EV2181-TL-00A

1A Synchronous Step-down Converter Evaluation Board

DESCRIPTION

The MP2181 is a monolithic, step-down, switch-mode converter with built-in internal power MOSFETs. It achieves 1A continuous output current from a 2.5V-to-5.5V input voltage with excellent load and line regulation. The output voltage can be regulated to as low as 0.6V.

The Constant-On-Time control scheme provides fast transient response and eases loop stabilization. Fault protections include cycle-bycycle current limiting and thermal shutdown.

The MP2181 is available in an ultra-small SOT583 package and requires a minimal number of readily available standard external components.

The MP2181 is ideal for a wide range of applications including high performance DSPs, wireless power, portable and mobile devices, and other low-power systems.

ELECTRICAL SPECIFICATION

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	2.5 – 5.5	V
Output Voltage	V_{OUT}	1.2	V
Output Current	I_{OUT}	1A	A

Note: V_{IN}<3.3V may need more input capacitor.

FEATURES

- Low I_Q: 21μA
- 1.2MHz Switching Frequency
- EN for Power Sequencing
- 1% FB Accuracy
- Wide 2.5V-to-5.5V Operating Input Range
- Output Adjustable from 0.6V
- Up to 1A Output Current
- 90mΩ and 50mΩ Internal Power MOSFET Switches
- 100% Duty On
- Output Discharge
- Vo OVP
- External Soft Start Control
- Short-Circuit Protection with Hiccup Mode
- Power Good
- Available in a SOT583 Package

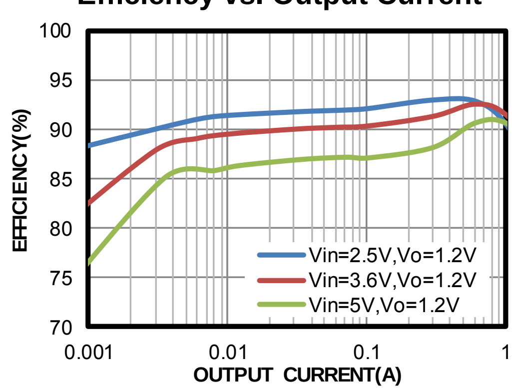
APPLICATIONS

- Wireless/Networking Cards
- Portable Instruments
- Battery Powered Devices
- Low Voltage I/O System Power
- Multi Function Printer

EV2181-TL-00A EVALUATION BOARD

Board Number	MPS IC Number
EV2181-TL-00A	MP2181GTL

Efficiency vs. Output Current



EVALUATION BOARD SCHEMATIC

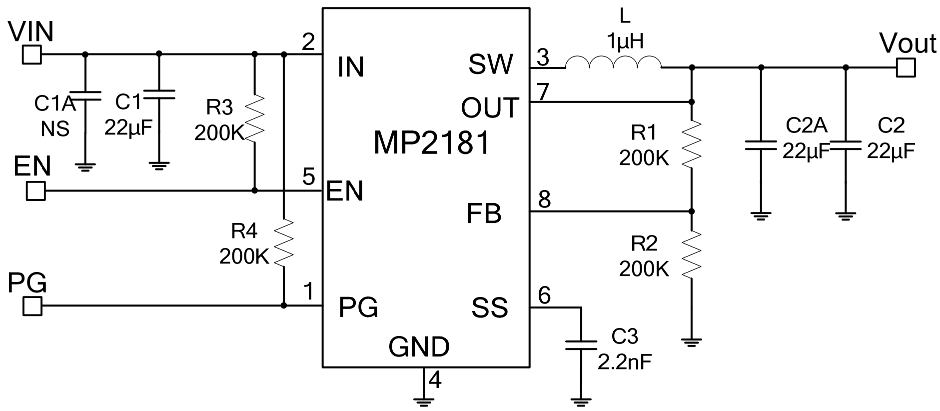


Figure 1—Typical Application Circuit for MP2181GTL

Note: V_{IN}<3.3V may need more input capacitor.

EV2181-TL-00A BILL OF MATERIALS

Qty	RefDes	Vaue	Description	Package	Manufacturer	Manufacturer/PN
0	C1A	NS				
3	C1,C2, C2A	22µF	Ceramic Cap.,16V,X5R	0805	Murata	GRM21BR61C226ME44L
1	C3	2.2nF	Ceramic Cap.,50V,X7R	0603	Murata	GRM188R71H222KA01D
4	R1,R2, R3,R4	200k	Film Res,1%,0603,200K	0603	YAGEO	RC0603FR-07200KL
1	L	1µH	Inductor,RDC=27mOhm, Isat=9.0A	4020	WE	74437324010
1	U1	MP2181	Synchronous Step-Down switcher	SOT583	MPS	MP2181GTL

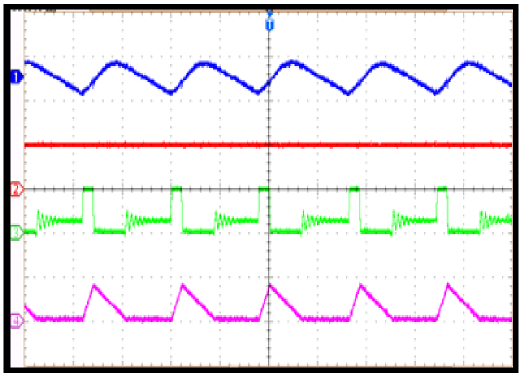
EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT} = 1.2V, L =1µH, C_{OUT}=44µF, T_A = +25ºC, unless otherwise noted.

Steady State

V_{IN}=5V, V_{OUT}=1.2V, I_{OUT}=0.1A

CH1: V_{OUT}/AC 10mV/div.
CH2: V_{IN} 5V/div.
CH3: SW 5V/div.
CH4: I_L 1A/div.

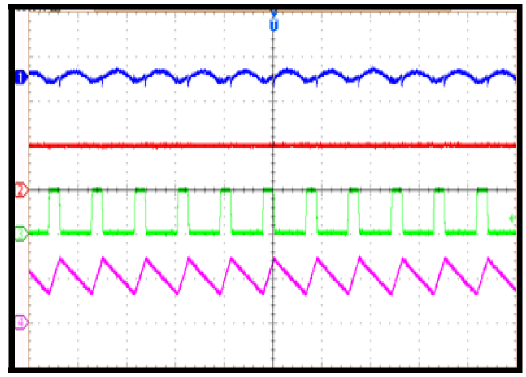


1µs/div.

Steady State

V_{IN}=5V, V_{OUT}=1.2V, I_{OUT}=1A

CH1: V_{OUT}/AC 10mV/div.
CH2: V_{IN} 5V/div.
CH3: SW 5V/div.
CH4: I_L 1A/div.

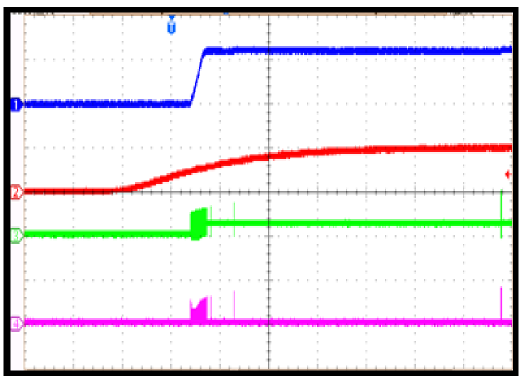


1µs/div.

VIN Power On

V_{IN}=5V, V_{OUT}=1.2V, I_{OUT}=0A

CH1: V_{OUT} 1V/div.
CH2: V_{IN} 5V/div.
CH3: SW 5V/div.
CH4: I_L 1A/div.

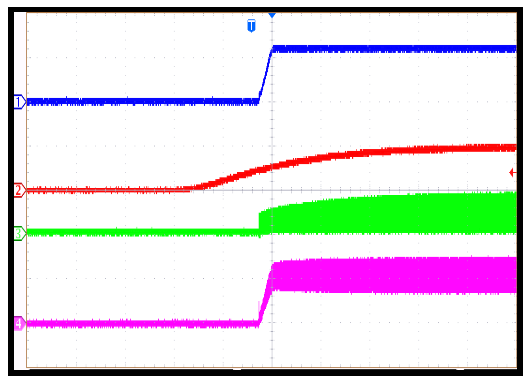


2ms/div.

VIN Power On

V_{IN}=5V, V_{OUT}=1.2V, I_{OUT}=1A

CH1: V_{OUT} 1V/div.
CH2: V_{IN} 5V/div.
CH3: SW 5V/div.
CH4: I_L 1A/div.

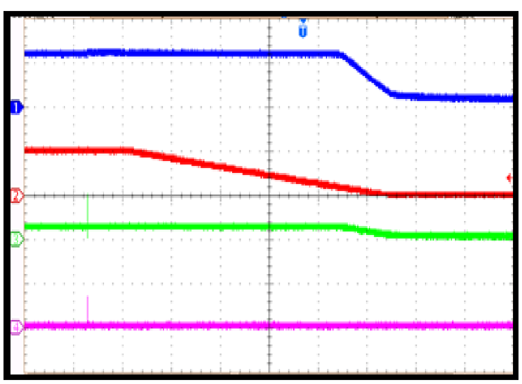


2ms/div.

VIN Power Off

V_{IN}=5V, V_{OUT}=1.2V, I_{OUT}=0A

CH1: V_{OUT} 1V/div.
CH2: V_{IN} 5V/div.
CH3: SW 5V/div.
CH4: I_L 1A/div.

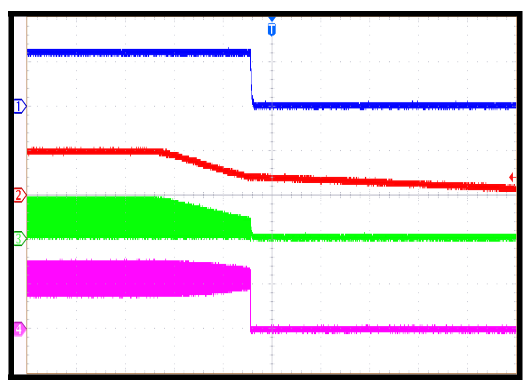


40ms/div.

VIN Power Off

V_{IN}=5V, V_{OUT}=1.2V, I_{OUT}=1A

CH1: V_{OUT} 1V/div.
CH2: V_{IN} 5V/div.
CH3: SW 5V/div.
CH4: I_L 1A/div.



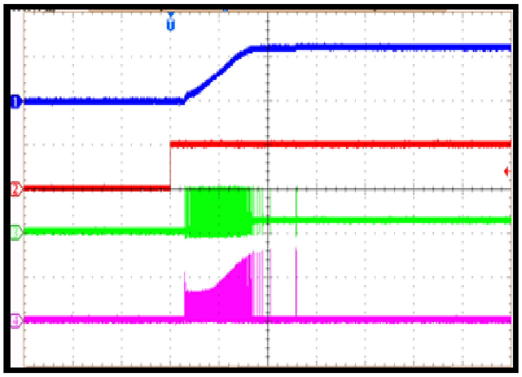
2ms/div.

EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT} = 1.2V, L =1µH, C_{OUT}=44µF, T_A = +25ºC, unless otherwise noted.

EN Power On
V_{IN}=5V, V_{OUT}=1.2V, I_{OUT}=0A

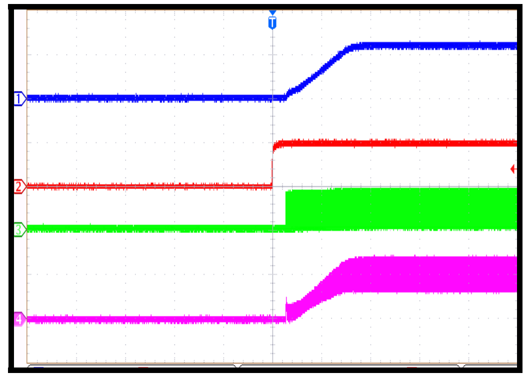
CH1: V_{OUT} 1V/div.
CH2: V_{EN} 5V/div.
CH3: SW 5V/div.
CH4: I_L 500mA/div.



400µs/div.

EN Power On
V_{IN}=5V, V_{OUT}=1.2V, I_{OUT}=1A

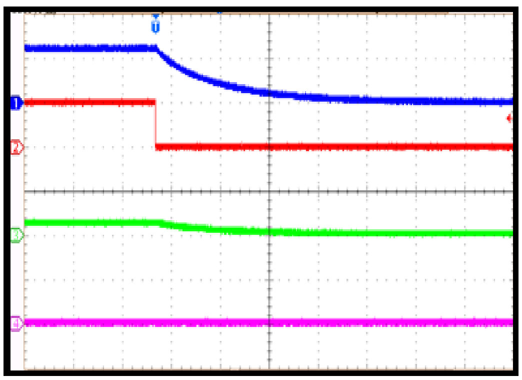
CH1: V_{OUT} 1V/div.
CH2: V_{EN} 5V/div.
CH3: SW 5V/div.
CH4: I_L 1A/div.



400µs/div.

EN Power Off
V_{IN}=5V, V_{OUT}=1.2V, I_{OUT}=0A

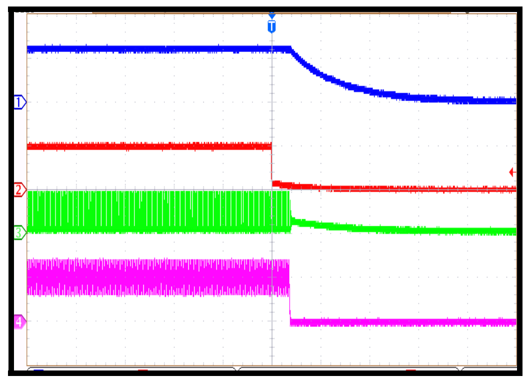
CH1: V_{OUT} 1V/div.
CH2: V_{EN} 5V/div.
CH3: SW 5V/div.
CH4: I_L 500mA/div.



4ms/div.

EN Power Off
V_{IN}=5V, V_{OUT}=1.2V

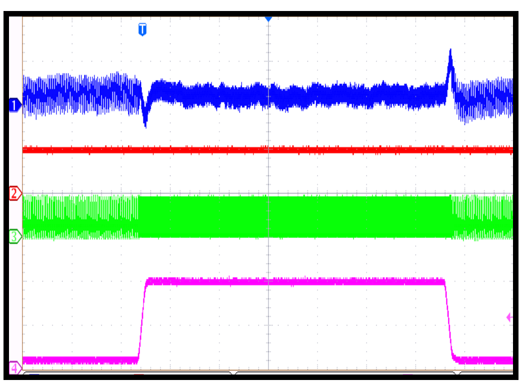
CH1: V_{OUT} 1V/div.
CH2: V_{EN} 5V/div.
CH3: SW 5V/div.
CH4: I_L 1A/div.



40µs/div.

Load Transient
V_{IN}=5V, V_{OUT}=1.2V, I_{OUT}=0.1~1A

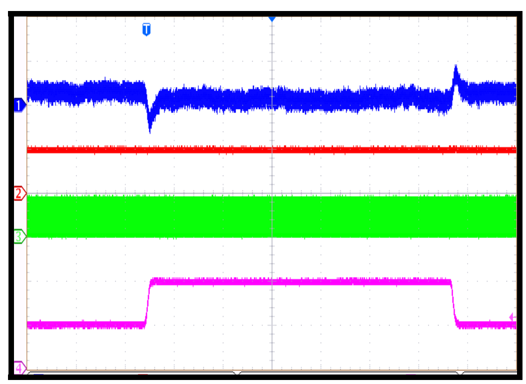
CH1: V_{OUT}/AC 10mV/div.
CH2: V_{IN} 5V/div.
CH3: GOK 5V/div.
CH4: I_{IN} 500mA/div.



80µs/div.

Load Transient
V_{IN}=5V, V_{OUT}=1.2V

CH1: V_{OUT}/AC 10mV/div.
CH2: V_{IN} 5V/div.
CH3: GOK 5V/div.
CH4: I_{IN} 500mA/div.



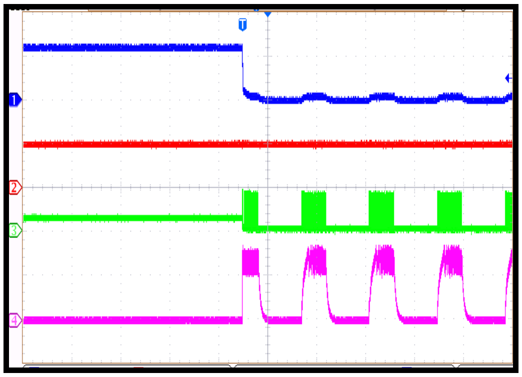
80µs/div.

EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT} = 1.2V, L =1µH, C_{OUT}=44µF, T_A = +25ºC, unless otherwise noted.

Short Entry

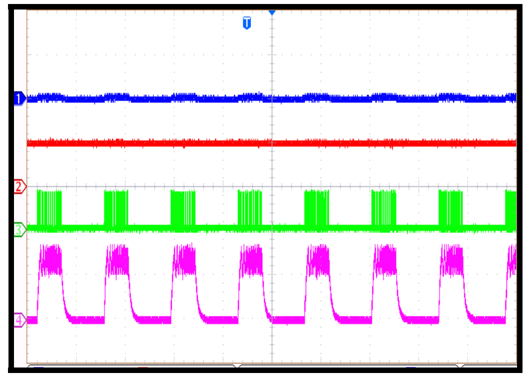
V_{IN}=5V, V_{OUT}=1.2V, I_{OUT}=0A



10µs/div.

Short State

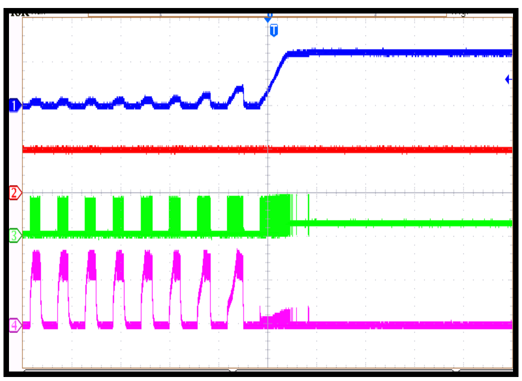
V_{IN}=5V, V_{OUT}=1.2V, I_{OUT}=0A



400µs/div.

Short Recovery

V_{IN}=5V, V_{OUT}=1.2V, I_{OUT}=0A



1ms/div.

CIRCUIT BOARD LAYOUT

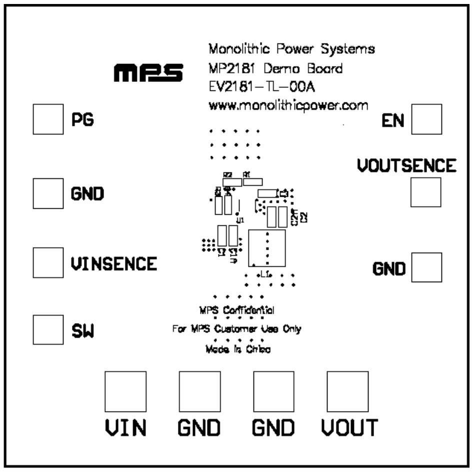


Figure 3—Top Silk Layer

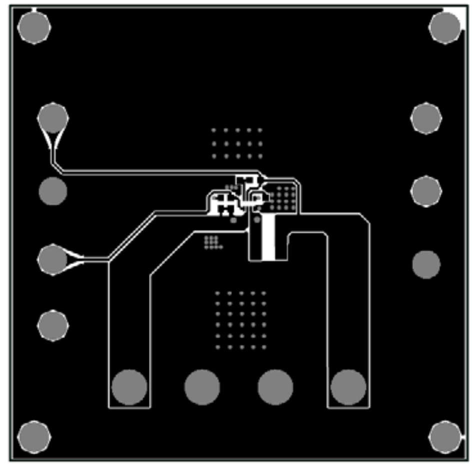


Figure 4—Top Layer

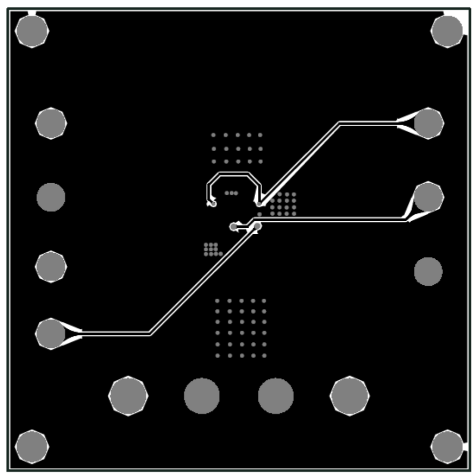


Figure 5—Bottom Layer

QUICK START GUIDE (MP2181GTL)

The output voltage of this board is set externally which can be regulated as low as 0.6V by operating from +2.5V to +5.5V input. The default output voltage of this board is set to 1.2V.

1. Connect the positive and negative terminals of the load to the VOUT and GND pins, respectively.
2. Preset the power supply output between 2.5V and 5.5V, and then turn off the power supply.
3. Connect the positive and negative terminals of the power supply output to the VIN and GND pins, respectively.
4. Turn the power supply on. The board will automatically start up.
5. The Output Voltage can be changed by varying R2. Choose R1 to 200k typically. R2 is then given by:

$$R2 = \frac{R1}{\frac{V_{out}}{0.6} - 1}$$

Example: For Vout= 1.8V, R1=200kΩ, R2=100kΩ.