DATA MODUL

SPECIFICATION

easy TOUCH DISPLAY

easyTOUCH DISPLAY Advanced (12015571)

7.0” - WVGA – eTD070W2201-INA-A

Version: 1.0
Date: 08.06.2020

Note: This specification is subject to change without prior notice

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easy TOUCH DISPLAY

ADVANCED LEVEL

7.0 inch (17.8cm)
Part-No. 12015571
G070Y2-L01 incl.easyTOUCH eTD070W2201-INA-A

Display

Panel Type	InnoluxG070Y2-L01
Resolution (pixel) / format	800 x 480/ wide
Brightness (typical)	500 cd/m²
Display Mode	TN, Normally White
Customer Interface Display	LVDS
Contrast ratio (typical)	600:1
Backlight	LED

Glass and Touch

Cover glass	2mm Glare Glass, chemically strengthened, no treatment Printing RAL9005 organic, light-tight Dimensions according to outline drawing
Touch sensor type	7.0" easyTOUCH 12012164
Active area touch sensor (W x H)	157.6 (H) x 93.7 (V)
Optical Specification	according to DATA MODUL Outgoing Specification 12005964
Touch Interface	USB mXT640T

Assembling

Glass to touch	Optically bonded
Glass/Touch assembly to display	AirGap-Bonding with 4 stripes industrial double-sided adhesive tape
Touch Controllerboard	mounted on rear side of TFT with metal bracket

Accessories

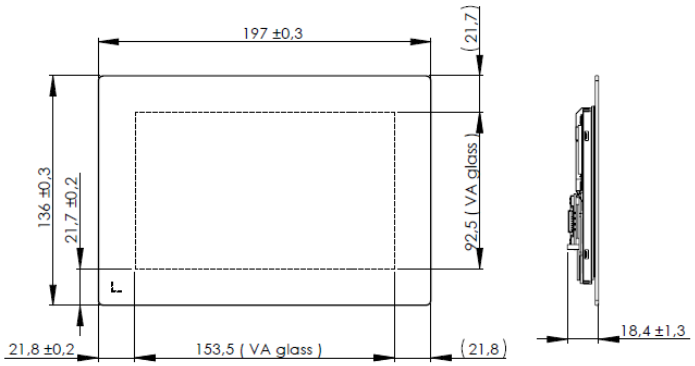
Touch Controller	easyTOUCH mXT640T Driverless USB

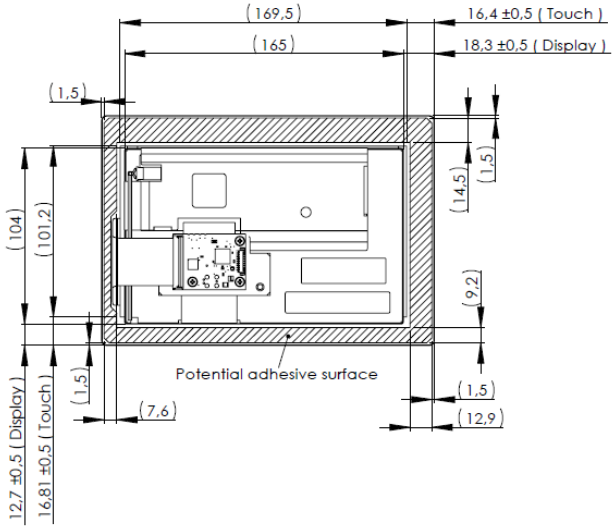
Environmental conditions

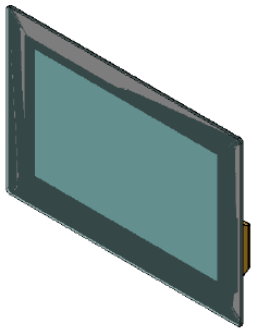
Temperature (operating)	-20 - 70 °C

Mechanical dimensions

Outline dimensions (W x H x T)	197.0 (H) x 136.0 (V) x 18.4 (T) Detailed dimensions according to outline drawing
Weight	approx. 0.350 kg







Weight: 350g ± 10%
Surface and lamination defects according DataModul Spec. 12005964

Doc. Number :

☐ Tentative Specification
☐ Preliminary Specification
■ Approval Specification

MODEL NO.: G070Y2
SUFFIX: L01(Rev.C7)

Customer:

APPROVED BY **SIGNATURE**

Name / Title _____ _____
Note

Please return 1 copy for your confirmation with your signature and comments.

Approved By	Checked By	Prepared By
Matt.LC.Chen	Sen.lin	Crika.liu

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REVISION HISTORY

Version	Date	Page	Description
Ver 2.0	Oct. 30, '09	All	G070Y2-L01 Approval specification was first issued.
Ver 2.1	May.13, 10	1.4	Module Power Consumption from 3.56 W to 3.71 W
		3.2	Converter Power Supply Current from 0.25A to 0.263mA Converter Power Consumption from 3W to 3.15W Note(2) I_L = 60 mA(Per EA) change to I_L = 55 mA(Per EA)
		7.1	TEST CONDITIONS Current from 60±4mA to 55±3mA
		1.4	Module Power consumption 3.71W ->4.04W
Ver 2.2	Sep. 9, 10	3.1	Power Supply Current White 140mA -> 250mA Black 170mA -> 270mA
		3.2	Add Note(3)
		6.1	Clock Frequency $1/T_{clock}$: Min. 27 MHz -> 28 MHz Max. 33 MHz -> 32MHz
Ver 2.3	Dec. 1, 10	2.2.2	Enable Voltage Max. from 4 to 5 Backlight Adjust Max. from 3.3 to 5
Ver 2.4	Aug. 23, 10	3.2	EN Control Level / Backlight on max. from 3.3 to 5 PWM Control Level / PWM High Level max. from 3.3 to 5 PWM Control Duty Ratio min. from 20 to 10 PWM Control Frequency min. from 190 to 100 max. from 210 to 300
Ver 2.5	Dec. 21,15	All	Change CHIMEI INNOLUX Logo to INNOLUX
		2.1	Modify Note(2) Add Note (4).
		5.3	Add UD & LR signal
		6.1	Add Note(3).
		8	Add Note(5)~(6)
		9.2	Add UN-PACKING METHOD
		10.1	Update Module label define
		12	Add Mechanical 2D Outline
Ver 2.6	Feb.19,16	1.3	Module Power Consumption from 4.04W to 3.8W
		3.2	Converter Power Supply Current Typ.Value from 0.263A to 0.24mA Converter Power Consumption Typ. Value from 3.15W to 2.8W
Ver 2.7	Jun.24,16	3.2	Note(2) I_L = 55 mA(Per EA) change to I_L = 50 mA(Per EA)
		7.1	Current from 55±3mA to 50±3mA
Ver2.8	Sep.2, 16	6.2	Add 6bit FRC remark "(RX3+/RX3-:floating)"
		7.2	Add measurement method remark "all items are measured at the center point of screen except white variation."
Ver2.9	Aug.15,17	5.1	Modify pin5 GND->NC
Ver3.0	Nov 21,18	All	Change Reversion from C6 to C7

1.GENERAL DESCRIPTION

1.1 OVERVIEW

G070Y2-L01 is a 7inch IAV TFT Liquid Crystal Display module with a LED backlight unit and a-20pin 6/8bit LVDS interface controller board. The converter for the LED Backlight Unit is built in. This module supports 800 (R.G.B)x 480 WVGA mode which main application is the automotive display and industrial field.

1.2 FEATURES

- Wide viewing angle.
- Fast response time
- Wide operating temperature
- Reversible scan function
- 6/8 bit convertible
- High Color gamut (NTSC：72%)

1.3 APPLICATION

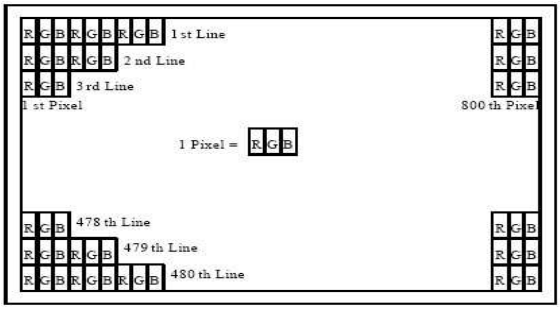
- Automotive Display
- Industry Application

1.4 GENERAL SPECIFICATI0NS

Item	Specification	Unit	Note
Diagonal Size	7	inch	
Active Area	152.4x91.44	mm	(1)
Bezel Opening Area	154.6x93.64	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	800 x R.G.B. x 480	pixel	-
Pixel Pitch	0.1905 x 0.1905	mm	-
Pixel Arrangement	RGB vertical stripe	-	(2)
Display Colors	262k or 16.2M	color	-
Display Mode	Normal White	-	-
Surface Treatment	Anti-glare, Hard Coating (3H)	-	-
Module Power Consumption	3.8	W	Typ.

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

Note (2)



1.5 MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	164.3	165	165.3	mm	(1)
	Vertical (V)	103.3	104	104.3	mm	
	Depth (D)	9.03	9.53	10.03	mm	
Weight			147	162	g	

Note (1)Please refer to the attached drawings for more information of front and back outline dimensions.

2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

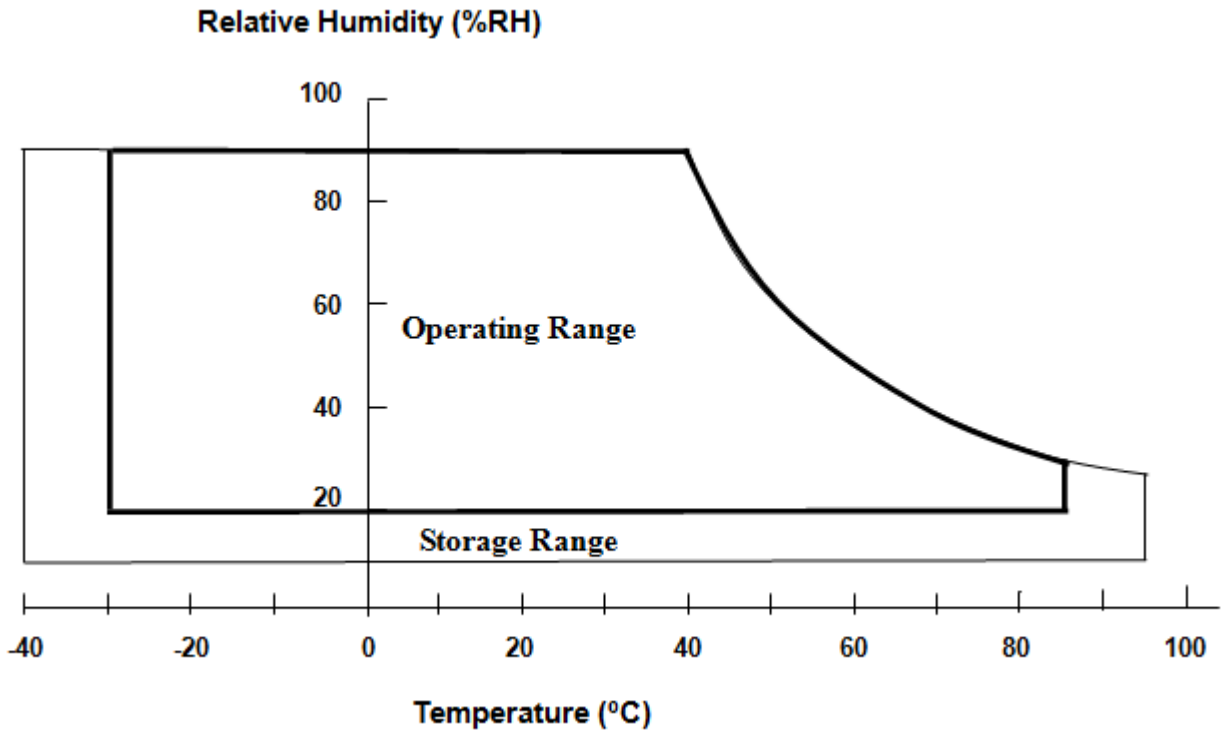
Item	Symbol	Value		Unit	Note
		Min.	Max.		
Operating Ambient Temperature	T_{OP}	-30	+85	ºC	
Storage Temperature	T_{ST}	-40	+95	ºC	

Note (1) Temperature and relative humidity range is shown in the figure below.

(2) Wet-bulb temperature should be 39 ºC Max..

(3) No condensation.

(4) The absolute maximum rating values of this product are not allowed to be exceeded at any times. The module should not be used over the absolute maximum rating value. It will cause permanently unrecoverable function fail in such an condition.



2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	Vcc	-0.3	4	V	(1)

2.2.2 LED CONVERTER

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Converter Voltage	V_i	-0.3	18	V	(1) , (2)
Enable Voltage	EN	---	5	V	
Backlight Adjust	ADJ	---	5	V	

Note (1)Permanent damage to the device may occur if maximum values are exceeded. Function operation should be restricted to the conditions described under Normal Operating Conditions.

Note (2)Specified values are for LED converter (Refer to 3.2 for further information).

3. ELECTRICAL CHARACTERISTICS

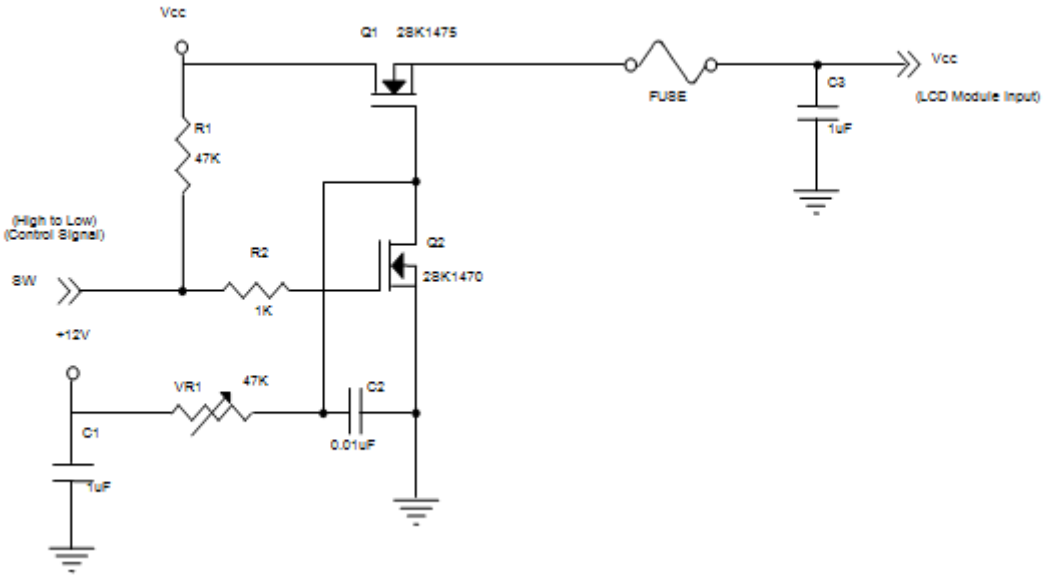
3.1 RECOMMENDED OPERATION CONDITION

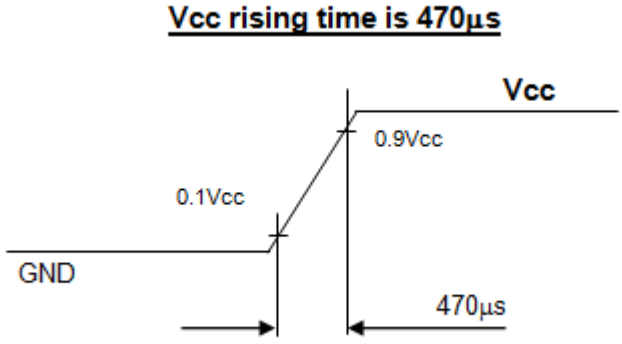
Ta = 25 ± 2 ºC

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		Vcc	3.0	3.3	3.6	V	(1)
Rush Current		I_{RUSH}			1.5	A	(2)
Power Supply Current	White			140	168	mA	(3)a
	Black			170	204	mA	(3)b
LVDS Differential Input High Threshold		$V_{TH(LVDS)}$			100	mV	-
LVDS Differential Input Low Threshold		$V_{TL(LVDS)}$	-100			mV	-
LVDS Common Mode Voltage		V_{CM}		1.2		V	-

Note (1)The assembly should be always operated within above ranges.

Note (2)Measurement Conditions:





Note (3)The specified power supply current is under the conditions at Vcc = 3.3V , Ta = 25 ± 2 ºC, f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

a. White Pattern

Active Area

b. Black Pattern

Active Area

3.2 BACKLIGHT UNIT

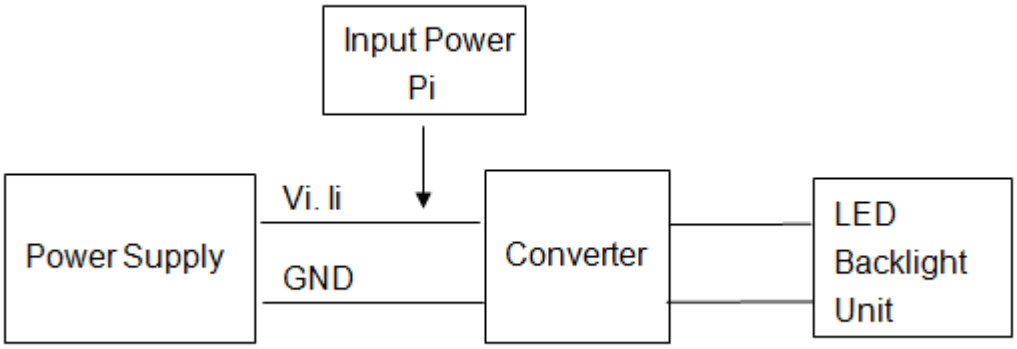
Ta = 25 ± 2 ºC

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Converter Power Supply Voltage		V_i	10.8	12.0	13.2	V	
Converter Power Supply Current		I_i	---	0.24	---	A	@ Vi = 12V (Duty 100%)
Converter Power Consumption		P_{LED}	---	2.8	---	W	@ Vi = 12V (Duty 100%)
EN Control Level	Backlight on		2.0	---	5	V	
	Backlight off		0	---	0.8	V	
PWM Control Level	PWM High Level		2.0	---	5	V	
	PWM Low Level		0	---	0.15	V	
PWM Control Duty Ratio			10		100	%	
PWM Control Frequency		f_{PWM}	100	200	300	Hz	
LED Life Time		L_L	50,000			Hrs	(2)

Note (1)LED current is measured by utilizing a high frequency current meter as shown below:

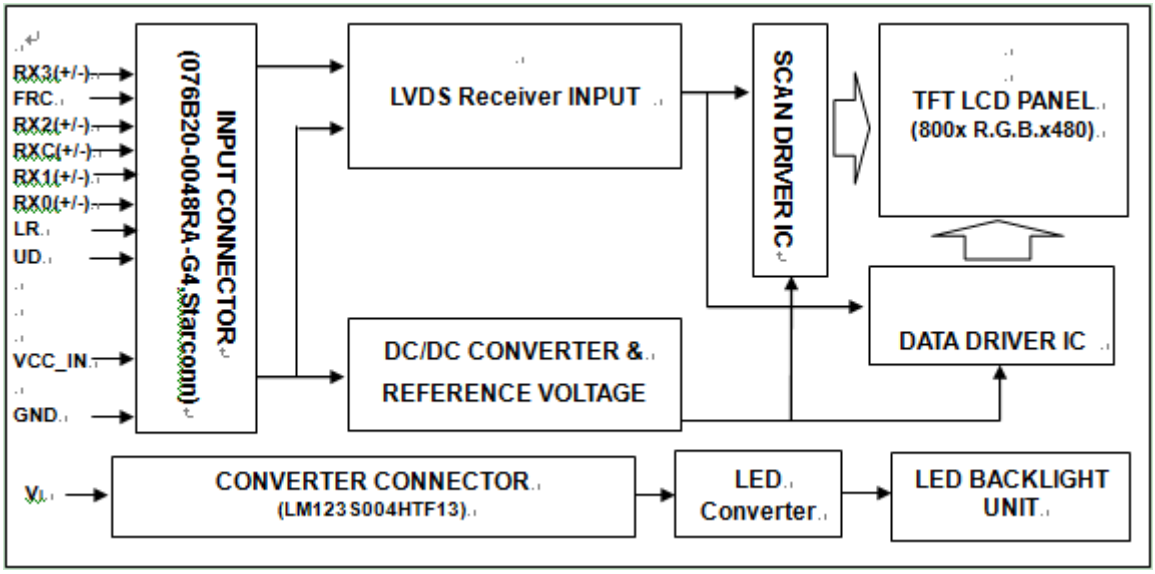
Note (2) The lifetime of LED is defined as the time when it continues to operate under the conditions at Ta = 25 ±2 ℃ and I_{LED} = 50mA_{DC}(LED forward current) until the brightness becomes ≦ 50% of its original value.

Note (3) Please note that LED life will be shorter than the average life described in the specification if operate in higher ambient temperature.



4. BLOCK DIAGRAM

4.1 TFT LCD MODULE



5. INPUT TERMINAL PIN ASSIGNMENT

5.1 LVDS I/O PIN ASSIGNMENT

Pin	Name	I/O	Description
1	RX3+	I	LVDS differential data input Pair 3.
2	RX3-	I	
3	NC	I	No Connected
4	FRC	I	Dithering control setting When FRC=H, the width of data input 8 bits When FRC=L, the width of data input 6 bits (Default pull low)
5	NC	I	No Connected
6	RXC+	I	LVDS differential Clock input Pair
7	RXC-	I	
8	GND	I	Ground
9	RX2+	I	LVDS differential data input Pair 2
10	RX2-	I	
11	GND	I	Ground
12	RX1+	I	LVDS differential data input Pair 1
13	RX1-	I	
14	GND	I	Ground
15	RX0+	I	LVDS differential data input Pair 0
16	RX0-	I	
17	LR	I	Shift direction of Source Driver IC internal shift register is controlled by this pin as show below: LR=H SO1→ ……SO1200 (Default pull high) LR=L SO1200→…….SO1
18	UD	I	Gate Driver Up/down scan setting When UD=H, reverse scan When UD=L, normal scan (Default pull low)
19	VCC_IN	I	Digital power supply (+3.3V)
20	VCC_IN	I	Digital power supply (+3.3V)

Note (1) Connector Part No.: 076B20-0048RA-G4,Starconn or equivalent

5.2 BACKLIGHT PIN ASSIGNMENT (Converter connector pin)

No	Symbol	I/O	Description
1	Vi	I	Converter input voltage
2	ADJ	I	Backlight Adjust
3	EN	I	Enable pin
4	V_{GND}		Converter ground

Note (1) Connector Part No: LM123S004HTF13,4 PIN,UNE

5.3 SCANNING DIRECTION

The following figures show the image see from the front view. The arrow indicates the direction of scan.

Fig.1 Normal Scan

Fig.2 Reverse Scan

Fig.3 Reverse Scan

Fig.4 Reverse Scan

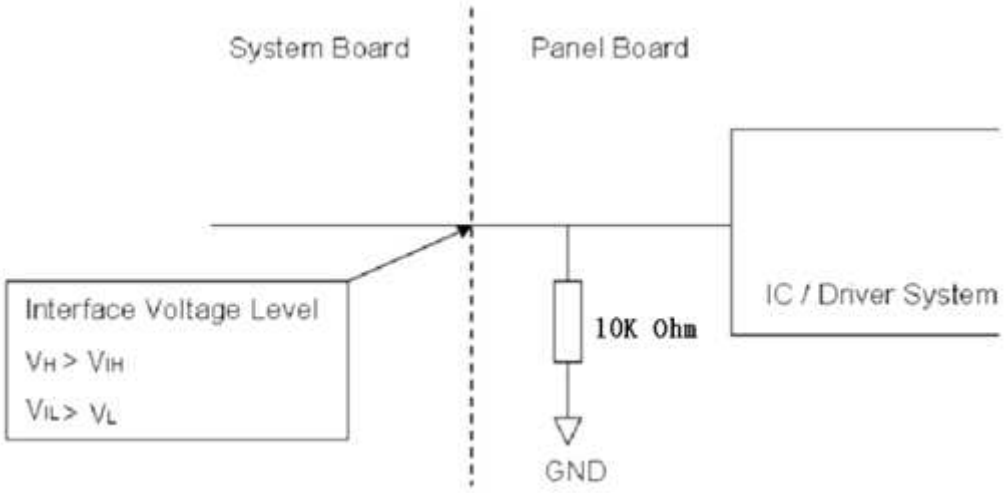
Fig. 1 Normal scan (pin 17, LR = High ; pin 18, UD = Low)

Fig. 2 Reverse scan (pin 17, LR = Low ; pin 18, UD = Low)

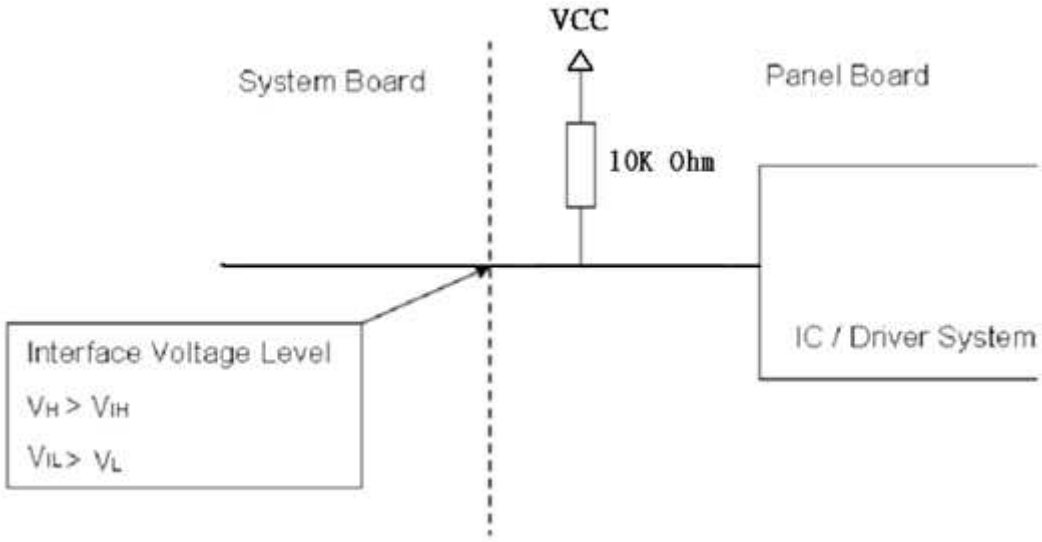
Fig. 3 Reverse scan (pin 17, LR = High ; pin 18, UD = High)

Fig. 4 Reverse scan (pin 17, LR = Low ; pin 18, UD = High)

UD Signal



LR Signal



5.4 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 6-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input. (0: Low Level Voltage, 1: High Level Voltage)

Color		Data Signal																	
		Red						Green						Blue					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	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	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0) / Dark	0	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	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
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	Red(61)	1	1	1	1	0	1	0	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	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0) / Dark	0	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	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
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	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	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	0
Gray Scale Of Blue	Blue(0) / Dark	0	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	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
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	Blue(61)	0	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	0	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

(0: Low Level Voltage, 1: High Level Voltage)

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0)/ Dark	0	0	0	0	0	0	0	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	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
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	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	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	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	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

6. INTERFACE TIMING

6.1 TIMING CHARACTERISTICS

The input signal timing specifications are shown as the following table and timing diagram

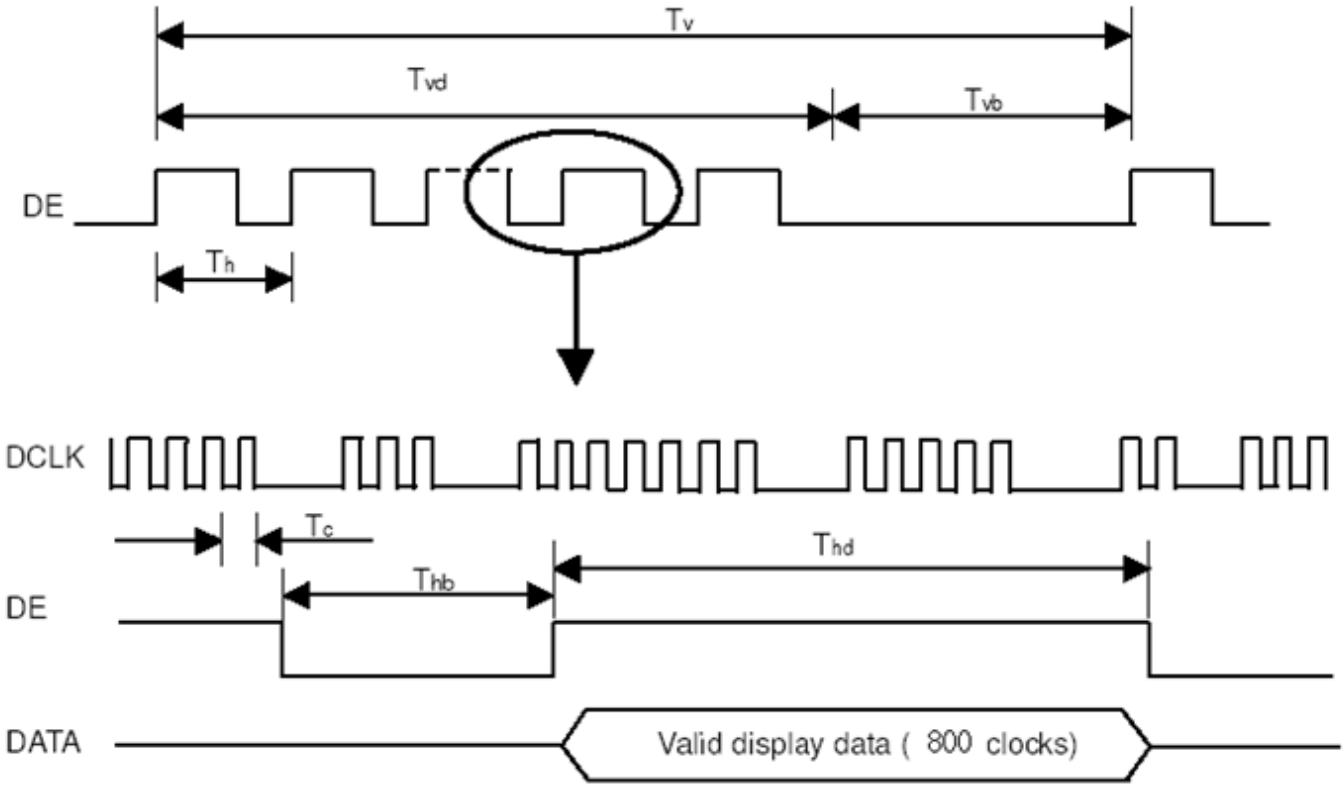
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Vertical Display	Period	Tv	490	500	550	T_h	Tv=Tvd+Tvb
	Active	Tvd	-	480	-	T_h	-
	Blanking	Tvb	10	20	70	T_h	-
Horizontal Display	Period	T_h	930	992	1090	Tclock	Th=Thd+Thb
	Active	T_{hd}	-	800	-	Tclock	-
	Blanking	T_{hb}	130	192	290	Tclock	-
Clock Frequency		$1/T_{clock}$	28	29.5	32	MHz	-

Note(1) Since this assembly is operated in DE only mode, Hsync and Vsync input signals should be set to low logic level. Otherwise, this assembly would operate abnormally.

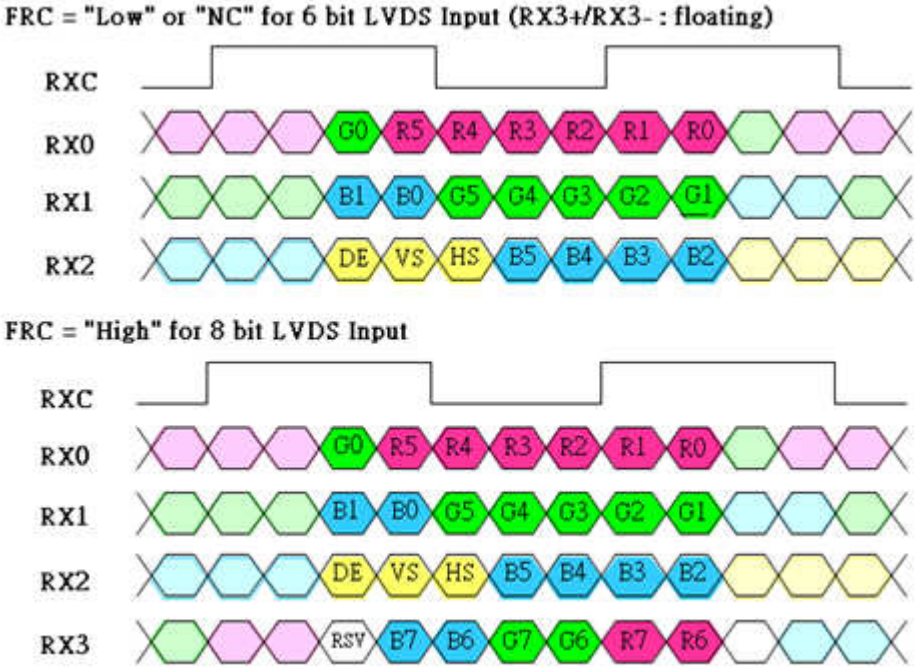
(2) Frame rate is 60Hz.

(3) The Tv(Tvd+Tvb) must be integer, otherwise, this module would operate abnormally.

INPUT SIGNAL TIMING DIAGRAM



6.2 LVDS INPUT DATA FORMAT



Note (1) R/G/B data 7: MSB, R/G/B data 0: LSB

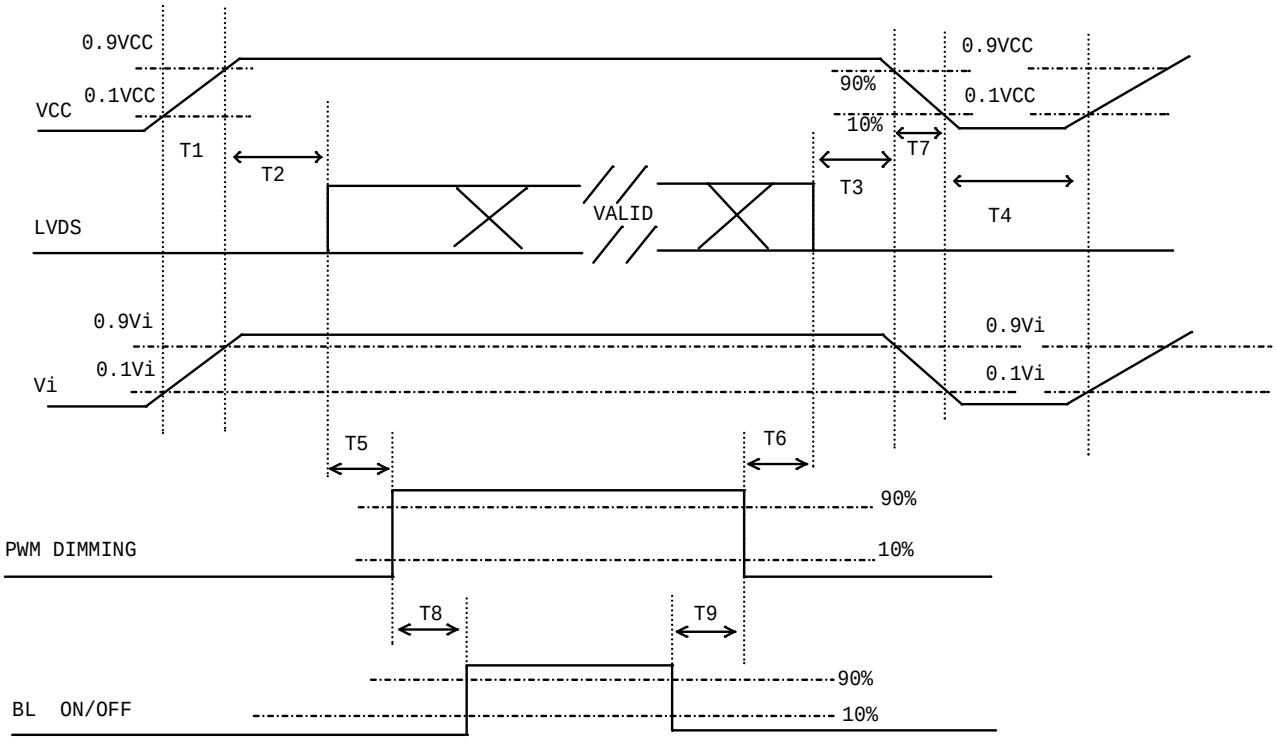
Note (2) Please follow PSWG

Signal Name	Description	Remark
R7 R6 R5 R4 R3 R2 R1 R0	Red Data 7 (MSB) Red Data 6 Red Data 5 Red Data 4 Red Data 3 Red Data 2 Red Data 1 Red Data 0 (LSB)	Red-pixel Data Each red pixel's brightness data consists of these 8 bits pixel data.
G7 G6 G5 G4 G3 G2 G1 G0	Green Data 7 (MSB) GreenData 6 GreenData 5 GreenData 4 GreenData 3 GreenData 2 GreenData 1 GreenData 0 (LSB)	Green-pixel Data Each green pixel's brightness data consists of these 8 bits pixel data.
B7 B6 B5 B4 B3 B2 B1 B0	Blue Data 7 (MSB) Blue Data 6 Blue Data 5 Blue Data 4 Blue Data 3 Blue Data 2 Blue Data 1 Blue Data 0 (LSB)	Blue-pixel Data Each blue pixel's brightness data consists of these 8 bits pixel data.
RXCLKIN+ RXCLKIN-	LVDS Clock Input	
DE	Display Enable	
VS	Vertical Sync	
HS	Horizontal Sync	

Note (3) Output signals from any system shall be low or Hi-Z state when VCC is off.

6.3 POWER ON/OFF SEQUENCE

To prevent a latch-up or DC operation of LCD assembly, the power on/off sequence should be as the diagram
below



Power ON/OFF sequence

Note (1)Please avoid floating state of interface signal at invalid period.

Note (2)When the interface signal is invalid, be sure to pull down the power supply of LCD VCC to 0 V.

Note (3)The Backlight converter power must be turned on after the power supply for the logic and the interface signal is valid. The Backlight converter power must be turned off before the power supply for the logic and the interface signal is invalid.

Parameter	Value			Units
	Min	Typ	Max	
T1	0.5	-	10	ms
T2	0	-	50	ms
T3	0	-	50	ms
T4	500	-	-	ms
T5	20	-	-	ms
T6	10	-	-	ms
T7	5		300	ms
T8	10	-	-	ms
T9	10	-	-	ms

7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{CC}	3.3	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Current	I_f	50±3	mA
Converter Duty		100	%

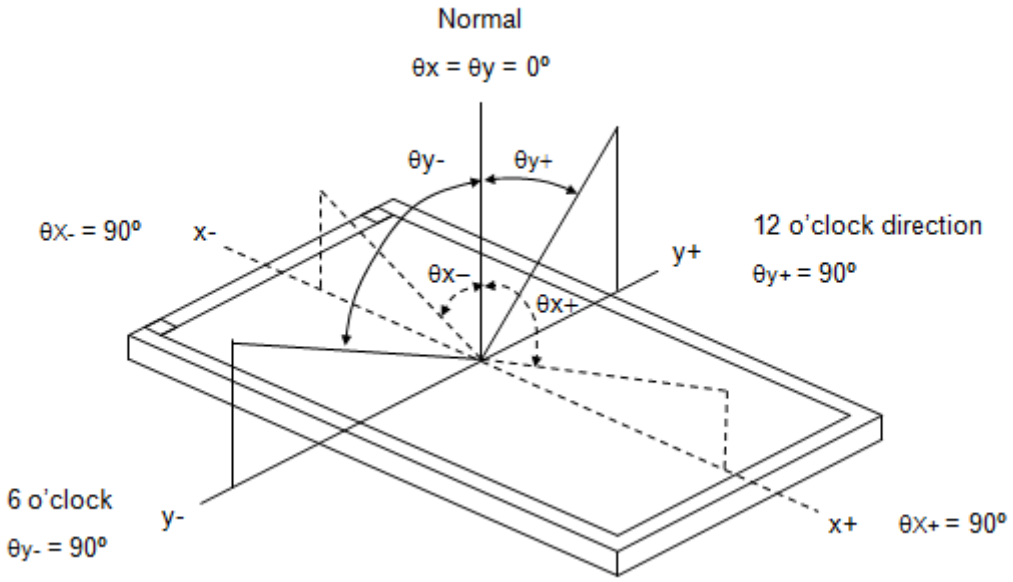
Note (1) I_f means the forward current of each channel

7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 7.2 and all items are measured at the center point of screen except white variation. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (6).

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity	Red	Rx	θ_x=0°, θ_Y =0° Viewing Normal Angle	Typ – 0.03	0.645	Typ + 0.03		(1), (6)
		Ry			0.341			
	Green	Gx			0.312			
		Gy			0.625			
	Blue	Bx			0.153			
		By			0.053			
	White	Wx			0.313			
		Wy			0.329			
Center Luminance of White		L_C		400	500		cd/m^2	(4), (6)
Contrast Ratio		CR		500	600		-	(2), (6)
Response Time		T_R			5	10	Ms	(3)
		T_F			11	16	Ms	
White Variation		δW			1.25	1.4	-	(5), (6)
Viewing Angle	Horizontal	θ_x+	CR ≧ 10	60	70		Deg.	(1), (6)
		θ_x-		60	70			
	Vertical	θ_Y+		50	60			
		θ_Y-		50	60			

Note (1) Definition of Viewing Angle (θx, θy):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L63 / L0

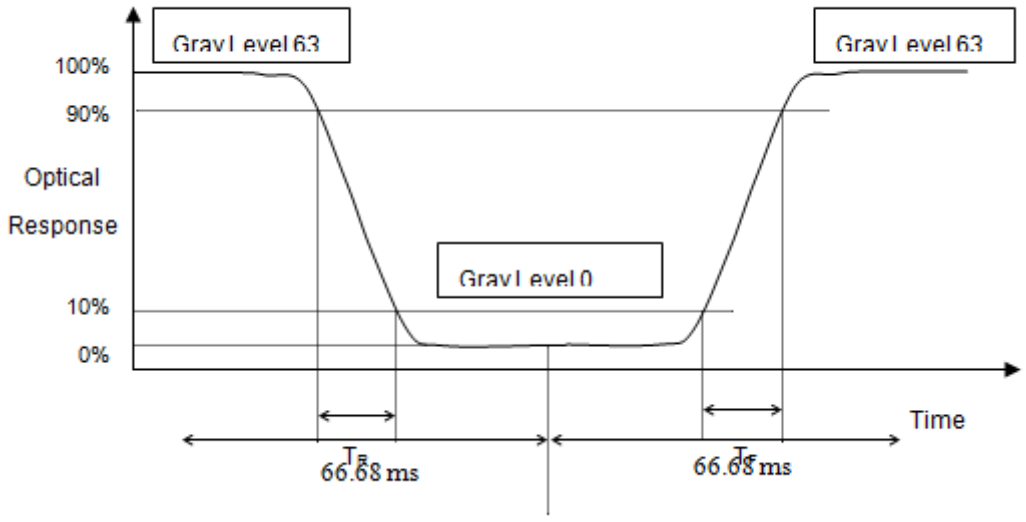
L63: Luminance of gray level 63

L 0: Luminance of gray level 0

CR = CR (5)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (5).

Note (3) Definition of Response Time (T_R, T_F) and measurement method:



Note (4) Definition of Luminance of White (L_C):

Measure the luminance of gray level 63 at center point

L_C = L (5)

L (x) is corresponding to the luminance of the point X at Figure in Note (5).

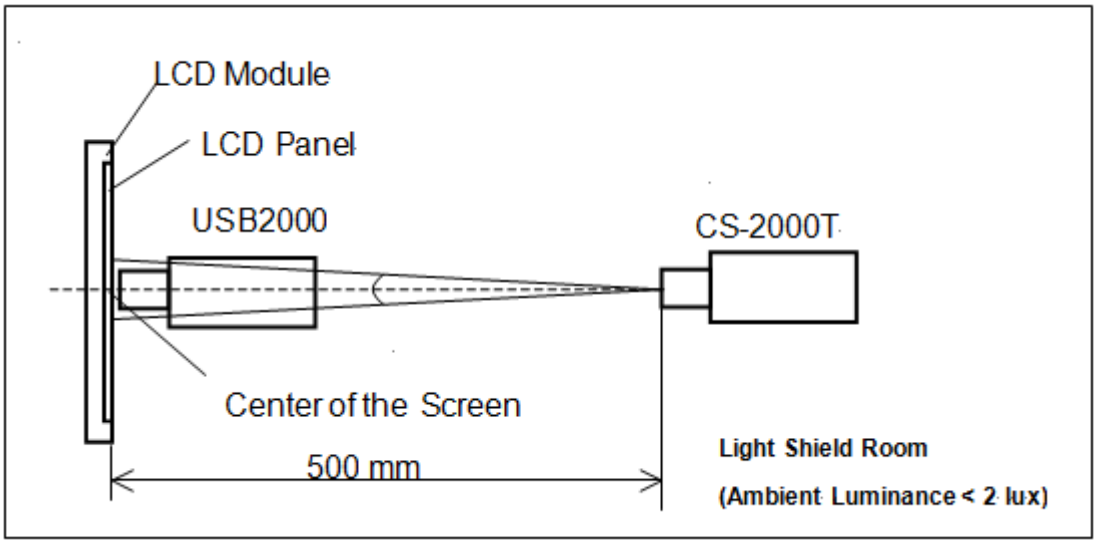
Note (5)Definition of White Variation (δW):

Measure the luminance of gray level 63 at 5 points

δW = Maximum [L (1), L (2), L (3), L (4), L (5)] / Minimum [L (1), L (2), L (3), L (4), L (5)]

Note (6)Measurement Setup:

The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.



8. RELIABILITY TEST

8.1 RELIABILITY TEST CONDITION

No.	Test Item	Test Condition	Note
1	High Temperature Storage	95℃, 240 hours	(1),(2) (4),(5)
2	Low Temperature Storage	-40℃, 240 hours	
3	Thermal Shock Storage	{(-40℃, 0.5 hour) (85℃, 0.5 hour)}, 100 cycles	
4	High Temperature Operating	85℃, 240 hours	
5	Low Temperature Operating	-30℃, 240 hours	
6	High Temperature & High Humidity Operating	60℃, 90% RH, 240hours	(1),(2) (4),(6)
7	Shock (Non-Operating)	100G, 6ms, half sine wave, 3 times for ± X, ± Y, ± Z.	(3)
8	Vibration (Non-Operating)	3G, 10 ~ 200 Hz, 10min/cycle, 3 cycles each X, Y, Z	(3)

Note (1)There should be no condensation on the surface of panel during test.

Note (2)The temperature of panel display surface area should be 95℃ Max.

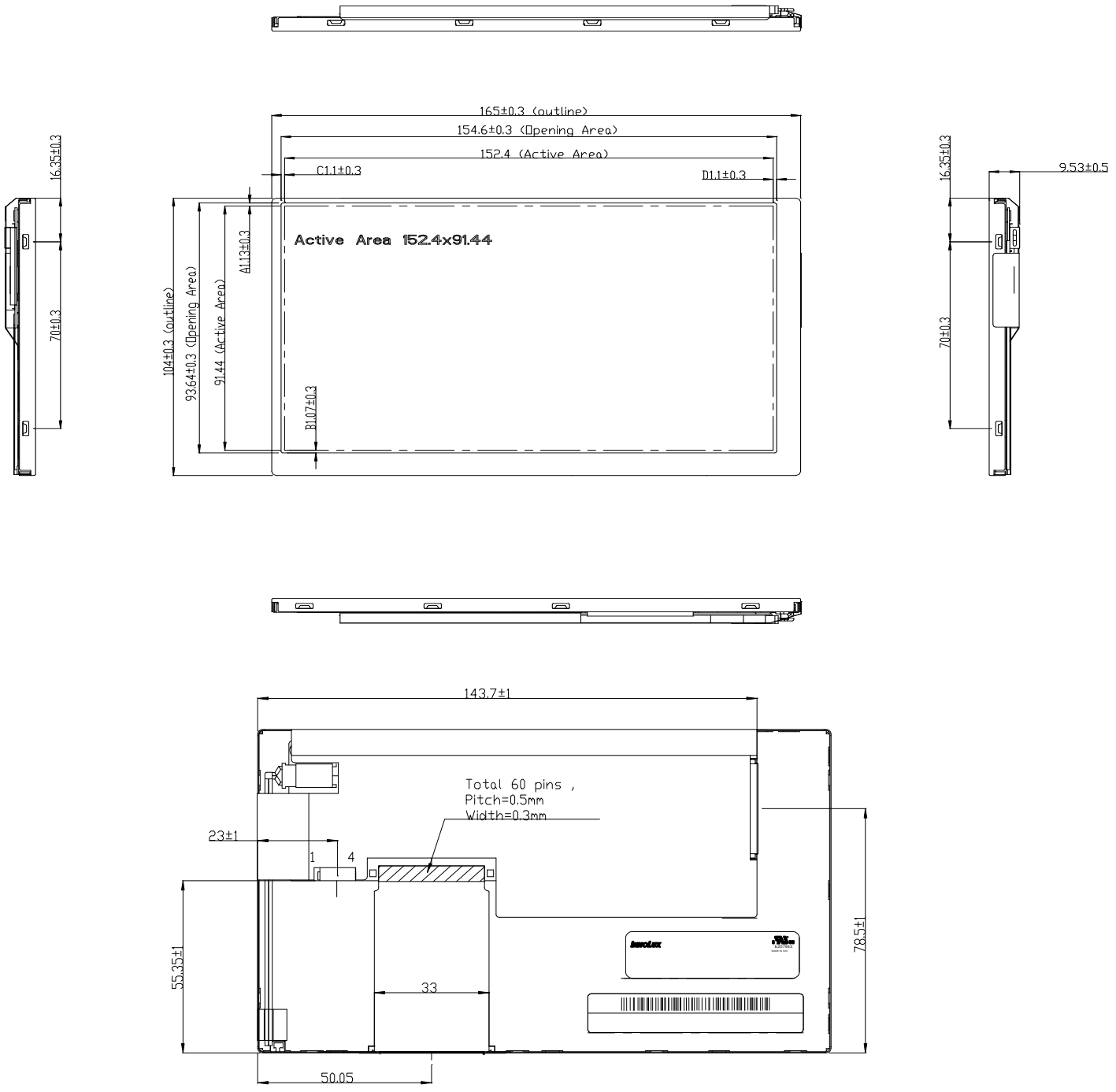
Note (3)At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

Note (4) In the standard conditions, there is no function failure issue occurred. All the cosmetic specification is judged before the reliability test.

Note (5) Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note (6) Before cosmetic and function test, the product must have enough recovery time, at least 24 hours at room temperature.

12. MECHANICAL CHARACTERISTICS



Note:
1.UNSPECIFIED TOLERANCE=±0.3mm.
2.DISPLAY AREA POSITION TOLERANCE: |A-B|<=1mm
3.LVDS CONNECTOR: 73B20-0048RA-G4 (Starcon).
4.P/I CONNECTOR: LM123S004HTF13 (Unicorn).
5.THOSE SCREWS AT PCBA BOARD TO TWIST WITH FORCE IS 0.6 Kgf-cm AND REPEAT TIMES<= 4 .
6.THE WIRE IS UNDER THE PCB PROTECTOR FILM.

DATA MODUL

easy TOUCH

7.0 inch PCAP solution
12012164

Revision: 001

Date: 2016-02-18

Table of contents

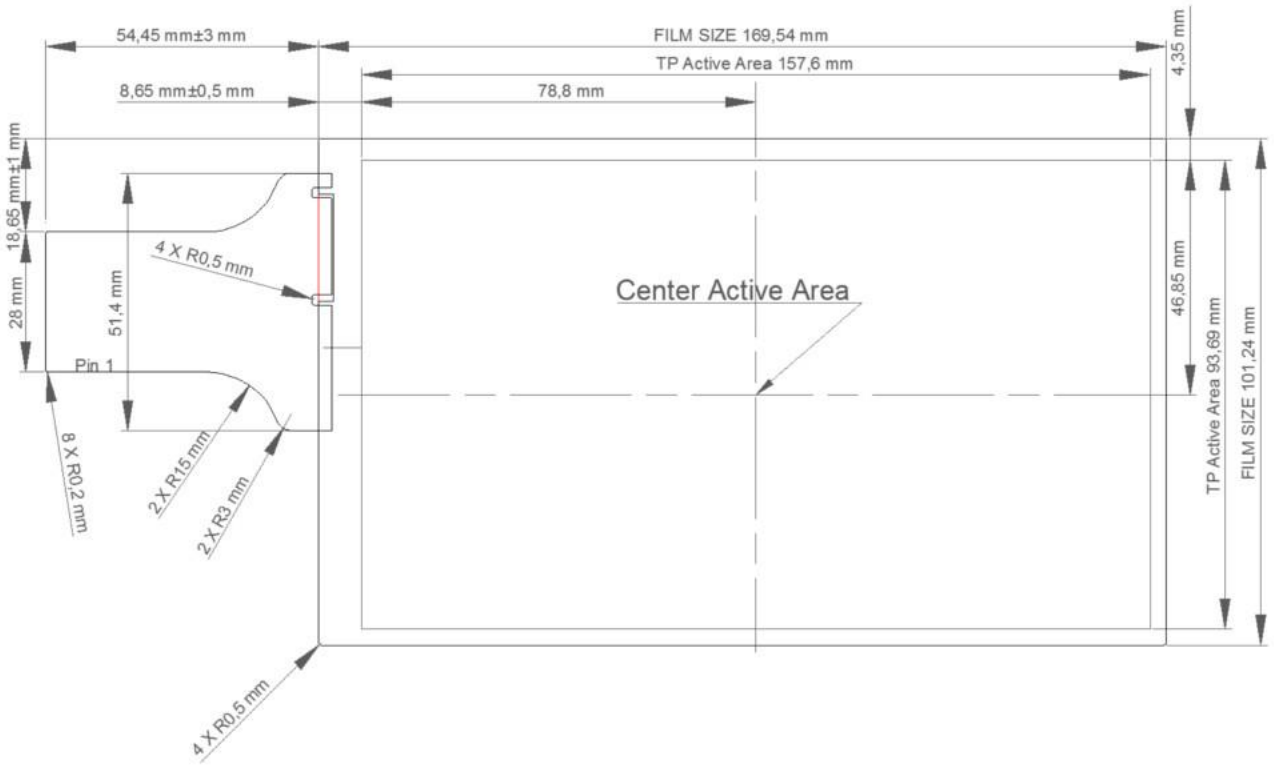
1 Sensor

Screen size	7.0 inch / 17.8 cm
Format	wide
Composite	Film/Film
Outline dimensions	169.54 x 101.24 x 0.63 mm (WxHxT)
Carrier glass	-
Active area	157.6 x 93.69 mm (WxH)
View area	-
Bending radius of tail	>5R recommended
Weight	-
Resolution X /Y	30 x 18
Touch separation X /Y	11 / 11 mm
Transmissivity	85% (min.)
Haze	3% (max.)
Operating temp. / humidity	-20 to +70°C / 20 to 85%RH
Storage temp. / humidity	-40 to +80°C / 20 to 90%RH
Durability / estimated MTBF at 25 °C	100 000 000 touches / 250 000 hours
Tail connector	OMRON XF2M-5515-1A

2 Controller USB

Chipset	mXT640T
Outline dimensions	33x43x4.5 mm (WxHxT)
V_{in}	5V DC+-5%
Power consumption	40mA (max.)
Operating temp.	-20 to +70°C
Supported OS	XP, Win7/8, CE6, EC7, Linux, OSX, QNX
Protocol USB	HID Mouse, HID Digitizer
Connector	9pol Molex

3 Mechanical drawing



Thickness: 0.63 mm

4 Optical inspection criteria

Test items	Specification	Criteria
Scratch / linear object	W<0.05 (L max. 7, N max. 5)	OK
	W 0.05 to 0.1 (L max. 10, N max. 3)	OK
	W>0.1	NG
Visible area (VA) Air bubbles / punctate	D<0.4	OK
	D 0.4 to 0.5 (N max. 5)	OK
	D>0.5	NG
Bending mark of tail	Breakage or damage of tail is not allowed; slight folding mark is acceptable	
Abnormal color point	D<0.2	OK
	D 0.2 to 0.4 (N max.3, distance min. 30)	OK
	D>0.4	NG
Notation	D = diameter, L = length, N = number, W = width all dimensions in mm	

5 Temperature tests

Low temperature test	-30°C for 72h
High temperature test	70°C for 72h
High temperature / high humidity test	60°C, 85% RH for 250h
Temperature cycle test	-20°C / 60°C, 2 h/cycle, 36 cycles

Note: Test samples are allowed a 2h recovery time at room temperature following non-operational test before function operation is verified.

6 Precautions

6.1 Precautions for operation

- Do not put a heavy, hard or sharp object on the product.
- Do not bend the product in order to assure the reliability.
- Do not put one product on the other. Otherwise, it may cause the product to be scratched.
- Don't use any organic solvent acid or alkali solution.

6.2 Precautions for mounting

- The panel should be mounted using a configuration that either holds the panel by all four corners or by all four sides.
- The bezel edge must be positioned outside the active area. The bezel may cause false activation if the edge overlaps the active area.
- Any mounting configuration should ensure that there is no twisting force applied to the panel.
- 1mm distance between TFT screen and touch panel is recommended.

6.3 Precautions for tail

The flex tail in general can be bent with a min. radius of about 5mm. In order to avoid damaging and malfunction of the sensor, please don't bend the FPC area next to the panel. Excess or repeated bending of the FPC connector should also be avoided.

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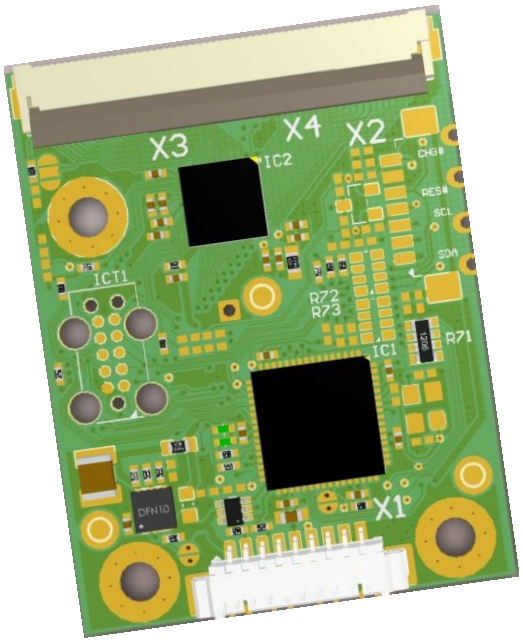


easyTOUCH mXT640T
PCAP USB controller

Revision: 002

Date: 2016-03-04

Table of contents

1 Introduction

The easyTouch mXT640T Controller is designed as a part of the capacitive touch systems developed by Data Modul. It offers the possibility to connect a projective capacitive touch sensor to standard computers or embedded systems using USB. For the connection the customer can use the cable or connect the controller board via soldering pads on top of another PCB.

The controller is based on the Atmel maXTouch 640T which offers a very good touch performance and high noise resistance. To get the best touch performance with water and glove usage the mXT640T has integrated self-capacitance technology. In combination with the mutual-capacitance entity the controller is applicable for single- and multi-touch. Together with outstanding filter technology the maXTouch ICs are suitable for industrial, medical and other applications.

For the communication with the OS the controller uses Data Modul's Driverless firmware. The firmware connects as a Human Interface Device (HID) without an additional driver to the most popular operating systems like Windows XP, Windows 7 / 8, Windows CE5/6/7, OSX and Linux. For more information about the Data Modul Driverless firmware please refer to the *Driverless Controller User Guide*.

2 Controller specification

2.1 Mechanical features

Size	33x43x4.5 mm
Operating temperature	-30 to +85 °C
Storage temperature	-30 to +85 °C
Temperature slew rate	10 °C /minute (max.)
Relative humidity	95 % at 60 °C no condensation
RoHS compliant	Yes

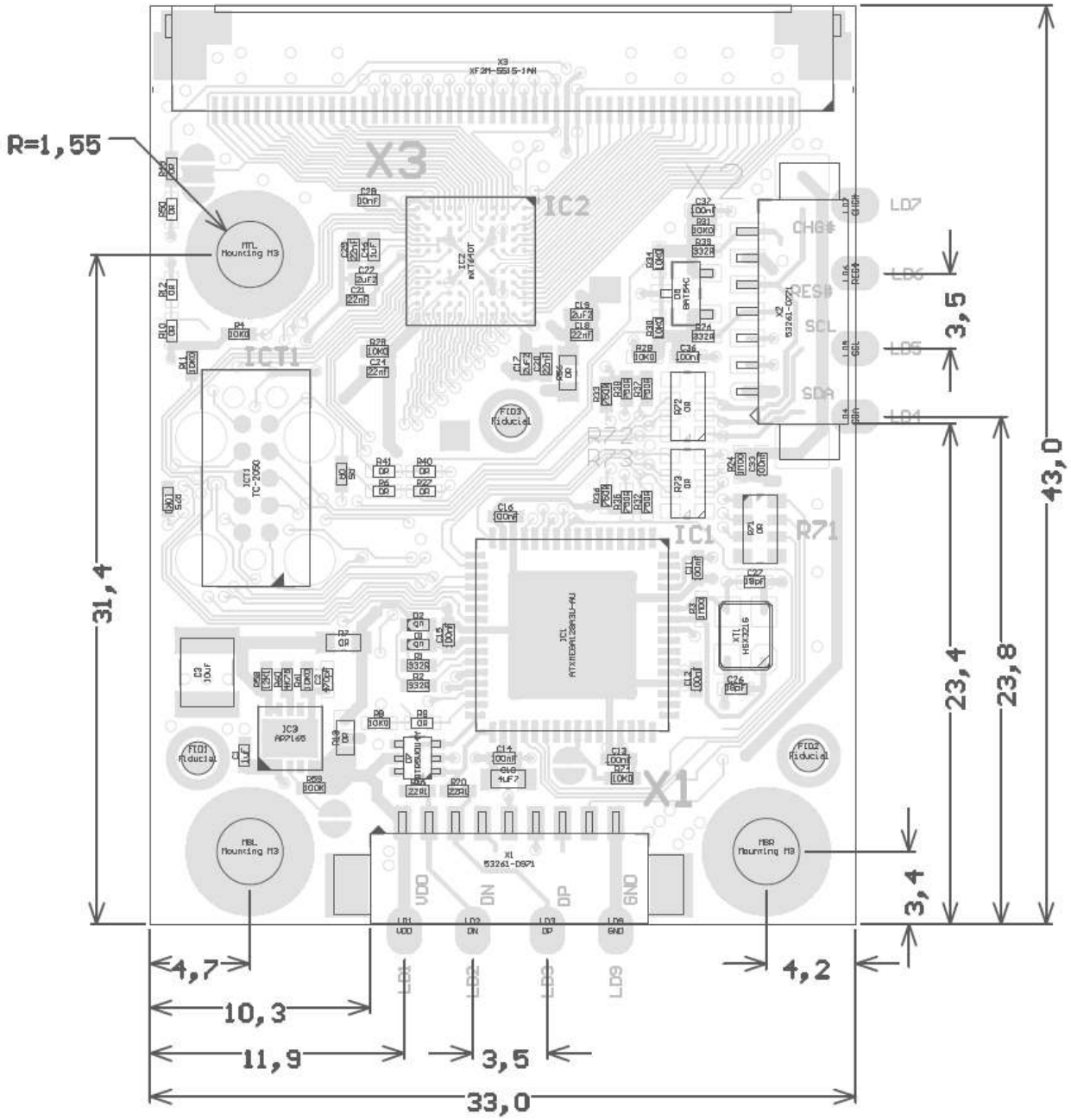
2.2 Connection features

Protocol	HID mouse, HID digitizer
Multi touch	10 fingers (max.)
Single touch	HID mouse with right mouse button emulation
Resolution	4096 x 4096 (x/y)
Report rate	350 Hz (max. subject to configuration)
USB connector	MOLEX 53261-0971 or equivalent

2.3 Electrical features

Power supply	5 V± 5%
Vin ripple	±50 mV peak-peak (max.)
On board voltage	3.3 V and 6.6 V
Power consumtion	200 mW (max. subject to configuration)

3 Mechanical drawing



Height: 4.5 mm (including components)

4 Connectors and signals

4.1 Connectors

Connector	Type	Connection
X1	1.25 mm pitch 9 pin header MOLEX 53261-0971	USB
X3	0.5 mm pitch 55 pin header	Flextail to touch sensor
Soldering pads LD1-9		Alternative connector of X1

4.2 X1 and soldering pads pin assignment

X1	Pad	Signal	Description
1	1	VDD_5V	USB power supply
2	2	USB DM	USB signal -
3	3	USB DP	USB signal +
4	4		Do not use
5	5		Do not use
6	6		Do not use
7	7		Do not use
8	-		Do not use
9	9	GND	Ground

Matching USB cable (length 2m): Article number **TP72241**

5 UL information

Part	Type	UL number
X1	1.25 mm pitch 9 pin header MOLEX 53261-0971	Molex 53261-**xx**71: E29179 or YeonHo 12505WR- **xx**: E108706
X3	0.5 mm pitch 55 pin header	Omron XF2M-**xx**15-1AH: LCP resin (UL94V-0)/natural LCP resin (UL94V-0)/black
PCB		Fuying: E315019

7 Appendix: Frequently asked questions

Touch coordinates are not stable and the cursor is “jumping around”?

In mains-operated systems this can happen if the touch controller is missing the systems ground reference. Another reason can be an extreme amount of noise present that exceeds the touch threshold set in the controller.

Please connect the system ground reference to one of the mounting holes. For best touch performance the touch controller needs a low impedance AC connection to the person that operates the system to achieve a good current loop back to the controller.

If the instability is caused by a noise source like a display, a switching regulator or a RF antenna your system may have an integration issue. With proper settings the controller can most likely suppress the noise. However, eliminating the noise source should be the first thing to check. If you have any difficulties to find the correct settings, please contact Data Modul.

Connecting is done, but no touch function at all?

If the tail is inserted “upside-down” you will not get any touch event. Please check if the tail is connected correctly. When connecting the touch panel to the controller, do not let the golden finger side misleading you. Always check the alignment of the three ground connections on the tail (marked blue in the following picture) to make sure the connection is correct. Please always connect the tail first before you connect to USB. You also should check if you touch the correct side of the panel.

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ALL TECHNOLOGIES. ALL COMPETENCIES. ONE SPECIALIST.

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