AND9543/D

LC717A Series Capacitance Checker 2 Software User's Manual

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APPLICATION NOTE

Overview

This document describes the operation method of LC717A series capacitance checker application software "LC717ACapChecker2.exe".

Functions

- Measurement of Cin electrode capacitance.
- Measurement of Cref reference capacitance.

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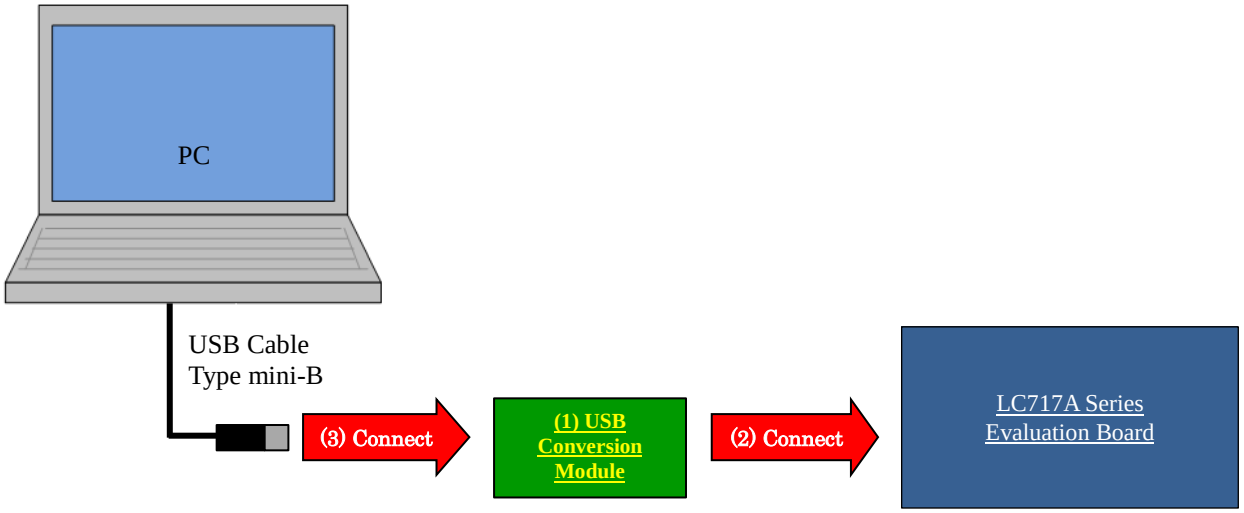
SETUP

Installing Software

Copy the executable capacitance check software “LC717ACapChecker2.exe” (Hereinafter this is called “the CapChecker software”) to any folder on your PC.

Connect the Evaluation Board to the PC

(1) Required - USB conversion module. (See below for tested modules and device drivers)
(2) Connect USB conversion module to LC717A series evaluation board.
(3) Connect USB conversion module to PC.



Tested USB conversion modules:

- “MM-FT232H” produced by Sunhayato Corp (Japan).

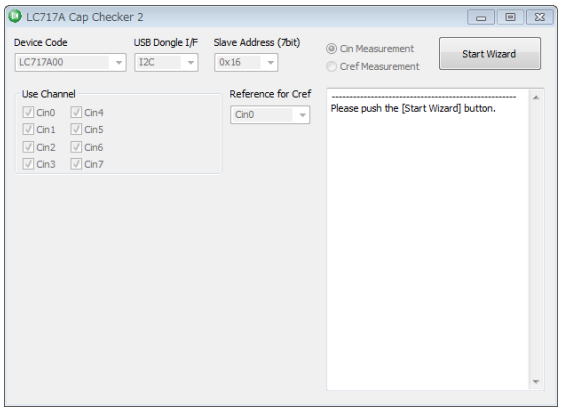
Device Driver for the USB conversion modules:

You can download D2XX drivers, which are appropriate drivers for the modules, from FTDI’s web page. Please download the device driver from the following URL and install it into your PC.
FTDI official web page: http://www.ftdichip.com/

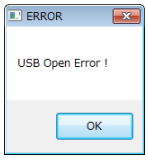
USING THE APPLICATION SOFTWARE

(1) Open LC717ACapChecker2.exe

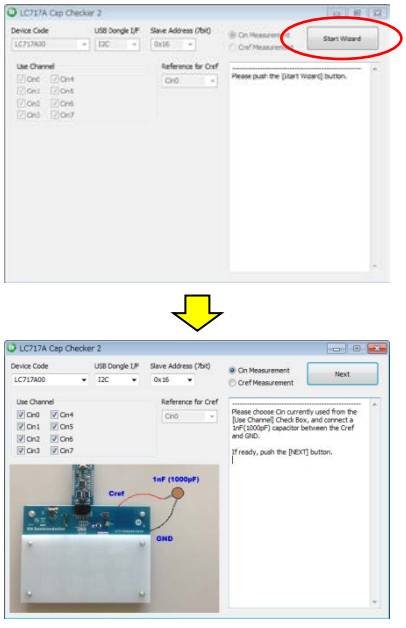
When you start the CapChecker software with USB conversion module correctly connected with PC, the following windows are displayed.



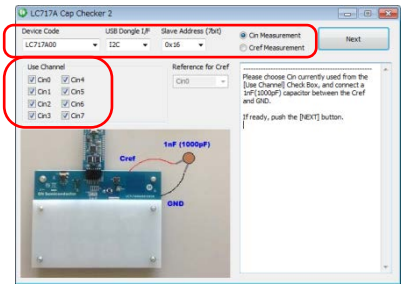
If USB conversion module is incorrectly connected to your PC, the following window is displayed.



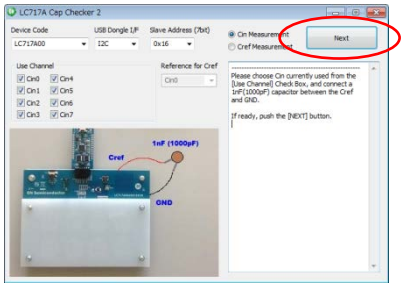
(2) Push the [Start Wizard] button



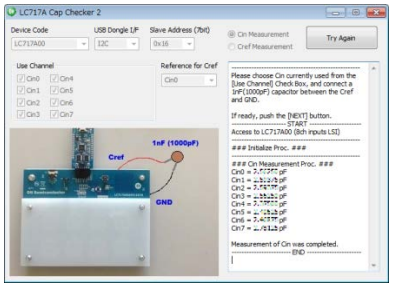
(3) Choose the evaluation board configuration



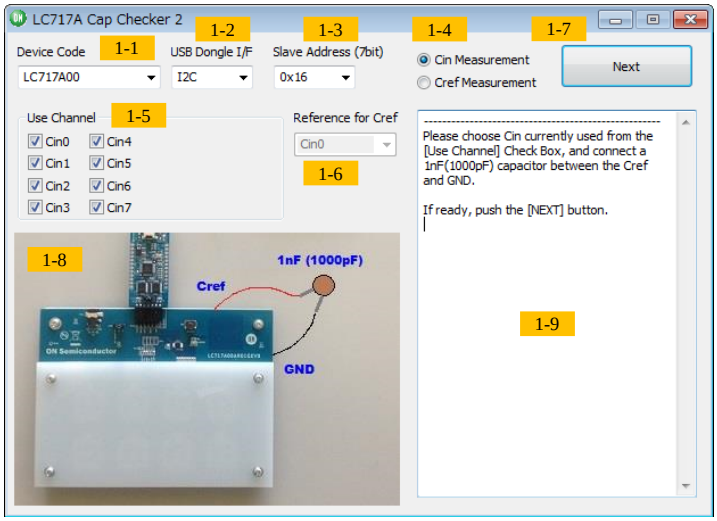
(4) Push the [Next] button



(5) Capacitance measurement starts



MAIN WINDOW (LC717A00)

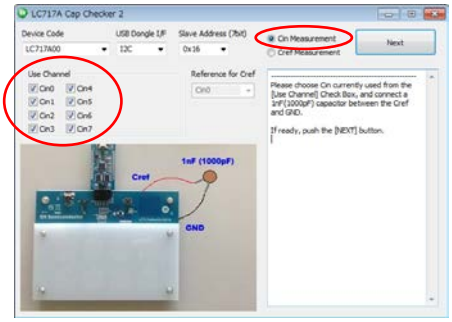


[1-1][Device Code]
Choose LC717A00 from combo box.

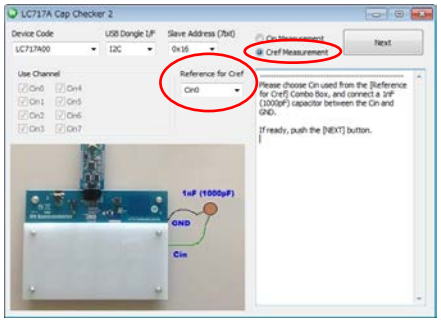
[1-2][USB Dongle I/F]
Choose one from combo box. (I2C or SPI)

[1-3][Slave Address (7bit)]
Choose one from combo box. (0x16 or 0x17)

[1-4][Cin Measurement]/[Cref Measurement]
In the case of the [Cin Measurement], a dialog changes as follows. Choose [1-5][Use Cannel] check button.



In the case of the [Cref measurement], a dialog changes as follows. Choose [1-6][Reference for Cref] combo box.



[1-5][Use Cannel]
Choose Cin used from the [Use Channel] check box. And connect a 1 nF (1000 pF) capacitor between the Cref and GND.

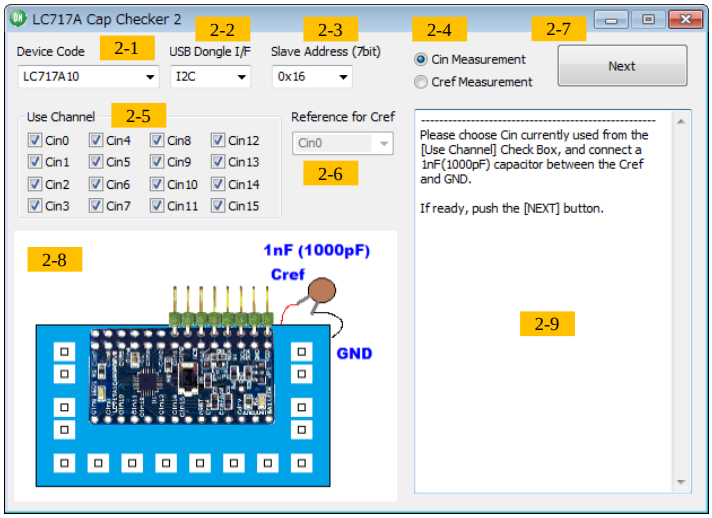
[1-6][Reference for Cref]
Choose Cin used from the [Reference for Cref] combo box. And connect a 1 nF (1000 pF) capacitor between the Cin and GND.

[1-7][Next]
When push the [Next] button, capacitance measurement starts.

[1-8]Picture
Capacitance measurement configuration is shown.

[1-9]Message Window
This window shows instructions, processing state, measurement result and error contents.

MAIN WINDOW (LC717A10)

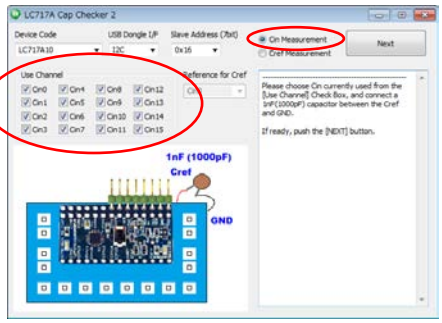


[2-1][Device Code]
Choose LC717A10 from combo box.

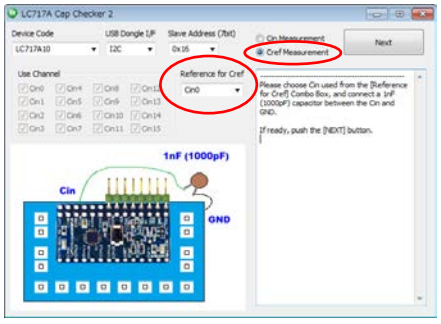
[2-2][USB Dongle I/F]
Choose one from combo box. (I2C or SPI)

[2-3][Slave Address (7bit)]
Choose one from combo box. (0x16 to 0x19)

[2-4][Cin Measurement]/[Cref Measurement]
In the case of the [Cin Measurement], a dialog changes as follows. Choose [2-5][Use Cannel] check button.



In the case of the [Cref measurement], a dialog changes as follows. Choose [2-6][Reference for Cref] combo box.



[2-5][Use Cannel]
Choose Cin used from the [Use Channel] check box. And connect a 1 nF (1000 pF) capacitor between the Cref and GND.

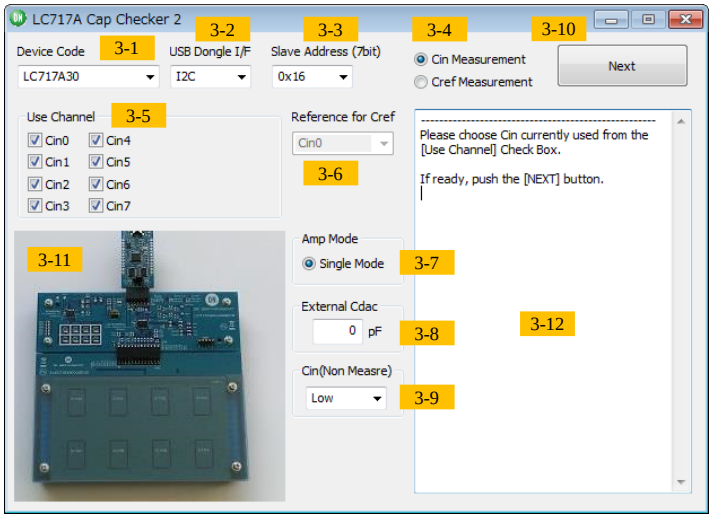
[2-6][Reference for Cref]
Choose Cin used from the [Reference for Cref] combo box. And connect a 1 nF (1000 pF) capacitor between the Cin and GND.

[2-7][Next]
When push the [Next] button, capacitance measurement starts.

[2-8]Picture
Capacitance measurement configuration is shown.

[2-9]Message Window
This window shows instructions, processing state, measurement result and error contents.

MAIN WINDOW (LC717A30)

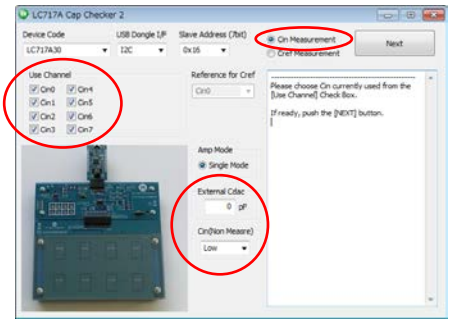


[3-1][Device Code]
Choose LC717A30 from combo box.

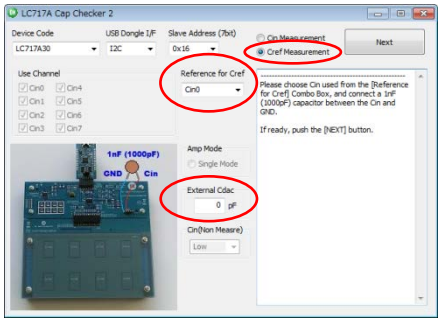
[3-2][USB Dongle I/F]
Choose one from combo box. (I2C or SPI)

[3-3][Slave Address (7bit)]
Choose one from combo box. (0x16 or 0x17)

[3-4][Cin Measurement]/[Cref Measurement]
In the case of the [Cin Measurement], a dialog changes as follows. Choose [3-5][Use Cannel] check button. In addition, input [3-8][External Cdac] and choose [3-9][Cin(Non Measure)] combo box as necessary.



In the case of the [Cref measurement], a dialog changes as follows. Choose [3-6][Reference for Cref] combo box. In addition, input [3-8][External Cdac] as necessary.



[3-5][Use Cannel]
Choose Cin used from the [Use Channel] check box.

[3-6][Reference for Cref]
Choose Cin used from the [Reference for Cref] combo box. And connect a 1 nF (1000 pF) capacitor between the Cin and GND.

[3-7][Amp Mode]
CapChecker software automatically sets to single mode.
In the case of the [Cin Measurement], Amp Mode works on Single Mode and it is measured without using the external parts.
In the case of the [Cref measurement], remove the Single Mode check on Amp Mode. Therefore, connect a 1 nF (1000 pF) capacitor between the Cin and GND.

[3-8][External Cdac](Hereinafter this is called “ExtCap”)
In the case of using external Cdac capacitances, it needs to prepare three same capacitances and needs to insert them between Cref and CdrvBar, between CMAdd0 and CdrvBar, and between CMAdd4 and CdrvBar. Input external Cdac capacitor value. Then, it is measured with external capacitances by using LSI internal Cdac.
In the case of not using external capacitances, input external Cdac capacitor value as 0 pF.

[3-9][Cin(Non Measure)]
Choose one from combo box. (Low, Hi-z or Cdrv)

[3-10][Next]
When push the [Next] button, capacitance measurement starts.

[3-11]Picture
Capacitance measurement configuration is shown.

[3-12]Message Window
This window shows instructions, processing state, measurement result and error contents.

MESSAGE CONTENTS

Table 1. PROCESSING MESSAGE CONTENTS

Message	State	Advice
Please push the [Start Wizard] button.	Just after CapChecker software start.	When push [Start Wizard] button, CapChecker starts.
Please choose Cin currently used from the [Use Channel] Check Box, and connect a 1 nF (1000 pF) capacitor between the Cref and GND. If ready, push the [NEXT] button.	Cin measurement mode of LC717A00 or LC717A10 was chosen.	When push [Next] button, capacitance measurement starts.
Please choose Cin used from the [Reference for Cref] Combo Box, and connect a 1 nF (1000 pF) capacitor between the Cin and GND. If ready, push the [NEXT] button.	Cref measurement mode of LC717A00 or LC717A10 was chosen.	When push [Next] button, capacitance measurement starts.
Please choose Cin currently used from the [Use Channel] Check Box. If ready, push the [NEXT] button.	Cin measurement mode of LC717A30 was chosen.	When push [Next] button, capacitance measurement starts.
Please choose Cin used from the [Reference for Cref] Combo Box, and connect a 1 nF (1000 pF) capacitor between the Cin and GND. If ready, push the [NEXT] button.	Cref measurement mode of LC717A30 was chosen.	When push [Next] button, capacitance measurement starts.
Cin0 = 2.31250 pF	The capacitance measurement is finished normally.	Measurement mode using LSI internal Cdac. It is measurable from 0 to 8 pF.
Cin0 = 10.56250 pF	The capacitance measurement is finished normally.	Measurement mode using external Cdac. Input external Cdac capacitor value into [External Cdac]. (e.g. when 8 pF is inputted, it is measurable from 8 to 16 pF)
Cin0 = Unused	Cin channel is unused.	The unused channel does nothing.

ERROR MESSAGE

Table 2. ERROR MESSAGE CONTENTS

Error State	Error Massage	Advice
System error occurred. (SysErr bit = 1)	Error is detected. (Error Code: 1 (or 7)) System error occurred. Please check 1. Disconnection of Interface. 2. Imperfect solder joint. 3. Mistaken slave address(only I2C).	Disconnection of Interface. Imperfect solder joint. Mistaken slave address(Only I2C).
Read Data is always low. (Control 1 register data is not 09h)	Error is detected. (Error Code: 2 (or 8)) Read Data is always low. Please check 1. Disconnection of Interface. 2. Imperfect solder joint. 3. Mistaken slave address(only I2C).	Disconnection of Interface. Imperfect solder joint. Mistaken slave address(Only I2C).
AD level abnormality after the calibration. (Other than -2 to +2)	Cin0 = AD value error (AD level) + Error is detected. (Error Code: 3 (or 9)) Calibration error occurred.	Influence of the external noise.
Calibration error occurred. (Cdac value is 00h or 01h)	Cin0 = Calibration Error (Too small) + Error is detected. (Error Code: 3 (or 9)) Calibration error occurred.	Capacitance is too small. Disconnection of switch pattern. Note: Measurement mode using LSI internal Cdac.
Calibration error occurred. (Cdac value is 00h or 01h)	Cin0 = Calibration Error (8pF to ExtCap) + Error is detected. (Error Code: 3 (or 9)) Calibration error occurred.	Capacitance is from 8 pF to ExtCap. (In the case of about 8 pF, a measurement result may not be got. Change ExtCap and measure it again) Note: Only LC717A30.

Note: When Cin measurement, error code is from 1 to 3. When Cref measurement, error code is from 7 to 9.

Table 3. ERROR MESSAGE CONTENTS (CONTINUE)

Error State	Error Massage	Advice
Calibration error occurred. (Cdac value is from FDh to FFh)	Cin0 = Calibration Error (More than 8pF) or Cin0 = Calibration Error (More than 16pF) + Error is detected. (Error Code: 3 (or 9)) Calibration error occurred.	Capacitance exceeds the measurement range.
Not calibration error. (Cdac value is 00h or 01h)	Cin0 = Data is abnormal (Cdac value) + Error is detected. (Error Code: 3 (or 9)) Calibration error occurred.	Capacitance is too small, and a measurement result may be untrustworthy.
Not calibration error. (Cdac value is from FDh to FFh)	Cin0 = Data is abnormal (Cdac value) + Error is detected. (Error Code: 3 (or 9)) Calibration error occurred.	Capacitance exceeds the measurement range, and a measurement result may be untrustworthy.
Detailed error message when error code is 3 or 9.	Error is detected. (Error Code: 3 (or 9)) Calibration error occurred. Please check 1. Too large switch pattern. 2. Disconnection of switch pattern. 3. Influence of the external noise. 4. In the case of around 8pF, change ExtCap and measure it again. (only LC717A30)	Too large switch pattern. Disconnection of switch pattern. Influence of the external noise. In the case of around 8 pF, change ExtCap and measure it again. (Only LC717A30)

Note: When Cin measurement, error code is from 1 to 3. When Cref measurement, error code is from 7 to 9.

* I^2C Bus is a trademark of Philips Corporation.