Preliminary

8.4″ SVGA

TECHNICAL SPECIFICATION

T-55466D084J-LW-A-AAN

OPTREX CORPORATION.

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CONTENTS

1. APPLICATION

This specification applies to color TFT-LCD module, T-55466D084J-LW-A-AAN.

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OPTREX   classifies the usage of the TFT-LCD module as follows. Please confirm the usage before using the product.

(1) Standard Usage
> Computers, office equipment, factory automation equipment, test and measurement equipment, communications, transportation equipment(automobiles, ships, trains, etc.), provided, however, that operation is not influenced by TFT-LCD directly.

(2) Special Usage
> Medical equipment, safety equipment, transportation equipment, provided, however, that TFT-LCD is necessary to its operation.

(3) Specific Usage
> Cockpit Equipment, military systems, aerospace equipment, nuclear reactor control systems, life support systems and any other equipment. OPTREX   should make a contract that stipulate apportionment of responsibilities between OPTREX   and our customer.

The product specified in this document is designed for "Standard Usage" unless otherwise specified in this document. If customers intend to use the product for applications other than those specified for "Standard Usage", hey should first contact OPTREX   sales representative for it's intended use in writing.

OPTREX   has been making continuous effort to improve the reliability of its products. Customers should implement sufficient reliability design of their application equipments such as redundant system design, fail-safe functions, anti-failure features.

2. OVERVIEW

T-55466D084J-LW-A-AAN is 8.4" color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs, control circuit, and backlight unit.

By applying 6 bit or 8 bit digital data, 800 600, 262k-color or 16.7M-color images are displayed on the 8.4" diagonal screen. Input power voltage is 3.3 V for LCD driving.
The type of data and control signals are digital and transmitted via LVDS interface per Typ. 40 MHz clock cycle.

Driver circuit for LED backlight is not included in this module. General specifications are summarized in the following table:

ITEM	SPECIFICATION
Display Area (mm)	170.4 127.8 (8.4-inch diagonal)
Number of Dots	800 3 (H) 600 (V)
Pixel Pitch (mm)	0.213 (H) 0.213 (V)
Color Pixel Arrangement	RGB vertical stripe
Display Mode	Normally white TN
Number of Color	262k(6 bit/color), 16.7M(8 bit/color)
Luminance (cd/m²)	600
Wide Viewing Angle Technology	Optical Compensation Film

Viewing Angle (CR 10)

3. ABSOLUTE MAXIMUM RATINGS

| ITEM	SYMBOL	MIN.	MAX.	UNIT
Power Supply Voltage for LCD	VCC	0	4.0	V

Logic Input Voltage

VCC-dip conditions:

    1) When 2.6 V   VCC < 3.0 V, td   10 ms

    2) When VCC < 2.6 V

        VCC-dip conditions should also follow the power and signals sequence.
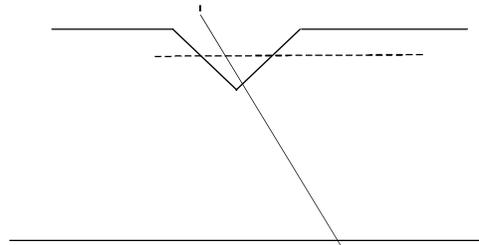
5. INTERFACE PIN CONNECTION

(1) CN 1(Interface Signal)

Used connector: 20186-020E-11F(I-PEX) [FI-SEB20P-HFE (JAE) equivalent]
Corresponding connector: 20197-020U-F(I-PEX), FI-S20S (JAE) [for discrete Wire]
FI-SE20ME (JAE) [for FPC]

Pin No.	Symbol	Function(ISP 6 bit compatibility mode)		Function(ISP 8 bit compatibility mode)
		6 bit input	8 bit input	
1	VCC	+3.3 V Power supply		
2	VCC	+3.3 V Power supply		
3	GND	GND		
4	GND	GND		
5	Link 0	R0, R1, R2, R3, R4, R5, G0	R2, R3, R4, R5, R6, R7, G2	R0, R1, R2, R3, R4, R5, G0
6	Link 0+	R0, R1, R2, R3, R4, R5, G0	R2, R3, R4, R5, R6, R7, G2	R0, R1, R2, R3, R4, R5, G0
7	GND	GND		
8	Link 1	G1, G2, G3, G4, G5, B0, B1	G3, G4, G5, G6, G7, B2, B3	G1, G2, G3, G4, G5, B0, B1
9	Link 1+	G1, G2, G3, G4, G5, B0, B1	G3, G4, G5, G6, G7, B2, B3	G1, G2, G3, G4, G5, B0, B1
10	GND	GND		
11	Link 2	B2, B3, B4, B5, DENA	B4, B5, B6, B7, DENA	B2, B3, B4, B5, DENA
12	Link 2+	B2, B3, B4, B5, DENA	B4, B5, B6, B7, DENA	B2, B3, B4, B5, DENA
13	GND	GND		
14	CLKIN	Clock		
15	CLKIN+	Clock +		
16	GND	GND		
17	Link3	See: *2)	R0, R1, G0, G1, B0, B1	R6, R7, G6, G7, B6, B7
18	Link3+	See: *2)	R0, R1, G0, G1, B0, B1	R6, R7, G6, G7, B6, B7
19	MODE	Low=ISP 6 bit compatibility mode		High=ISP 8 bit compatibility mode
20	SC			

(2) CN 2(Backlight)

      Backlight-side connector: SM06B-SHLS-TF (JST)

      Corresponding connector: SHLP-06V-S-B (JST)

          Pin No.

6. INTERFACE TIMING

LVDS transmitter input signal

(1) Timing Specifications

| ITEM			SYMBOL	MIN	TYP	MAX	UNIT
DCLK	Frequency		f_{CLK}	35	40	42	MHz
	Period		t_{CLK}	23.8	25	28.6	ns
DENA	Horizontal	Active Time	t_{HA}	800	800	800	t_{CLK}
		Blanking Time	t_{HB}	20	256	--	t_{CLK}
		Frequency	f_H	35.2	37.9	39.2	kHz
		Period	t_H	25.5	26.4	28.4	s
	Vertical	Active Time	t_{VA}	600	600	600	t_H
		Blanking Time	t_{VB}	3	28	--	t_H
		Frequency	f_V	55	60	64.2	Hz
		Period	t_V	15.6	16.7	18.2	ms

[Note]

1) DENA (Data Enable) should always be positive polarity as shown in the timing specification.

2) DCLK should appear during all invalid period.

3) LVDS timing follows the timing specifications of LVDS receiver IC: THC63LVDF84B(Thine).

4) In case of blanking time fluctuation, please satisfy following condition.

$t_{VBn} > t_{VBn-1}$ $3(t_H)$

(2) Timing Chart

   a. Horizontal Timing Chart

DCLK

DATA
(R,G,B)

DENA
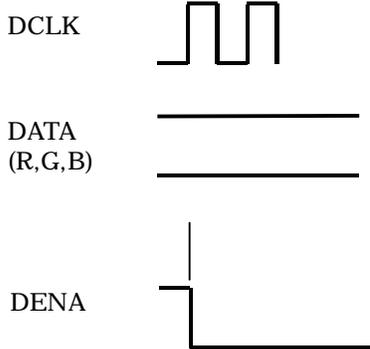
(3) Color Data Assignment

a. 6 bit input

	INPUT DATA		
	R DATA	G DATA	B DATA
	R5　R4　R3　R2　R1　R0	G5　G4　G3　G2　G1　G0	B5　B4　B3　B2　B1　B0

b. 8 bit input

| COLOR	INPUT DATA		
	R DATA	G DATA	B DATA
	R7 R6 R5 R4 R3 R2 R1 R0	G7 G6 G5 G4 G3 G2 G1 G0	B7 B6 B5 B4 B3 B2 B1 B0
	MSB LSB	MSB LSB	MSB LSB
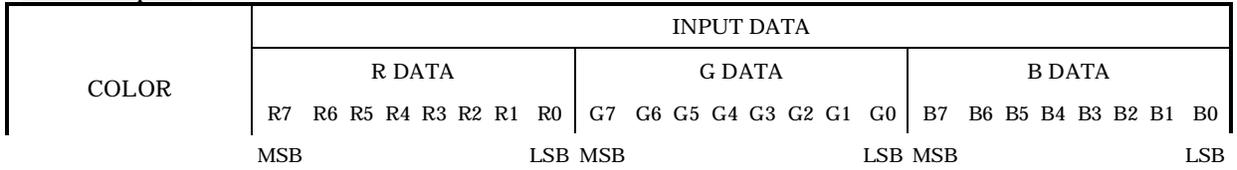
(4) Display Position and Scan Direction

 D(X,Y) shows the data number of input signal for LCD panel signal processing PCB.

SC: Low   SC: High

D(1,1) ──────────→ D(800,1)
        ⇐╌╌╌╌──────→

D(1,600) ─────────→ D(800,600)

7. BLOCK DIAGRAM

Timing Controller

Drivers(gate)

TFT-LCD

S2
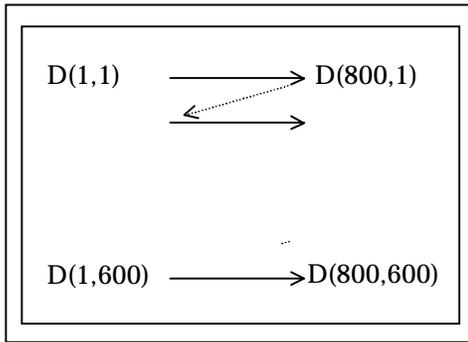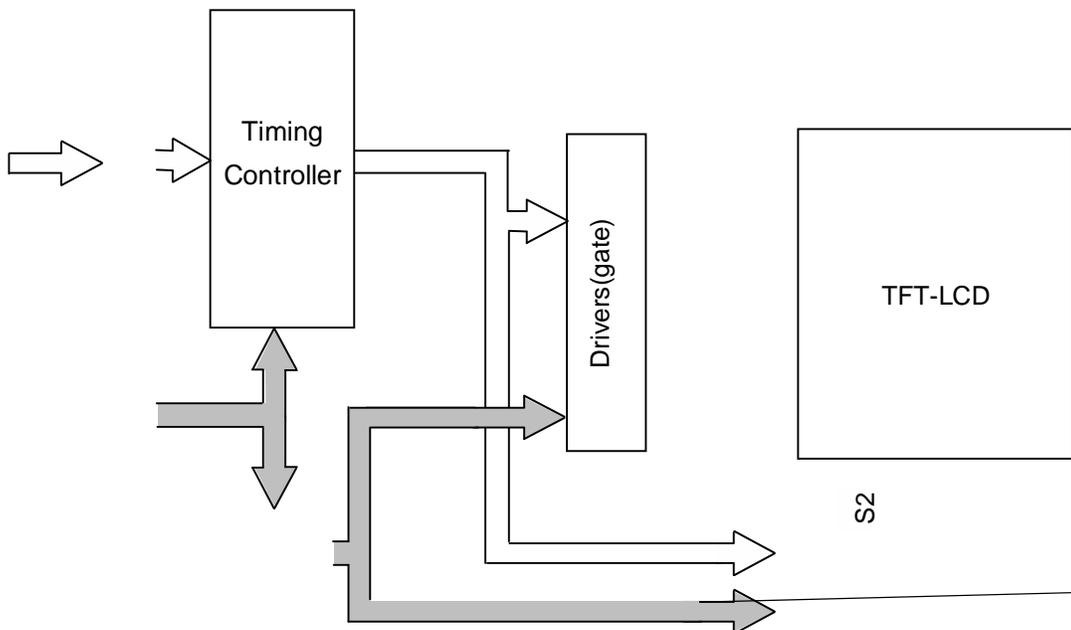
8. MECHANICAL SPECIFICATIONS
(1) Front Side

(2) Rear Side

9. OPTICAL CHARACTERISTICS

Ta=25°C, VCC=3.3V, Input Signals: Typ. Values shown in Section 6

| ITEM		SYMBOL	CONDITION		MIN	TYP	MAX	UNIT	Remarks
Contrast Ratio		CR	V	H	390	600	--	--	*1)*2)*5)
Luminance		Lw	V	H	480	600	--	cd/m²	*1)*5)
Luminance Uniformity		Lw	V	H	--	--	30	%	*1)*3)*5)
Response Time		tr	V	H	--	4	--	ms	*1)*4)*5)
		tf	V	H	--	12	--	ms	*1)*4)*5)
Viewing Angle	Horizontal	H	CR 10		70 70	80 80	--	°	*1)*5)
	Vertical	V			50 70	60 80	--	°	*1)*5)
Image sticking		tis	2 h		--	--	2	s	*6)
Color Coordinates	Red	Rx	V	H	TBD	TBD	TBD	--	*1)*5)
		Ry			TBD	TBD	TBD		
	Green	Gx			TBD	TBD	TBD		
		Gy			TBD	TBD	TBD		
	Blue	Bx			TBD	TBD	TBD		
		By			TBD	TBD	TBD		
	White	Wx			0.273	0.313	0.353		
		Wy			0.289	0.329	0.369		

*1) Measurement Point
   Contrast Ratio, Luminance, Response Time, Viewing Angle, Color Coordinates: Display Center
   Luminance Uniformity: point 1

*6) Image sticking:

Continuously display the test pattern shown in the figure below for two-hours. Then display a completely white screen. The previous image shall not persist more than two seconds at 25°C.

Black
Lines
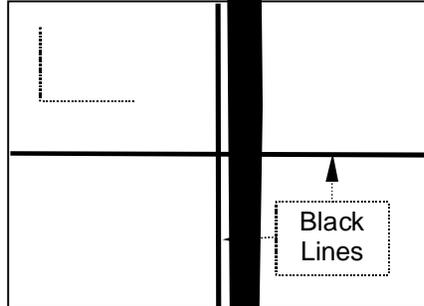
10. RELIABILITY TEST CONDITION

(1) Temperature and Humidity

ITEM	CONDITIONS
HIGH TEMPERATURE HIGH HUMIDITY OPERATION	40°C, 90%RH, 240 h (No condensation)
HIGH TEMPERATURE OPERATION	80°C, 240 h
LOW TEMPERATURE OPERATION	30°C, 240 h
HIGH TEMPERATURE STORAGE	80°C, 240 h
LOW TEMPERATURE STORAGE	30°C, 240 h
THERMAL SHOCK (NON-OPERATION)	BETWEEN 30°C (1h) and 80°C(1h), 100 CYCLES

(2) Shock & Vibration

ITEM	CONDITIONS
SHOCK (NON-OPERATION)	Shock level: 1470 m/s² (150G) Waveform: half sinusoidal wave, 2 ms Number of shocks: one shock input in each direction of three mutually perpendicular axes for a total of six shock inputs

Vibration level: 9.8 m/s²

VIBRATION
(NON-OPERATION)

11. OTHER FEATURE

This LCD module complies with RoHS[*] directive.

[*] RoHS: Restriction of the use of certain hazardous substances in electrical and electronic equipment

12. HANDLING PRECAUTIONS FOR TFT-LCD MODULE

Please pay attention to the followings in handling TFT-LCD products;

(1) ASSEMBLY PRECAUTION

   a. Please mount the LCD module by using mounting hole with a screw clamping torque (recommended value: 0.3 Nm). Please do not bend or wrench the LCD module in assembling. Please do not drop, bend or twist the LCD module in handling.

   b. Please design display housing in accordance with the following guide lines.

     (a) Housing case must be designed carefully so as not to put stresses on LCD and not to wrench module.

     (b) Under high temperature environment, performance and life time of LED may heavily shorten. When you design with our LCD product, please consider radiating heat and ventilation for good heat management.

     (c) Keep sufficient clearance between LCD module back surface and housing when the LCD module is mounted. Approximately 1.0mm of the clearance in the design is recommended taking into account the tolerance of LCD module thickness and mounting structure height on the housing.

     (d) When some parts, such as, FPC cable and ferrite plate, are installed underneath the LCD module, still sufficient clearance is required, such as 0.5mm. This clearance is, especially, to be reconsidered when the additional parts are implemented for EMI countermeasure.

     (e) Design the LED driver location and connector position carefully so as not to give stress to LED backlight cable.

     (f) Keep sufficient clearance between LCD module and the others parts, such as inverter and speaker so as not to interfere the LCD module. Approximately 1.0 mm of the clearance in the design is recommended.

     (g) To avoid local elevation/decrease of temperature, considering location of heating element, heat release, thermal design should be done.

   c. Please do not push or scratch LCD panel surface with anything hard. And do not soil LCD panel surface by touching with bare hands. (Polarizer film, surface of LCD panel is easy to be flawed.)

   d. Please wipe off LCD panel surface wi7.0surface hee

i. Please connect the metal frame of LCD module to GND in order to minimize the effect of external noise and EMI.

j. Be sure to connect the cables and the connecters correctly.

(2) OPERATING PRECAUTIONS

a. Please be sure to turn off the power supply before connecting and disconnecting signal input cable.

b. Please do not change variable resistance settings in LCD module. They are adjusted to the most suitable value. If they are changed, it might happen LCD does not satisfy the characteristics specification.

c. The interface signal speed is very high. Please pay attention to transmission line design and other high speed signal precautions to satisfy signal specification.

d. A condensation might happen on the surface and inside of LCD module in case of sudden change of ambient temperature. Please take care so as not to cause any damage mentioned on (1)-d.

e. Please pay attention not to display the same pattern for very long time. Image might stick on LCD. Even if image sticking happens, it may disappear as the operation time proceeds.

f. Please obey the same safe instructions as ones being prepared for ordinary electronic products.

(3) PRECAUTIONS WITH ELECTROSTATICS

a. This LCD module use CMOS-IC on circuit board and TFT-LCD panel, and so it is easy to be affected by electrostatics. Please be careful with electrostatics by the way of your body connecting to the ground and so on.

b. Please remove protection film very slowly from the surface of LCD module to prevent from electrostatics occurrence.

(4) STORAGE PRECAUTIONS

LCD should be stored in the room temperature environment with normal humidity. The LCD inventory should be processed by first-in first-out method.

(5) SAFETY PRECAUTIONS

a. When you waste damaged or unnecessary LCDs, it is recommended to crush LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.

b. If any liquid leaks out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

c. Be sure to turn off the power supply when inserting or disconnecting the LED backlight cable.

d. LED driver should be designed carefully to limit or stop its function when over current is detected on the LED.

(6) OTHERS

a. A strong incident light into LCD panel may cause deterioration to polarizer film, color filter, and other materials, which will degrade the quality of display characteristics. Please do not expose LCD module under strong Ultraviolet rays for a long time.

b. Please pay attention to a panel side of LCD module not to contact with other materials in preserving it alone.

c. For the packaging box handling, please see and obey with the packaging specification datasheet.