

12.12.2024

Revision History

Revision	Date	Originator	Detail	Remarks
0	12.12.2024	LQ	Initial Release	-

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1. General Description

DE CB-480480E VMH-PW-N series module is a module that perfectly combines the display screen, encoder, push button and status LED into a rotating button display. The unique innovative structure and exquisite manufacturing process of the module make it have excellent reliability and excellent control experience. It is applicable to the demand of rotating button control in many industrial applications of electronic products

1.1. Module serial port control function:

- 1. The module contains MCU. The TFT display is driven and controlled by the MCU and its peripheral device.
- 2. The module MCL ith the external HOST MCU according to the specified protocol, and can transmit control commands and display information to each other.
- 3. The GUI (graphical interface) of the module can be stored in the flash(flash size: 128 megabytes) of the module, and can be customized according to the product application.
- 4. There is special software which can efficiently develop beautiful image and complex control GUI.

1.2. Product application:

- 1. Smart home appliances: smart refrigerators, household and commercial air conditioners, washing machines, stoves, entertainment electronic devices, and smart home central control modules.
- 2. Medical beauty products: medical testing instruments, health physiotherapy instruments.
- 3. Instruments: automobile monitor, motorcycle instrument, building management, security monitoring instrument.
- 4. Industrial control instruments: electromechanical equipment control display, charging equipment, elevator floor control and display, ordering machine.

2. Basic Parameters

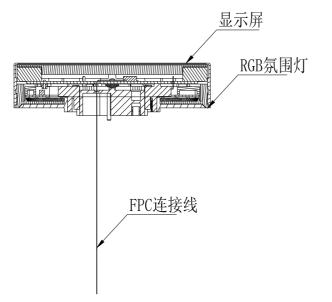
- 1. 2.1 Inch Circular Display 480 x RGB x 480 TFT / USB Burn + Serial Port
- 2. Annular Status LED Indicator
- 3. EC4301-AX-11.2/6.2-20P2 Encoder
- 4. Integral Push Button
- 5. FPC Standard 0.3mm -10P Interface
- 6. Three Point Standard Screw Installation

3. Mechanical Characteristics

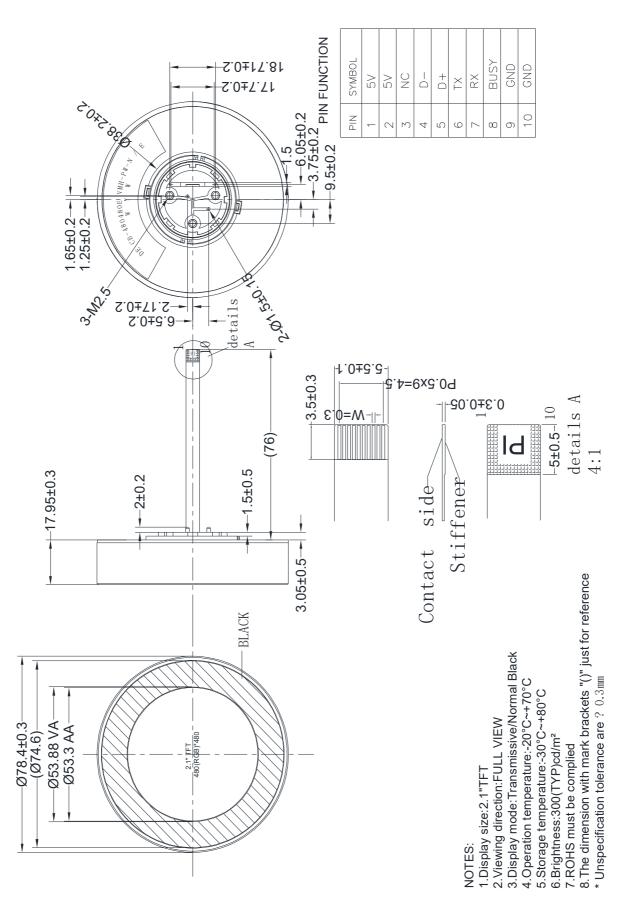
3.1. Appearance picture



3.2. Basic Structure



3.3. Outline Drawing



PIN	Symbol	Definition	Remarks
1	5V	Power Supply	-
2	5V	Power Supply	-
3	NC	No connection	-
4	D-	Signal input negative	-
5	D+	Signal input positive	-
6	ТХ	Signal Transmit	-
7	RX	Signal Receive	-
8	BUSY	BUSY signal input	-
9	GND	Ground	-
10	GND	Ground	-

4. Interface Pins Definition

5. Module Parameter

Features	Details	Remark
Module Size	Φ78.40 x 17.95 mm	-
Viewing Area	Φ53.88 mm	-
Active Area	Φ53.3 mm	-
Display Size	2.1"	-
View Direction	FULL VIEW	-
Display Mode	IPS, Transmissive / Normal black	-
Color	16.7 Million	-
Resolution	480 x RGB x 480	-
Driver IC	ST7701SN (Sitronix)	-
MCU LT168B (Levetop)		-
Luminance	300cd/m ²	-
Operating Temperature	-20°C ~ 70°C	-
Storage Temperature	-30°C ~ 80°C	-
Operating Voltage4.8Volt ~ 5.2Volt, typ: 5Volt		-
Current Consumption	Current Consumption 210mA	
Weight	t.b.d.	-

6. Optical Characteristics

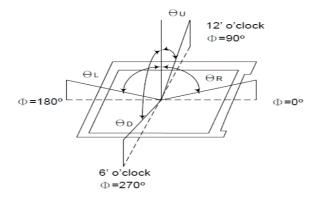
							Ta=25⁰C	
Parameter	Symbol	Condition	Min.	Тур.	Max.	Unit	Remark	
Contrast Ratio	C/R	$\theta = 0^{\circ}$	800	1000	-	-	Note(4)	
NTSC Ratio	S	θ = 0°	64	69	-	%	Note(7)	
Luminance	L	θ =0 °	240	300	-	cd/m2	Note(5)	
Luminance uniformity	UW	θ =0 °	70	80	-	%	Note(3)	
Response Time	TR+ TF	25 °C	-	30	35	ms	Note(2)	
	Rx			0.635				
	R _Y	θ = 0° (Center) Normal viewing angle		0.346				
	Gx			0.326				
Color	G _Y		Normal viewing -0.05 angle	mal ving -0.05 gle	0.627	+0.05	NTSC (x,y)	Note(6)
Coordination	Bx				0.148			
	B _Y	B/L On			0.091			
	Wx			0.304				
	Wy			0.339				
	θL		80	85	-			
	θR		80	85	-	Decree		
Viewing Angle	θυ	C/R>10	80	85	-	Degree	Note(1)	
	θD		80	85	-			

Test Conditions:

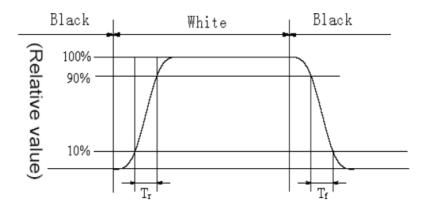
1. VDD=3.3V, IF=20mA (Backlight current), the ambient temperature is+25 $^\circ\!\!\mathbb{C}.$

2. The test systems refer to Note 8.

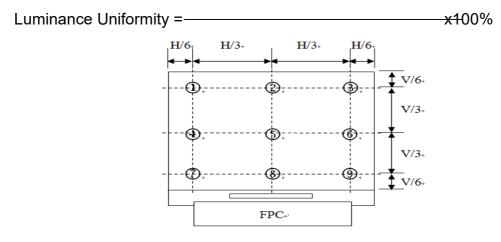
Note1: Definition of Viewing Angle: The viewing angle range that the CR>10



Note2: Definition of Response time: Sum of TR and TF



Note 3: Definition of Luminance Uniformity: Active area is divided into 9 measuring areas, every measuring point is placed at the center of each measuring area.



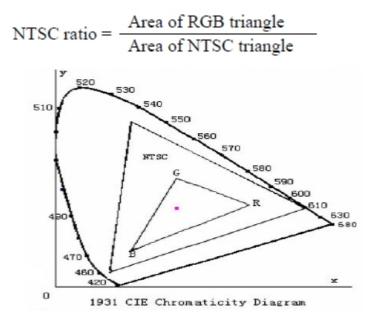
Note4: Definition of Contrast Ratio (CR): measured at the center point of panel

 $Contrast ratio (CR) = \frac{Luminance measured when LCD on the "White" state}{Luminance measured when LCD on the "Black" state}$

- **Note 5:** Definition of Luminance: Center Luminance of white is defined as luminance values of 1point average across the LCD surface.
- Note 6: Definition of Color Chromaticity (CIE 1931)

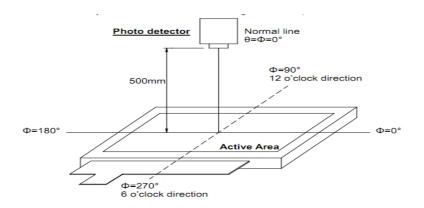
Color coordinates of white & red, green, blue measured at center point of LCD.

Note 7: Definition of NTSC ratio:



Note 8: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen.(Response time is measured by Photo detector TOPCON BM-7, Field of view: 1°/Height: 500mm.)



7. Reliability

Item	Test Condition	SPECIFICATIONS	
Inculation	Amply a valtage of 250V/DC between the motel autor	The resistance between the metal	
Insulation	Apply a voltage of 250V DC between the metal outer	outer rotating button and the base	
Impedance	rotating button and the base for 1 minute.	is more than 100M Ω .	
Rated	Apply a voltage of 300V AC between the metal outer		
Voltage	rotating button and the base for 1 minute.	No insulation damage	
Full Rotation		360° (No stop point)	
Angle			
Rotation		15±7mN.m	
Torque		(150±70gf.cm)	
Positioning		20 positioning points	
Points and	Only suitable for C.C, equipment.	(interval angle 18°±2 °)	
Positions			
Axial	At the shaft end, apply a static load force of 5Kgf	The shaft is not damaged and	
Compression	along the axial direction and press down for 10	press is normal; The electrical	
Strength	seconds (the screw is fixed on the face shell).	performance is normal	
Axial	At the shaft end, apply a static load force of 5Kgf	The shaft is not damaged and	
Drawing	along the axial direction and pull up for 10 seconds	press is normal; The electrical	
Strength	(the screw is fixed on the face shell).	performance is normal	
		Torque: - 50% ~ + 10% of the	
Rotational	Under no-load condition, the shaft rotates 30000 at	initial value	
Life	the speed of 600 ~ 1000 cycles / hour (1 cycle refers	Rotating button display LCD can	
LIIC	to 360° clockwise and 360° counterclockwise)	be powered on and adjusted	
		normally.	
		The surface of the outer rotating	
	60 ± 3°C, 90 ~ 95%RH, 96 ± 4Hrs	button is free of cracking and	
High	Before function test and visual inspection, the	bubbling, and the display screen	
Humidity	product must have enough recovery time, at least	is free of OCA falling off.	
Experiment	1.5 hours in normal temperature and humidity.	Rotating button display LCD can	
		be powered on and adjusted	
		normally.	
		The surface of the outer rotating	
	70 ± 3°C, 96 ± 4Hrs	button is free of cracking and	
High	Before function test and visual inspection, the	bubbling, and the display screen	
Temperature	product must have enough recovery time, at least	is free of OCA falling off.	
Experiment	1.5 hours in normal temperature and humidity.	Rotating button display LCD can	
		be powered on and adjusted	
		normally.	

DE CB-480480E VMH-PW-N

Thermal Cycling Test	阶段 step 温度 Termperature 1 -20°C 2 常温 standard atmospheric conditions 3 70°C 4 standard atmospheric conditions it染周期: 5周 test cycle:	放置时间 Durationure 0.5 hour 0.5 hour 0.5 hour 0.5 hour	The surface of the outer rotating button is free of cracking and bubbling, and the display screen is free of OCA falling off. Rotating button display LCD can be powered on and adjusted normally.
	Before function test and visual inspe product must have enough recovery 1.5 hours in normal temperature and		
Force of Pressing the Rotating Button	Apply an axial force to the face cove does not move, and take the large va application process.	250±30gf	
Movement Amount of Pressing the Rotating Button	Fix the product on the face cover pla static load force of twice the driving f above the cover plate, and measure distance when the rotating button is immobility.	0.5±0.2 mm	
Press Life of the Rotating Button	After the product is fixed, apply a pressing pressure of 250±30gf axially, press it to the end and release it to let it return freely. Press 100000 times. The pressing speed is 1500-1800 times per hour.		The pressing force is - 50% ~ + 10% of the initial value. Rotating button display LCD can be powered on and adjusted normally. The plastic part is free of damage, deformation and rotation is normal.

8. Product Packaging Information

Storage environment and conditions:

- It shall be stored in a well ventilated environment with temperature of 15°C ~ + 25°C, relative humidity of 40% - 65% and no harmful gas around.
- 2. During storage and transportation, the stacking height of products shall not exceed 5 boxes.

Items	Normal Parameters	Limit Parameters	Material Valid Status	Remarks
Temperature	25°C	85°C	Normal	-
Humidity	65%	95%	Normal	-