



SPECIFICATION APPROVAL SHEET

**5.6" Digital TFT-LCD Open Frame Module  
with Resistive Touch**

**MODEL: FCOP0560-TR**





## 1. General Description

### 1.1 Features

- 5.6" (640x480) Digital TFT LCD
- Aspect Ratio: 4:3
- Ultra Compact
- NTSC / PAL /Video Auto Switch
- Input Signal CVBS / S-Video (Option) / Analog RGB (VGA)
- All Functions can be controlled by UART
- Built-in EDID Function
- 4 Wires Resistive Touch Panel
- 6 Key Buttons Controls
- 9 Language OSD Menu
- LED Backlight
- Single Operation Voltage +12V

### 1.2 Applications

- Industrial
- Medical Environment
- Instrument Display
- Kiosk
- Security
- Signage
- Office Electronics
- Home Application
- Educate Application



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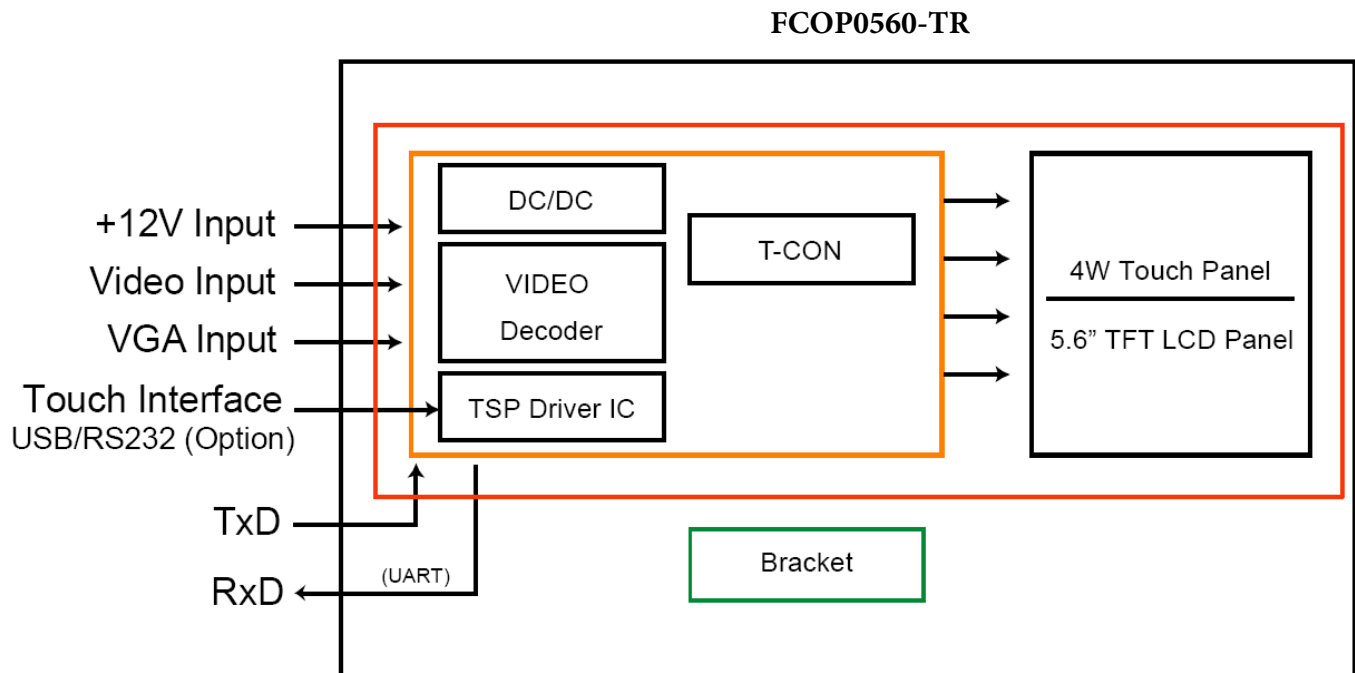
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### 3. Specifications

LCD	
Panel Size	5.6"
Resolution (Pixels)	640 x 480
Color	262K
Luminance without TP	350 cd/m <sup>2</sup>
Luminance (RTP)	280 cd/m <sup>2</sup>
Contrast Ratio	500
View Angle	70(L) / 70(R) / 50(T) / 70(B)
LED Life Time (Min.)	20K hours
Power Requirement	
Power Input (DC Jack 2.1 φ)	+12 Vdc
PowerConsumption@+12V	3.36W
Touch Screen	
Resistive	USB / RS232 (Option) Interface
Resistive Type Support OS	Windows / Linux /Android / Mac / QNX

Input Signal			
CVBS	RCA JACK		
VGA	D-Sub15		
Controls			
Key	6 Buttons		
Serial Remote Control	UART / RS232 (Option)		
Environment			
Temperature Range	Without TP	Without TP	With 4W RTP
	Operating	-20 ~ +60°C	-20 ~ +60°C
High Temperature &High Humidity(Non-condensing)	Storage	-20 ~ +70°C	-20 ~ +70°C
	Operating	+40°C / 90%	+40°C / 90%

### 4. Block Diagram





## 5. Order Information

### 5.1 Unit

Item	FCOP0560-TR
Power Connector	DC Jack
CVBS (RCA Jack)	1
VGA (DB-15)	⊙
Touch Panel Type	-
Touch Screen Interface	-
6 Keys	Built-in
Serial Remote Control	UART
Dimensions	141.5 x 101.8 x 25.1mm
Weight	230g
Condition	Standard

Item	FCOP0560
Power Connector	DC Jack
CVBS (RCA Jack)	1
VGA (DB-15)	⊙
Touch Panel Type	4W Resistive
Touch Screen Interface	USB
6 Keys	Built-in
Serial Remote Control	UART
Dimensions	141.5 x 101.8 x 26.6
Weight	270
Condition	Standard

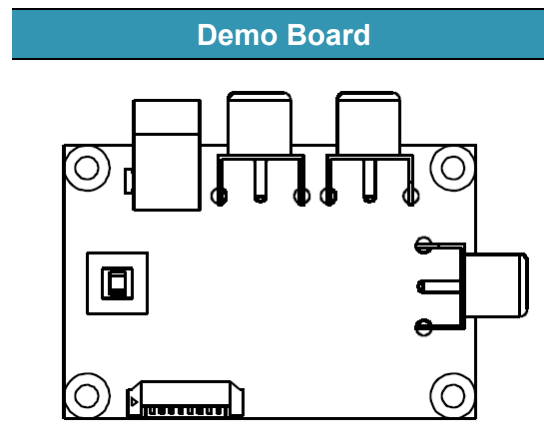
**Note: 1.** The assembling of panel and bracket is aimed for delivery, packaging and experiment. If the demand of shockproof and long-term fix, pls. have it into consideration of mechanism design.

## 5.2 Customized

Function	Item
Serial Remote Control	RS232 (DB9)
External Key	5 keys

Note: Special order condition will apply to non-standard items and pls. contact salespersons in i-Tech.

## 5.3 Demo Board (Option)



## 6. Accessories (Option)

Before you begin installing the KIT, please make sure that the following materials have been shipped:

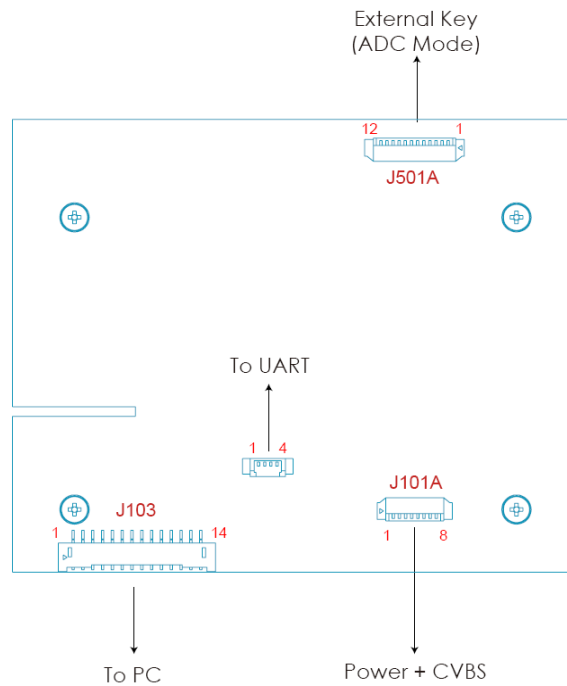
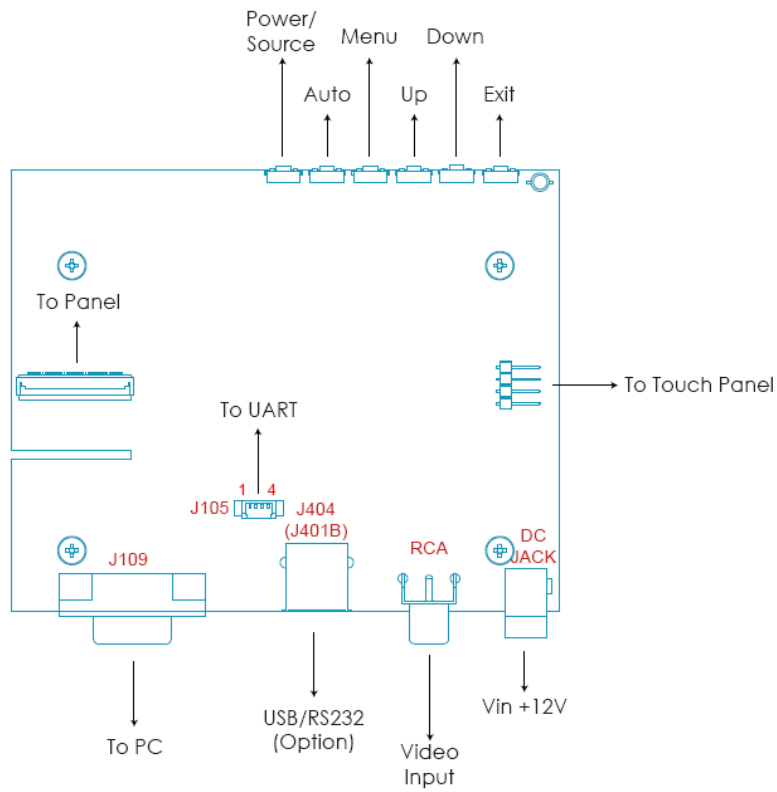


- A. AC to DC Adapter (L:1500mm,100-240V<sub>AC</sub> 50-60Hz to +12V<sub>DC</sub> @ 3.3A,  $\phi$  2.1)
- B. D Type AC Power Cord (L:1800mm, Plug Type B for USA)
- C. Video Cable (L:1800mm)
- D. VGA Cable DB-15 male to male (L:1800mm)
- E. USB Cable USB Type A male to male (L:1800mm)
- F. RS232 Straight Line Cable DB-9 female to male (L:1800mm)
- G. Touch Screen Driver CD Disk / User Manual



## 7. Operation manual / Connection

### 7.1 Driver Board Manual





## 8. Pin Description

### 8.1 DC JACK : Pin Assignment of Power Input (DC-Jack Inside Diameter:2.1 ϕ Outside Diameter:5.5 ϕ Side Entry Type)

Pin No.	Symbol	I/O	Description	Remark
1	DC-In	I	+12Vdc Input Voltage	
2	GND	-	Power Ground	

### 8.2 RCA: Pin Assignment of Video Input (RCA JACK Yellow, Side Entry Type)

Pin No.	Symbol	I/O	Description	Remark
1	Video	I	Video Input	
2	AGND	-	Analog Ground	

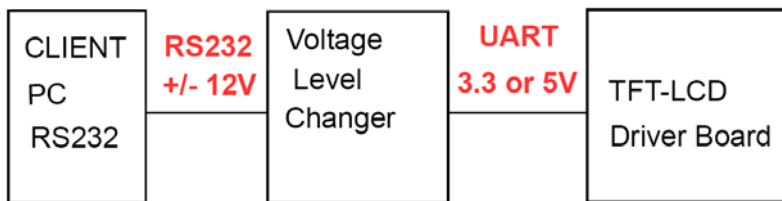
### 8.3 J105 : Pin Assignment of UART (Pitch 1.25mm 4Pin, Top Entry Type)

※ Connector [Same as 53398-0471 (MOLEX)] ;

※ Matching [Same as 51021-0400 (MOLEX)].

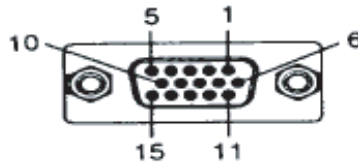
Pin No.	Symbol	I/O	Description	Remark
1	TX / RS232 TX (Option)	O	UART / RS232 (Option) Transmission Data	
2	RX / RS232 RX (Option)	I	UART / RS232 (Option) Receive Data	
3	GND	-	Ground	
4	+3.3Vdc	O	+3.3Vdc Output Voltage	

Note: All Functions can be controlled by UART , About UART command list please contact i-Tech sales.



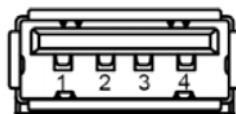
**8.4 J109 : Pin Assignment of Analog RGB Input ( D-Sub 15Pin)**

Pin No.	Symbol	I/O	Description	Remark
1	RI+	I	Analog Red Signal	
2	GI+	I	Analog Green Signal	
3	BI+	I	Analog Blue Signal	
4	NC	-	No Connection	
5	GND	-	Ground	
6	AGND	-	Analog Ground	
7	AGND	-	Analog Ground	
8	AGND	-	Analog Ground	
9	VGA5V	-	VGA +5Vdc Input	
10	NC	-	No Connection	
11	NC	-	No Connection	
12	DDC_SDA	-	DDC2 Data	
13	HS_IN	I	TTL Horizontal sync.	
14	VS_IN	I	TTL Vertical sync.	
15	DDC_SCL	-	DDC2 Clock	



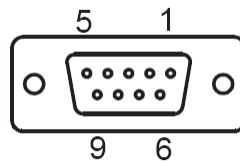
**8.5 J404 : Pin Assignment of Touch USB (USB A Type - Female 2.0mm, Side Entry Type )(Option)**

Pin No.	Symbol	I/O	Description	Remark
1	VBUS	-	USB VCC	
2	D-	-	DATA (-)	
3	D+	-	DATA (+)	
4	DGND	-	Digital Ground	



**8.6 J401B : Pin Assignment of Touch RS232 (D-SUB 9 FEMALE)(Option)**

Pin No.	Symbol	I/O	Description	Remark
1	-	-	Don't Connect	
2	TXD	-	Transmit Data	
3	RXD	-	Receive Data	
4	-	-	Don't Connect	
5	GND	-	Ground	
6	NC	-	No Connection	
7	-	-	Don't Connect	
8	-	-	Don't Connect	
9	NC	-	No Connection	



**8.7 J101A: Pin Assignment of Signal Input (Pitch 1.25mm 8Pin, Top Entry Type)**

※ Connector Part No.: MS24018R (STM) [Same as 53261-0819 (MOLEX)] ;

Matching Connector Part No.: P24018 (STM) [Same as 51021-0800 (MOLEX)].

Pin No.	Symbol	I/O	Description	Remark
1	VCC12V	-	+12V Input Voltage	
2	VCC12V	-	+12V Input Voltage	
3	GND_D	-	Ground	
4	GND_D	-	Ground	
5	VIDEO1	I	Video1 Input Signal	
6	GND_A	-	Ground for Video1	
7	VIDEO2	I	Video2 Input Signal	
8	GND_A	-	Ground for Video2	



**8.8 J501A : Pin Assignment of ADC Key (Pitch 1.25mm 12Pin, Side Entry Type)(Option)**

※ Connector Part No.: MS240112R (STM) [Same as 53261-1219 (MOLEX)] ;

※ Matching Connector Part No.: P240112 (STM) [Same as 51021-1200 (MOLEX)].

Pin No.	Symbol	I/O	Description	Remark
1	SW5	I	EXIT	
2	SW4	I	DOWN	
3	SW3	I	UP	
4	SW2	I	MENU / S	
5	SW1	I	POWER / SOURCE	
6	-	-	Don't Connect	
7	GND	-	Ground	
8	VDDP	-	+3.3Vdc Output Voltage	
9	-	-	Don't Connect	
10	RED	O	Indicator red LED for power off control	
11	GREEN	O	Indicator green LED for power off control	
12	GND	-	Ground	

**8.9 J103 : Pin Assignment of Analog RGB Input (Pitch 2.0mm 14Pin, Side Entry Type)(Option)**

※ Connector Part No.: MS242614R (STM) [Same as S14B-PH-SM4-TB (JST)] ;

※ Matching Connector Part No.: P242614 (STM) [Same as PHR-14 (JST)].

Pin No.	Symbol	I/O	Description	Remark
1	NC	-	No Connect	
2	DDC-SCL	-	DDC2 Clock	
3	DDC-SDA	-	DDC2 Data	
4	GND	-	Ground	
5	VGA5V	-	VGA +5Vdc Input	
6	VS_IN	I	TTL Vertical sync.	
7	HA_IN	I	TTL Horizontal sync.	
8	AGND	-	Analog Ground	
9	RI+	I	Analog Red Signal	
10	AGND	-	Analog Ground	
11	GI+	I	Analog Green Signal	
12	AGND	-	Analog Ground	
13	BI+	I	Analog Blue Signal	
14	GND	-	Ground	



## 9. Absolute Maximum Ratings

### 9.1 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Remark
Input Voltage	Vin	+9	+15	V	
Video Input Signal	Video in	0.5	2.0	Vp-p	@75Ω
S-Video Input Signal	S-Video in	0.5	2.0	Vp-p	@75Ω
Analog RGB Input Signal	Analog RGB in	0.5	2.0	Vp-p	@75Ω
Digital Input Signal	TTL	+0.3	+3.6	V	
Operating Temp. without TP		-20	+60	°C	
Operating Temp. with 4W RTP		-20	+60	°C	
Storage Temp. without TP		-20	+70	°C	
Storage Temp. with 4W RTP		-20	+70	°C	
High Temperature & High Humidity (Non-condensing) without TP		-	+40 / 90	°C / %	
High Temperature & High Humidity (Non-condensing) with 4W RTP		-	+40 / 90	°C / %	

## 10. Recommended Operating Conditions

### 10.1 Electrical Characteristics

Parameter	Symbol		I/O	Min	Typ	Max	Unit	Note
Input Voltage	Vin		I	+10	+12	+14	V	
Total Current	Iin (+12V)		I	-	280	-	mA	±15%
Power Consumption			I	-	3.36	-	W	@+12V Note
Output Voltage	VDD		O	+3.2	+3.3	+3.4	V	I=10mA
Video Input Signal	Video in		I	-	1.0	-	Vp-p	@75Ω
S-Video Input Signal	S-Video in	Y	I	-	0.7	-	Vp-p	@75Ω
		C	I	-	0.286	-	Vp-p	@75Ω
Analog RGB Input Signal	Analog RGB	R/G/B	I	-	0.7	-	Vp-p	@75Ω

Note: Test Condition

1. CVBS : NTSC & color bar · Dimmer(default)=9
2. VGA: Resolution 640x480 @ input = PC desktop screen @ Dimmer(default )=9

### 10.2 Support Display Mode Characteristics

Dots per inch	Standard	H	Unit	Polarity	V	Unit	Polarity	Note
640 × 480	VGA	31.5	KHz	Negative	59.9	Hz	Negative	
800 × 600	VESA	37.9	KHz	Positive	60.3	Hz	Positive	
1024 × 768	VESA	48.4	KHz	Negative	60.0	Hz	Negative	

Note: Polarity & standard only for VGA mode



## 11. 4W Resistance Touch Panel Characteristics

### 11.1 Electrical Performance

Parameter	Symbol	Min	Typ	Max	Unit	Note
Terminal Resistance	X	330	-	900	Ω	
	Y	100	-	500	Ω	
Input Voltage	VT	-	5.0	-	V	
Linearity		-	-	1.5	%	
Insulation Impedance		20	-	-	MΩ	DC 25V
Response Time		-	-	20	ms	

### 11.2 Optical Performance

Parameter	Specifications
Transmittance	≥ 80% (Typ)
Haze	8% (Typ)

### 11.3 Mechanical Performance

Parameter	Specifications
Input Method	Finger or stylus pen
Operating Force	30~120gf
Surface Hardness	3H or more

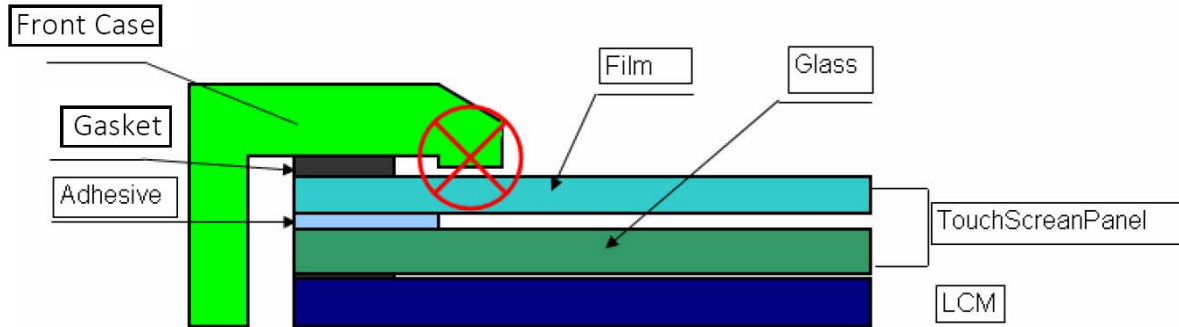
### 11.4 Durability Performance

Parameter	Specifications
Pen Sliding Durability	≥ 100,000 words, with R0.8 mm polyacetal stylus, 250g, 60 mm / sec
Finger knocking Durability	≥ 1,000,000 times, with R8.0 mm silicon rubber, 250g, 2Hz

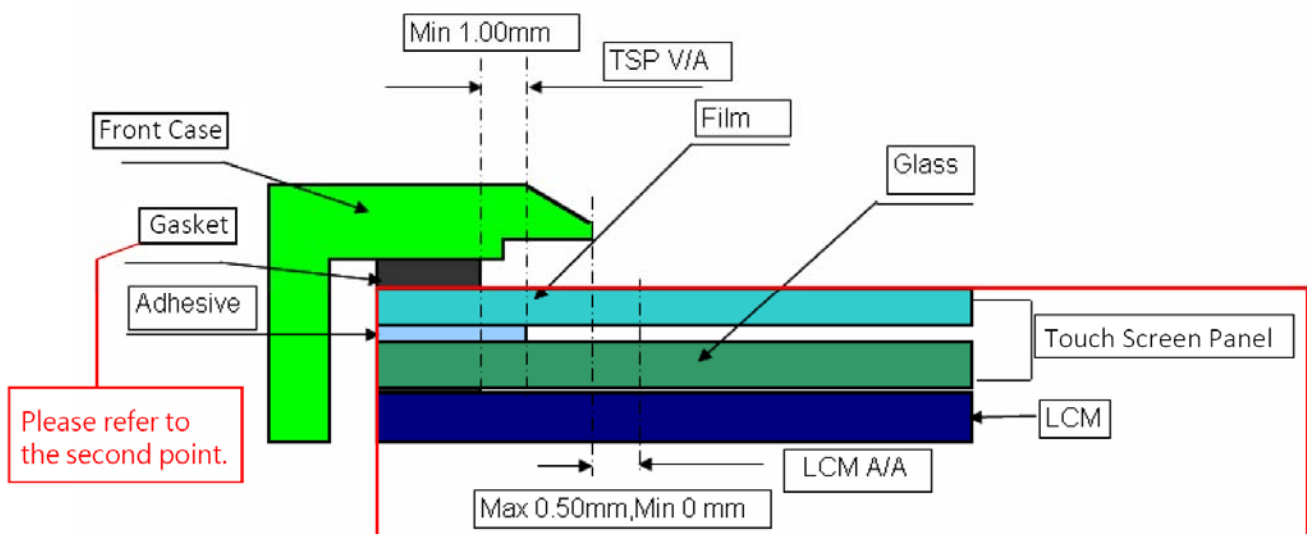
## 11.5 Resistive Touch Panel Integration Design Guide

Front case design follow as below

1. Avoid the design that front case overlap and press on the active area of the LCM.
2. Give enough gap(over 0.5mm at compressed) between the front case and TSP to protect wrong operating.



3. Use a buffer material(Gasket) between the TSP and front case to protect damage and wrong operating.
4. Avoid the design that buffer material overlap and press on the inside of TSP view area.

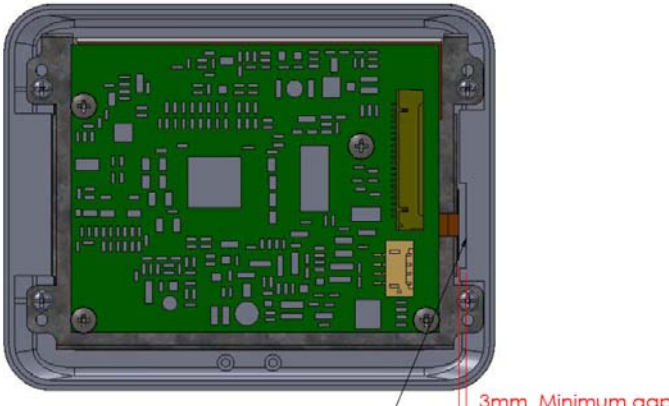
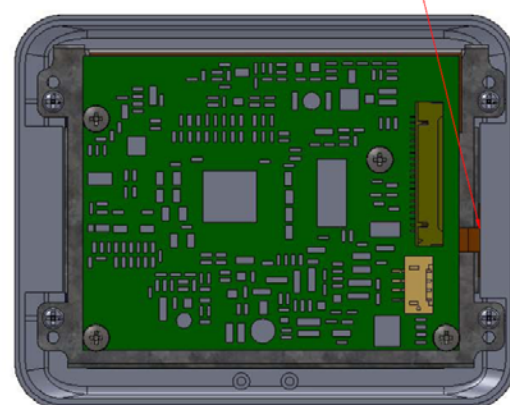
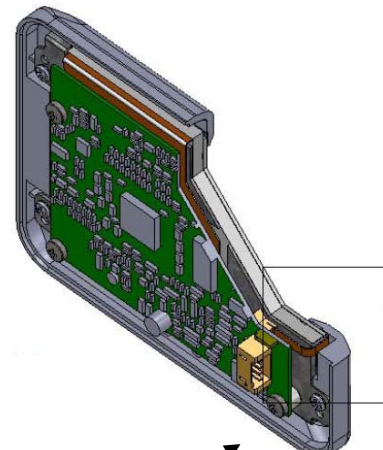
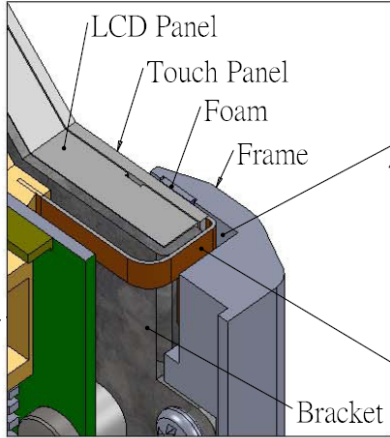

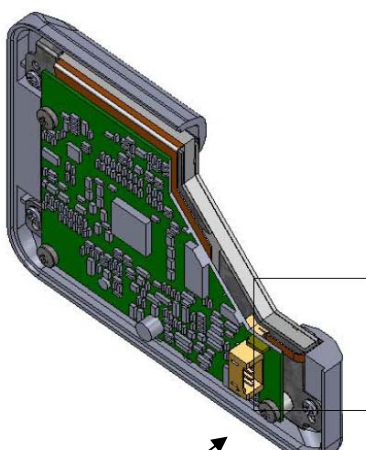
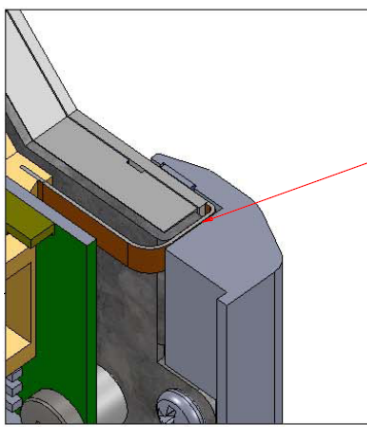



Module

Please refer to the second point.



## 11.6 Mechanical Design Notice for Resistive Touch Panel

Correct Installation	Incorrect Installation
 <p data-bbox="159 795 478 840">&lt;Correct Installation&gt;</p> <p data-bbox="558 761 766 795">3mm Minimum gap</p>	 <p data-bbox="957 369 1308 414">&lt;Incorrect Installation&gt;</p>
 <p data-bbox="399 1400 766 1444">&lt;Correct Installation&gt;</p> <div data-bbox="87 1456 478 1892">  <p data-bbox="159 1467 319 1500">LCD Panel</p> <p data-bbox="223 1512 351 1545">Touch Panel</p> <p data-bbox="287 1556 367 1590">Foam</p> <p data-bbox="319 1601 399 1635">Frame</p> <p data-bbox="367 1848 478 1881">Bracket</p> <p data-bbox="494 1814 734 1848">FPC to Touch Panel</p> <p data-bbox="223 1892 335 1926">Zoom-In</p> </div> <p data-bbox="478 1568 782 1724">  Frame can not surpress on LCD Panel and FPC to Touch Panel         </p>	 <p data-bbox="1117 1411 1500 1456">&lt;Incorrect Installation&gt;</p> <div data-bbox="813 1456 1181 1881">  <p data-bbox="1197 1568 1260 1635">  </p> <p data-bbox="1212 1646 1484 1747">Supression on FPC to Touch Panel causes the fracature.</p> </div> <p data-bbox="957 1881 1069 1915">Zoom-In</p>



**11.7 Resistive Touch Panel Operation System Support**

**Driver Vender : EETI (eGalax\_eMPIA Technology Inc.)**

OS	Version	Interface
<b>Windows</b>	Windows 7, 8, 8.1, 10	USB/RS232
	Windows Embedded 7, 8	
	Windows Embedded POSReady 2009 , POSReady 7	
	Embedded Standard 7	
	Embedded Enterprise 7	
	Embedded 8 Standard	
	Embedded 8.1 Pro/ Embedded 8.1 Industry	
	Windows , XP, 2000	
Windows XP Embedded		
<b>Windows CE</b>	Windows Embedded Compact 2013, 7	USB/RS232
	Windows CE 6.0	
	Windows CE.Net (4.x / 5.0)	
<b>Linux</b>	Kernel 2.6.24 Upward and 3.x.x / 4.x.x / 5.x.x (X86 / ARM / MIPS)	USB
	Kernel 2.6.23 Downward (X86)	
	Kernel 2.4.x (x86)	
<b>Android</b>	Android Version 2.3.x upwards (X86 / ARM / MIPS)	USB
<b>Mac OS</b>	Mac OS X 10.5.3 Leopard (Power PC)	USB
	Mac OS X 10.7.4 Earlier (32Bit / 64Bit) (Intel CPU)	
	Mac OS X 10.7.5 (32Bit / 64Bit) (Intel CPU)	
	Mac OS X 10.8.x Mountain Lion (Intel CPU)	
	Mac OS X 10.9.x Mavericks (Intel CPU)	
	Mac OS X 10.10.x Yosemite (Intel CPU)	
	Mac OS X 10.11 El Capitan (Intel CPU)	
	Mac OS 10.12 Sierra (Intel CPU)	
	Mac OS 10.13 High Sierra (Intel CPU)	
	Mac OS 10.14 Mojave (Intel CPU)	
	Mac OS 10.15 Catalina (Intel CPU)	
<b>QNX</b>	QNX Neutrino RTOS V6.5/6.4	USB/RS232
	QNX Neutrino RTOS V6.3	

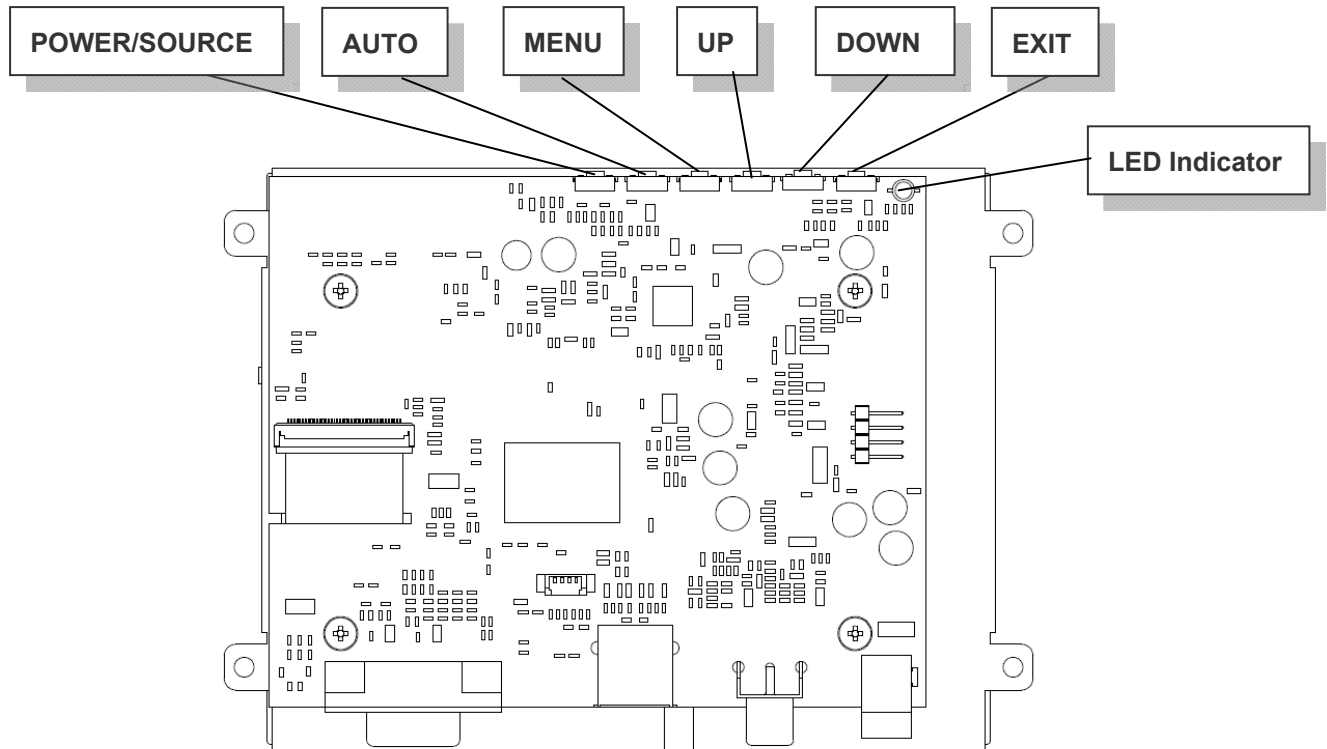
**Note: 1. Please refer to the website for the driver installation and support operating system.**

**2. How to use Touch Driver, please refer to Readme of Touch Screen Driver CD Disk.**

**3. Please refer to the website for the latest driver version and support operating system.**

## 12. Key Function by OSD

### 12.1 Menu Operation

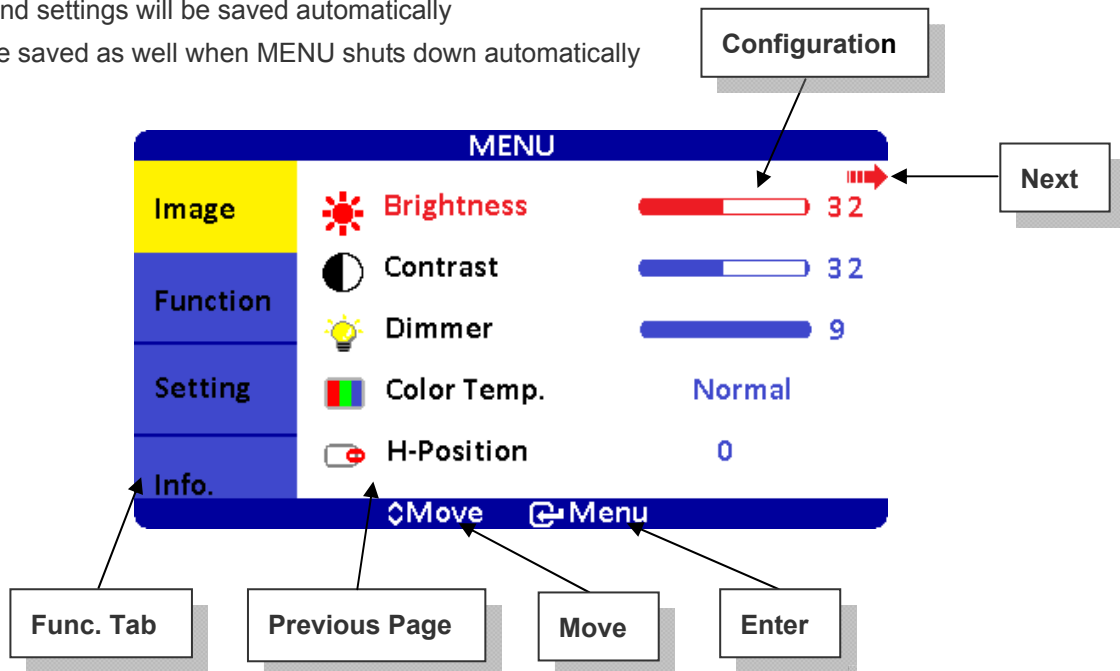


### OSD ICON Instructions :

1. POWER/ SOURCE : Power On/Off (※Press for 3 secs to turn off)
2. AUTO : Auto adjust Screen (VGA Only)
3. MENU / ENTER : (After turning on MENU, only ENTER is available)
4. UP : Move Upward / Increase Value / Option Switch
5. DOWN : Move Downward / Decrease Value / Option Switch
6. EXIT : Return to Previous Page
7. LED Indicator
  - Waiting : Flickering Green
  - Power ON : Green
  - Power OFF : Red

## Save OSD Setting:

1. EXIT MENU and settings will be saved automatically
2. Settings will be saved as well when MENU shuts down automatically



## Overview of the Menu :










### Image (VGA)

Indicator	Meaning	Default	Adjustable range	Remark
	Brightness	32	0~63	Adjust-Bar
	Contrast	32	0~63	Adjust-Bar
	Dimmer	9	0~9	Adjust-Bar
	Color Temp.	Normal	Normal / Warm / sRGB / Cool	
	H-Position	0	The adjusting value range depends on each resolution mode	
	V-Position	0	The adjusting value range depends on each resolution mode	
	Clock	0	-49~+49	
	Phase	14	0~63	
	Auto	Depend on the Signal		
	Exit			




## Image (Video)

Indicator	Meaning	Default	Adjustable range	Remark
	Brightness	23	0~63	Adjust-Bar
	Contrast	42	0~63	Adjust-Bar
	Color	50	0~63	Adjust-Bar
	Tint	16	0~31	for NTSC System Only
	Sharpness	8	0~15	Adjust-Bar
	Dimmer	9	0~9	Adjust-Bar
	Exit			



## Function

ICON	Meaning	Function	Default	Status	Description	Remark
	Show Status	Information of input source	On	On	Show input source	
				Off	Hide input source	
	Blue Screen	Select blue/ black screen when no input signal is detected.	On	On	Show blue screen when no input.	
				Off	Show black screen when no input.	
	Auto Power On	Modules turns on automatically without power key input.	On	On	Auto	
				Off	Manual	
				Auto Save	Power off , the last state	
	Detect Source	Auto detect input source.	On	On	Auto-detect signal source	
				Off	Manual switch signal source	
	Auto Power Saving	Modules go standby when no input source is detected.	Off	6s / 15s / 30s	Go standby by settings when no input	LED indicator: Flickering Green
				Off	Show no signal when no input	LED indicator: Green
	Auto Sleep	Modules go off when set timing is out.	Off	15M / 30M / 60M	Go off by time setting	LED indicator: Red Press Power Key back to life.
				Off	Turn off sleep mode	
	Exit					

**Note :** After configuration is set, RESET won't restore to default setting.



## Setting

Indicator	Meaning	Default	Adjustable range	Remark
	Mirror	Off	On / Off	Left-right reversal
	Upside down	Off	On / Off	Upside down
	Scan	Under Scan	Over Scan/Under Scan	CVBS Only, Note 1
	Language	English	English / 中文 / 日本語 / 한국의 / Française / Deutsch / Italiano / Española / Português	Note 1
	OSD Transparent	0	0~7	Menu Transparent
	Reset			Restore to default
	Exit			

Note 1: Press MENU to store changes when OSD adjustment is done.



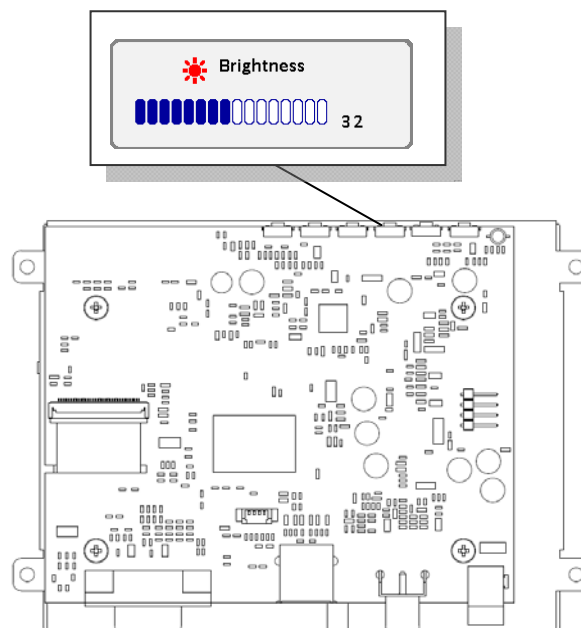
## Info.

**MENU**

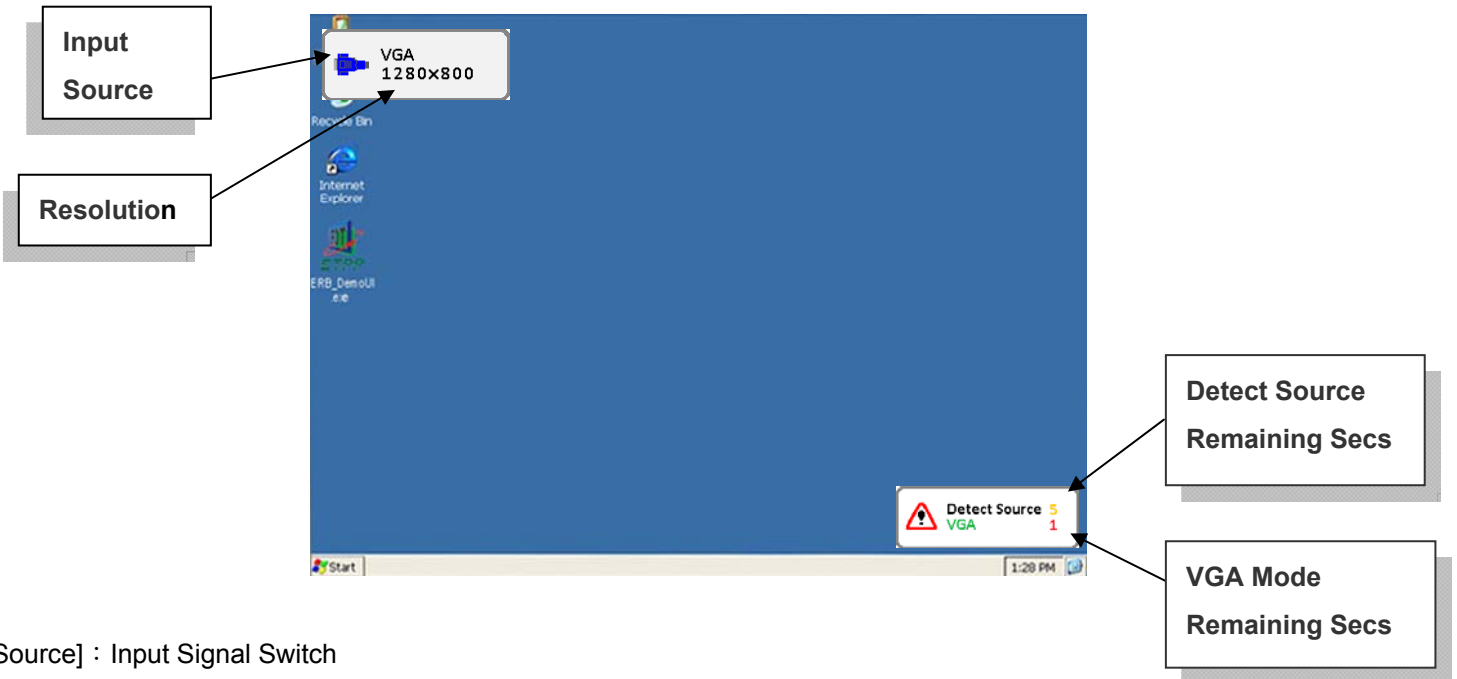
<b>Image</b>	Source : VGA
<b>Function</b>	Resolution : 1024x768
<b>Setting</b>	H.Freq : 48.2KHz V.Freq : 59.8Hz
<b>Info.</b>	Program Ver : 2.00 Command Ver : 2.00

◀ Move    Menu ▶

Hot Key When OSD Menu is Off :



Information of Input Source and Functionality :



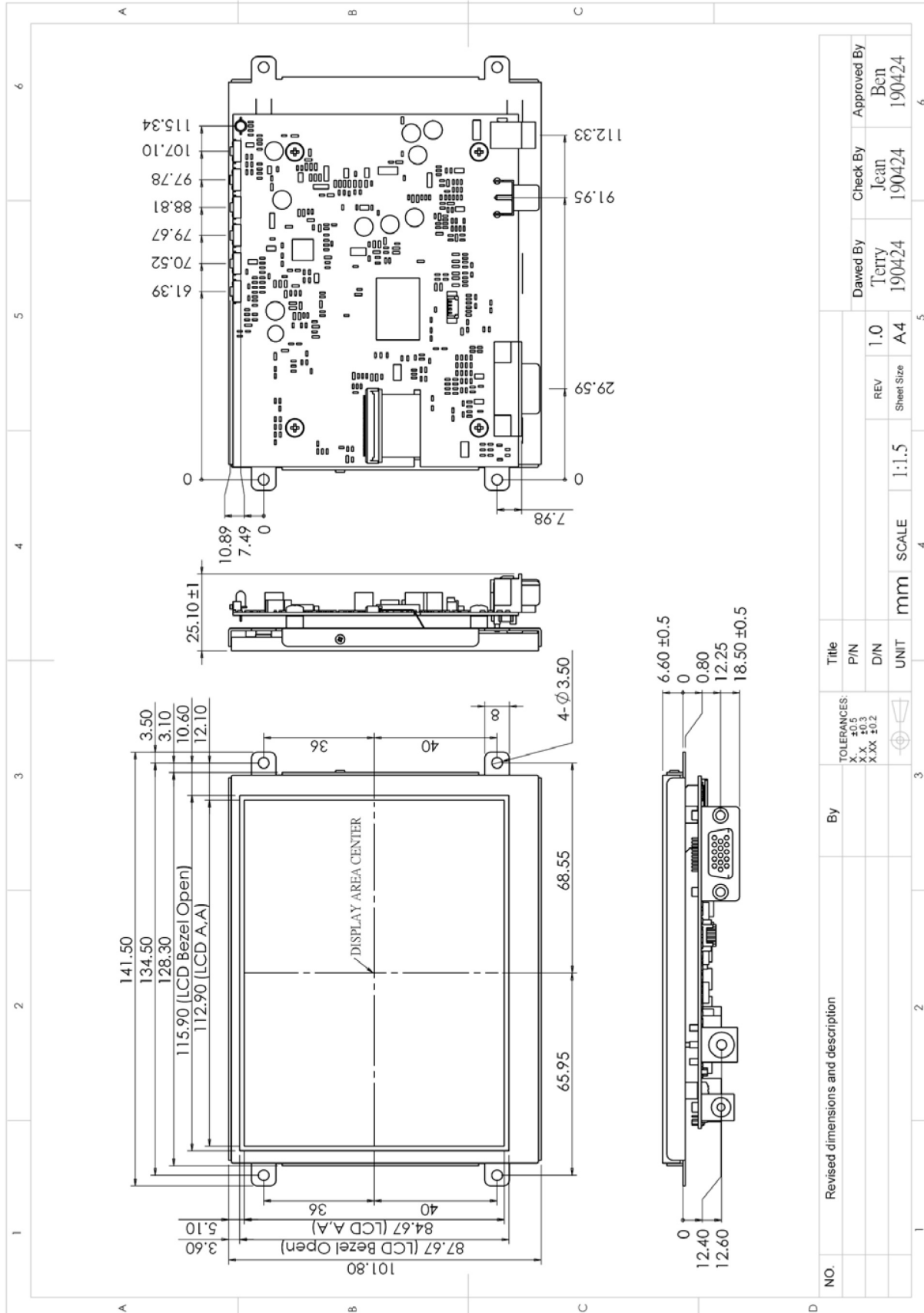
[Source] : Input Signal Switch

Overview of Input Signals :

Indicator	Interface
	AV1
	VGA

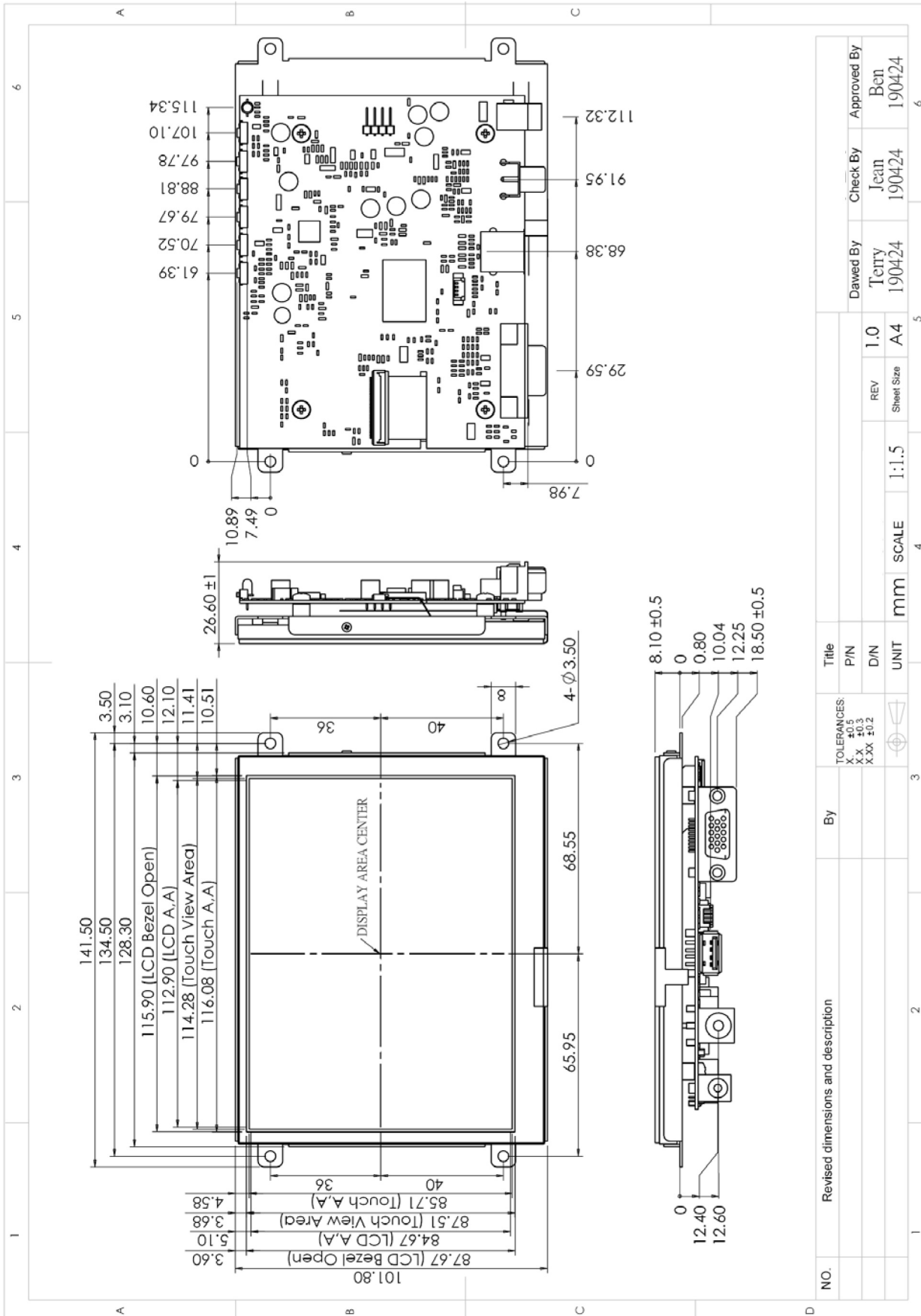


## 13.4 Unit (FCOP0560)





**13.6 Unit (FCOP0560-TR)**





## 14. Appendix

### 14.1 TFT-LCD Mechanical Specifications

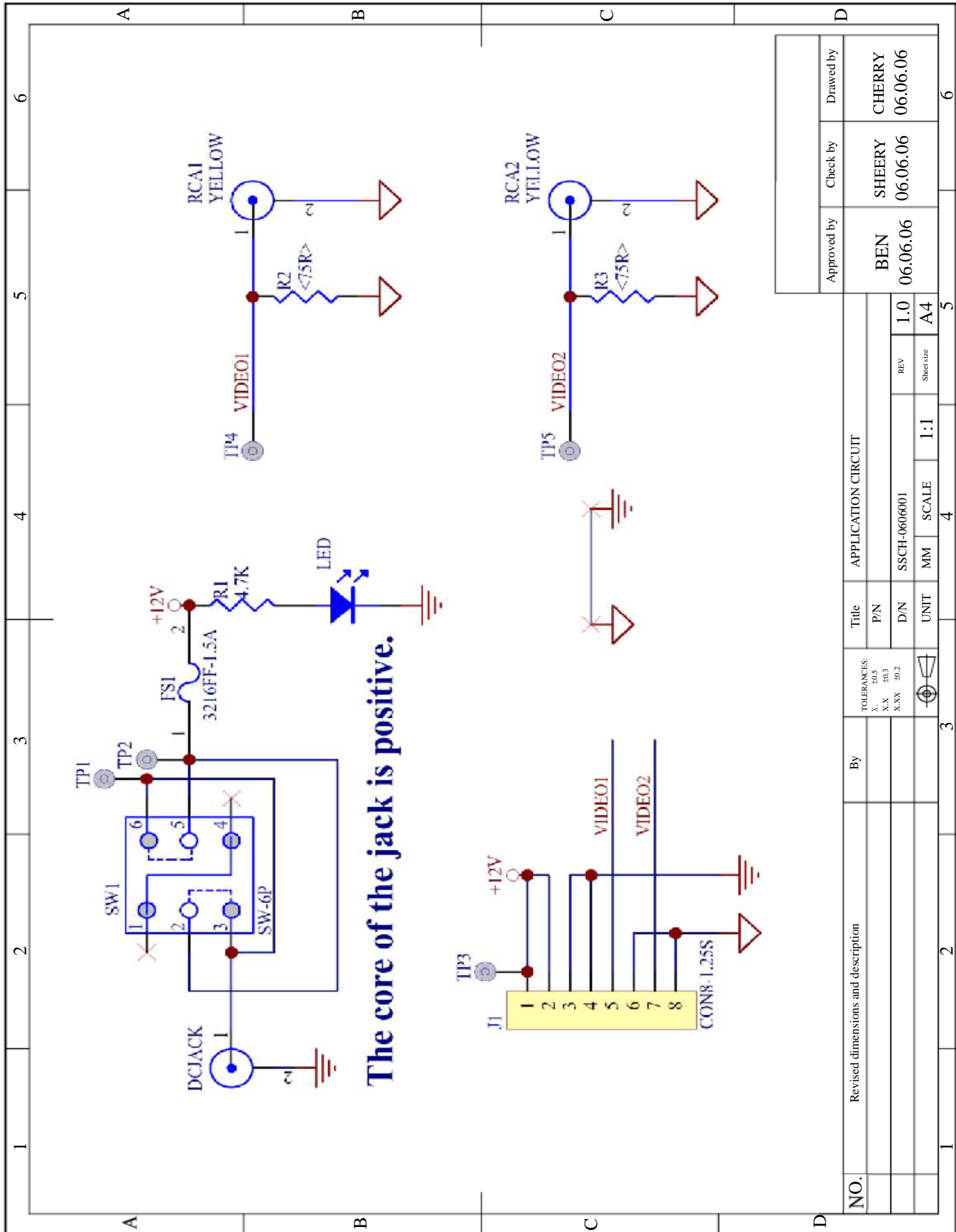
Parameter	Specifications	Unit
Screen Size	5.6 (diagonal)	Inch
Display Format	640 x (R.G.B) x 480	Dot
Active Area	112.896 (H)× 84.672 (V)	mm
Pixel Pitch	0.1764(H) x 0.1764(V)	mm
Pixel Arrangement	RGB stripe	

### 14.2 TFT-LCD Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Remark
Viewing Angle	Horizontal	Left	CR ≥ 10	60	70	---	deg
		Right		60	70	---	deg
	Vertical	Top		40	50	---	deg
		Bottom		60	70	---	deg
Contrast Ratio	CR	At optimized Viewing angle	400	500	---	---	
Luminance without TP	L		280	350	---	cd/m <sup>2</sup>	
Luminance with RTP	L		224	280	---	cd/m <sup>2</sup>	
LED Life Time		25°C	20000	---	---	hours	Note

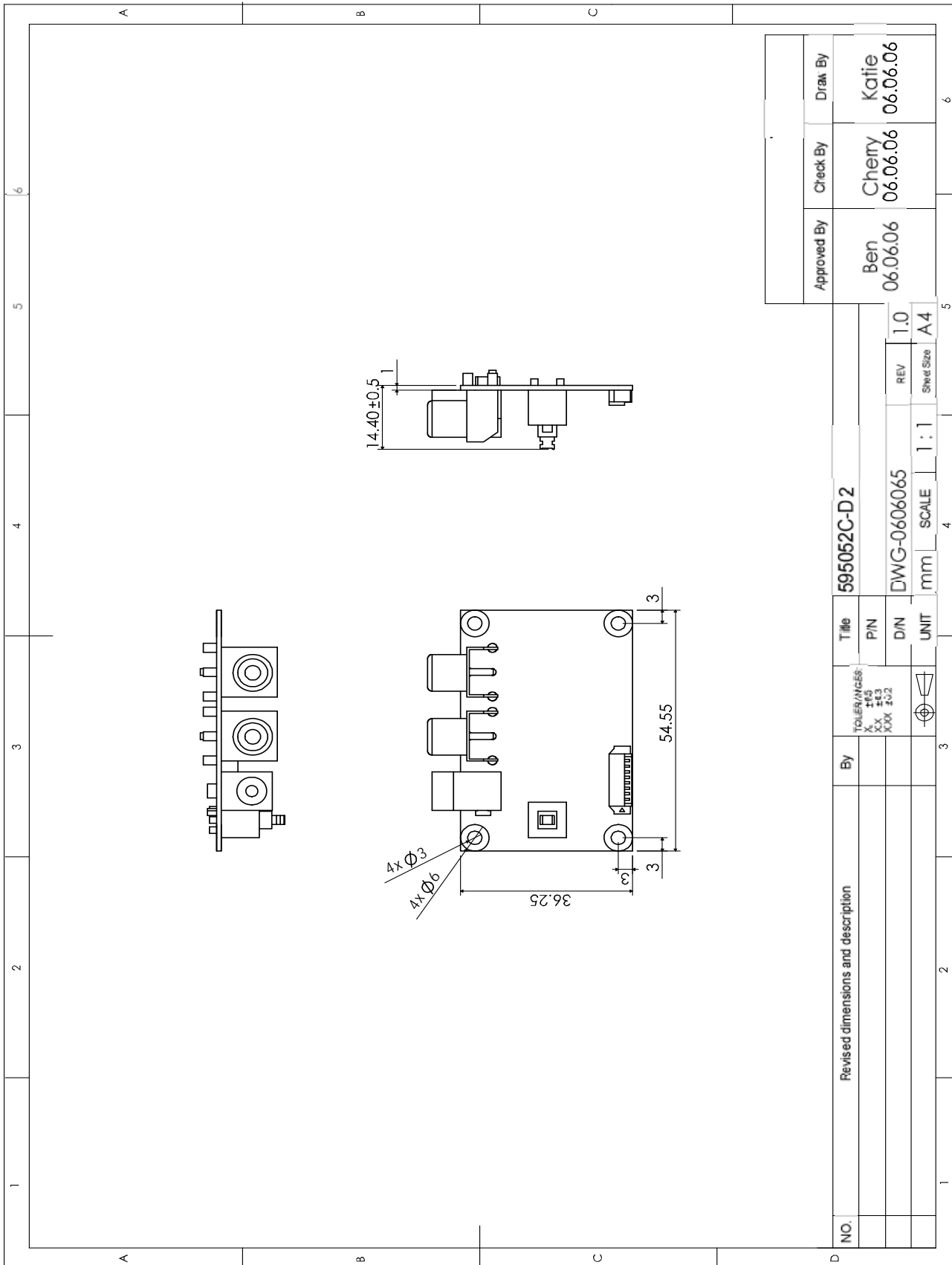
Note: The "LED Life Time" is defined as the module brightness decrease to 50% original.

14.3 Application Circuit

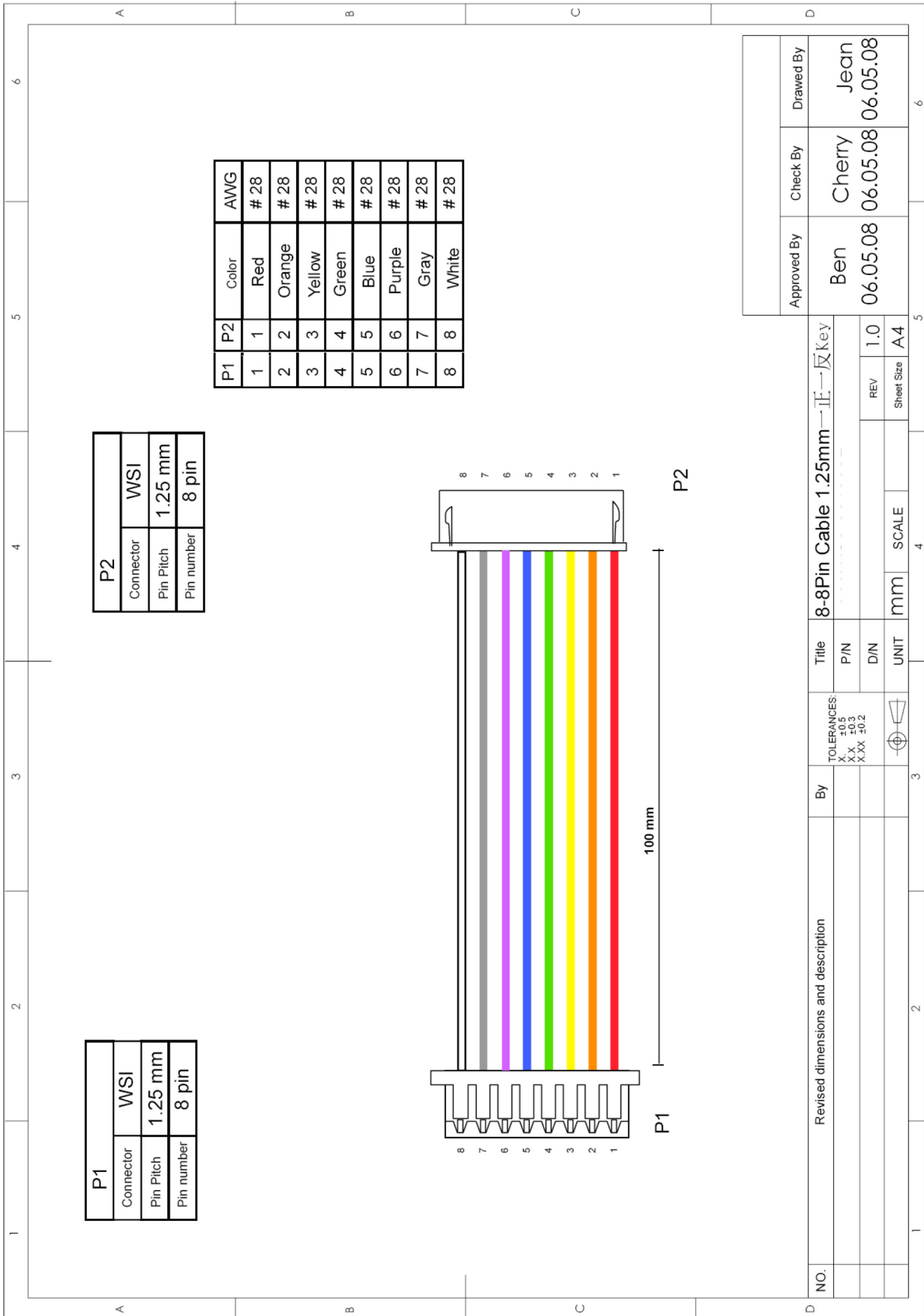


VER :B

**14.4 (Option)**



**14.5 Cable: 8P-8P 1.25mm L:100mm (Option)**



## 15. Revision History

### 15.1 Record of Revision

NO	Date	Description	Page	Note
0.1	October 14, 2019	· Modify 11. 4W Resistance Touch Panel Characteristics	14	
1.0	January 17, 2020	· Modify 10.2 Support Display Mode Characteristics	13	
		· Change description of Chattering to Response Time	14	
		· Paragraph adjusted from 10.1 to 11.1 with RTP IC Response Time	14	
		· Modify 12. Key Function by OSD	19-20	
1.1	February 10, 2020	· Redefine RTP Response Time and RTP driver IC Response Time as RTP Response Time	14	
1.2	November 17, 2020	· Modify the power consumption value,because backlight's LED chips improved the efficiency.	4,13	
1.3	December 30, 2020	· Update 11.7 Resistive Touch Panel Operation System Support	17	
1.4	February 24, 2021	· Modify 11.7 Resistive Touch Panel Operation System Support Note	17	