Touch Revolution

MODEL: Fusion 7

P/N: F07A-0102

PRODUCT SPECIFICATION

Version 1.4

REVISION HISTORY

Version #	Implemented By	Revision Date	Approved By	Approval Date	Reason
1.0	Alan Dragon	October 6, 2010	Mark Hamblin	October 6, 2010	Rev 1.0 Release
1.1	Alan Dragon	October 7, 2010	Mark Hamblin	October 7, 2010	Update Reliability and Testing
1.2	Alan Dragon	October 21, 2010	Mark Hamblin	October 21, 2010	Define signals on touch panel connector
1.3	Chris Graham	May 25, 2011			Updated Mechanical DWG / Doc Cosmetic changes
1.4	Chris Graham	August 25, 2011	Bob Mitton	October 24, 2011	Revised document and DWG

Touch Revolution is committed to continuous improvement of its product designs and performance. This specification is therefore subject to change without notice. Please contact a customer support representative to insure that you have the most current specification. Products are not intended for use in safety-critical or military/aerospace applications, and customer is responsible for all legal and regulatory requirements associated with use in such applications.

While this specification is intended to assist customers in identifying an appropriate product for their intended application, it does not constitute a warranty that the product is suitable for any specific use. It is the customer's responsibility to determine that the product is suitable for its intended application

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1 INTRODUCTION

The Fusion 7 is an integrated projected capacitive touch display incorporating a 7”, 800 x 480 (WVGA) LCD with a LED backlight. The touch portion of the module consists of a glass sensor optically bonded to 1.0 mm cover glass with an FPC (Flexible Printed Circuit) attached for communicating with the touch panel. The touch panel assembly (sensor plus cover glass) is bonded to the LCD frame.

Interfacing to the touch panel is done through an I2C protocol communicating with the controller incorporated onto the FPC. The touch panel can provide accurate and responsive touch performance capable of sensing two unambiguous points. The integrated configuration of the Fusion touch display gives the user the ability to develop a touch product with a minimum of time and design effort.

2 TOUCH MODULE

2.1 GENERAL SPECIFICATIONS

Table 1 - Touch Performance Specification

Parameter		Value	Unit	Remarks
Linearity	Center	1	mm	Note 1, Appendix A
	Within 5mm of the edge	2		
Touch Sensor Resolution		1550 x 950	Detectable Resolution	
Report Rate	Single Touch	100	Serviced Interrupts/ Second	Note 2, Appendix A
	Dual Touch	50		
First Touch Response Time		$30 \cdot 10^{-3}$	sec	Note 3, Appendix A
Minimum Touch Diameter		7	mm	Note 4, Appendix A
Minimum Detectable Separation		15	mm	
Number of unique detectable concurrent touches		2		

2.2 ELECTRICAL – TOUCH PANEL

Table 2 - Electrical Specification

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max	
Supply voltage	V_{CC}	3.15	3.3	3.45	V
Current (no touch)	I_{CC}	-	5.2	10.0	mA
Current (1 touch)	I_{CC1}	-	5.1	10.0	mA
Current (2 touch)	I_{CC2}	-	5.0	10.0	mA

2.3 ENVIRONMENTAL

Table 3 - Environmental Specification

Parameter	Value	Unit
Operating Temperature	-20 to +60	°C
Storage Temperature	-30 to +70	°C

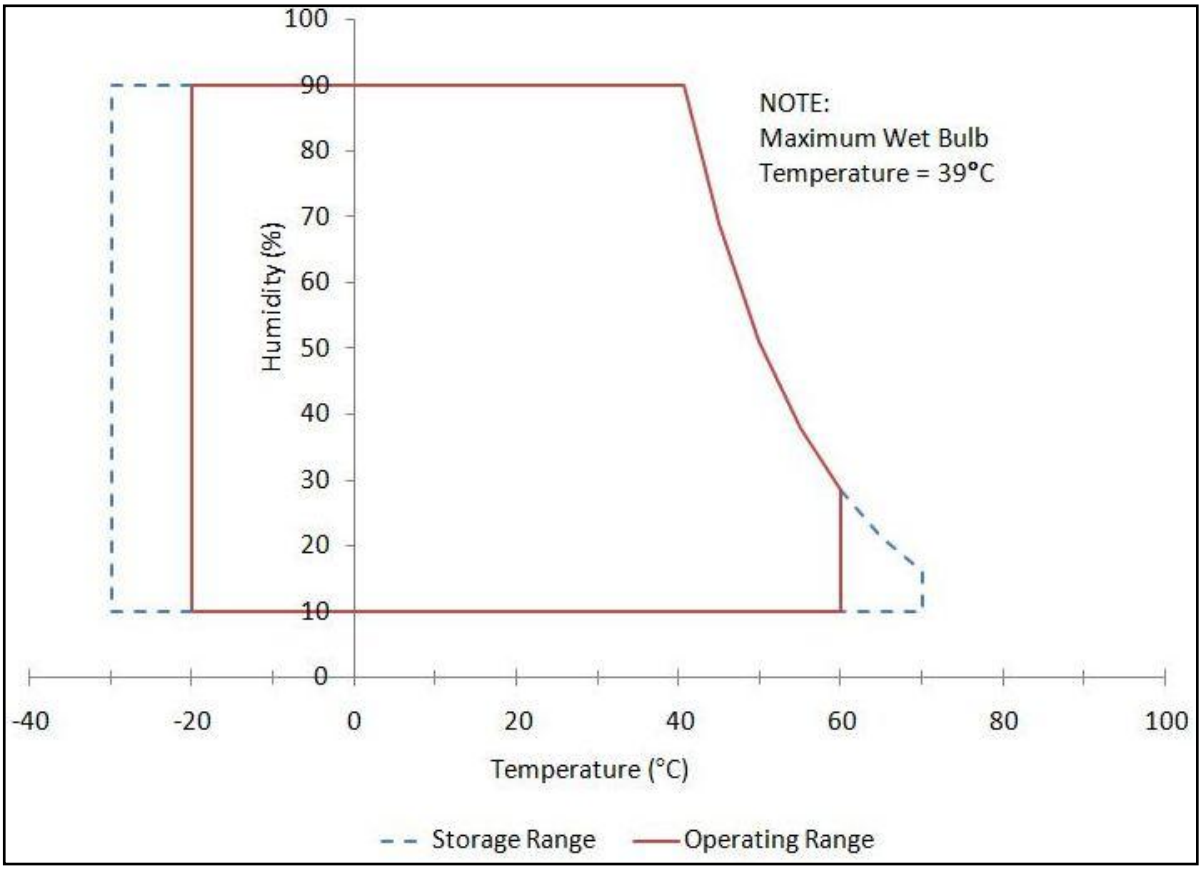


Figure 1 - Operating Temperature and Humidity Range

2.4 OPTICAL PERFORMANCE

Table 4 - Optical Performance Specification

Parameter			Value		Unit	Remarks
Optical Transmittance of Touch Panel			>89		%	Note 5, Appendix A
Light Output without touch panel			Min.=300	Typ.=350	cd/m²	Center of the Panel
Light Output with Touch Panel			Min.=265	Typ.=310	cd/m²	Center of the Panel
Viewing Angle	Hor.	Θ_L	Min.=60	Typ.=70	Deg.	Note 6, Appendix A
		Θ_R	Min.=60	Typ.=70		
	Vert.	Φ_T	Min.=50	Typ.=60	Deg.	
		Φ_B	Min.=60	Typ.=70		

2.5 MECHANICAL DIMENSIONS

Table 5 - Mechanical Specification

Parameter	Value	Unit	Remarks
Outline Dimension	179.96 x 119.00 x 7.50	mm	Appendix B
Active Area	152.40(H) x 91.44(V)	mm	LCD, Touch Sensor
Weight	210.5 (Typ.)	grams	
Cover Glass Surface Hardness	>9H	Pencil Hardness	See Note 7, Appendix A

2.6 FPC SPECIFICATION

The flexible segment (any portion without a stiffener) of the signal FPC from the touch panel has a minimum bend radius ≥ 1.0mm. The image below shows the FPC with the stiff areas outlined in red. Stiff areas are not designed to be bent or deformed.

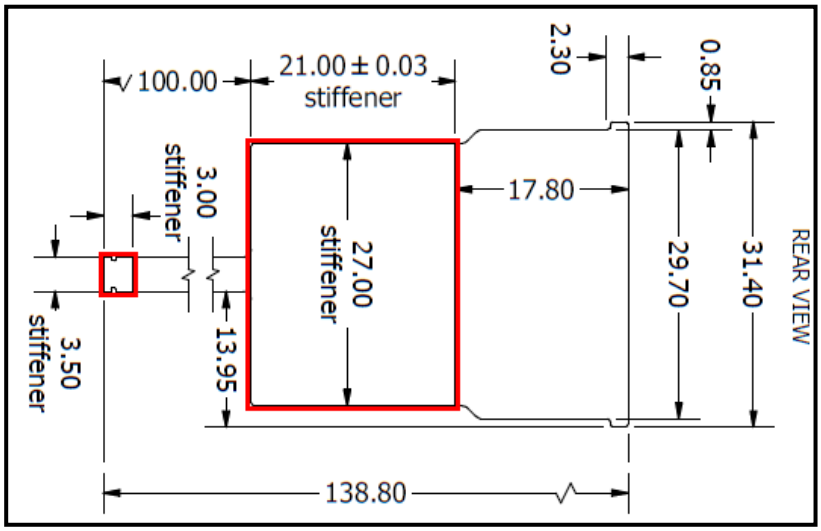


Figure 2 - FPC Stiffener Areas

3 COMMUNICATIONS INTERFACE

3.1 INTRODUCTION

The touch panel communicates with a host processor through an I2C interface. An edge sensitive interrupt output indicates when new touch points have been detected. In a normal system setup the rising edge of the interrupt will cause the host processor to read the coordinate data through the I2C bus. The coordinate data is stored in a register mapped array that is defined section 3.6.2.

3.2 I2C INTERFACE SPECIFICATION

The touch panel supports a NXP compliant I2C interface[1]. The slave address for the touch controller is 7 bit 0x10, followed by the R/W bit. The I2C bus supports the standard bus speed of 100 kHz and fast 400 kHz.

External pull up resisters are required on the I2C clock and data lines. Refer to UM10204 I2C-Bus Specification and User Manual when selecting pull-up resistor values to ensure proper operation.

3.3 TOUCH PANEL CONNECTOR

The recommended touch panel connector is: Kyocera-Elco 6-pin P/N 04-6298-006000883. The pin out for the Kyocera connector is as noted in the following table.

Table 6 - Touch Panel Connector Pinout – Refer to Mechanical Drawings for Pin 1 Orientation

Pin No.	Symbol	Description
1	VCC	Power supply
2	RST	Reset
3	INT	Interrupt
4	SDA	I2C data line
5	SCL	I2C clock line
6	GND	Ground

[1] The specification for the NXP compliant I2C interface is *UM10204 I2C-Bus Specification and User Manual, Rev. 03—19 June 2007*. It is available from NXP Semiconductor at http://www.nxp.com/documents/user_manual/UM10204.pdf.

3.4 SIGNAL DEFINITIONS

- VCC - Power supply for the touch controller.
- RST - Reset for the touch controller. Should be connected to a reset line. This reset is asserted low (0V). When not asserted it should be raised to VCC.
- INT - Interrupt from the touch controller. This should be connected to an interrupt enabled IO. This output is asserted high to VCC when touch data is ready. This interrupt should be treated as an edge sensitive signal.
- SDA - Data line of I2C connection. This signal should be connected to the data line of an I2C bus. This I2C bus should have pull-up resistors to VCC. The touch controller does not contain pull-ups resistors
- SCL - Clock line of I2C connection. This signal should be connected to the clock line of an I2C bus. This I2C bus should have pull-up resistors to VCC. The touch controller does not contain pull-ups resistors.
- GND - Digital Ground.

3.5 COMMUNICATIONS PROTOCOL

The Touch controller is designed to work in an interrupt driven protocol. When the Touch panel is touched and data is ready for the host processor it asserts the interrupt line to the processor. The processor should then read the data registers and once it is finished it must clear the interrupt in the controller by writing a 0 to the scan complete bit of the Handshaking control register.

The I2C data will not change until the scan complete bit is cleared by the host processor. Once the scan complete bit is cleared the controller will resume scanning the sensor.

3.6 REGISTER MAPPED INTERFACE

3.6.1 Description

A set of logical registers is defined and exposed by the touch panel controller. The host communicates with the controller by reading and writing the exposed registers via physical I2C transactions. All registers are 8 bits in length. Multi-byte data words are spread across multiple registers. An 8-bit I2C address is used to uniquely identify each register.

3.6.2 Register Map

The following table defines the location of each value in the register map.

Table 7 – Register Map

Address	Purpose	Accessibility
0x00 – 0x00	Data Information Register	R
0x01 - 0x06	First Touch Point Information Registers	R
0x07 – 0x0C	Second Touch Point Information Registers	R
0x0D – 0x0D	Register Map Version	R
0x0E – 0x0F	Firmware Version Register	R
0x10 – 0x10	Reset Control Register	W
0x11 – 0x11	Scan Complete Register	R/W
0x12 – 0x13	Reserved	R
0x14 – 0x14	Firmware Update Control Register	W

3.7 REGISTER DEFINITIONS

3.7.1 Touch Coordinate registers

3.7.1.1 Data Information Register (0x00)

	7	6	5	4	3	2	1	0
0x00	-	-	-	-	-	-	Number of Fingers	

- Bits [1:0] indicate the number of fingers touching the panel at the time of the last interrupt.
  - {00} = 0 fingers
  - {01} = 1 finger
  - {10} = 2 fingers
  - {11} = not defined

Note: After the first touch, this register does not indicate when there are no fingers touching the sensor because interrupts are not triggered on the finger-up or ‘0 finger’ event. The data remaining in this register is the number of fingers touching the sensor at the time of the most recent interrupt. It will always be 1 or 2 after the first interrupt after power-up or reset. To determine if there are no fingers touching the sensor use the tip switch value in register 0x06.

3.7.1.2 First Touch Point Information Registers (0x01 – 0x06)

	7	6	5	4	3	2	1	0
0x01	X0 Position (bits 15:8)							
0x02	X0 Position (bits 7:0)							
0x03	Y0 Position (bits 15:8)							
0x04	Y0 Position (bits 7:0)							
0x05	First Touch Point Pressure Value							
0x06	Touch ID				Tip Switch			

All touch point information registers are read only.

- Registers 0x01 – 0x04
  - The coordinates for the first touch point are in registers 0x01 – 0x04 as defined above.
  - The value is reported as a 16 bit value with the maximum value equal to the resolution of the sensor.
- Register 0x05
  - This register returns a pressure value for the touch point. The pressure value is representative of the diameter of the contact area touching the sensor.
  - This value is an 8 bit number. The value is not normalized so it should be interpreted as a relative number.
- Register 0x06

	7	6	5	4	3	2	1	0
0x06	Touch ID				Tip Switch			

  - Bits 3:0 indicate if the current touch point is touching the screen. This field should be used to determine when a touch point is detected and also when it is lifted from the screen.
    - {0000} = This value indicates the finger is not touching the screen for the current coordinate point.
    - {0001} = This value indicates the finger is touching the screen for the current coordinate point.
    - All other combinations are not defined.
  - Bits 7:4 represent a unique ID to differentiate between 2 different fingers under the case where the data for the fingers switches

between the first touch point and the second touch point. This can be used to maintain tracking information between 2 different fingers.

3.7.1.3 Second Touch Point Information Registers (0x07 – 0x0C)

	7	6	5	4	3	2	1	0
0x07	X1 Position (bits 15:8)							
0x08	X1 Position (bits 7:0)							
0x09	Y1 Position (bits 15:8)							
0x0A	Y1 Position (bits 7:0)							
0x0B	Second Touch Point Pressure Value							
0x0C	Touch ID				Tip Switch			

The coordinates of the second touch point are reported via registers 0x07 to 0x0C. These registers are Read-Only and only valid when more than one finger is reported in the Data Information Register and the Tip Switch is asserted.

- Registers 0x07 – 0x0A
  - The coordinates for the second touch point are in registers 0x07 – 0x0A as defined above.
  - The value is reported as a 16 bit value with the maximum value equal to the resolution of the sensor.
- Registers 0x0B
  - This register returns a pressure value for the touch point. The pressure value is representative of the diameter of the contact area touching the sensor.
  - This value is an 8 bit number. The value is not normalized so it should be interpreted as a relative number.
- Registers 0x0C

	7	6	5	4	3	2	1	0
0x0C	Touch ID				Tip Switch			

- Bits 3:0 indicate if the current touch point is touching the screen. This field should be used to determine when a touch point is detected and also when it is lifted from the screen.
  - {0000} = This value indicates the finger is not touching the screen for the current coordinate point.

- {0001} = This value indicates the finger is touching the screen for the current coordinate point.
- All other combinations are not defined.

- Bits 7:4 represent a unique ID to differentiate between 2 different fingers under the case where the data for the fingers switches between the first touch point and the second touch point. This can be used to maintain tracking information between 2 different fingers.

3.7.1.4 Register map version (0x0D)

	7	6	5	4	3	2	1	0
0x0D	Register map version (7:0)							

This register dictates the register map. This register can be queried by the host to determine which register values are located at which register offsets. For the register map corresponding to this document the value will be 0x02.

3.7.1.5 Firmware Version Register (0x0E - 0x0F)

	7	6	5	4	3	2	1	0
0x0E	Product Info		Year		Month			
0x0F	Day					Firmware Version		Release

Firmware releases are numbered by the following format: yyyymmddx where yyyymmdd is the date of release and x is the running number of the release in case there are multiple releases on a given day.

To store the version information, two registers (0x0D – 0X0E) are used and defined as follows:

- Register 0x0E

  Bits 7:6 represent Product Information (Read Only)

  - {00} = 43Z6 = 4.3” Panel
  - {01} = 70Z7 = 7” Panel
  - {10} = 10Z8 = 10.1” Panel
  - {11} = Reserved

  Bits 5:4 represent the Year (Read Only)

  - {00} = 2010

- {01} = 2011
- {10} = 2012
- {11} = 2013

Bits 3:0 represent the Month (Read Only)

- {0x1} = January
- {0x2} = February
- {0x.} = ……..
- {0x.} = ……..
- {0xC} = December

- Register 0x0F

Bits 7:3 represent the Day (Read Only)

- {0x01} = 1
- {0x02} = 2
- {0x.} = ……..
- {0x.} = ……..
- {0x1F} = 31

Bits 2:1 represent the Firmware Version (Read Only)

- {00} = v1.0 Firmware Architecture
- {01} = v1.4 Firmware Architecture

Bit 0 represents the Release (Read Only)

- {00} = First release of the day.
- {11} = Second release of the day.

Note: More than 2 releases are not expected in one day.

3.7.2 Control Registers

3.7.2.1 Reset Control Register (0x10)

	7	6	5	4	3	2	1	0
0x10	Reset	-	-	-	-	-	-	-

This register can be used to trigger a software initiated reset. This reset will clear out all data in the sensor. The busy register will be reset to 0x00. During a software initiated reset the device will not be available on the I2C bus and the interrupt pin will stay low. The system will be available 125 ms after the reset is triggered.

- Register 0x10

- Bit 7 = reset bit. This bit is write only. Writing a 1 to this bit initiates the reset.
- Bits 6:0 = reserved.

3.7.3 Scan Complete Register (0x11)

	7	6	5	4	3	2	1	0
0x11	-	-	-	-	-	-	-	Scan Complete

This register is used to indicate that data is ready for the Host processor to read. When data is ready to be read the touch controller will not update the data until the host processor indicates it has completed gathering all data for this interrupt.

- Registers 0x11
  - Bit 0 represents Scan Complete(Read and Write)
  - {0} indicates that there is no new data for the Host processor. When this bit is {0} the touch controller is continually scanning the touch panel for new touch events.
  - {1} indicates current scan cycle has been completed and new data is ready for the Host processor.
  - This bit will mimic the interrupt output of the touch controller.
  - The Host should clear this bit (Write “0”) to indicate that a data transfer has been completed and subsequent scan can be started.

3.7.4 Reserved (0x12 – 0x13)

3.7.5 Firmware Update Control Register (0x14)

	7	6	5	4	3	2	1	0
0x14	Enter Firmware Update-							

- Register 0x14
  - Bits 7:0 represents Enter Firmware Update (Write Only)

    Host should write 0x4C to register 0x14 set a flag which will force the controller to boot into firmware update mode on its next power cycle, soft reset or hard reset.

4 LCD INTERFACE

4.1 GENERAL DESCRIPTION

4.1.1 Introduction

The Fusion 7 incorporates a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT switching device. The LCD assembly is composed of a TFT LCD panel, a driving circuit, and LED backlight system. The display has a 7.0 inch diagonally measured active display area with an 800H x 480V (WVGA) display format that can display 262,144 colors.

4.1.2 Features

- 7.0” (16:9) inch diagonal configuration
- 800H x 480V (WVGA) Pixel Format
- 3.3V TTL Interface
- 262K colors using a 18 bit R.G.B. signal input

4.1.3 General Specifications

Table 8 - LCD Specifications

Parameter	Specifications(LCD Only)	Unit
Screen Size	7.0” (Diagonal)	
Display Format	800 RGB(H)X 480(V) (WVGA)	pixels
Pixel Configuration	RGB Vertical Stripe	
Active Area	152.40 x 91.44	mm
Pixel Pitch	0.1905 x 0.1905	mm
Outline Dimension	165.00(W) x 104.44(H) x 5.20(D)	mm
Backlight	White LED	
Power Consumption	0.66W(Logic)/ 1.6W(Backlight)	Watt
Operating Temperature	-20 ~ 70	°C
Storage Temperature	-30 ~ 80	°C
Bits per pixel	18	

4.2 ABSOLUTE MAXIMUM RATINGS

Table 9 - LCD Maximum Ratings (GND=0V)

Item	Symbol	Condition	Min.	Max.	Unit	Remark
Power Voltage	VCC	GND=0	-0.3	6	V	-
Input Logic Voltage	Vi	GND=0	-0.3	VCC+0.3	V	Note 1

Note 1: DCLK, DE, R0 ~ R5, G0 ~ G5, B0 ~ B5

4.3 ELECTRICAL CHARACTERISTICS

4.3.1 Recommended Operating Conditions

Table 10 - LCD Recommended Operating Conditions (GND=0V, Ta=25°C)

Parameter		Symbol	Rating			Unit	Condition
			Min.	Typ.	Max.		
Power Supply Voltage		VCC	3.0	3.3	3.6	V	
Input Logic Voltage	High Level	VIH	0.7VCC	-	VCC	V	Note 1
	Low Level	VIL	0	-	0.3VCC	V	Note1

Note 1: DCLK, DE, R0 ~ R5, G0 ~ G5, B0 ~ B5

4.3.2 LED Driving Conditions

Table 11 - LED Driving Conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED Current	I_{LED}	-	160	-	mA	Note 1
LED Voltage	V_{LED}	-	9.9	-	V	
LED Life	-	10,000	20,000	-	Hr.	Note 2

Note 1: There are 8 groups of LEDs as shown below, V_{LED}=9.9V, I_{LED}=160mA.
Note 2: Light output is decreased to 50% of the initial value.

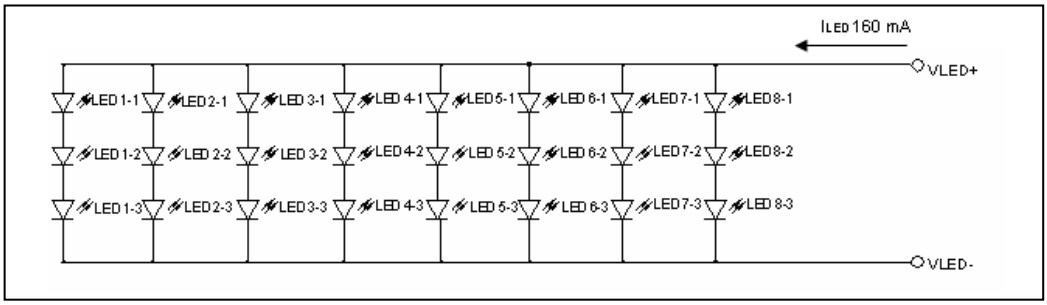


Figure 3 - LED Configuration

4.3.3 TFT-LCD Current Consumption

Table 12 - LCD Current Consumption

Parameter	Symbol	Rating			Unit	Condition
		Min.	Typ.	Max.		
LCD Power Current	I_{CC}	-	200	260	mA	Black Pattern
LED Power Current	I_{LED}	-	160	200	mA	

4.4 INTERFACE

4.4.1 Timing Signal Characteristics

Table 13 - LCD Signal Timing Characteristics

Parameter	Symbol	Rating			Unit
		Min.	Typ.	Max.	
Data Setup Time	Tdsu	6	-	-	ns
Data Hold Time	Tdhd	6	-	-	ns
DE Setup Time	Tesu	6	-	-	ns
CLK Frequency	FCPH	29.40	33.26	42.48	MHz
CLK Period	TCPH	23.54	30.06	34.01	ns
CLK Pulse Duty	TCWH	40	50	60	%
CLK Pulse Duty	TCWL	40	50	60	%
DE Period	TDEH+TDEL	1000	1056	1200	TCPH
DE Pulse Width	TDEH	-	800	-	TCPH
DE Frame Blanking	TDEB	10	45	110	TDEH+TDEL
DE Frame Width	TDE	-	480	-	TDEH+TDEL

Note: Using the typical values will give better performance.

4.4.2 Controller Timing Chart

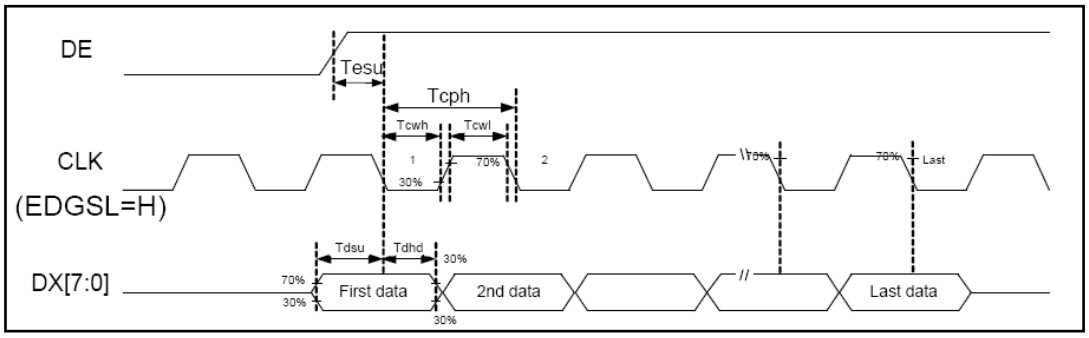


Figure 4 - LCD Interface Waveform

4.4.3 Data Input Format

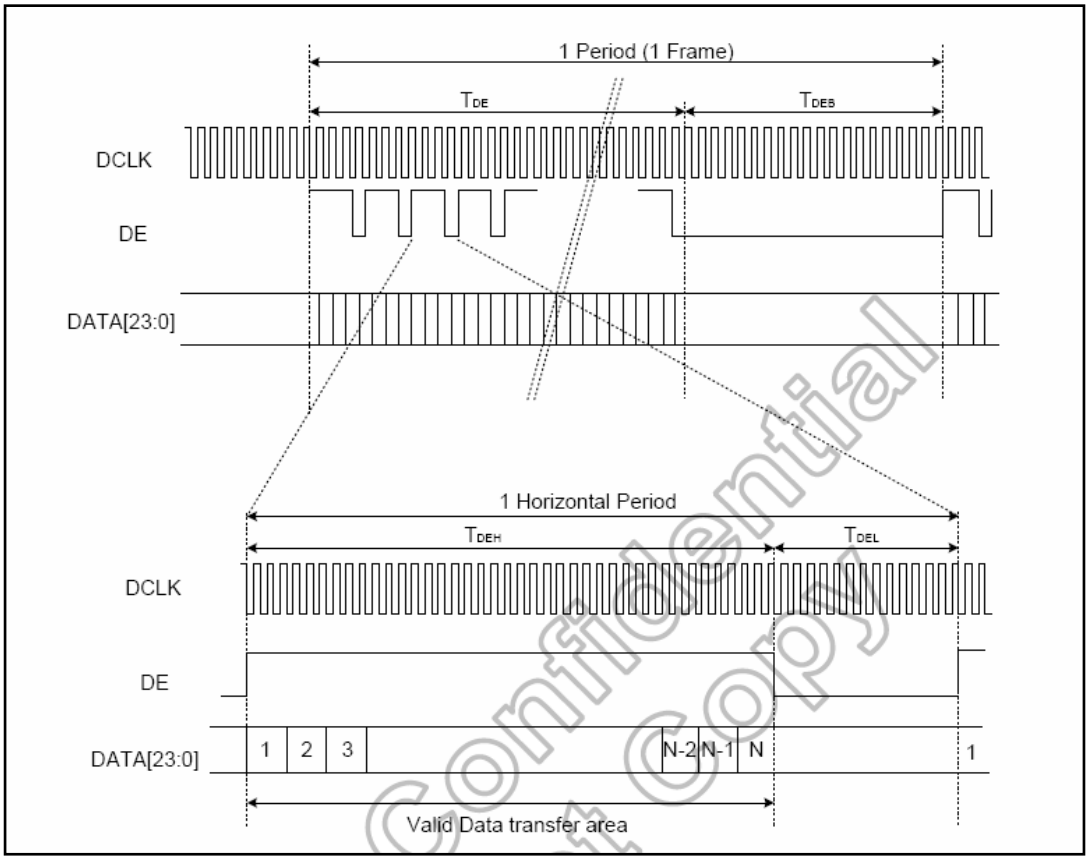


Figure 5 - LCD Data Format

4.4.4 Power ON/OFF Sequence

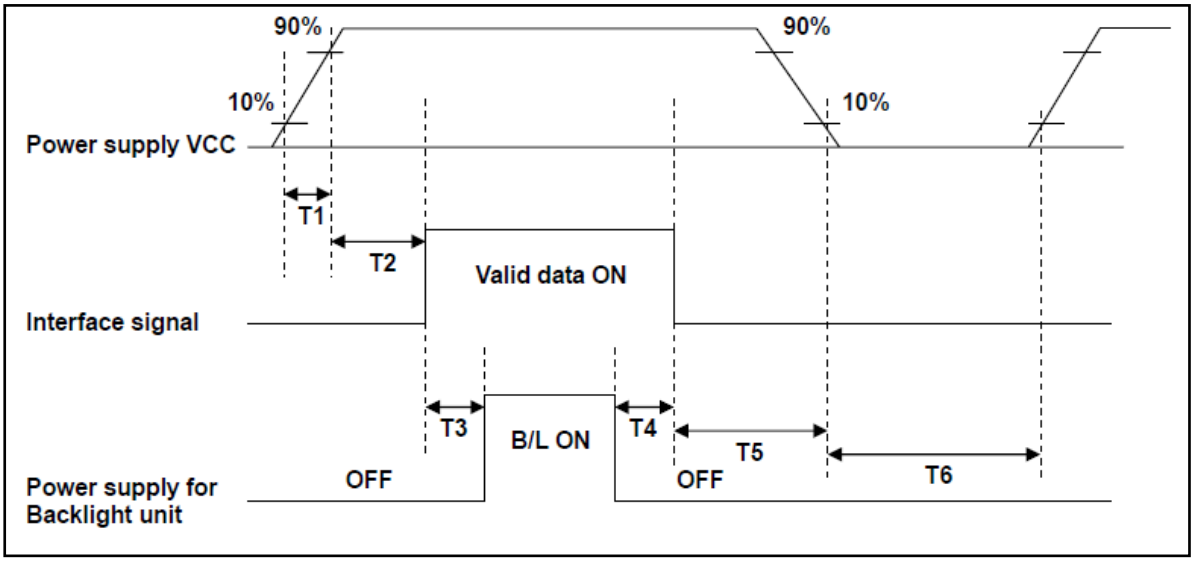


Figure 6 – Power Sequence

4.4.5 Power ON/OFF timing values

Table 14 - Power ON/OFF Timing Values

Parameter	Specification			Unit
	Min.	Typ.	Max.	
T1	1		2	ms
T2	0	60		ms
T3	200			ms
T4	200			ms
T5	1			ms
T6	1000			ms

4.4.6 LCD Signal Cable Definition

Table 15 - LCD Signal Definition

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	GND	Power Ground	21	G5	Green Data 5 (MSB)
2	GND	Power Ground	22	G4	Green Data 4
3	NC	No Connect	23	G3	Green Data 3
4	VCC	Digital Power Supply	24	GND	Power Ground
5	VCC	Digital Power Supply	25	G2	Green Data 2
6	VCC	Digital Power Supply	26	G1	Green Data 1
7	VCC	Digital Power Supply	27	G0	Green Data 0 (LSB)
8	NC	No Connect	28	GND	Power Ground
9	DE	Data Enable	29	R5	Red Data 5 (MSB)
10	GND	Power Ground	30	R4	Red Data 4
11	GND	Power Ground	31	R3	Red Data 3
12	GND	Power Ground	32	GND	Power Ground
13	B5	Blue Data 5 (MSB)	33	R2	Red Data 2
14	B4	Blue Data 4	34	R1	Red Data 1
15	B3	Blue Data 3	35	R0	Red Data 0 (LSB)
16	GND	Power Ground	36	GND	Power Ground
17	B2	Blue Data 2	37	GND	Power Ground
18	B1	Blue Data 1	38	DCLK	Clock Signal- Note1
19	B0	Blue Data 0 (LSB)	39	GND	Power Ground
20	GND	Power Ground	40	GND	Power Ground

Note1 - Latch Data at the Falling Edge

4.4.6.1 LCD Signal Mating Cable

Mating FFC is **MT-FP430N-2FR** manufactured by UJU or equivalent. (0.5mm pitch 40 pin FFC)

4.4.7 Backlight Signal Cable Definition

Table 16 - Backlight Signal Definition

Pin No.	Symbol	Description
1	VLED+	Red, LED Anode
2	VLED-	White, LED Cathode

*Note: Backlight socket is **SM02B-BHSS-1-TB** manufactured by JST. The connector on the backlight cable is **BHSR-02VS-1** manufactured by JST.*

Backlight pin ordering of the cable attached to the LCD is shown below.

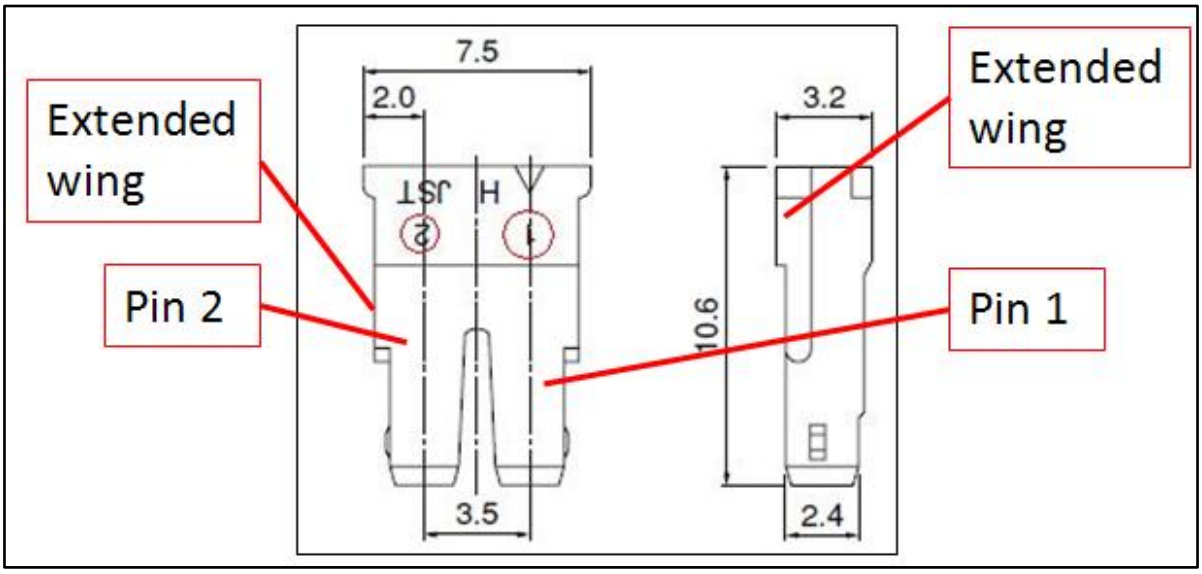


Figure 7 - Backlight Pin Ordering

Note: Top of connector has wide wings that extend out.

4.5 LCD INTERNAL BLOCK DIAGRAM

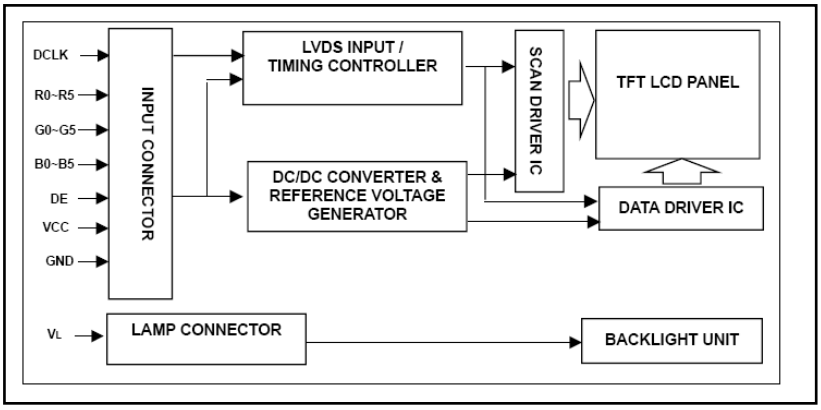


Figure 8 - LCD Block Diagram

4.6 OPTICAL PERFORMANCE

Table 17 - LCD Optical Performance

Parameter		Symbol	Cond'n	Min.	Typ.	Max.	Unit	Remark
Brightness		-	Viewing Normal Angle Φ=θ=0	300	350	-	cd/m²	Center of Display
Response Time		Tr		-	5	10	ms	
		Tf		-	11	16	ms	
Contrast Ratio		CR		250	400		-	
Color Chromaticity	White	Wx		0.249	0.299	0.349	-	
		Wy		0.278	0.328	0.378		
Viewing Angle	Hor.	θR	CR≥10	60	70		Deg	
		θL		60	70			
	Ver.	ΦT		50	60			
		ΦB		60	70			

Note: Parameters in above table are for LCD only.

5 RELIABILITY AND TESTING

5.1 RELIABILITY TEST SPECIFICATIONS

Table 18 - Reliability Test Specifications

Item	Condition
High Temperature Storage	T_A= +70°C, 240 hrs
Low Temperature Storage	T_A= -30°C, 240 hrs
High Temperature Operation	T_A= +60°C, 240 hrs
Low Temperature Operation	T_A= -20°C, 240 hrs
Thermal Cycling	-20°C (30 min) · +60°C (30 Min), 100 cycles (DRY)
Electrostatic Discharge	±8kV (Contact) / ±10kV (air)

5.2 PACKAGING SPECIFICATIONS

Table 19 - Packaging Specifications

Item	Condition
Drop Test	1) Drop Sequence: 1 corner, 3 edges, and 6 surfaces. 2) Drop height according to the weight of the package. 3) Inspection: sampling check, check each layer of upper and lower, 2 layers in center, total 4 layers.
Non-Operating Random Vibration	1) Truck Spectrum: (0.52G rms) and Air Spectrum: (PSD=1.46G rms), 3 axis (X/Y/Z), 20 min per axis per test. 2) Inspection: sampling check, check each layer of upper and lower, 2 layers in center, total 4 layers.

6 BARCODE

6.1 DESCRIPTION

Every Fusion touch panel contains a unique 2 dimensional barcode. This barcode is used for serial number identification and part specification.

6.2 LOCATION

The barcode is located on the flex tail as pictured below.

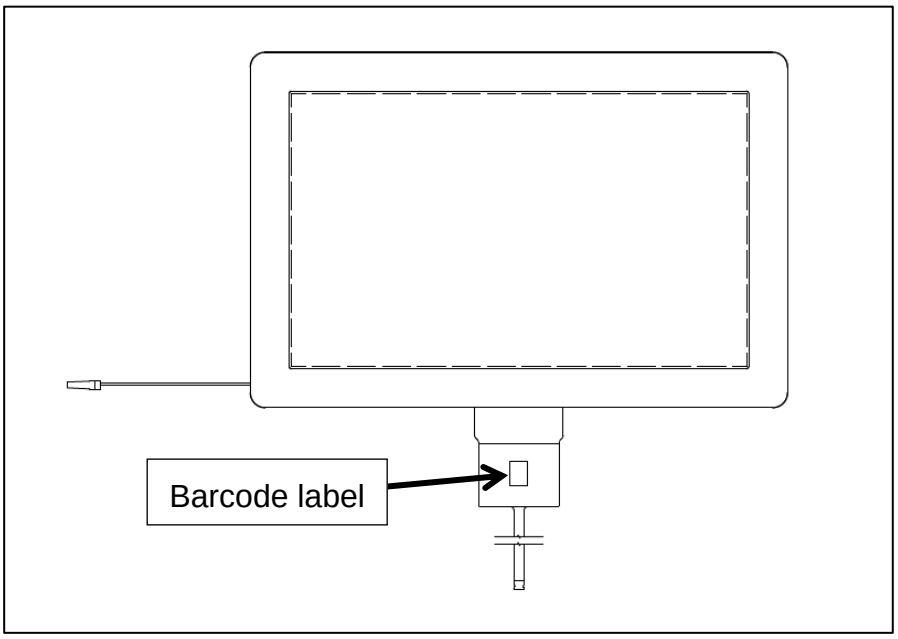


Figure 9 – Barcode Label Area (Front View of Module Shown)

6.3 CONTENTS

The barcode contains the serial number, Touch Revolution part number, project name (if applicable), and touch firmware release version.

7 HANDLING AND PRECAUTIONS

7.1 DISASSEMBLY OR MODIFICATION

Do not disassemble or modify the touch display. This may cause damage to sensitive components and may cause dust or scratches between the touch sensor and LCD. Touch Revolution's warranty will be void if the unit has been disassembled or modified.

7.2 UV EXPOSURE

Long term exposure to sunlight can affect the optical performance of the LCD.

7.3 CLEANING

The cover glass should be cleaned using a soft, lint free cloth. It is recommended that either an ammonia based glass cleaner (e.g. Windex) or a 50:50 solution of isopropyl alcohol and water be used for cleaning the sensor. Apply the cleaning solution to the cloth and gently wipe the surface of the sensor. To help minimize streaking, wipe in a circular motion starting in the center and working outwards.

7.4 STATIC ELECTRICITY

Since the LCD and Touch panel use CMOS ICs, the device is susceptible to electrostatic discharge. Please use appropriate grounding when handling these modules.

7.5 ABSOLUTE MAXIMUM RATINGS

Do not exceed the absolute maximum rating values for the supply voltages and environmental conditions to prevent damage to the touch display.

7.6 BREAKAGE

If the LCD panel breaks be careful not to touch any liquid crystal material that may spill. Immediately rinse with water if liquid crystal material comes in contact with skin.

7.7 INPUT VOLTAGES

Turn off the power supply before handling and/or inserting signal or power cables to the touch module.

7.8 STATIC IMAGES

If fixed images are displayed for a long period of time, an afterimage is likely to occur.

7.9 OUTGASSING

Do not store or use the touch module in an environment where caustic materials such as reagents, solvents, adhesives, and resins are present. Outgassing of these materials can damage the polarizer and ACF connections.

APPENDIX A

Note 1**: Linearity Test Definition**

The linearity of the sensor is tested by dragging a 6mm diameter copper slug in a line across the first surface of the touch sensor. The distance between the actual location of the center of the slug and the reported location shall be less than or equal to the maximum specified error.

Note 2: **Report Rate**

Report rate is the maximum rate at which touch data is returned to the host PC. The report rate may drop to 30 interrupts/second for some unique two finger touch combinations.

Note 3: **Response Time**

Response time is the time elapsed between first touch and interrupt assuming touch is in active mode

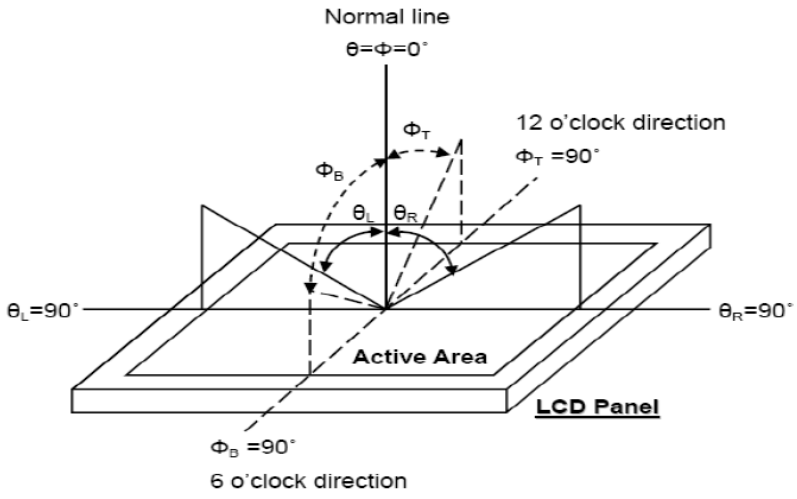
Note 4: **Minimum Touch Diameter**

The minimum touch diameter is the minimum diameter of a copper slug that is needed to record a touch.

Note 5: **Optical Transmittance**

Measured Per ASTM D1003

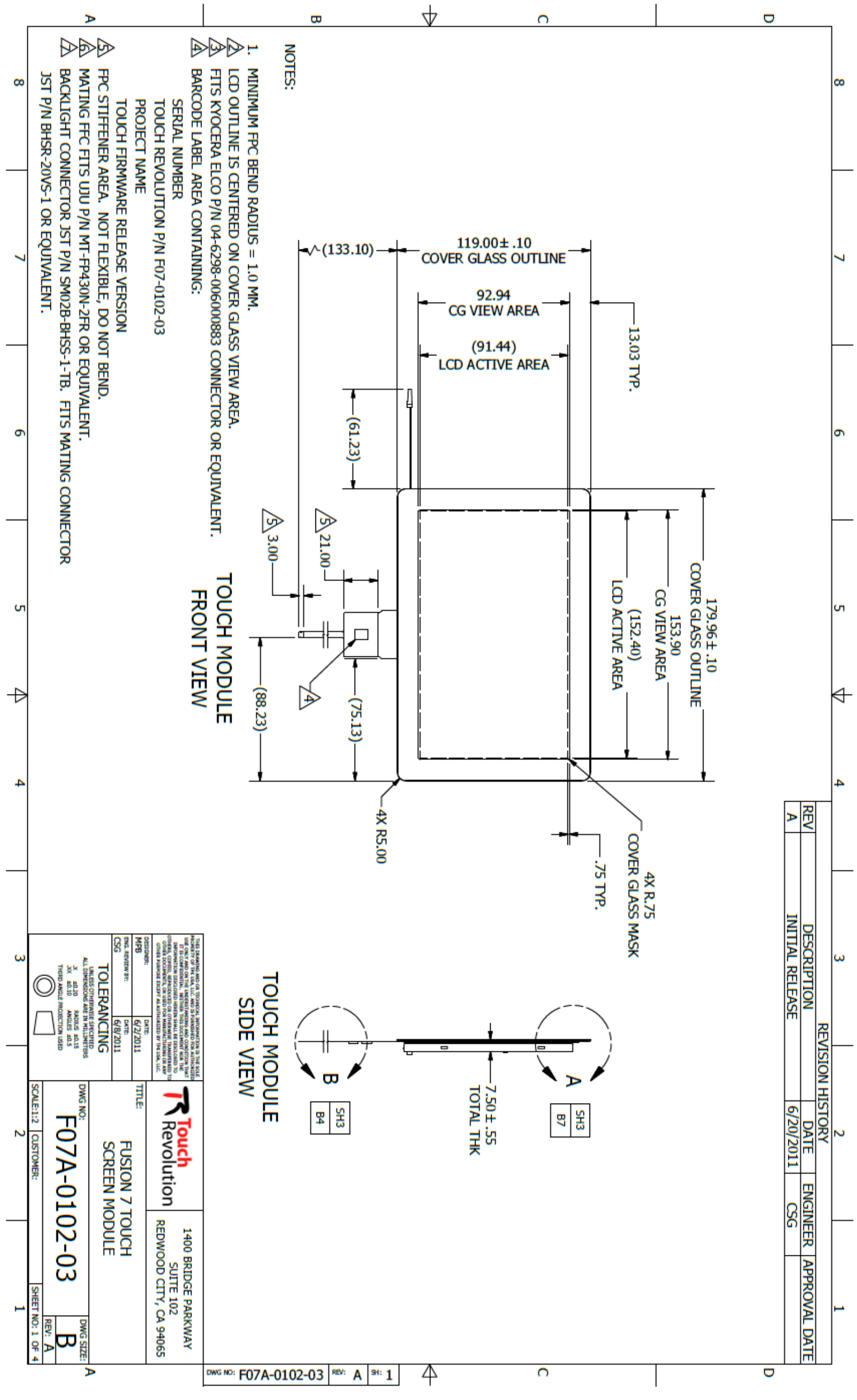
Note 6: **Viewing Angle**

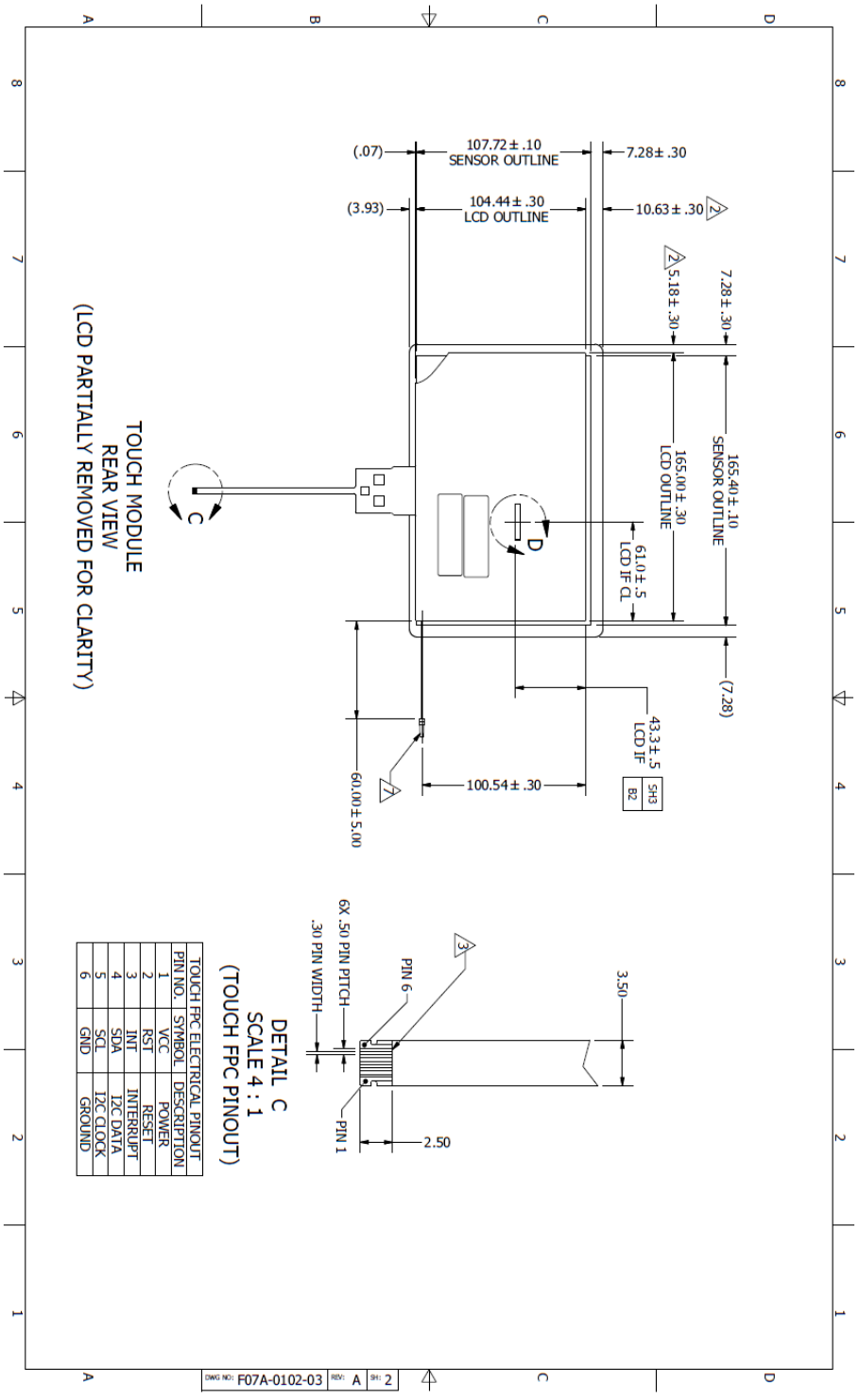


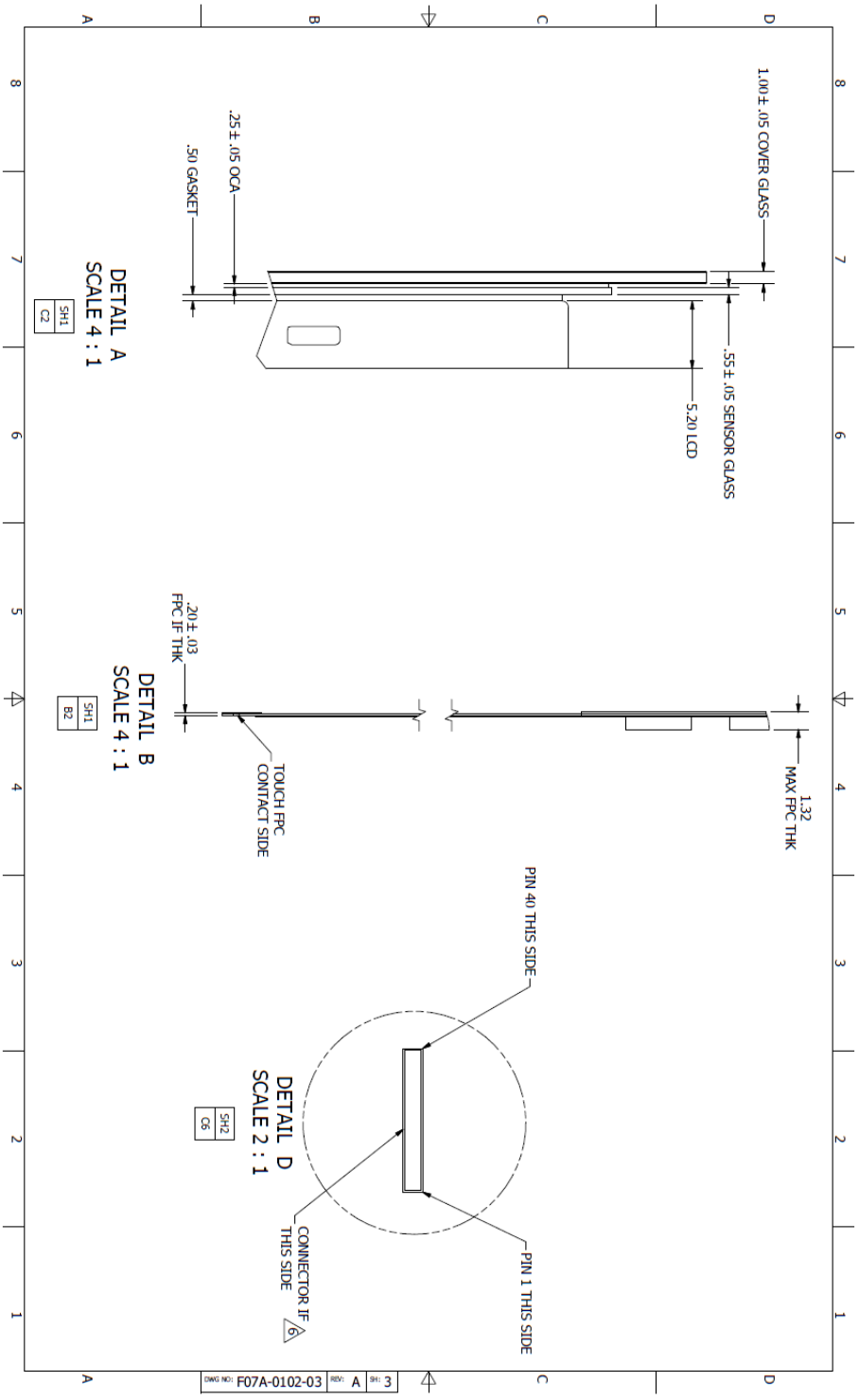
Note 7: **First Surface Hardness**

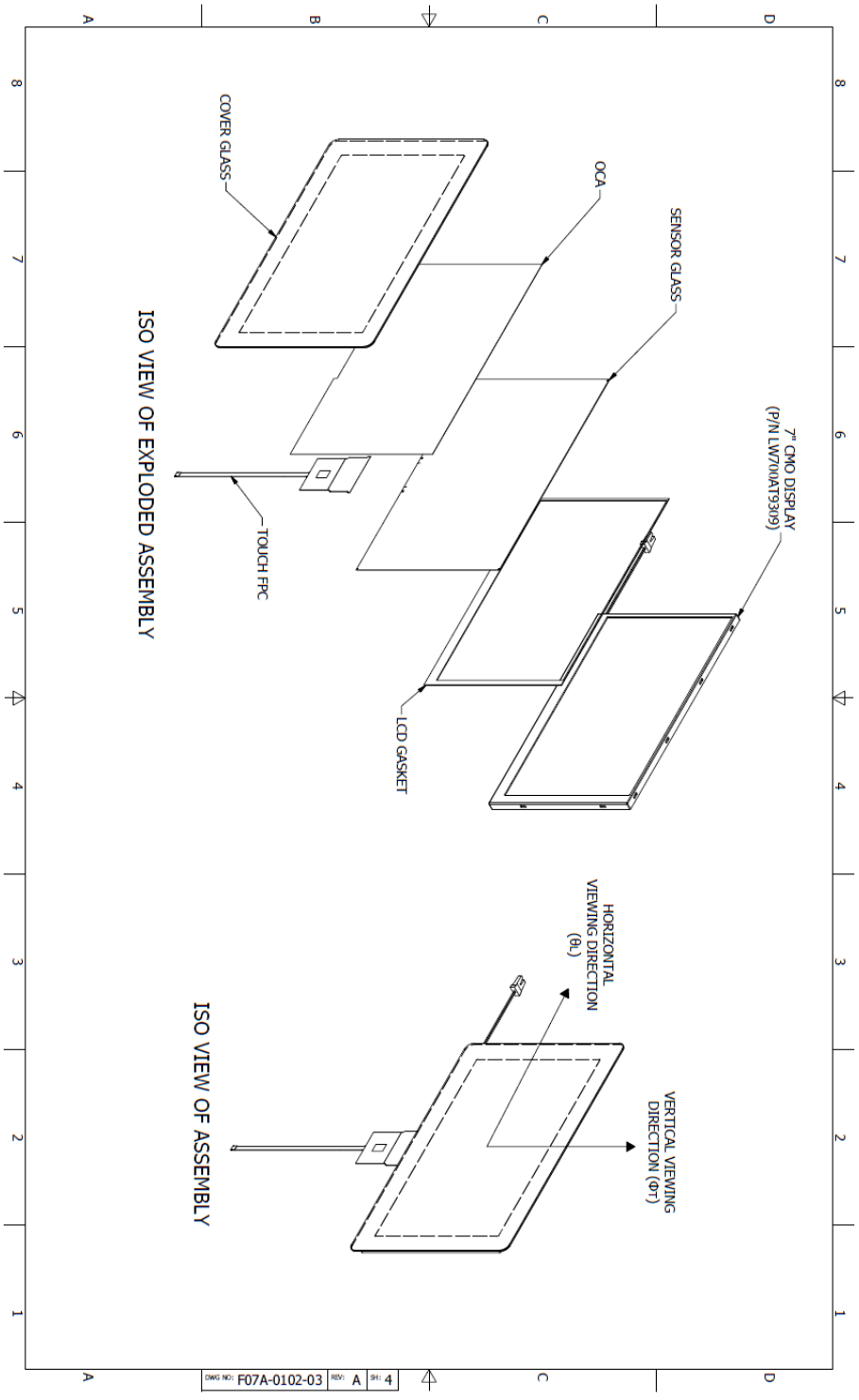
Measured Per ASTM D3363

APPENDIX B


NOTES:
1. MINIMUM FPC BEND RADIUS = 1.0 MM.
2. LCD OUTLINE IS CENTERED ON COVER GLASS VIEW AREA.
3. FITS KYOCERA ELCO P/N 04-6298-006000883 CONNECTOR OR EQUIVALENT.
4. BARCODE LABEL AREA CONTAINING:
TOUCH REVOLUTION P/N F07-0102-03
SERIAL NUMBER
PROJECT NAME
TOUCH FIRMWARE RELEASE VERSION
5. FPC STIFFENER AREA. NOT FLEXIBLE, DO NOT BEND.
6. MATING FPC FITS UJU P/N MT-FP430N-2FR OR EQUIVALENT.
7. BACKLIGHT CONNECTOR JST P/N SM02B-BHSS-1-TB. FITS MATING CONNECTOR JST P/N BHSR-20VS-1 OR EQUIVALENT.
119.00± .10 COVER GLASS OUTLINE
92.94 CG VIEW AREA
(91.44) LCD ACTIVE AREA
(133.10)
13.03 TYP.
(61.23)
179.96± .10 COVER GLASS OUTLINE
153.90 CG VIEW AREA
(152.40) LCD ACTIVE AREA
21.00
3.00
(75.13)
(88.23)
4X R5.00
4X R.75 COVER GLASS MASK
.75 TYP.
TOUCH MODULE FRONT VIEW
TOUCH MODULE SIDE VIEW
7.50 ± .55 TOTAL THK
REVISION HISTORY
REV | DESCRIPTION | DATE | ENGINEER | APPROVAL DATE
A | INITIAL RELEASE | 6/20/2011 | CSG
TOLERANCING
Touch Revolution
1400 BRIDGE PARKWAY SUITE 102 REDWOOD CITY, CA 94065
TITLE: FUSION 7 TOUCH SCREEN MODULE
DWG NO: F07A-0102-03
DWG SIZE: B
REV: A
SCALE: 1:2
SHEET NO: 1 OF 4
DESIGNER: MFB DATE: 6/2/2011
ENG. REVIEW BY: CSG DATE: 6/8/2011


(.07)
107.72 ± .10
SENSOR OUTLINE
7.28 ± .30
(3.93)
104.44 ± .30
LCD OUTLINE
10.63 ± .30
5.18 ± .30
7.28 ± .30
165.00 ± .30
LCD OUTLINE
165.40 ± .10
SENSOR OUTLINE
61.0 ± .5
LCD IF CL
(7.28)
43.3 ± .5
LCD IF
SH3
B2
100.54 ± .30
60.00 ± 5.00
C
D
TOUCH MODULE
REAR VIEW
(LCD PARTIALLY REMOVED FOR CLARITY)
DETAIL C
SCALE 4 : 1
(TOUCH FPC PINOUT)
6X .50 PIN PITCH
.30 PIN WIDTH
PIN 6
PIN 1
3.50
2.50
TOUCH FPC ELECTRICAL PINOUT
PIN NO. SYMBOL DESCRIPTION
1 VCC POWER
2 RST RESET
3 INT INTERRUPT
4 SDA I2C DATA
5 SCL I2C CLOCK
6 GND GROUND
DWG NO: F07A-0102-03
REV: A
SH: 2


1.00 ± .05 COVER GLASS
.25 ± .05 OCA
.50 GASKET
.55 ± .05 SENSOR GLASS
5.20 LCD
DETAIL A
SCALE 4 : 1
SH1
C2
.20 ± .03
FPC IF THK
TOUCH FPC
CONTACT SIDE
1.32
MAX FPC THK
DETAIL B
SCALE 4 : 1
SH1
B2
PIN 40 THIS SIDE
CONNECTOR IF
THIS SIDE
6
PIN 1 THIS SIDE
DETAIL D
SCALE 2 : 1
SH2
C6
DWG NO: F07A-0102-03
REV: A
SH: 3


ISO VIEW OF EXPLODED ASSEMBLY
COVER GLASS
OCA
SENSOR GLASS
7" CMO DISPLAY
(P/N LW700AT9309)
TOUCH FPC
LCD GASKET
ISO VIEW OF ASSEMBLY
HORIZONTAL
VIEWING DIRECTION
(θL)
VERTICAL VIEWING
DIRECTION (θT)
DWG NO: F07A-0102-03
REV: A
SH: 4