminance (Ld) in a dark area (R=G=B=0).

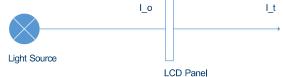
$$Cr = \frac{Lw}{Ld}$$

(3) Definition of Transmittance (T%):

The transmittance of the panel including the polarizers is measured with electrical driving. The equation for transmittance Tr is:

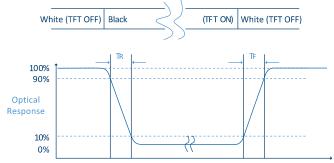
$$Tr = \frac{It}{Io} \times 100\%$$

Io = the brightness of the light source. It = the brightness after panel transmission



(4) Definition of Response Time (TR, TF):

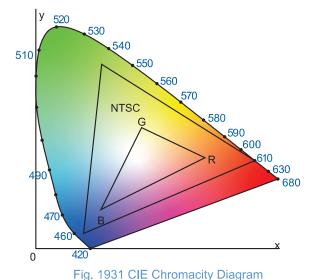
The rise time 'Tr' is defined as the time for luminance to change from 90% to 10% as a result of a change of the electrical condition. The fall time 'Tf' is defined as the time for luminance to change from 10% to 90% as a result of a change of the electrical condition.





(5) Definition of Color Gamut:

Measuring machine CFT-01. NTSC's Primaries: R(x,y,Y),G(x,y,Y), B(x,y,Y). FPM520 of Westar Display Technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics. The color chromaticity shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

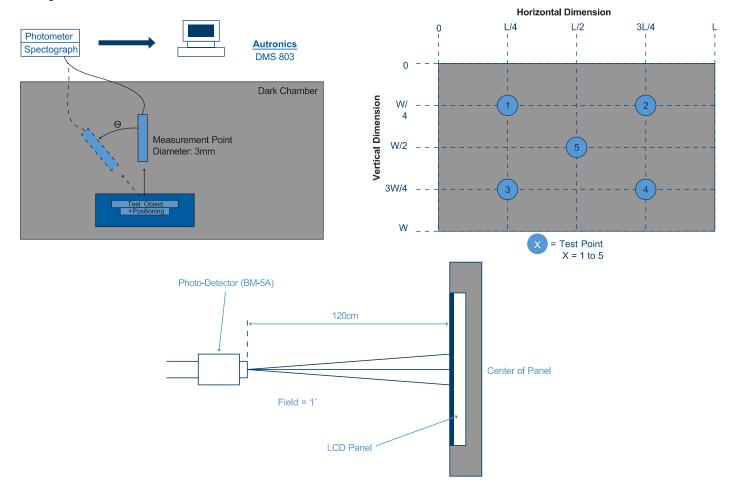


rig. 1931 CIE Cilioniacity Diagram

Color Gamut: S = Area of RGB Triangle x 100% Area of NTSC Triangle

(6) Definition of Optical Measurement Setup:

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.





4. TFT Electrical Characteristics

4.1 Absolute Maximum Ratings (Ta=25°C, VSS=0V)

Characteristics	Symbol	Min.	Max.	Unit
Digital Supply Voltage	VDD	-0.3	4.0	V
Operating Temperature	TOP	-30	+85	°C
Storage Temperature	TST	-30	+85	°C

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

4.2 DC Electrical Characteristics

Characteristics		Symbol	Min.	Тур.	Max	Unit
LCM Sup	ply Voltage	VDD	3.0	3.3	3.6	V
Normal Mode Cu	Normal Mode Current Consumption			90	1	mA
Lovel Input Velte	go (BCB Interface)	VIH	2.0		VDD	V
Level Input Volta	Level Input Voltage (RGB Interface)		GND		0.8	V
LVDC Interface	Differential Input High Threshold	VLVTH			100	mV
LVDS Interface	Differential Input Low Threshold	VLVTL	-100			mV



4.3 LED Backlight Characteristics

This module utilizes an edge-lit backlight system with 16 LED chips.

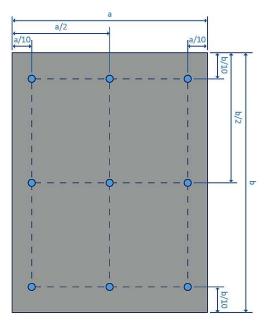
Item	Symbol	Min.	Тур.	Max.	Unit	Note
Forward Current	IF	30	40		mA	
Forward Voltage	VF		25.6		V	
LCM Luminance	LV	700	750		cd/m²	(3)
LED Lifetime	Hr		50,000		Hour	(1)(2)
Uniformity	Avg	80			%	(3)

Note 1: LED lifetime (H_r) can be defined as the time in which it continues to operate under the condition: $Ta = 25\pm3^{\circ}C$, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note 2: The "LED lifetime" is defined as the module brightness decrease to 50% original brightness at Ta = 25° C and IF = 40mA. The LED lifetime could be decreased if operating I_F is larger than 40mA. The constant current driving method is suggested.

Backlight Circuit:





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

$$Luminance = \frac{(Total\ Luminance\ of\ 9\ Points)}{9}$$

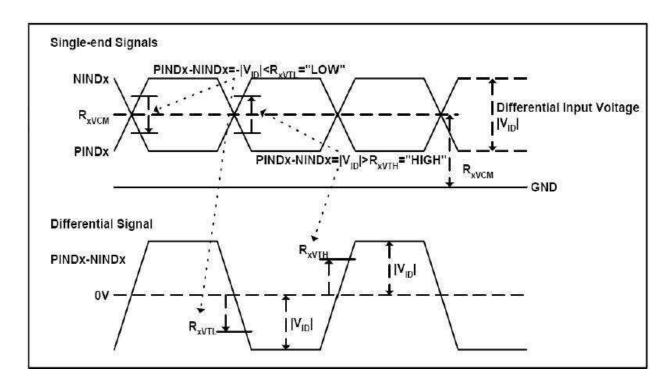
Uniformity =
$$\frac{Minimum\ Luminance\ in\ 9\ Points\ (1-9)}{Maximum\ Luminance\ in\ 9\ Points\ (1-9)}$$



5. LVDS Signal Timing Characteristics

5.1 AC Electrical Characteristics

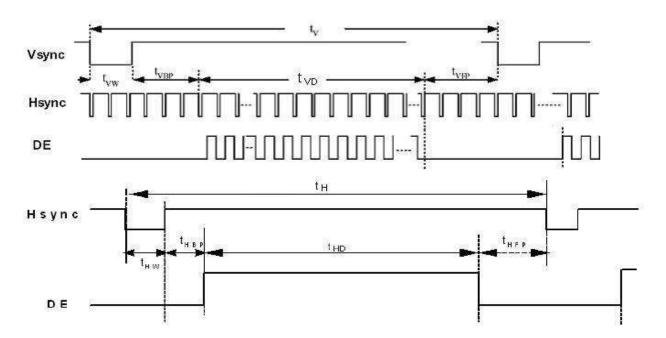
Item	Symbol	Min.	Тур.	Max.	Unit	Note	
LVDS Differential input high Threshold voltage	RxVTH		1	+100	mV	DV\/CM=1 2\/	
LVDS Differential input low Threshold voltage	RxVTL	-100			mV	RXVCM=1.2V	
LVDS Differential input common mode voltage	RxVCM	0.7		1.6	V		
LVDS Differential voltage	[VID]	200		600	mV		





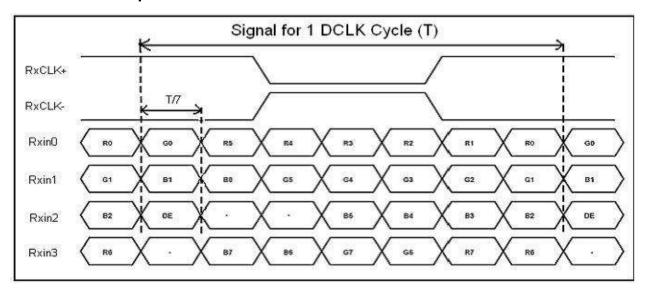
5.2 Timing Table

Ito	Item		Min.	Тур.	Max.	Unit	Conditions
DCLK F	DCLK Frequency		23	25	27	MHz	
	Period Time	Th	808	816	896	DCLK	
	Display Period	Thdisp		800		DCLK	
LICYNIC	Back Porch	Thbp	4	8	48	DCLK	
HSYNC	Front Porch	Thfp	4	8	48	DCLK	
	Pulse Width	Thw	2	4	8	DCLK	
	Period Time	Tv	488	496	504	HSYNC	
	Display Period	Tvdisp		480		HSYNC	
) (O) (N) O	Back Porch	Tvbp	4	8	12	HSYNC	
VSYNC	Front Porch	Tvfp	4	8	12	HSYNC	
	Pulse Width	Tvw	2	4	8	HSYNC	





5.3 LVDS Data Input Format





6. CTP Specification

6.1 Electrical Characteristics

Absolute Maximum Rating

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	VDD	2.66	3.47	V	
Operating temperature	ТОР	-30	+85	°C	
Storage temperature	TST	-30	+85	°C	

DC Electrical Characteristics (Ta=25°C)

(Ambient temperature:25°C, VDD=2.8V, VDDIO=1.8V or VDDIO=VDD)

Item	Min.	Тур.	Max.	Unit	Note
Power Supply Voltage/VDD	2.66	3.3	3.47	V	
Normal mode operating current		8	14.5	mA	
Green mode operating current		3.3		mA	
Sleep mode operating current	70		120	uA	
Doze mode operating current		0.78		mA	
Digital Input low voltage/VIL	-0.3		0.25*VDD	V	
Digital Input high voltage/VIH	0.75*VDD		VDD+0.3	V	
Digital Output low voltage/VOL			0.15*VDD	V	
Digital Output high voltage/VOH	0.85*VDD			V	

AC Characteristics

(Ambient temperature:25°C, VDD=2.8V, VDDIO=1.8V)

Parameter	Min	Тур	Max	Unit	Note
OSC oscillation frequency	59	60	61	MHZ	
I/O output rise time, low to high	-	14	-	ns	
I/O output fall time, high to low	-	14	-	ns	

6.2 I2C Timing

For information on the I2C timing and data transmission of the CTP, reference the GT911 specification in the following link: https://focusicds.com/content/GT911.pdf



7. Quality Inspection Standards

For TFT quality inspection standards, please reference the latest information on our website through the following link: https://focuslcds.com/tft-quality-inspectionstandards/

8. Cautions and Handling Precautions

8.1 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 fingerstalls with soft gloves in order to keep the displays 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.
- 14. Power supply should always be turned on/off by the item Power On Sequence & Power Off Sequence.

8.2 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.
- 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.