LC717A00BS01GEVK

LC717A00BS01GEVK Electrostatic Capacitive Sensor Evaluation Kit User's Manual

ON Semiconductor®

EVAL BOARD USER'S MANUAL

Contents

Electrostatic capacitive sensor kit (LC717A00BS01GEVK) has several evaluation boards to evaluate various switch patterns. LC717A00AR works not only as a stand−alone but also as passive object by communicating through PC. This manual explains configuration, usage and options.

Features

- Evaluation of 8ch Slider Switch
- Evaluation of 8ch Wheel Switch
- Evaluation of 1ch Proximity Sensor
- USB Cable for Power Supply

Equipment Used

- Electrostatic Capacitive Sensor Evaluation Kit "LC717A00BS01GEVK"
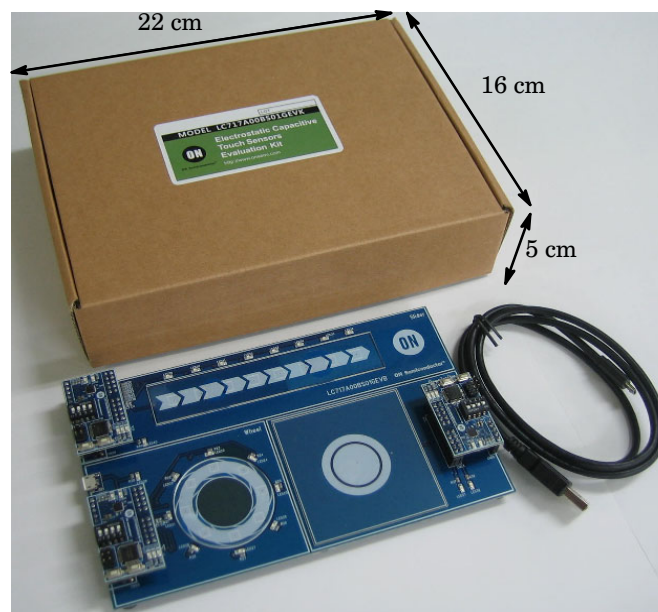- USB Power Supply
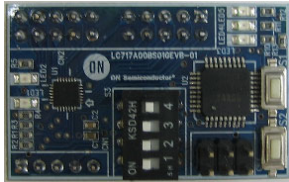

Figure 1. Photo of LC717A00BS01GEVK Evaluation Kit

LC717A00BS01GEVK

Package Contents Confirmation
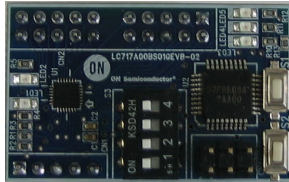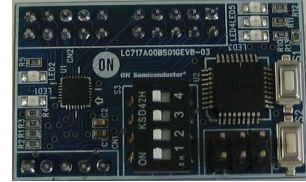
1 Mother Board
   "LC717A00BS01GEVB"

2 Daughter Board
   "LC717A00BS01GEVB–01"

3 Daughter Board
   "LC717A00BS01GEVB–02"

4 Daughter Board
   "LC717A00BS01GEVB–03"

5 USB Cable (Power Cable)

Operational Environment

Following operational environment is necessary in order to use "LC717A00AR Software" for the Touch Sensor Evaluation Board Application.

● Correspondence OS : Windows* XP(32bit), Window* 7(32bit)

● Memory Capacity: More than 16MB

● HDD Capacity: More than 500KB (application size) free space for program, and need additional space as optional for obtaining Log file.

● Interface : USB 2.0

* Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

Setup

1. Download:
   http://www.onsemi.com/PowerSolutions/product.do?id=LC717A00AR

2. http://www.onsemi.com/PowerSolutions/supportDoc.do?type=software&rpn=LC717A00AR

Note) Evaluation through PC is necessary USB conversion module and driver. Index "Connecting USB Conversion module" shows details.
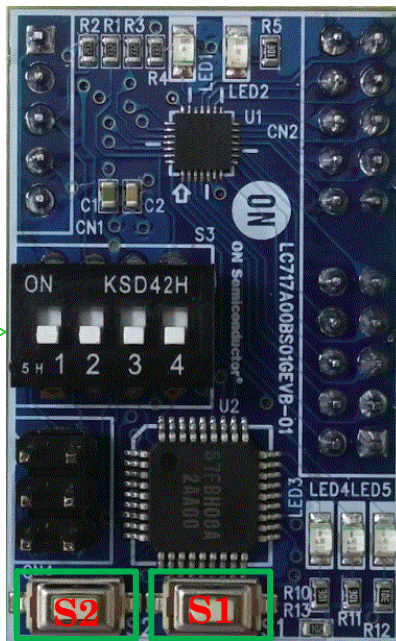
LC717A00BS01GEVB
 Button & LED State

Conversion Module Connect:
All Switches OFF
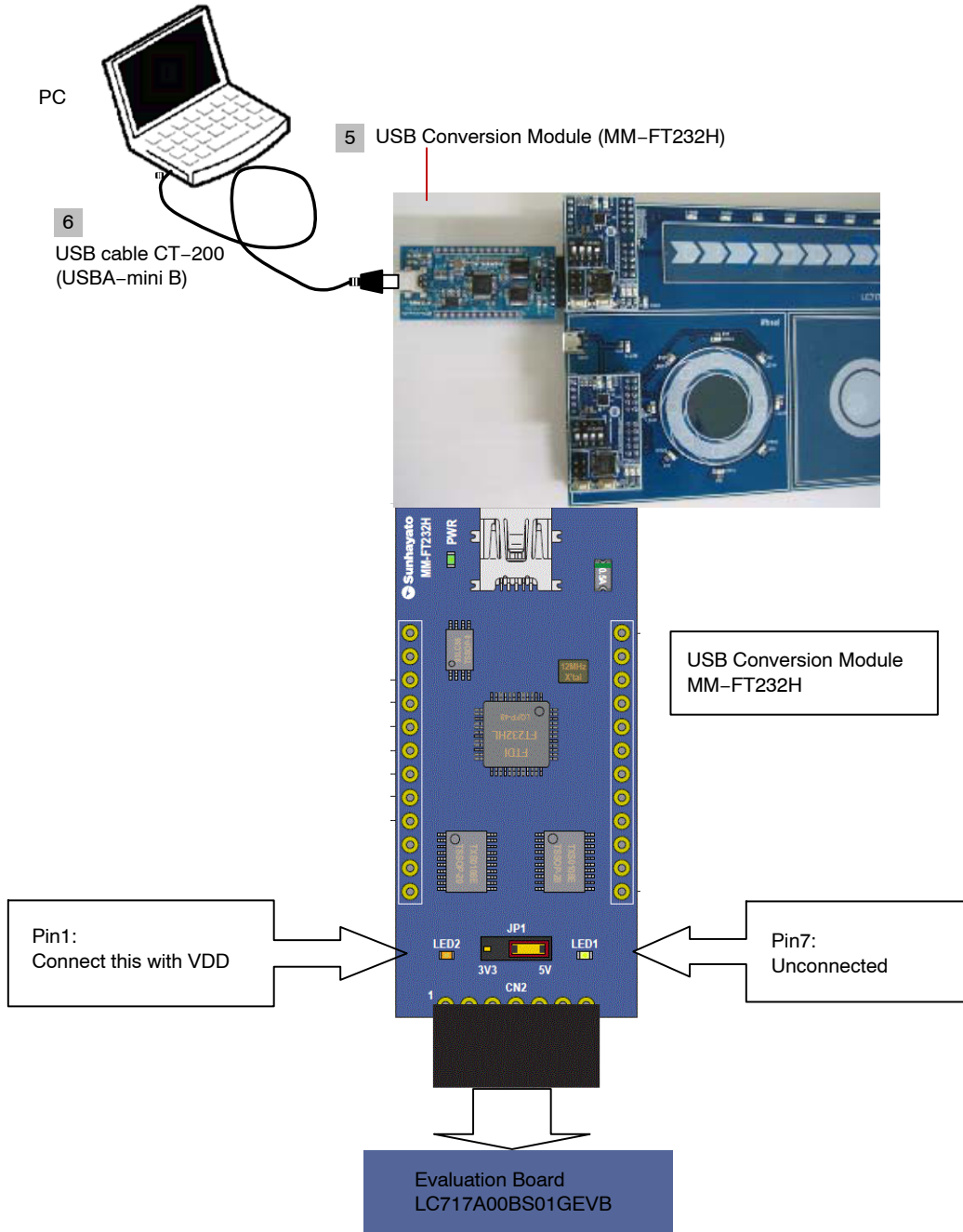**Conversion Module Disconnect:**
All Switches ON

LED State with S1/S2
<Operation Flow>
Step1:
S2: **Mode selection as turn**
LED on sequentially;
– LED3 for Normal
– LED4 for Gloves
– LED5 for Air Gap / Proximity
Step2:
S1: **Write registers value into**
touch sensor
– LED 3/4/5 blink one time and
stay at on at selected mode
Note)
LED2 : Power supply on
LED1 : Red color on when
touch sensor has an error.
Can be "Reset" with S1 push

LC717A00BS01GEVK

Connecting USB Conversion Module to PC

When it is necessary to change the parameter of LC717A00AR, it can evaluate to connect USB conversion module to PC as the following figure.

PC

5 USB Conversion Module (MM−FT232H)

6 USB cable CT−200 (USBA−mini B)

USB Conversion Module MM−FT232H

Pin1: Connect this with VDD

Pin7: Unconnected

Evaluation Board LC717A00BS01GEVB

Note) The USB conversion module and the USB cable aren't included in this LC717A00BS01GEVK. LC717A00GEVK or LC717A30UJGEVK include both the USB cable and the USB conversion module. Otherwise, please prepare them from Sunhayato Corp.

URL:MM−FT232H

http://www.sunhayato.co.jp/material2/index.php/item?cell003=%E6%95%99%E8%82%B2%E5%AE%9F%E7%BF%92%E3%83%BB%E9%9B%BB%E5%AD%90%E5%B7%A5%E4%BD%9C%E8%A3%BD%E5%93%81&cell004=IC%E3%83%A2%E3%82%B8%E3%83%A5%E3%83%BC%E3%83%AB&name=%E5%A4%9A%E6%A9%9F%E8%83%BDUSB%E5%A4%89%E6%8F%9B%E3%83%A2%E3%82%B8%E3%83%A5%E3%83%BC%E3%83%AB%E3%80%80MM−FT232H&id=759&label=1

URL:CT−200

http://www.sunhayato.co.jp/material2/index.php/item?cell003=%E6%95%99%E8%82%B2%E5%AE%9F%E7%BF%92%E3%83%BB%E9%9B%BB%E5%AD%90%E5%B7%A5%E4%BD%9C%E8%A3%BD%E5%93%81&cell004=%E5%85%B1%E9%80%9A%E3%82%A2%E3%82%AF%E3%82%BB%E3%82%B5%E3%83%AA&name=%E3%83%9F%E3%83%8BUSB%E3%82%B1%E3%83%BC%E3%83%96%E3%83%AB%E3%80%80CT−200&id=920&label=1

LC717A00BS01GEVK

Usage Advisory

If error is displayed when starting "LC717A00AR Software" through PC, please check the following;

Please make sure that Device Driver is operating correctly: If "!" is shown at "USB Serial Port" in Windows' "Device Manager", Device Driver is not operating correctly. In such a case, disconnect the device from PC and reconnect. If "!" still is displayed up on the screen after disconnecting so many times, please reinstall the Device Driver.

The system uses the MM−FT232H interface module to communicate to PC USB port and needs the device drivers of FTDI to be installed into PC.

Refer to InstallationGuides of FTDI (http://www.ftdichip.com/).

Install the device driver before using GUI software.

Specification

Board	Parameter	Conditions	Remarks
LC717A00BS01GEVB	Board size	184*110	mm
LC717A00BS01GEVB	Board Material	Glass (FR−4)	Thickness 1.6mm, 2Layer
LC717A00BS01GEVB	Supply Voltage	5V	DC, USB
LC717A00BS01GEVB−01	Board size	40*25	mm
LC717A00BS01GEVB−01	Board Material	Glass (FR−4)	Thickness 1.6mm, 2Layer
LC717A00BS01GEVB−01	Supply Voltage	5V	DC, USB
LC717A00BS01GEVB−01	Capacitance Touch Sensor	LC717A00AR	
LC717A00BS01GEVB−01	MCU	LC87FBH08A	
LC717A00BS01GEVB−02	Board size	40*25	mm
LC717A00BS01GEVB−02	Board Material	Glass (FR−4)	Thickness 1.6mm, 2Layer
LC717A00BS01GEVB−02	Supply Voltage	5V	DC, USB
LC717A00BS01GEVB−02	Capacitance Touch Sensor	LC717A00AR	
LC717A00BS01GEVB−02	MCU	LC87FBH08A	
LC717A00BS01GEVB−03	Board size	40*25	mm
LC717A00BS01GEVB−03	Board Material	Glass (FR−4)	Thickness 1.6mm, 2Layer
LC717A00BS01GEVB−03	Supply Voltage	5V	DC, USB
LC717A00BS01GEVB−03	Capacitance Touch Sensor	LC717A00AR	
LC717A00BS01GEVB−03	MCU	LC87FBH08A	

Contents of Registers – (Normal Mode)

Normal mode is the mode to be adjusted as just turning on when touching.
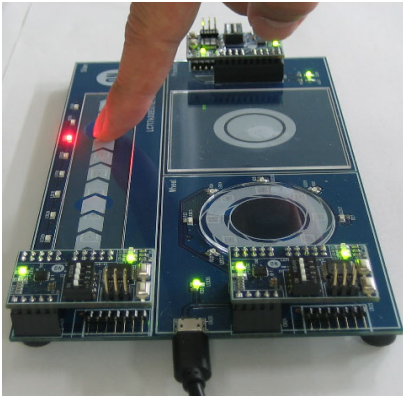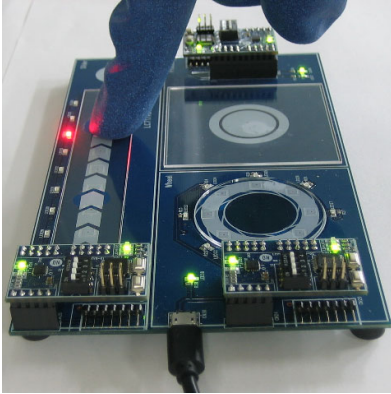

Contents of register at Normal Mode

Register Address	Item	Value Data
0x00	Use channel	0xFF
0x01	Cin0 Gain	0x10
0x02	Cin1 Gain	0x10
0x03	Cin2 Gain	0x10
0x04	Cin3 Gain	0x10
0x05	Cin4 Gain	0x10
0x06	Cin5 Gain	0x10
0x07	Cin6 Gain	0x10
0x08	Cin7 Gain	0x10
0x09	Cin0 Threshold	0x0A
0x0A	Cin1 Threshold	0x0A
0x0B	Cin2 Threshold	0x0A
0x0C	Cin3 Threshold	0x0A
0x0D	Cin4 Threshold	0x0A
0x0E	Cin5 Threshold	0x0A
0x0F	Cin6 Threshold	0x0A
0x10	Cin7 Threshold	0x0A
0x1D	Average	0x40
0x1E	Filter Parameter	0x04
0x1F	Debounce	0x01
0x20	Short Interval Time	0x05
0x21	Long Interval Time	0x01
0x22	Dynamic Offset Interval	0x07
0x23	Dynamic Offset Plus	0x03
0x24	Dynamic Offset Minus	0x03
0x25	ON Cancel Time (TOCL)	0x00
0x26	ON Cancel Time (TOCL)	0x00
0x3D	Cdac Base	0x80
0x3E	Measurement Mode	0x10

Except above mentioned registers are default.

Contents of Registers – (Gloves Mode)

Gloves mode is the mode to be adjusted as just turning on when touching with gloves.

Contents of register at Gloves Mode

Register Address	Item	Value Data
0x00	Use channel	0xFF
0x01	Cin0 Gain	0x40
0x02	Cin1 Gain	0x40
0x03	Cin2 Gain	0x40
0x04	Cin3 Gain	0x40
0x05	Cin4 Gain	0x40
0x06	Cin5 Gain	0x40
0x07	Cin6 Gain	0x40
0x08	Cin7 Gain	0x40
0x09	Cin0 Threshold	0x0A
0x0A	Cin1 Threshold	0x0A
0x0B	Cin2 Threshold	0x0A
0x0C	Cin3 Threshold	0x0A
0x0D	Cin4 Threshold	0x0A
0x0E	Cin5 Threshold	0x0A
0x0F	Cin6 Threshold	0x0A
0x10	Cin7 Threshold	0x0A
0x1D	Average	0x80
0x1E	Filter Parameter	0x04
0x1F	Debounce	0x01
0x20	Short Interval Time	0x05
0x21	Long Interval Time	0x01
0x22	Dynamic Offset Interval	0x07
0x23	Dynamic Offset Plus	0x03
0x24	Dynamic Offset Minus	0x03
0x25	ON Cancel Time (TOCL)	0x00
0x26	ON Cancel Time (TOCL)	0x00
0x3D	Cdac Base	0x80
0x3E	Measurement Mode	0x10

Except above mentioned registers are default.

Contents of Registers − (Air−Gap / Proximity Mode)

Air−Gap / Proximity mode is the mode to be adjusted as turning on when approaching over certain air−gap or proximity.
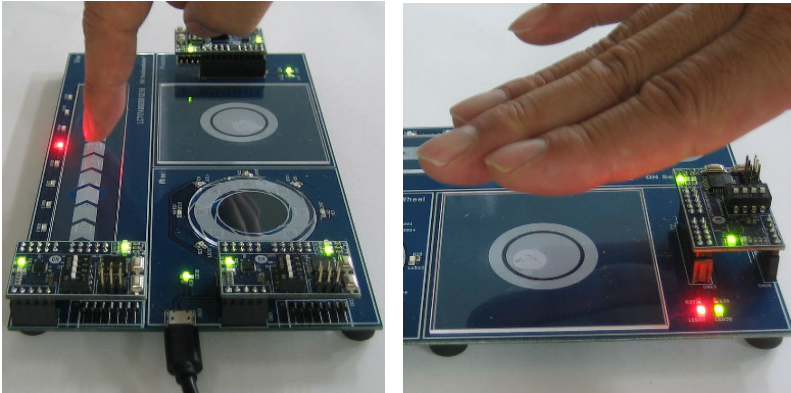
Contents of register at Air−Gap / Proximity Mode

Register Address	Item	Value Data
0x00	Use channel	0xFF
0x01	Cin0 Gain	0XF0
0x02	Cin1 Gain	0xF0
0x03	Cin2 Gain	0xF0
0x04	Cin3 Gain	0xF0
0x05	Cin4 Gain	0xF0
0x06	Cin5 Gain	0xF0
0x07	Cin6 Gain	0xF0
0x08	Cin7 Gain	0xF0
0x09	Cin0 Threshold	0x0A
0x0A	Cin1 Threshold	0x0A
0x0B	Cin2 Threshold	0x0A
0x0C	Cin3 Threshold	0x0A
0x0D	Cin4 Threshold	0x0A
0x0E	Cin5 Threshold	0x0A
0x0F	Cin6 Threshold	0x0A
0x10	Cin7 Threshold	0x0A
0x1D	Average	0x80
0x1E	Filter Parameter	0x04
0x1F	Debounce	0x01
0x20	Short Interval Time	0x05
0x21	Long Interval Time	0x01
0x22	Dynamic Offset Interval	0x07
0x23	Dynamic Offset Plus	0x03
0x24	Dynamic Offset Minus	0x03
0x25	ON Cancel Time (TOCL)	0x00
0x26	ON Cancel Time (TOCL)	0x00
0x3D	Cdac Base	0x80
0x3E	Measurement Mode	0x10

Except above mentioned registers are default.

Figure 2. LC717A00BS01GEVB – Main Board Schematic

LC717A00BS01GEVK

Figure 3. (LC717A00BS01GEVB−01, 02, 03)

*Option1 : I2C --> R18,R19 (0 ohm), R22 (X)
          SPI --> R18,R19 (X), R22 (0 ohm)

*Option2 : High Gain --> R25 (0 ohm), R26 (X)
          Low Gain --> R25 (X), R26 (0 ohm)

*Option3 : I2C --> R24 (X)
          SPI --> R24 (0 ohm)

LC717A00BS01GEVK

Table 1. BILL OF MATERIALS OF LC717A00BS01GEVK

No.	Designator	Component Name	Type & Description	Vendor	Qty.	Check
1	PCB	170*110 FR–4 1.6T 2LAYER MAIN	LC717A00BS01GEVB	HANSAEM DIGITEC	1	
2	PCB	25*40 FR–4 1.6T 2LAYER SUB	LC717A00BS01GEVB–01	HANSAEM DIGITEC	1	
3	PCB	25*40 FR–4 1.6T 2LAYER SUB	LC717A00BS01GEVB–02	HANSAEM DIGITEC	1	
4	PCB	25*40 FR–4 1.6T 2LAYER SUB	LC717A00BS01GEVB–03	HANSAEM DIGITEC	1	
5	R1,R2,R3,R4,R17	RES. CHIP	3.3k ohm 5% 1608	YAGEO	5	
6	R5,R10,R11,R12,-R21,R22,R23,R24,R25,R26,R27,R28,R29,R30,R31,R32,R33,R34,R35,-R36,R37,R38,R39,R40	RES. CHIP	300 ohm 5% 1608	YAGEO	24	
7	R6	RES. CHIP	510k ohm 5% 1608	YAGEO	1	
8	R7,R8,R9,R15	RES. CHIP	100 ohm 5% 1608	YAGEO	4	
9	R13,R14	RES. CHIP	1k ohm 5% 1608	YAGEO	2	
10	R20,R21,R23	RES. CHIP	100k ohm 5% 1608	YAGEO	3	
11	R18,R19	RES. CHIP	0 ohm 5% 1608	YAGEO	2	
12	C1,C4	CERAMIC. CHIP	16V/475K (1608)(Y5R)	SAMWHA	2	
13	C2,C5,C6	CERAMIC. CHIP	16V/104K (1608)(Y5R)	SAMWHA	3	
14	C3	CERAMIC. CHIP	16V/223K (1608)(Y5R)	SAMWHA	1	
15	C1,C3,C6	CERAMIC. CHIP	16V/030K (1608)(Y5R)	SAMWHA	3	
16	U1	IC	LC717A00AR	ON SEMICONDUCTOR	1	
17	U2	IC	LC87FBH08A	ON SEMICONDUCTOR	1	
18	LED2,LED3,LED4,LED5,LED38,LE-D39,LED40	LED Chip	GREEN (2012) CHIP	EVERLIGHT	7	
19	LED1,LED21,LED22,LED23,LED24,-LED25,LED26,LE-D27,LED28.LED29,LED30,LED31,L-ED32,LED33,LED34.LED35,LED36,-LED37	LED Chip	RED (2012) CHIP	EVERLIGHT	18	
20	S3	DIP SWITCH	KSD42 (SLIDE TYPE)	OTAX	2	
21	SW1,SW2	SWITCH	YST1502		2	
22	CN24,CN26,CN28	PIN HEADER SOCKET 2.54mm Pitch 1? 5pin	Straight		3	
23	CN21,CN22,CN23	PIN HEADER SOCKET 2.54mm Pitch 2? 22pin	Straight		3	
24	CN1	PIN HEADER 2.54mm Pitch 1? 5pin	Straight		1	
25	CN2	PIN HEADER 2.54mm Pitch 2? 22pin	Straight		1	
26	CN4	PIN HEADER 2.54mm Pitch 1? 6pin	Straight		1	
27	CN25,CN27,CN29	PIN HEADER 2.54mm Pitch 1? 7pin	Angle		3	
28	CN30	Micro USB CONNECTOR			1	
29	PCB Support	5mm Rubber				
30	Acrylic	Circle 1T 44Φ			1	
31	Acrylic	Rectangle 1T 22mm 113MM			1	
32	Acrylic	Rectangle 1T 65mm 63MM			1	

USB CONVERSION MODULE OPERATION GUIDE

USB Conversion Module (MM−FT232H: Sunhayato) in this kit is made of FTDI's IC (FT232H) and can change USB interface into various interfaces. It can output the power-supply voltage from USB port to the connecter terminal and it is possible to change a voltage level to 3.3 V or 5.0 V by jumper setup.

NOTE

Refer to the application note on ON Semiconductor touch sensor page for sensor patterns of the design rule and usage of LSI.

Refer to the user's manual of the application-software for usage of the software and installing the device driver.

Connector   Power Supply LED   USB Connector (Type Mini-B)
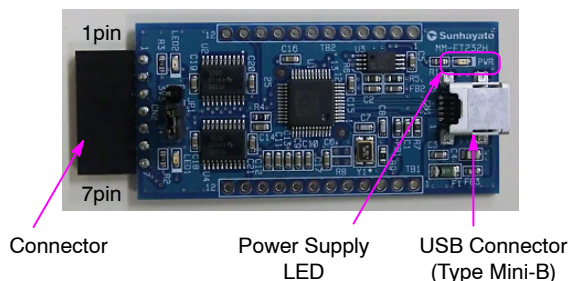
Table 2.

No.	I^{2}C I/F Terminal	SPI I/F Terminal
1	VDD	VDD
2	GND	GND
3	SCL	SCK
4	SDA	SI
5	SDA (Note 1)	SO
6	N.C. (open)	N.C. (open)
7	N.C. (open)	nCS

1. Make sure to connect both 4 pin and 5 pin as the common terminal on customer's board side at I^{2}C interface.
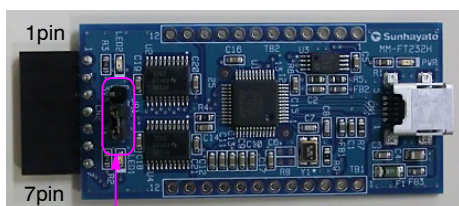
Voltage Selectable Jumper

Table 3.

Jumper Location	Voltage Level
CN2 3V3 / 5V	5.0 V
CN2 3V3 / 5V	3.3 V

PUBLICATION ORDERING INFORMATION

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