



## TFT DISPLAY MODULE DATA SHEET

Data Sheet Release 2016-09-14  
for  
CFAF480640B-035T-TS

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### ■ GENERAL INFORMATION

Item of general information	Contents	Unit
LCD type	TFT TRANSFLECTIVE,NORMALLY WHITE	/
Recommended Viewing Direction	12:00	O' Clock
Module area (W × H×T)	63.50×85.50×4.33	mm <sup>3</sup>
Viewing area (W×H)	55.57×73.42	mm <sup>2</sup>
Active area (W×H)	53.57×71.42	mm <sup>2</sup>
Number of Dots	480RGB×640	/
Pixel pitch (W × H)	0.1116×0.1116	mm <sup>2</sup>
Driver IC	HX8363-A	/
Interface Type	RGB interface	/
Input voltage	3.3	V
Module Power consumption	838	mw
Backlight Type	LED	/

### ■ ABSOLUTE MAXIMUM RATINGS

Parameter of absolute maximum ratings	Symbol	Min	Max	Unit
Supply voltage for logic	VDD	-0.3	4.6	V
Input voltage	VIN	-0.3	VDD+0.3	V
Operating temperature	Top	-10	60	°C
Storage temperature	TST	-20	70	°C
Humidity	RH	-	90%(Max60 °C)	RH

### ■ ELECTRICAL CHARACTERISTICS

#### DC CHARACTERISTICS

Parameter of DC characteristics	Symbol	Min	Typ	Max	Unit
Supply voltage for logic	VDD	2.5	3.3	3.3	V
Input Current	I <sub>dd</sub>	-	37.65	75.3	mA
Input voltage 'H' level	V <sub>IH</sub>	0.7VDD	-	VDD	V
Input voltage 'L' level	V <sub>IL</sub>	0	-	0.3VDD	V
Output voltage 'H' level	V <sub>OH</sub>	0.8VDD	-	VDD	V
Output voltage 'L' level	V <sub>OL</sub>	0	-	0.2VDD	V

#### ■ BACKLIGHT CHARACTERISTICS

Item of backlight characteristics	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage	V <sub>f</sub>	26.0 (Typ)	29.5 (Typ)	33.0 (Typ)		I <sub>f</sub> =20mA
Forward current	I <sub>led</sub>		15 mA	20 mA		
Number of LED	-	-	10	-	Piece	-
Connection mode	S	-	Serial	-	-	-

Using condition: constant current driving method I<sub>f</sub>=20mA(+/-10%).

### CAUTION

Do not drive the LEDs at any current over their rated maximum of 20mA (15mA recommended for longer life). Be aware that the forward voltage of white LEDs can vary (LED to LED, batch to batch, and over time) by a significant amount. We recommend using a constant current LED power supply such as the AP3036, NCP5007, FAN5333, or similar to drive the LEDs. Do not use a constant voltage source to drive the LEDs.

If you have only +3.3v available and need to step up the power supply for the LED backlight, use a current feedback LED driver such as the Fairchild Semiconductor [FAN5333 \(www.fairchildsemi.com/pf/FA/FAN5333B.html\)](http://www.fairchildsemi.com/pf/FA/FAN5333B.html). One source for the FAN5333 is here: <http://search.digikey.com/scripts/DkSearch/dksus.dll?Cat=2556628&k=FAN5333>. The FAN5333 is good to +30v. Many similar drivers are available. By using a driver, you do not need a current limiting resistor. Here is the example circuit from the FAN5333 datasheet:

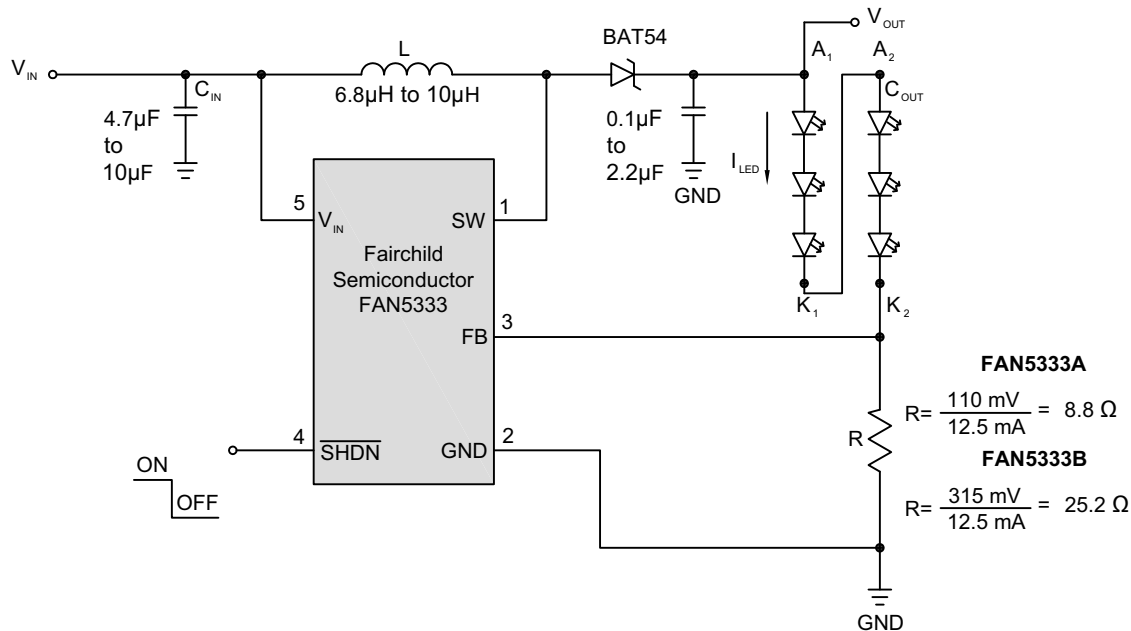


Figure 9. Circuit Example Using Feedback LED Driver



■ INTERFACE DESCRIPTION

Pin No.	Symbol	Level	Description	When no in use
1	VSS	0V	Ground	--
2	VSS	0V	Ground	--
3	VDD	3V	Power supply	--
4	VDD	3V	Power supply	--
5	VSS	0V	Ground	--
6	RESETB	H/L	Reset signal. Setting either pin low initializes LSI. Must be reset after power is supplied.	VSS/VDD
7	HSYNC	H/L	Line synchronizing signal.	VSS/VDD
8	VSYNC	H/L	Frame synchronizing signal	VSS/VDD
9	CLK	H/L	Dot clock signal.	VSS/VDD
10	VSS	0V	Ground	--
11	D00	H/L	Display data (B).	Open
12	D01	H/L		Open
13	D02	H/L		Open
14	D03	H/L		Open
15	D04	H/L		Open
16	D05	H/L		Open
17	D10	H/L	Display data (G).	Open
18	D11	H/L		Open
19	D12	H/L		Open
20	D13	H/L		Open
21	D14	H/L		Open
22	D15	H/L		Open
23	D20	H/L	Display data (R).	Open
24	D21	H/L		Open
25	D22	H/L		Open
26	D23	H/L		Open
27	D24	H/L		Open
28	D25	H/L		Open
29	VSS	0V	Ground	--
30	DE	H/L	A data ENABLE signal in RGB I/F mode.	VSS
31	NC	--	No connection.	--
32	TEST1	0V	Connect to ground.	--
33	XL	--	X-axis left terminal.	Open
34	YD	--	Y-axis downside terminal.	Open
35	XR	--	X-axis right terminal.	Open
36	YU	--	Y-axis upside terminal.	Open
37	TEST2	0V	Connect to ground.	--
38	BLH	--	LED anode.	--
39	BLL	--	LED cathode.	--

■ REFERENCE APPLICATION CIRCUIT

Please consult our technical department for detail information.



Item of electro-optical characteristics	Symbol	Condition	Min	Typ	Max	Unit	Remark	Note
Response time	Tr+ Tf	θ=0° ∅=0° Ta=25°C	-	31	47	ms	Fig.1	4
Contrast ratio	Cr		27	53	-	---	FIG 2.	1
Luminance uniformity	δ WHITE		77	86	-	%	FIG 2.	3
Surface Luminance	Lv		98	123	-	cd/m <sup>2</sup>	FIG 2.	2
Viewing angle range	θ	∅ = 90°	70	80	-	deg	FIG 3.	6
		∅ = 270°	27	37	-	deg	FIG 3.	
		∅ = 0°	15	25	-	deg	FIG 3.	
		∅ = 180°	31	41	-	deg	FIG 3.	
NTSC ratio	---	---	---	43	---	%	-	-
Reflectance	R%	---	---	6.74	---	%	-	-
CIE (x, y) chromaticity	Red x	θ=0° ∅=0° Ta=25°C	0.5255	0.5755	0.6255	-	FIG 2.	5
	Red y		0.3076	0.3576	0.4076	-		
	Green x		0.2928	0.3428	0.3928	-		
	Green y		0.5284	0.5784	0.6284	-		
	Blue x		0.1187	0.1687	0.2187	-		
	Blue y		0.0949	0.1449	0.1949	-		
	White x		0.2544	0.3144	0.3744	-		
	White y		0.2821	0.3421	0.4021	-		

Note1. Contrast Ratio(CR) is defined mathematically by the following formula. For more information see FIG 2.:

$$\text{Contrast Ratio} = \frac{\text{Average Surface Luminance with all white pixels (P 1,P2, P 3,P4, P5)}}{\text{Average Surface Luminance with all black pixels (P1, P2, P 3,P4, P5)}}$$

Note2. Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information see FIG 2.

$$L_v = \text{Average Surface Luminance with all white pixels (P1, P2, P 3,P4, P5)}$$

Note3. 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 FIG 2.

$$\delta \text{ WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels (P}_1, \text{P}_2, \text{P}_3, \text{P}_4, \text{P}_5)}{\text{Maximum Surface Luminance with all white pixels (P}_1, \text{P}_2, \text{P}_3, \text{P}_4, \text{P}_5)}$$

Note4. 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..

Note5. CIE (x, y) chromaticity ,The x,y value is determined by screen active area position 5. For more information see FIG 2.

Note6. 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 FIG 3.

Note7. For Viewing angle and response time testing, the testing data is base on Autronic-Melchers's ConoScope. Series Instruments. For contrast ratio, Surface Luminance, Luminance uniformity and CIE, the testing data is base on TOPCON's BM-5 photo detector.

Note8. For TFT transmissive module, Gray scale reverse occurs in the direction of panel viewing angle.



FIG.1. The definition of Response Time

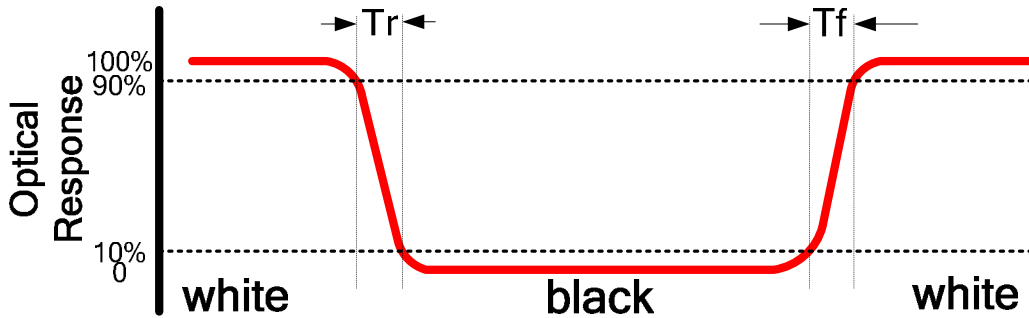


FIG.2. Measuring method for Contrast ratio, surface luminance, Luminance uniformity, CIE (x, y) chromaticity

A : 5 mm  
 B : 5 mm  
 H, V : Active Area  
 Light spot size  $\varnothing=5\text{mm}$ , 500mm distance from the LCD surface to detector lens  
 measurement instrument is TOPCON's luminance meter BM-5

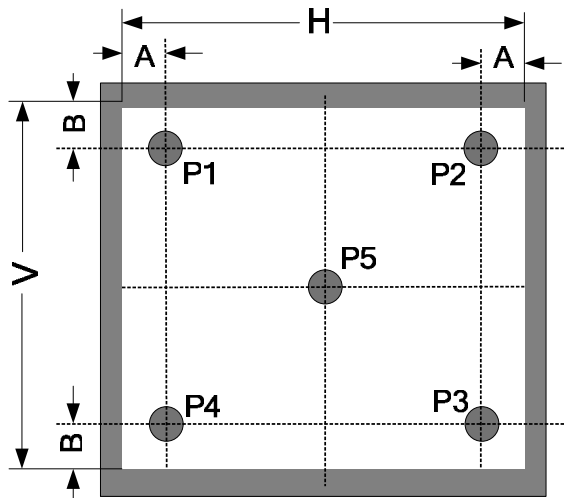
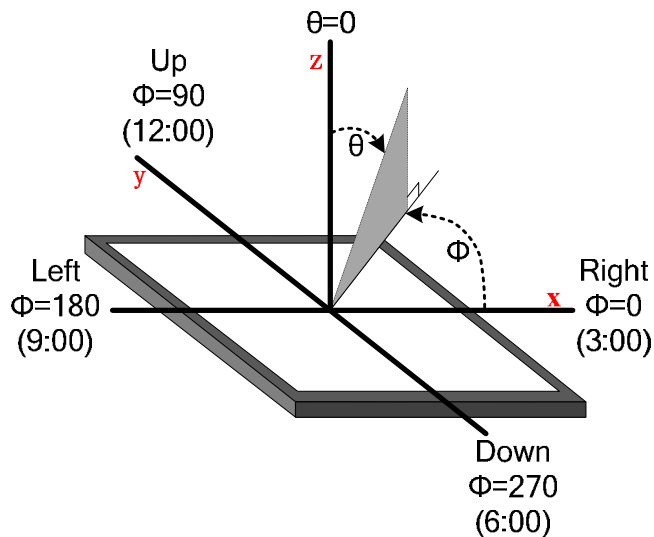


FIG.3. The definition of viewing angle





## ■ RELIABILITY TEST CONDITIONS

No.	Test Item	Test Condition	Inspection after test
1	High Temperature Storage	70 ± 2 °C / 200 hours	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD; 2.Sealleak; 3.Non-display; 4.missing segments; 5.Glass crack; 6.Current Idd is twice higher than initial value.
2	Low Temperature Storage	-20 ± 2 °C / 200 hours	
3	High Temperature Operating	60 ± 2 °C / 120 hours	
4	Low Temperature Operating	-10 ± 2 °C / 120 hours	
5	Temperature Cycle storage	-10 ± 2 °C ~ 25 ~ 60 ± 2 °C × 10cycles (30min.) (5min.) (30min.)	
6	Damp proof Test operating	50 °C ± 5 °C × 90%RH / 120 hours	
7	Vibration Test	Frequency: 10Hz~55Hz~10Hz Amplitude: 1.5mm, X, Y, Z direction for total 3hours (Packing condition)	
8	Dropping test	Drop to the ground from 1m height, one time, every side of carton. (Packing condition)	
9	ESD test	Voltage: ±8KV R: 330Ω C: 150pF Air discharge, 10time	

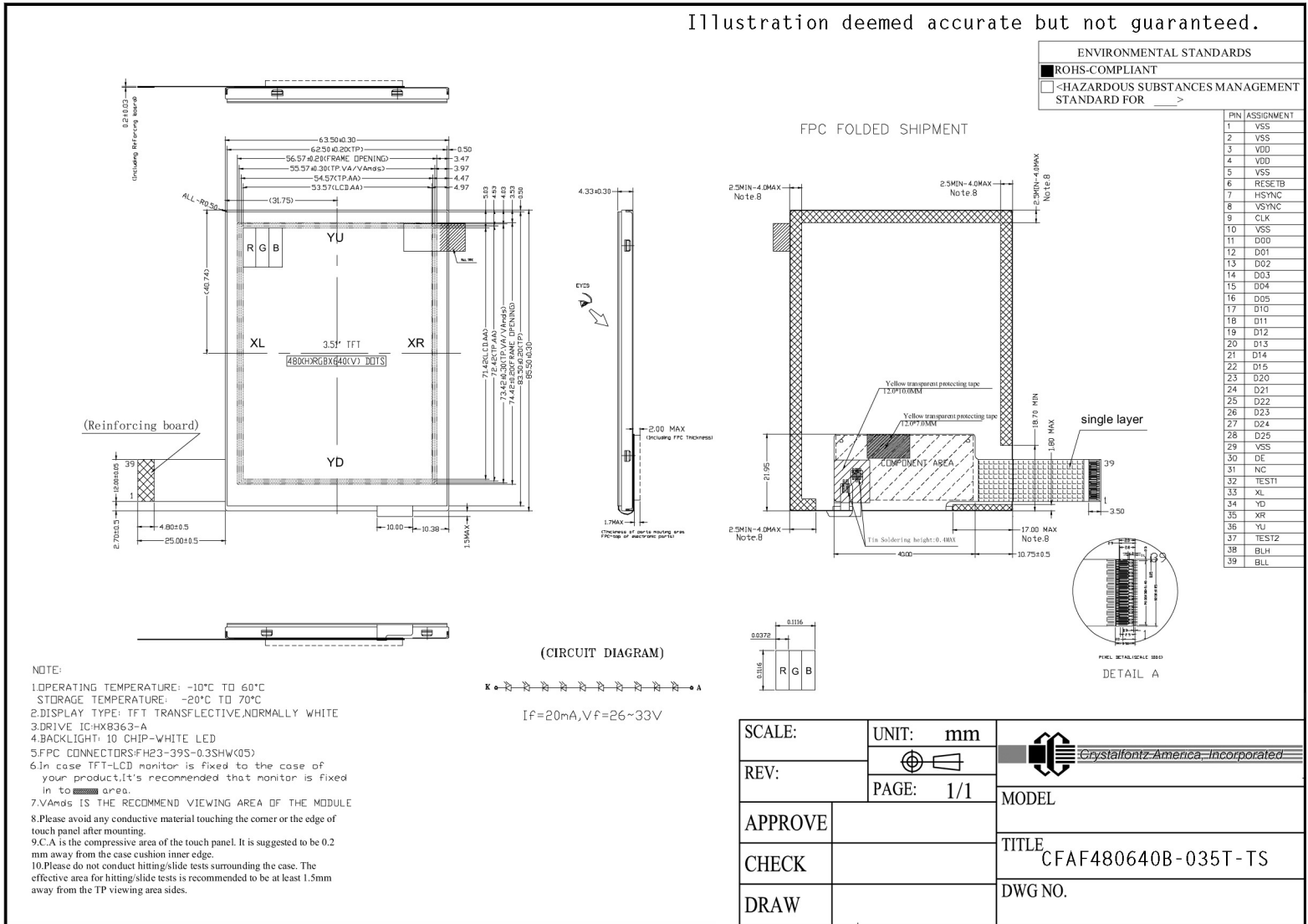
**Remark:**

- 1.The test samples should be applied to only one test item.
- 2.Sample size for each test item is 5~10pcs.
- 3.For Damp Proof Test, Pure water(Resistance > 10MΩ) should be used.
- 4.In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.
- 5.EL evaluation should be excepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and Fluorescence EL has.
- 6.Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.





EXTERNAL DIMENSIONS



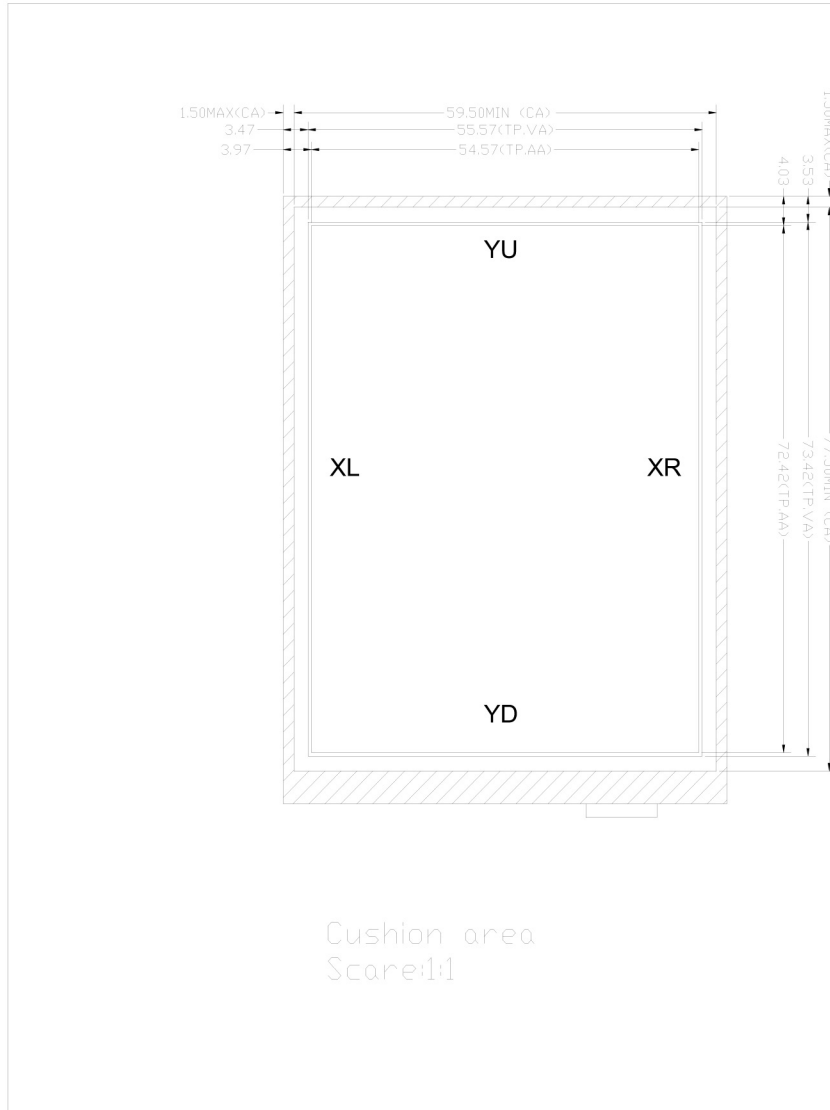
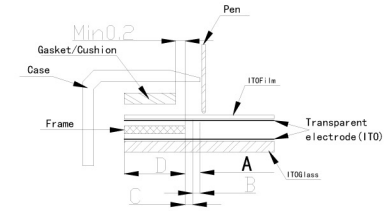



Illustration deemed accurate but not guaranteed.

Structure and Area definition



- A Active area  
 The area which guarantees a touch panel operation with the following characteristics when passed.  
 (1) Operation force, (2) Electric characteristics, (3) Tapping durability, (4) Pen sliding durability, (5) Operation non-guaranteed area.
- B Operation non-guaranteed area  
 The area which does not guarantee a touch panel operation and its function when this area is pressed, touch panel shows degradation of its performance and durability such as a pen sliding durability becomes about one-tenth compared with the active area (Area-A) as guaranteed area and its operation force requires about double. About 0.5mm outside from a boundary of the active corresponds to this area.
- C Pressing prohibition area  
 The area which forbids pressing, because an excessive load is applied a transparent electrode and a serious damage is given to touch panel function by pressing.
- D Non-Active area  
 The area which does not activate even if passed.

SCALE:	UNIT: mm	 Crystalfontz America, Incorporated
REV:	PAGE: 1/1	
APPROVE		MODEL
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