

The cover page features a blue background with a circuit board pattern. On the left, the title "Faraday Current Sense and Measurement Solution" is written in large white font. Below the title is the website "www.FutureElectronics.com". On the right, there is an image of the "FUT-FARADAY-1" board, which includes components like RECOM, Infineon, WS, Melexis, and Diodes. Below the board image is a QR code and the Future Electronics logo, which consists of a green 'F' with diagonal lines and the text "FUTURE ELECTRONICS".

1. Faraday Package Content

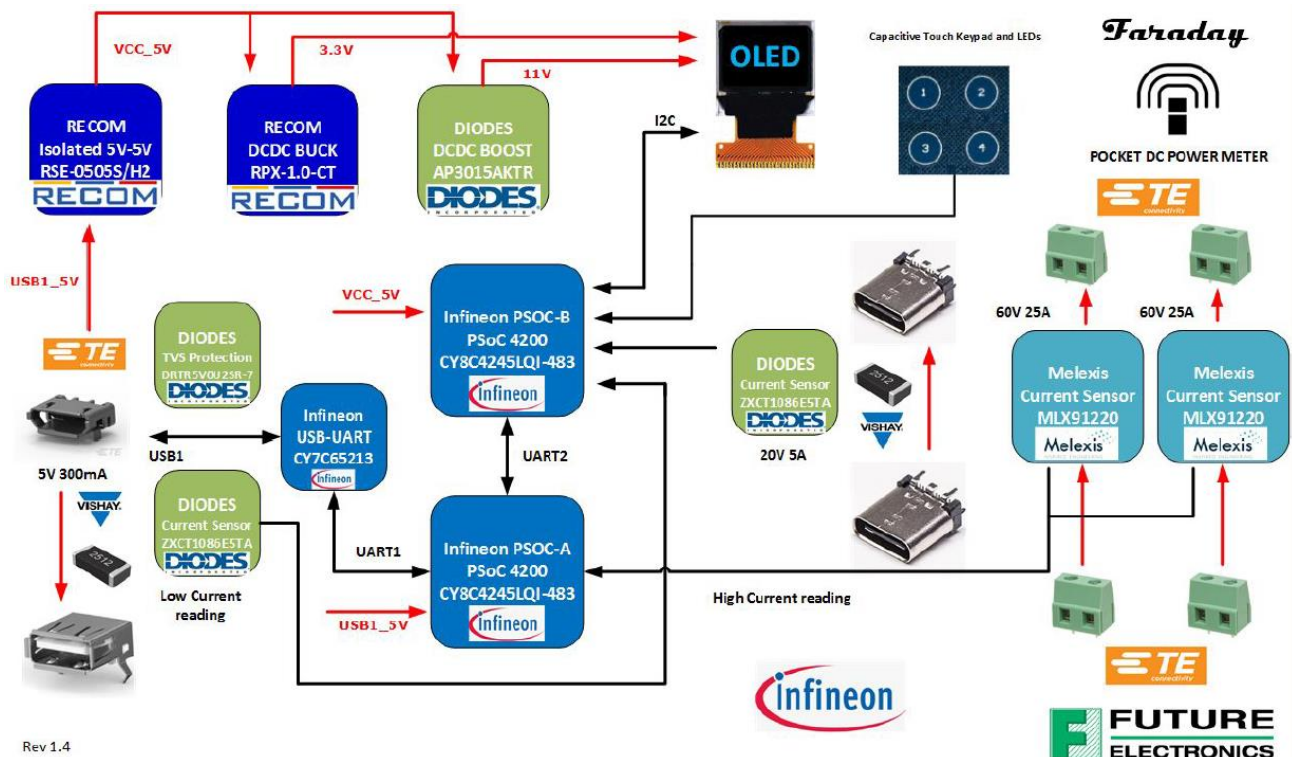
- A. Faraday Board x 1
- B. USB cable A-to-MicroB x 1

Faraday Current Sense and Measurement Solution

2. Faraday Overview

Faraday is a simple platform designed by Future Electronics System Design Center to demonstrate current sensing designs. It implements four channels with current sensors controlled by two Infineon PSoC 4 (CY8C4245) microcontrollers to measure voltage, current and power. Channel 1 and 2 are isolated channels implemented with two Melexis integrated magnetic current sensors (MLX91220) controlled by Infineon PSoC 4 (CY8C4245) (marked as PSoC-A on block diagram) to measure DC current up to 25A / 60V via terminal block connections. Channel 3 is designed for current measurement up to 5A / 20V via an USB Type C port connection, using Vishay current sense resistor (WSL series) combined with Diodes Inc. current monitor (ZXCT1086) and Infineon PSoC 4 (CY8C4245) microcontroller (PSoC-B on block diagram). Channel 4 can measure up to 300mA / 5V via a USB Type A port connection using the same PSoC-B microcontroller as channel 3.

The PSoC-A is also controlling the communication to PC through USB/UART bridge (CY7C65213). And the PSoC-B controls user interface with capacitive touch keypad user buttons and the WiseChip OLED display to show current, voltage and power measurement results.



3. Operation Instructions

- **Faraday Setup:**

Faraday is designed as a pocket power meter to measure Voltage, Current and Power going through any of the 4 channels. Below are the four setup configurations can be used:

- Channel 1&2 (60V 25A):
 1. Connect Power Source and Device Under Test (DUT) in series to Channel 1 (or 2) to measure Voltage, Current and Power as shown in **Figure 1**
 2. Connect Channel 1 for the input and Channel 2 for the output as shown in **Figure 2** to measure DC power supply efficiency;
- Channel 3 (20V 2A)
 3. Connect an USB Type C source to the CH3_IN connector and an USB Type C device to the CH3_OUT connector to measure Voltage, Current and Power of an USB Type C device as shown in **Figure 3**
- Channel 4 (5V 300mA)
 4. Connect an USB device on the channel 4 USB-A connector to measure Voltage, Current and Power of an USB device as shown in **Figure 4**
- **Board Operation:**
 - Select one of the test setups as shown above and connect the power and device
 - Connect the Faraday board to a PC using USB port (J1) using the USB cable provided, the board will enumerate as Serial COM Port
 - Press the CHx button corresponding to the desired channel number (i.e. CH1, CH2 etc) on the bottom right corner of the Faraday board to view measurement information on the LCD display
 - Press buttons CH1 and CH2 together at the same time, power and efficiency information of the channels 1&2 will be shown on the LCD display
- **PC Terminal Connection (Optional)**

Connect to the Serial COM Port (115200, N, 8, 1; enable local echo)

- Right after startup, press enter or type help and then press enter to view basic commands
- After a command is entered, pressing enter again will repeat the last command
- Type "getall" to view all channels
- Enter commands such as "getall, getchx, getvx, getix, geteff12", where x is the desired channel number

Faraday Current Sense and Measurement Solution

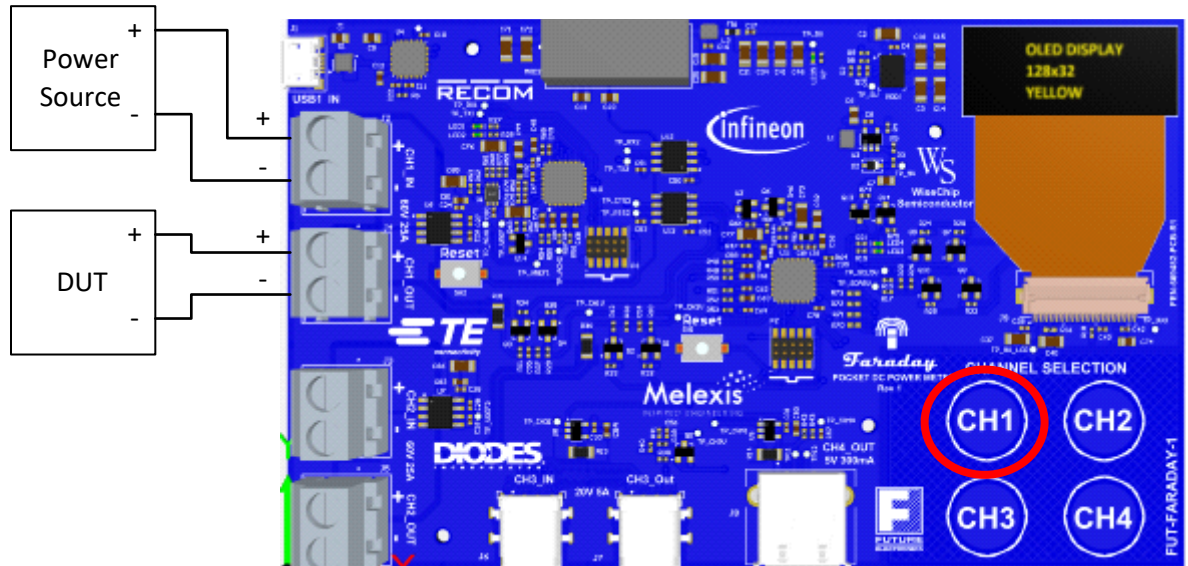


Figure 1. Voltage, Current & Power Measurement Using Channel 1

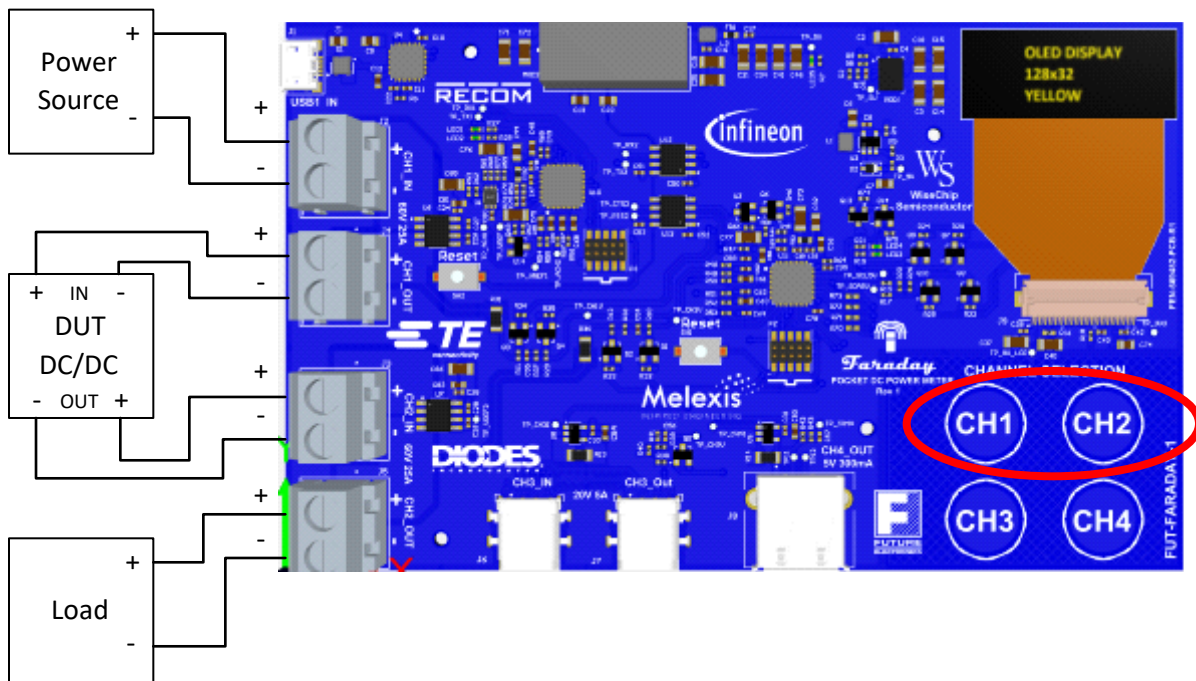


Figure 2. Power Efficiency Measurement Using Both Channel 1 & 2

Faraday Current Sense and Measurement Solution

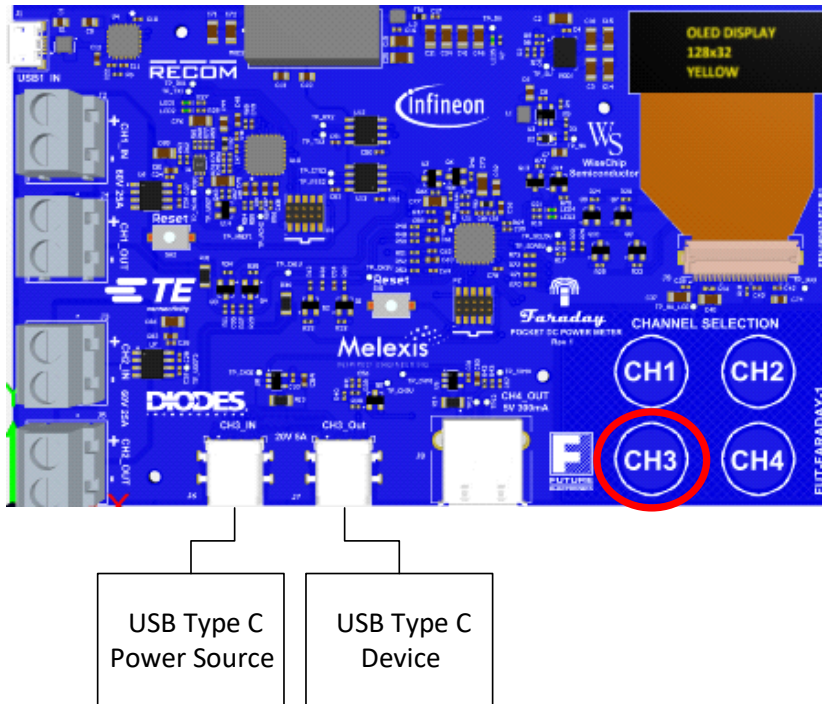


Figure 3. Voltage, Current & Power Measurement on USB Type C Ports Using Channel 3

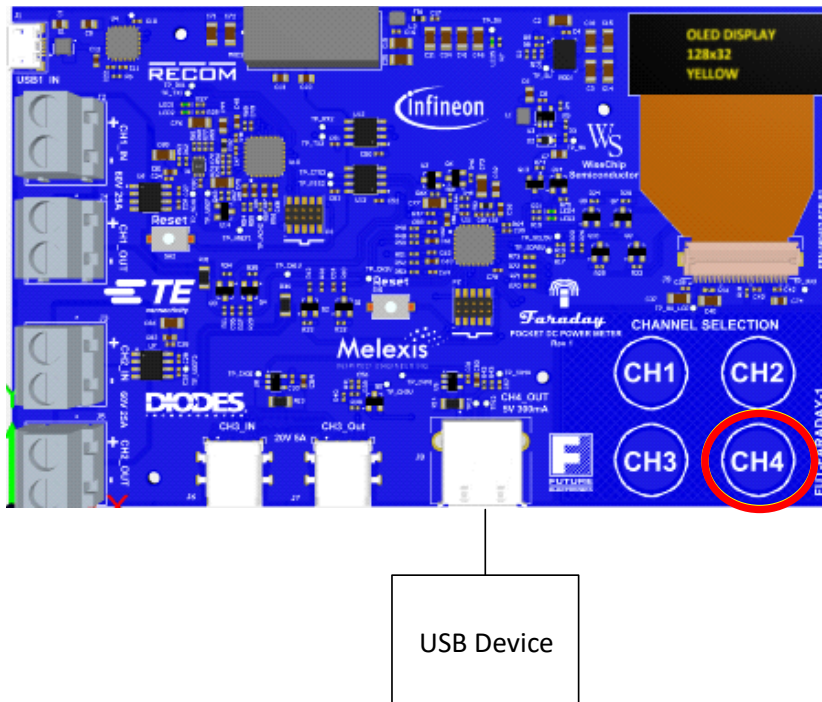


Figure 4. Voltage, Current & Power Measurement on USB Port Using Channel 4