DATA MODUL

SPECIFICATION

easy TOUCH DISPLAY

easyTOUCH DISPLAY Advanced (12024025)

15,6” - WXGA – eTD156W3202-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

15.6 inch (39.6cm)
Part-No. 12024025
G156BGE-L01 incl.easyTOUCH eTD156W3202-INA-A

Display

Panel Type	InnoluxG156BGE-L01
Resolution (pixel) / format	1366 x 768/ wide
Brightness (typical)	300 cd/m²
Display Mode	TN, Normally White
Customer Interface Display	LVDS
Contrast ratio (typical)	500:1
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	15.6" easyTOUCH 12014892
Active area touch sensor (W x H)	348.6 (H) x 197.9 (V)
Optical Specification	according to DATA MODUL Outgoing Specification 12005965
Touch Interface	USB mXT2952T2

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

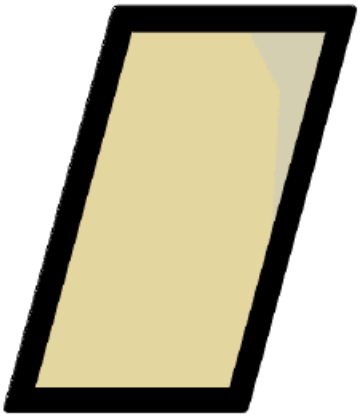
Touch Controller	easyTOUCH mXT2952T2 Driverless USB

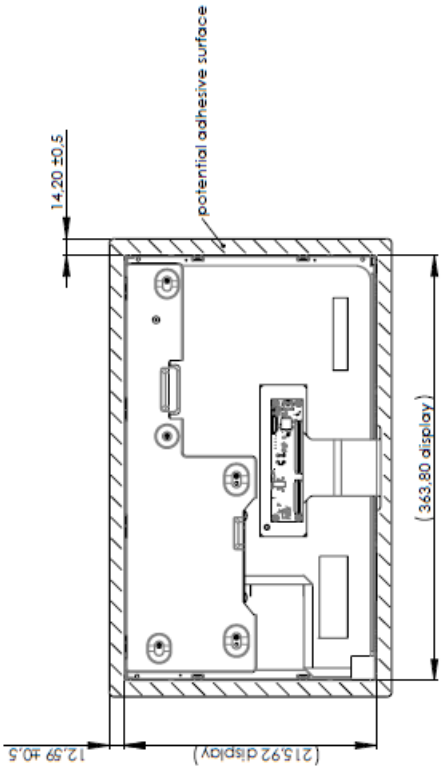
Environmental conditions

Temperature (operating)	0 - 60 °C

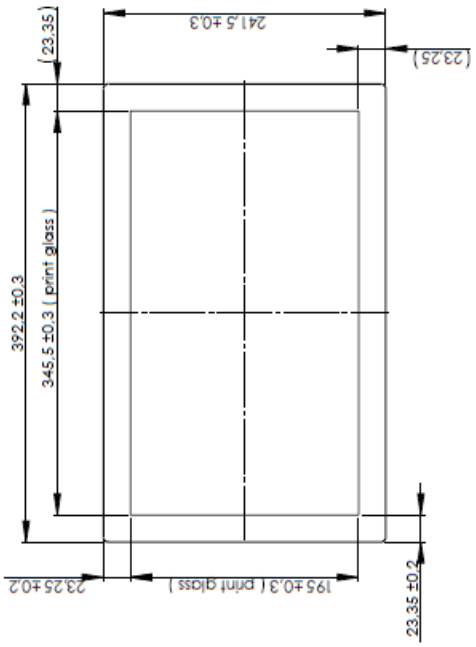
Mechanical dimensions

Outline dimensions (W x H x T)	392.2 (H) x 241.5 (V) x 24.2 (T) Detailed dimensions according to outline drawing
Weight	approx. 2.1 kg




potential adhesive surface
14.20 ±0.5
(363.80 display)
12.59 ±0.5
(215.92 display)


24.22 ±1.3


(23.35)
241.5 ±0.3
(23.25)
392.2 ±0.3
345.5 ±0.3 (print glass)
23.25 ±0.2
195 ±0.3 (print glass)
23.35 ±0.2

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REVISION HISTORY

Version	Date	Page	Description
2.0	Feb.17, 2014	All	Spec Ver. 2.0 was first issued.
2.1	Jul., 8, 2014	7	4.2. INTERFACE CONNECTIONS Note(1) Added User Connector
		11	4.3.4 BACKLIGHT PIN ASSIGNMENT Added Note(2) User Connector
2.2	Feb.22, 2018	All	Transfer the manufacture side from TW to NGB. Spec update from Ver. 2.1 to Ver.2.2.

1. GENERAL DESCRIPTION

1.1 OVERVIEW

G156BGE-L01 is a 15.6” TFT Liquid Crystal Display module with WLED Backlight unit and 30 pins 1ch-LVDS interface. This module supports 1366 x 768 WXGA mode and can display up to 16.7M colors. The converter module for Backlight is built in.

1.2 GENERAL SPECIFICATIONS

Item	Specification	Unit	Note
Screen Size	15.6” real diagonal		
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1366 x R.G.B. x 768	pixel	-
Pixel Pitch	0.252 (H) x 0.252 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	262K/16.7M	color	-
Transmissive Mode	Normally white	-	-
Surface Treatment	AG type, 3H hard coating,	-	-
Luminance, White	300	Cd/m2	
Color Gamut	65 % of NTSC(Typ.)	-	-
Power Consumption	(10.95)	W	

2. MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	363.3	363.8	364.3	mm	
	Vertical (V)	215.42	215.92	216.42	mm	
	Thickness (T)	16.35	16.85	17.35	mm	
Bezel Area	Horizontal	347.03	347.53	347.03	mm	
	Vertical	196.34	196.84	197.34	mm	
Active Area	Horizontal	-	344.232	-	mm	
	Vertical	-	193.536	-	mm	
Weight		-	1190	1250	g	

3. ABSOLUTE MAXIMUM RATINGS

3.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	TST	-20	60	℃	(1)
Operating Ambient Temperature	TOP	0	(60)	℃	(1), (2)

Note (1)

(a) 90 %RH Max. (Ta < 40 ℃).

(b) Wet-bulb temperature should be 39 ℃ Max. (Ta < 40 ℃).

(c) No condensation.

Note (2) The temperature of panel surface should be 0 ℃ min. and 60 ℃ max.

3.2 ELECTRICAL ABSOLUTE RATINGS

3.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	VCCS	-0.3	6.0	V	(1)
Logic Input Voltage	VIN	-0.3	6	V	

3.2.2 BACKLIGHT CONVERTER

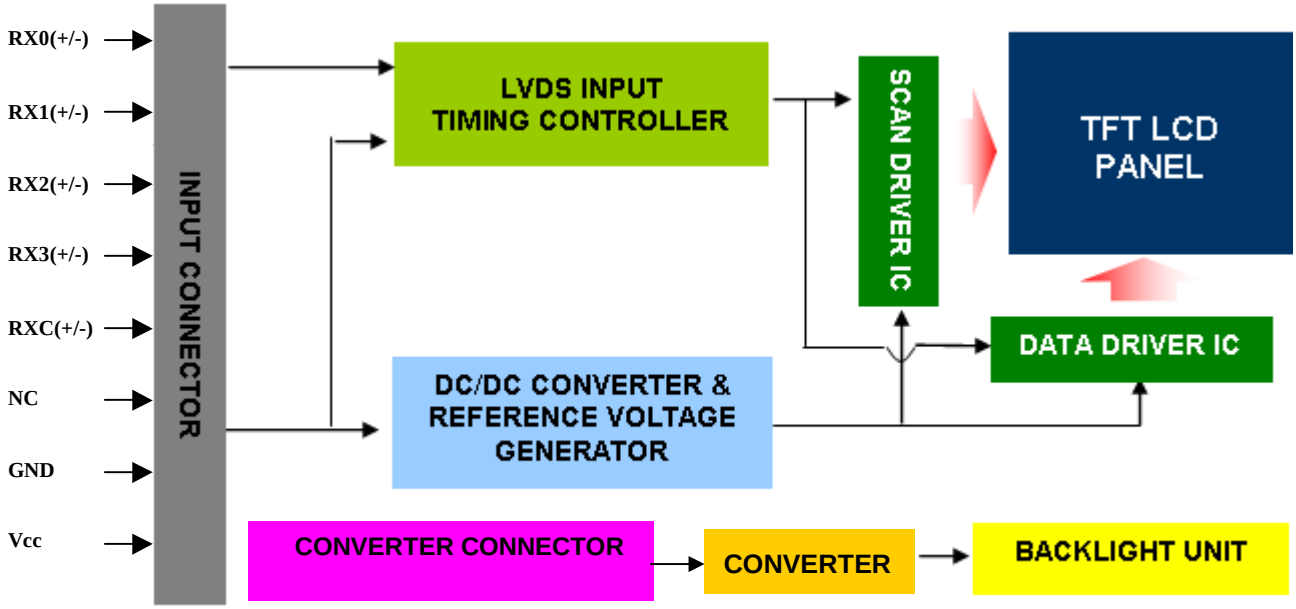
Item	Symbol	Value			Unit	Note
		Min.	Typ	Max.		
Converter Voltage	LED_V_{in}	0	12.0	18.0	V	(1), (2) Duty=100%
Enable Voltage	LED_EN	0	3.3 / 5	7	V	
Backlight Adjust	LED_PWM	0	3.3 / 5	7	V	(1), (2) Pulse Width≦10msec. and Duty≦10%

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 input pin of LED light bar at Ta=25±2 ℃ (Refer to 4.3.3 and 4.3.4 for further information).

4. ELECTRICAL SPECIFICATIONS

4.1 FUNCTION BLOCK DIAGRAM



4.2. INTERFACE CONNECTIONS

PIN ASSIGNMENT

Pin	Name	Description
1	GND	Ground
2	NC	Not connection, this pin should be open.
3	NC	Not connection, this pin should be open.
4	GND	Ground
5	RX0-	Negative LVDS differential data input. Channel 0
6	RX0+	Positive LVDS differential data input. Channel 0
7	GND	Ground
8	RX1-	Negative LVDS differential data input. Channel 1
9	RX1+	Positive LVDS differential data input. Channel 1
10	GND	Ground
11	RX2-	Negative LVDS differential data input. Channel 2
12	RX2+	Positive LVDS differential data input. Channel 2
13	GND	Ground
14	RXCLK-	Negative LVDS differential clock input.
15	RXCLK+	Positive LVDS differential clock input.
16	GND	Ground
17	RX3-	Negative LVDS differential data input. Channel 3
18	RX3+	Positive LVDS differential data input. Channel 3
19	GND	Ground
20	NC	Not connection, this pin should be open.
21	NC	Not connection, this pin should be open.
22	NC	Not connection, this pin should be open.
23	GND	Ground
24	GND	Ground
25	GND	Ground
26	Vcc	+5V power supply
27	Vcc	+5V power supply
28	Vcc	+5V power supply
29	Vcc	+5V power supply
30	Vcc	+5V power supply

Note (1) Connector Part No.:187114-30091(P-TWO) or equivalent

User's connector Part No.:FI-X30H(JAE)

Note (2) The first pixel is odd.

Note (3) Input signal of even and odd clock should be the same timing.

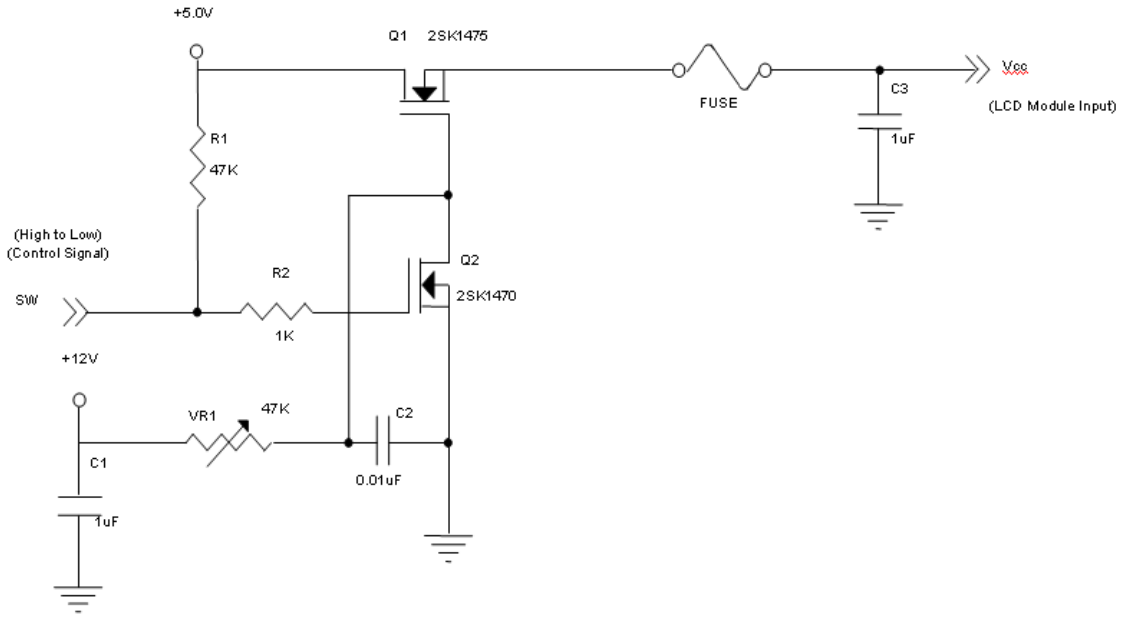
4.3 ELECTRICAL CHARACTERISTICS

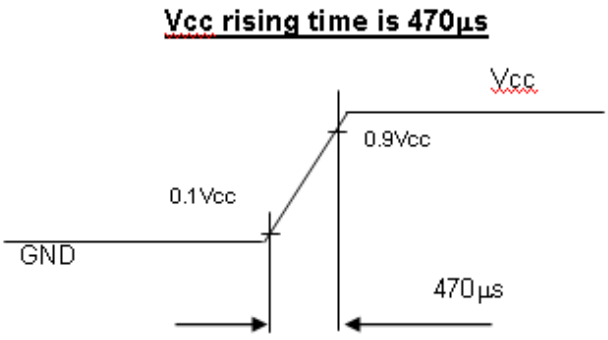
4.3.1 LCD ELETRONICS SPECIFICATION

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		Vcc	(4.5)	(5)	(5.5)	V	-
Ripple Voltage		V_{RP}	-	-	(150)	mV	-
Rush Current		I_{RUSH}	-	-	(3)	A	(2)
Power Supply Current	White		-	(0.16)	(0.21)	A	(3)a
	Black		-	(0.22)	(0.27)	A	(3)b
	Vertical Stripe		- -	(0.27)	(0.32)	A	(3)c
Power Consumption		PLCD	-	(1.35)	(2.52)	Watt	(4)
LVDS differential input voltage		Vid	-	(1.35)	(1.60)	mV	
LVDS common input voltage		Vic	(200)	-	(600)	V	
Logic High Input Voltage		VIH	-	(1.2)	-	V	
Logic Low Input Voltage		VIL	(2.7)		(3.3)	V	

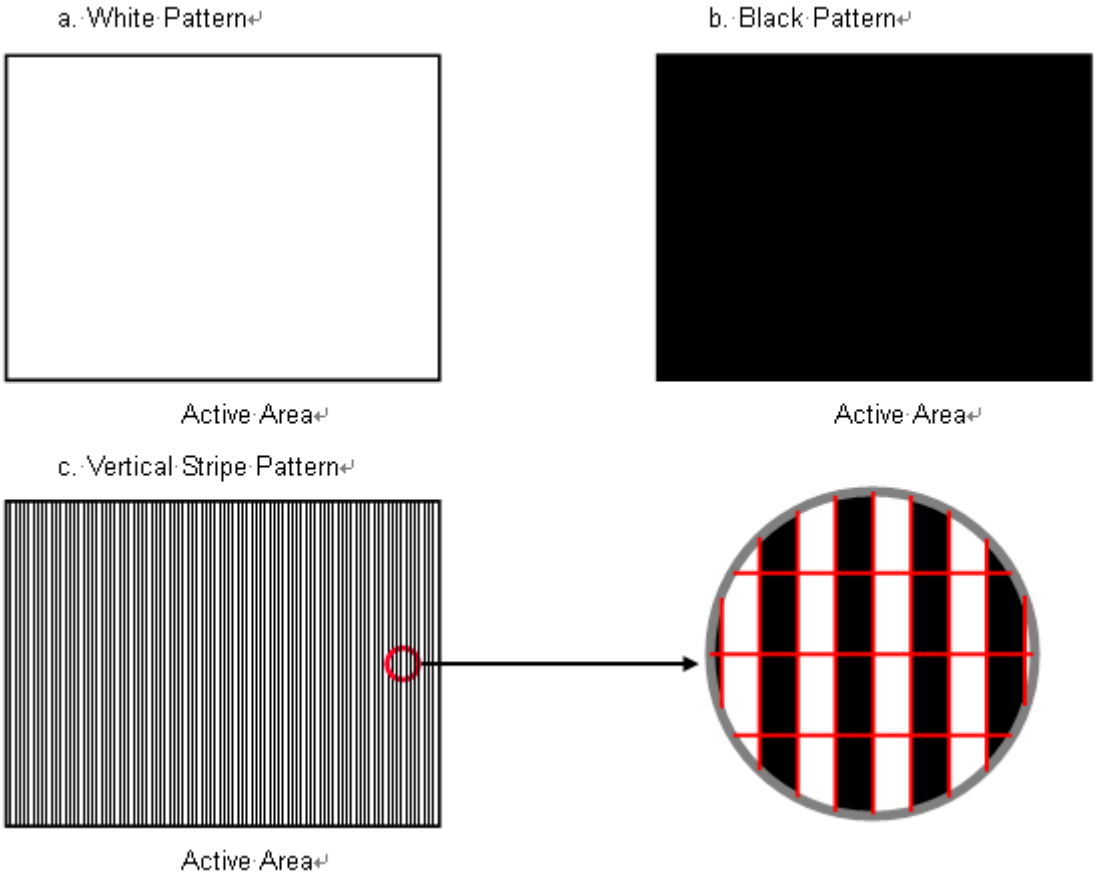
Note (1) The ambient temperature is Ta = 25 ± 2 ℃.

Note (2) Measurement Conditions:



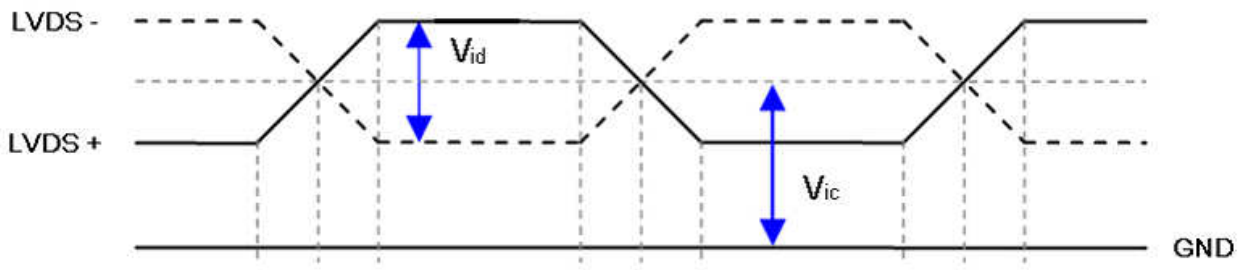


Note (3) The specified power supply current is under the conditions at Vcc = 5.0 V, Ta = 25 ± 2 ℃, Fr = 60Hz, whereas a power dissipation check pattern below is displayed.

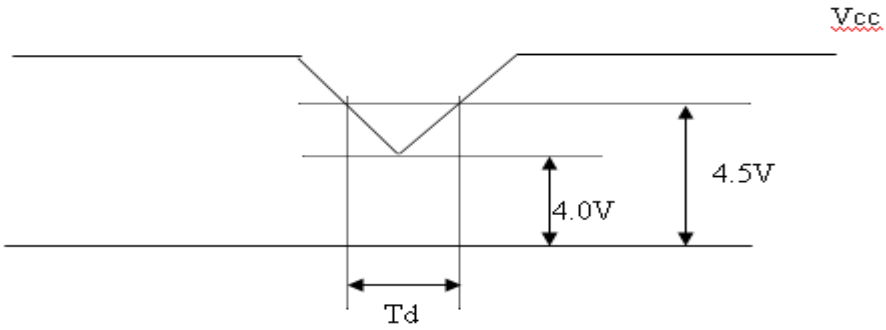


Note (4) The power consumption is specified at the pattern with the maximum current.

Note (5) VID waveform condition



4.3.2 Vcc Power Dip Condition



4.3.3 BACKLIGHT UNIT

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Converter Power Supply Voltage		LED_Vin	(10.8)	(12.0)	(13.2)	V	
Converter Power Supply Current		Ii	(0.6)	(0.8)	(1)	A	@LED_Vin= 12V Duty=100%
Converter Input Rush Current		Iirsh			(3)	A	@LED_Vin rising = 1mS
Power Consumption		P_{LED}		(9.6)		W	@ LED_Vin = 12V Duty=100%
EN Control Level	Backlight on	LED_EN	(2.0)	(5)	(5.5)	V	
	Backlight off		(0)	(0)	(0.8)		
PWM Control Level	PWM High Level	LED_PWM	(2.0)	(3.3)	(5.0)	V	
	PWM Low Level		(0)	(0)	(0.15)		
PWM Control Duty Ratio			(10)	--	(100)	%	
PWM Control Frequency		f_{PWM}	(190)	(200)	(20k)	Hz	
LED Life Time		L_L	(50,000)			Hrs	(2)

Note (1) LED light bar input voltage and current are measured by utilizing a true RMS multimeter as shown below:

Note (2) The lifetime of LED is estimated data and defined as the time when it continues to operate under the conditions at Ta = 25 ±2 ℃ and Duty 100% until the brightness becomes ≦ 50% of its original value. Operating LED at high temperature condition will reduce life time and lead to color shift.

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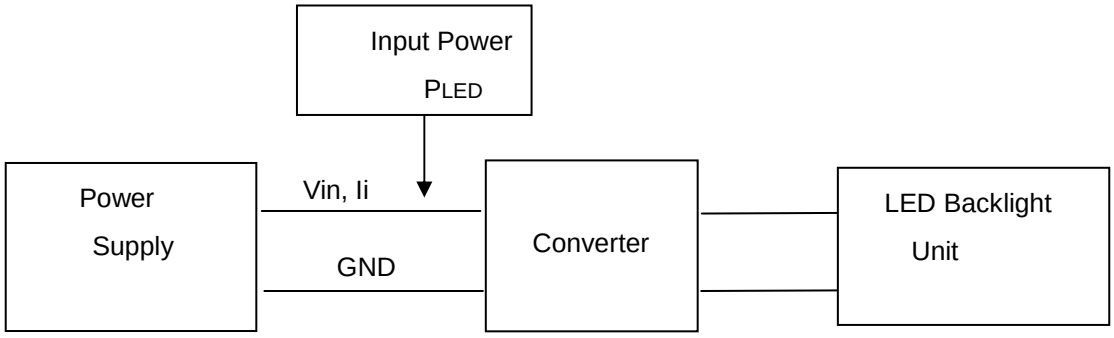

4.3.4 BACKLIGHT PIN ASSIGNMENT

Pin	Symbol	Description	Remark
1	V_i	Converter input voltage	12V
2	V_{GND}	Converter ground	Ground
3	EN	Enable pin	3.3 / 5 V
4	ADJ	Backlight Adjust	PWM Dimming (Hi: 3.3 / 5V_{DC}, Lo: 0V_{DC})
5	NC	Not Connect	

Note (1) Connector Part No.:CI4205M2HRP-NH,CVILUX

Note (2) User's connector Part No.:CI4205SL000(CVILUX)

4.4 LVDS INPUT SIGNAL SPECIFICATIONS

4.4.1 LVDS DATA MAPPING TABLE

LVDS Channel 0	LVDS output	D7	D6	D4	D3	D2	D1	D0
	Data order	G0	R5	R4	R3	R2	R1	R0
LVDS Channel 1	LVDS output	D18	D15	D14	D13	D12	D9	D8
	Data order	B1	B0	G5	G4	G3	G2	G1
LVDS Channel 2	LVDS output	D26	D25	D24	D22	D21	D20	D19
	Data order	DE	NA	NA	B5	B4	B3	B2
LVDS Channel 3	LVDS output	D23	D17	D16	D11	D10	D5	D27
	Data order	NA	B7	B6	G7	G6	R7	R6

4.4.2 COLOR DATA INPUT ASSIGNMENT

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.

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
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	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

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

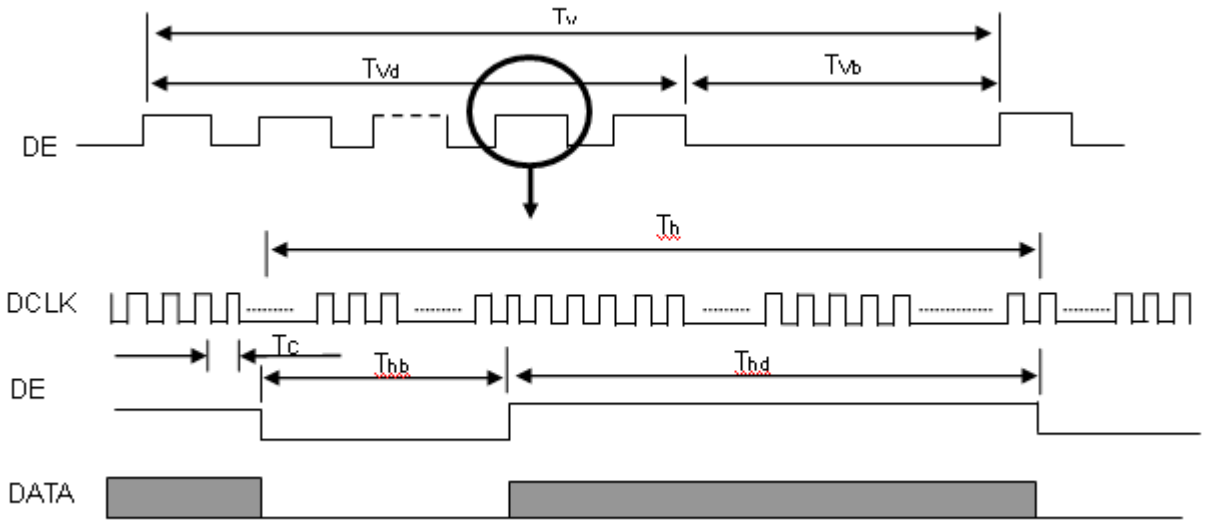
4.5 DISPLAY TIMING SPECIFICATIONS

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

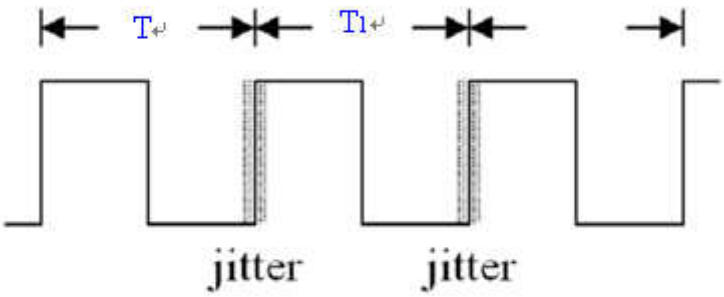
Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Clock	Frequency	Fc	(63)	(76)	(96)	MHz	-
	Period	Tc		(13)		ns	
	Input cycle to cycle jitter	T_{rcl}	(TC -200)		(TC +200)	ns	(1)
	Input Clock to data skew	TLVCCS			(400)	ps	(2)
	Spread spectrum modulation range	Fclkin_mod	(FC*97%)		(FC*103%)	MHz	(3)
	Spread spectrum modulation frequency	F_{SSM}			(200)	KHz	
Vertical Display Term	Frame Rate	Fr	(50)	(60)	(76)	Hz	Tv=Tvd+Tvb
	Total	Tv	(800)	(806)	(815)	Th	-
	Active Display	Tvd	(768)	(768)	(768)	Th	-
	Blank	Tvb	(32)	(38)	(47)	Th	-
Horizontal Display Term	Total	Th	(1500)	(1560)	(1570)	Tc	Th=Thd+Thb
	Active Display	Thd	(1366)	(1366)	(1366)	Tc	-
	Blank	Thb	(134)	(194)	(204)	Tc	-

Note: Because this module is operated by DE only mode, Hsync and Vsync input signals are ignored.

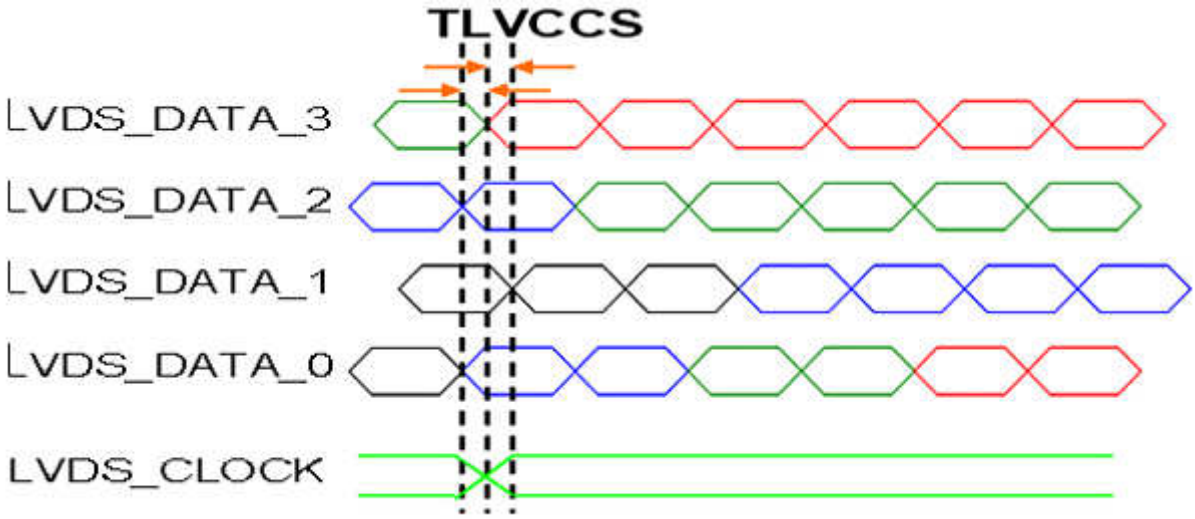
INPUT SIGNAL TIMING DIAGRAM



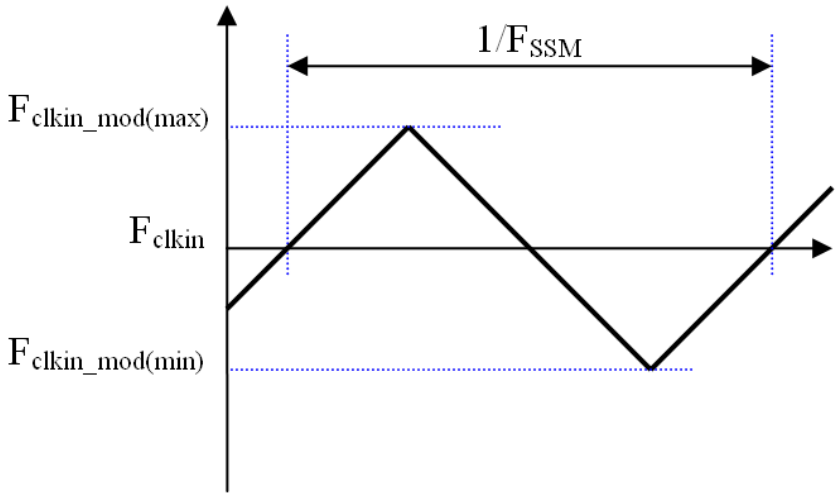
Note (1) The input clock cycle-to-cycle jitter is defined as below figures. Trcl = I T_1 – TI



Note (2) Input Clock to data skew is defined as below figures.

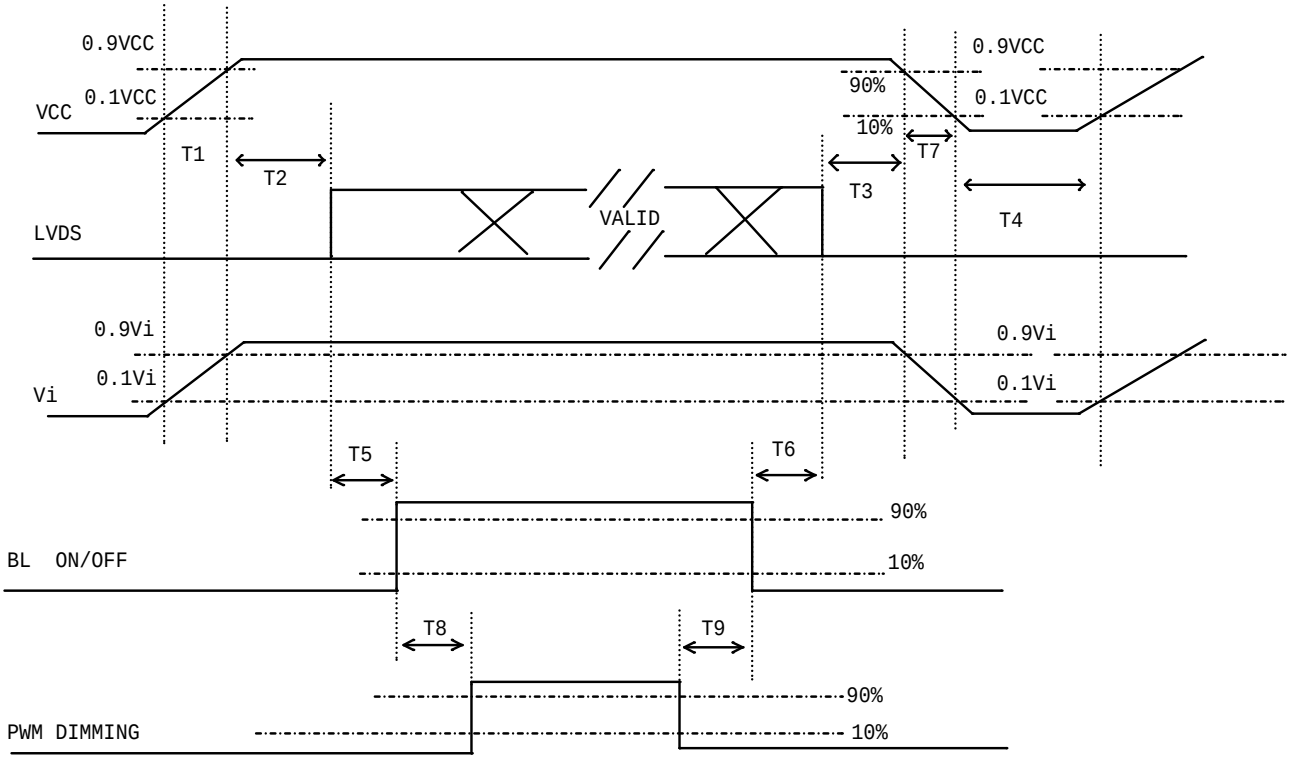


Note (3) The SSCG (Spread spectrum clock generator) is defined as below figures.



4.6 POWER ON/OFF SEQUENCE

The power sequence specifications are shown as the following table and diagram.



Timing Specifications:

Parameter	Value			Units
	Min	Typ	Max	
T1	0.5	-	10	ms
T2	0	-	50	ms
T3	0	-	50	ms
T4	500	-	-	ms
T5	200	-	-	ms
T6	20	-	-	ms
T7	5	-	300	ms
T8	10	-	-	ms
T9	10	-	-	ms

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.

5. OPTICAL CHARACTERISTICS

5.1 TEST CONDITIONS

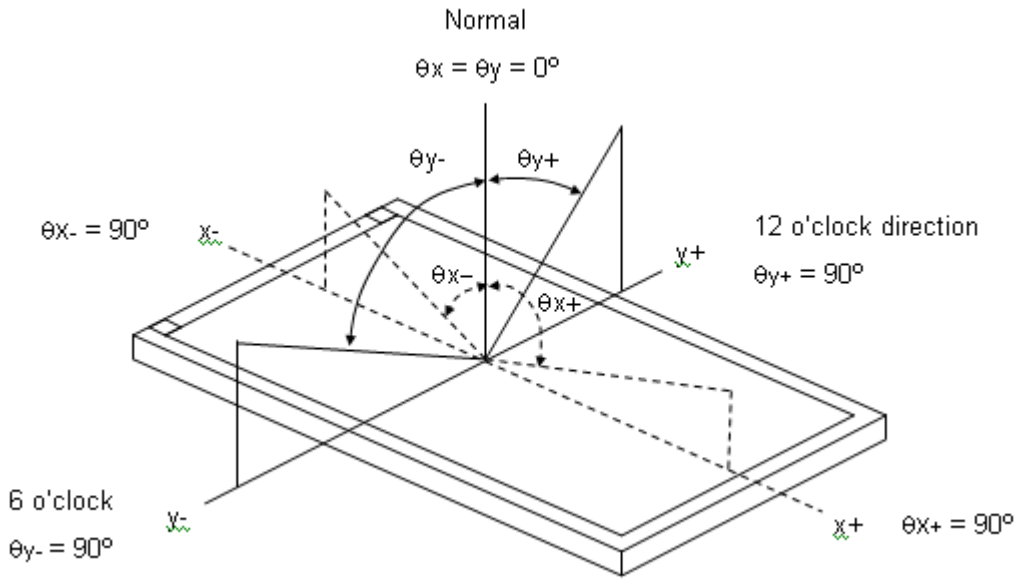
Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	℃
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	According to typical value in "ELECTRICAL CHARACTERISTICS"		
Input Signal			
LED Light Bar Input Current Per Input Pin			

5.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 5.2 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 5.1 and stable environment shown in Note (5).

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity (CIE 1931)	Red	Rx	θ_x=0°, θ_Y =0° CS-2000 R=G=B=255 Gray scale	Typ – 0.045	(0.617)	Typ + 0.045	-	(1), (5)
		Ry			(0.340)			
	Green	Gx			(0.320)			
		Gy			(0.598)			
	Blue	Bx			(0.160)			
		By			(0.084)			
	White	Wx			(0.313)			
		Wy			(0.329)			
Center Luminance of White (Center of Screen)		L_C		240	300	-	cd/m^2	(4), (5)
Contrast Ratio		CR		400	500	-	-	(2), (5)
Response Time		T_R	θ_x=0°, θ_Y =0°	-	(3)	(8)	ms	(3)
		T_F		-	(7)	(13)		
White Variation		W	θ_x=0°, θ_Y =0°	(65)	-	-	%	(5), (6)
Viewing Angle	Horizontal	θx- + θx+	CR ≧ 10	(140)	(160)	---	Deg.	(1), (5)
	Vertical	θy- + θy+		(140)	(160)	---		

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) = L255 / L0

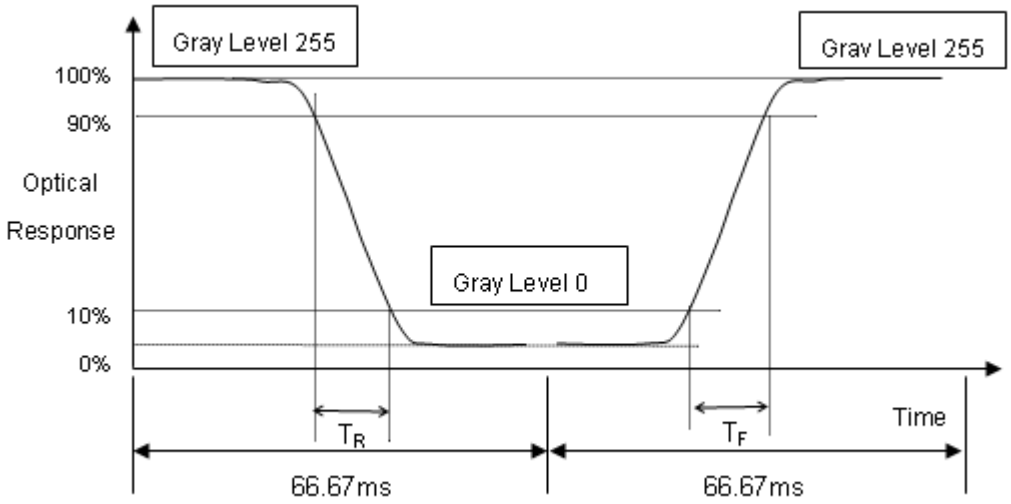
L255: Luminance of gray level 255

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 (6).

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



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

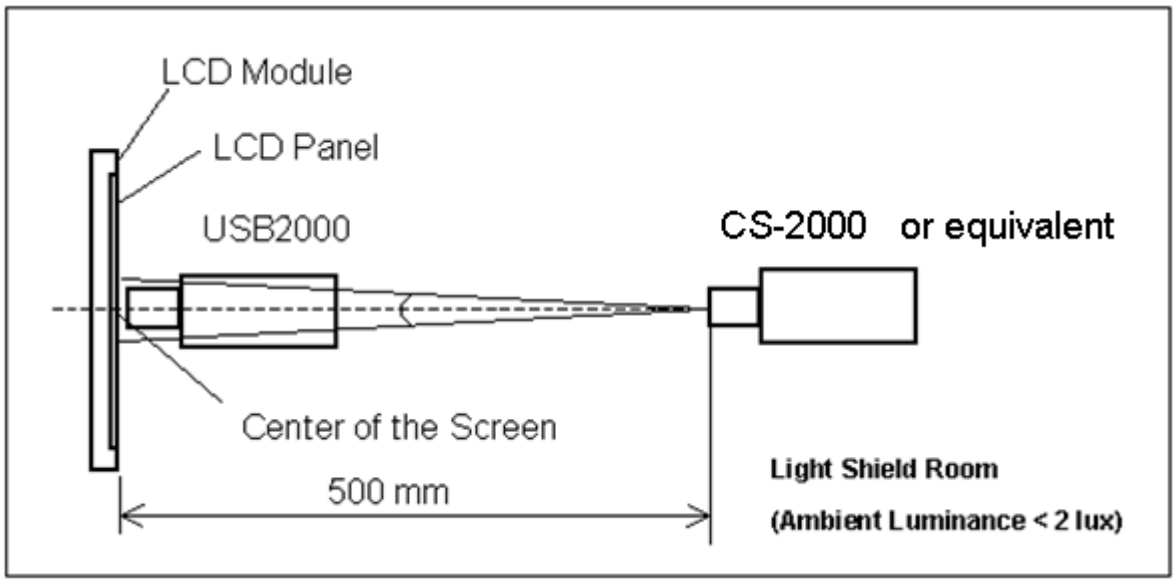
Measure the luminance of gray level 255 at center point

L_C = L (5)

L (x) is corresponding to the luminance of the point X at Figure in Note (6).

Note (5) Measurement Setup:

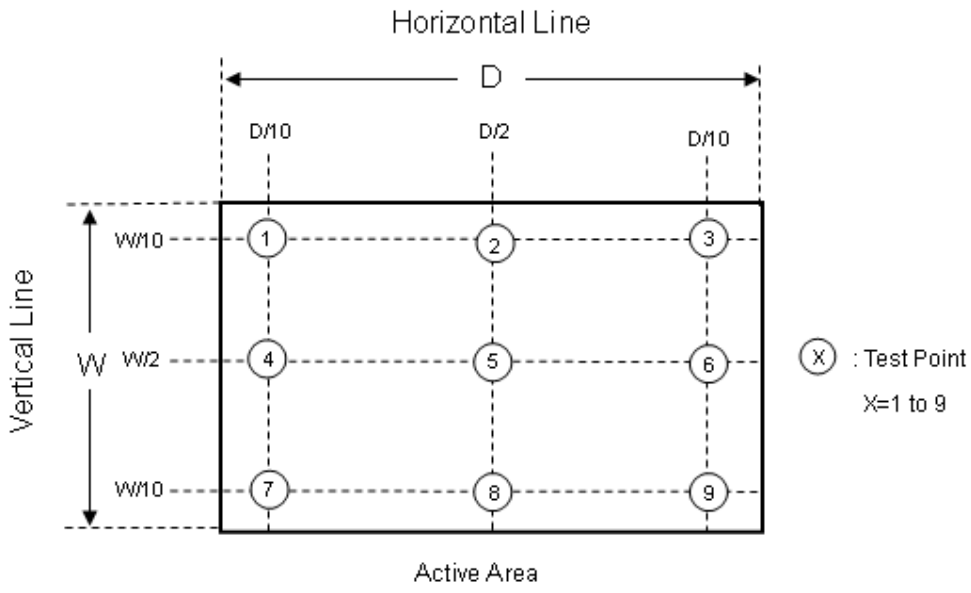
The LCD module should be stabilized at given temperature for 40 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 40 minutes in a windless room.



Note (6) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 9 points

δW = (Minimum [L (1) ~ L (9)] / Maximum [L (1) ~ L (9)]) *100%



6. RELIABILITY TEST ITEM

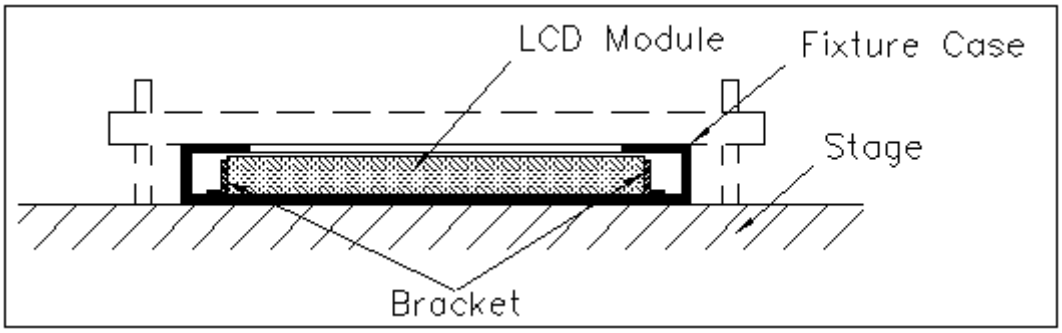
Items	Required Condition	Note
Temperature Humidity Bias (THB)	Ta= 50℃ , 80%RH, 240hours	
High Temperature Operation (HTO)	Ta= 60℃ , 50%RH , 240hours	
Low Temperature Operation (LTO)	Ta= 0℃ , 240hours	
High Temperature Storage (HTS)	Ta= 60℃ , 240hours	
Low Temperature Storage (LTS)	Ta= -20℃ , 240hours	
Vibration Test (Non-operation)	Acceleration: 1.5 Grms Wave: Half-sine Frequency: 10 - 300 Hz Sweep: 30 Minutes each Axis (X, Y, Z)	
Shock Test (Non-operation)	Acceleration: 50 G Wave: Half-sine Active Time: 11 ms Direction : ± X, ± Y, ± Z.(one time for each Axis)	
Thermal Shock Test (TST)	-20℃/30min , 60℃ / 30min , 100 cycles	
On/Off Test	25℃ ,On/10sec , Off /10sec , 30,000 cycles	
ESD (Electro Static Discharge)	Contact Discharge: ± 8KV, 150pF(330Ω)	
	Air Discharge: ± 15KV, 150pF(330Ω)	
Altitude Test	Operation:10,000 ft / 24hours Non-Operation:30,000 ft / 24hours	

Note (1) criteria : Normal display image with no obvious non-uniformity and no line defect.

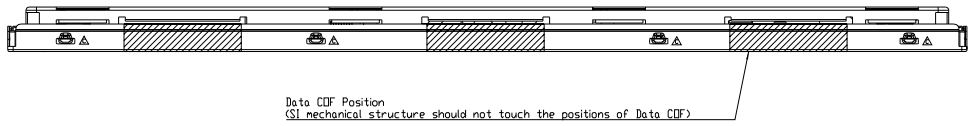
Note (2) Evaluation should be tested after storage at room temperature for more than two hour

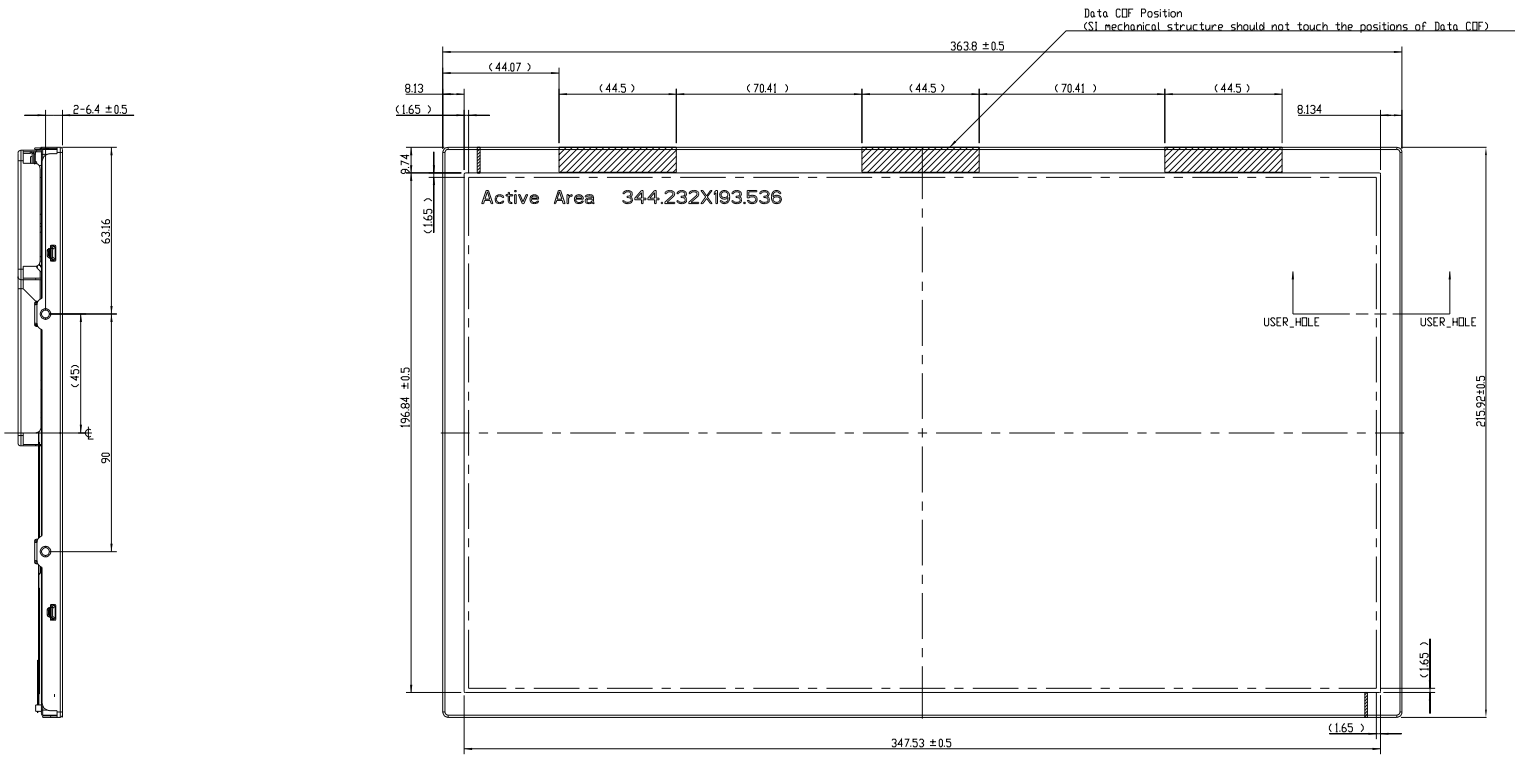
Note (3) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

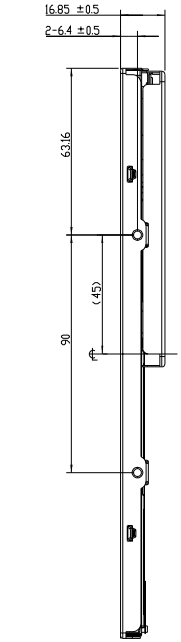
The fixing condition is shown as below:

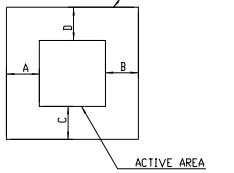


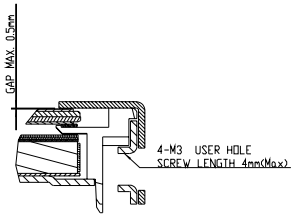
REV	EC NUMBER	DESCRIPTION	DATE
A		First Release	2013/12/10
B	ER00781199	Add P Cover to Frame Rear Gap=0.5 (Reference Dimension)	2014/01/07
C	ER00051132	Modify Top View Drawing	2016/01/05









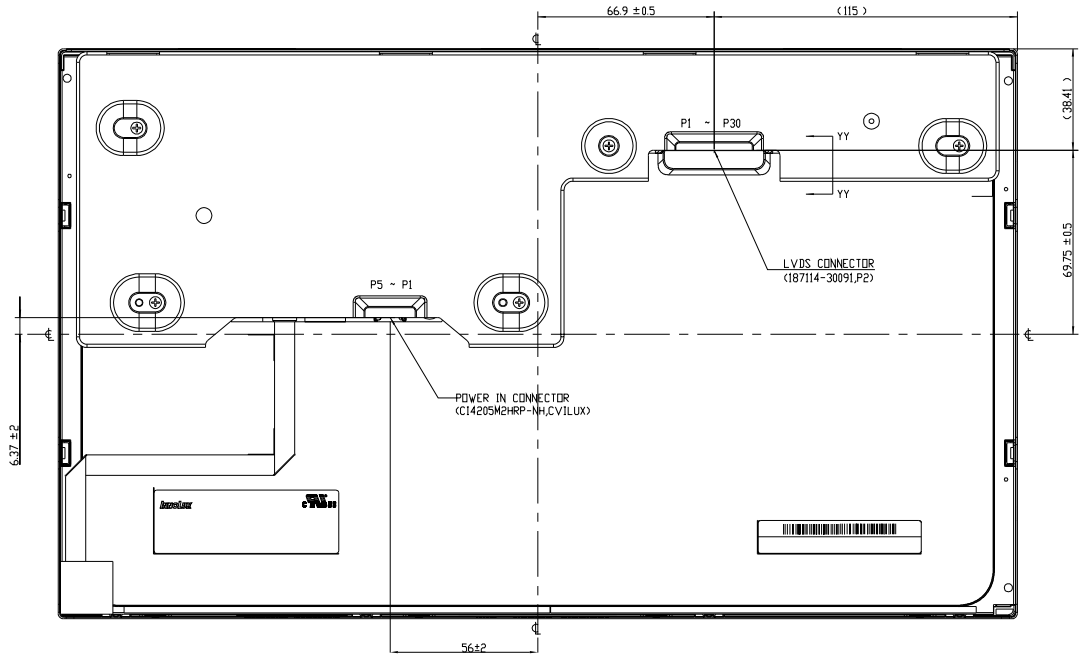


SECTION USER_HOLE-USER_HOLE
SCALE 4:1

NOTE:
1. DISPLAY AREA POSITION TOLERANCE: IA-BK=1mm & IC-DK=1mm.
2. UNSPECIFIED TOLERANCE: ±0.5mm.
3. SIDE MOUNT HOLE ROTATIONAL TORQUE MAX. IS 5kgf-cm

APPROVED	SY Feng	PART NUMBER or PDM NUMBER: G070S6BGC00105 / ENG367196	C
CHECKED	Wish Huang	PART DESCRIPTION: Module_G156BGE-L01	SHEET NUMBER 1/2
DESIGNED	Weihsin Hsieh	INNOLUX	SIZE A1

REV	EC NUMBER	DESCRIPTION	DATE
A		First Release	2013/12/10
B	ER00078199	Add P Cover to Frame Rear Gap=0.5 (Reference Dimension)	2014/01/07
C	ER00051132	Modify Top View Drawing	2016/01/05



P Cover to Frame Rear Gap=0.5 (Reference Dimension)

SECTION YY-YY

NOTE:
1. DISPLAY AREA POSITION TOLERANCE: IA-BK<=1mm & IC-DK<=1mm.
2. UNSPECIFIED TOLERANCE: ±0.5mm.
3. SIDE MOUNT HOLE ROTATIONAL TORQUE MAX. IS 5kgf-cm.

APPROVED	SY Feng	PART NUMBER or PDM NUMBER: G015HBGC0105 / ENG367196	SHEET No.: C
CHECKED	Wish Huang	PART DESCRIPTION: Module_G156BGE-L01	SHEET NUMBER: 2/2
DESIGNED	Veihsin Hsieh	InnoLux	SIZE: A1

DATA MODUL

easy TOUCH

15.6 inch SITO PCAP solution

Revision: 001

Date: 2016-04-25

Table of contents

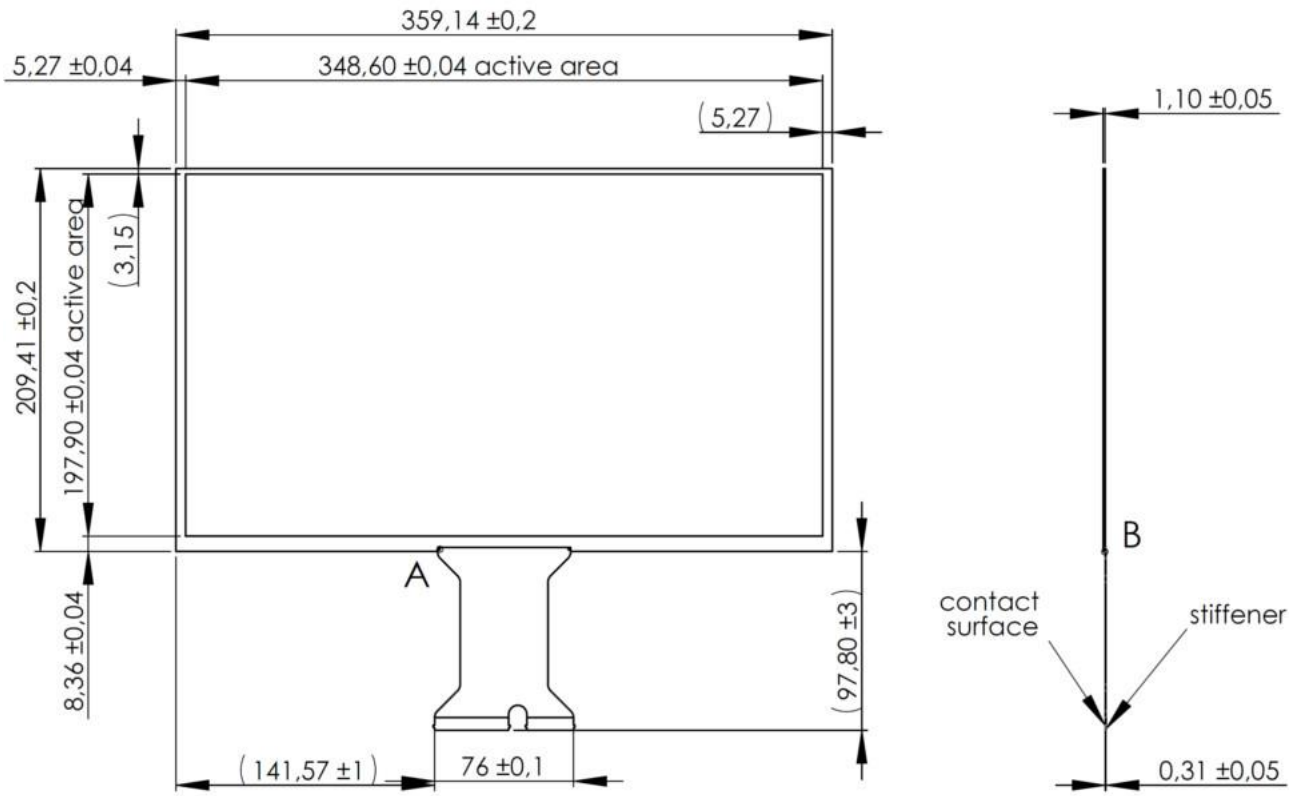
1 Sensor

Screen size	15.6 inch / 39.6 cm
Format	wide
Composite	SITO
Outline dimensions	359.14 x 209.41 x 1.1 mm
Active area	348.6 x 197.9 mm
Bending radius of tail	›2R recommended
Weight	220 g
Resolution X /Y	41 x 71
Touch separation X /Y	10 / 10 mm
Transmissivity	90% (min.)
Operating temperature	-30 to +85°C
Storage temperature	-40 to +85°C
Durability / estimated MTBF at 25 °C	100 000 000 touches / 250 000 hours
Tail connector	Hirose FH28H-80S-0.5SH, Hirose FH28H-50S-0.5SH

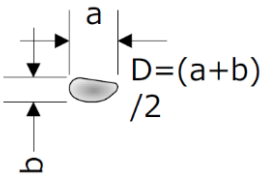
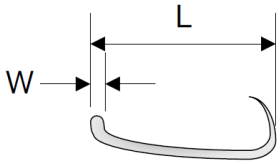
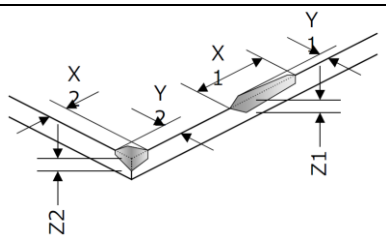
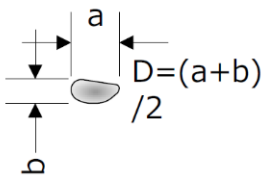
2 Controller USB

Chipset	mXT2952T2
Outline dimensions	105.1x27x6 mm
V_{in}	5V DC+-5%
Power consumption	100mA (max.)
Operating temperature	-40 to +85°C
Storage temperature	-40 to +85°C
Supported OS	XP, Win7/8, CE6, EC7, Linux, OSX, QNX
Protocol USB	HID Mouse, HID Digitizer
Connector	Mini USB, 9pol Molex

3 Mechanical drawing



4 Optical inspection criteria

<table>
<tr><th>Test items</th><th colspan="8">Condition and dimensions</th></tr>
<tr><td rowspan="4">Dot/spot inclusion/dent (including optical film air bubbles)</td><td rowspan="2">OK</td><td colspan="8">D≤0.1</td></tr>
<tr><td colspan="3">N≤3</td><td colspan="5" rowspan="2">0.1<D≤0.3
 
</td></tr>
<tr><td rowspan="2">NG</td><td colspan="3">more than one substance within Ø30 area</td></tr>
<tr><td colspan="8">0.3<D</td></tr>
<tr><td rowspan="4">Linear inclusion/ scratch</td><td rowspan="2">OK</td><td colspan="8">W<0.1</td></tr>
<tr><td colspan="3">N≤2</td><td colspan="5" rowspan="2">0.1≤W<0.3 and L≤4 (sensor side)
0.1≤W<0.15 and L≤4 (glass side)
 
</td></tr>
<tr><td rowspan="2">NG</td><td colspan="3">more than one substance within Ø30 area</td></tr>
<tr><td colspan="8">0.3≤W to be applied dot/spot inclusion/dent criteria</td></tr>
<tr><td rowspan="4">Glass fragment</td><td rowspan="3">OK</td><td>X1</td><td>Y1</td><td>Z1</td><td>X2</td><td>Y2</td><td>Z2</td><td colspan="2" rowspan="3"> 
</td></tr>
<tr><td>≤3.0</td><td>≤1.5</td><td>≤t</td><td>≤1.5</td><td>≤1.5</td><td>≤t</td></tr>
<tr><td>≤5.0</td><td>≤1.0</td><td>≤t</td><td colspan="3"></td></tr>
<tr><td>NG</td><td colspan="6">fragment at terminal an wiring area</td></tr>
<tr><td rowspan="2">Glass crack</td><td>OK</td><td colspan="8">nil</td></tr>
<tr><td>NG</td><td colspan="8">all</td></tr>
<tr><td rowspan="2">Stain</td><td>OK</td><td colspan="8">stain to be available to wipe off by volatile solvent</td></tr>
<tr><td>NG</td><td colspan="8">stain to be not available to wipe off by volatile solvent</td></tr>
<tr><td rowspan="4">Protection film air bubbles</td><td rowspan="2">OK</td><td colspan="8">D≤0.2</td></tr>
<tr><td colspan="3">N≤3</td><td colspan="5" rowspan="2">0.2<D≤0.6
 
</td></tr>
<tr><td rowspan="2">NG</td><td colspan="3">more than one substance within Ø30 area</td></tr>
<tr><td colspan="8">0.6<D</td></tr>
<tr><td>Notation</td><td colspan="8">D=average diameter, N=number, W=width, L=length, t=glass thickness;
all dimensions in mm</td></tr>
</table>

5 Precautions

5.1 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.

5.2 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.

5.3 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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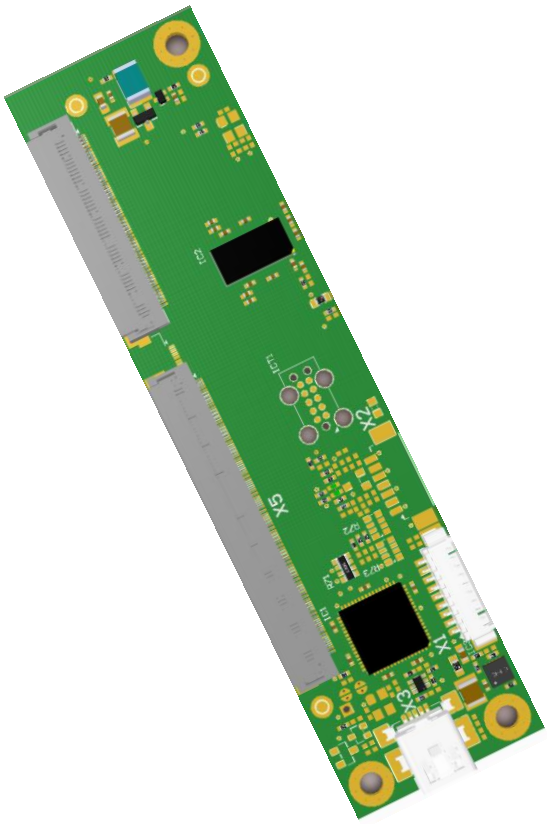


easyTOUCH mXT2952T2 2-tail PCAP USB controller

Revision: 003

Date: 2016-03-29

Table of contents

1 Introduction

The easyTouch mXT2952T2 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.

The controller is based on the Atmel maXTouch 2952T2 which offers a very good touch performance and high noise resistance. To get the best touch performance with water and glove usage the mXT2952T2 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	105x27x6 mm
Operating temperature	-40 to +85 °C
Storage temperature	-40 to +85 °C
Temperature slew rate	10 °C /minute (max.)
Relative humidity	95 % at 60 °C no condensation
RoHS compliant	Yes

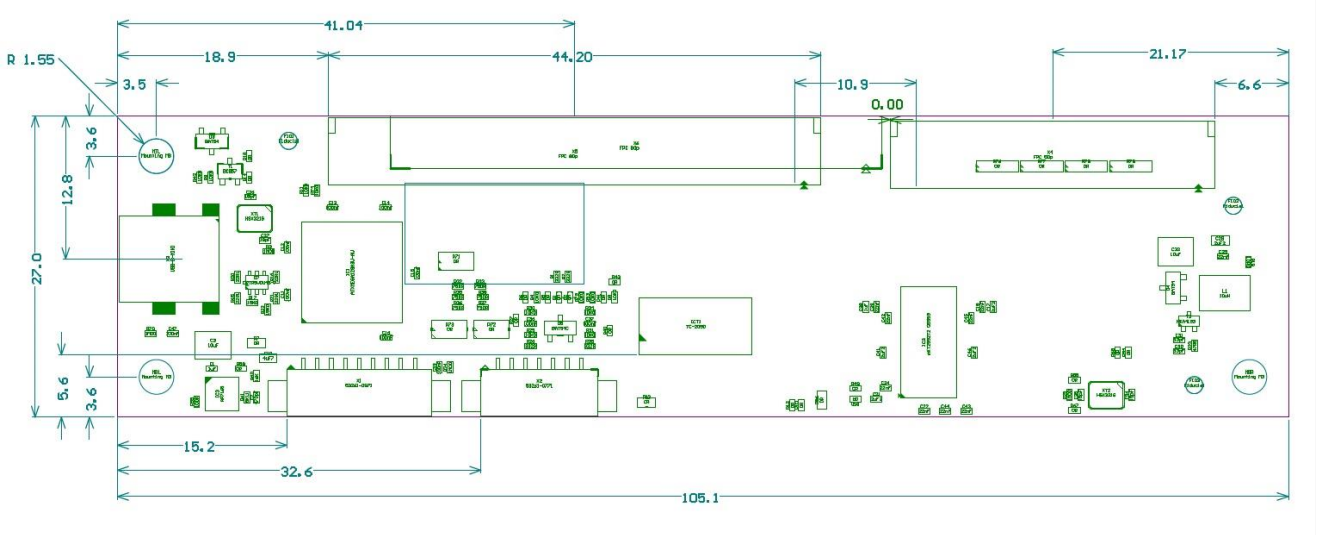
2.2 Connection features

Protocol	HID mouse, HID digitizer
Multi touch	16 fingers (max.)
Single touch	HID mouse with right mouse button emulation
Resolution	4096 x 4096 (x/y)
Report rate	>100 Hz for 15 touches, subject to configuration
USB connector	Mini USB or Molex 53261-0971

2.3 Electrical features

Power supply	5 V± 5%
Vin ripple	±50 mV peak-peak (max.)
On board voltage	3.3 V and 8.5 V
Power consumtion	500 mW (max. subject to configuration)

3 Mechanical drawing



Height: 6 mm (including components)

4 Connectors and signals

4.1 Connectors

Connector	Type	Connection
X1	1.25 mm Pitch 9 pin header Molex 53261-0971 compatible	USB
X3	Mini USB connector	USB
X4	0.5 mm pitch 50 pin header	Flextail to touch sensor
X5	0.5 mm pitch 80 pin header	Flextail to touch sensor

4.2 X1 pin assignment

X1	Signal	Description
1	VDD_5V	USB power supply
2	USB DM	USB signal -
3	USB DP	USB signal +
4		Do not use
5		Do not use
6		Do not use
7		Do not use
8		Do not use
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 compatible	Molex 53261-**xx**71: E29179 or YeonHo 12505WR-**xx**: E108706
X3	Mini USB connector	FCI 10033526-N3212LF or W+P 8233-2-05-60-FTR/SW: Thermoplastic UL94V-0
X4	0.5 mm pitch 50 pin header	Hirose FH28D-**xx**S-0.5SH(05): LCP resin (UL94V-0)/gray LCP resin (UL94V-0)/black
X5	0.5 mm pitch 80 pin header	Hirose FH28H-**xx**S-0.5SH(05): LCP resin (UL94V-0)/gray LCP resin (UL94V-0)/black
PCB		Fastprint: E204460

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.

DATA MODUL

ALL TECHNOLOGIES. ALL COMPETENCIES. ONE SPECIALIST.

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