



The Future of Analog IC Technology®

# EV5480-C-00A

## Integrated Charger with 5V/100mA DCDC Synchronous Regulator Evaluation Board

### DESCRIPTION

The EV5480-C-00A is an evaluation board for the MPQ5480, a monolithic power management solution for hearing instruments.

MPQ5480 contains a USB compatible, constant current/ constant voltage charger along with a high efficiency synchronous step down regulator. It also features cell protection and a separate power switch for powering additional power devices.

The hysteresis control scheme provides fast transient response and eases loop stabilization. Fault condition protection includes cycle by cycle current limiting, output short protection and thermal shutdown.

The EV5480-C-00A is assembled and tested with a WLCSP-16 (1.7mmx1.7mm) package.

### ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input Voltage	$V_{IN}$	4-6	V
Battery Voltage	$V_{BAT}$	2.5-5	V
Output Voltage	$V_{OUT}$	1.22	V
Output Current	$I_{OUT}$	40	mA

### FEATURES

- Wide 4V to 6V Charger Input Range
- Guaranteed 100mA DC-DC Output Current
- Feedback Voltage Accuracy: 1%
- 1.22V Default Output Voltage
- Cycle-by-Cycle Over Current Protection
- On Die Thermal Protection
- Stable with Low ESR Output Ceramic Capacitors
- Fully Assembled and Tested

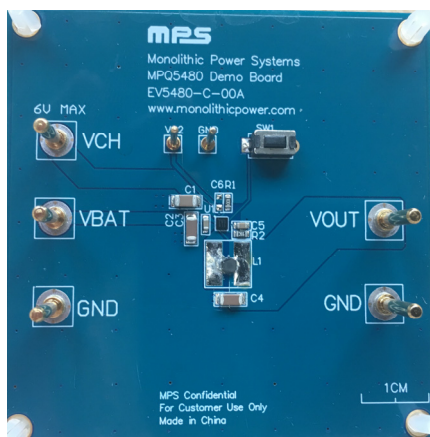
### APPLICATIONS

- Wearable Device
- Other Battery Based Portable Device

All MPS parts are lead-free, halogen-free, and adhere to the RoHS directive. For MPS green status, please visit the MPS website under Quality Assurance.

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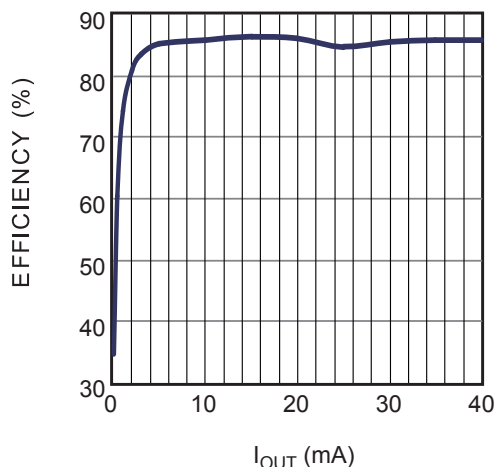
### EVALUATION BOARD



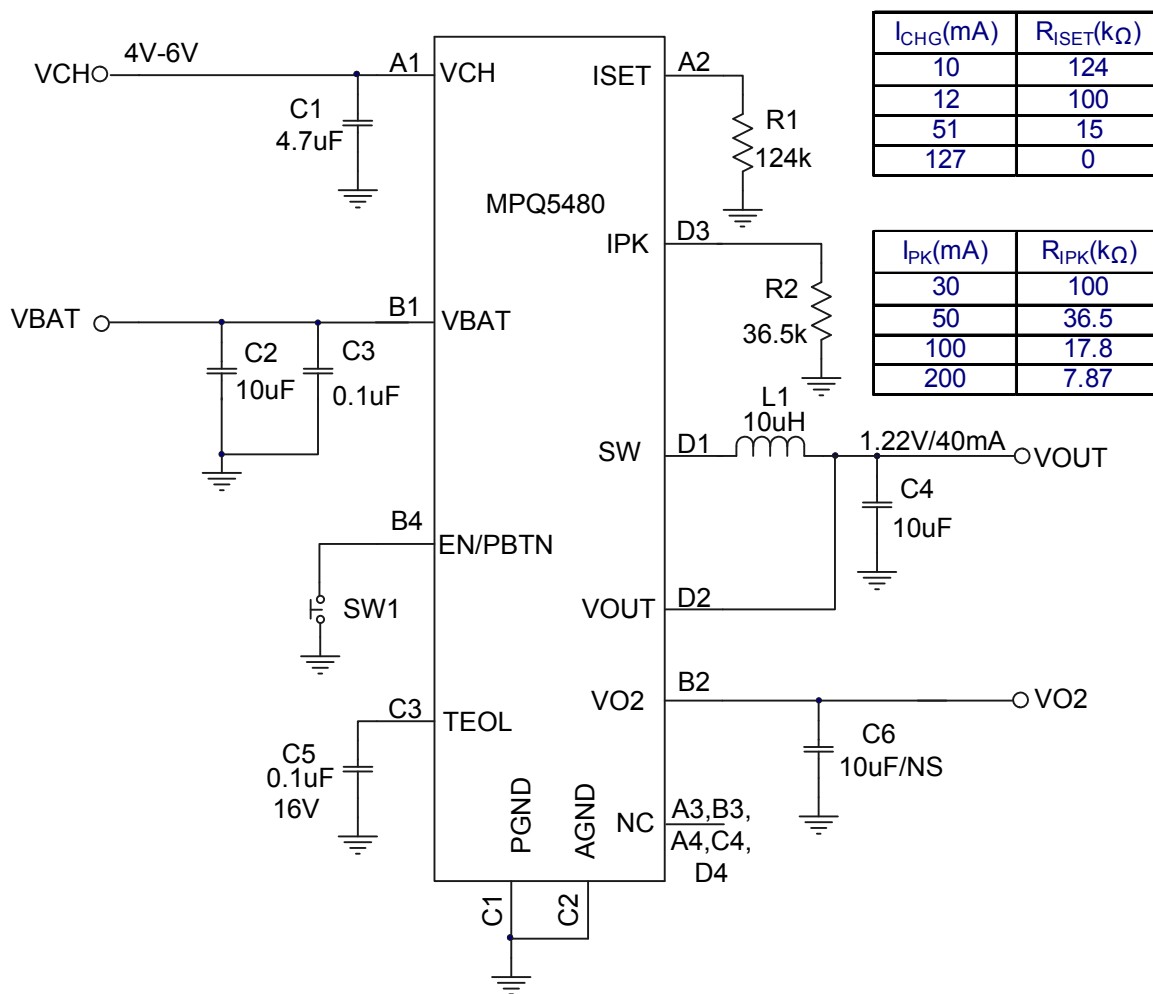
(L x W x H) 2.5" x 2.5" x 0.4"  
(6.4cm x 6.4cm x 1.0cm)

Board Number	MPS IC Number
EV5480-C-00A	MPQ5480GC

### Efficiency vs. Load Current



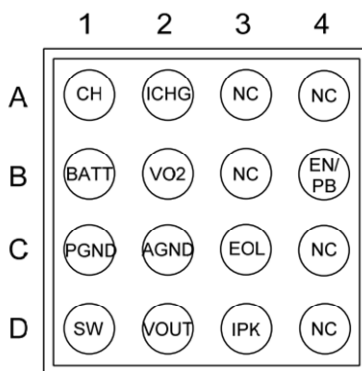
# EVALUATION BOARD SCHEMATIC



$I_{CHG}(mA)$	$R_{ISET}(k\Omega)$
10	124
12	100
51	15
127	0

$I_{PK}(mA)$	$R_{IPK}(k\Omega)$
30	100
50	36.5
100	17.8
200	7.87

## Package Reference

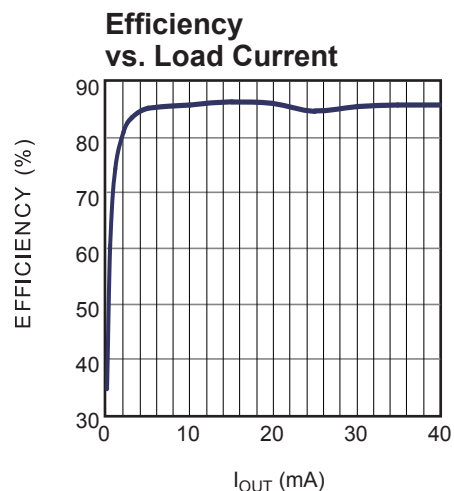


## EVQ5480-C-00A BILL OF MATERIAS

Designator	Value	Description	Package	Manufacture	Manufacture_PN
C1	4.7uF	Ceramic Cap;25V;X7R;	1206	muRata	GRM31CR71E475KA88L
C2	10uF	Ceramic Cap;10V;X7R;	1206	muRata	GRM31CR71A106KA01L
C3, C5	0.1uF	Ceramic Cap;16V;X7R;	0603	muRata	GRM188R71C104KA01D
C4	10uF	Ceramic Cap;16V;X7R;	1206	muRata	GRM31CR71C106KAC7L
C6	NS				
L1	10uH	Inductor;10uH; 936mOhm;520mA	SMD	TDK	VLS2010ET-100M
R1	124K	Film Resistor;1%;	0603	Yageo	RC0603FR-07124KL
R2	36.5K	Film Resistor;1%;	0603	Yageo	RC0603FR-0736K5L
SW1		Button		any	
U1			CSP1.7* 1.7-16	MPS	MPQ5480GC
VO2, GND		1.0 Gold Pin		HZ	
VCH, VBAT, GND, VOUT, GND		2.0 Gold Pin		HZ	

## TYPICAL PERFORMANCE CHARACTERISTICS

$V_{BATT} = 3.8V$ ,  $V_{CH}=5V$ ,  $L=10\mu H$ ,  $C_{IN}= 10\mu F$ ,  $C_{OUT}=10\mu F$ ,  $T_A=+30^{\circ}C$ , unless otherwise noted.



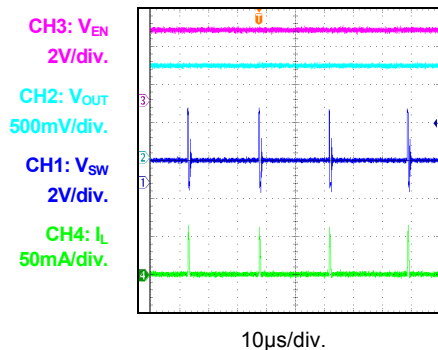
# TYPICAL PERFORMANCE CHARACTERISTICS

$V_{BATT} = 3.8V$ ,  $V_{CH} = 5V$ ,  $L = 10\mu H$ ,  $C_{IN} = 10\mu F$ ,  $C_{OUT} = 10\mu F$ ,  $T_A = +30^\circ C$ , unless otherwise noted.

## DC/DC Section

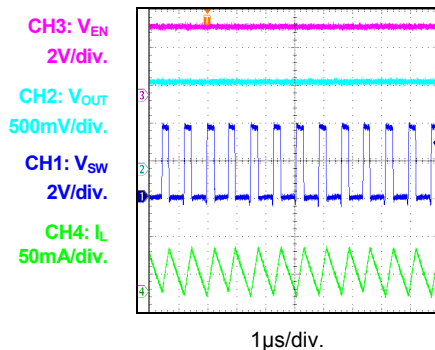
### Steady State

$I_{OUT} = 1mA$



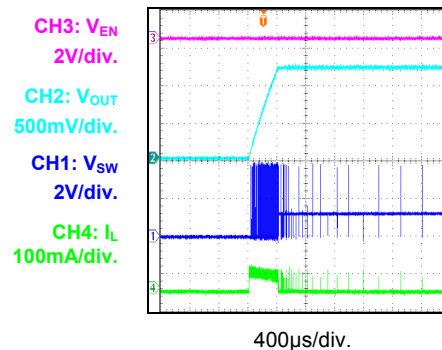
### Steady State

$I_{OUT} = 30mA$



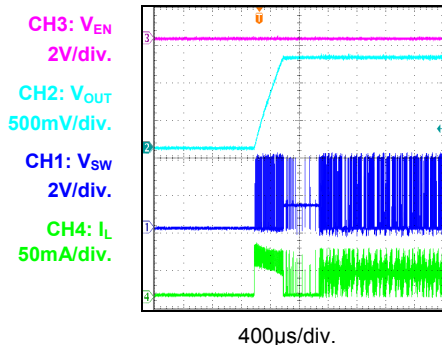
### Push-button On

$I_{OUT} = 0A$



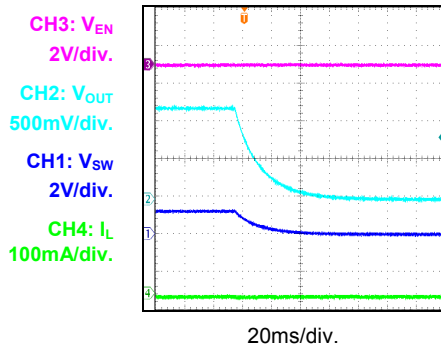
### Push-button On

$I_{OUT} = 30mA$



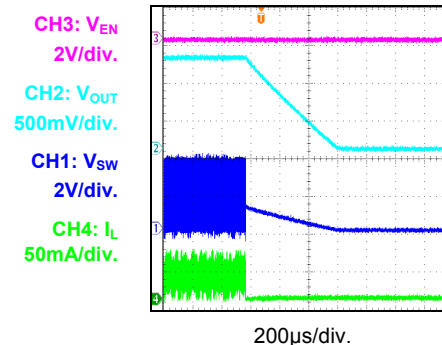
### Push-button Off

$I_{OUT} = 0A$

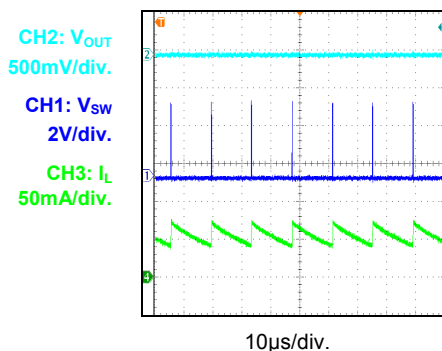


### Push-button Off

$I_{OUT} = 30mA$

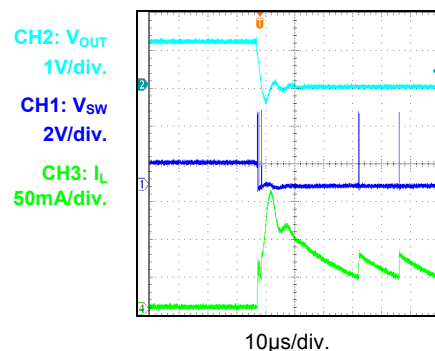


### SCP Steady State



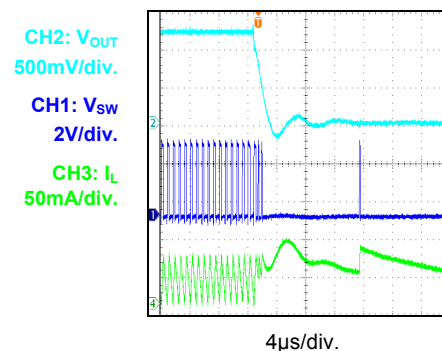
### SCP Entry

$I_{OUT} = 0A$  to Short Circuit



### SCP Entry

$I_{OUT} = 30mA$  to Short Circuit



# TYPICAL PERFORMANCE CHARACTERISTICS

$V_{BATT} = 3.8V$ ,  $V_{CH} = 5V$ ,  $L = 10\mu H$ ,  $C_{IN} = 10\mu F$ ,  $C_{OUT} = 10\mu F$ ,  $T_A = +30^\circ C$ , unless otherwise noted.

## DC/DC Section

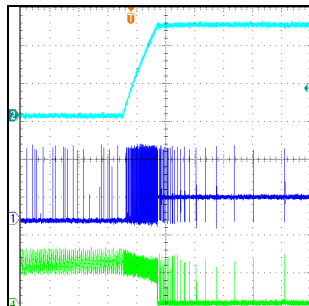
### SCP Recovery

Short Circuit to  $I_{OUT} = 0$

CH2:  $V_{OUT}$   
500mV/div.

CH1:  $V_{sw}$   
2V/div.

CH3:  $I_L$   
50mA/div.



200µs/div.

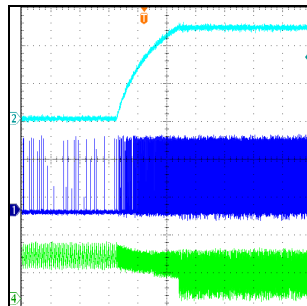
### SCP Recovery

Short Circuit to  $I_{OUT} = 30mA$

CH2:  $V_{OUT}$   
500mV/div.

CH1:  $V_{sw}$   
2V/div.

CH3:  $I_L$   
50mA/div.



200µs/div.

### Thermal Shutdown

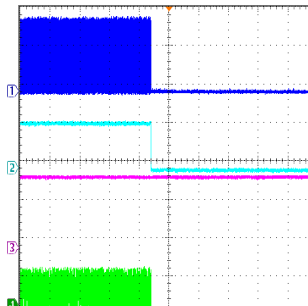
$I_{OUT} = 30mA$

CH1:  $V_{sw}$   
2V/div.

CH2:  $V_{OUT}$   
1V/div.

CH3:  $V_{BATT}$   
2V/div.

CH4:  $I_L$   
50mV/div.

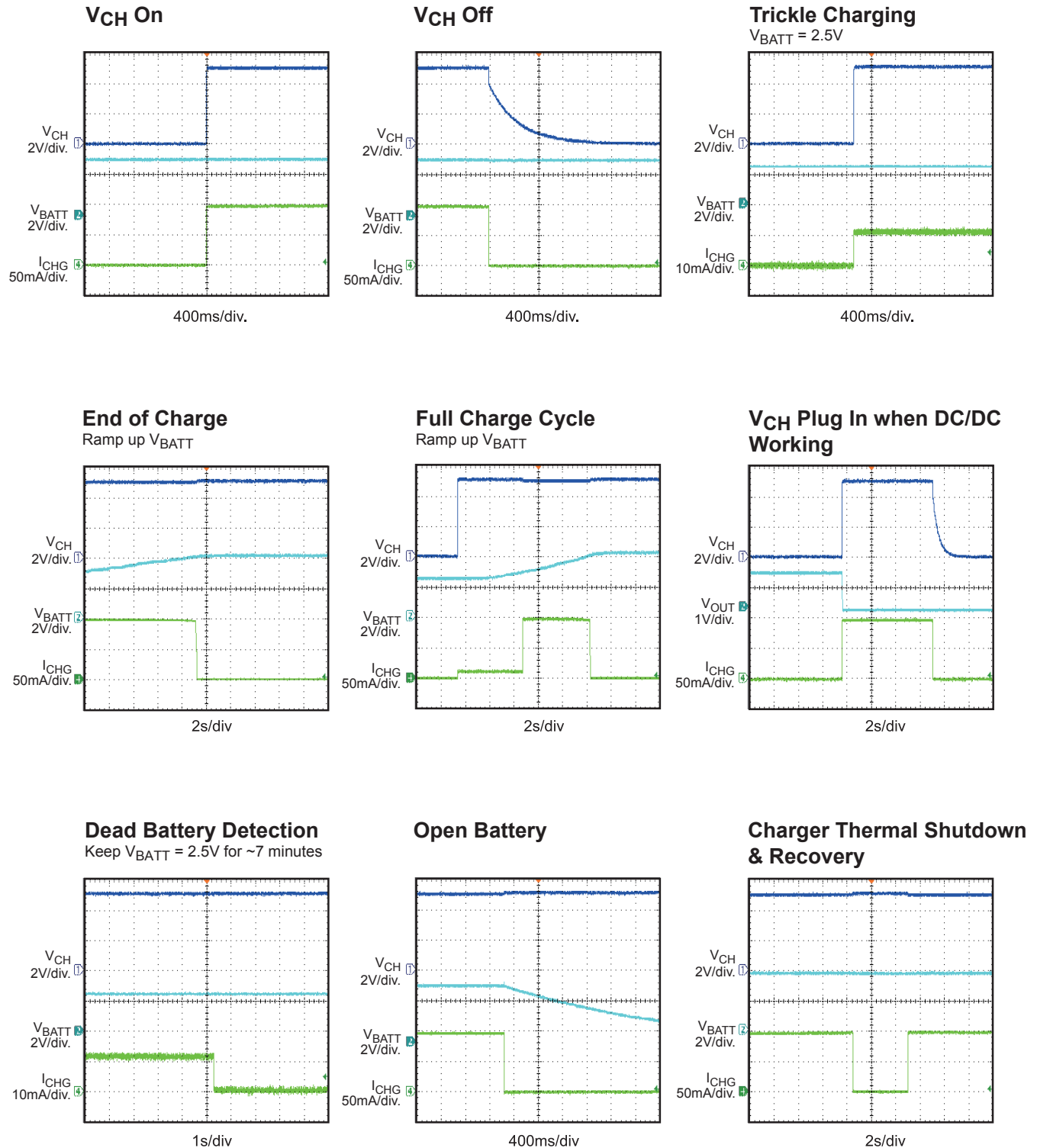


1s/div.

## TYPICAL PERFORMANCE CHARACTERISTICS

$V_{BATT} = 3.8V$ ,  $V_{CH} = 5V$ ,  $R_{ICHG} = 2.49k\Omega$ ,  $L = 10\mu H$ ,  $C_{IN} = 10\mu F$ ,  $C_{OUT} = 10\mu F$ ,  $T_A = +30^\circ C$ , unless otherwise noted.

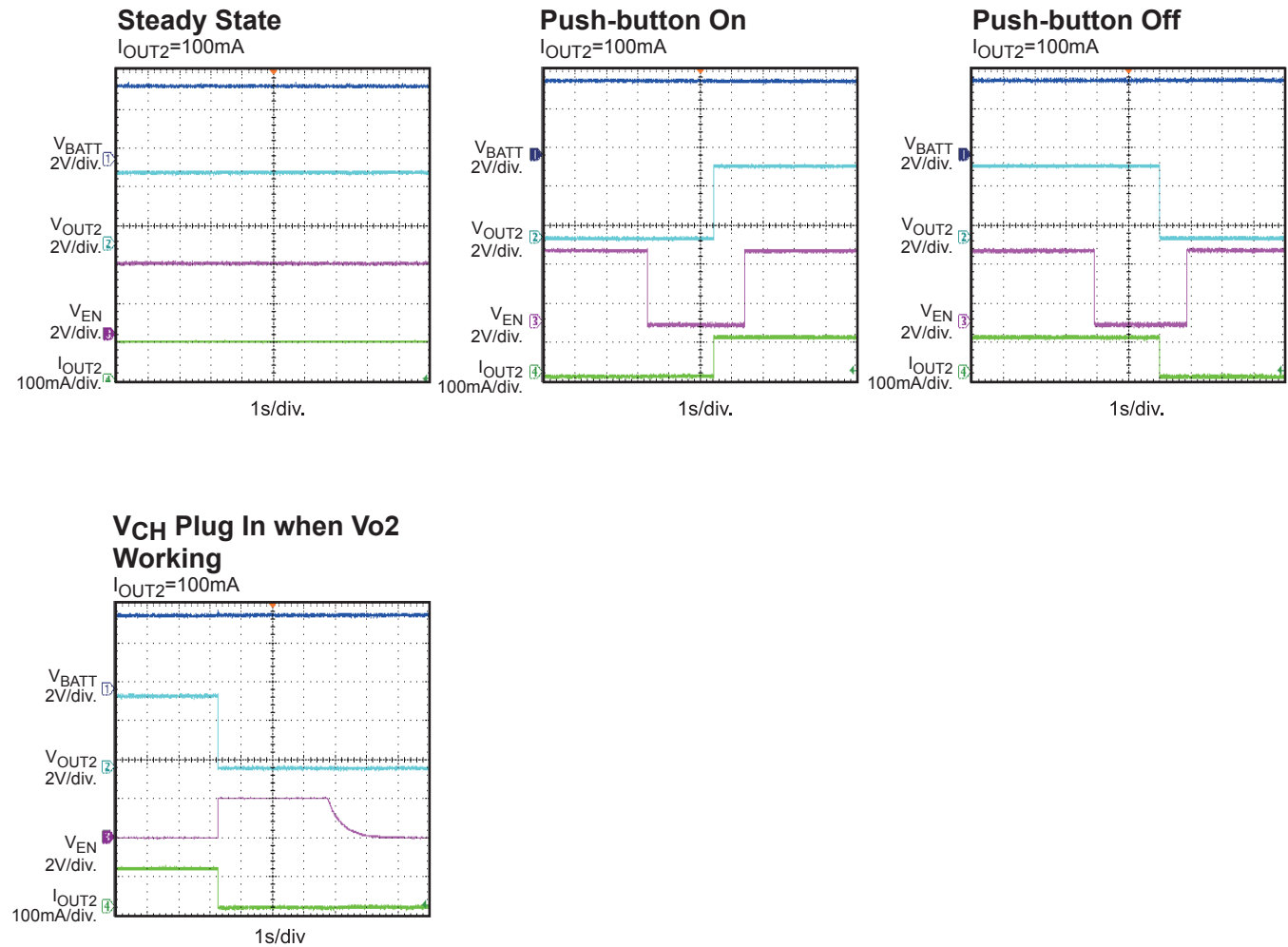
### Charger Section



## TYPICAL PERFORMANCE CHARACTERISTICS

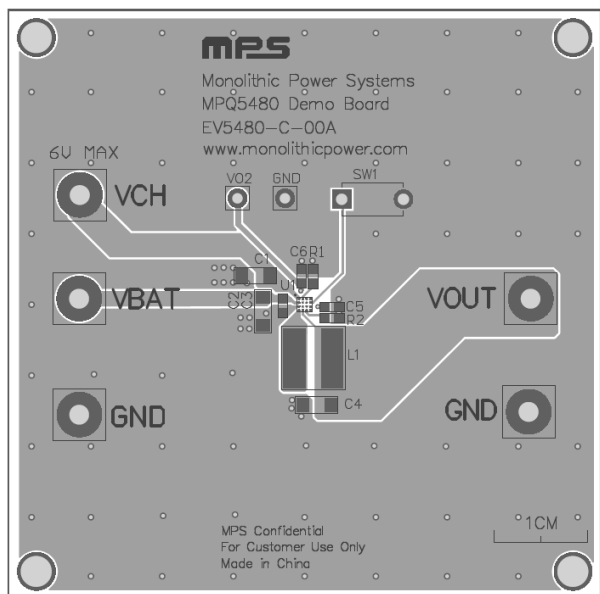
$V_{BATT} = 3.8V$ ,  $V_{CH} = 5V$ ,  $L = 10\mu H$ ,  $C_{IN} = 10\mu F$ ,  $C_{OUT} = 10\mu F$ ,  $T_A = +30^\circ C$ , unless otherwise noted.

### Vo2 Function

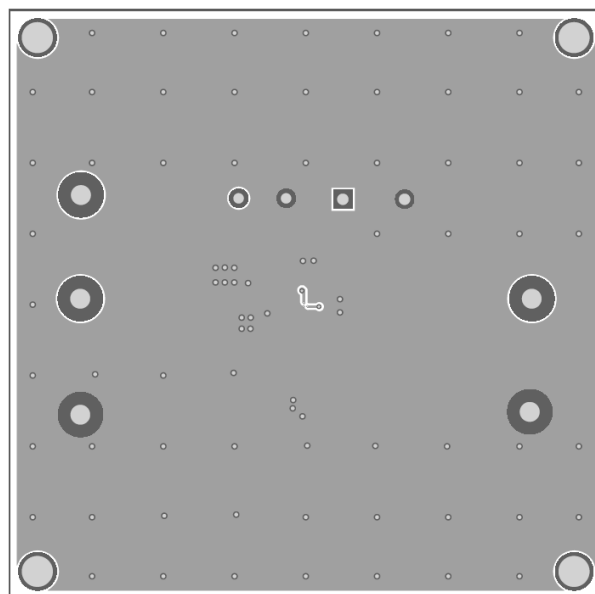




## PRINTED CIRCUIT BOARD LAYOUT



**Figure 1—Top Silk Layer & Top Layer**



**Figure 2—Bottom Layer**

## QUICK START GUIDE

1. Connect the positive and negative terminals of the load to the VOUT and GND pins, respectively. Be aware that electronic load represents negative impedance to the regulator and if set it to a too high current, the SCP protection may be triggered at startup.
2. Preset the power supply output to expected value (4V-6V), and then turn it off.
3. Connect the positive and negative terminals of the power supply output to the VCH and GND pins, respectively.
4. Connect the positive and negative terminals of a battery (2.5V to 5V) to the VBAT and GND pins, respectively.
5. Push the S1 button for longer than 2.2s, the DC/DC will be turned on automatically; Push the S1 button for longer than 2.2s to shutdown it.
6. Turn the power supply on, the charger will be turned on automatically to charge the battery;
7. To use the EOL (End of life) function, connecting a 0.1 $\mu$ F capacitor on TEOL pin to provide voltage filtering for low battery detection.

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