LC717A30UJGEVK

LC717A30UJGEVK Electrostatic Capacitive Sensor Evaluation Kit User's Manual

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EVAL BOARD USER'S MANUAL

Contents

Electrostatic capacitive sensor kit (LC717A30UJGEVK) 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

- Evaluation of 8ch Touch Switch
- Evaluation of 2ch Proximity Sensor
- Evaluation of Liquid Level Sensing
- Evaluation of Electrode Sheet of Film Type
- Evaluation of Customer's Sensor Board
- Communication Module between this Kit and PC through USB

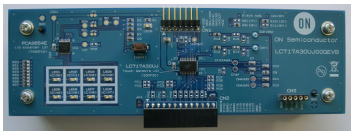
Equipment Used

- Electrostatic Capacitive Sensor Evaluation Kit "LC717A30UJGEVK"
- PC (Installed GUI and USB Power Supply)

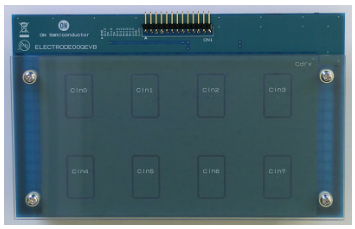
Figure 1. Photo of LC717A30UJGEVK Evaluation Kit

LC717A30UJGEVK Content

1 Main Control Board
“LC717A30UJ00GEVB”

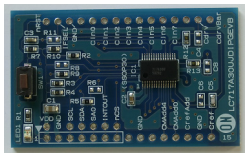


2 Touch Switch Board
“ELECTRODE00GEVB”

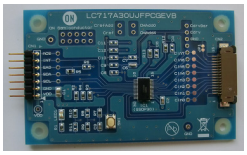


3 Proximity Sensor Board
“ELECTRODE01GEVB”

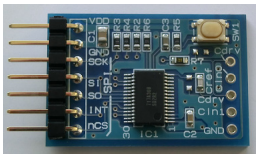
5 DIP Conversion Board
“LC717A30UJDIPGEVB”



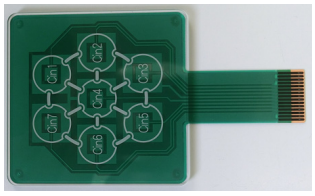
6 FPC Conversion Board
“LC717A30UJFPCGEVB”



7 2ch Sensor Board
“LC717A30UJ2CH00GEVB”



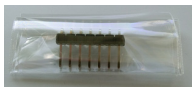
8 Sensor Key Sheet



9 Plastic Bottle

10 Funnel

11 Pin Header (7pin)

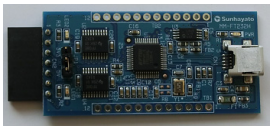


4 Liquid Level Sensing Board
“ELECTRODE02GEVB”

12 Jump Wire
“SPP−150”

13 USB Cable Type mini-B

14 USB Conversion Module
“MM−FT232H”



SET UP

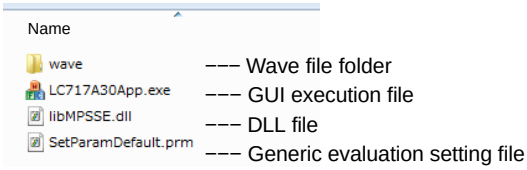
(1) Install the Device Driver for USB Conversion Module (MM−FT232H)

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.

(2) Install the Evaluating Software (GUI)

Unzip GUI software (e.g. LC717A30A_SOFT.ZIP) to an arbitrary folder from website LC717A30UJ product.

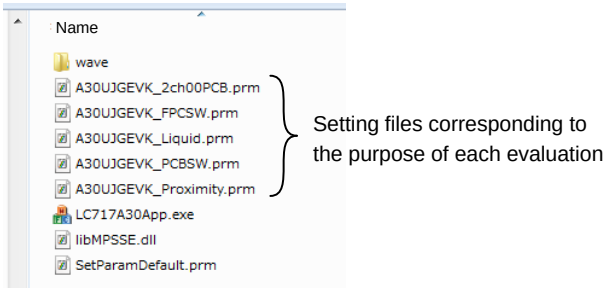
The file contains:



Unzip the setting file (e.g. LC717A30_PARAMETER. ZIP) corresponding to the purpose of each evaluation from website LC717A30UJGEVB.

The setting files need to be stored into the same folder as the GUI software LC717A30App.exe.

The file contains:



- A30UJGEVK_2ch00PCB.prm:
  Setting-file for 2ch sensor board
- A30UJGEVK_FPCSW.prm:
  Setting-file for sensor key sheet
- A30UJGEVK_Liquid.prm:
  Setting-file for liquid level sensing on Cin4
- A30UJGEVK_PCBSW.prm:
  Setting-file for touch switch PCB
- A30UJGEVK_Proximity.prm:
  Setting-file for proximity sensor board

(3) Connect USB Conversion Module to PC (with GUI-installed) by USB Cable

USB conversion module MM−FT232H's LEDPWR lights up green. USB conversion module can select power-supply voltage for I/O 3.3 V or 5.0 V by jumper setup. Refer "USB Conversion Module Operation Guide" in detail. 3.3 V draws less power than 5.0 V.

(4) Connect USB Conversion Module to Touch Switch Board

(5) Execute Evaluation Software LC717A30App.exe

Refer application software user's manual about how to operate.

(6) Load the Proper Setting (File Extension ".prm") for Corresponding to the Target Touch Sensor Board (Evaluation Purpose)

(7) Use "Reset-Button" when the Behavior of Sensor Evaluation Operation Fails

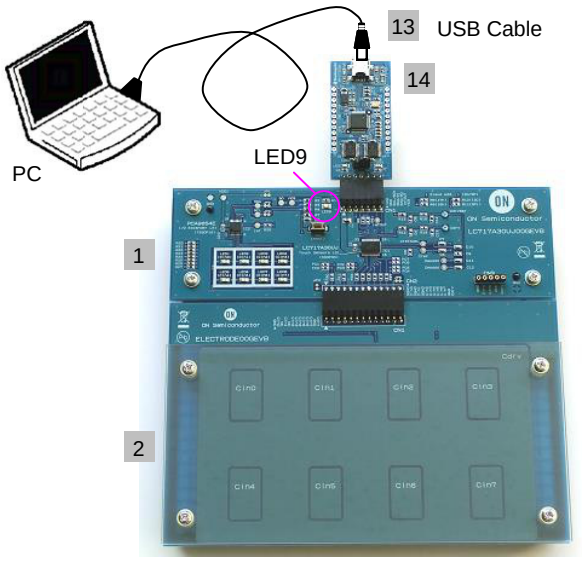
Do not push and hold the "Reset-Button".

SETTING PROCESS CORRESPONDING TO EVALUATION PURPOSE

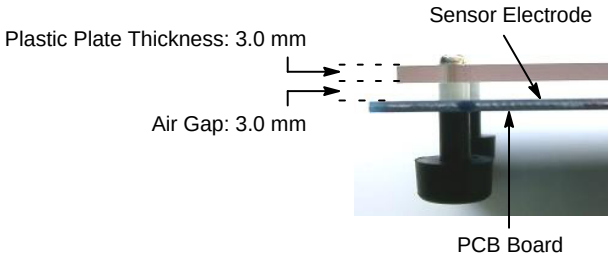
Touch Evaluation

(1) Configuration

Connect the main control board "1 LC717A30UJ00GEVB" to the touch switch board "2 ELECTRODE00GEVB", connect USB conversion module "14 MM−FT232H". LED9 on the main control board will light up red by connecting PC.

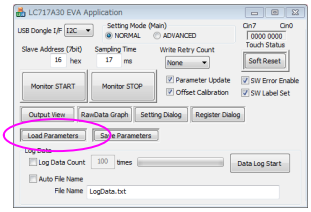


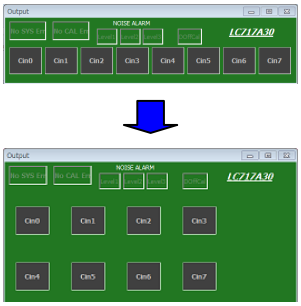
Cross Section:



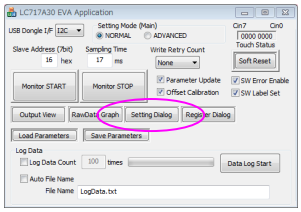
(2) GUI Software Setup

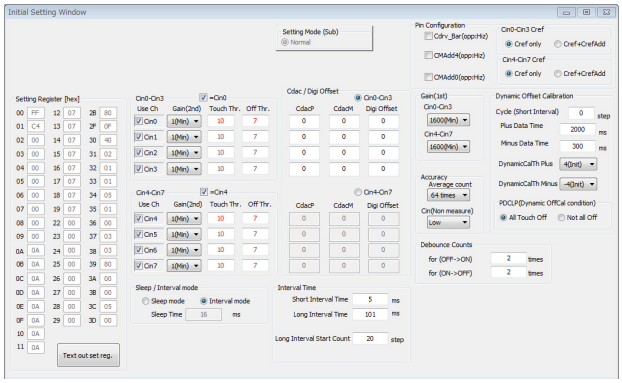
Execute GUI software "LC717A30App.exe". Push button "Load Parameters" and open the setting file of PCB touch evaluation "A30UJGEVK_PCBSW.prm". Output window pattern will match the pattern on the touch switch electrode board and the register values will be loaded.





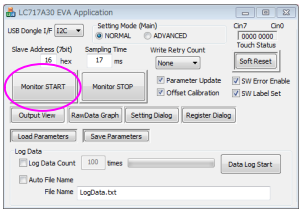
Register settings can be reviewed by pushing "Setting Dialog" to display Initial Setting Window.



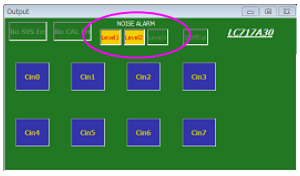


(3) Start Operation

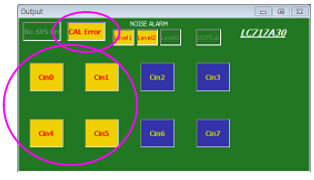
Push "Monitor Start" on Main Window. Static offset calibration will be performed.



Correct operation;
Cin0 to Cin7 become blue button.
Noise alarm display might be yellow by around noise.

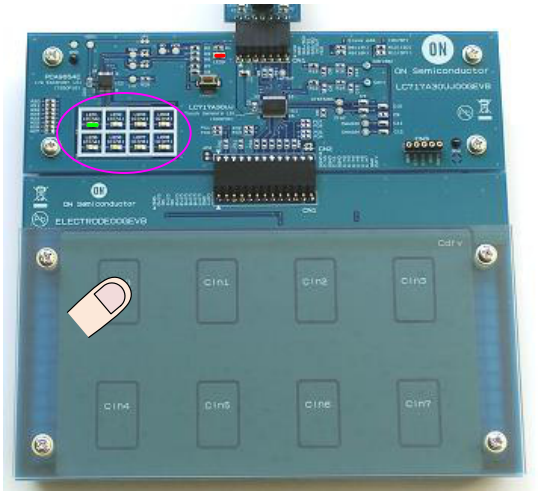


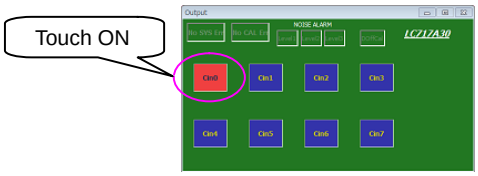
Incorrect operation;
CAL Error displays yellow,
Error channels become yellow.



(4) Touch Switch Operation Check

The target channel on “Output Window” becomes red when a finger touches above Cin0 to Cin7 on the top of Touch Switch Board. LED1 (Cin0) to LED8 (Cin7) on the main control board will light up green.

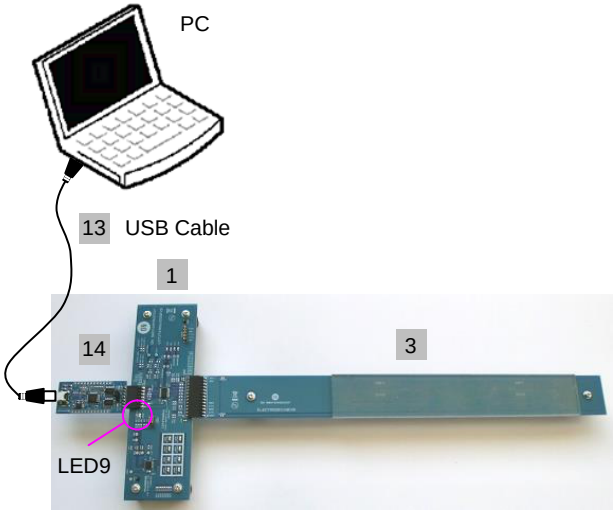




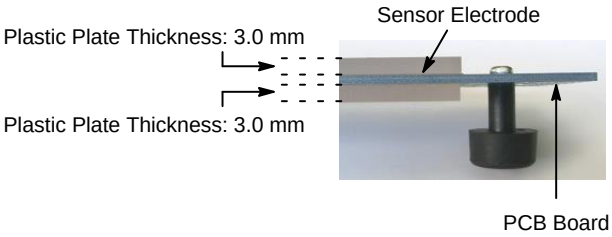
Proximity Sensor Evaluation

(1) Configuration

Connect the main control board “ 1 LC717A30UJ00GEVB” to the proximity sensor board “ 3 ELECTRODE01GEVB”, connect USB conversion module “ 14 MM−FT232H”. LED9 on the main control board will light up red by connecting PC.

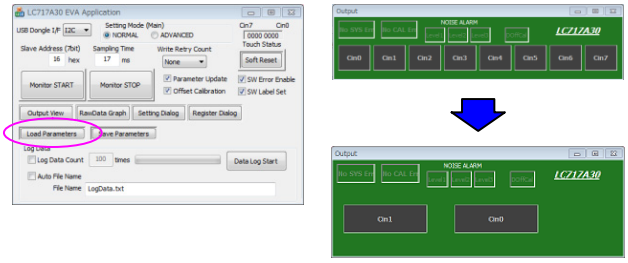


Cross Section:

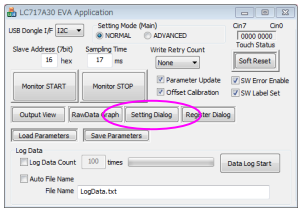


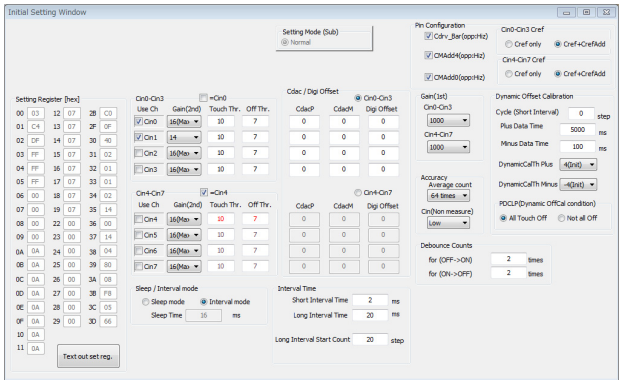
(2) GUI Software Setup

Execute GUI software “LC717A30App.exe”. Push button “Load Parameters” and open the setting file of proximity sensor evaluation “A30UJGEVK_ Proximity.prm” Output window pattern will match the pattern on the proximity sensor board and the register values will be loaded.



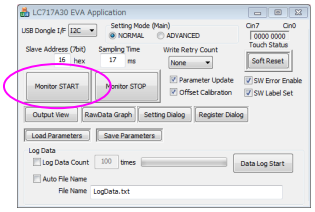
Register settings can be reviewed by pushing “Setting Dialog” to display Initial Setting Window.



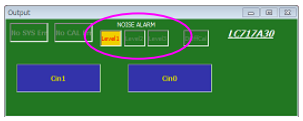


(3) Start Operation

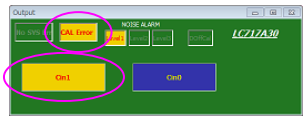
Push “Monitor Start” on Main Window. Static offset calibration will be performed.



Correct operation;
Cin0 or Cin1 become blue button.
Noise alarm display might be yellow by around noise.

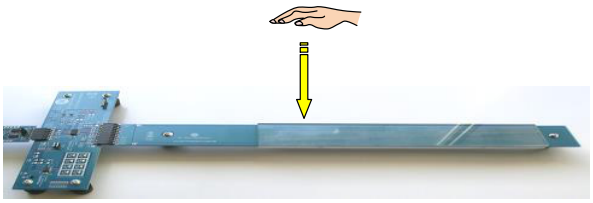


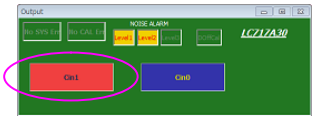
Incorrect operation;
CAL Error displays yellow,
Error channel becomes yellow.



(4) Proximity Sensor Operation Check

The target channel on “Output Window” becomes red when a hand approaches within 10 cm above the proximity sensor electrode Cin0 or Cin1. LED1 (Cin0) or LED2 (Cin1) on the main control board will light up green.

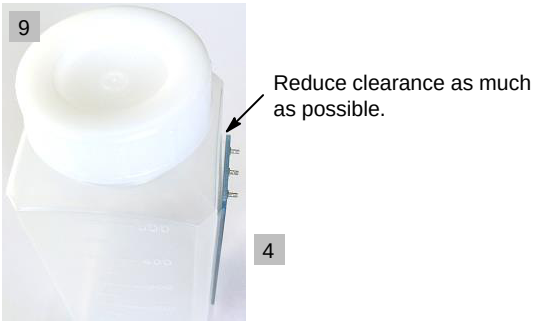




Liquid Level Sensing Evaluation

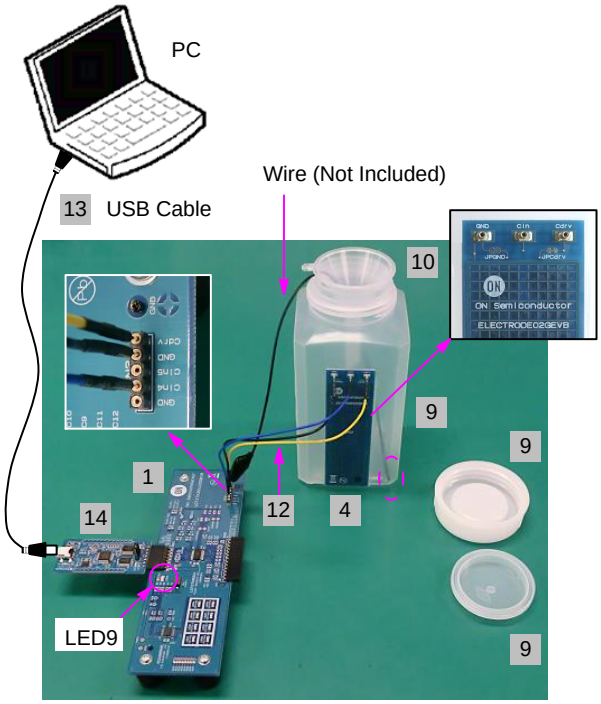
(1) Configuration

Confirm whether the liquid level sensing board “ 4 ELECTRODE02GEVB” was pasted to 9 the plastic bottle firmly. Make sure to stick both the plastic bottle and the electrode board by pushing when adhesion clearance is not small.



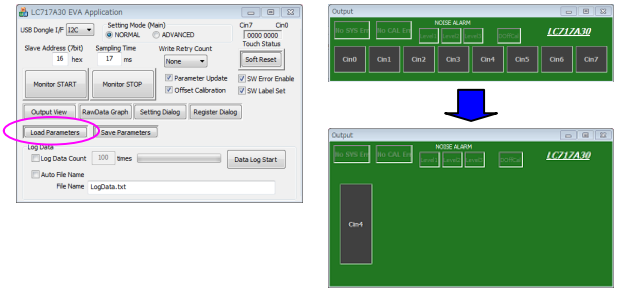
Connect the main control board “ 1 LC717A30UJ00GEVB” to each terminal on the liquid level sensing board “ 4 ELECTRODE02GEVB” by 12 Jump wires; GND−GND, Cin4−Cin, Cdrv−Cdrv.

Open the cap, lead a wire (not included in this kit) from GND pin on the main control board into the tank bottom and settle 10 the funnel. Connect USB conversion module “ 14 MM−FT232H”. LED9 on the main control board will light up red by connecting PC.

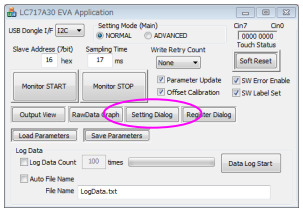


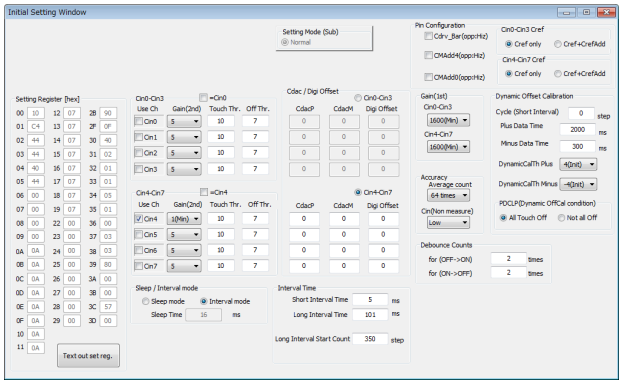
(2) GUI Software Setup

Execute GUI software “LC717A30App.exe”. Push button “Load Parameters” and open the setting file of liquid level sensing evaluation “A30UJGEVK_Liquid.prm”. Output window pattern will match the pattern on the liquid level sensing board and the register values will be loaded.



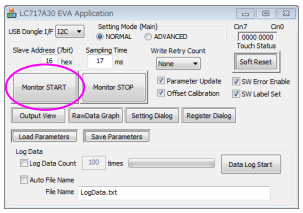
Register settings can be reviewed by pushing “Setting Dialog” to display Initial Setting Window.



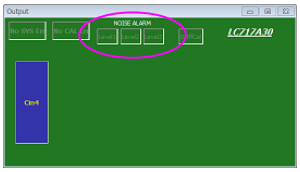


(3) Start Operation

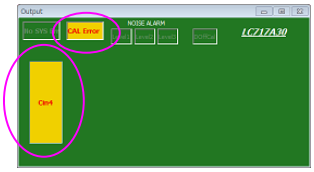
Push “Monitor Start” on Main Window. Static offset calibration will be performed.



Correct operation;
Cin4 becomes blue button.
Noise alarm display might be yellow by around noise.

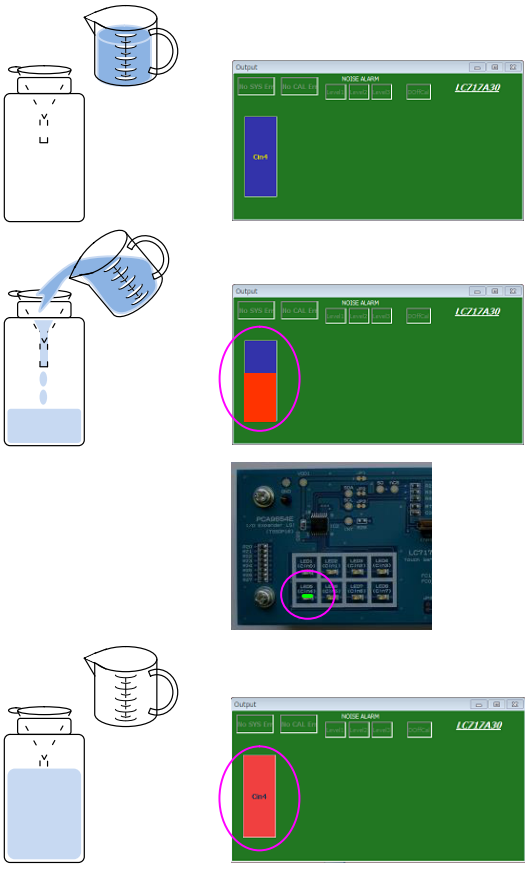


Incorrect operation;
CAL Error displays yellow,
Error channel becomes yellow.



(4) Liquid Level Sensing Operation Check

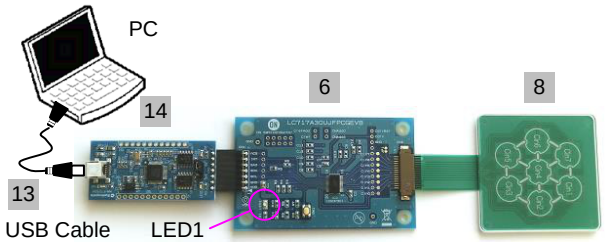
Pour water from the funnel. The level display of Cin4 on “Output Window” becomes red corresponding to the amount of poured water. LED5 (Cin4) on the main control board will light up green by exceeding the threshold.



Sensor Key Sheet Evaluation

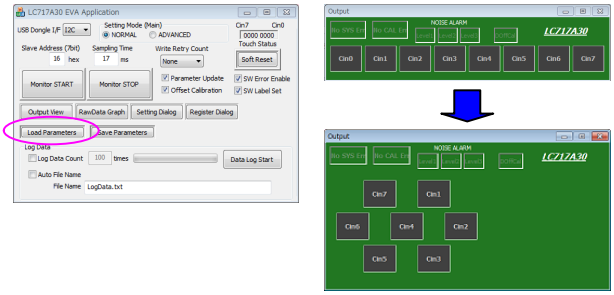
(1) Configuration

Connect the FPC conversion board “ 6 LC717A30UJFPCGEVB” to 8 the sensor key sheet, connect USB conversion module “ 14 MM−FT232H”. LED1 on the FPC conversion board will light up red by connecting PC.

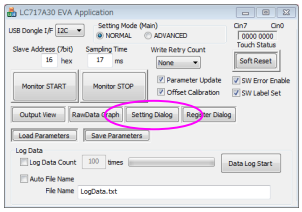


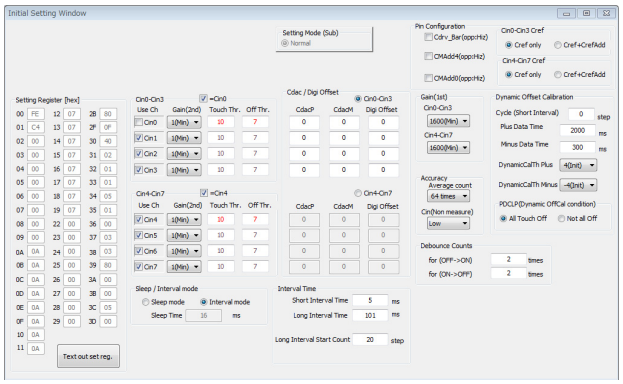
(2) GUI Software Setup

Execute GUI software “LC717A30App.exe”. Push button “Load Parameters” and open the setting file of sensor key sheet evaluation “A30UJGEVK_FPCSW.prm”. Output window pattern will match the pattern on the sensor key sheet and the register values will be loaded.



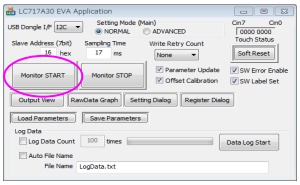
Register settings can be reviewed by pushing “Setting Dialog” to display Initial Setting Window.



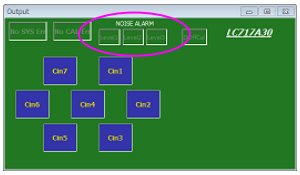


(3) Start Operation

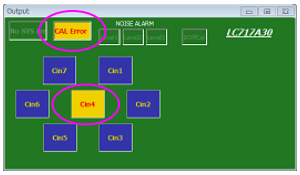
Push “Monitor Start” on Main Window. Static offset calibration will be performed.



Correct operation;
Cin1 to Cin7 become blue button.
Noise alarm display might be yellow by around noise.

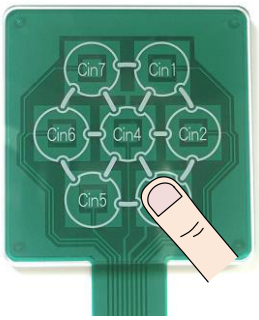


Incorrect operation;
CAL Error displays yellow,
Error channel becomes yellow.



(4) Sensor Key Operation Check

The target channel on “Output Window” becomes red when a finger touches above Cin1 to Cin7 on the top of the sensor key sheet.

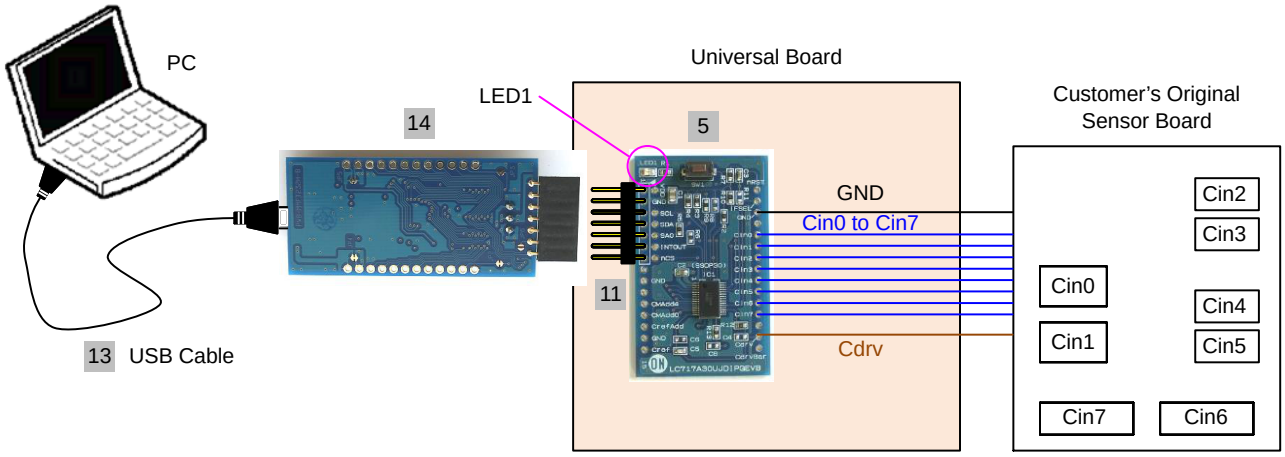


Evaluation of Using DIP Conversion Board

(1) Configuration

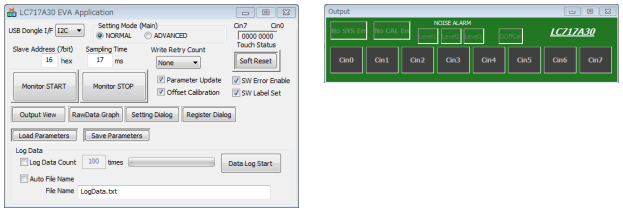
DIP Conversion Board " 5 LC717A30UJDIPGEVB" is an evaluation board for customer to confirm whether its original sensor board works correctly. Make sure to complete the evaluation preparation by soldering 11 the 7 pin header (included) or generic pin header/connecter. Connect USB conversion module " 14 MM−FT232H". LED1 on the DIP conversion board will light up red by connecting PC.

Take care of the direction of connector between USB conversion module and this evaluation board because of opposite direction of other boards.

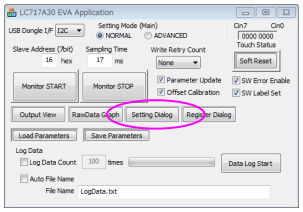


(2) GUI Software Setup

Execute GUI software "LC717A30App.exe". When GUI starts, "SetParamDefault.prm" is loaded as configuration file.

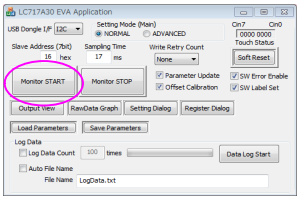


Register settings can be reviewed by pushing "Setting Dialog" to display Initial Setting Window.

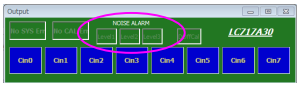


(3) Start Operation

Push "Monitor Start" on Main Window. Static offset calibration will be performed.



Correct operation;
Cin0 to Cin7 become blue button.
Noise alarm display might be yellow by around noise.



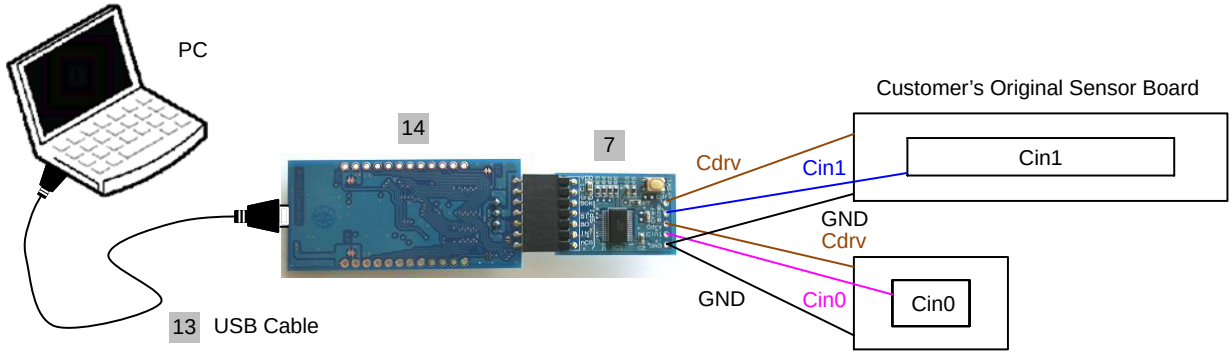
Incorrect operation;
CAL Error displays yellow,
Error channel becomes yellow.

2ch Sensor Board Evaluation

(1) Configuration

2ch sensor board “ 7 LC717A30UJ2CH00GEVB” is an evaluation board for customer to confirm whether its original sensor board works correctly in small space. Connect USB conversion module “ 14 MM−FT232H”.

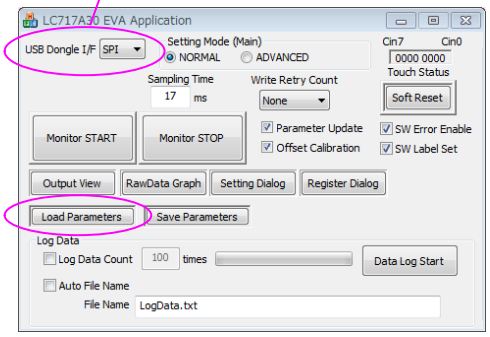
Take care of the direction of connector between USB conversion module and this 2ch evaluation board because of opposite direction of other boards.

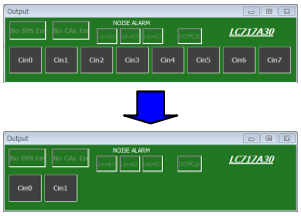


(2) GUI Software Setup

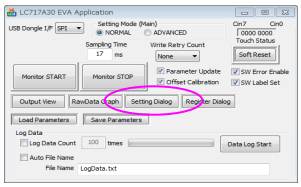
Execute GUI software “LC717A30App.exe”. Push button “Load Parameters” and open the setting file of the 2ch00PCB board “A30UJGEVK_2ch00PCB.prm”. Output window pattern will match the pattern on the 2ch sensor board and the register values will be loaded.

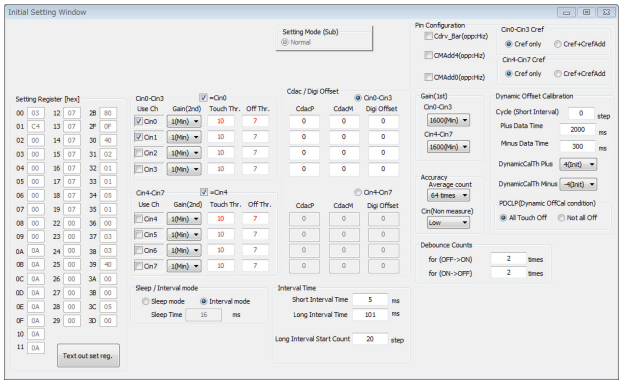
NOTE: Make sure to select SPI but I^2C on “USB Dongle I/F”.





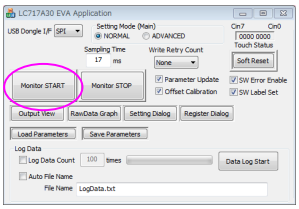
Register settings can be reviewed by pushing “Setting Dialog” to display Initial Setting Window.



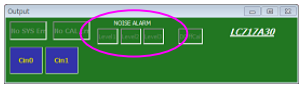


(3) Start Operation

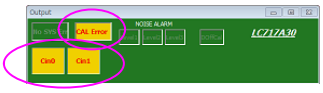
Push “Monitor Start” on Main Window. Static offset calibration will be performed.



Correct operation;
Cin0 or Cin1 become blue button.
Noise alarm display might be yellow by around noise.



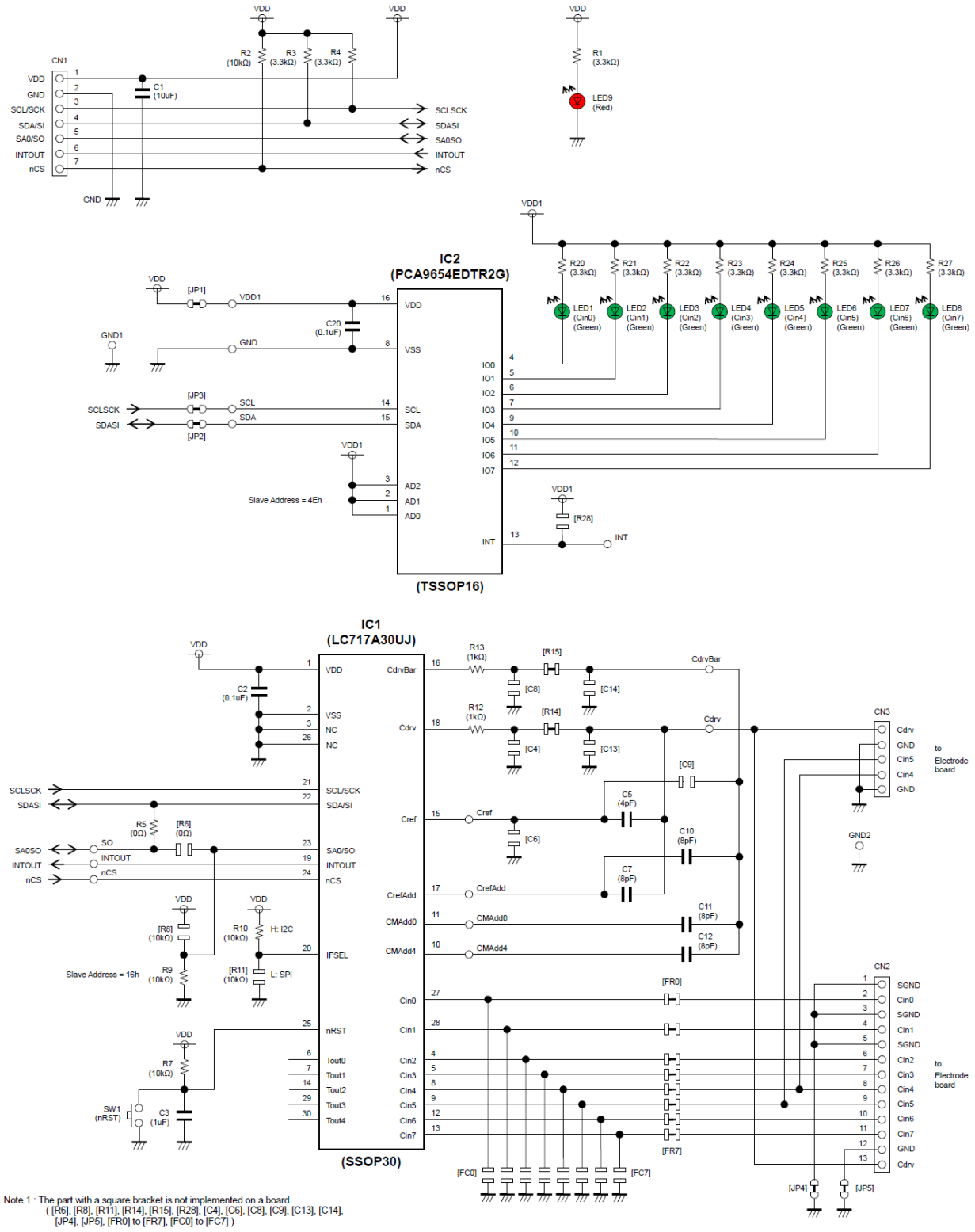
Incorrect operation;
CAL Error displays yellow,
Error channels become yellow.



FUNCTION EXPLANATION

Main Control Board (LC717A30UJ00GEVB)

(1) Schematic



Note.1 : The part with a square bracket is not implemented on a board.
([R6], [R8], [R11], [R14], [R15], [R28], [C4], [C6], [C8], [C9], [C13], [C14], [JP4], [JP5], [FR0] to [FR7], [FC0] to [FC7])

Figure 2. Main Control Board − Schematic

(2) BOM

Table 1. BILL OF MATERIALS OF LC717A30UJ00GEVB EVALUATION BOARD

Designator	Qty.	Description	Part Number	Value	Manufacturer
IC1	1	Capacitive Touch Sensors LSI	LC717A30UJ	8ch, SSOP30	ON Semiconductor
IC2	1	I/O Expander LSI	PCA9654EDTR2G	8ch, TSSOP16	ON Semiconductor
LED1−LED8	8	LED	KP−2012ZGC	Green LED	Kingbright
LED9	1	LED	KP−2012SURCK	Red LED	Kingbright
R5	1	Resistor	MCR03EZPJ000	0 Ω	ROHM
R12, R13	2	Resistor	MCR03EZPJ102	1.0 kΩ ±5%, 0.1 W	ROHM
R1, R3, R4, R20−R27	11	Resistor	MCR03EZPJ332	3.3 kΩ ±5%, 0.1 W	ROHM
R2, R7, R9, R10	4	Resistor	RK73B1JTTD103J	10.0 kΩ ±5%, 0.1 W	KOA
C5	1	Multilayer Ceramic Capacitor	GRM1885C1H4R0CA01D	4 pF ±0.25 pF, 50 V	Murata
C7, C10−C12	4	Multilayer Ceramic Capacitor	GRM1885C1H8R0DA01D	8 pF ±0.5 pF, 50 V	Murata
C2, C20	2	Multilayer Ceramic Capacitor	GRM188B11E104KA01D	0.1 μF ±10%, 25 V	Murata
C3	1	Multilayer Ceramic Capacitor	GRM188B31E105KA75D	1.0 μF ±10%, 25 V	Murata
C1	1	Multilayer Ceramic Capacitor	GRM21BB31C106KE15L	10.0 μF ±10%, 16 V	Murata
SW1	1	Push Button Switch	DTSM−31N−V−T/R		Diptronics Manufacturing
CN1	1	Connector	2545B−1x7G	7 pin, Right Angle	HO CHIEN
CN2	1	Connector	FSR−41085−13	13 pin, Right Angle	Hirosugi−Keiki
CN3	1	Socket Pin	PM−1−5P	5 pin-cut, Gold-Su	MAC8
Cdrv, CdrvBar	2	Check Terminal	LC−3−G−Skyblue	1 pin, Skyblue	MAC8
GND1, GND2	2	Check Terminal	LC−3−G−Black	1 pin, Black	MAC8
	1	Printed Circuit Board	LC717A30UJ00GEVB	160.0 mm x 50.0 mm, 2-levels, t = 1.6 mm	ON Semiconductor
	4	Screw		M3 x 18.0 mm	
	4	Nut		M3	
	4	Washer		M3, 6.0 mm, in Rubber Foot	
	4	Washer		M3, 7.0 mm, Top Side	
	4	Plastic Spacer	EB−10	Black, M3 x 10.0 mm	MAC8
	4	Natural Rubber Foot	BU−692−A	Black, M15 x 7.5 mm	SATO PARTS

(3) Printed Circuit Board Layout

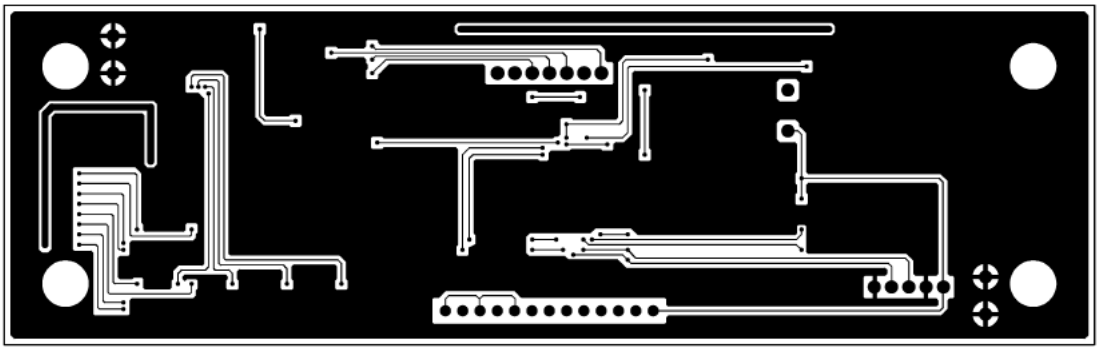


Figure 3. Pattern 1 Layer (Solder Side)

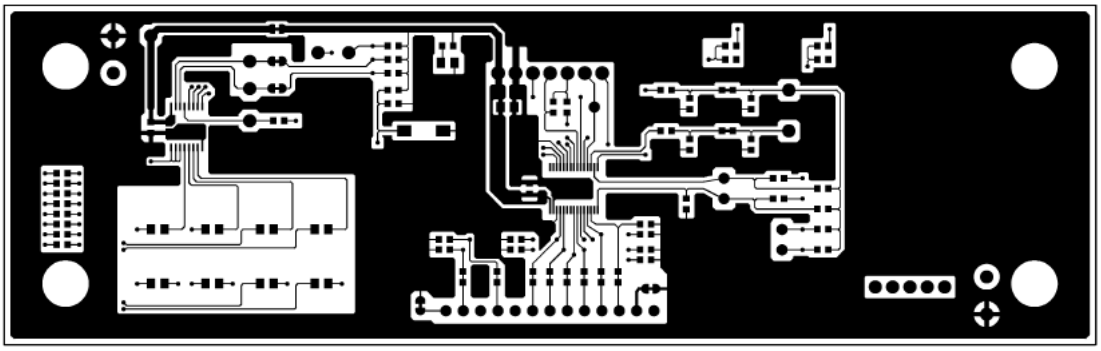


Figure 4. Pattern 2 Layer (Parts Side)

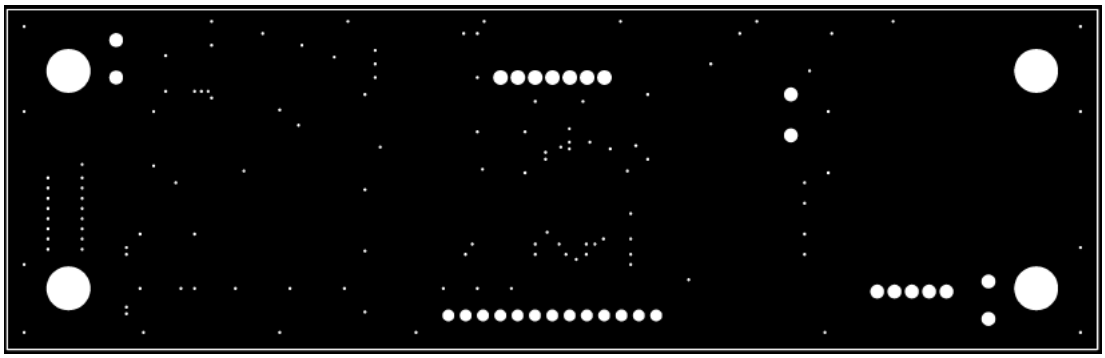


Figure 5. Resist 1 Layer (Solder Side)

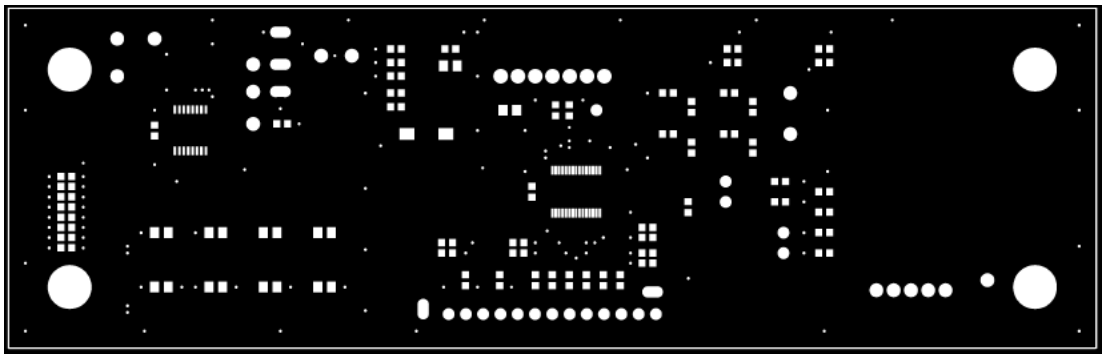


Figure 6. Resist 2 Layer (Parts Side)

Nothing

Figure 7. Silk 1 Layer (Solder Side)

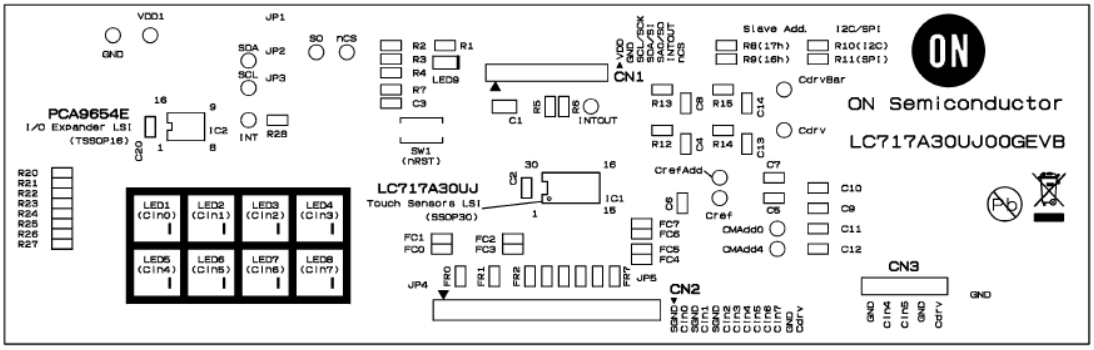


Figure 8. Silk 2 Layer (Parts Side)

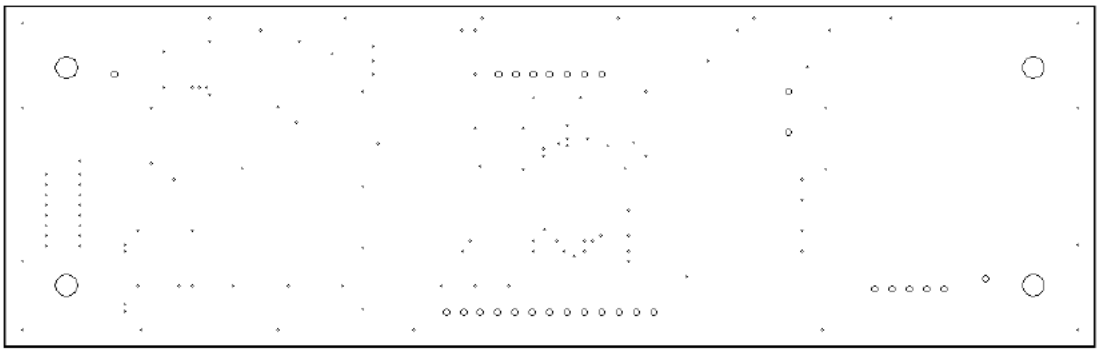


Figure 9. Hole

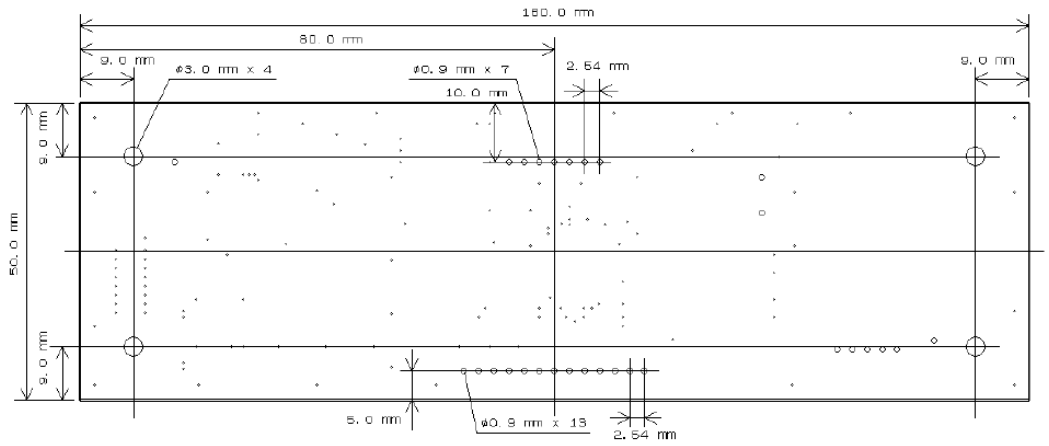


Figure 10. Outline

DIP Conversion Board (LC717A30UJDIPGEVB)

(1) Schematic

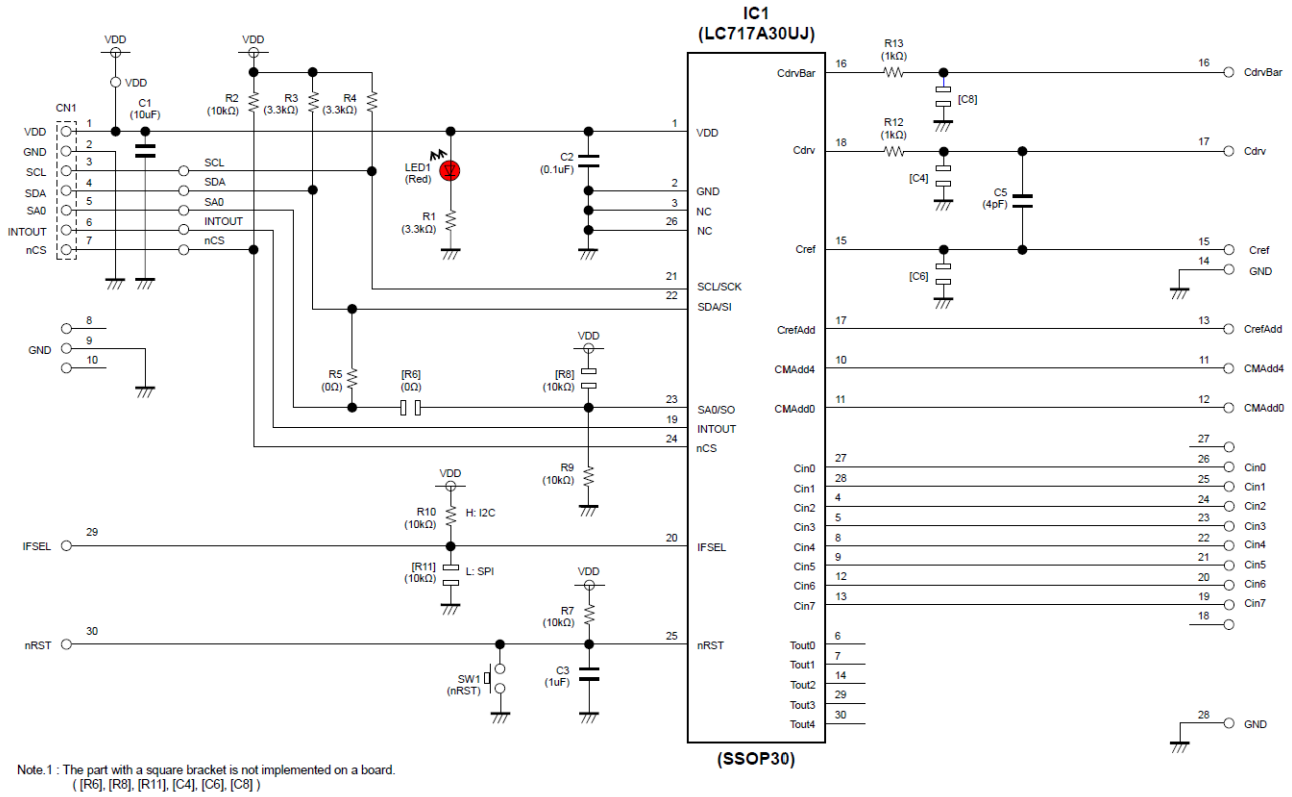


Figure 11. DIP Conversion Board − Schematic

(2) BOM

Table 2. BILL OF MATERIALS OF LC717A30UJDIPGEVB EVALUATION BOARD

Designator	Qty.	Description	Part Number	Value	Manufacturer
IC1	1	Capacitive Touch Sensors LSI	LC717A30UJ	8 ch, SSOP30	ON Semiconductor
LED1	1	LED	KP−2012SURCK	Red LED	Kingbright
R5	1	Resistor	MCR03EZPJ000	0 Ω	ROHM
R12, R13	2	Resistor	MCR03EZPJ102	1.0 kΩ ±5%, 0.1 W	ROHM
R1, R3, R4	3	Resistor	MCR03EZPJ332	3.3 kΩ ±5%, 0.1 W	ROHM
R2, R7, R9, R10	4	Resistor	RK73B1JTTD103J	10.0 kΩ ±5%, 0.1 W	KOA
C5	1	Multilayer Ceramic Capacitor	GRM1885C1H4R0CA01D	4 pF ±0.25 pF, 50 V	Murata
C2	1	Multilayer Ceramic Capacitor	GRM188B11E104KA03D	0.1 μF ±10%, 25 V	Murata
C3	1	Multilayer Ceramic capacitor	GRM188B31E105KA75D	1.0 μF ±10%, 25 V	Murata
C1	1	Multilayer Ceramic Capacitor	GRM21BB31C106KE15L	10.0 μF ±10%, 16 V	Murata
SW1	1	Push Button Switch	DTSM−31N−V−T/R		Diptronics Manufacturing
	1	Printed Circuit Board	LC717A30UJDIPGEVB	50.0 mm x 30.0 mm, 2-levels, t = 1.6 mm	ON Semiconductor

(3) Printed Circuit Board Layout

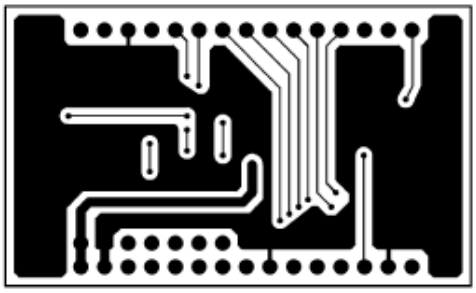


Figure 12. Pattern 1 Layer (Solder Side)

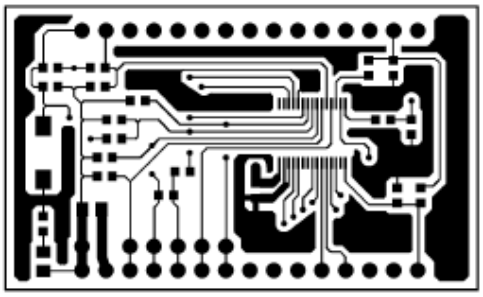


Figure 13. Pattern 2 Layer (Parts Side)

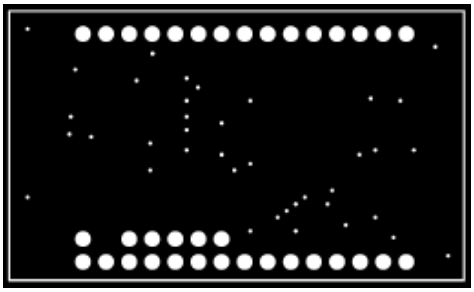


Figure 14. Resist 1 Layer (Solder Side)

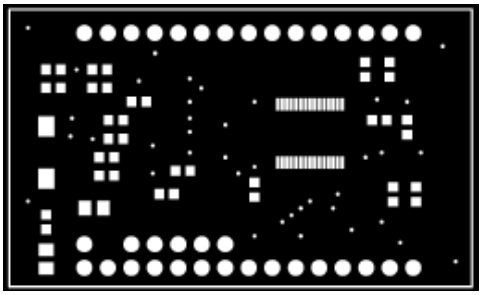


Figure 15. Resist 2 Layer (Parts Side)

Figure 16. Silk 1 Layer (Solder Side)

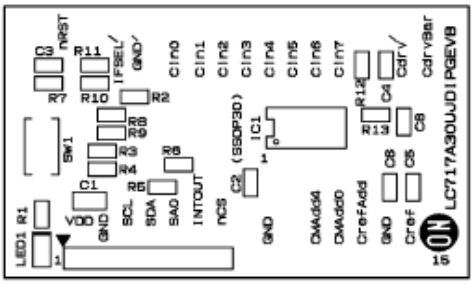


Figure 17. Silk 2 Layer (Parts Side)

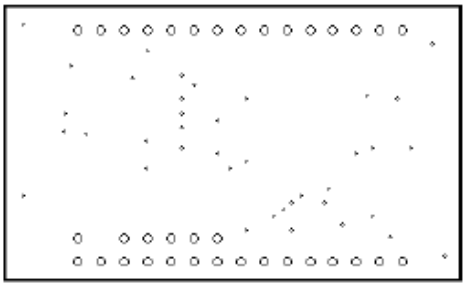


Figure 18. Hole

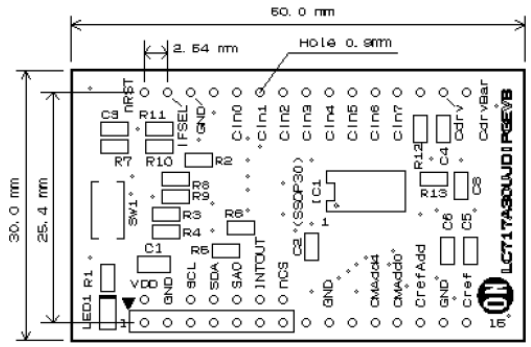


Figure 19. Outline

FPC Conversion Board (LC717A30UJFPCGEVB)

(1) Schematic

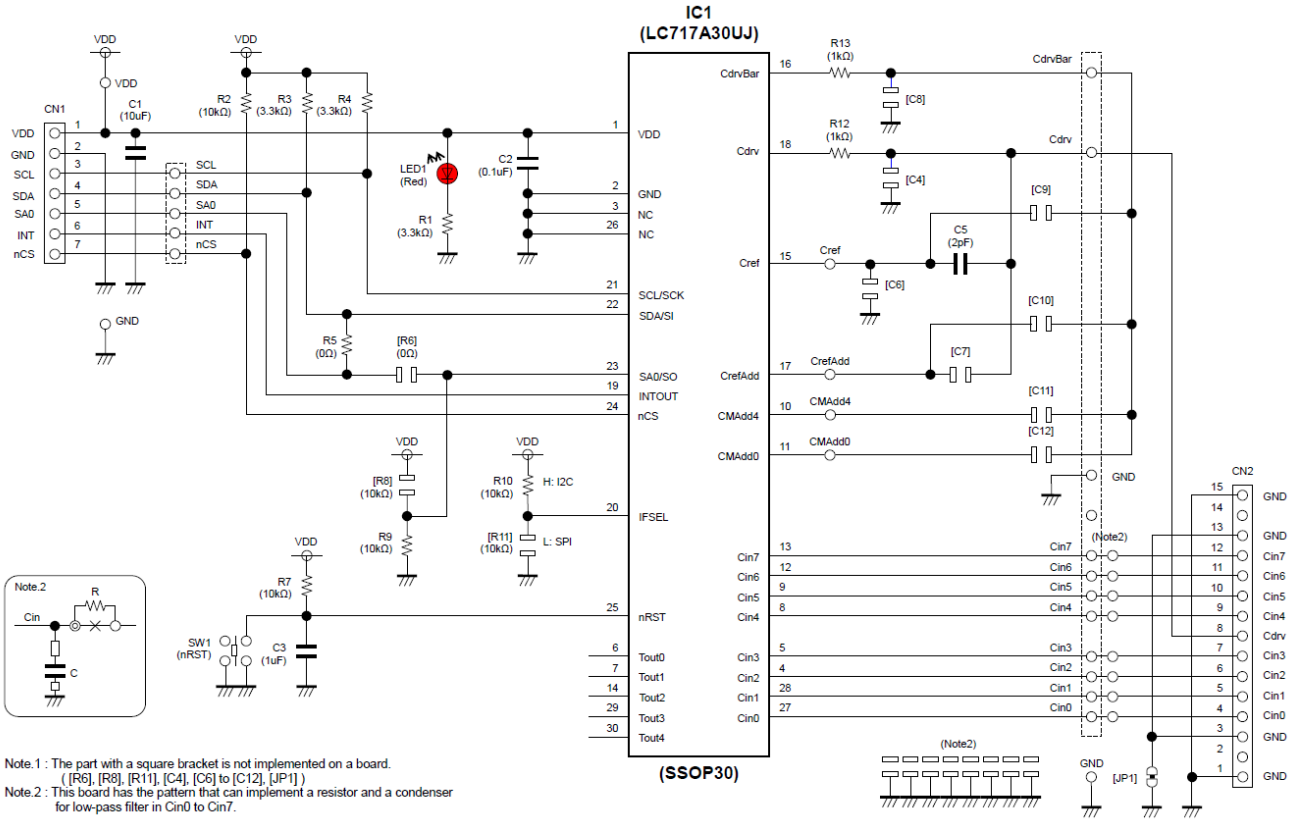


Figure 20. FPC Conversion Board − Schematic

(2) BOM

Table 3. BILL OF MATERIALS OF LC717A30UJFPCGEVB EVALUATION BOARD

Designator	Qty.	Description	Part Number	Value	Manufacturer
IC1	1	Capacitive Touch Sensors LSI	LC717A30UJ	8 ch, SSOP30	ON Semiconductor
LED1	1	LED	KP−2012SURCK	Red LED	Kingbright
R5	1	Resistor	MCR03EZPJ000	0 Ω	ROHM
R12, R13	2	Resistor	MCR03EZPJ102	1.0 kΩ ±5%, 0.1 W	ROHM
R1, R3, R4	3	Resistor	MCR03EZPJ332	3.3 kΩ ±5%, 0.1 W	ROHM
R2, R7, R9, R10	4	Resistor	RK73B1JTTD103J	10.0 kΩ ±5%, 0.1 W	KOA
C5	1	Multilayer Ceramic Capacitor	GRM1885C1H2R0CA01D	2 pF ±0.25 pF, 50 V	Murata
C2	1	Multilayer Ceramic Capacitor	GRM188B11E104KA01D	0.1 μF ±10%, 25 V	Murata
C3	1	Multilayer Ceramic Capacitor	GRM188B31E105KA75D	1.0 μF ±10%, 25 V	Murata
C1	1	Multilayer Ceramic Capacitor	GRM21BB31C106KE15L	10.0 μF ±10%, 16 V	Murata
SW1	1	Push Button Switch	SKRPACE010		ALPUS
CN1	1	Connector	2545B−1x7G	7 pin, Right Angle	HO CHIEN
CN2	1	FFC/FPC Connector	00 6224 015 001 800+	15 pin, Right Angle	Kyocera Connector Products
	1	Printed Circuit Board	LC717A30UJFPCGEVB	80.0 mm x 50.0 mm, 2-levels, t = 1.6 mm	ON Semiconductor

(3) Printed Circuit Board Layout

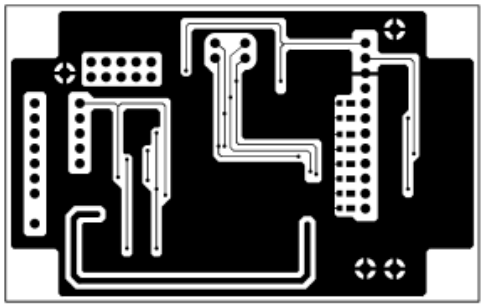


Figure 21. Pattern 1 Layer (Solder Side)

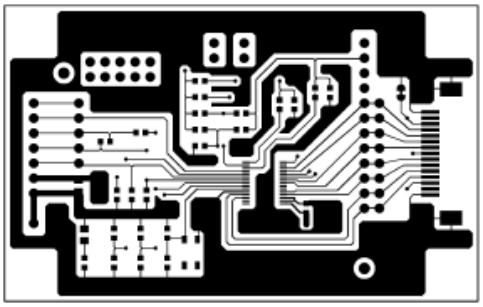


Figure 22. Pattern 2 Layer (Parts Side)

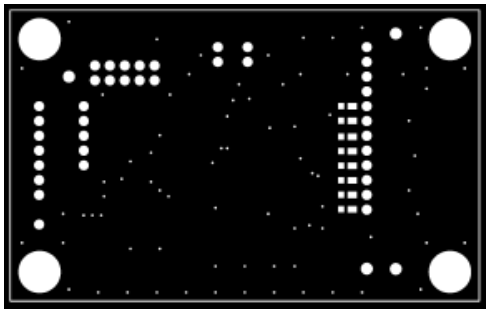


Figure 23. Resist 1 Layer (Solder Side)

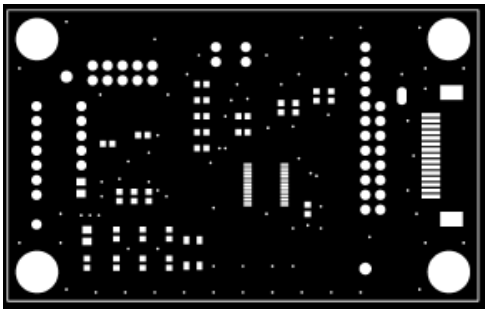


Figure 24. Resist 2 Layer (Parts Side)

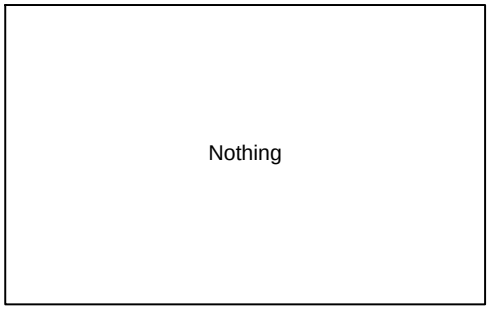


Figure 25. Silk 1 Layer (Solder Side)

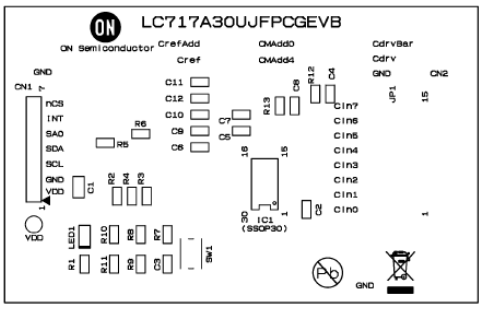


Figure 26. Silk 2 Layer (Parts Side)

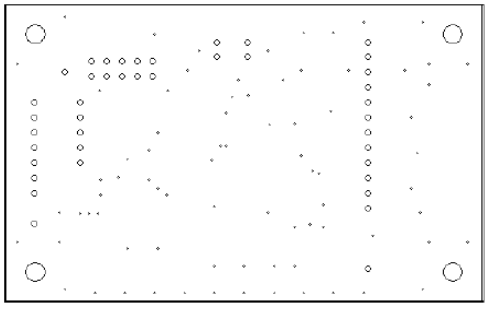


Figure 27. Hole

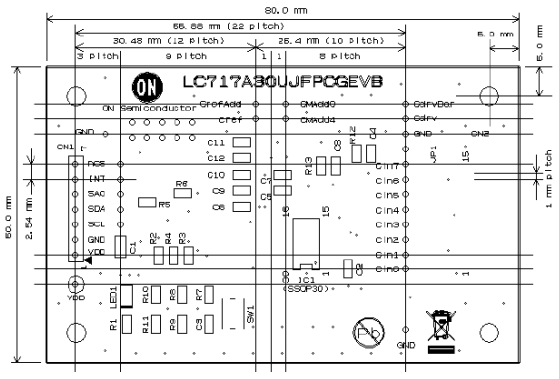


Figure 28. Outline

2ch Sensor Board (LC717A30UJ2CH00GEVB)

(1) Schematic

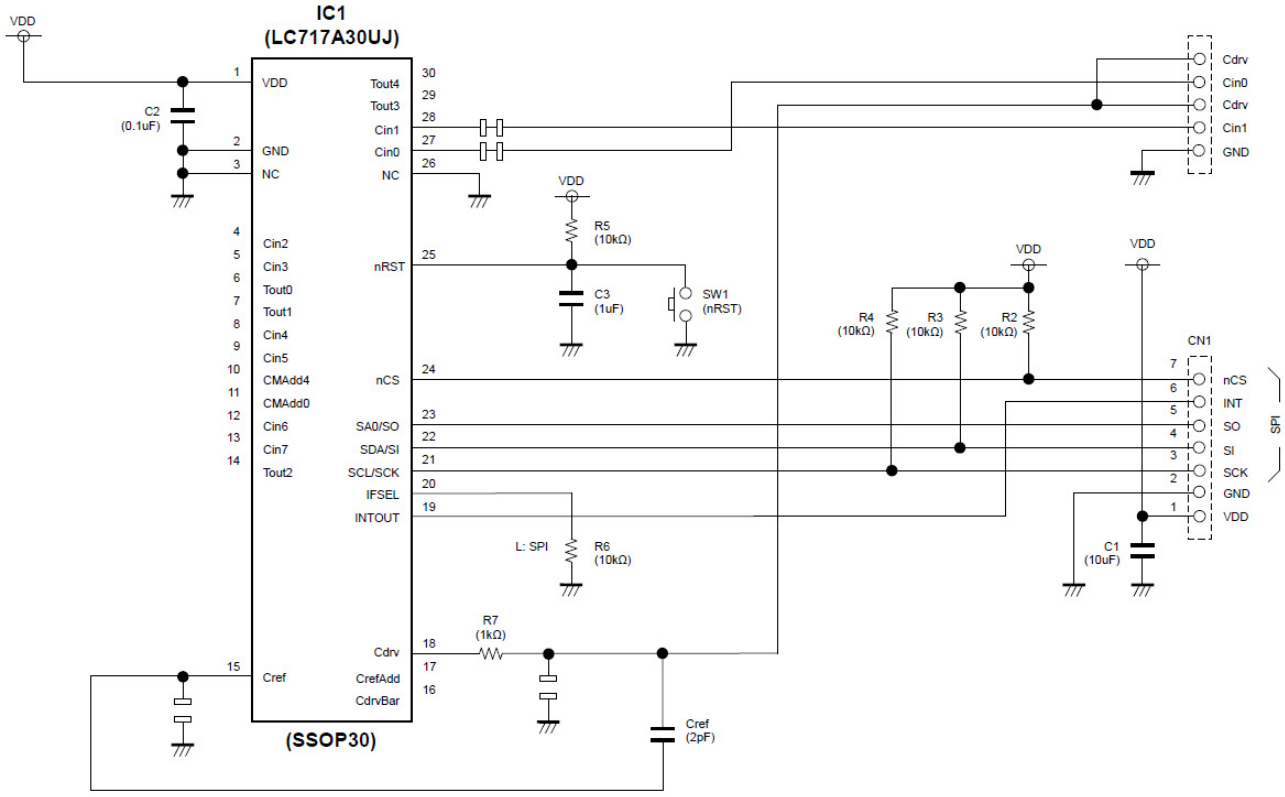


Figure 29. 2ch Sensor Board − Schematic

(2) BOM

Table 4. BILL OF MATERIALS OF LC717A30UJ2CH00GEVB EVALUATION BOARD

Designator	Qty.	Description	Part Number	Value	Manufacturer
IC1	1	Capacitive Touch Sensors LSI	LC717A30UJ	8 ch, SSOP30	ON Semiconductor
R7	1	Resistor	MCR03EZPJ102	1.0 kΩ ±5%, 0.1 W	ROHM
R2−R6	5	Resistor	RK73B1JTTD103J	10.0 kΩ ±5%, 0.1 W	KOA
Cref	1	Multilayer Ceramic Capacitor	GRM1885C1H2R0CA01D	2 pF ±0.25 pF, 50 V	Murata
C2	1	Multilayer Ceramic Capacitor	GRM188B11E104KA01D	0.1 μF ±10%, 25 V	Murata
C3	1	Multilayer Ceramic Capacitor	GRM188B31E105KA75D	1.0 μF ±10%, 25 V	Murata
C1	1	Multilayer Ceramic Capacitor	GRM21BB31C106KE15L	10.0 μF ±10%, 16 V	Murata
SW1	1	Push Button Switch	SKRPACE010		ALPUS
CN1	1	Connector	2545B−1x7G	7 pin, Right Angle	HO CHIEN
	1	Printed Circuit Board	LC717A30UJ2CH00GEVB	30.0 mm x 20.0 mm, 2-levels, t = 1.6 mm	ON Semiconductor

(3) Printed Circuit Board Layout

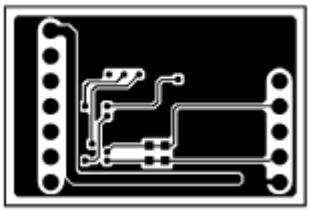


Figure 30. Pattern 1 Layer (Solder Side)

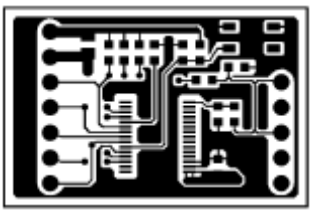


Figure 31. Pattern 2 Layer (Parts Side)

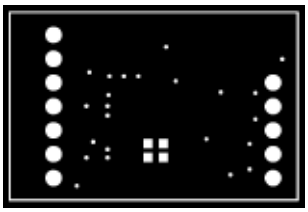


Figure 32. Resist 1 Layer (Solder Side)

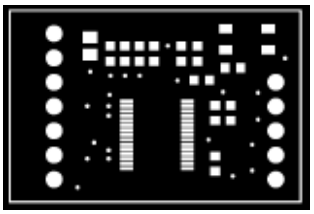


Figure 33. Resist 2 Layer (Parts Side)

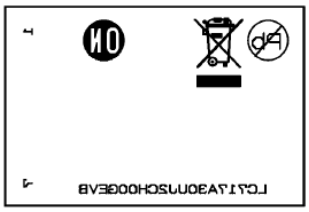


Figure 34. Silk 1 Layer (Solder Side)

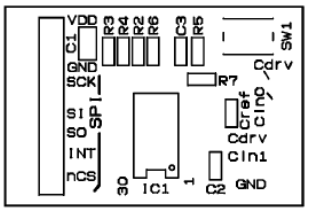


Figure 35. Silk 2 Layer (Parts Side)

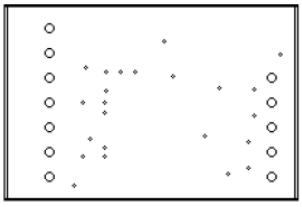


Figure 36. Hole

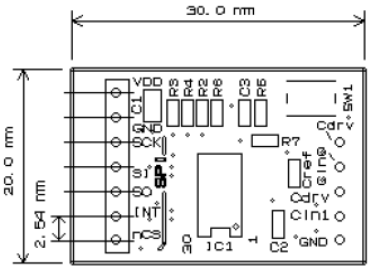


Figure 37. Outline

Touch Switch Board (ELECTRODE00GEVB)

(1) Schematic

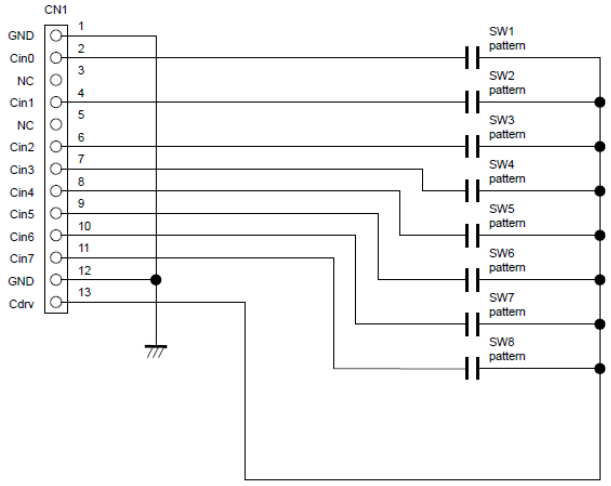


Figure 38. Touch Switch Board − Schematic

(2) BOM

Table 5. BILL OF MATERIALS OF ELECTRODE00GEVB EVALUATION BOARD

Designator	Qty.	Description	Part Number	Value	Manufacturer
CN1	1	Connector	2545B−1x13G	13 pin, Right Angle	HO CHIEN
	1	Printed Circuit Board	ELECTRODE00GEVB	160.0 mm x 100.0 mm, 2-levels, t = 1.6 mm	ON Semiconductor
	1	Plastic Prate		160.0 mm x 80.0 mm, t = 3.0 mm	
	4	Screw		M3 x 25.0 mm	
	4	Nut		M3	
	4	Washer		M3, 6.0 mm, in Rubber Foot	
	4	Washer		M3, 7.0 mm, Top Side	
	4	Plastic Spacer	EB−10	Black, M3 x 10.0 mm	MAC8
	4	Plastic Spacer	EP−3	White, M3 x 3.0 mm	MAC8
	4	Natural Rubber Foot	BU−692−A	Black, M15 x 7.5 mm	SATO PARTS

(3) Printed Circuit Board Layout

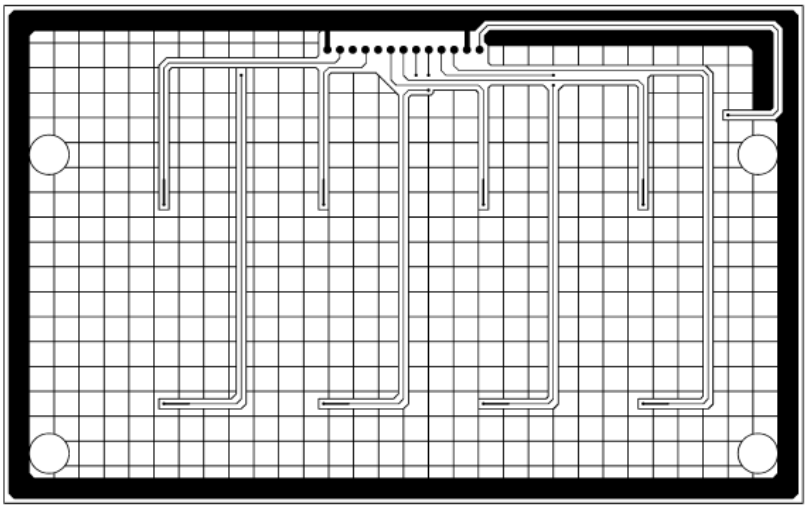


Figure 39. Pattern 1 Layer (Solder Side)

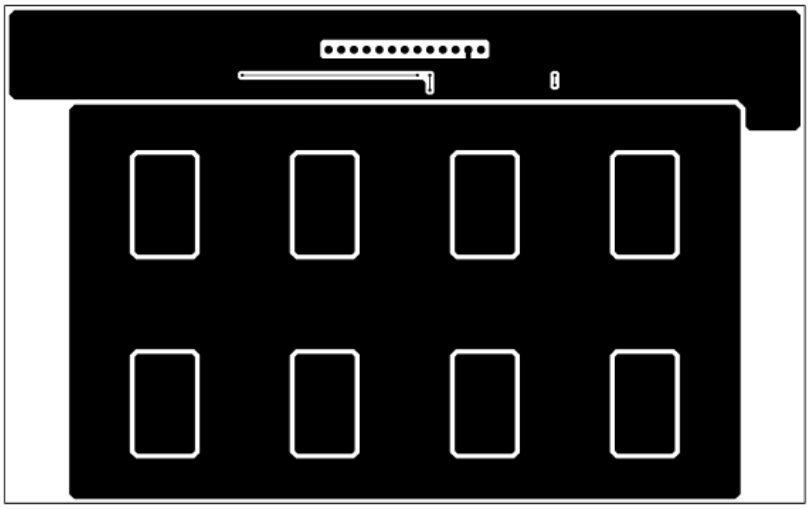


Figure 40. Pattern 2 Layer (Parts Side)

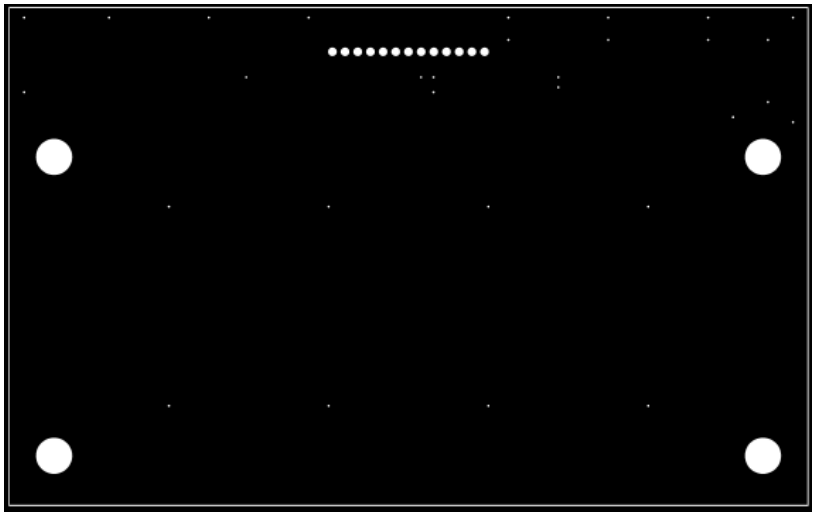


Figure 41. Resist 1 Layer (Solder Side)

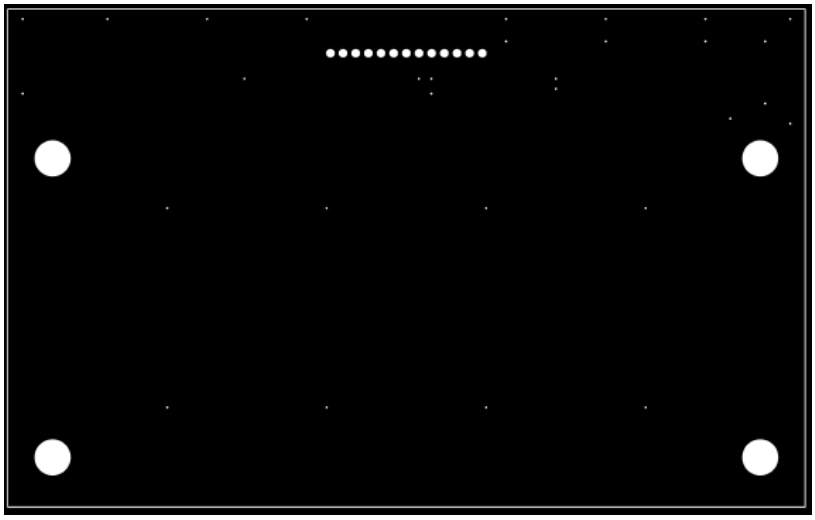


Figure 42. Resist 2 Layer (Parts Side)

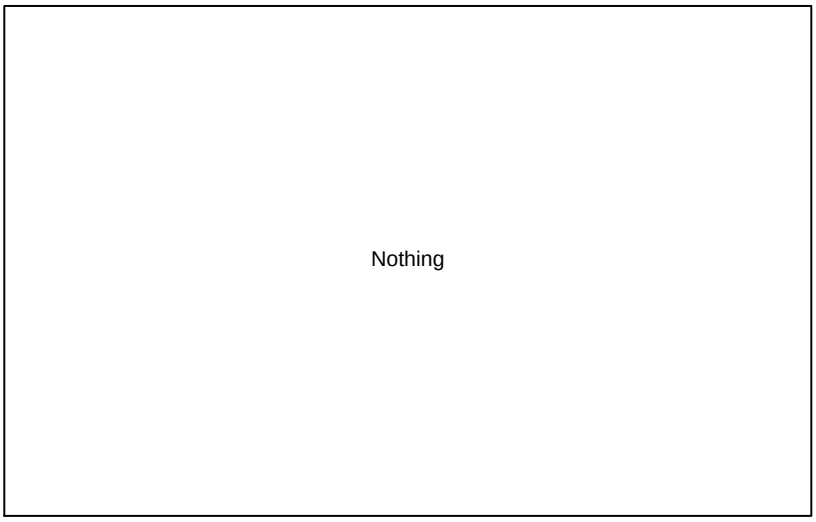
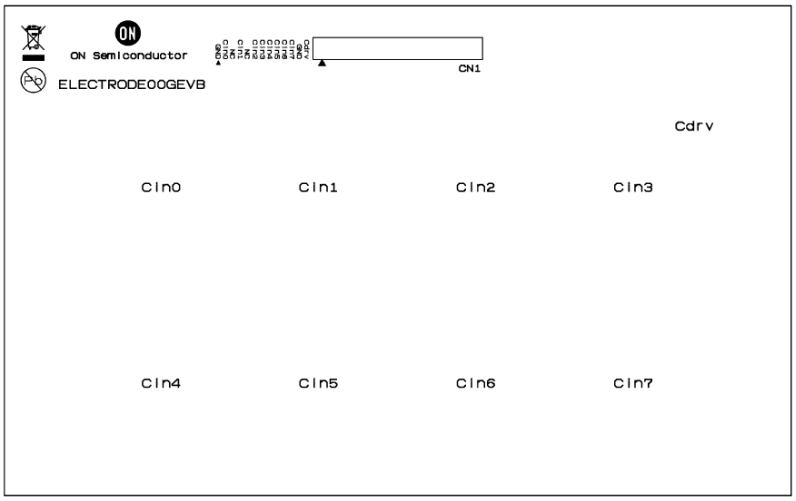


Figure 43. Silk 1 Layer (Solder Side)



Note: Silk characters enlarging of CN1

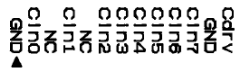


Figure 44. Silk 2 Layer (Parts Side)

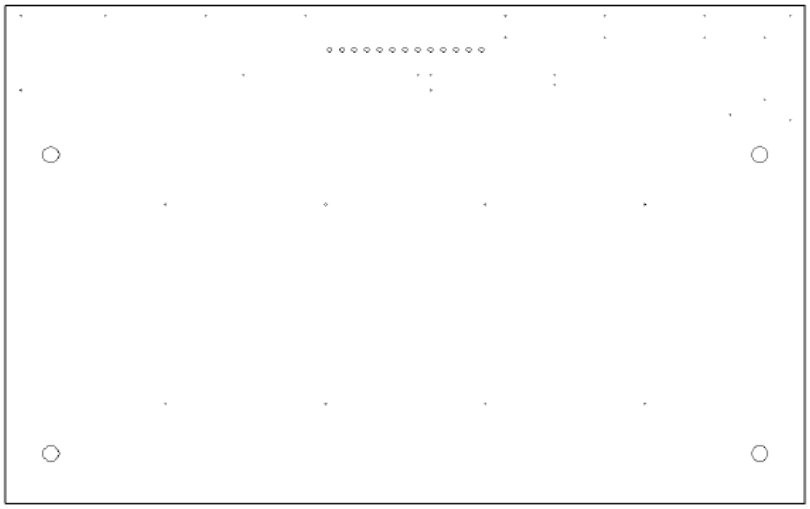


Figure 45. Hole

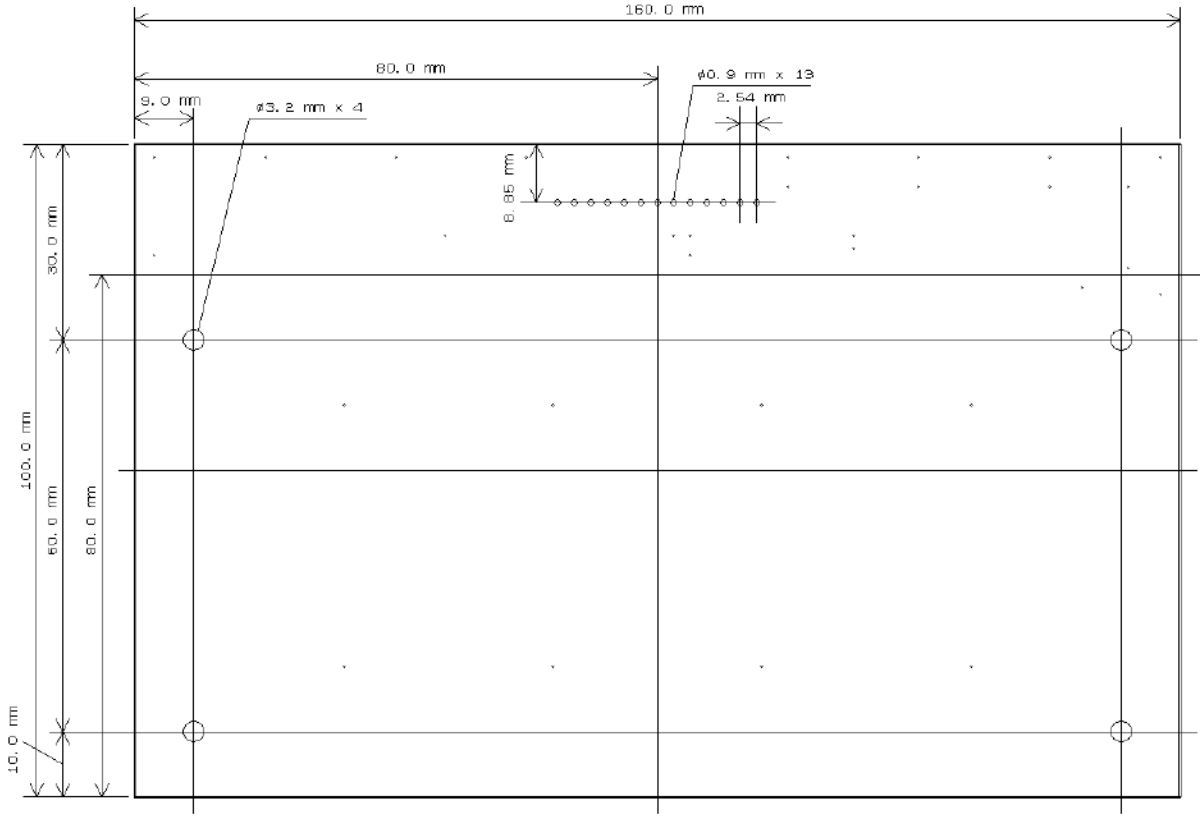


Figure 46. Outline

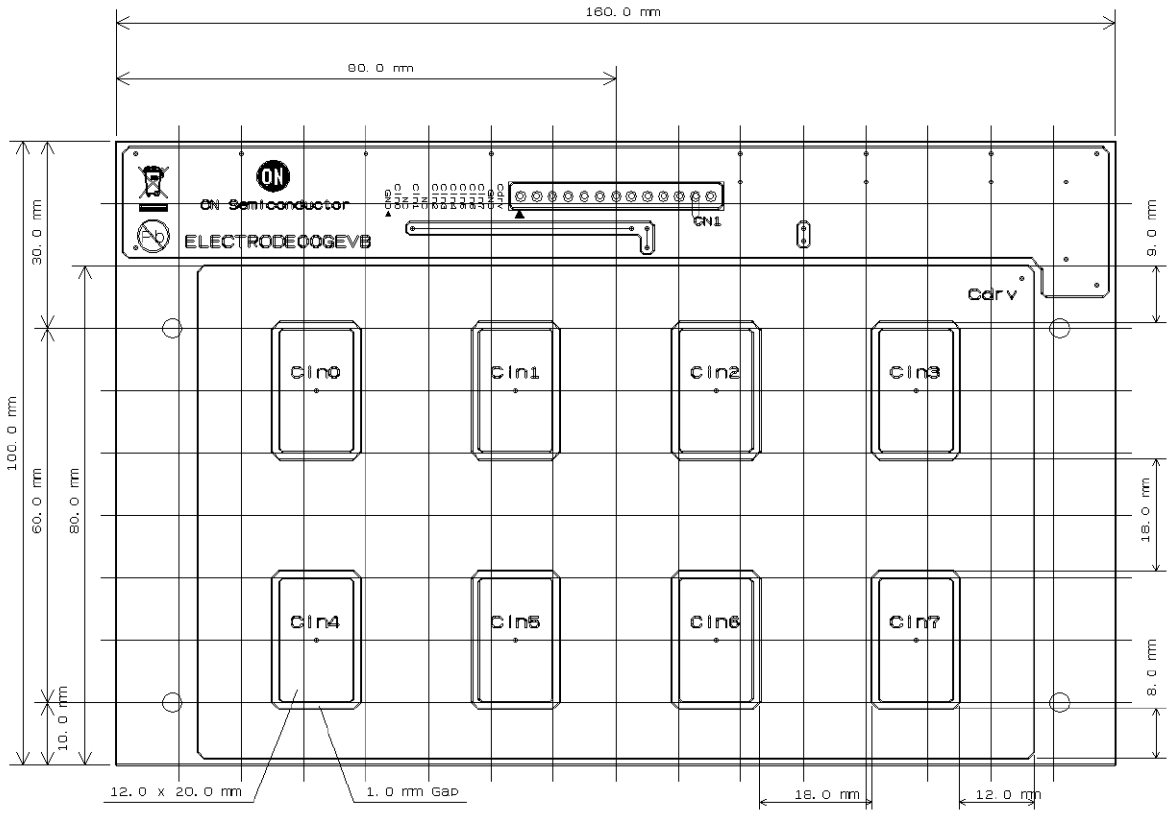


Figure 47. Electrode Pattern

Proximity Sensor Board (ELECTRODE01GEVB)

(1) Schematic

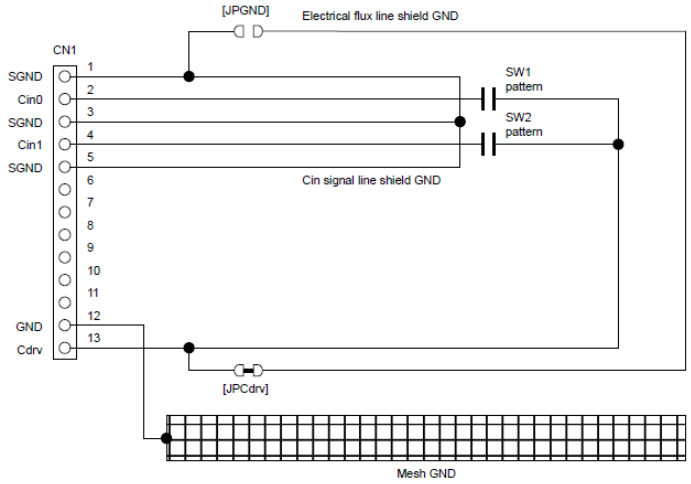


Figure 48. Proximity Sensor Board − Schematic

(2) BOM

Table 6. BILL OF MATERIALS OF ELECTRODE01GEVB EVALUATION BOARD

Designator	Qty.	Description	Part Number	Value	Manufacturer
CN1	1	Connector	2545B−1x13G	13 pin, Right Angle	HO CHIEN
	1	Printed Circuit Board	ELECTRODE01GEVB	340.0 mm x 35.0 mm, 2-levels, t = 1.6 mm	ON Semiconductor
	2	Plastic Prate		210.0 mm x 35.0 mm, t = 3.0 mm	
	2	Screw		M3 x 18.0 mm	
	2	Nut		M3	
	2	Washer		M3, 6.0 mm, in Rubber Foot	
	2	Washer		M3, 7.0 mm, Top Side	
	2	Plastic Spacer	EB−10	Black, M3 x 10.0 mm	MAC8
	2	Natural Rubber Foot	BU−692−A	Black, M15 x 7.5 mm	SATO PARTS
	2	Double-face Tape		Clear, 210.0 mm x 35.0 mm	

(3) Printed Circuit Board Layout

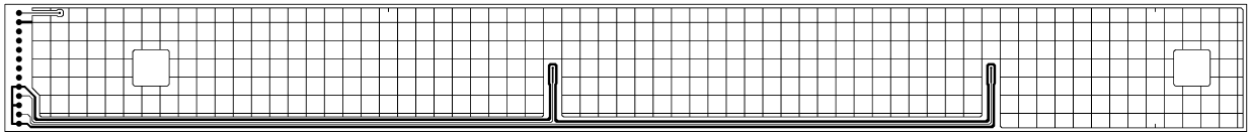


Figure 49. Pattern 1 Layer (Solder Side)

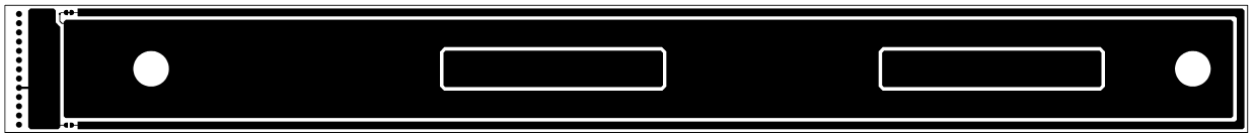


Figure 50. Pattern 2 Layer (Parts Side)

Figure 51. Resist 1 Layer (Solder Side)

Figure 52. Resist 2 Layer (Parts Side)

Nothing

Figure 53. Silk 1 Layer (Solder Side)

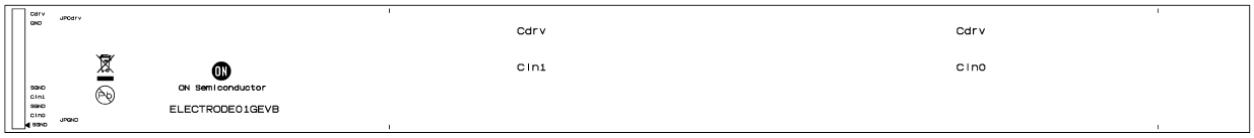


Figure 54. Silk 2 Layer (Parts Side)

Figure 55. Hole

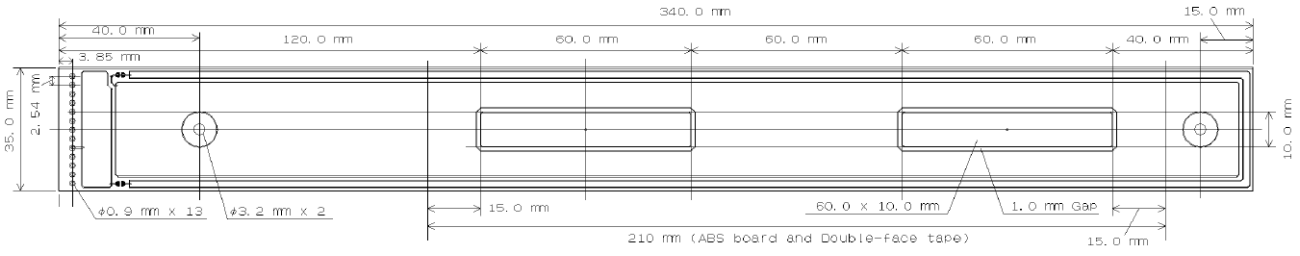


Figure 56. Outline and Electrode Pattern

Liquid Level Sensing Board (ELECTRODE02GEVB)

(1) Schematic

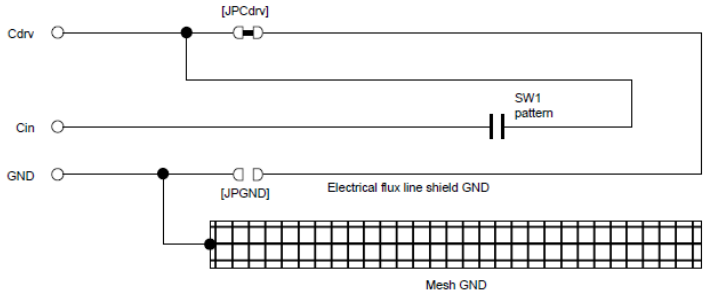


Figure 57. Liquid Level Sensing Board − Schematic

(2) BOM

Table 7. BILL OF MATERIALS OF ELECTRODE02GEVB EVALUATION BOARD

Designator	Qty.	Description	Part Number	Value	Manufacturer
Cin, Cdrv, GND	3	Socket Pin	PE−1	1pin	MAC8
	1	Printed Circuit Board	ELECTRODE02GEVB	100.0 mm x 30.0 mm, 2-levels, t = 1.6 mm	ON Semiconductor

(3) Printed Circuit Board Layout

Figure 58. Pattern 1 Layer (Solder Side)

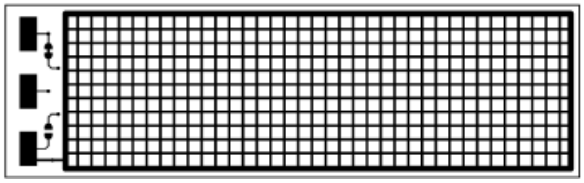


Figure 59. Pattern 2 Layer (Parts Side)

Figure 60. Resist 1 Layer (Solder Side)

Figure 61. Resist 2 Layer (Parts Side)

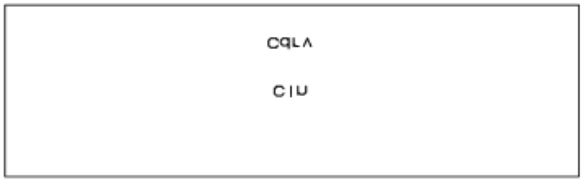


Figure 62. Silk 1 Layer (Solder Side)

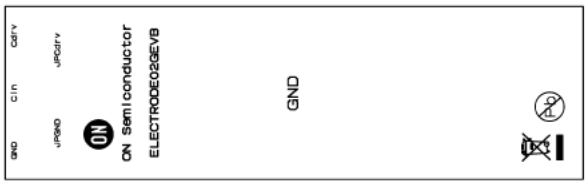


Figure 63. Silk 2 Layer (Parts Side)

Figure 64. Hole

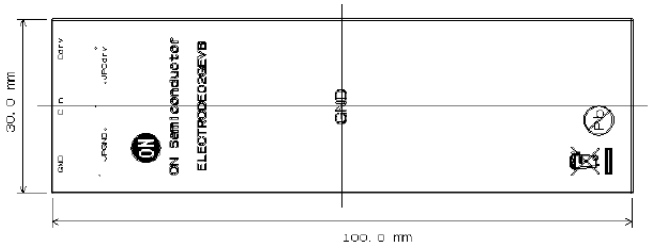


Figure 65. Outline

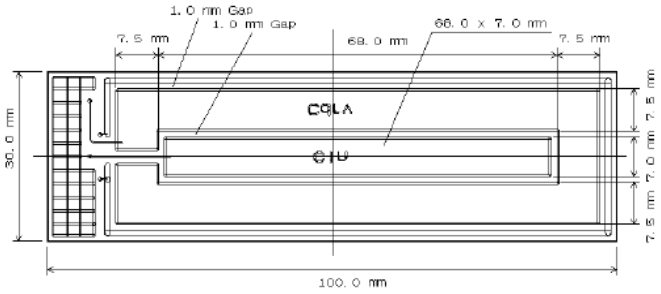


Figure 66. Electrode Pattern

Sensor Key Sheet

(1) Product Drawing

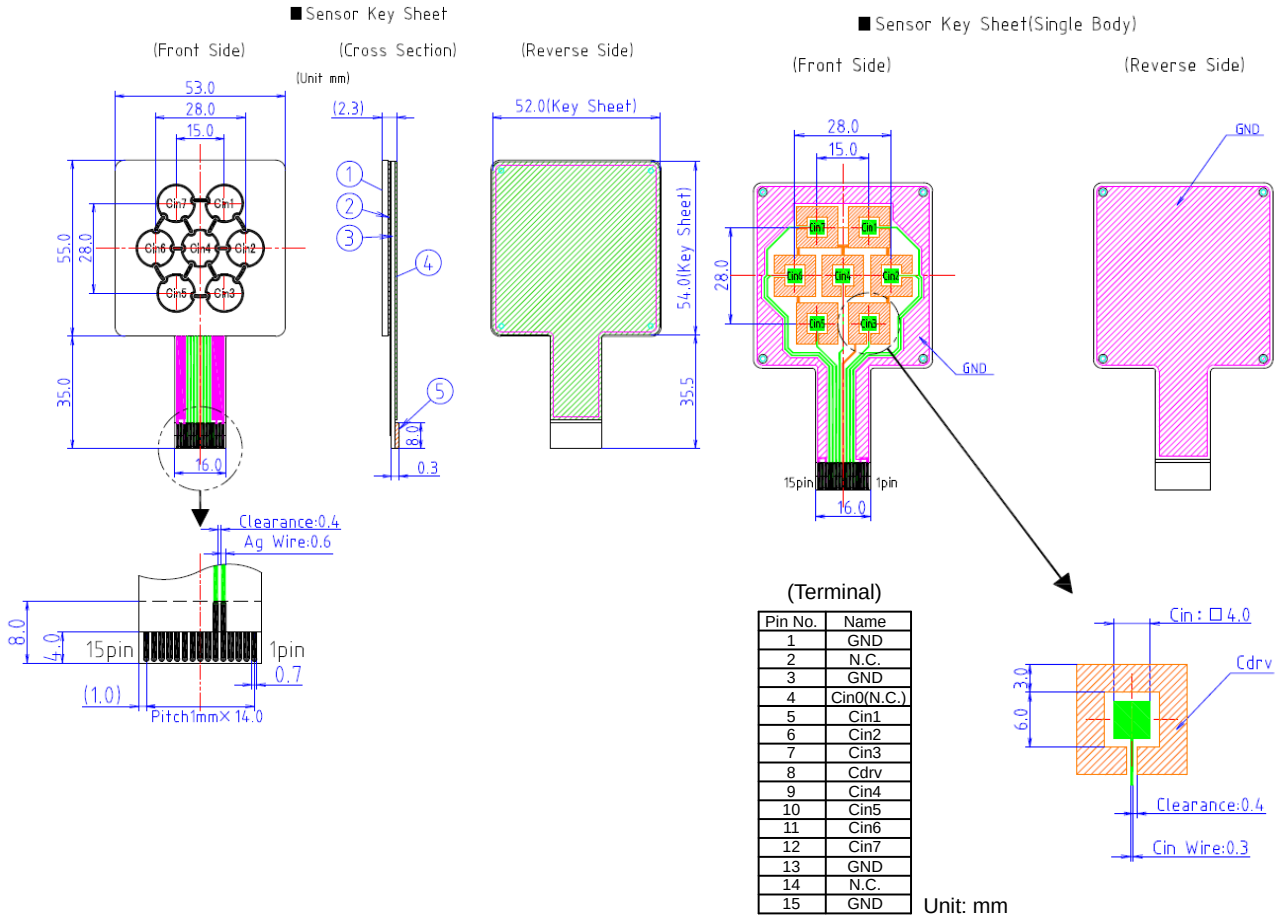


Figure 67. Sensor Key Sheet

(2) BOM

Table 8. BILL OF MATERIALS OF SENSOR KEY SHEET

Designator	Qty.	Description	Part Number	Value	Manufacturer
(1)	1	Top Panel		Plastic, t = 2000 μm	K&D
(2)	1	Glue Sheet		Polyester, t = 50 μm	K&D
(3)	1	Sensor Key Sheet		Polyester, t = 100 μm	K&D
(4)	1	Bottom Sheet		Polyester, t = 50 μm	K&D
(5)	1	Reinforcing Plate		Polyester, t = 213 μm	K&D

NOTE: K&D Co., Ltd. Refer to URL; http://www.kandd.co.jp or http://www.kandd.co.jp/en/.

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.

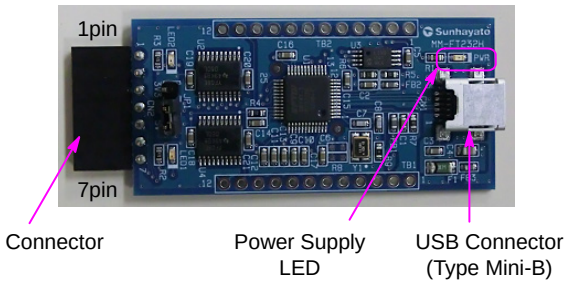


Table 9.

No.	I²C 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 I²C interface.

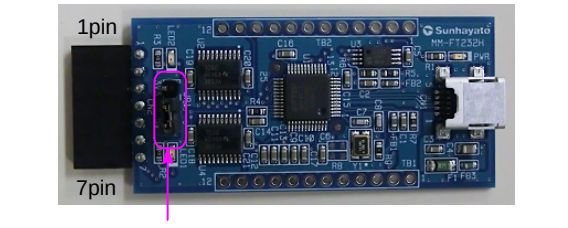


Table 10.

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

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.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
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Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

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Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

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