

EVE 3 7"



This datasheet gives detailed information about the Riverdi 7" EVE3 displays. The displays come in different versions: with capacitive, resistive, or no touchscreen, with a decorative cover glass, as well as with or without a metal mounting frame.

ITEM		CONTENTS	UNIT
LCD Type		TFT/Transmissive/Normally white	/
Size		7	Inch
Viewing Direction		12:00 (without image inversion)	O' Clock
Gray Scale Inversion Direction		6:00	O' Clock
Number of Dots		800 x (RGB) x 480	/
Driver IC		BT81x	/
Interface Type		SPI/QSPI	/
Module Memory Size		1 MB (BT81x) + 64 Mb (external flash)	/
Brightness	no touch module	500	cd/m ²
	CTP module	450	
	RTP module	400	
Color Depth		16.7M	/
Pixel Arrangement		RGB Vertical Stripe	/
Surface Treatment		Anti-glare / Clear (for CTP)	/
Input Voltage		3.3	V

Note 1: RoHS, REACH SVHC compliant

Note 2: LCM weight tolerance: ± 5%.

Revision Record

REV NO.	REVDATE	CONTENTS	REMARKS
1.0	2018-10-22	Rev 1.0	
2.0	2020-02-12	Rev 2.0	Note 1: Due to the EOL of the RVT7.0A800480TNWN00 module, all modules combined are updated and marked with V2 at the end of the PN. Note 2: Update Brightness, External dimensions, Timing Characteristics.

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1. Module classification information

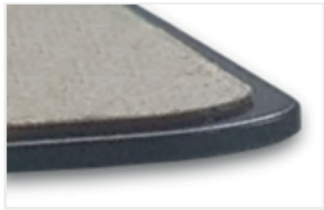
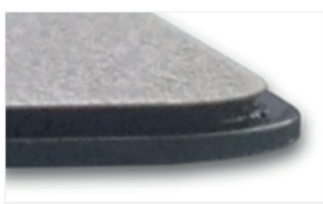
RV	T	70	x	Q	B	x	W	x	Ox
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.

1.	BRAND	RV – Riverdi
2.	PRODUCT TYPE	T – TFT Standard
3.	DISPLAY SIZE	70 – 7.0” 7.0 – 7.0”
4.	MODEL SERIAL NO.	A (A-Z) U – UxTouch
5.	RESOLUTION	Q– 800×480 px 800.480– 800×480 px
6.	INTERFACE	B– BT81x
7.	FRAME	N – No Frame F – Mounting Frame
8.	BACKLIGHT TYPE	W – LED White
9.	TOUCH PANEL	N – No Touch Panel R – Resistive Touch Panel C – Capacitive Touch Panel
10.	VERSION	Ox (00-99)

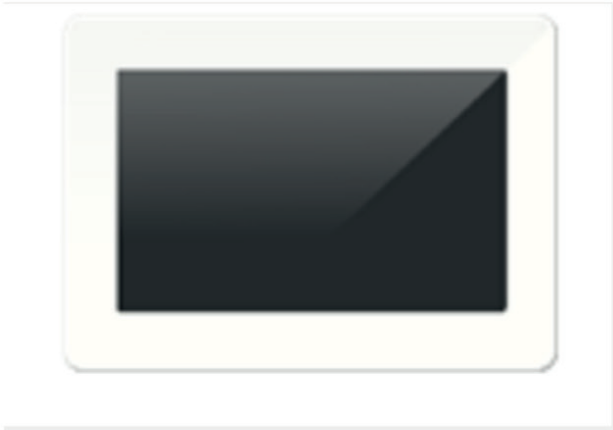
2. Assembly guide – integration

Three options of rear side adhesive tape are available: double side adhesive tape 0.2 mm with 3M 467MP glue, foam double side adhesive tape 0.5 mm with DST 3M 9495LE glue or without any tape. There are also two versions of glass color: black and white.

Rear side adhesive tape options :

		
Double side adhesive tape with DST 3M 9495LE glue (total thickness 0.2mm)	Foam double side adhesive tape with 3M 9495LE glue (total thickness 0.5mm)	Without tape

Cover glass color options :

	
BLACK	WHITE

Product options :

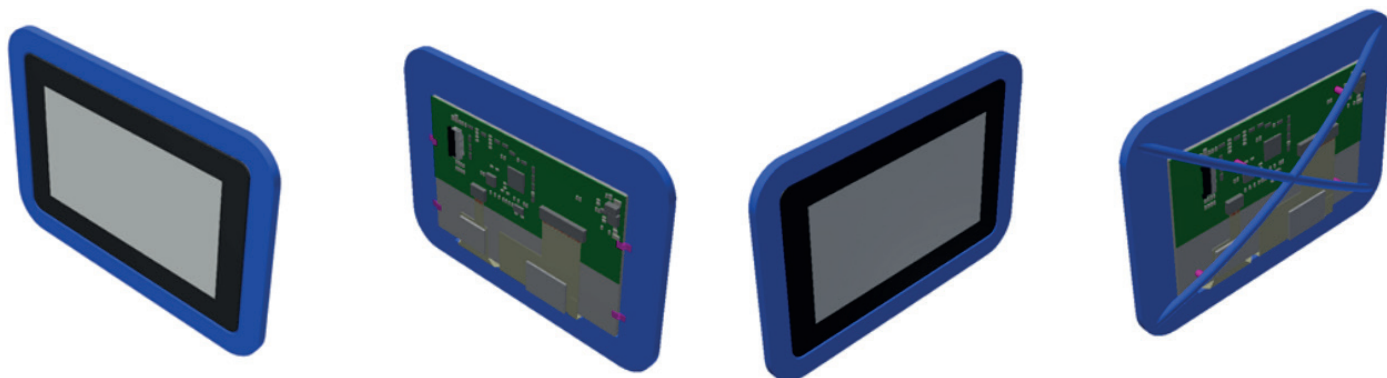
NAME OF THE PRODUCT	PART NUMBER	DESCRIPTION
RiTFT-70	RVT70AQBNWN00 V2	BT816, No mounting frame, No touch panel, Rev 2.0
RiTFT-70-RES	RVT70AQBNWR00 V2	BT816, No mounting frame, RTP, Rev 2.0
RiTFT-70-CAP	RVT70AQBNWC00 V2	BT815, No mounting frame, CTP, Rev 2.0
RiTFT-70-FR	RVT70AQBFWN00 V2	BT816, With mounting frame, No touch panel, Rev 2.0
RiTFT-70-RES-FR	RVT70AQBFWR00 V2	BT816, With mounting frame, RTP, Rev 2.0
RiTFT-70-CAP-FR	RVT70AQBFWC00 V2	BT815, With mounting frame, CTP, Rev 2.0
RiTFT-70-CAP-UX	RVT70UQBNWC00 V2	BT815, uxTouch, black cover glass, 0.2 mm DST, Rev 2.0
	RVT70UQBNWC01 V2	BT815, uxTouch, black cover glass, 0.5 mm DST, Rev 2.0
	RVT70UQBNWC02 V2	BT815, uxTouch, black cover glass, no DST, Rev 2.0
	RVT70UQBNWC03 V2	BT815, uxTouch, white cover glass, 0.2mm DST, Rev 2.0
	RVT70UQBNWC04 V2	BT815, uxTouch, white cover glass, 0.5 mm DST, Rev 2.0
	RVT70UQBNWC05 V2	BT815, uxTouch, white cover glass, no DST, Rev 2.0

2.1. UxTouch assembly

UxTouch are LCD TFT displays with specially designed projected capacitive touch panels. UxTouch display can be mounted without any hole in the housing. Our standard UxTouch displays include double-sided adhesive tape (DST) to stick TFT easily to the housing. Basic series include 4.3", 5.0" and 7.0" display sizes.

UxTouch models with double-side adhesive tape (PN with endings 00, 01, 03, 04) can be mounted by connecting the glass to the housing. Riverdi recommends to use support brackets assembled to display's back. An additional support will stiffen the whole structure and minimize the influence of external factors such as vibration. Figure 1 and Figure 2 below show examples of using support elements.

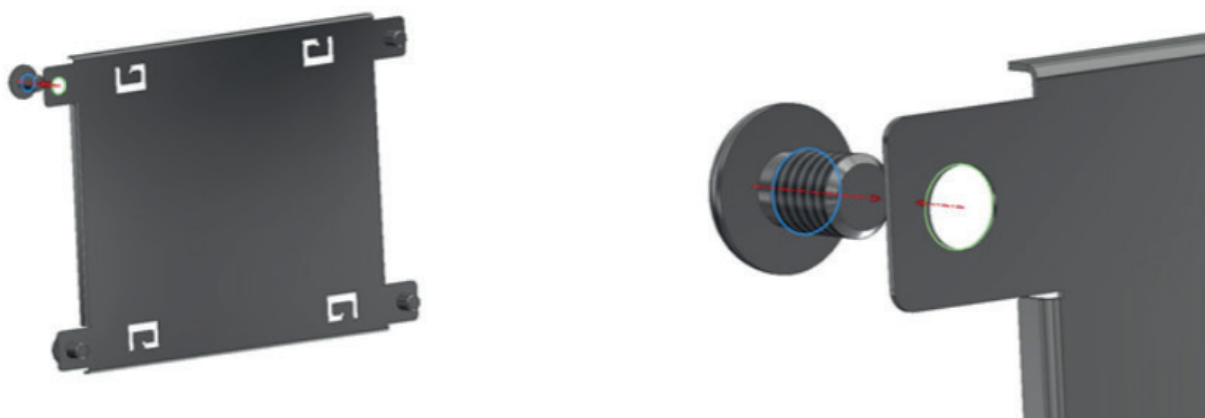
Figure 1. Example of using support brackets



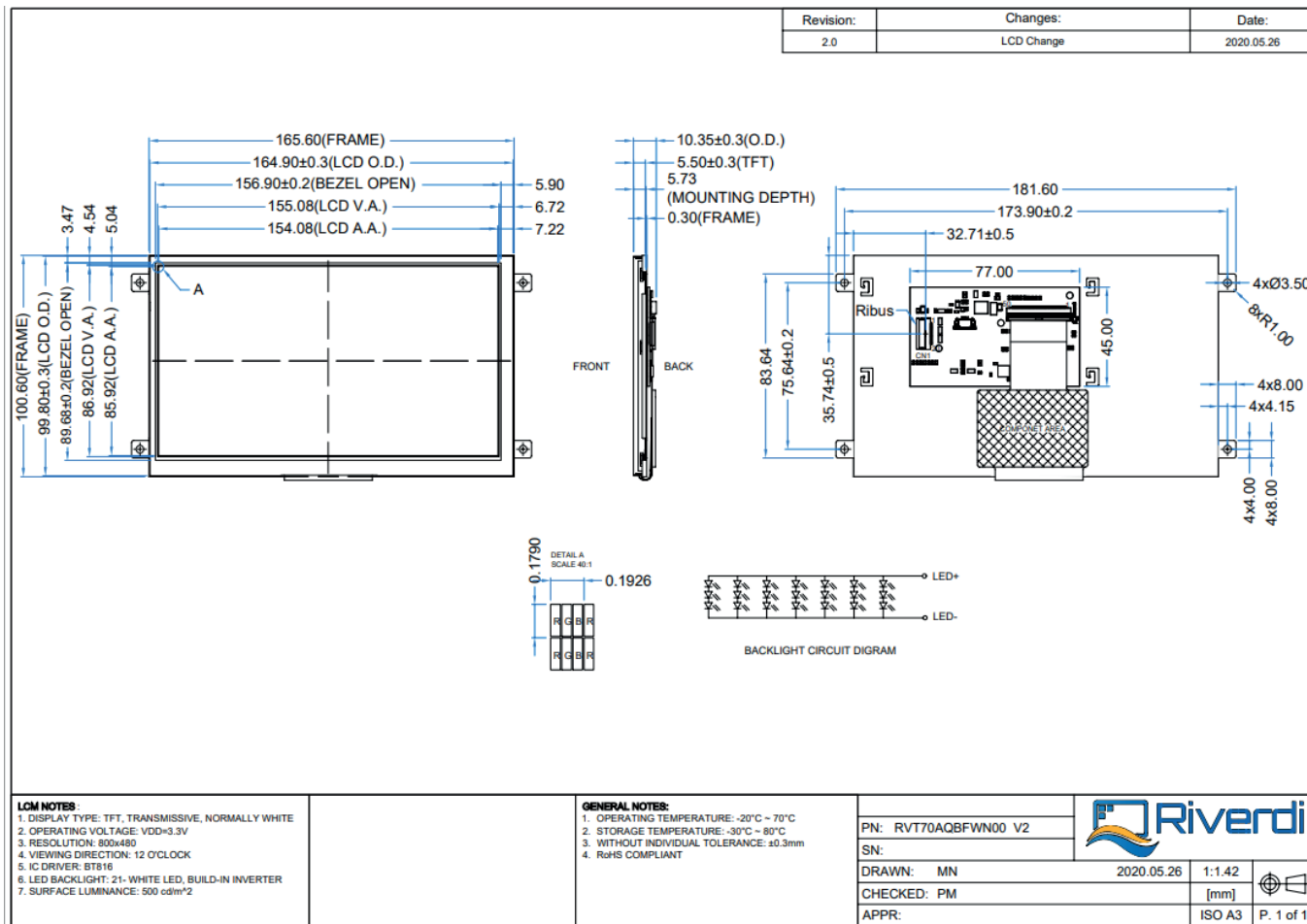
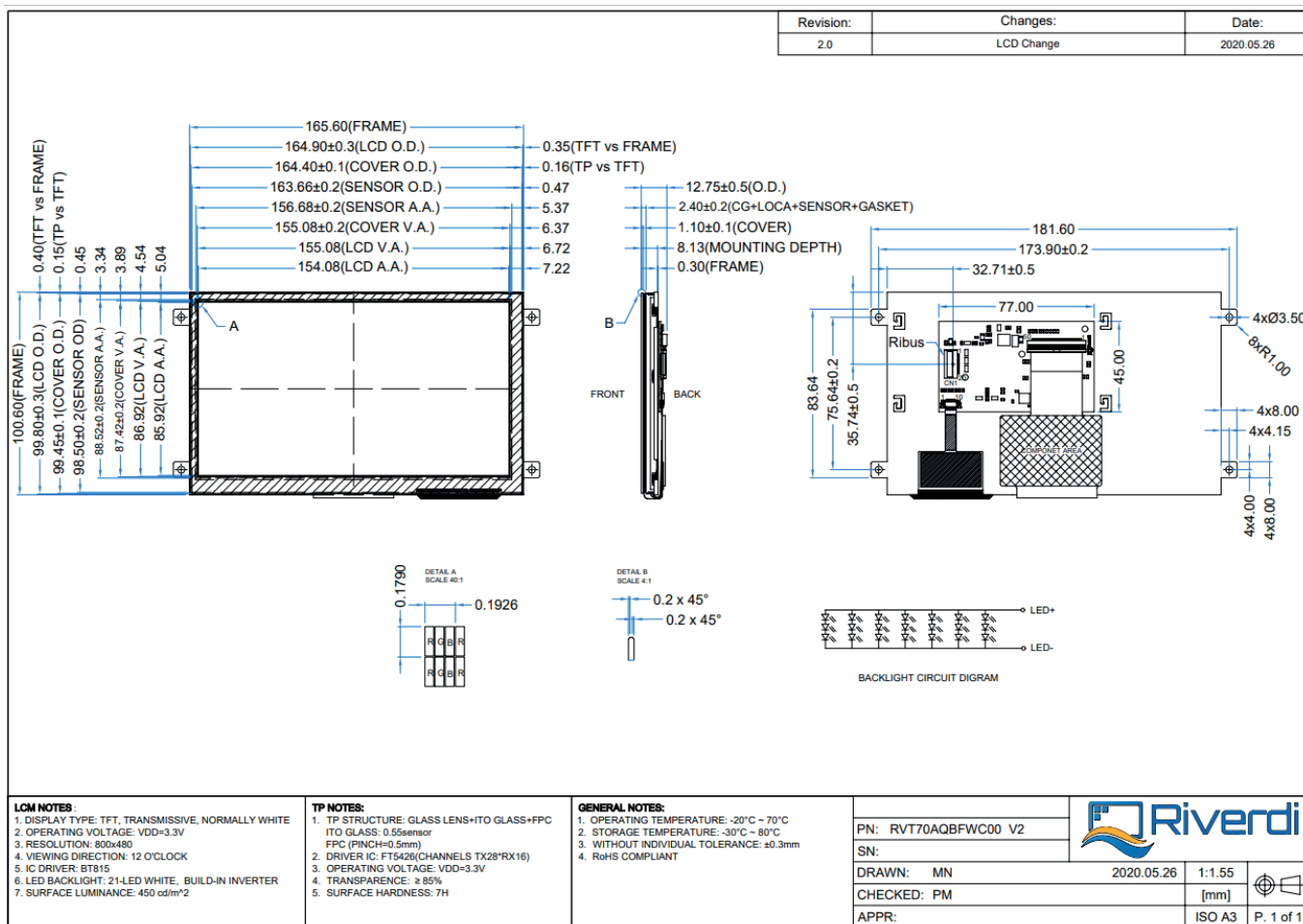
2.2. Mounting frame

For dimensions 3.5", 4.3", 5.0" and 7.0" the product with mounting frame version is available. Thanks to the four catches attached to the side, frame provides strong assembly to the surface by mounting element (like the screw, see Figure 3). The frames are specially designed to fit Riverdi products perfectly. The diameter of the mounting hole is 3.5mm.

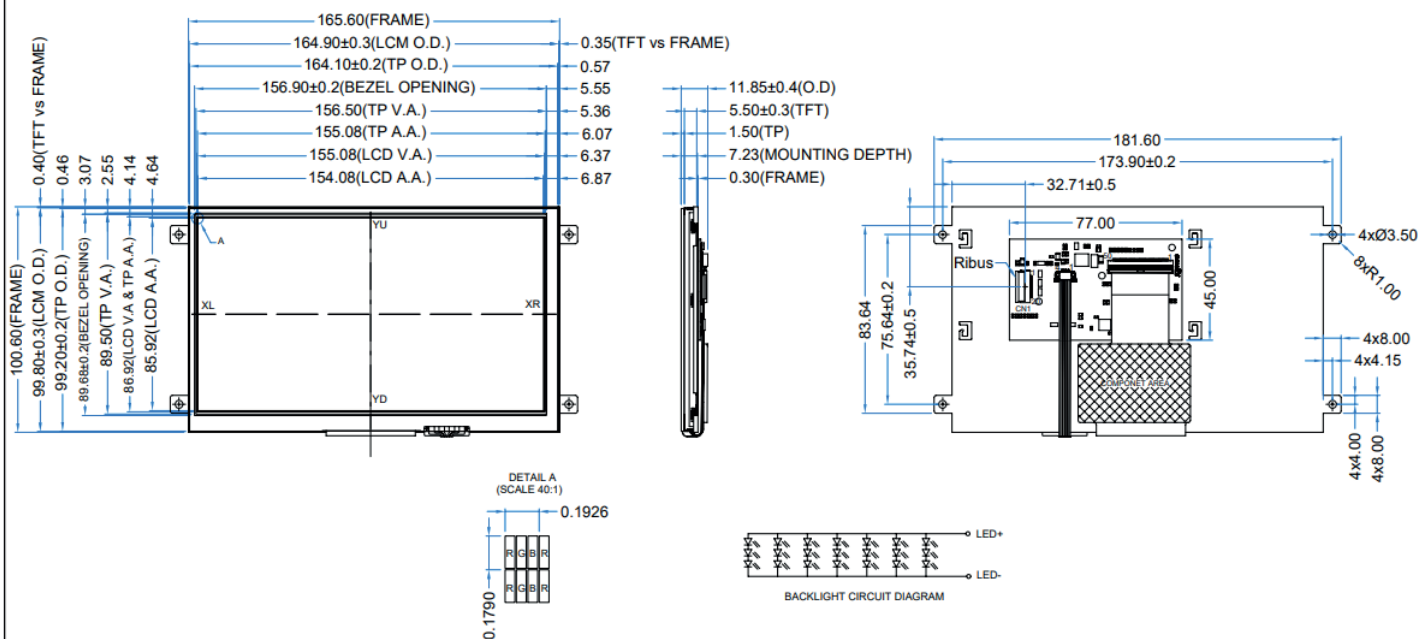
Figure 2. Mounting frame



3. Module drawing



Revision:	Changes:	Date:
2.0	LCD Change	2020.05.26



LCM NOTES:
 1. DISPLAY TYPE: TFT, TRANSMISSIVE, NORMALLY WHITE
 2. OPERATING VOLTAGE: VCC=3.3V
 3. RESOLUTION: 800x480
 4. VIEWING DIRECTION: 12 O'CLOCK
 5. IC DRIVER: BT816
 6. LED BACKLIGHT: 21-LED WHITE, BUILT-IN INVERTER
 7. SURFACE LUMINANCE: 400 cd/m²

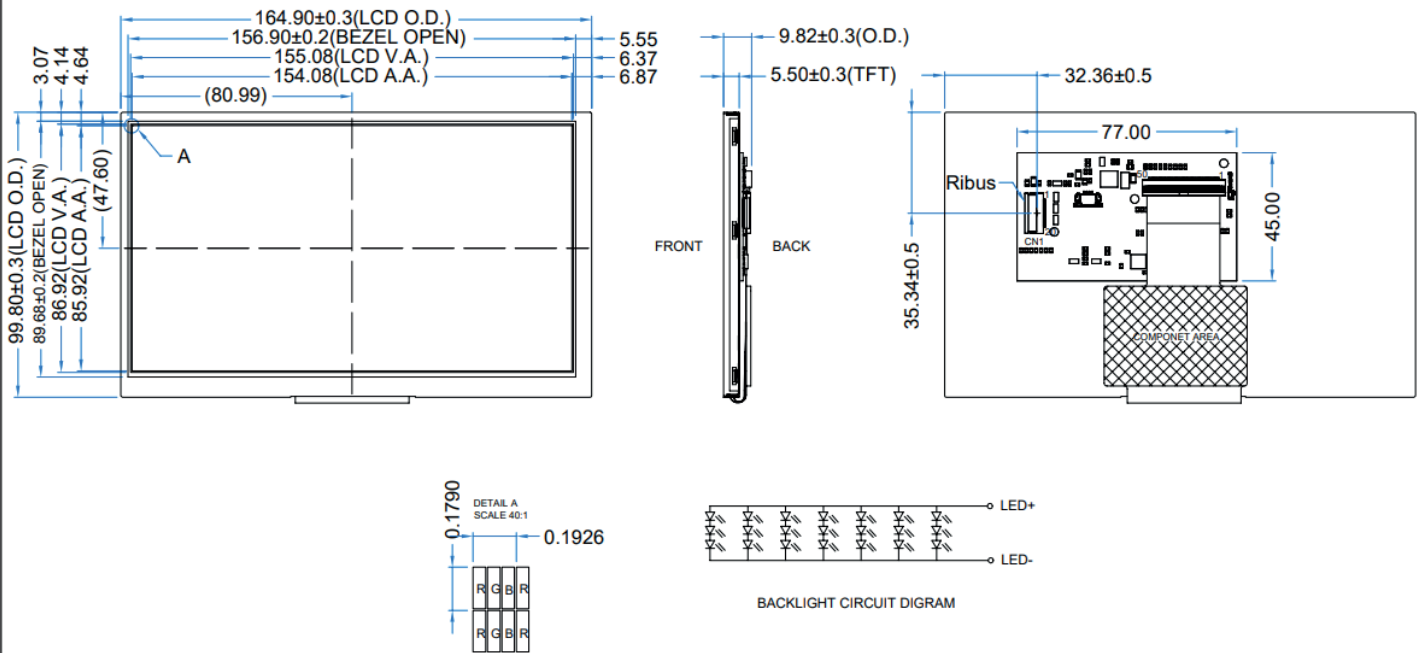
TP NOTES:
 1. TP STRUCTURE: FILM TO GLASS, 4 ELECTRODE RESISTIVE TOUCH PANEL

GENERAL NOTES:
 1. OPERATING TEMPERATURE: -20°C ~ 70°C
 2. STORAGE TEMPERATURE: -30°C ~ 80°C
 3. WITHOUT INDIVIDUAL TOLERANCE: ±0.3mm
 4. RoHS COMPLIANT

PN: RVT70AQBFWR00 V2
 SN:
 DRAWN: MN
 CHECKED: PM
 APPR:

Riverdi
 2020.05.26 1:1.6
 [mm]
 ISO A3 P. 1 of 1

Revision:	Changes:	Date:
2.0	LCD Change	2020.05.26

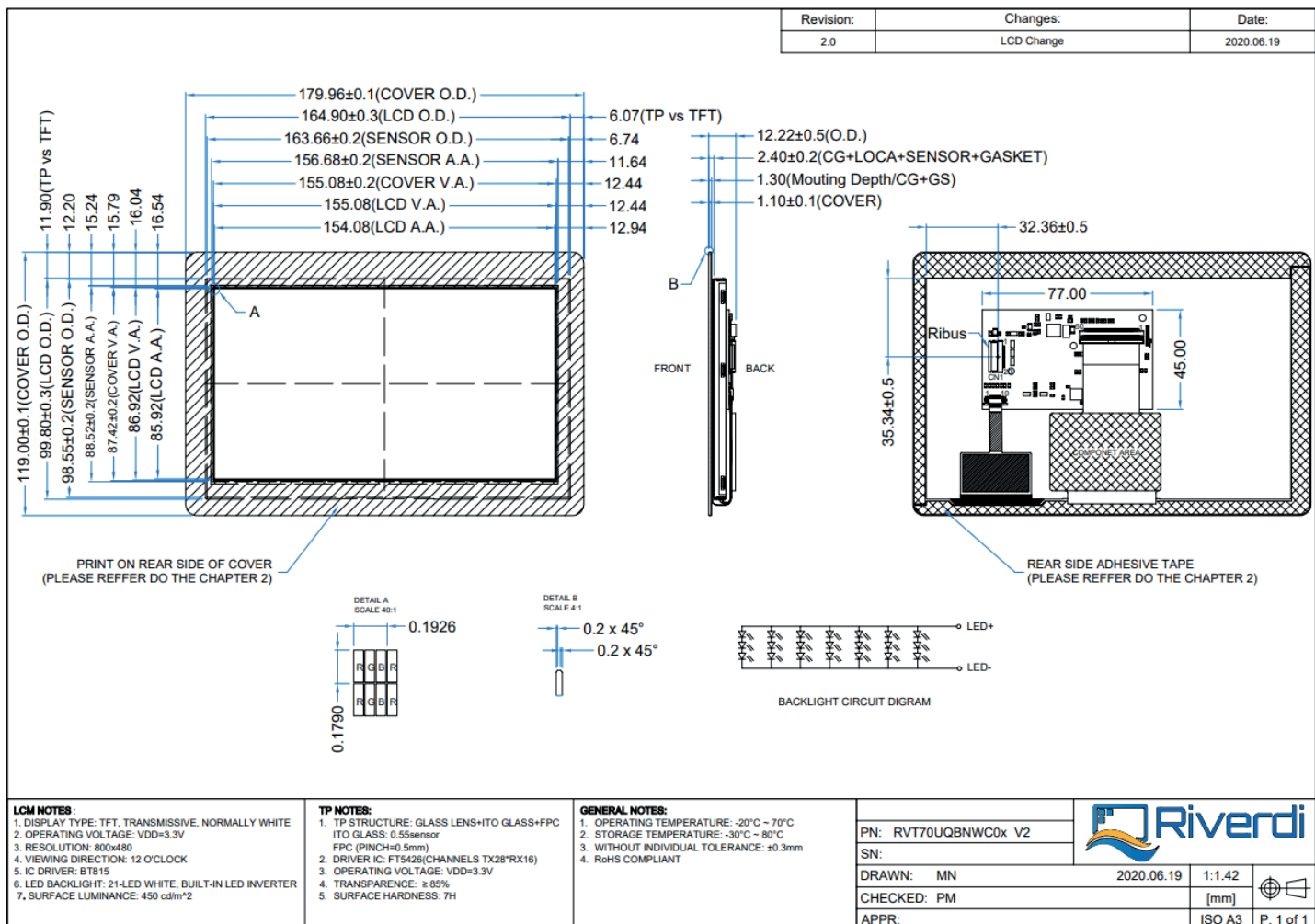
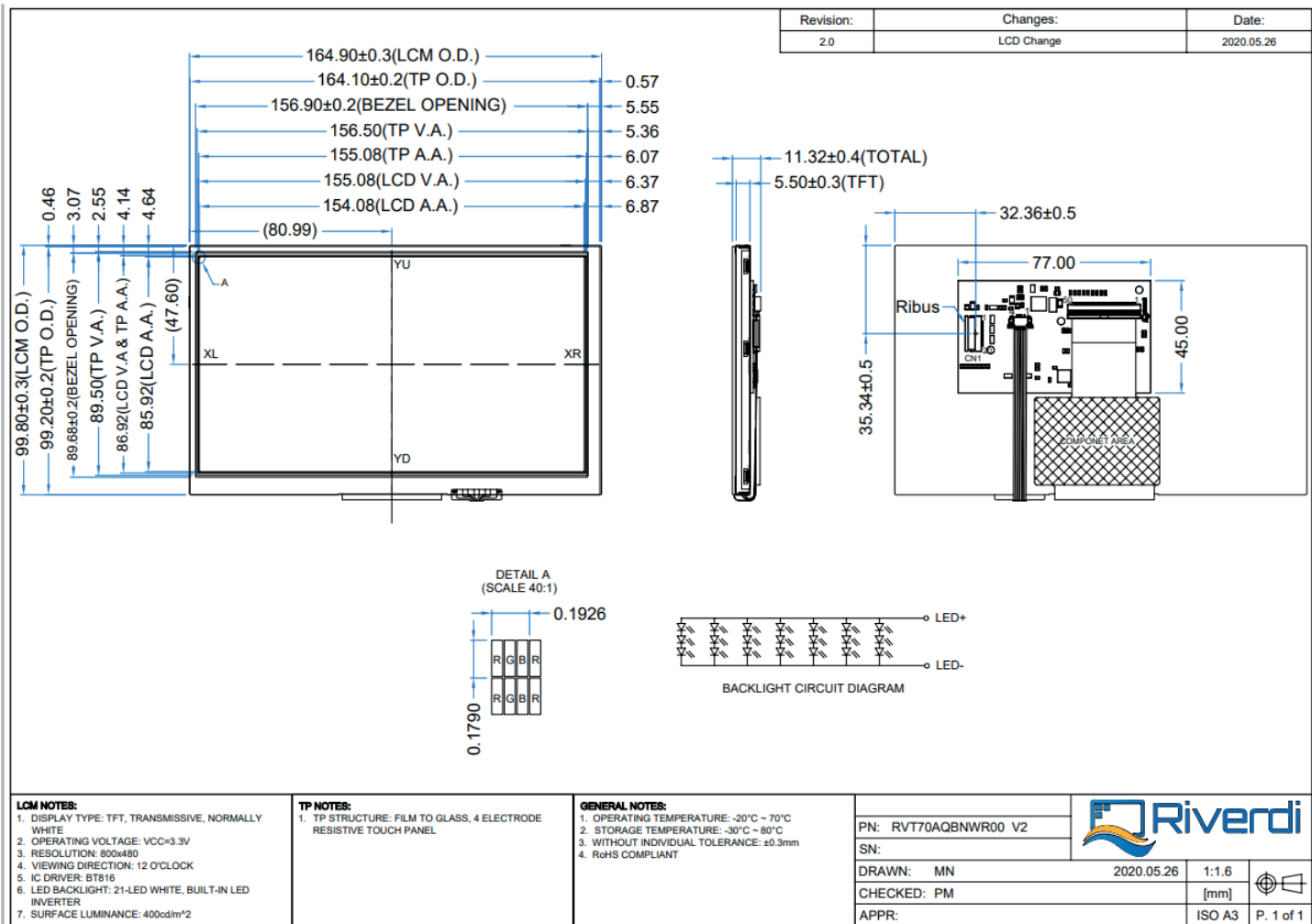


LCM NOTES:
 1. DISPLAY TYPE: TFT, TRANSMISSIVE, NORMALLY WHITE
 2. OPERATING VOLTAGE: VDD=3.3V
 3. VIEWING DIRECTION: 12 O'CLOCK
 4. IC DRIVER: BT816
 5. LED BACKLIGHT: 21-LED WHITE, BUILT-IN INVERTER
 6. SURFACE LUMINANCE: 500 cd/m²

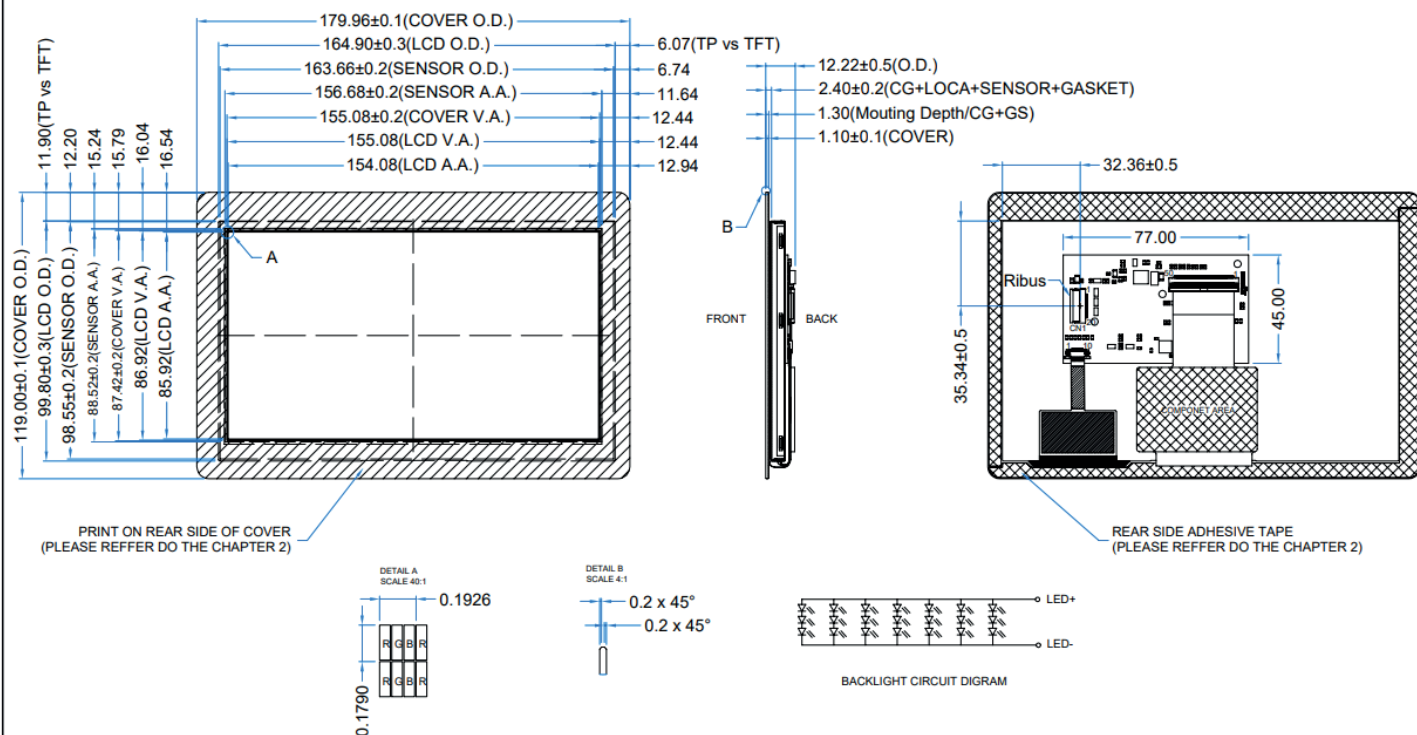
GENERAL NOTES:
 1. OPERATING TEMPERATURE: -20°C ~ 70°C
 2. STORAGE TEMPERATURE: -30°C ~ 80°C
 3. WITHOUT INDIVIDUAL TOLERANCE: ±0.3mm
 4. RoHS COMPLIANT

PN: RVT70AQBWN00 V2
 SN:
 DRAWN: MN
 CHECKED: PM
 APPR:

Riverdi
 2020.05.26 1:1.20
 [mm]
 ISO A3 P. 1 of 1



Revision:	Changes:	Date:
2.0	LCD Change	2020.06.19



LCM NOTES: 1. DISPLAY TYPE: TFT, TRANSMISSIVE, NORMALLY WHITE 2. OPERATING VOLTAGE: VDD=3.3V 3. RESOLUTION: 800x480 4. VIEWING DIRECTION: 12 O'CLOCK 5. IC DRIVER: BT815 6. LED BACKLIGHT: 21-LED WHITE, BUILT-IN LED INVERTER 7. SURFACE LUMINANCE: 450 cd/m ²	TP NOTES: 1. TP STRUCTURE: GLASS LENS+ITO GLASS+FPC ITO GLASS: 0.55sensor FPC (PINCH=0.5mm) 2. DRIVER IC: FT5426(CHANNELS TX28*RX16) 3. OPERATING VOLTAGE: VDD=3.3V 4. TRANSPARENCE: ≥ 85% 5. SURFACE HARDNESS: 7H	GENERAL NOTES: 1. OPERATING TEMPERATURE: -20°C ~ 70°C 2. STORAGE TEMPERATURE: -30°C ~ 80°C 3. WITHOUT INDIVIDUAL TOLERANCE: ±0.3mm 4. RoHS COMPLIANT					
			PN: RVT70UQBNWC0x V2				
			SN:				
			DRAWN: MN	2020.06.19	1:1.42		
			CHECKED: PM		[mm]		
			APPR:		ISO A3	P. 1 of 1	

4. Absolute maximum ratings

PARAMETER	SYMBOL	MIN	MAX	UNIT
Supply Voltage for Logic	VDD	-0.3	5.0	V
Supply Voltage for LED Inverter	BLVDD	0	7.0	V
LED forward current (each LED)	IF	–	30	mA
Operating Temperature	T _{OP}	-20	70	°C
Storage Temperature	T _{ST}	-30	80	°C
Humidity	RH	–	90% (Max 60°C)	RH

5. Electrical characteristics

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	NOTES
Supply Voltage For Module	VDD	3.0	3.3	3.6	V	
Input Voltage for LED Inverter	BLVDD	2.8	5.0	5.5	V	
LED Backlight Current	IDDbacklight	–	290	363	mA	BLVDD=3.3V
LED Backlight Current	IDDbacklight	–	180	225	mA	BLVDD=5V
Input Voltage ' H ' level	V _{IH}	0.8VDD	–	VDD	V	
Input Voltage ' L ' level	V _{IL}	0	–	0.2VDD	V	
Input Current	I _{In}		TBD		mA	
Input Current for module with CTP	I _{InC}		TBD		mA	

6. Backlight characteristics

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
Voltage for LED backlight	V _I	8.4	9.6	10.8	V
Current for LED backlight	I _I		180		mA
LED Life Time	–	30000	50000	–	H _{rs}

Note : The LED Supply Voltage is defined by the numbers of LED at Ta=25°C and IL= 40mA.

7. Electro-optical characteristics

ITEM		SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	REMARK	NOTE
Response Time		Tr+Tf	$\theta=0^{\circ}$ $\varnothing=0^{\circ}$ Ta=25	–	20	35	ms	Figure 4	4
Contrast Ratio		Cr		400	500	–	—	Figure 5	1
Luminance Uniformity		δ WHITE		70	75	–	%	Figure 5	3
Surface Luminance	TFT	Lv		400	500	–	cd/m^2	Figure 5	2
	TFT+CTP			360	450	–			
	TFT+RTP		320	400	–				
Viewing Angle Range		θ	∅ = 90°	40	50	–	deg	Figure 6	6
			∅ = 270°	60	70	–	deg	Figure 6	
			∅ = 0°	60	70	–	deg	Figure 6	
			∅ = 180°	60	70	–	deg	Figure 6	
CIE (x, y) Chromaticity	Red	x	$\theta=0^{\circ}$ $\varnothing=0^{\circ}$ Ta=25	0.522	0.572	0.622	Figure 6	5	
		y		0.300	0.350	0.400			
	Green	x		0.311	0.361	0.411			
		y		0.526	0.576	0.626			
	Blue	x		0.097	0.147	0.197			
		y		0.038	0.088	0.138			
	White	x		0.266	0.316	0.366			
		y		0.266	0.316	0.366			

Note 1. Contrast Ratio(CR) is defined mathematically as below, for more information see Figure 4 .

$$\text{Contrast Ratio} = \frac{\text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Average Surface Luminance with all black pixels (P1, P2, P3, P4, P5)}}$$

Note 2. Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information, see Figure 4 .

$$Lv = \text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}$$

Note 3. The uniformity in surface luminance δ WHITE is determined by measuring luminance at each test position 1 through 5, and then dividing the maximum luminance of 5 points luminance by minimum luminance of 5 points luminance. For more information, see Figure 4 .

$$\delta \text{ WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Maximum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}$$

Note 4. Response time is the time required for the display to transition from white to black (Rise Time, Tr) and from black to white (Decay Time, Tf). For additional information see FIG 1. The test equipment is Autronic-Melchers's ConoScope series.

Note 5. CIE (x, y) chromaticity, the x, y value is determined by measuring luminance at each test position 1 through 5, and then make average value.

Note 6. Viewing angle is the angle at which the contrast ratio is greater than 2. For TFT module the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see Figure 4.

Note 7. For viewing angle and response time testing, the testing data is based on Autronic-Melchers's ConoScope series. Instruments for Contrast Ratio, Surface Luminance, Luminance Uniformity, CIE the test data is based on TOPCON's BM-5 photo detector.

Note 8. For TFT module, Gray scale reverse occurs in the direction of panel viewing angle.

Figure 3. The definition of response time

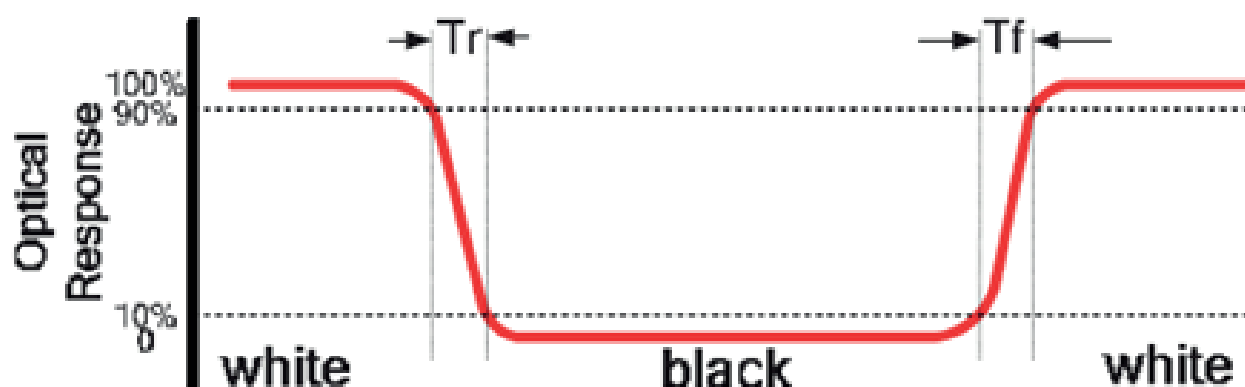


Figure 4. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x, y) chromaticity

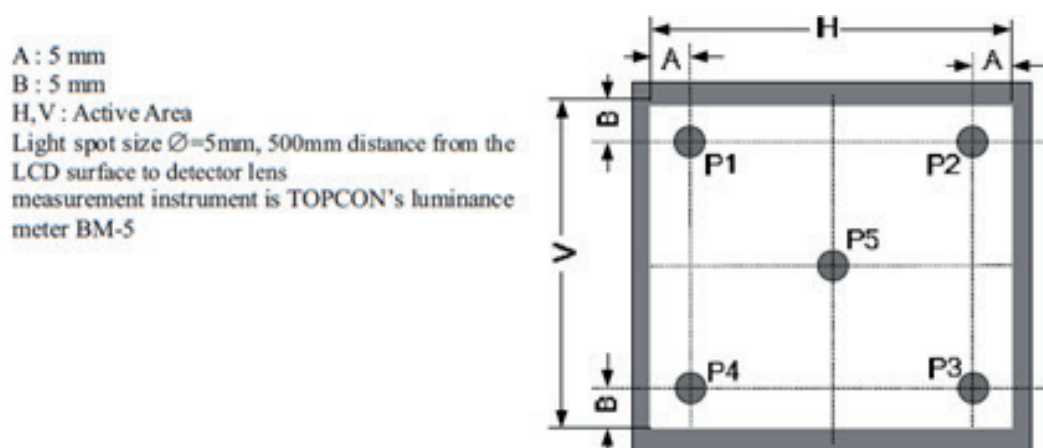
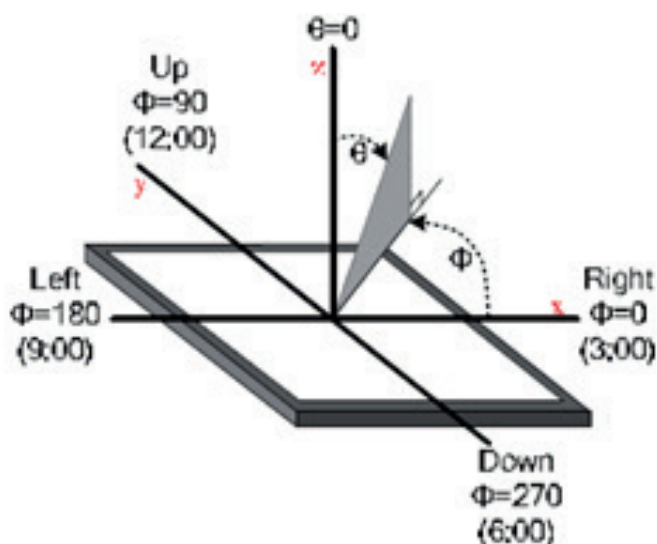


Figure 5. The definition of viewing angle



8. Interface description

PIN NO.	SYMBOL	DESCRIPTION
1	VDD	Power Supply
2	GND	Ground
3	SPI_SCLK	SPI SCK Signal, Internally 47k Pull UP
4	MISO/ IO1	SPI MISO Signal / SPI Quad mode: SPI data line 1
5	MOSI/ IO0	SPI MOSI Signal / SPI Quad mode: SPI data line 0
6	CS	SPI Chip Select Signal , Internally 47k Pull UP
7	INT	Interrupt Signal, Active Low, Internally 47k Pull UP
8	PD	Power Down Signal, Active Low, Internally 47k Pull UP
9	NC	Not Connected
10	AUDIO_OUT	Audio Out Signal
11	GPIO0/IO2	SPI Single mode: General purpose IO0/ SPI Quad mode: SPI data line 2
12	GPIO1/IO3	SPI Single mode: General purpose IO1/ SPI Quad mode: SPI data line 3
13	GPIO2	General purpose IO2
14	GPIO3	General purpose IO3 or analog input for ADC
15	NC	Not Connected
16	NC	Not Connected
17	BLVDD	Backlight Power Supply, Can Be Connected to VDD
18	BLVDD	Backlight Power Supply, Can Be Connected to VDD
19	BLGND	Backlight Ground, Internally connected to GND
20	BLGND	Backlight Ground, Internally connected to GND

9. BT8x Controller specifications

BT8x or EVE3 (Embedded Video Engine 3) simplifies the system architecture for advanced human machine interfaces (HMI) by providing functionality for display, audio, and touch as well as an object oriented architecture approach that extends from display creation to the rendering of the graphics.

9.1. Serial host interface

Figure 6. SPI interface connection

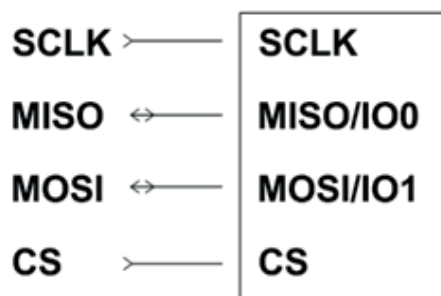
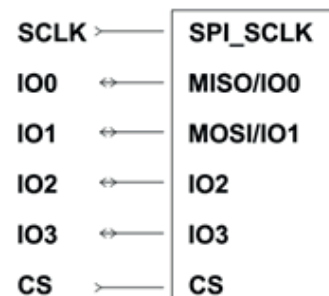


Figure 7. QSPI interface connection



SPI Interface – the SPI slave interface operates up to 30MHz.

Only SPI mode 0 is supported. The SPI interface is selected by default (MODE pin is internally pulled low by 47k resistor).

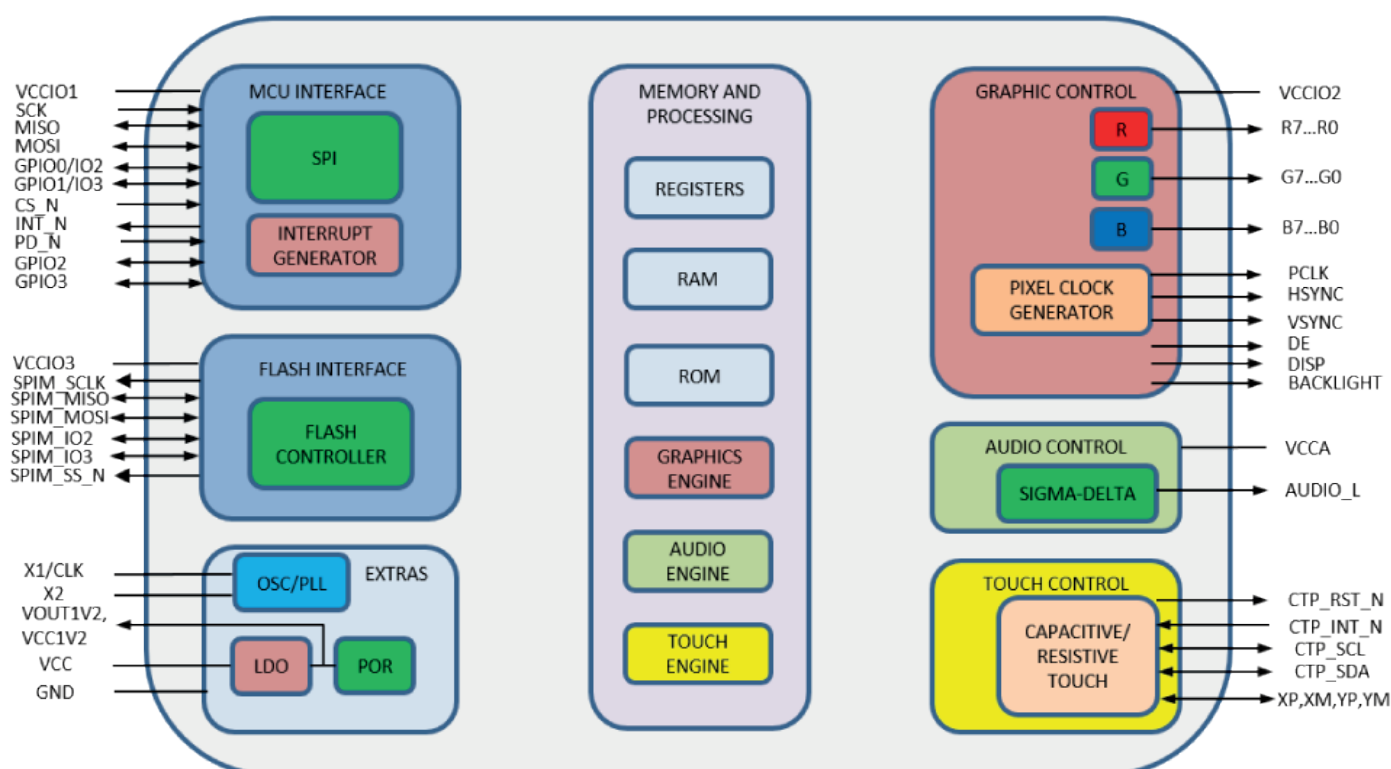
QSPI Interface – the QSPI slave interface operates up to 30MHz. Only SPI mode 0 is supported.

The QSPI can be configured as a SPI slave in SINGLE, DUAL or QUAD data bus modes.

By default the SPI slave operates in the SINGLE channel mode with MOSI as input from the master and MISO as output to the master. DUAL and QUAD channel modes can be configured through the SPI slave itself. To change the channel modes, write to register REG_SPI_WIDTH.

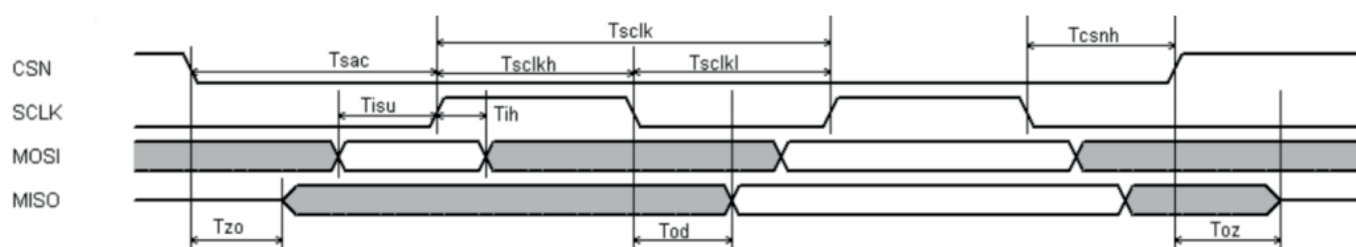
9.2. Block diagram

Figure 8. BT8x Block diagram



9.3. Host Interface SPI mode 0

Figure 9. SPI timing diagram



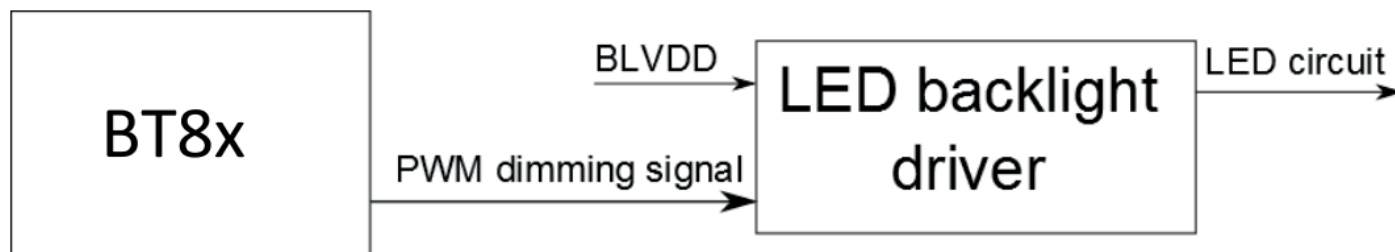
For more information about BT8x controller please go to official BT8x website.

<https://www.ftdichip.com/Products/ICs/BT81X.html>

9.4. Backlight driver block diagram

Backlight enable signal is internally connected to BT8x Backlight control pin. This pin is controlled by two BT8x's registers. One of them specifies the PWM output frequency, second one specifies the duty cycle. Refer to BT8x datasheet for more information.

Figure 10. Backlight driver block diagram



10. LCD timing characteristics

10.1. Clock and data input time diagram

Figure 11. Horizontal Input timing diagram

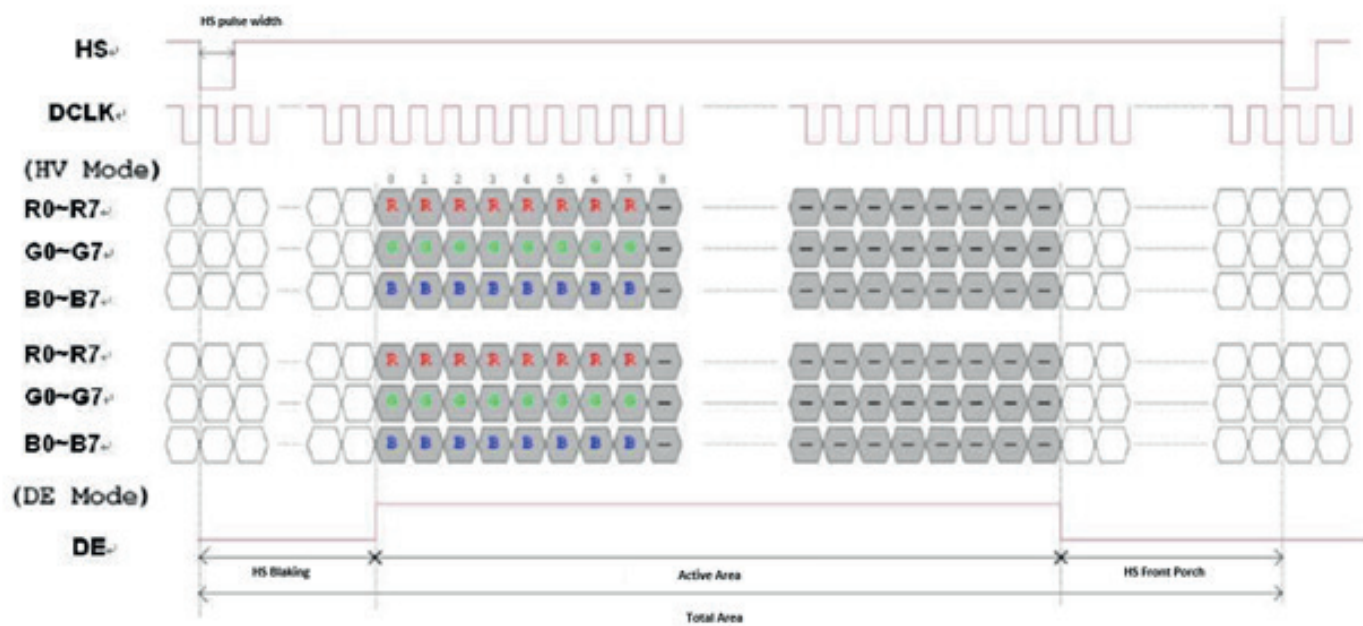
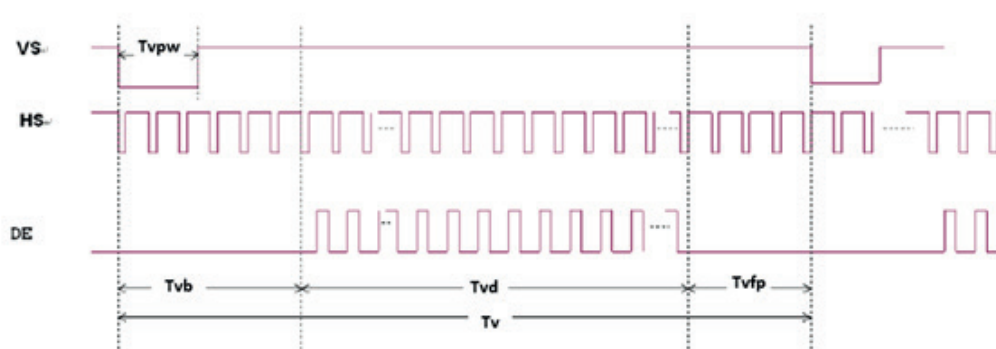


Figure 12. Vertical input timing diagram



10.2. Parallel RGB timing table

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Horizontal Display Area	T _{hd}	–	800	–	DCLK
DCLK Frequency	F _{clk}	26.0	30.0	36.0	MHz
One Horizontal Line	T _h	1026	1056	1086	DCLK
HS pulse width	T _{h_{pw}}	–	30	–	DCLK
HS Blanking	T _{hb}	–	16	–	DCLK
HS Front Porch	T _{h_{fp}}	180	210	240	DCLK
Vertical Display Area	T _{vd}	–	480	–	TH
VS period time	T _v	515	525	535	TH
VS pulse width	T _{v_{pw}}	–	13	1	TH
VS Blanking	T _{vb}	–	10	–	TH
VS Front Porch	T _{v_{fp}}	12	22	32	TH

11. Touch panel specifications

11.1. Electrical characteristics

Note : Avoid operating with hard or sharp material such as a ball point pen or a mechanical pencil except a polyacetal pen (tip R0.8mm or less) or a finger

11.1.1. For capacitive touch panel

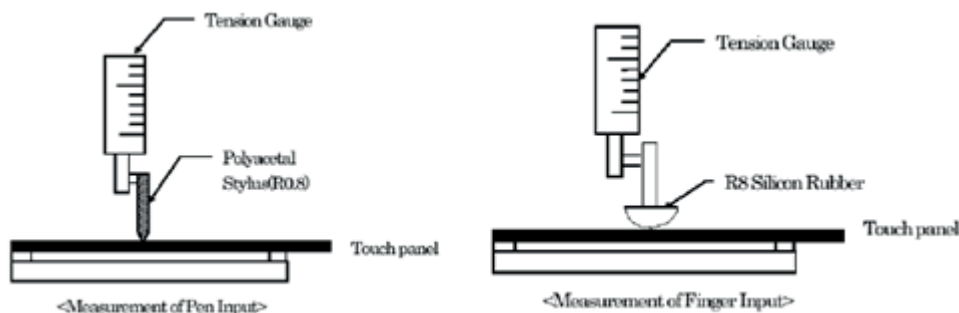
DESCRIPTION		SPECIFICATION
Operating Voltage		DC 2.8~3.6V
Power Consumption (IDD)	Active Mode	TBD μ A
	Sleep Mode	TBD μ A
Interface		I ² C
Linearity		<1.5%
Controller		FT5426
I2C address		0x38 (7 bit address)
Resolution		1792*1024

11.1.2. For resistive touch panel

ITEM	VALUE			UNIT	REMARK
	Min.	Typ.	Max.		
Linearity	-3.0	–	3.0	%	Analog X and Y directions
Terminal Resistance	440	–	1000	Ω	X
	100	–	420	Ω	Y
Insulation Resistance	25	–	–	M Ω	DC DC 25V
Voltage	–	–	10	V	DCDC
Chattering	–	–	10	ms	100k Ω pull-up
Transparency	78	–	–	%	JIS K7105

11.2. Mechanical characteristics

Note 1 : Force test condition, Input DC 5V on X direction, Drop off Polyacetal Stylus (R0.8), until output voltage stabilize, then get the R8.0mm Silicon rubber and do finger Activation force test. Next step, 9 points.



Note 2 : Measurement surface area conditions, Scratch 100,000 times straight line on the film with a stylus change every 20,000 times with Force: 250gf, Speed: 60mm/sec by R0.8 polaceteal stylus.

Note 3 : Pitting test, Pit 1, 000, 000 times on the film with R0.8 silicon rubber with Force: 250gf and Speed: 2 times/sec.

11.2.1 for capacitive touch panel

DESCRIPTION	INL SPECIFICATION	REMARK
Touch Panel Size	7.0 inch	
Outline Dimension (OD)	164.4 mm x 99.45 mm	Cover Lens Outline
Outline Dimension (OD) – UxTouch	179.96 x 119.0mm	Cover Lens Outline
Product Thickness	2.3 mm	
Glass Thickness	1.1 mm	
Ink View Area	155.08mm x 87.42mm	
Sensor Active Area	156.68mm x 88.52mm	
Input Method	5 Finger	
Activation Force	Touch	
Surface Hardness	≥7H	

11.2.2. For resistive touch panel

Note 1 : Force test condition, Input DC 5V on X direction, drop off Polyacetal Stylus (R0.8), until output voltage stabilize, then get the R8.0mm Silicon rubber and do finger Activation force test. Next step, 9 points.

ITEM	VALUE			UNIT	REMARK
	Min.	Typ.	Max.		
Activation Force	20	–	100	gf	Note 1
Durability-Surface Scratching	Write 100,000	–	–	characters	Note 2
Durability-Surface Pitting	1,000,000	–	–	touches	Note 3
Surface Hardness	3	–	–	H	JIS K5400

12. Inspection

Standard acceptance/rejection criteria for TFT module.

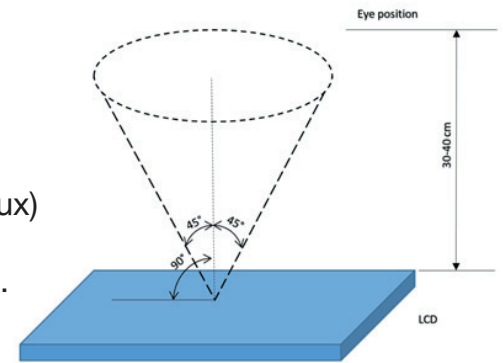
12.1. Inspection condition

Ambient conditions :

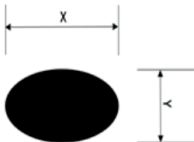
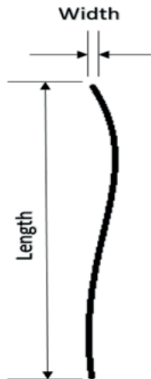
- Temperature: $25 \pm 0.5^\circ\text{C}$
- Humidity: $(60 \pm 10) \% \text{RH}$
- Illumination: Single fluorescent lamp non-directive (300 to 700 lux)

Viewing distance : $35 \pm 5 \text{ cm}$ between inspector bare eye and LCD.

Viewing Angle : U/D: $45^\circ/45^\circ$, L/R $45^\circ/45^\circ$



12.2 Inspection standard

Item	Criterion																																			
Black spots, white spots, light leakage, Foreign Particle (round Type)	$D = \frac{(x + y)}{2}$ *Spots density: 10 mm	<table><tr><th colspan="2">Size < 5"</th></tr><tr><th>Average Diameter</th><th>Qualified Qty</th></tr><tr><td>D < 0.2 mm</td><td>Ignored</td></tr><tr><td>0.2 mm < D < 0.3 mm</td><td>3</td></tr><tr><td>0.3 mm < D < 0.5 mm</td><td>2</td></tr><tr><td>0.5 mm < D</td><td>0</td></tr></table> <table><tr><th colspan="2">Size >= 5"</th></tr><tr><th>Average Diameter</th><th>Qualified Qty</th></tr><tr><td>D<0.2 mm</td><td>Ignored</td></tr><tr><td>0.2 mm < D < 0.3 mm</td><td>4</td></tr><tr><td>0.3 mm < D < 0.5 mm</td><td>2</td></tr><tr><td>0.5 mm < D</td><td>0</td></tr></table>	Size < 5"		Average Diameter	Qualified Qty	D < 0.2 mm	Ignored	0.2 mm < D < 0.3 mm	3	0.3 mm < D < 0.5 mm	2	0.5 mm < D	0	Size >= 5"		Average Diameter	Qualified Qty	D<0.2 mm	Ignored	0.2 mm < D < 0.3 mm	4	0.3 mm < D < 0.5 mm	2	0.5 mm < D	0										
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LCD black spots, white spots, light leakage (line Type)	 *Spots density: 10 mm	<table><tr><th colspan="3">Size < 5"</th></tr><tr><th>Length</th><th>Width</th><th>Qualified Qty</th></tr><tr><td>–</td><td>W< 0.02</td><td>Ignored</td></tr><tr><td>L < 3.0</td><td>0.02 < W <0.05</td><td rowspan="2">2</td></tr><tr><td>L < 2.5</td><td>0.05 < W <0.08</td></tr><tr><td>–</td><td>0.08 < W</td><td>0</td></tr></table> <table><tr><th colspan="3">Size >= 5"</th></tr><tr><th>Length</th><th>Width</th><th>Qualified Qty</th></tr><tr><td>–</td><td>W< 0.02</td><td>Ignored</td></tr><tr><td>L < 3.0</td><td>0.02 < W <0.05</td><td rowspan="2">4</td></tr><tr><td>L < 2.5</td><td>0.05 < W <0.08</td></tr><tr><td>–</td><td>0.08 < W</td><td>0</td></tr></table>	Size < 5"			Length	Width	Qualified Qty	–	W< 0.02	Ignored	L < 3.0	0.02 < W <0.05	2	L < 2.5	0.05 < W <0.08	–	0.08 < W	0	Size >= 5"			Length	Width	Qualified Qty	–	W< 0.02	Ignored	L < 3.0	0.02 < W <0.05	4	L < 2.5	0.05 < W <0.08	–	0.08 < W	0
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13. Reliability test

NO.	TEST ITEM	TEST CONDITION	REMARKS
1	High Temperature Storage	80±2°C/240hours	Note 2
2	Low Temperature Storage	-30±2°C/240hours	Note 1,2
3	High Temperature Operating	70±2°C/240hours	
4	Low Temperature Operating	-20±2°C/240hours	Note 1
5	Temperature Cycle	-30±2°C~25±2°C ~80±2°C × 20 cycles (30min.) (5min.) (30min.)	Note 1,2
6	Damp Proof Test	60°C ±5°C , 90%RH/240hours	
7	Vibration Test	Frequency 10Hz~55Hz Amplitude of vibration : 1.5mm Sweep time: 11 min X, Y, Z 2 hours for each direction.	
8	Package Drop Test	Height:60 cm 1 corner, 3 edges, 6 surfaces	
9	ESD Test	Air: ±8KV 150pF/330Ω 5 times Contact: ±4KV 150pF/330Ω 5 times	
10	ESD Test for RTP	Air: ±8KV 150pF/330Ω 5 times Contact: ±4KV 150pF/330Ω 5 times	

Note 1 : Without water condensation.

Note 2 : The function test shall be conducted after 2 hours storage at the room temperature and humidity after removed from the test chamber.