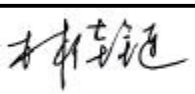
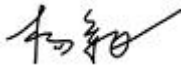
SPECIFICATION
FOR
IOT MODULE
MODULE NO. : 1.3" Rotary IPS TFT
Part Number : IPS013A101A
Rev No. : A

GTK	PREPARED BY	CHECKED BY	APPROVED BY
SIGNATURE			
DATE	2023.07.06	2023.07.06	2023.07.06

CUSTOMER APPROVAL	SIGNATURE	DATE

REVISION RECORD

Rev No.	Rev date	Contents	Remarks
O	2022.09.08	The first edition	Liquan.Li
A	2023.07.06	Update	Liquan.Li

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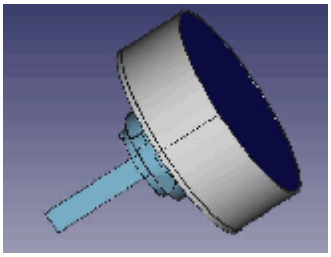
1 MODULE DESCRIPTION

IPS013A101A is a serial communication TFT color screen display knob switch module based on the M0 chip development platform. Through the optimization algorithm, the main chip, the display screen, and the encoder switch can quickly coordinate with each other to make it have excellent screen refresh rate and dynamic display effect. The unique innovative structure and exquisite manufacturing process of the module make it with excellent reliability and excellent handling experience. Applicable to household appliances, smart home, automotive central control, beauty instruments, industrial control and other applications requiring button control.

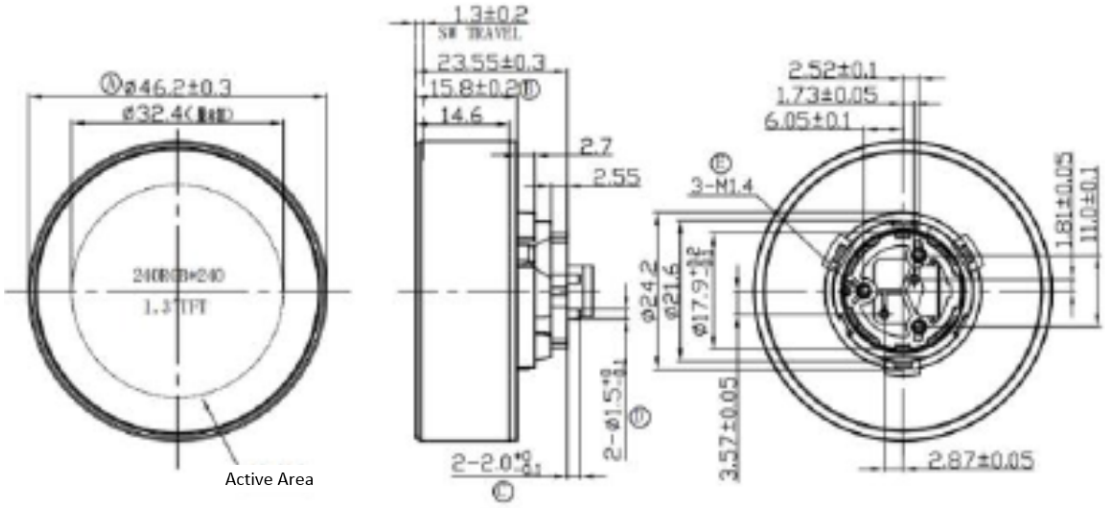
Communication	Serial port （TX1、RX1）
LCD information	1.3”/IPS/320*320
Storage	128Mbit nor Flash (Support for custom)
Operation type	Rotate and press
Atmosphere lamp	Bottom RGB tricolor lamp ring, Support for custom
The UI content	Support for custom
Appearance	Aluminum alloy car anode sandblasting, black/ white optional, cover 2.5D/2.0D optional

2 TECHNICAL INFORMATION

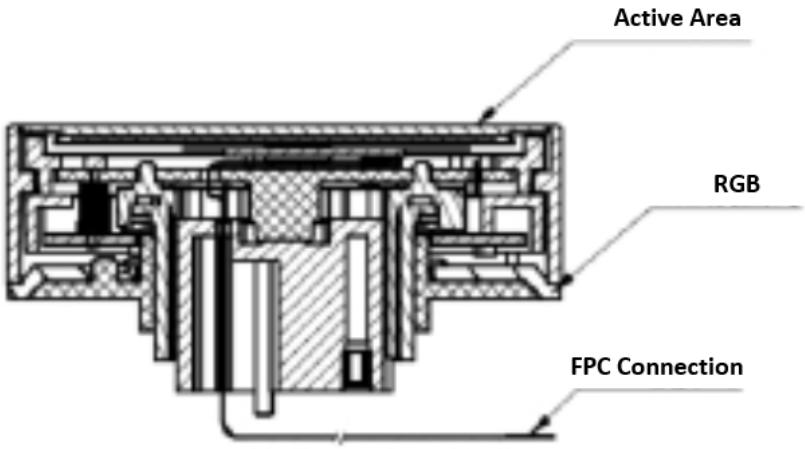
2.1 APPEARANCE



2.2 SHAPE



2.3 STRUCTURE



2.4 INTERFACE DEFINITION

PIN	Symbol	Definition	Note
P1	GND	Ground	
P2	5V	Power	
P3	5V	Power	
P4	RX	Communication input	
P5	TX	Communication output	
P6	RX1	Communication input	
P7	TX1	Communication output	
P8	GND		
P9	GND		
P10	NC		

2.5 TECHNICAL PARAMETERS

2.5.1 BASIC PARAMETERS

Item	Contents	Note
Operation voltage	5V(TYP)	
Operation current	50mA～150mA, 100mA(TYP)	
Color depth	65K	
Resolution	320（W）*320（H）	
Surface luminance	300±10%cd/m²	
Viewing direction（EYE）	ALL	
Operation temperature	-20℃～60℃/96H	
Storage temperature	-30℃～80℃/96H	

2.5.2 OPTICAL PROPERTIES

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Contrast Ratio	C/R	q = 0°	900	1100	-	-	Note(4)
NTSC Ratio	S	q =0°	55	60	-	%	Note(7)
Luminance	L	q =0°	300	-	-	cd/m2	Note(5)
Luminance uniformity	UW	q =0°	70	80	-	%	Note(3)
Response Time	TR+ TF	25 °C	-	30	40	ms	Note(2)
Color Coordination	WX	q = 0° (Center) Normal viewing angle B/L On	-0.04	0.29	+0.02	NTSC (x,y)	Note(6)
	WY			0.32			
	RX			0.644			
	RY			0.332			
	GX			0.323			
	Gy			0.565			
	BX			0.134			

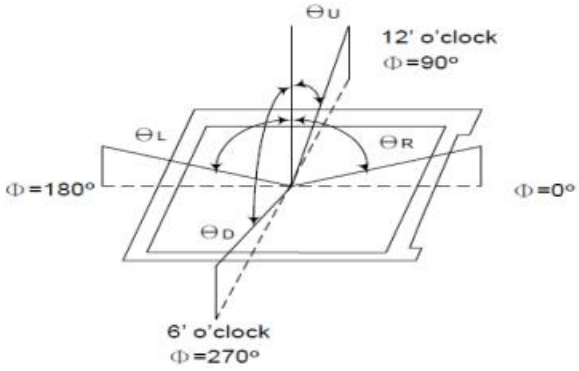
	BY			0.124			
Viewing Angle	θL	C/R>10	80	85	-	Degree	Note(1)
	θR		80	85	-		
	θU		80	85	-		
	θD		80	85	-		

Test Conditions:

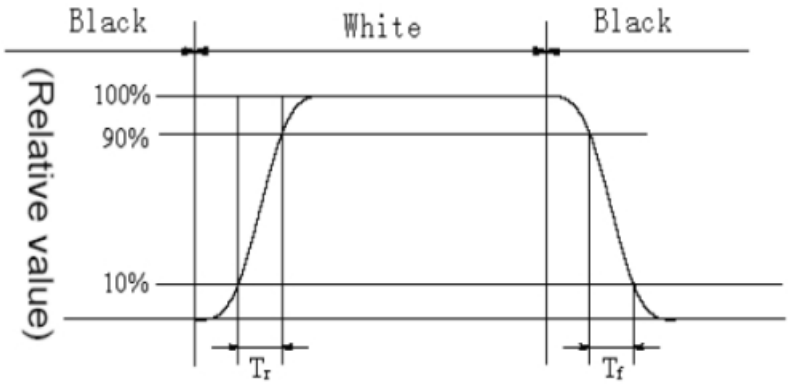
1. VDD=3.3V, IF=20mA (Backlight current), the ambient temperature is+25℃.

2. The test systems refer to Note 8.

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

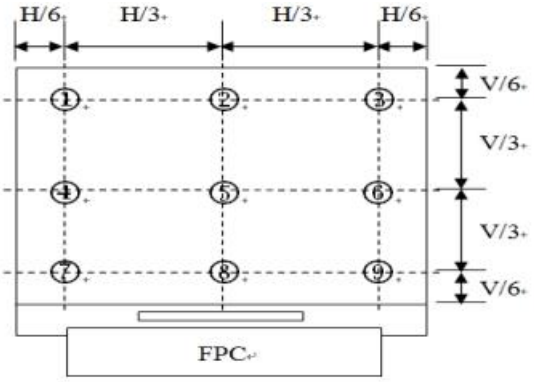


Note2: Definition of Response time: Sum of TR and TF



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.

$$\text{Luminance Uniformity} = \frac{\text{Min Luminance of white among 9-points}}{\text{Max Luminance of white among 9-points}} \times 100\%$$



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

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

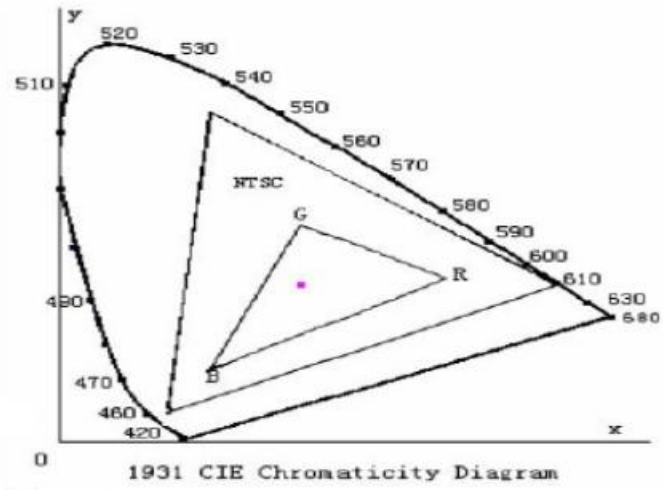
Note 5: Definition of Luminance: Center Luminance of white is defined as luminance values of 1point average across the LCD surface.

Note 6: Definition of Color Chromaticity (CIE 1931)

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

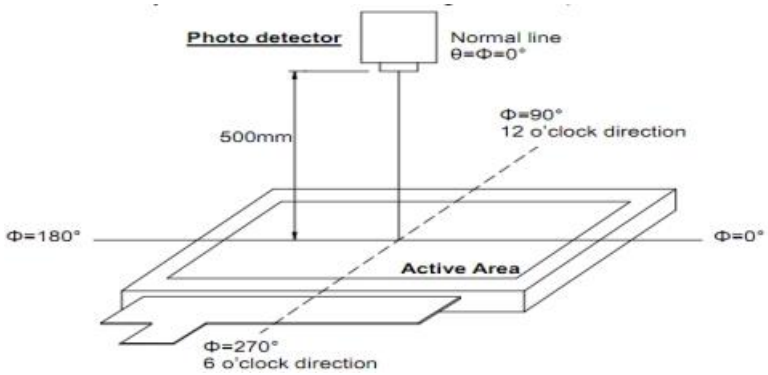
Note 7: Definition of NTSC ratio:

$$\text{NTSC ratio} = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}}$$



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.)



2.6 RELIABILITY TEST CONDITIONS

Item	Test Condition	SPECIFICATIONS
High Temperature Storage Test	+80°C/72 hours	
Low Temperature Storage Test	-30°C/72 hours	
High Temperature Operating Test	+60°C/48 hours	
Low Temperature Operating Test	-20°C/48 hours	
Temperature Cycle Storage Test	-30°C ~ 25°C ~ +80°C/10 cycles (30 min.) (10 min.) (30 min.)	
High Temperature High Humidity Test	+50°C*90% RH/48 hours	
Insulation impedance	Apply a voltage of 250V DC between the metal outer knob and the base for 1 minute.	The resistance between the metal outer knob and the base is above 100MΩ .
voltage	Apply AC 300V voltage between the metal outer knob and the base for 1 minute.	No insulation damage
Full rotation Angle		360°(no stop point)
Rotary torque		15±7mN.m (150±70gf.cm)
Position points and positions		30 point positioning (spacing Angle 12°±2°)
Axial compression strength	At the shaft end, apply a static load force of 5Kgf in the axial direction and press down for 10 seconds (the screw is fixed on the surface shell).	No damage to the shaft, no abnormality when pressed; The electrical performance is normal.

Axial drawing strength	At the shaft end, apply a static load force of 5Kgf in the axial direction and press down for 10 seconds (the screw is fixed on the surface shell).	No damage to the shaft, no abnormality when pressed; The electrical performance is normal.
Rotate the life	In the condition of no load, the shaft rotates 30,000 at the speed of 600~1000 cycles/hour (1 cycle refers to clockwise turn 360° counterclockwise turn 360°)	Torque: -50% to +10% of the initial value The knob is energized to show no abnormal adjustment.
Wet resistance	After 96±4 hours in a constant temperature and humidity tank with a temperature of 60±3°C and a humidity of 90~95%, the test was carried out after 1.5 hours in room temperature and normal humidity.	There is no cracking or bubbling on the surface of the outer button and no degumming on the display screen. The knob is energized to show no abnormal adjustment.
Heat resistance	The temperature was 60±3°C in the incubator for 96±4 hours, room temperature, often wet for 1.5 hours after the test.	There is no cracking or bubbling on the surface of the outer button and no degumming on the display screen. The knob is energized to show no abnormal adjustment.
Cold tolerance	Test according to the above conditions and place in normal temperature and humidity for 1.5 hours.	There is no cracking or bubbling on the surface of the outer button and no degumming on the display screen. The knob is energized to show no abnormal adjustment.
Press the switch for power	An axial force is applied to the cover plate until it does not move, and the maximum value of the force application process is taken.	250±80gf
Press the switch movement	Fix the product on the cover plate, apply 2 times the static load force as the power above the cover plate, and measure the moving distance when the knob is pressed to the point where it cannot move.	1.3±0.2 mm
Pressing life of switch	After the product is fixed, the axial pressure of 300GF is applied, and the end is released to allow it to return	Press the -50%~+10% knob for the initial value of power to show no

	freely. Press 30,000 times. Press at 1500-1800 times per hour.	abnormal adjustment. The plastic part has no damage, no deformation, no abnormal rotation.

2.7 PRECAUTIONS

Avoid storage in high temperature, damp and corrosive places. Use up the product within 6 months after purchase. After unpacking, the remaining products that have not been used up should be stored in a moisture-proof and anti-virus environment.

Operating temperature range: -20℃ ~ 70℃, long-term high temperature will cause failure.

Wear an ESD wrist strap when touching electrostatic sensitive components of the main control board, especially the main control chip.

The DC power supply voltage shall not be greater than 8V to prevent the voltage regulator chip from being broken down or damaged by the jump surge during power supply contact.

3 TRANSPORTATION 、STOCKPILE

3.1 TRANSPORTATION REGULATIONS

1、During transportation, direct or indirect rain and snow should be avoided, as well as mechanical damage or damp, in case of package damage.

2、During transportation or handling, heavy fall or heavy weight should be avoided to avoid damage or deformation of pins.

3.2 STORAGE ENVIRONMENT AND CONDITIONS

1、It should be stored in a well-ventilated environment with a temperature of -15℃ ~ +25℃, relative humidity of 40%-65%, and no acid, alkali or other harmful gases around.

2、During storage and transportation, the height of each stack shall not exceed 5 boxes of products.

Item	TYP	MAX	Condition	Note
Temperature	25℃	85℃	Normal	
Humidity	65%	95%	Normal	