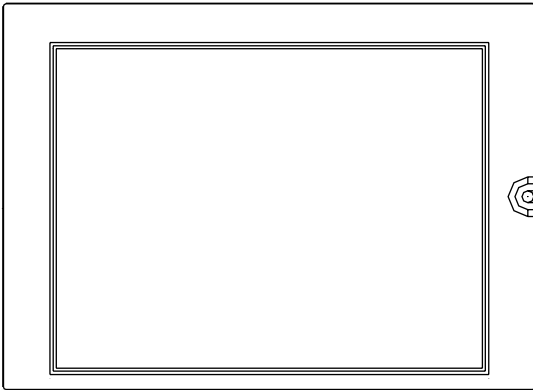




PRODUCT SPECIFICATION

HDA570S-U

5.7", TFT QVGA COLOR
LCD DISPLAY MODULE

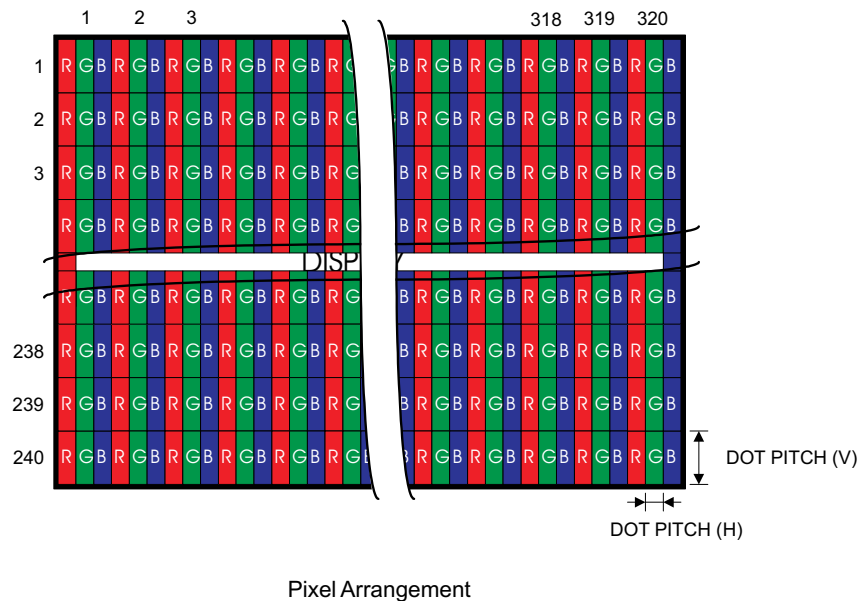


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1.2. General Specifications

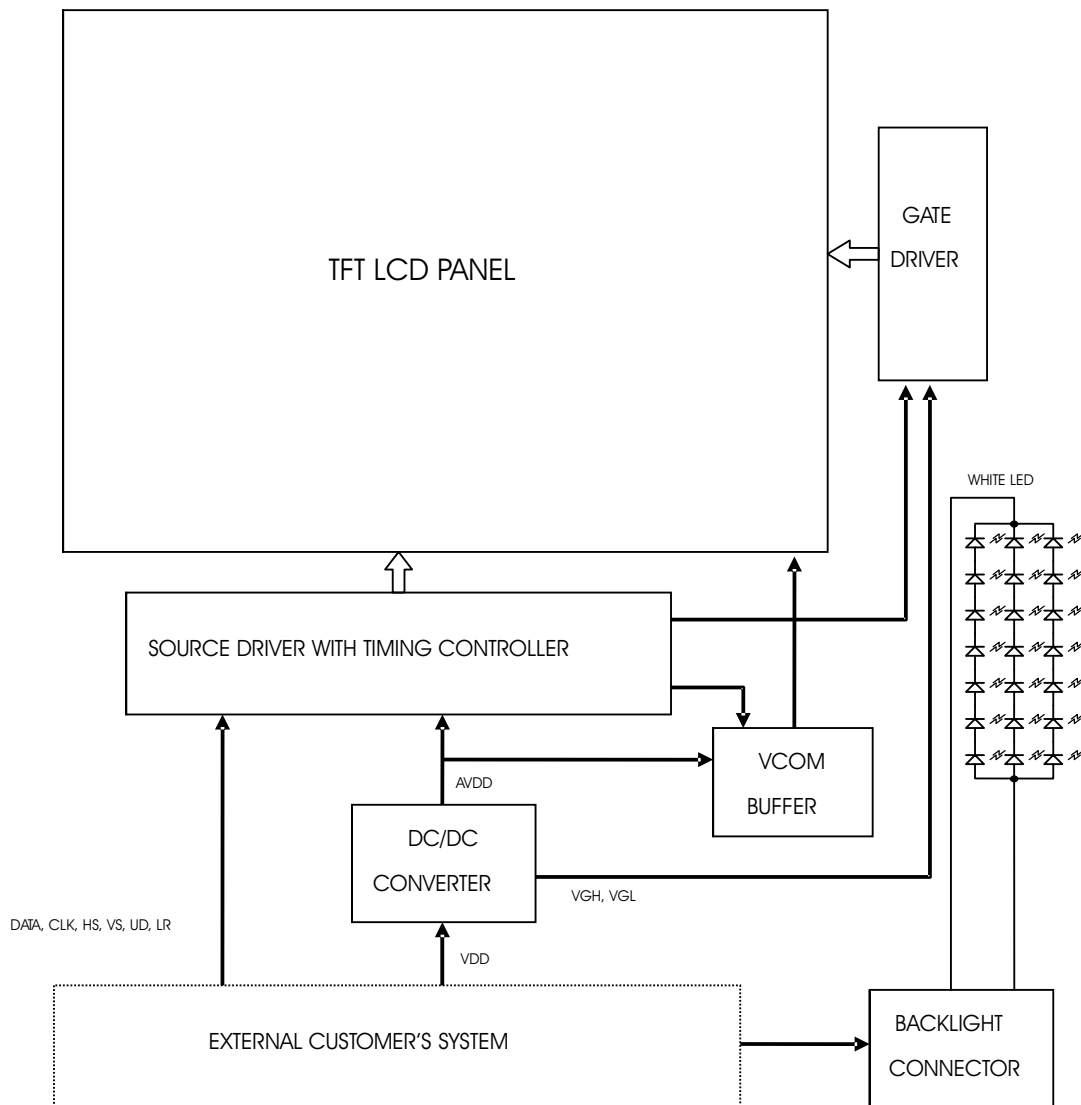
No.	Item	Description	Unit
1	Screen Size(diagonal)	5.7	inch
2	Resolution	320 (H) x RGB x 240 (V)	pixel
3	Dot Pitch	0.120 (H) x 0.360 (V)	mm
4	Active Area	115.20 (H) x 86.40 (V)	mm
5	Outline Dimension	144.00 (W) x 104.60 (H) x 13.00 (T)	mm
6	Display Mode	Normally white/transmissive	
7	Pixel Arrangement	RGB-stripe	
8	Input Interface	18-bit parallel RGB	
9	Surface Treatment	Anti-glare (AG)	
10	Weight	128	g
11	Operating Temperature Range	-20 (T _a) ~ 70 (T _a)	°C
12	View Angle(U/D/R/L)	60/45/60/60	degree
13	Brightness	350	cd/m ²
14	Light Source	LED	
15	NTSC Rate	58	%

Note: T_a means ambient temperature.



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2. Functional Block Diagram



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3. Electrical Specifications

3.1. Pin Descriptions

3.1.1. Input Interface Connector Pin Descriptions

No.	Symbol	I/O	Description	Note
1	GND	-	Ground	
2	CLK	I	Clock Signal Input. Latching data at the rising edge.	
3	HS	I	Horizontal Synchronization Signal Input	
4	VS	I	Vertical Synchronization Signal Input	
5	GND	-	Ground	
6	R0	I	Red Data (LSB)	
7	R1	I	Red Data	
8	R2	i	Red Data	
9	R3	i	Red Data	
10	R4	I	Red Data	
11	R5	I	Red Data	
12	GND	-	Ground	
13	G0	I	Green Data (LSB)	
14	G1	I	Green Data	
15	G2	I	Green Data	
16	G3	I	Green Data	
17	G4	I	Green Data	
18	G5	I	Green Data (MSB)	
19	GND	-	Ground	
20	B0	I	Blue Data (LSB)	
21	B1	I	Blue Data	
22	B2	I	Blue Data	
23	B3	I	Blue Data	
24	B4	I	Blue Data	
25	B5	I	Blue Data (MSB)	
26	GND	-	Ground	

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No.	Symbol	I/O	Description	Note
27	DE	I	Display Data Enable Signal Input. Pull low if unused.	
28	VDD	I	Power Supply Input. Connected to 3.3V.	
29	VDD	I	Power Supply Input. Connected to 3.3V.	
30	LR	I	UP/DOWN Scan Control. Screen vertical flip selection.	Note 1
31	UD	I	LEFT/RIGHT Scan Control. Screen horizontal flip selection.	Note 1
32	NC	-	Not Connected	
33	GND	I	Ground	

Note:

- The UD and LR control the display direction of the panel. The settings of UD and LR are as following:



UD=VDD, LR=GND



UD=VDD, LR=VDD



UD=GND, LR=GND



UD=GND, LR= VDD

- The input interface connector is FH12-33S-0.5SH (HIROSE) or equivalent.

3.1.2. Backlight Connector Pin Descriptions

Pin No.	Symbol	Description	Wire Color
1	VLEDA	Backlight LED Anode.	Red
2	VLEDC	Backlight LED Cathode.	Black

Note: The backlight connector is BHSR-02VS-01 (JST) or equivalent.

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3.1.3. Relationship Between Displayed Color and Input Data

Color		Input Color Data																
		Red						Green						Blue				
		MSB			LSB			MSB			LSB			MSB		LSB		
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Red	Red(0) Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63) Bright	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Green	Green(0) Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
	Green(63) Bright	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0
Blue	Blue(0) Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63) Bright	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

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3.2. Absolute Maximum Ratings

Item	Symbol	Values		Unit	Note
		Min.	Max.		
Power Supply Voltage	V _{DD}	-0.3	7.0	V	
Input Logic Signal Voltage	V _I	-0.3	V _{DD} +0.3	V	Note 1
Backlight LED Reverse Voltage	V _R	-35.0	-	V	Note 3
Backlight LED Forward Current	I _F	-	90	mA	Note 3
Operation Temperature	T _{OP}	-20	70	°C	Note 2
Storage Temperature	T _{st}	-30	80	°C	

Note:

1. V_I implies CLK, R0~R5, G0~G5, B0~B5, HS, VS, DE, LR, UD.
2. The maximum operation temperature is set for the panel surface temperature. The minimum operation temperature is set for the ambient temperature.
3. The ratings are measured from the backlight anode pin to the backlight cathode pin.

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3.3. Electrical Characteristics

3.3.1. Panel Typical Operating Conditions ($T_a=25^\circ\text{C}$)

Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltages	V_{DD}	3.0	3.3	3.6	V	
Power Supply Current Consumption	I_{VDD}	-	60	-	mA	
Input Logic Signal High Threshold	V_{IH}	$0.7V_{DD}$	-	-	V	
Input Logic Signal Low Threshold	V_{IL}	-	-	$0.3V_{DD}$	V	

Note:

3.3.2. Backlight Unit Typical Operating Conditions

Item	Symbol	Condition	Values			Unit	Note
			Min.	Typ.	Max.		
Backlight Power Consumption	P_{LED}	$T_a=25^\circ\text{C}$, $I_F=60\text{mA}$	1.26	1.43	1.60	W	
Backlight Forward Current	I_F	$T_a=25^\circ\text{C}$	-	60	-	mA	

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3.4. AC Timing

3.4.1. AC Timing Characteristics

Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
CLK Period	T _{CLK}	125	156	166	ns	
CLK High Width	T _{WCL}	56.5	72	77	ns	
CLK Low Width	T _{WCH}	56.5	72	77	ns	
CLK Rise Time	T _{rCLK}	-	-	6	ns	
CLK Fall Time	T _{fCLK}	-	-	6	ns	
Data Setup Time	T _{SU}	12	-	-	ns	For CLK
Data Hold Time	T _{HD}	12	-	-	ns	For CLK
Data Rise Time	T _{rD}	-	-	10	ns	
Data Fall Time	T _{fD}	-	-	10	ns	
HS Setup Time	T _{SH}	12	-	-	ns	For CLK
HS Hold Time	T _{HH}	12	-	-	ns	For CLK
HS Period	T _H	406	408	432	T _{CLK}	
HS Pulse Width	T _{HS}	4	30	-	T _{CLK}	
HS Rise Time	T _{rH}	-	-	700	ns	
HS Fall Time	T _{fH}	-	-	300	ns	
VS Setup Time	T _{SV}	3	-	-	T _{CLK}	For HS
VS Hold Time	T _{HV}	3	-	-	T _{CLK}	For HS
VS Period	T _V	258	262	280	T _H	
VS Pulse Width	T _{VS}	1	3	-	T _H	
VS Rise Time	T _{rV}	-	-	700	ns	
VS Fall Time	T _{fV}	-	-	1.5	ns	
DE Setup Time	T _{SE}	12	-	-	ns	For CLK
DE Hold Time	T _{HE}	12	-	-	ns	For CLK
Horizontal Display Time	T _{HDE}	-	320	-	T _{CLK}	
Vertical Display Time	T _{VDE}	-	240	-	T _H	
Horizontal Back Porch	T _{HBP}	28	38	-	T _{CLK}	
Horizontal Front Porch	T _{HFP}	-	20	-	T _{CLK}	
Vertical Back Porch	T _{VBP}	1	15	-	T _H	
Vertical Front Porch	T _{VFP}	-	4	-	T _H	

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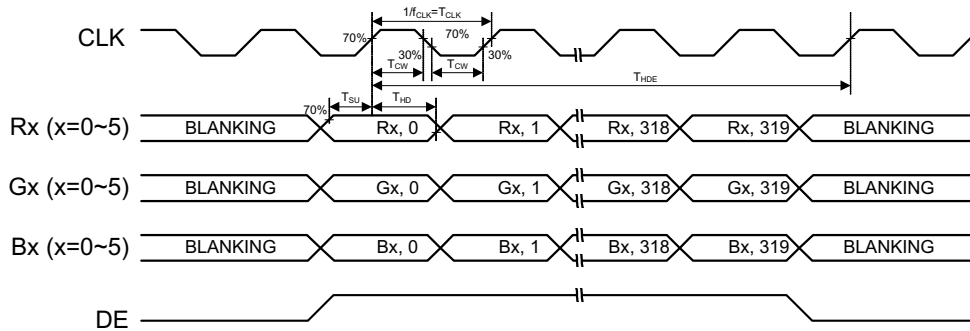
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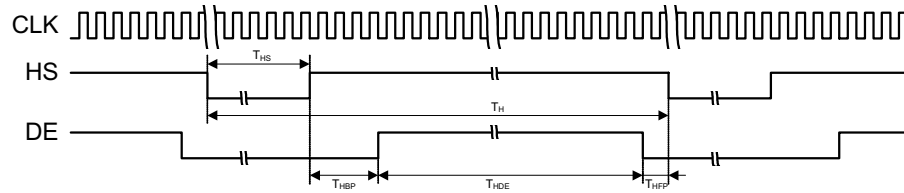
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3.4.2. AC Timing Diagrams

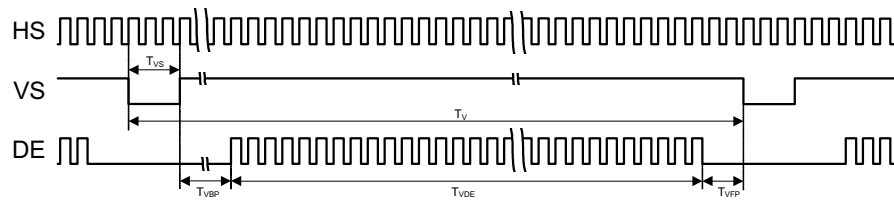
3.4.2.1. Data Clock Timing



3.4.2.2. Horizontal Timing



3.4.2.3. Vertical Timing



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4. Optical Specifications

The following items are measured under stable conditions. The optical characteristics should be measured in dark room or equivalent state with the methods shown in Note 1.

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Brightness			300	350	-	cd/m ²		
Response Time	T _R	θ = 0	-	15	30	ms	Note 2	
	T _F		-	35	50	ms		
Contrast Ratio	CR	At optimized viewing angle	350	400	-	-	Note 3	
Color Chromaticity	White	W _x	θ = 0	0.26	0.31	0.36	-	Note 4
		W _y		0.28	0.33	0.38		
Viewing Angle	Hor.	θ _R	CR ≥ 10	55	60	-	degree	Note 5
		θ _L		55	60	-		
	Ver.	∅ _H		55	60	-		
		∅ _L		40	45	-		

T_a = 25 ± 2 °C, I_f = 60mA

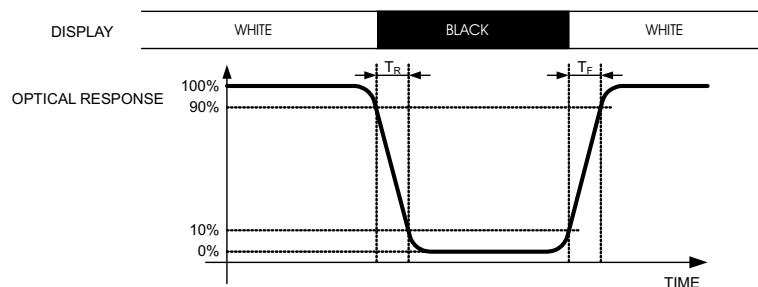
Note:

1. Test equipment setup:

After stabilizing and leaving the panel alone at a given temperature for 15 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-5A-10000 with a viewing angle of 2° at a distance of 50cm and normal direction.

2. Definition of response time: T_R and T_F

The figure below is the output signal of the photo detector.



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3. Definition of contrast ratio:

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness measured when LCD is at "white state "}}{\text{Brightness measured when LCD is at "black state"}}$$

$$\text{White } V_i = V_{i50\%} + / - 1.5V$$

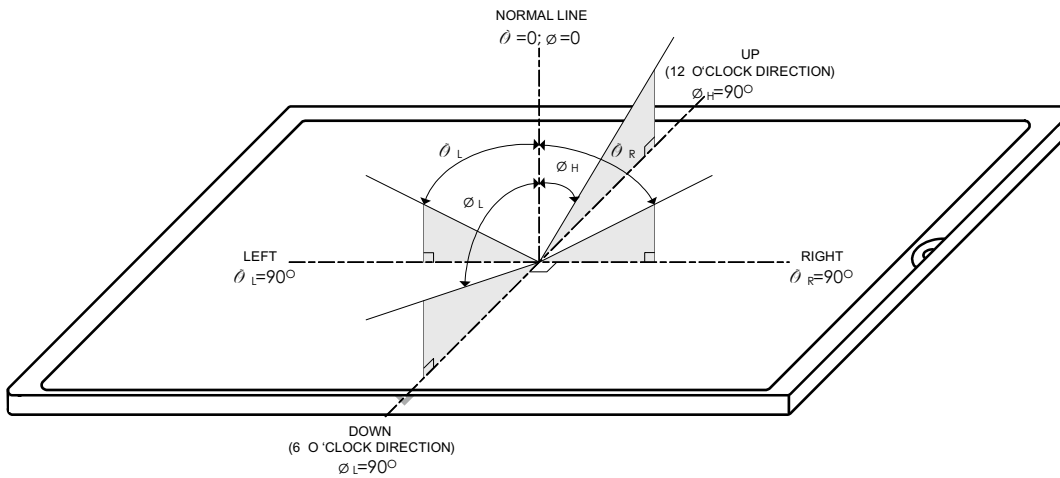
$$i = V_{i50\%} - / + 2.0V$$

"+/-" 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.

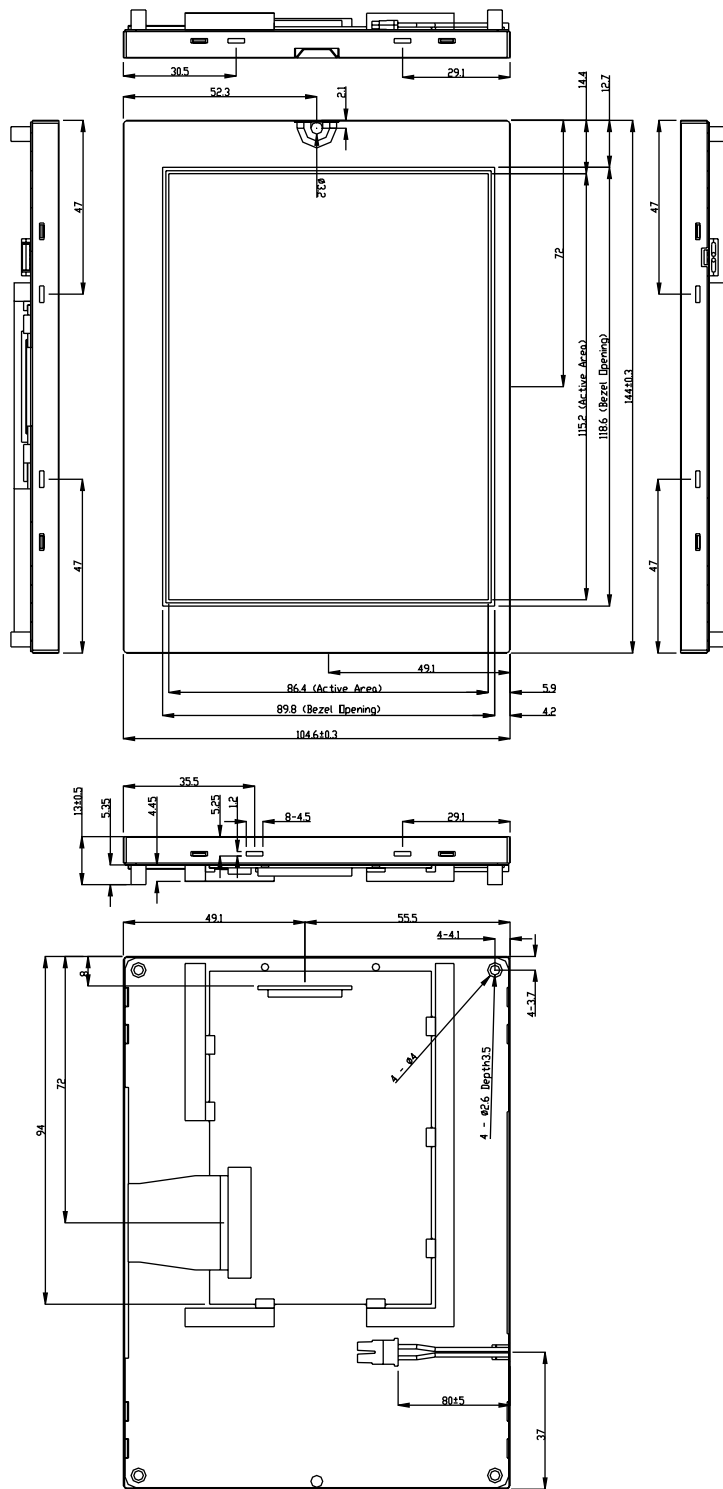
V_{i50%}: The analog input voltage when transmission is 50%.

4. The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.
5. Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.
6. Definition of viewing angle:



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5. Mechanical Dimensions



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