

## A photograph of a green printed circuit board (PCB) for a Microsemi LX2205 USB Li-Ion Battery Charger. The board features various electronic components including integrated circuits, resistors, capacitors, and connectors. Labels on the board include "LX2205 USB Li-Ion Battery Charger", "Microsemi INTEGRATED PRODUCTS", "CONTROL LOGIC", "BATTERY", "CHG", "DOK", "END", "SCOV", "USB Hi", "USB Lo", "SUSPEND", "OFF", "ON", "TO", "BT", "RST", "VCC", "GND", "BAT+", "BAT-", "CHG+", "CHG-", "DOK+", "DOK-", "END+", "END-", "SCOV+", "SCOV-". The board is populated with several surface-mount components and has four mounting holes at the corners.



## INTRODUCING TO PRODUCT

The LX2205 Evaluation Board is available from Microsemi for evaluating the performance of the LX2205 Battery Charger Integrated Circuit. The component sizes used on the evaluation board facilitate easy probing, however, in practice, smaller component sizes are recommended to minimize the circuit physical size.

## KEY FEATURES

- Charging up to 1A.
- Charging from USB port.
- USB current compliance
- Auto battery switchover
- CC/CV w thermal Feedback
- Battery temp monitor
- Precision Charge Termination

## APPLICATIONS

- Navigation Devices
- Portable USB Devices
- Multi-Media Player
- PDA Phones
- Digital Cameras

## PART SPECIFIC INFORMATION

Part Number	Product
LX2205ILQ	Battery Charger and Power Interface

TABLE 1 – PART INFORMATION

IC	EVALUATION BOARDS
LX2205ILQ	LX2205 EVAL KIT

TABLE 2 – EVALUATION BOARD INFORMATION

## SCHEMATIC FOR EVB

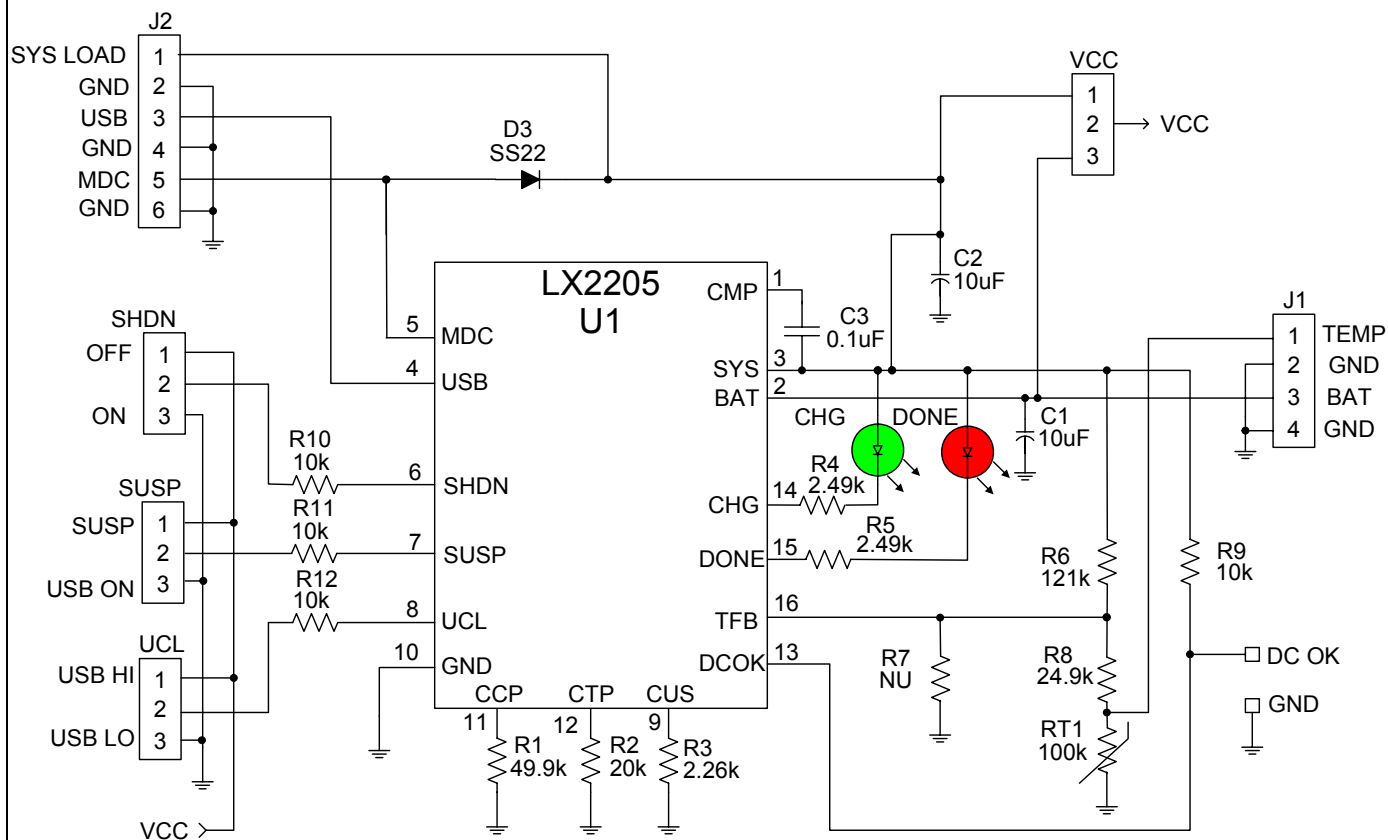


Figure 1 – LX2205 Evaluation Board Schematic

## IC BLOCK DIAGRAM

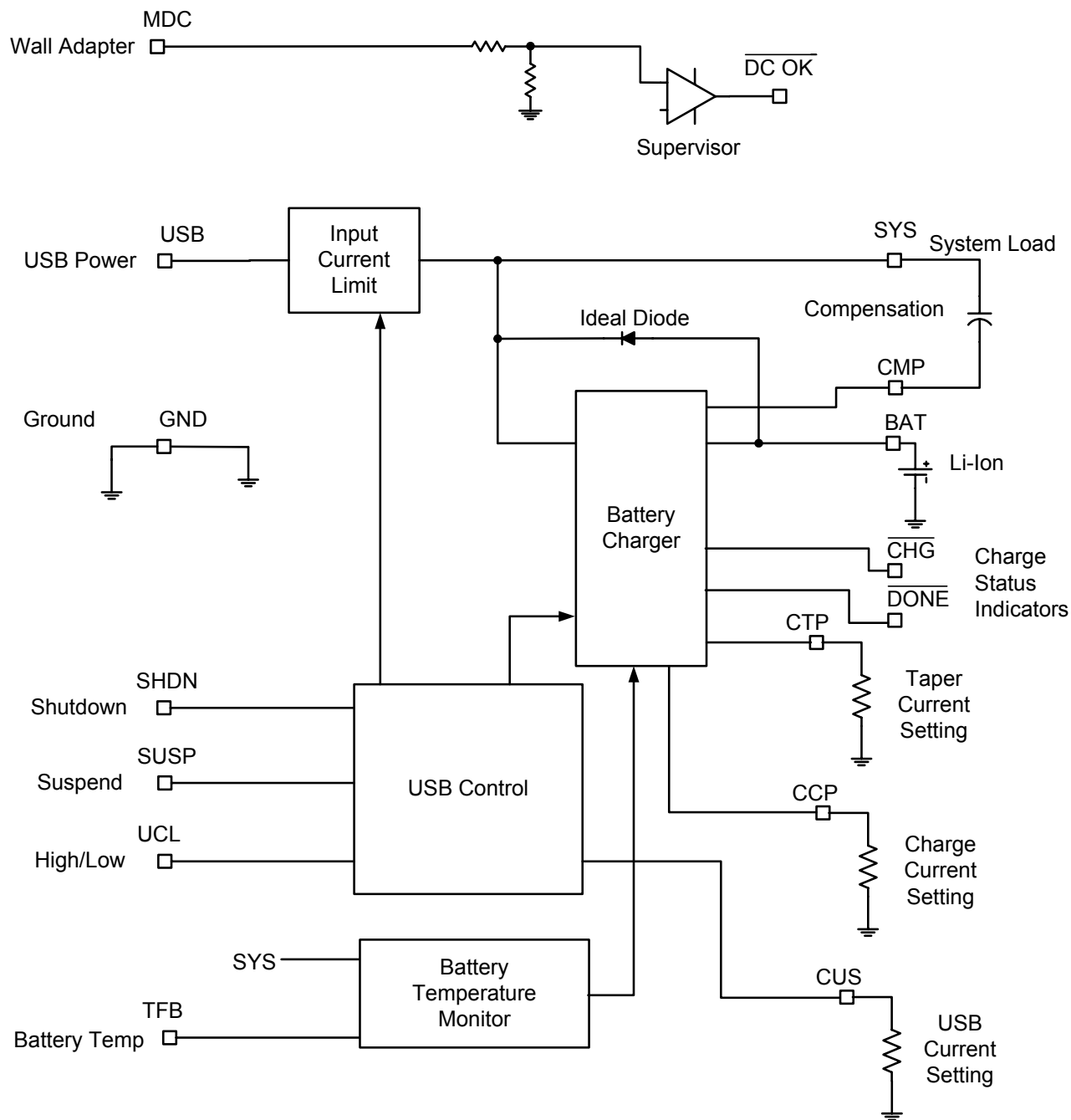


Figure 2 – Simplified Block Diagram

## LX2205 EVB TEST PROCEDURE

Connections. The LX2205 Evaluation Board has two power input and two power output connections. GND is the return for all inputs and outputs.

FUNCTION	PIN NAME	VOLTAGE
Adapter Power	MDC	5V +/- 0.65V
USB Power	USB	5V +/- 0.65V
Battery +	BAT+	0V to 4.3V
System Load	SYS LOAD	$2.8\Omega \leq R \leq \infty$

The following is a test procedure for the LX2205 evaluation board:

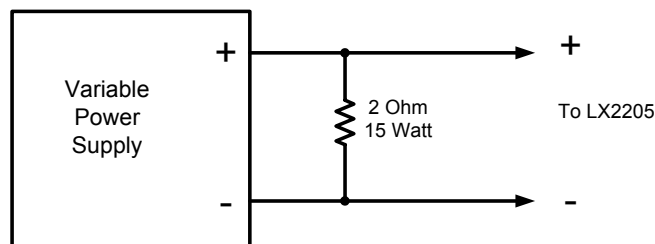
- Place the jumpers in the following positions:

VCC	Place in the BATTERY position.
SHDN	Place in the ON position.
SUSP	Place in the USB ON position.
UCL	Place in the USB HI position.

- Apply the Battery Simulator (referred to below as the battery) between the BAT terminal and GND terminal. Adjust the battery voltage to 3.9V.

3)

### Battery Simulator



- Verify the DCOK pin is >3.7V.
- Apply a 5.0V power source between the MDC terminal and GND terminal.
- Verify the CHG LED is illuminated.
- Verify the voltage at the DCOK test point is <100mV.
- Verify the current flowing into the battery is 1000 +/- 150mA.
- Place the VCC jumper in the SYS position and verify the CHG LED is illuminated. Then place the VCC jumper in the BATTERY position.
- Place the SHDN jumper in the OFF position and verify the current flowing into the battery drops to 0mA +/- 1mA. Then place the SHDN jumper in the ON position.
- Slowly adjust the battery voltage to 4.25V while monitoring the current flowing into the battery and verify the Battery Charge current drops to 0mA +/- 1mA, the CHG LED shuts off and the DONE LED turns on. Just before the CHG LED turns off, verify the current flowing into the battery is less than 100mA but greater than 40mA.
- Set the battery voltage to 3.9V.
- Remove the 5.0V power source from the MDC terminal and apply it to the USB terminal.
- Verify the current flowing into the battery is between 425mA and 500mA.
- Place the UCL jumper in the USB LO position and verify the current flowing into the battery is between 85mA and 100mA.
- Place the SUSP jumper in the SUSPEND position and verify the current flowing into the battery drops to 0mA +/- 1mA. Then place the SUSPEND jumper in the USB ON position.
- Place a 20Ω load from the SYS terminal and GND terminal and verify the CHG

LED and DONE LED are off. Verify the current flowing into the USB pin is 90mA +/- 10mA. Then remove the 20Ω load.

- 18) Monitor the battery current and apply heat (from a heat gun) to RT1. Verify that when RT1 gets hot, that the battery current drops to 0mA +/- 1mA. Verify

when the heat is removed, after a short wait to cool, that the battery current flowing into the battery is between 85mA and 100mA.

- 19) Place the jumpers in their initial positions.  
20) Test COMPLETE.

## LX2205 TYPICAL TEST HOOKUP

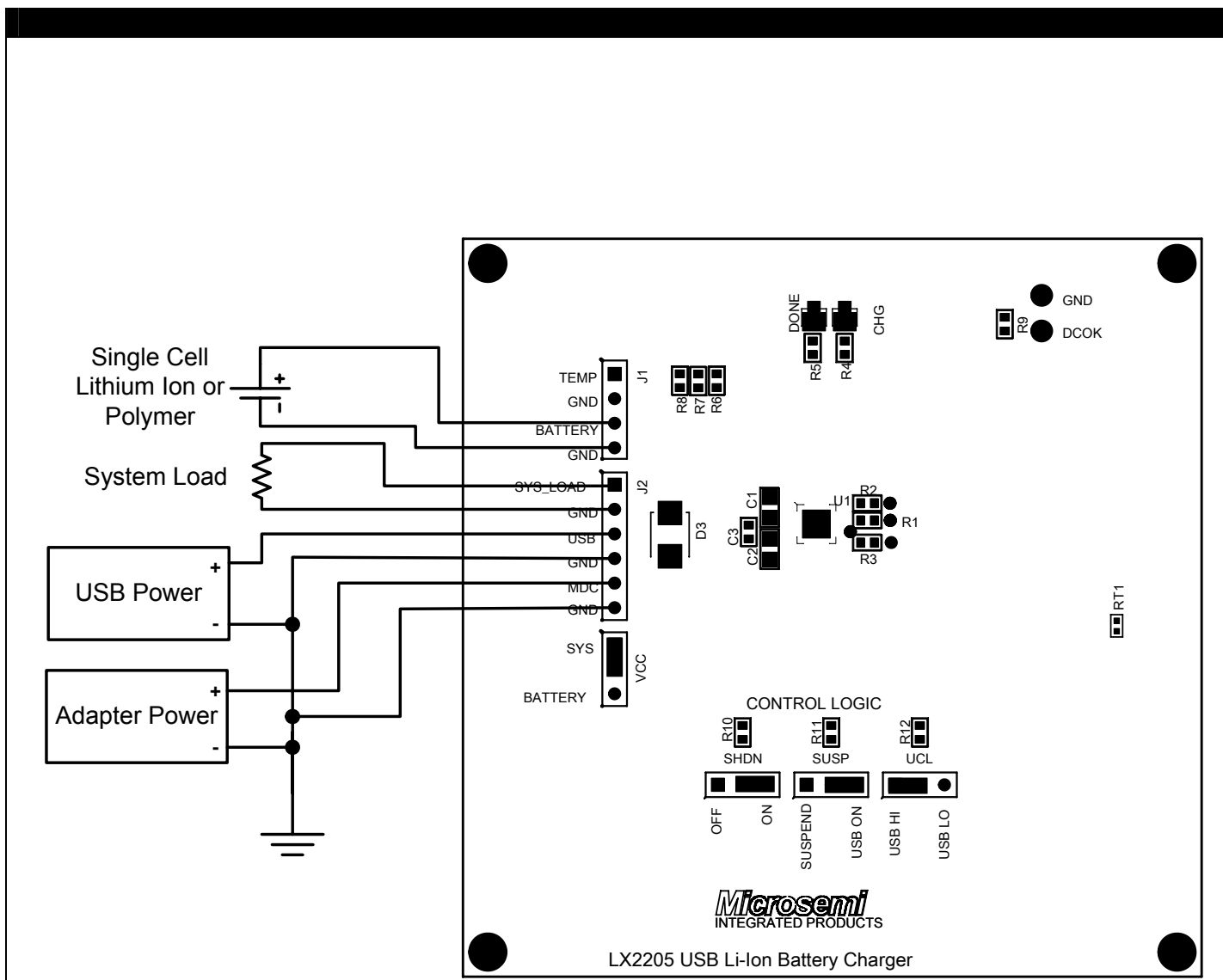
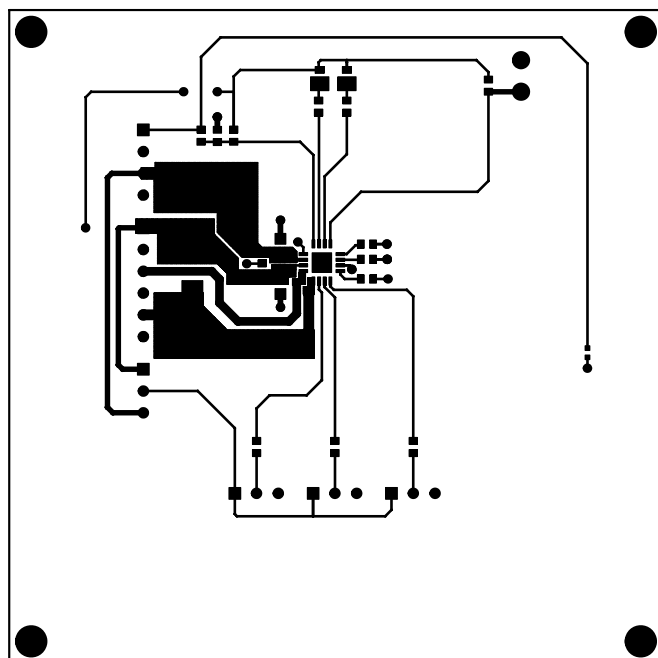


Figure 3 – LX2205 Typical Test Hookup

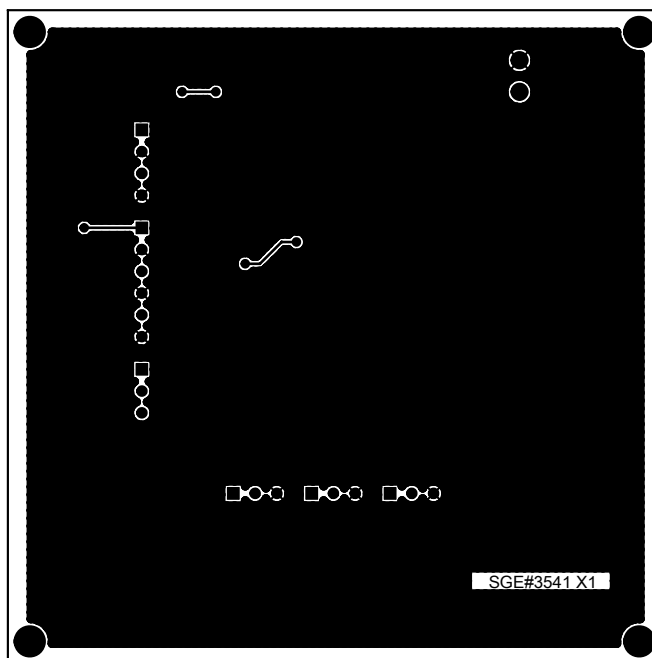
## PCB LAYOUT RECOMMENDATIONS

It is recommended that C1 and C2 be located within 1cm of the LX2205. The CMP capacitor should be located close to the SYS and CMP pins. Also the high impedance summing node connecting to the TMP pin should be kept relatively short to prevent the coupling of noise into this node. It is important that

the LX2205 have a good thermal path to ambient to dissipate heat. The simplest way to do this is to heatsink the LX2205 bottom pad directly to the ground plane by placing 4 or more vias in the ground pad directly under the LX2205 footprint.



SGE#3541 X1  
TOP LAYER RR



SGE#3541 X1  
BOTTOM LAYER WR

## LX2205 PRINTED CIRCUIT BOARD LAYOUT

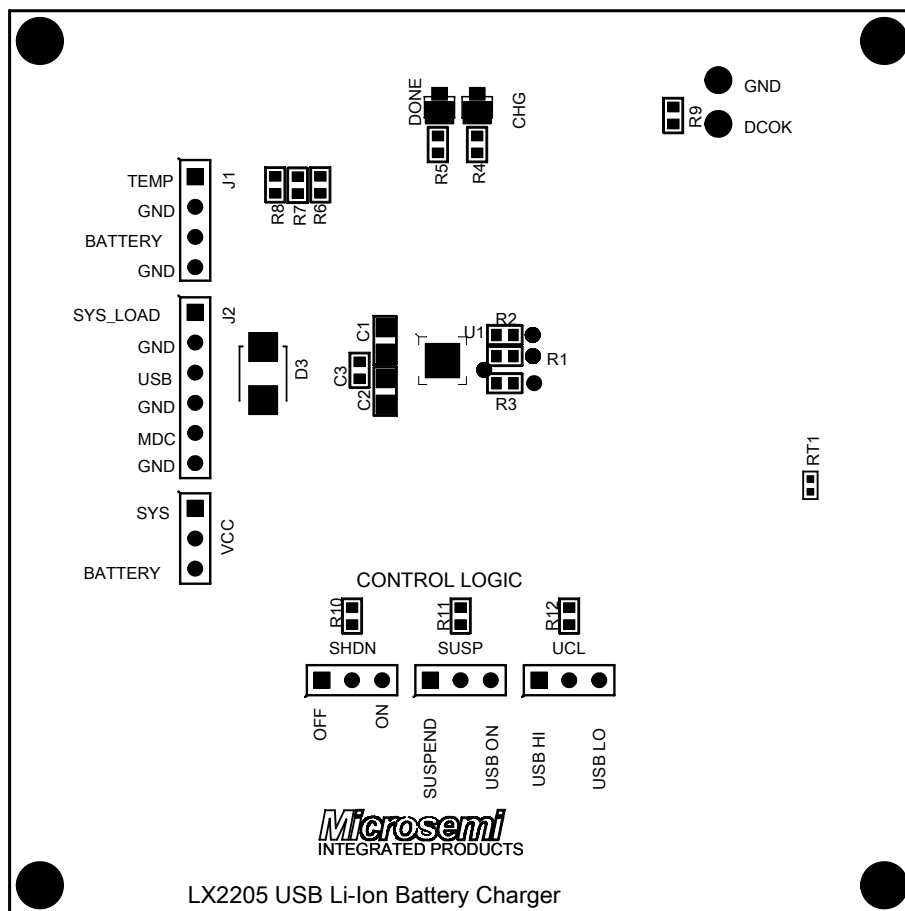


Figure 3 – LX2205 Evaluation Board Layout



## LX2205 EVALUATION BOARD BILL OF MATERIALS

## MISCELLANEOUS COMPONENTS

Line Item	Part Description	Manufacturer & Part #	Case	Reference Designators	Qty
1	Microsemi IC – Battery Charger	MICROSEMI LX2205ILQ	4x4 MLP	U1	1
2	LED - Red	Panasonic LNJ214K8ARA	0603	DONE	1
3	LED - Green	Panasonic LNJ314G8TRA	0603	CHG	1
4	Thermistor – NTC, 100k	Vishay NTHS0402N01N1003J	0402	RT1	1
5	Diode, Schottky, 2A, 20V	On Semi SS22	SMB	D3	1
6	Test Point	Keystone 5007		DCOK, GND	2
7	Header 6 pin 0.100in spacing			J2	1
8	Header 3 pin 0.100in spacing			VCC, SHDN, SUSP, UCL	4
9	Header 4 pin 0.100in spacing			J1	1
10	Printed Circuit Board	Microsemi SGE#3541 X1			1

## CAPACITORS

Line Item	Part Description	Part Number	Case	Reference Designators	Qty
1	Capacitor, X5R, 10uF, 10V, 10%	Taiyo Yuden LMK212BJ106KD-T	0805	C1,2	2
2	Capacitor, X7R, 0.1uF, 16V, 20%	Taiyo Yuden EMK107BJ104KA-T	0603	C3	1

## RESISTORS

Line Item	Part Description	Part Number	Case	Reference Designators	Qty
1	Resistor, 49.9k, 1%, 1/10W	Panasonic ERJ-3EKF4992V	0603	R1	1
2	Resistor, 20.0k, 1%, 1/10W	Panasonic ERJ-3EKF2002V	0603	R2	1
3	Resistor, 2.26k, 1%, 1/10W	Panasonic ERJ-3EKF2261V	0603	R3	1
4	Resistor, 2.49k, 1%, 1/10W	Panasonic ERJ-3EKF2491V	0603	R4-5	2
5	Resistor, 121k, 1%, 1/10W	Panasonic ERJ-3EKF1213V	0603	R6	1
6	Resistor, 24.9k, 1%, 1/10W	Panasonic ERJ-3EKF2492V	0603	R8	1
7	Resistor, 10k, 1%, 1/10W	Panasonic ERJ-3EKF1002V	0603	R9-12	4