

37493-OP**ERM12864-6 Series****Graphic Module Datasheet****EastRising Technology Co., Limited**

Blue background with 128x64 monochrome White pixels
ST7920 controller that is built-in with 8192 16X16 dots Chinese fonts and 126 16X8 dots half height alphanumerical fonts.

4-bit/8-bit Parallel/Serial and 3-wire serial SPI interface.

LED backlight can be dimmed using a resistor or PWM.

5V power supply

NOTE:

Some specifications of IC are not listed in this datasheet. Please refer to the IC datasheet for more details.

REV	DESCRIPTION	RELEASE DATE
1.0	Preliminary Release	Jul-05-2012
1.1	Add Jump Point Description	Oct-9-2013
1.2	Change the Method of 5V to 3.3V Wire Jumper	Apr-20-2017

1. GENERAL INFORMATION

No.	Part Number	LCD Type	Backlight Color	Graphic & Font Color	Background Color
1	ERM12864SBS-6	STN Negative Blue	White Color	White Color	Blue Color

Display Format: 128x64 Dots
 Interface: 6800 4-bit Parallel , 6800 8-bit Parallel , 3-Wire Serial SPI
 IC or Equivalent: ST7920
 Appearance: White on Blue
 Diagonal Size: 2.9"
 Connection: Solder (Spaced for 0.1" Pitch Headers)
 Outline Dimension: W: 93.0 H: 70.0 T:12.5mm
 Visual Area: 71.80x40.00mm
 Active Area: 66.25(W)x33.24(H)
 Dot (Pixel) Size: 0.48x0.48mm
 Dot (Pixel) Pitch: 0.52x0.52mm
 IC Package: COB
 Display Type: STN-Negative
 Sunlight Readable: Yes
 Viewing Direction: 6:00
 Backlight Color: White
 Backlight Current (Typ): 60mA
 Power Supply: 5V
 Supply Current for LCM (Max): 6mA
 Operating Temperature: -20°C~70°C
 Storage Temperature: -30°C~80°C

2. SPECIFICATION

2.1 Display Specification

ITEM	STANDARD VALUE	UNIT
Dot Matrix	128x64	Dots
Display Connector	Pin Header, 20 pins	--
Operating Temperature	-20 ~ +70	°C
Storage Temperature	-30 ~ +80	°C
Touch Panel Optional	N/A	--
Font Chip Optional	N/A	--
*Sunlight Readable	No1, No3, No4, No5, No6, No7, No8	--

*Number of sunlight readable is from 1.1 ERM12864-6 Series Table of the datasheet.

2.2 Mechanical Specification

ITEM	STANDARD VALUE	UNIT
Outline Dimension	93.0(W) × 70.0(H) × 12.5(T) (MAX)	mm
Visual Area	71.8(W) × 40.0(H)	mm
Active Area	66.25(W) × 33.24(H)	mm
Dot Size	0.48x0.48	mm
Dot Pitch	0.52x0.52	mm

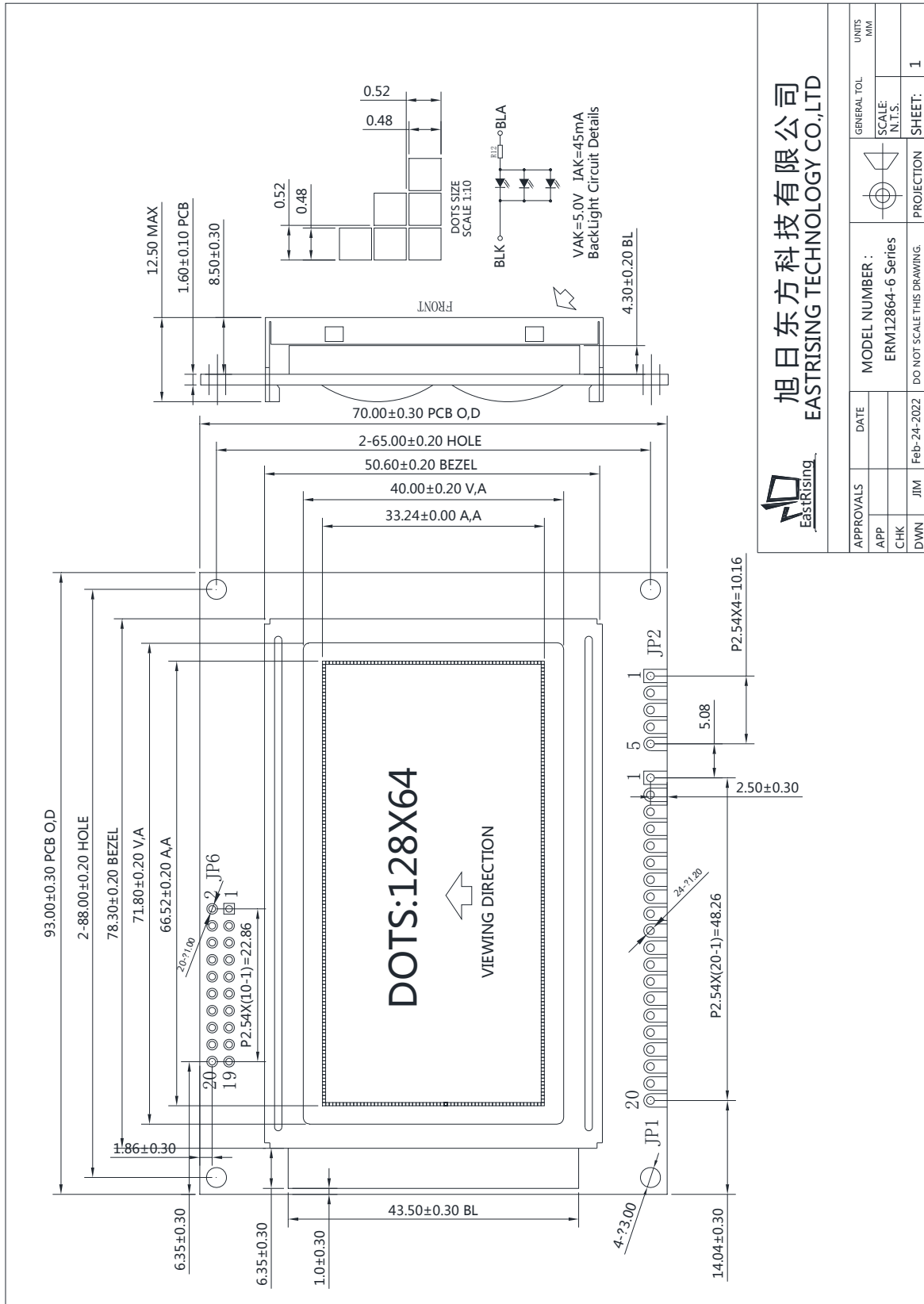
2.3 Electrical Specification

ITEM	STANDARD VALUE	UNIT
IC Package	COB	--
Controller	ST7920	--
Interface	6800 8-bit Parallel, 6800 4-bit Parallel, 3-Wire SPI	--

2.4 Optical Specification

ITEM	STANDARD VALUE	UNIT
LCD Type	Refer to 1.1 ERM12864-6 Series Table	--
Backlight Color	Refer to 1.1 ERM12864-6 Series Table	--
Viewing Direction	6:00	Clock
LCD Duty	1/32	Duty
LCD Bias	1/6	Bias

3. OUTLINE DRAWING



4. ELECTRICAL SPEC

4.1 Pin Configuration

JP1&JP6 (Parallel/Serial interface)

Pin Num	Pin Name	Description
1	VSS	GND
2	VCC	Power Supply for Logic
3	V0	Operating Voltage for LCD
4	RS	H: data L: Instruction code
5	R/W	H: read L: write
6	E	Enable Signal
7	DB0	Data Bus Line
8	DB1	
9	DB2	
10	DB3	
11	DB4	
12	DB5	
13	DB6	
14	DB7	
15	PSB	H: Parallel Interface Mode L: Serial Interface Mode
16	NC	No Connection
17	/RST	Reset Signal, Active "L"
18	Vout	Negative Voltage Output
19	LEDA	Backlight Anode (+5V)
20	LEDK	Backlight Cathode (0V)

JP2(Serial interface)

Pin Num	Pin Name	Description
1	VSS	GND
2	VCC	Power Supply for Logic
3	CS	Chip selection signal
4	SID	Serial data input
5	SCLK	Serial clock

Note:When using this interface, short-circuit the contact point "S"

4.2 Jumper Descripton About Changing Vdd=5V to Vdd=3.3V

Jump No	Description
VR3	Short Circuit the Left Two Soldering Point
C4,C5	Add C4= 4.7uF/10V and C5=4.7uF/10V
VR1	Remove VR1
R10.R11	Change R10 and R11 to 12 ohm

Note-1: We set power supply as Vdd=5V by default.

Note-2: The contrast could be only adjusted by connecting potentiometer between Pin3 and Pin18 if you set 3.3V power supply.

4.3 Absolute Maximum Ratings

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Power Supply for Logic	VDD-VSS	-0.3	-	+5.5	V
Power Supply for LCD	VEE	-0.3	-	+7.0	V
Input Voltage	VIN	-0.3	-	VDD+0.3	V
Supply Current for Backlight	ILED	-	60	-	mA

4.4 Electrical Characteristics

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Power Supply for LCM	VDD-VSS	-	4.8	5.0	5.2	V
			3.0	3.3	3.6	
Input Voltage	VIL	L Level	-0.2	-	1	V
	VIH	H Level	VDD-1.0	-	VDD	V
LCD Driving Voltage	VDD-V0	-	4.5	4.8	5.1	V
Supply Current for LCM	IDD	VDD=5.0V	-	-	6000	uA
		VDD=3.3V	-	-	5750	

6. PRECAUTIONS FOR USING

6.1 Handling Precautions

- ◆ This device is susceptible to Electro-Static Discharge (ESD) damage. Observe Anti-Static precautions.
- ◆ EastRising display panel is made of glass. Do not subject it to a mechanical shock by dropping it or impact.
- ◆ If EastRising display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.
- ◆ Do not apply excessive force to the EastRising display surface or the adjoining areas since this may cause the color tone to vary.
- ◆ The polarizer covering the EastRising display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- ◆ If EastRising display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following Isopropyl or alcohol.
- ◆ Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the Water.
- ◆ Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.
- ◆ Install the EastRising LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the cable or the backlight cable.
- ◆ Do not attempt to disassemble or process EastRising LCD module.
- ◆ NC terminal should be open. Do not connect anything.
- ◆ If the logic circuit power is off, do not apply the input signals.
- ◆ To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - Be sure to ground the body when handling EastRising LCD modules.
 - Tools required for assembling, such as soldering irons, must be properly grounded.
 - To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions.
 - The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

6.2 Power Supply Precautions

- ◆ Identify and, at all times, observe absolute maximum ratings for both logic and LC drivers. Note that there is some variance between models.
- ◆ Prevent the application of reverse polarity to VDD and VSS, however briefly.
- ◆ Use a clean power source free from transients. Power-up conditions are occasionally jolting and may exceed the maximum ratings of EastRising modules.
- ◆ The VDD power of EastRising module should also supply the power to all devices that may access the display. Don't allow the data bus to be driven when the logic supply to the module is turned off.

6.3 Operating Precautions

- ◆ DO NOT plug or unplug EastRising module when the system is powered up.
- ◆ Minimize the cable length between EastRising module and host MPU.
- ◆ For models with backlights, do not disable the backlight by interrupting the HV line. Unload inverters produce voltage extremes that may arc within a cable or at the display.
- ◆ Operate EastRising module within the limits of the modules temperature specifications.

6.4 Mechanical/Environmental Precautions

- ◆ Improper soldering is the major cause of module difficulty. Use of flux cleaner is not recommended as they may seep under the electrometric connection and cause display failure.
- ◆ Mount EastRising module so that it is free from torque and mechanical stress.
- ◆ Surface of the LCD panel should not be touched or scratched. The display front surface is an easily scratched, plastic polarizer. Avoid contact and clean only when necessary with soft, absorbent cotton dampened with petroleum benzene.
- ◆ Always employ anti-static procedure while handling EastRising module.
- ◆ Prevent moisture build-up upon the module and observe the environmental constraints for storage tem
- ◆ Do not store in direct sunlight
- ◆ If leakage of the liquid crystal material should occur, avoid contact with this material, particularly ingestion. If the body or clothing becomes contaminated by the liquid crystal material, wash thoroughly with water and soap

6.5 Storage Precautions

When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps. Keep EastRising modules in bags (avoid high temperature / high humidity and low temperatures below 0C Whenever possible, EastRising LCD modules should be stored in the same conditions in which they were shipped from our company.

6.6 Others

Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.

If EastRising LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

To minimize the performance degradation of the LCD modules resulting from destruction caused by static electricity etc., exercise care to avoid holding the following sections when handling the modules.

- Exposed area of the printed circuit board.
- Terminal electrode sections.

7. USING LCD MODULES

7.1 Liquid Crystal Display Modules

EastRising LCD is composed of glass and polarizer. Pay attention to the following items when handling.

- ◆ Please keep the temperature within specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.
- ◆ Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.).
- ◆ N-hexane is recommended for cleaning the adhesives used to attach front/rear polarizers and reflectors made of organic substances which will be damaged by chemicals such as acetone, toluene, ethanol and isopropylalcohol.
- ◆ When EastRising display surface becomes dusty, wipe gently with absorbent cotton or other soft material like chamois soaked in petroleum benzine. Do not scrub hard to avoid damaging the display surface.
- ◆ Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading.
- ◆ Avoid contacting oil and fats.
- ◆ Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizers. After products are tested at low temperature they must be warmed up in a container before coming in contact with room temperature air.
- ◆ Do not put or attach anything on EastRising display area to avoid leaving marks on.
- ◆ Do not touch the display with bare hands. This will stain the display area and degrade insulation between terminals (some cosmetics are determined to the polarizers).
- ◆ As glass is fragile. It tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring.

7.2 Installing LCD Modules

- ◆ Cover the surface with a transparent protective plate to protect the polarizer and LC cell.
- ◆ When assembling the LCM into other equipment, the spacer to the bit between the LCM and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements. The measurement tolerance should be ± 0.1 mm.

7.3 Precaution for Handling LCD Modules

Since EastRising LCM has been assembled and adjusted with a high degree of precision; avoid applying excessive shocks to the module or making any alterations or modifications to it.

- ◆ Do not alter, modify or change the shape of the tab on the metal frame.
- ◆ Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
- ◆ Do not damage or modify the pattern writing on the printed circuit board.
- ◆ Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.
- ◆ Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
- ◆ Do not drop, bend or twist EastRising LCM.

7.4 Electro-Static Discharge Control

Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC.

- ◆ Make certain that you are grounded when handling LCM.
- ◆ Before remove LCM from its packing case or incorporating it into a set, be sure the module and your body have the same electric potential.
- ◆ When soldering the terminal of LCM, make certain the AC power source for the soldering iron does not leak.
- ◆ When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.
- ◆ As far as possible make the electric potential of your work clothes and that of the work bench the ground potential.
- ◆ To reduce the generation of static electricity be careful that the air in the work is not too dried. A relative humidity of 50%-60% is recommended.

7.5 Precaution for Soldering to EastRising LCM

- ◆ Observe the following when soldering lead wire, connector cable and etc. to the LCM.

-Soldering iron temperature : $280^{\circ}\text{C} \pm 10^{\circ}\text{C}$

-Soldering time: 3-4 sec.

-Solder: eutectic solder.

If soldering flux is used, be sure to remove any remaining flux after finishing to soldering operation. (This does not apply in the case of a non-halogen type of flux.) It is recommended that you protect the LCD surface with a cover during soldering to prevent any damage due to flux spatters.

- ◆ When soldering the electroluminescent panel and PC board, the panel and board should not be detached more than three times. This maximum number is determined by the temperature and time conditions mentioned above, though there may be some variance depending on the temperature of the soldering iron.
- ◆ When remove the electroluminescent panel from the PC board, be sure the solder has completely melted, the soldered pad on the PC board could be damaged.

7.6 Precaution for Operation

- ◆ Viewing angle varies with the change of liquid crystal driving voltage (VO). Adjust VO to show the best contrast.
- ◆ Driving the EastRising LCD in the voltage above the limit shortens its life.
- ◆ Response time is greatly delayed at temperature below the operating temperature range. However, this does not mean the LCD will be out of the order. It will recover when it returns to the specified temperature range.
- ◆ If EastRising display area is pushed hard during operation, the display will become abnormal. However, it will return to normal if it is turned off and then back on.
- ◆ Condensation on terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore, it must be used under the relative condition of 40°C , 50% RH.
- ◆ When turning the power on, input each signal after the positive/negative voltage becomes stable.