LC717A30URGEVK

LC717A30URGEVK Electrostatic Capacitive Sensor Evaluation Kit User's Manual

ON Semiconductor®

EVAL BOARD USER'S MANUAL

Contents

The electrostatic capacitive sensor evaluation kit (LC717A30URGEVK) has both several evaluation boards to evaluate the operation of various switch patterns and the communication facility for PC because of changing some registers. This manual explains configuration, usage and specification.

Features

- Capable of Evaluating Using Film Type Electrode Sheet
- Capable of Evaluating Using Customer's Sensor Board
- Communication Module Between This Kit and PC Through USB

Equipment Used

- Electrostatic Capacitive Sensor Evaluation Kit "LC717A30URGEVK"
- PC (Installed GUI and USB Power Supply)

Typical Applications

- Automotive: Smart Key, Control Switches
- Consumer: White Goods
- Industrial: Security Lock
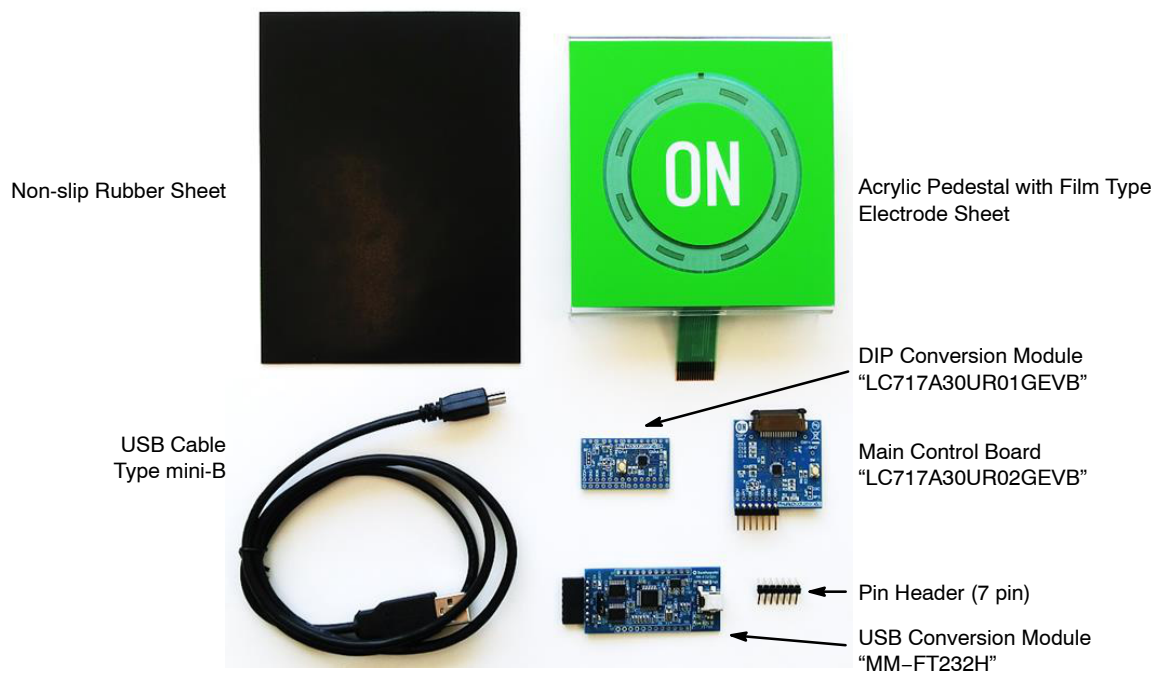- Computing: PC Peripherals
- Lighting: Remote Control Switches

Figure 1. Configuration of the LC717A30URGEVK Evaluation Kit

GETTING STARTED

Install the Evaluation Software (GUI)

Copy LC717A30 executable evaluation software "LC717A30AppV2.exe" (hereinafter this is called "the application software") to any folder on your PC. In addition, unzip the parameter file (e.g. LC717A30URGEVKV2_PARAMETER.ZIP) from this evaluation kit website and store it in the same folder as the GUI software.

Install the Device Driver

Download the device driver from the following URL and install it into your PC.
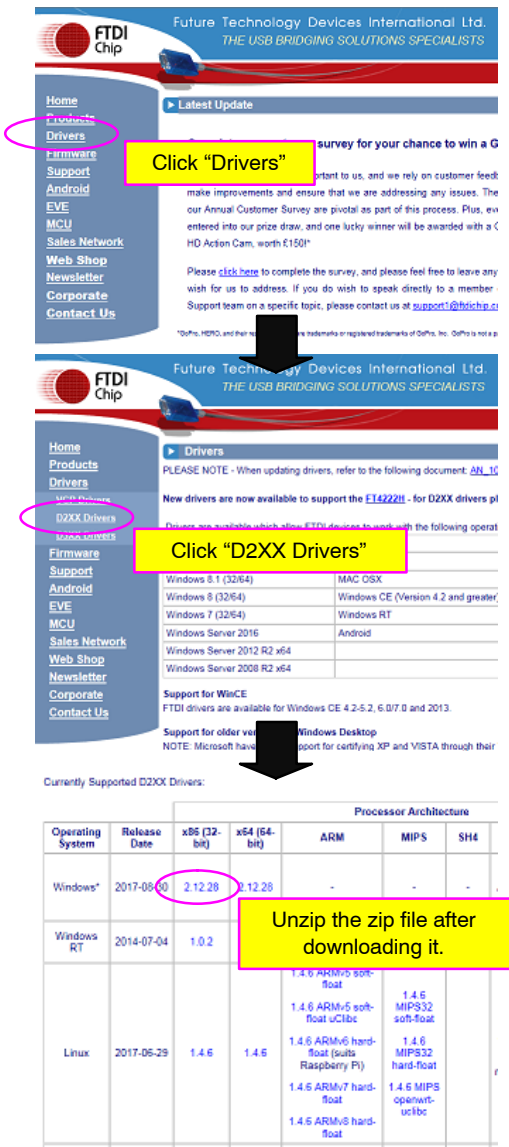
FTDI official web page: http://www.ftdichip.com/.

Figure 2.

Connection Procedure of the Evaluation Board

1. Connect a USB cable to PC.
2. Connect USB cable and USB conversion module (USB dongle).
3. Start LC717A30AppV2.exe of the GUI software.
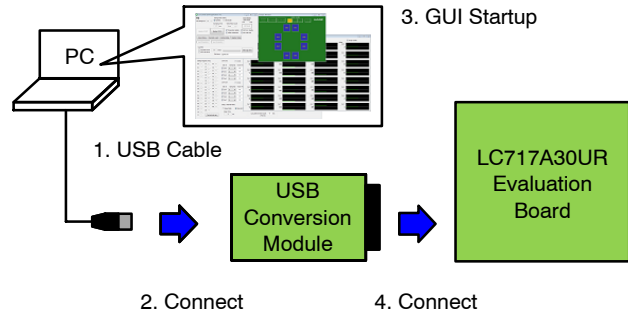4. Connect USB conversion module and LC717A30UR's evaluation board.

Figure 3.

USB Conversion Module Operation Guide

The USB conversion module (MM−FT232H made in Sunhayato) bundled with this evaluation kit is a conversion module mounted with a multi-functional USB conversion IC (FT232H) made in FTDI. This converts the USB interface into various interfaces. Also, the power supply voltage supplied from the USB port can be output from the connector, and the voltage level can be switched to 3.3 V or 5.0 V by jumper setting.
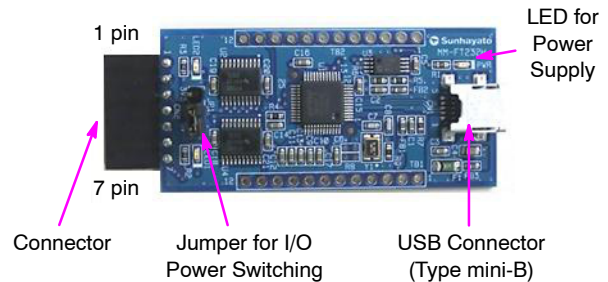

Figure 4.

Table 1. PIN ASSIGNMENT OF CONNECTOR

No.	I²C I/F Signal Name	SPI I/F Signal Name
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

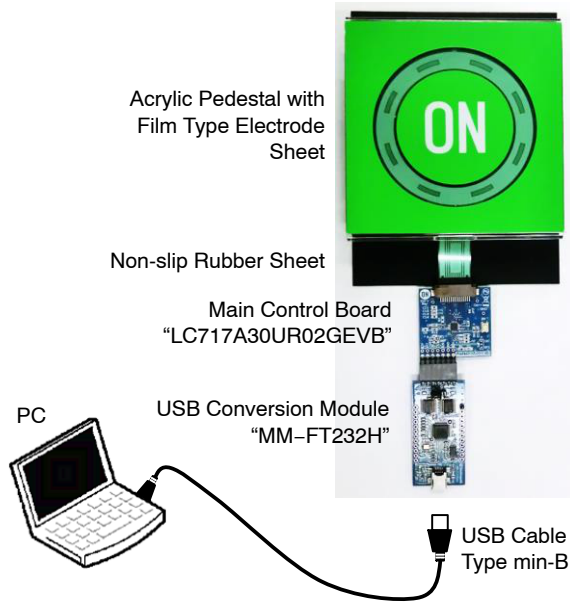1. When using an I²C interface, connect both 4 pin and 5 pin on customer's board side.

SETUP

Acrylic Pedestal with Film Type Electrode Sheet

Non-slip Rubber Sheet

Main Control Board "LC717A30UR02GEVB"

USB Conversion Module "MM−FT232H"

PC

USB Cable Type min-B

Figure 5.

1. Connect a PC, USB dongle and Main Control Board.
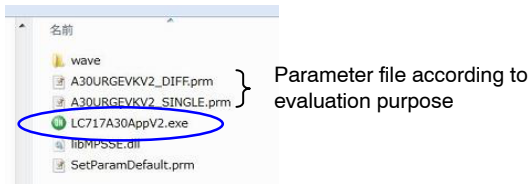

Parameter file according to evaluation purpose

Figure 6.

2. Start LC717A30AppV2.exe of the GUI software.
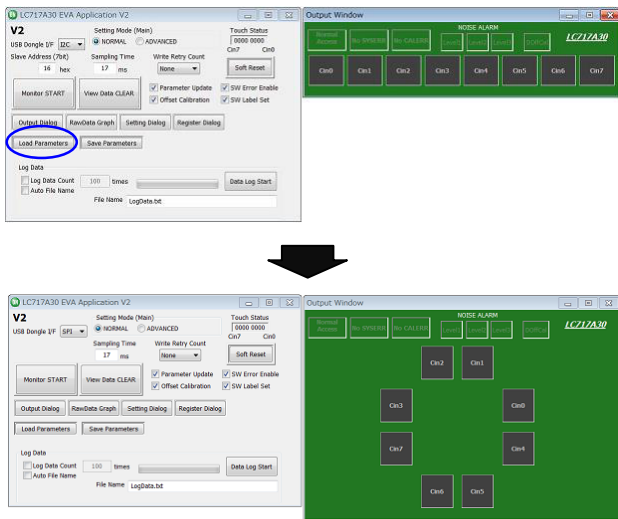
Figure 7.

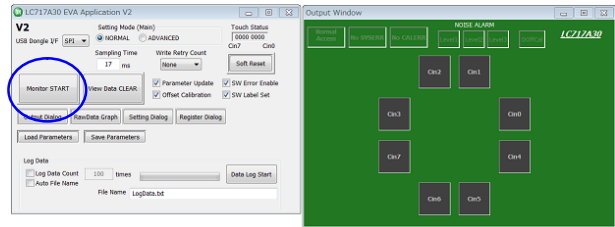3. Load a parameter file according to evaluation purpose. (e.g. A30URGEVKV2_SINGLE.prm)
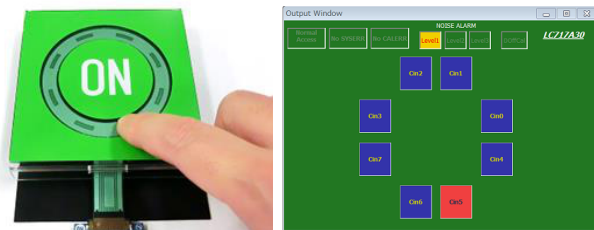

Figure 8.

4. Click the "Monitor START".

Figure 9.

5. When the finger touches the electrode sheet on the acrylic pedestal, the corresponding channel on the output window is displayed to red.
6. Click the "Monitor STOP" to stop the monitor operation.

- If you click the "Setting Dialog", the "Initial Setting Window" is displayed and you can confirm the register setting.
- If you click the "RawData Graph", the "Raw Data Graph Window" is displayed and you can confirm the AD value level waveform.
- The "A30URGEVKV2_SINGLE.prm" parameter file is set to measure in single mode with the AmpMode of the Control 3 Register (0x2B) set to "1".
- The "A30URGEVKV2_DIFF.prm" parameter file is set to measure in differential mode with the AmpMode of the Control 3 Register (0x2B) set to "0".

LC717A30URGEVK

MAIN CONTROL BOARD FUNCTINS
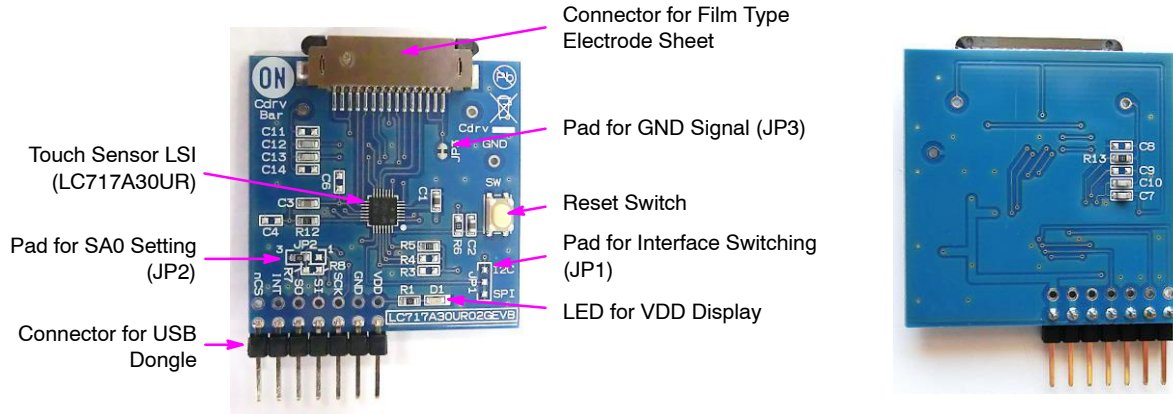
Configuration (LC717A30UR02GEVB)

Figure 10. Configuration of the Main Control Board

The communication interface can be switched to I^2C or SPI according to the JP1, JP2, R3, R4, R7 and R8 mount conditions on this evaluation board. The initial state is set to SPI mode.

Table 2. MOUNT CONDITIONS OF THE MAIN CONTROL BOARD

Designator	I^2C Mode	SPI Mode (Initial Setting)
R3	3.3 kΩ	Unmount (Open)
R4	3.3 kΩ	Unmount (Open)
R7	Unmount (Open)	0 Ω
R8	0 Ω	Unmount (Open)
JP2 (1–2)	100 kΩ (SA0=1)	Unmount (Open)
JP2 (2–3)	100 kΩ (SA0=0)	100 kΩ
JP1	I^2C	SPI

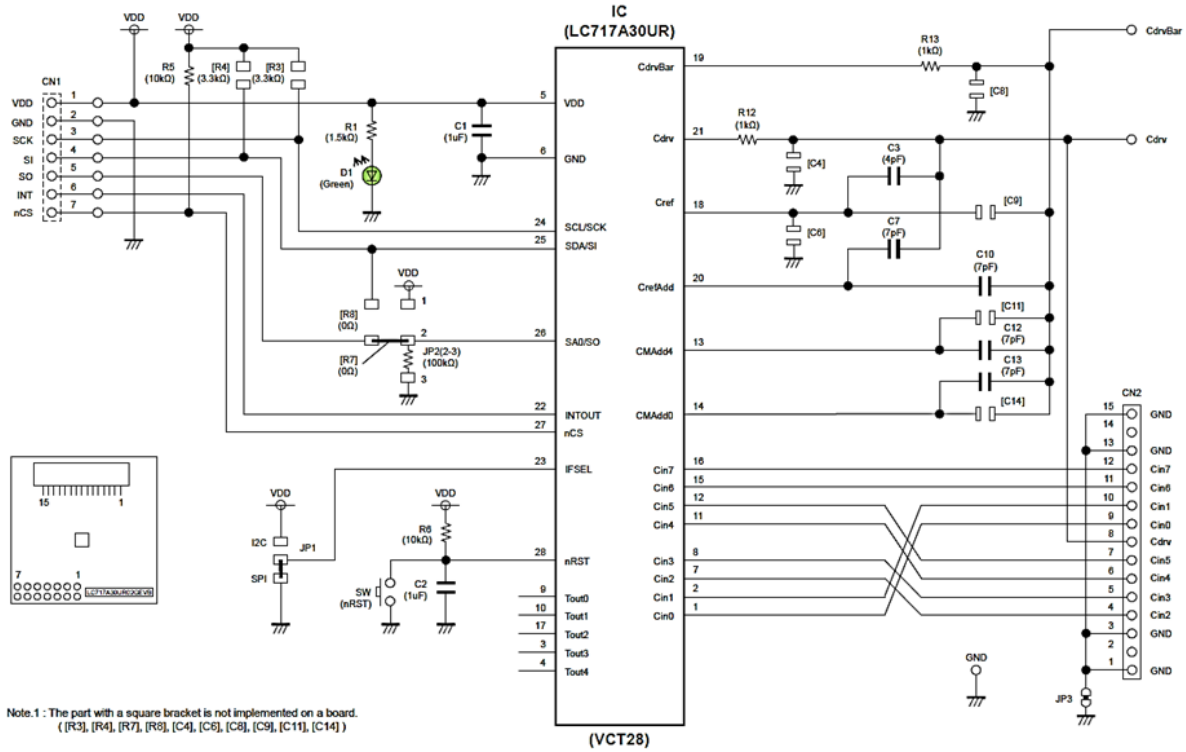**Schematic (LC717A30UR02GEVB)**

Figure 11. Schematic of the Main Control Board

Bill of Materials (LC717A30UR02GEVB)

Table 3. BILL OF MATERIALS OF LC717A30UR02GEVB EVALUATION BOARD

Designator	Qty.	Description	Part Number	Value	Manufacturer
IC	1	Capacitive touch sensors LSI	LC717A30UR	8ch, VCT28	ON Semiconductor
D1	1	LED	SML–512MW	Green LED	ROHM
R12, R13	2	Resistor	RK73B1JTTD102J	1 kΩ ±5%, 0.125 W	KOA
R1	1	Resistor	RK73B1JTTD152J	1.5 kΩ ±5%, 0.125 W	KOA
R5, R6	2	Resistor	RK73B1JTTD103J	10 kΩ ±5%, 0.125 W	KOA
JP2 (2–3)	1	Resistor	RK73B1JTTD104J	100 kΩ ±5%, 0.125 W	KOA
C3	1	Multilayer ceramic capacitor	GRM1885C1H4R0C	4 pF ±0.25 pF, 50 V	Murata
C7, C10, C12, C13	4	Multilayer ceramic capacitor	GRM1885C1H7R0C	7 pF ±0.25 pF, 50 V	Murata
C1, C2	1	Multilayer ceramic capacitor	TMK107BJ105K	1 μF ±10%, 25 V	TAIYO YUDEN
SW	1	Push button switch	SKRPACE010		ALPS ELECTRIC
CN1	1	Connector	PSR–410256–07	7 pin, Right angle	Hirosugi Keiki
CN2	1	FFC/FPC Connector	08 6224 015 002 800+	15 pin, Right angle	Kyocera Connector Products

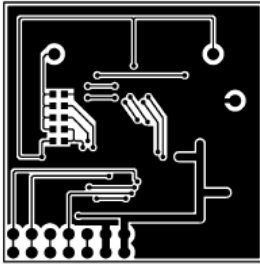**Printed Circuit Board Layout (LC717A30UR02GEVB)**

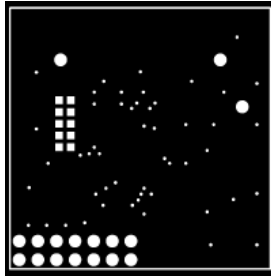**Figure 12. Pattern 1 Layer
(Solder Side)**
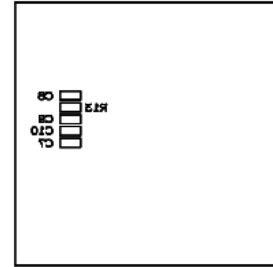
**Figure 13. Resist 1 Layer
(Solder Side)**

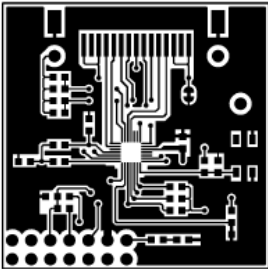**Figure 14. Silk 1 Layer
(Solder Side)**
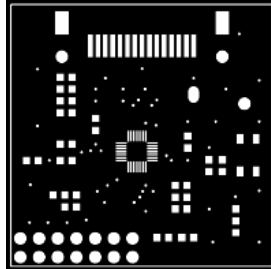
**Figure 15. Pattern 2 Layer
(Parts Side)**

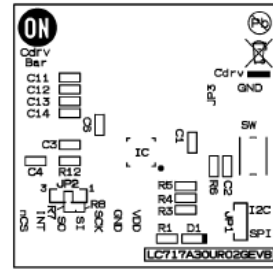**Figure 16. Resist 2 Layer
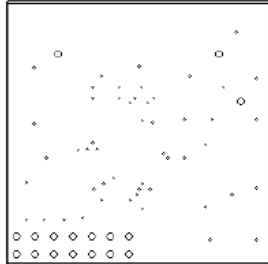(Parts Side)**

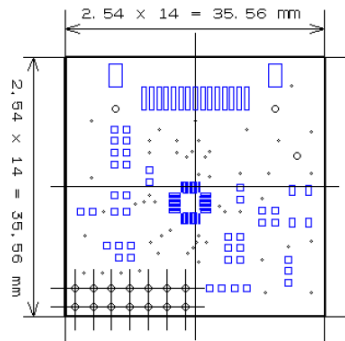**Figure 17. Silk 2 Layer
(Parts Side)**

Figure 18. Hole

Figure 19. Outline

DIP CONVERSION BOARD FUNCTIONS

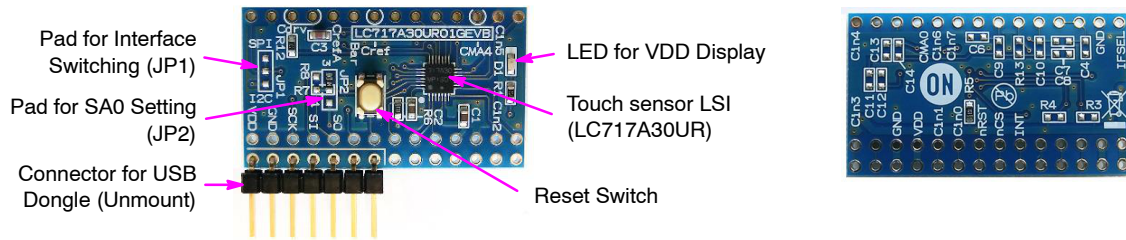**Configuration (LC717A30UR01GEVB)**

Figure 20. Configuration of the DIP Conversion Board

The communication interface can be switched to I²C or SPI according to the JP1, JP2, R3, R4, R7 and R8 mount conditions on this evaluation board. The initial state is set to SPI mode.

Table 4. MOUNT CONDITIONS OF THE DIP CONVERSION BOARD

Designator	I²C Mode	SPI Mode (Initial Setting)
R3	3.3 kΩ	Unmount (Open)
R4	3.3 kΩ	Unmount (Open)
R7	Unmount (Open)	0 Ω
R8	0 Ω	Unmount (Open)
JP2 (1−2)	100 kΩ (SA0=1)	Unmount (Open)
JP2 (2−3)	100 kΩ (SA0=0)	100 kΩ
JP1	I²C	SPI

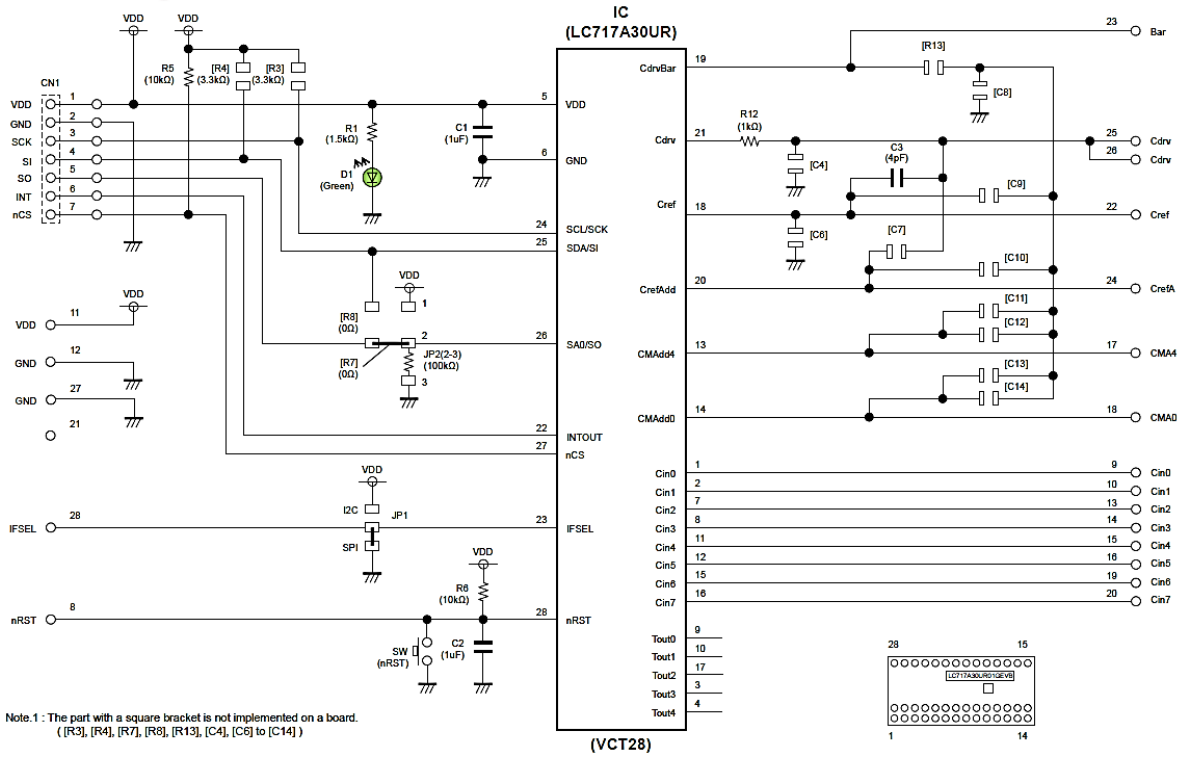## Schematic (LC717A30UR01GEVB)

Figure 21. Schematic of the DIP Conversion Board

Bill of Materials (LC717A30UR01GEVB)

Table 5. BILL OF MATERIALS OF LC717A30UR01GEVB EVALUATION BOARD

Designator	Qty.	Description	Part Number	Value	Manufacturer
IC	1	Capacitive touch sensors LSI	LC717A30UR	8ch, VCT28	ON Semiconductor
D1	1	LED	SML−512MW	Green LED	ROHM
R12	1	Resistor	RK73B1JTTD102J	1 kΩ ±5%, 0.125 W	KOA
R1	1	Resistor	RK73B1JTTD152J	1.5 kΩ ±5%, 0.125 W	KOA
R5, R6	2	Resistor	RK73B1JTTD103J	10 kΩ ±5%, 0.125 W	KOA
JP2 (2−3)	1	Resistor	RK73B1JTTD104J	100 kΩ ±5%, 0.125 W	KOA
C3	1	Multilayer ceramic capacitor	GRM1885C1H4R0C	4 pF ±0.25 pF, 50 V	Murata
C1, C2	1	Multilayer ceramic capacitor	TMK107BJ105K	1 μF ±10%, 25 V	TAIYO YUDEN
SW	1	Push button switch	SKRPACE010		ALPS ELECTRIC

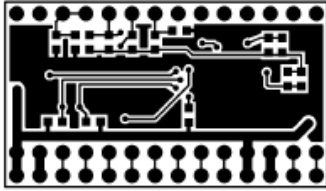**Printed Circuit Board Layout (LC717A30UR01GEVB)**

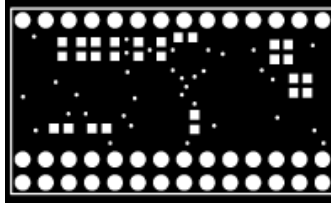**Figure 22. Pattern 1 Layer
(Solder Side)**

**Figure 23. Resist 1 Layer
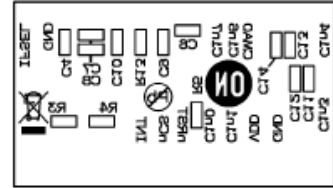(Solder Side)**

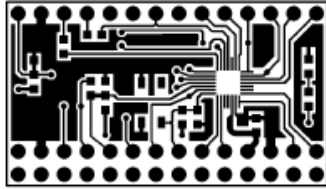**Figure 24. Silk 1 Layer
(Solder Side)**

**Figure 25. Pattern 2 Layer
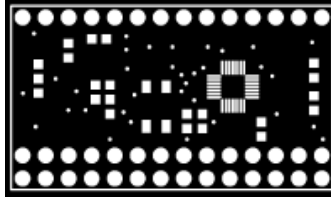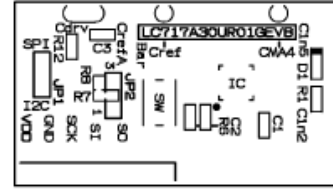(Parts Side)**

**Figure 26. Resist 2 Layer
(Parts Side)**

**Figure 27. Silk 2 Layer
(Parts Side)**
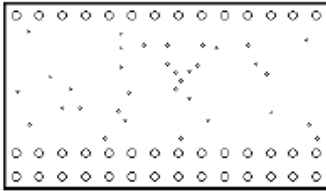
Figure 28. Hole

Figure 29. Outline

FILM TYPE ELECTRODE SHEET

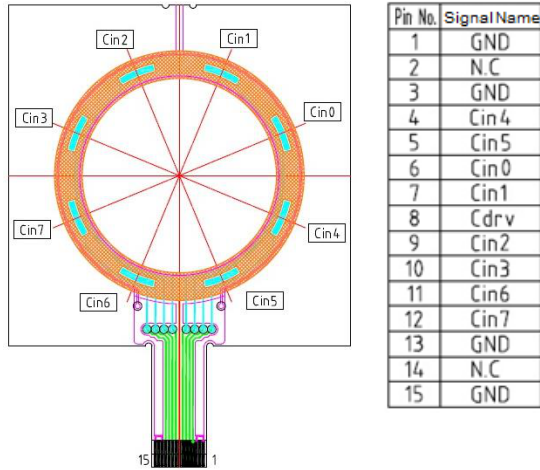| Pin No.	Signal Name
1	GND
2	N.C
3	GND
4	Cin4
5	Cin5
6	Cin0
7	Cin1
8	Cdrv
9	Cin2
10	Cin3
11	Cin6
12	Cin7
13	GND
14	N.C
15	GND
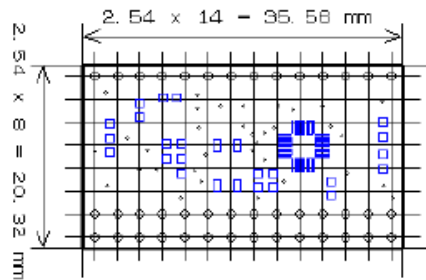
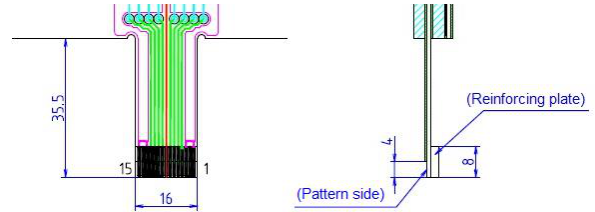**Figure 30. Pin Assignment of Connector**
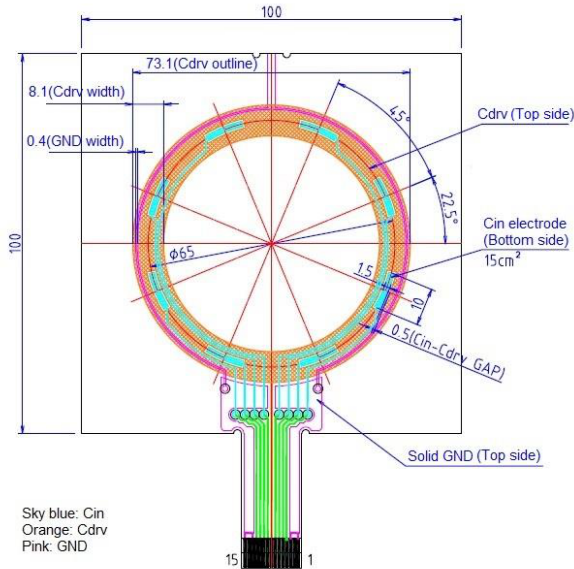

Figure 31. Connector Part Size
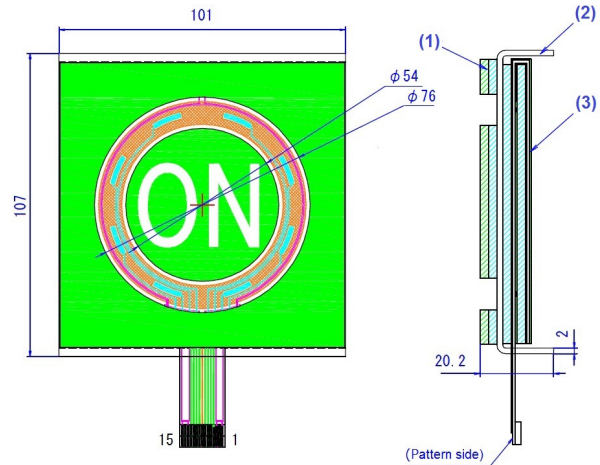

Figure 32. Sensor Electrode Size

Figure 33. Acrylic Pedestal Part Size

Table 6. BILL OF MATERIALS OF SENSORS SHEET

Designator	Qty.	Description	Part Number	Value	Manufacturer
(1)	1	Top sheet	ANK–0021F1		K&D Co., Ltd.
(2)	1	Acrylic		Clear, t = 2.0 mm	K&D Co., Ltd.
(3)	1	Sensors electrode sheet	ANK–0021S1–3		K&D Co., Ltd.

NOTE: For more information about K&D Co., Ltd., please see the https://www.kandd.co.jp/ website.

NOTE

Refer to the application-note on ON Semiconductor touch sensor page for sensor patterns of the design rule and usage of LSI. And, refer to the user's manual of the application-software for usage of the software and installing the device driver.