AGTechnologies
LCD Displays

SPECIFICATION

AGM 035A0-D0-R

Atualizado em 05/06/19.

Updates and Reviews:

VERSION	DATE	DESCRIPTIONS
00	23/08/2016	First issue
01	08/05/2018	Block diagram update and code system update.

Contents

1.Summary

This technical specification applies to 3.5” color TFT-LCD panel. The 3.5” color TFT-LCD panel is designed for camcorder, digital camera application and other electronic products which require high quality flat panel displays. This module follows RoHS.

2.General Specifications

Item	Dimension	Unit
Size	3.5 inch (Diagonal)	inch
Dot Matrix	320 x 3(RGB) x 240	dots
Module dimension	93.5(H) x 63.80(V) x 8.61(D)	mm
Active area	72.3(H) x 54.56 (V)	mm
Dot pitch	0.073(H) X 0.219(V)	mm
LCD type	TFT, Normally White, Transmissive	
View Direction	12 o’clock	
Backlight Type	LED , Normally White	
Controller IC	SSD1963	
Interface	Digital 8080 / 6800	
With /Without TP	With RTP	
Surface	Anti-Glare	

*Color tone slight changed by temperature and driving voltage

3.Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-20	---	+70	℃
Storage Temperature	TST	-30	---	+80	℃

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

Temp. ≦60℃, 90% RH MAX. Temp.＞60℃, Absolute humidity shall be less than 90% RH at 60℃

4. Electrical Characteristics

4.1. Operating conditions:

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Supply Voltage For LCM	VDD	---	3.0	3.3	3.6	V	---
Power Supply For LCM	IDD	---	---	310	470	mA	Note 1

Note 1 : This value is test for VDD=3.3V, Ta=25℃

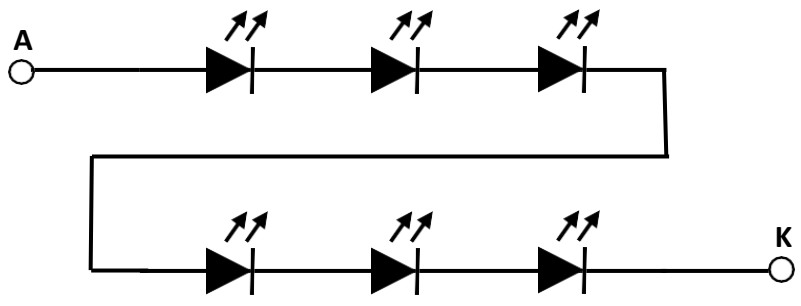
4.2. LED driving conditions (for external power supply when needed)

Backlight:

Name	Min	Type	Max	Unit
Current	15	20	25	mA
Voltage	18.0	19.2	22.0	V
Power Consumption	300	384	450	mW
Luminance	300	350	-	Cd/m² (Note1)
Luminance uniformity	75%	80%	-	
X color Coordinates	0.27	0.28	0.31	-
Y color Coordinates	0.27	0.28	0.31	-
Led Life Time	50.000	-	-	Hr (Note2)

Note1: This luminance is tested with assembling the LCD.

Note2: Brightness to be decreased to 50% of the initial value.



5.DC Characteristics

Parameter	Symbol	Rating			Unit	Condition
		Min	Typ	Max		
Low level input voltage	VIL	0	-	0.3VDD	V	
High level input voltage	VIH	0.7VDD	-	VDD	V	

6.Interface timing

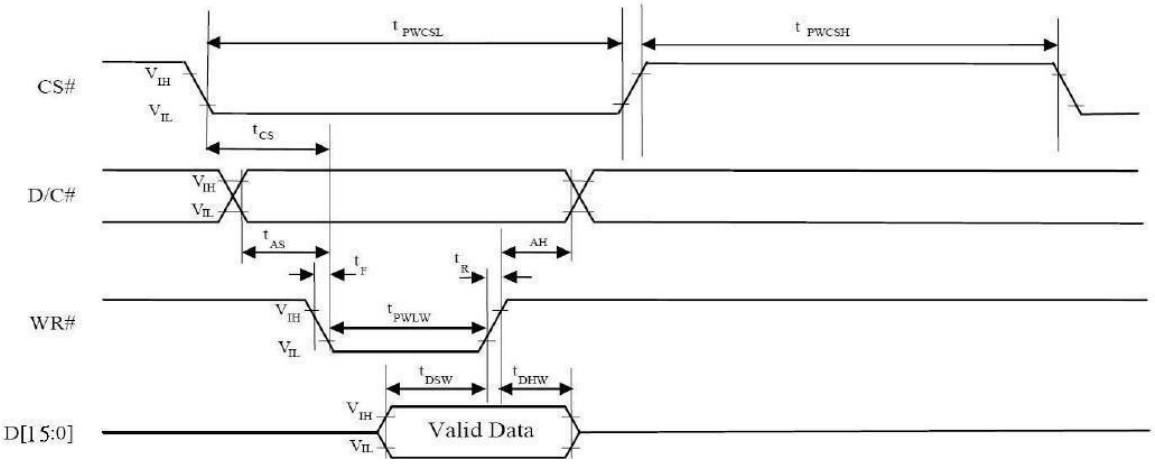
6.1. 8080 Mode

The 8080 mode MCU interface consist of CS#, D/C#, RD#, WR#, Data bus. This interface use WR# to define a write cycle and RD# for read cycle. If the WR# goes low when the CS# signal is low, the data or command will be latched into the system at the rising edge of WR#. Similarly, the read cycle will start when RD# goes low and end at the rising edge of RD#.

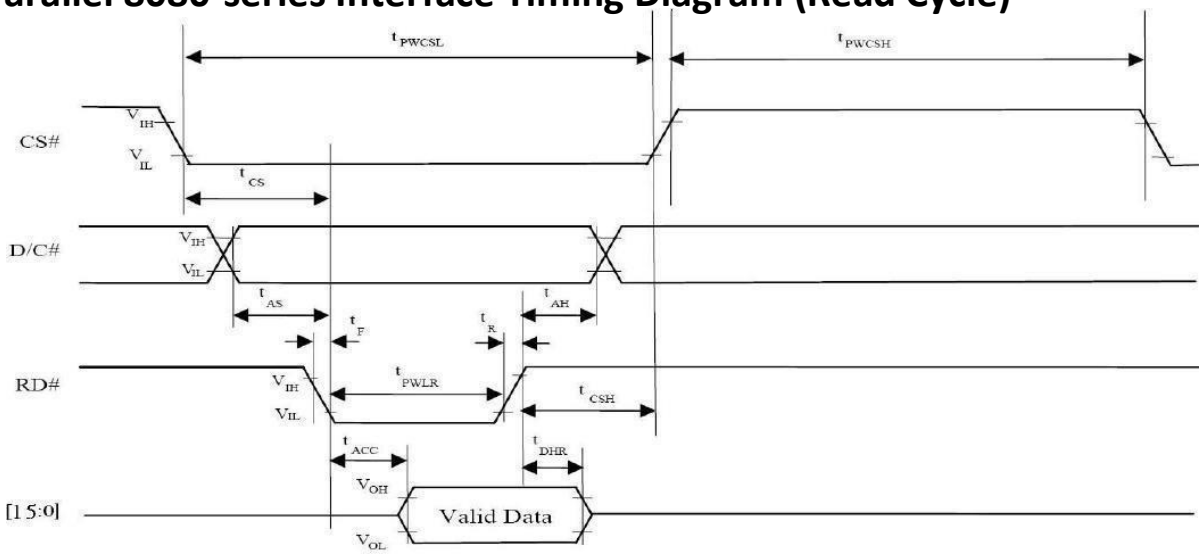
6.2. 8080 Mode Write Cycle

Symbol	Parameter	Min	Typ	Max	Unit
fMCLK	System Clock Frequency	1	—	110	MHz
tMCLK	System Clock Period	1/ fMCLK	—	—	ns
tPWCSH	Control Pulse High Width Write	13	1.5* tMCLK	—	ns
	Read	30	3.5* tMCLK		
tPWCSL	Control Pulse Low Width Write (next write cycle)	13	1.5* tMCLK	—	ns
	Write (next read cycle)	80	9* tMCLK		
	Read	80	9* tMCLK		
tAS	Address Setup Time	1	—	—	ns
tAH	Address Hold Time	2	—	—	ns
tDSW	Write Data Setup Time	4	—	—	ns
tDHW	Write Data Hold Time	1	—	—	ns
tPWLW	Write Low Time	12	—	—	ns
tDHR	Read Data Hold Time	1	—	—	ns
tACC	Access Time	32	—	—	ns
tPWLR	Read Low Time	36	—	—	ns
tR	Rise Time	—	—	0.5	ns
tF	Fall Time	—	—	0.5	ns
tCS	Chip select setup time	2	—	—	ns
tCSH	Chip select hold time to read signal	3	—	—	ns

6.3. Parallel 8080-series Interface Timing Diagram (Write Cycle)



6.4. Parallel 8080-series Interface Timing Diagram (Read Cycle)



6.5. Pixel Data Format

Interface	Cycle	D[15]	D[14]	D[13]	D[12]	D[11]	D[10]	D[9]	D[8]	D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]
16 bits (565 format)	1st	R5	R4	R3	R2	R1	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1
16 bits	1st	R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0
	2nd	B7	B6	B5	B4	B3	B2	B1	B0	R7	R6	R5	R4	R3	R2	R1	R0
	3rd	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
8 bits	1st									R7	R6	R5	R4	R3	R2	R1	R0
	2nd									G7	G6	G5	G4	G3	G2	G1	G0
	3rd									B7	B6	B5	B4	B3	B2	B1	B0

7.Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
Response time		Tr	θ =0°、Φ =0°	-	10	-	ms	Note 3,5
		Tf		-	15	-	ms	
Contrast ratio		CR	At optimized viewing angle	300	350	-	-	Note 4,5
Color Chromaticity	White	Wx	θ =0°、Φ =0	0.26	0.31	0.36	-	Note 2,6,7
		Wy		0.28	0.33	0.38	-	-
Viewing angle (Gray Scale Inversion Direction)	Hor	Φ R	CR≧10	-	55	-	Deg.	Note 1
		Φ L		-	55	-		
	Ver	Θ L		-	45	-		
		Θ H		-	50	-		
Brightness		-	-	300	350	-	cd/m^2	Center of display

Ta=25±2 ℃, IL=20mA

Note 1: Definition of viewing angle range

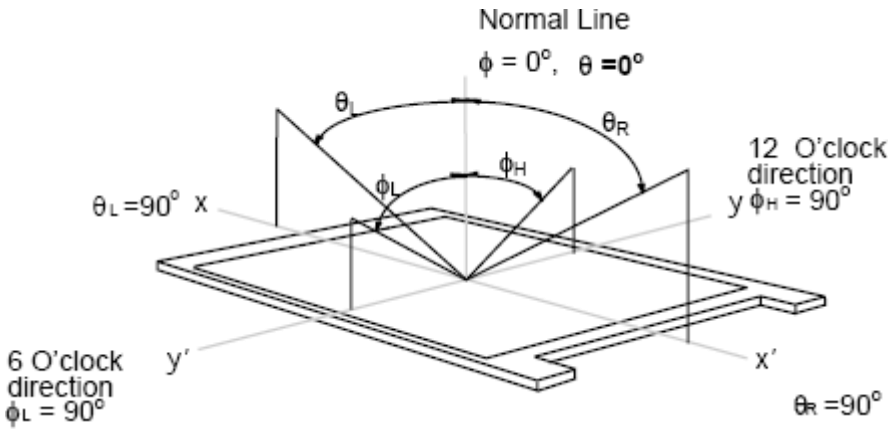


Fig. 7.1. Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7orBM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

Note 3: Definition of Response time:

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time, Tr, is the time between photo detector output intensity changed from 90%to
10%. And fall time, Tf, is the time between photo detector output intensity changed from 10%to 90%

Note 4: Definition of contrast ratio:

The contrast ratio is defined as the following expression.

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

Note 5: White Vi = Vi50 ± 1.5V
Black Vi = Vi50 ± 2.0V
“±” means that the analog input signal swings in phase with VCOM signal. “±” means that the analog input signal swings out of phase with VCOM signal.
The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

Note 6: Definition of color chromaticity (CIE 1931)

Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

8.Interface

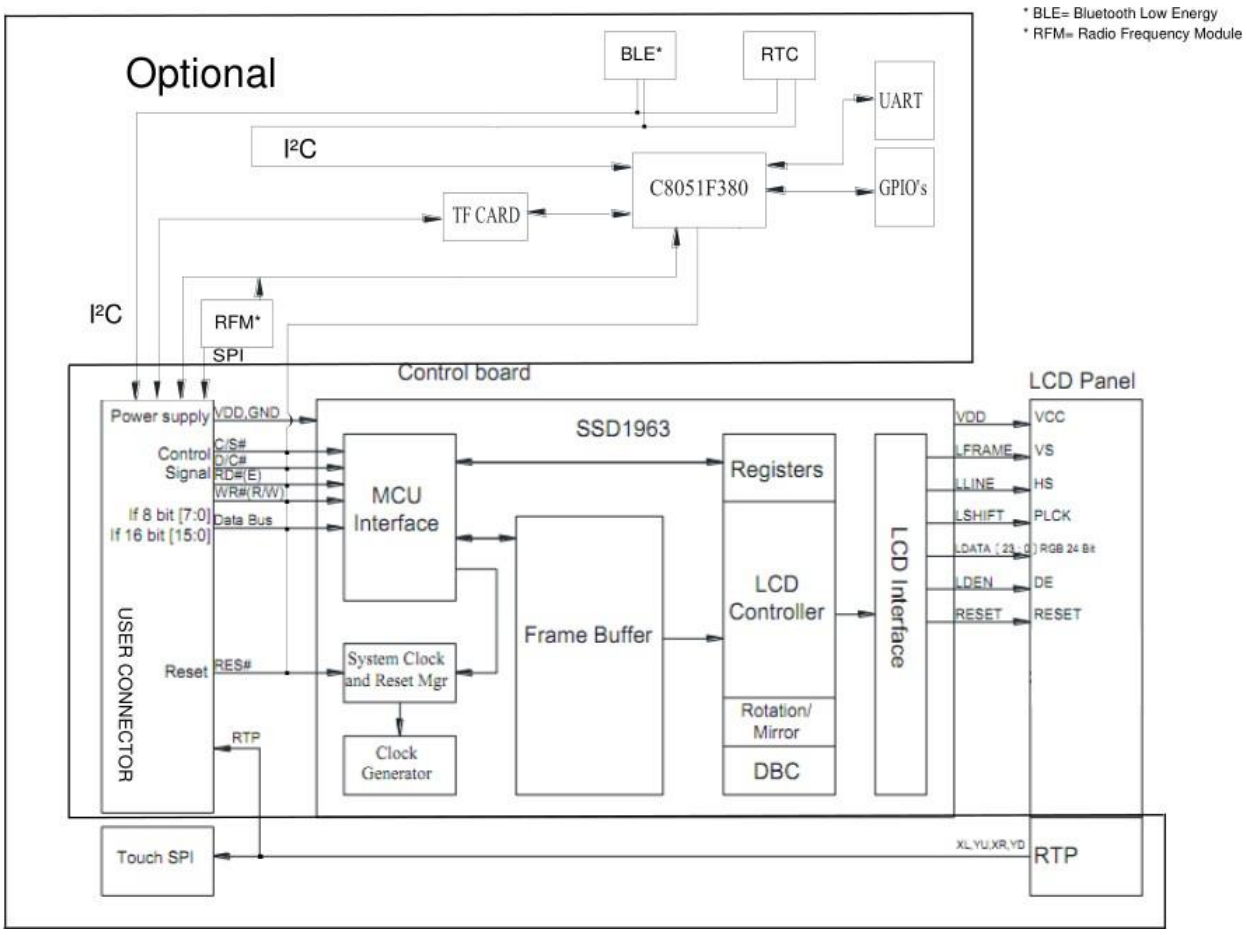
8.1. LCM 40-PIN Definition - (8/16/18 bits) interface FPC 40 Contacts 0.5mm Top contact

PIN	SYMBOL	FUNCTION	REMARK
1	GND	GROUND: 0.0V	LCD
2	VDD	POWER: +3.3V	LCD
3	BL_E	BACKLIGHT CONTROL SIGNAL: L-OFF / H-ON	LCD
4	RS	DATA/COMMAND SELECT	LCD
5	WR	WRITE STROBE SIGNAL	LCD
6	RD	READ STROBE SIGNAL	LCD
7	DB0	DATA BUS	LCD
8	DB1	DATA BUS	LCD
9	DB2	DATA BUS	LCD
10	DB3	DATA BUS	LCD
11	DB4	DATA BUS	LCD
12	DB5	DATA BUS	LCD
13	DB6	DATA BUS	LCD
14	DB7	DATA BUS	LCD
15	DB8	DATA BUS	LCD
16	DB9	DATA BUS	LCD
17	DB10	DATA BUS	LCD
18	DB11	DATA BUS	LCD
19	DB12	DATA BUS	LCD
20	DB13	DATA BUS	LCD
21	DB14	DATA BUS	LCD
22	DB15	DATA BUS	LCD
23	DB16	DATA BUS	LCD
24	DB17	DATA BUS	LCD
25	CS	CHIP SELECT	LCD
26	NC	NO CONNECTION	
27	DISP_ON / IRQ_TP	DISPLAY ON_OFF / INTERRUPTION SIGNAL FOR TOUCHPANEL	TOUCH PANEL
28	RES	HARDWARE RESET	LCD
29	XL / DOUT_TP	LEFT ELECTRODE / DATA OUT FOR TOUCHPANEL	TOUCH PANEL
30	YU / CS_TP	UP ELECTRODE / CHIP SELECT FOR TOUCHPANEL	TOUCH PANEL
31	XR / DCLK_TP	RIGHT ELECTRODE / CLOCK FOR TOUCHPANEL	TOUCH PANEL
32	YD / BUSY_TP	DOWN ELECTRODE / BUSY SIGNAL FOR TOUCHPANEL	TOUCH PANEL
33	DIN_TP	DATA IN FOR TOUCHPANEL	TOUCH PANEL
34	GPIO1 / DOUT_RFM	GENERAL PURPOUSE IO / DATA OUT FOR RF MODULE	IO1 / RFM
35	SCL	CLOCK FOR I^2C	I^2C
36	SDA	DATA FOR I^2C	I^2C
37	CS_SD	CHIP SELECT FOR SD CARD	SD CARD
38	DIN_SD	DATA IN FOR SD CARD	SD CARD
39	CLK_SD	CLOCK FOR SD CARD	SD CARD
40	DOUT_SD	DATA OUT FOR SD CARD	SD CARD

8.2. LCM 24-PIN Definition (8-bits interface) FPC 20/24 Contacts 1mm Top contact (Optional)

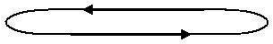
PIN	SYMBOL	FUNCTION	REMARK
1	GND	GROUND: 0.0V	LCD
2	VDD	POWER: +3.3V	LCD
3	BL_E	BACKLIGHT CONTROL SIGNAL: L-OFF / H-ON	LCD
4	RS	DATA/COMMAND SELECT	LCD
5	WR	WRITE STROBE SIGNAL	LCD
6	RD	READ STROBE SIGNAL	LCD
7	DB0	DATA BUS	LCD
8	DB1	DATA BUS	LCD
9	DB2	DATA BUS	LCD
10	DB3	DATA BUS	LCD
11	DB4	DATA BUS	LCD
12	DB5	DATA BUS	LCD
13	DB6	DATA BUS	LCD
14	DB7	DATA BUS	LCD
15	CS	CHIP SELECT	LCD
16	NC	NO CONNECTION	
17	RES	HARDWARE RESET	LCD
18	XL / DOUT_TP	LEFT ELECTRODE / DATA OUT FOR TOUCHPANEL	TOUCH PANEL
19	DISP_ON / IRQ_TP	DISPLAY ON_OFF / INTERRUPTION SIGNAL FOR TOUCHPANEL	TOUCH PANEL
20	YU / CS_TP	UP ELECTRODE / CHIP SELECT FOR TOUCHPANEL	TOUCH PANEL
21	XR / DCLK_TP	RIGHT ELECTRODE / CLOCK FOR TOUCHPANEL	TOUCH PANEL
22	YD / BUSY_TP	DOWN ELECTRODE / BUSY SIGNAL FOR TOUCHPANEL	TOUCH PANEL
23	DIN_TP	DATA IN FOR TOUCHPANEL	TOUCH PANEL
24	GPIO1 / DOUT_RFM	GENERAL PURPOUSE IO / DATA OUT FOR RF MODULE	IO1 / RFM

9.Block Diagram



10. Reliability

Content of Reliability Test (Wide temperature, -20℃~70℃)

Environmental Test			
Test Item	**Content of Test**	**Test Condition**	**Note**
High Temperature Storage	Endurance test applying the high storage temperature for a long time.	80℃ 200hrs	2
Low Temperature Storage	Endurance test applying the low storage temperature for a long time.	-30℃ 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time	70℃ 200hrs	-
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time	-20℃ 200hrs	1
High Temperature Humidity Operation	The module should be allowed to stand at 60℃,90%RH max	60℃,90%RH 96hrs	1,2
 Thermal Shock Resistance	The sample should be allowed stand the following 10 cycles of operation -20℃ 25℃ 70℃ 30mim 5mim 30mim 1cicle	-20℃/70℃ 10 cycles	-
Vibration test	Endurance test applying the vibration during transportation and using	Total fixed amplitude:15mm Vibration Frequency:10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the terminal	VS=800V RS=1.5kΩ CS=100pF 1 time	-

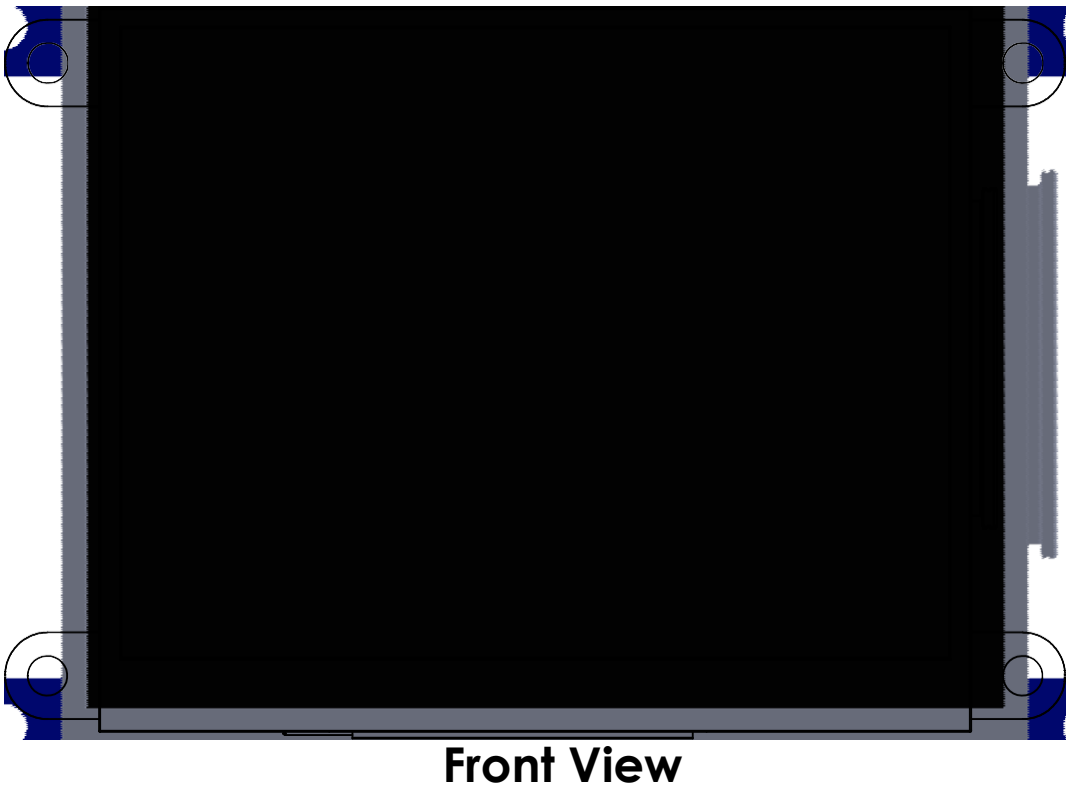
Note1: No dew condensation to be observed.
Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber
Note3: The packing has to including into the vibration testing.

11. Touch Panel Information

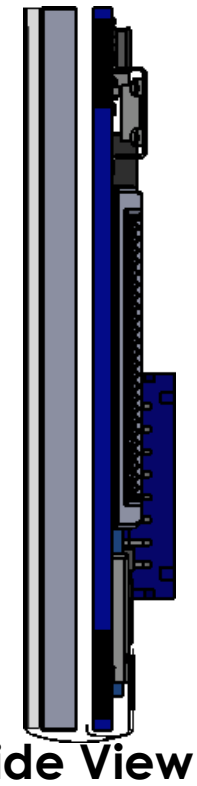
11.1. Resistance Touch Panel General Specifications

ITEM	DESCRIPTION
Driving condition	DC5V
Operating force	60~150g
Linearity max	≤±1.5%
Insulating resistance	＞20MΩ，25V (DC)
Light transparence	70%
Structure type	ITO Film/ITO Glass(F/G)
Surface Hardness	3H Typ
Pen Hitting Durability (with the silicon rubber)	＞1000,000 times
X resistance	200~1100Ω
Y resistance	200~1100Ω

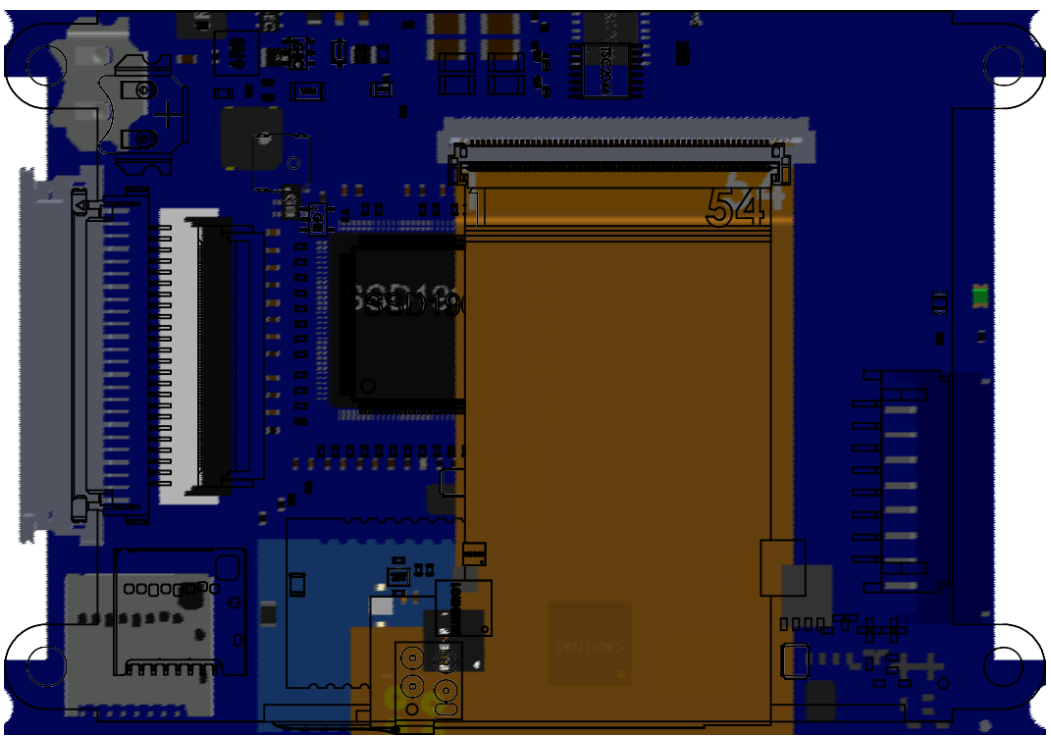
12. Contour Drawing



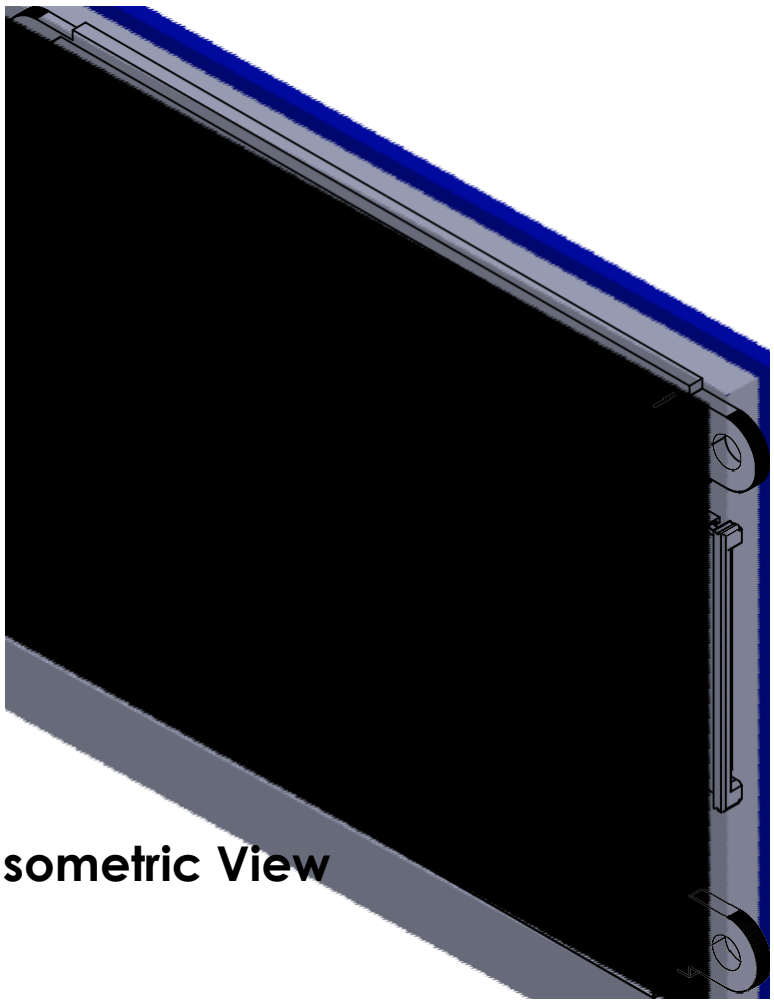
Front View



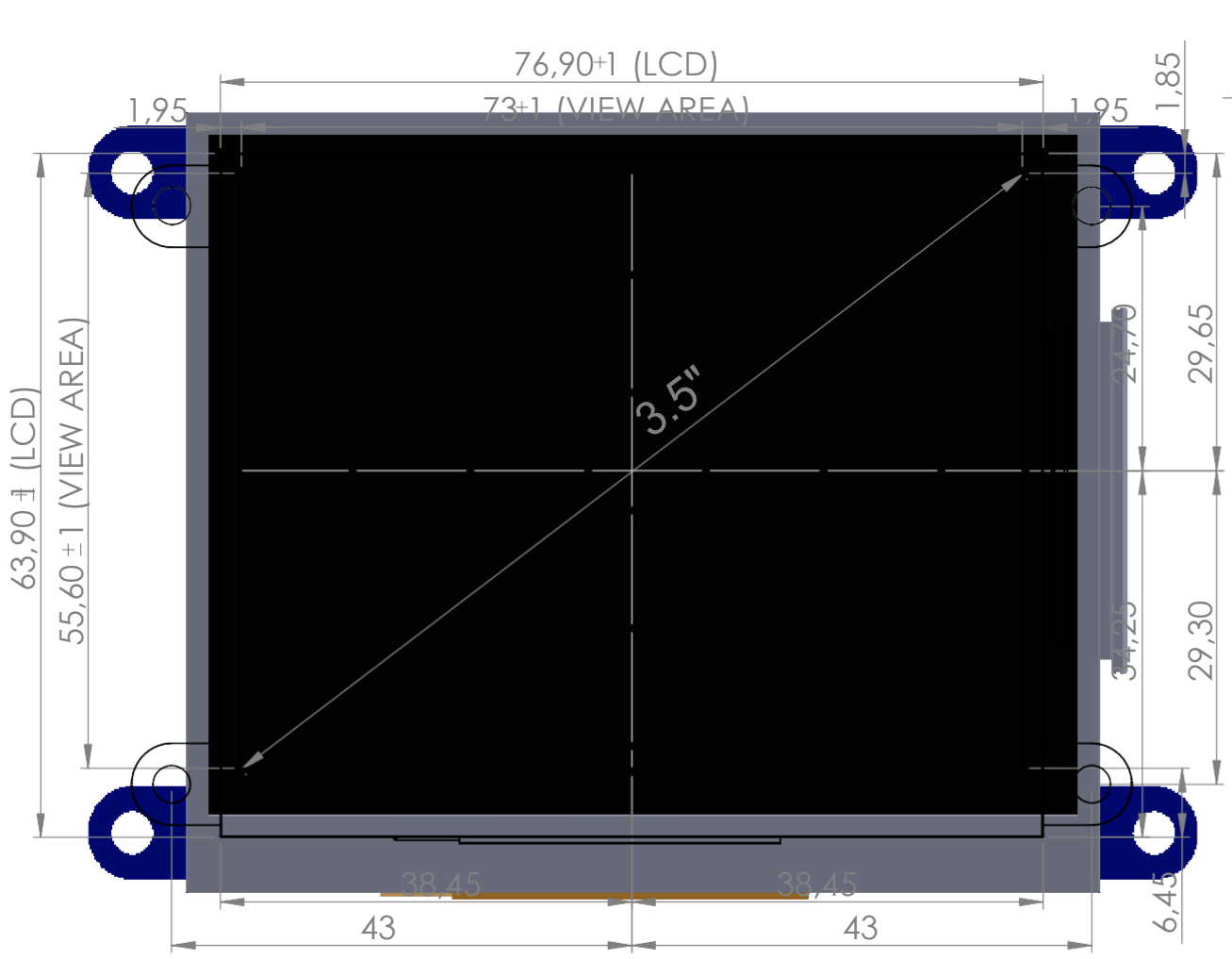
Side View

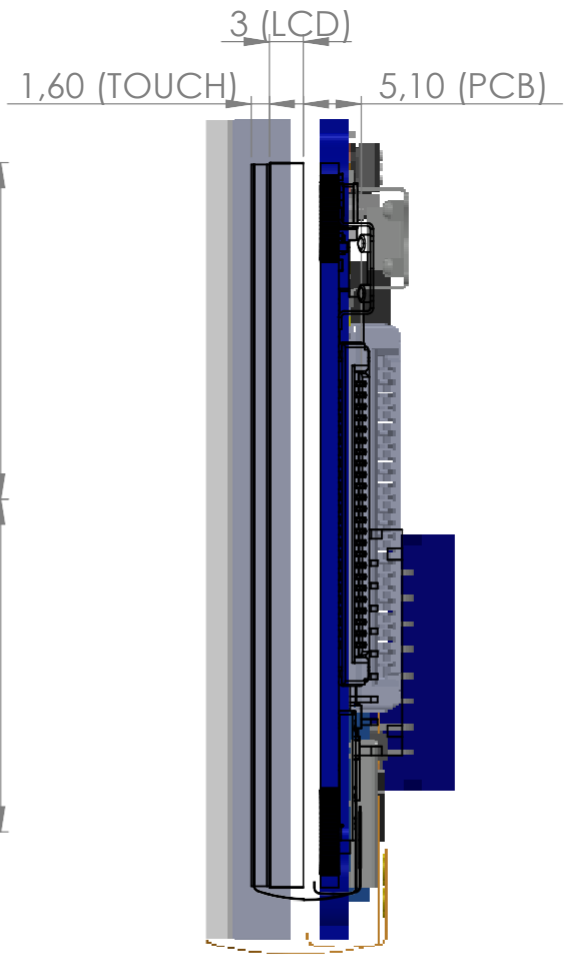


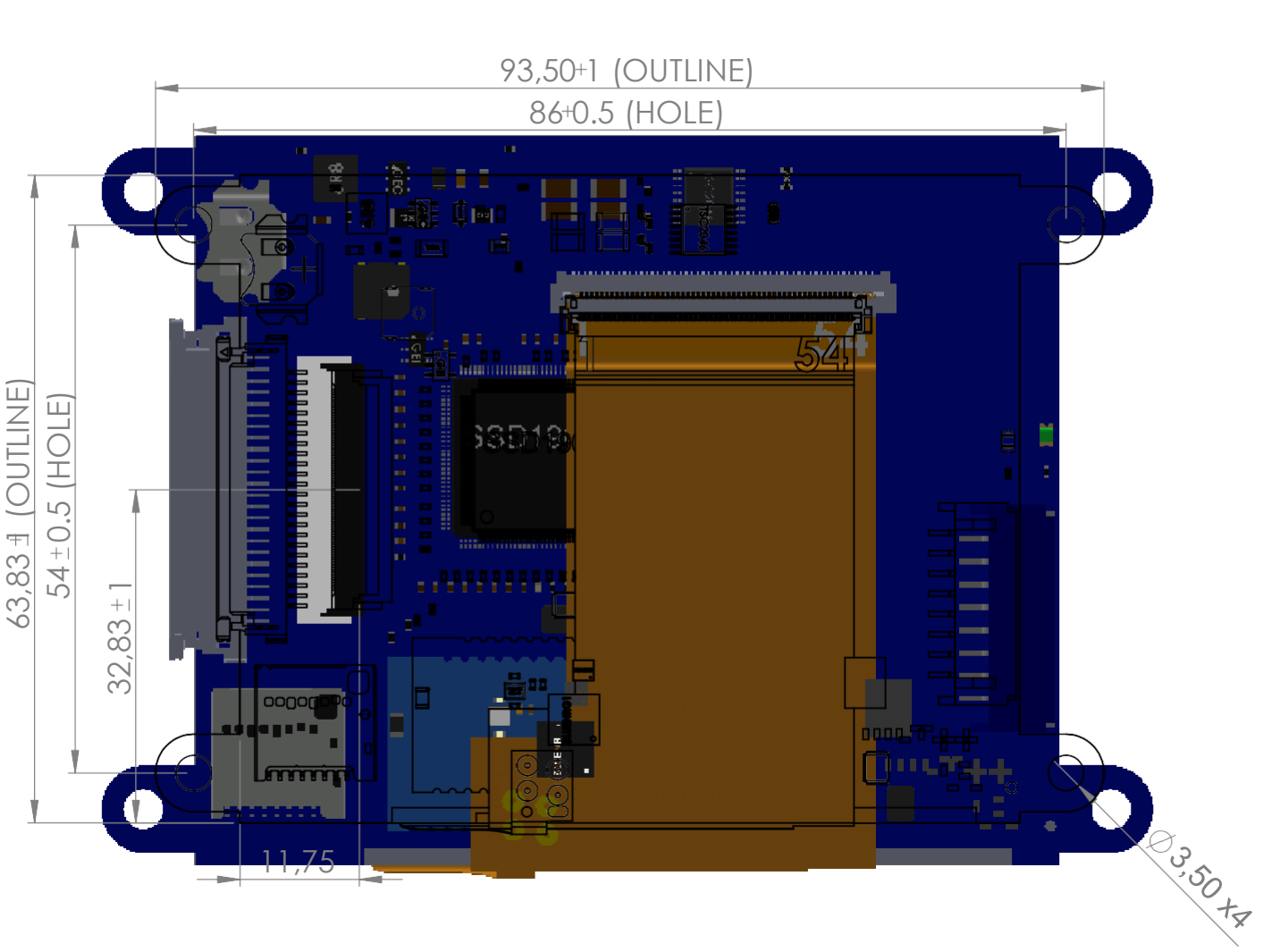
Back View

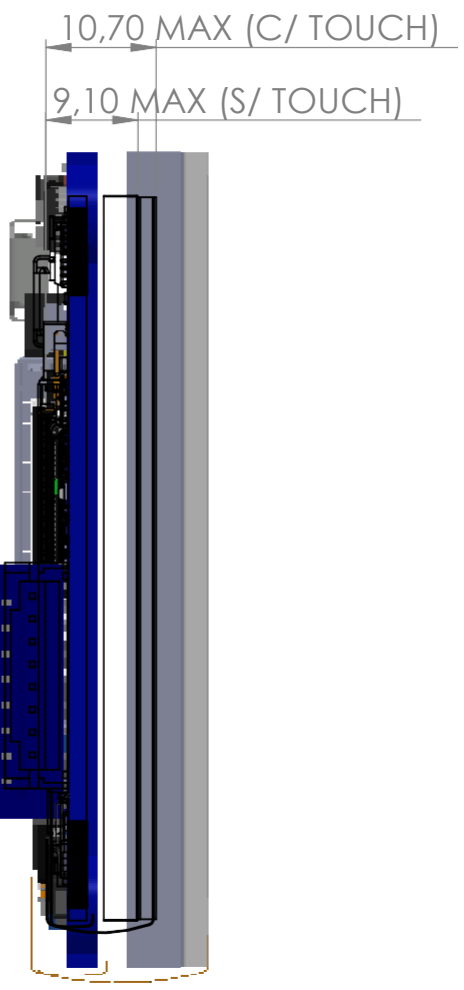


Isometric View

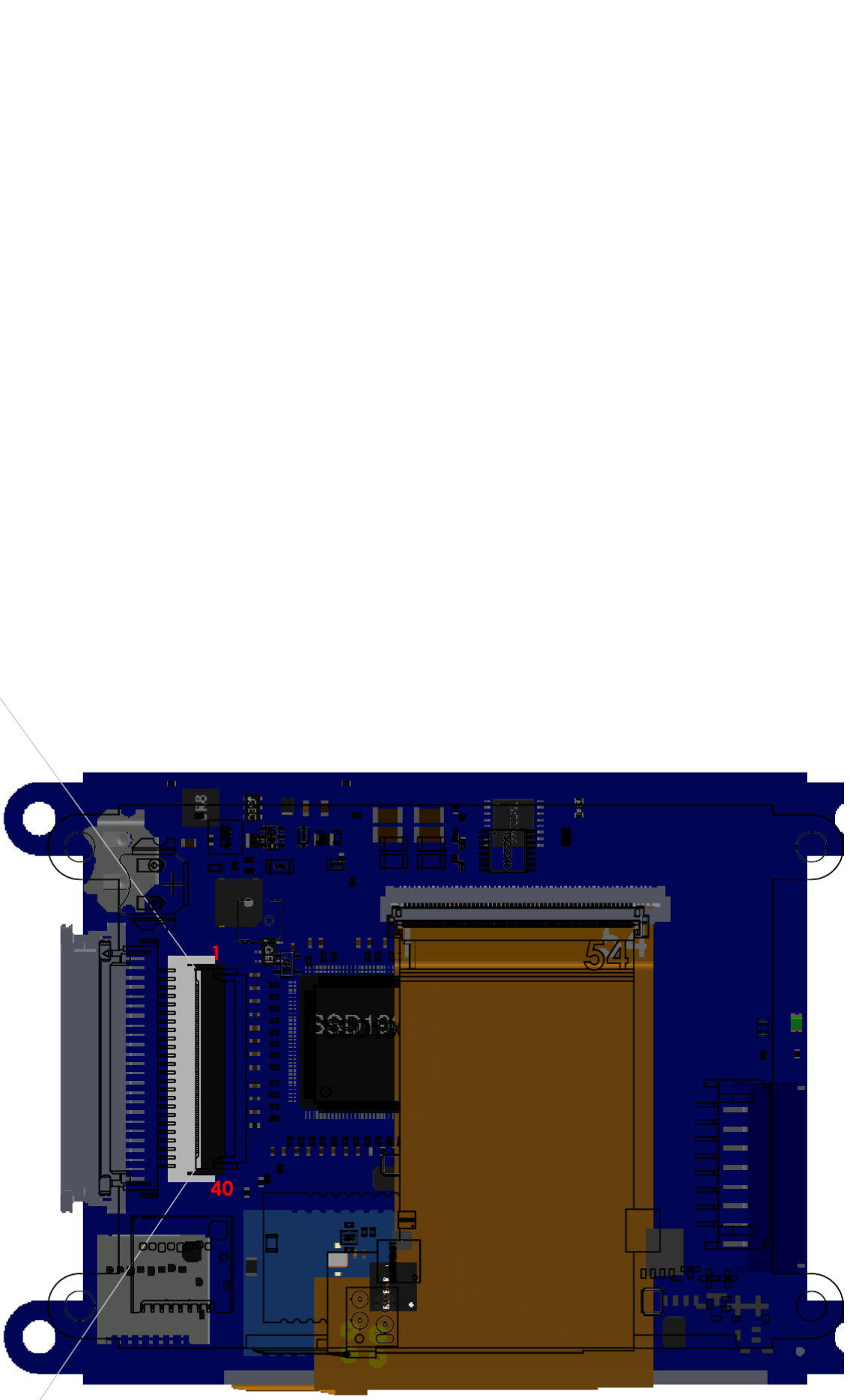

76,90±1 (LCD)
73±1 (VIEW AREA)
1,95
1,95
1,85
63,90 ±1 (LCD)
55,60 ±1 (VIEW AREA)
3.5"
24,70
29,65
34,25
29,30
38,45
38,45
43
43
6,45


3 (LCD)
1,60 (TOUCH)
5,10 (PCB)

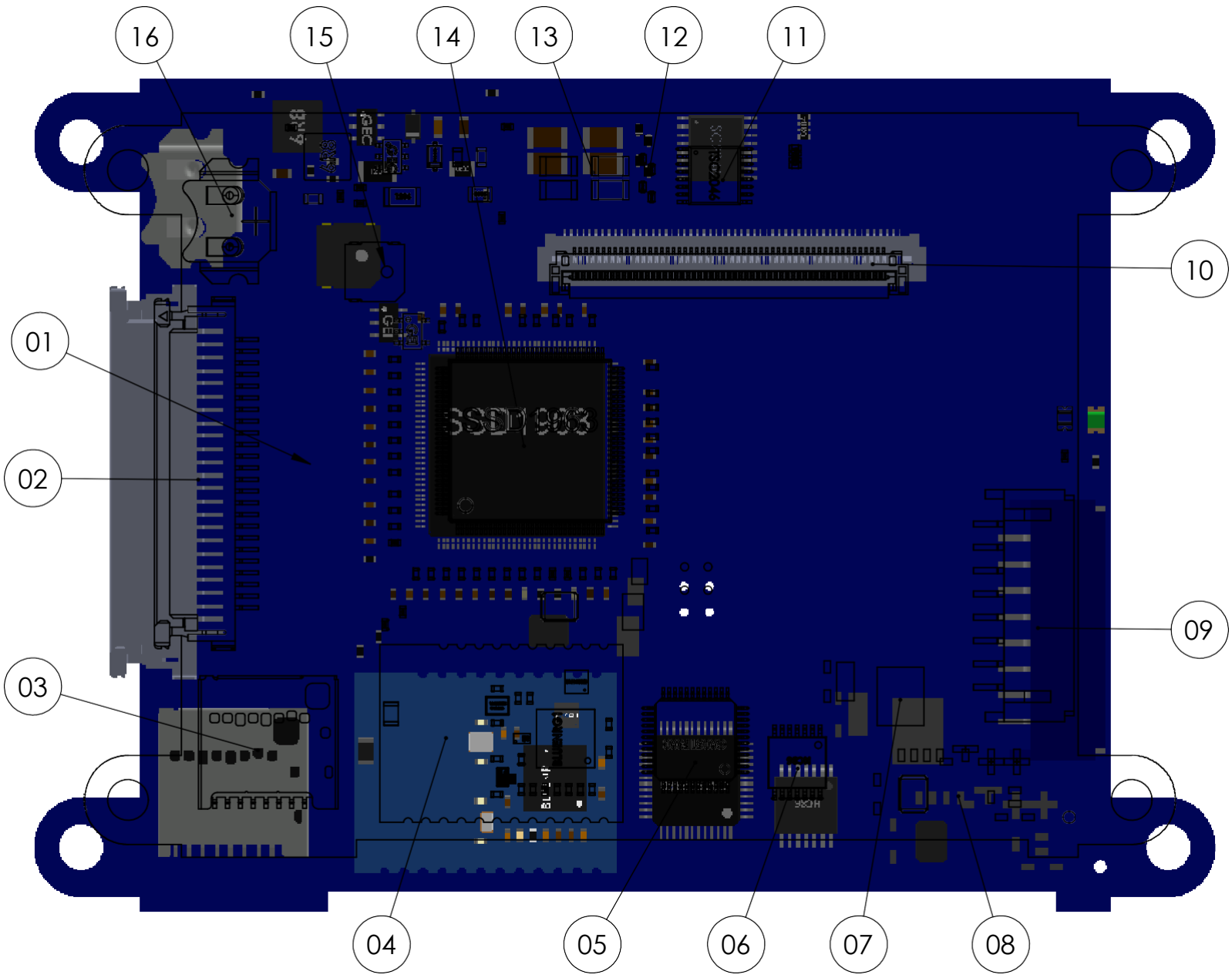

93,50±1 (OUTLINE)
86±0.5 (HOLE)
63,83 ±1 (OUTLINE)
54 ±0.5 (HOLE)
32,83 ±1
11,75
54
Ø3,50 x4


10,70 MAX (C/ TOUCH)
9,10 MAX (S/ TOUCH)

PIN	Name
1	GND
2	+3.3V
3	BLE(LCD)
4	RS(LCD)
5	WR(LCD)
6	RD(LCD)
7	DB0(LCD)
8	DB1(LCD)
9	DB2(LCD)
10	DB3(LCD)
11	DB4(LCD)
12	DB5(LCD)
13	DB6(LCD)
14	DB7(LCD)
15	DB8(LCD)
16	DB9(LCD)
17	DB10(LCD)
18	DB11(LCD)
19	DB12(LCD)
20	DB13(LCD)
21	DB14(LCD)
22	DB15(LCD)
23	DB16(LCD)
24	DB17(LCD)
25	CS(LCD)
26	N/C
27	DISPON(LCD)/IRQ(TP)
28	RST(LCD)
29	L/DOUT(TP)
30	U/CS(TP)
31	R/DCLK(TP)
32	D/BUSY(TP)
33	DIN(TP)
34	DIO1
35	SCL(I2C)
36	SDA(I2C)
37	CS(SD)
38	DI(TP)
39	CK(TP)
40	DO(TP)



13. Additional Resources



	DESCRIPTION		STD	OPC
01	CN1	8/16/18 Bits Interface	X	
02	CN2	8 Bits Interface		X
03	CN7	Micro SD Holder		X
04	BTM	Bluetooth Module 4.2 Low Energy		X
05	U6	MCU 8051 Core		X
06	U9	Level Converter for UART		X
07	RFM	RF 433.92MHz Module		X
08	U10	Real Time Clock (RTC)		X
09	CN8	UART/GPIO Interface		X
10	CN5	3.5" LCD Interface	X	
11	U5	Touchscreen Controller		X
12	V6/V7/V8/V9	TVS for Circuit Break		X
13	C52/C53/C54/C55	Capacitor for Circuit Break		X
14	U1	LCD-TFT Controller	X	
15	BZ	Buzzer		X
16	BAT	Real Time Clock (RTC) Battery Holder		X

CN8 - UART/GPIO INTERFACE	
01	GND
02	+5VDC
03	TX (UART)
04	RX (UART)
05	GPIO4
06	GPIO3
07	GPIO2
08	GPIO1

14. Code System AGT TFT

14.1. Standard

	1 2 3 4 5 6 7 8 - Additional AG M - 035 A 0 - D 0 - R
1	**AGTechnologies**
2	M: TFT + Control Board
3	**Display size**
	035: 3,5” 043: 4.3” 057: 5.7” 070: 7.0” 101: 10.1” 104: 10.4”
4	**Internal Code**
5	**Display model**
6	**Control Board**
	D: Data Control Board V: VGA Control Board C: Composite Video Control Board A: Android Control Board I: Interface Human Machine
7	**Control Board Model**
	0, 1, 2, 3, 4, 5...
8	**TouchPanel Model**
	N: No Touchscreen R: Resistive Touchscreen C: Capacitive Touchscreen P: Projected Touchscreen

14.2. Additional resources (Optional)

	T R B PAH S C M 0ZU K AGM 035A0-D0-R - 1 2 3 3.1 4 5 6 6.1 7
1	**T** = SPI Touch Controller
2	**R** = Radio Frequency Module
3	**B** = Bluetooth Low Energy module ***3.1:*** **P** = Pressure Sensor **A** = Accelerometer **H** = Humidity / Temperature Sensor
4	**S** = MicroSD / TF Card
5	**C** = RTC (Real Time Clock)
6	**M** = Module MCU 8051 **6.1:** **Z** = Buzzer **U** = UART Communication
7	**K =** Development Kit = (1+3) **FC =** (1+2) **F=** 1 **C=** 2 1 = Flat 40 contacts / 0.5mm pitch / 200mm length 2 = Connector FPC 40 contacts TOP / 0.5mm pitch / SMD 3 = FPC ADAPTER BOARD

15. Kit Information

40 pins FPC 0.5mm for DIP 2.54mm.