EV2141N-TF-00A

1A Synchronous Step-down Converter with 11µA Iq in a Tiny SOT

The Future of Analog IC Technology

DESCRIPTION

The MP2141N is a monolithic, step-down, switch-mode converter with built-in internal power MOSFETs. It achieves 1A continuous output current from a 2.3V-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-by-cycle current limiting and thermal shutdown.

The MP2141N is available in a tiny SOT package and requires a minimal number of readily available standard external components.

The MP2141N 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}	2.3 – 5.5	V
Output Voltage	V_{OUT}	1.2	V
Output Current	I_{OUT}	1	A

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

FEATURES

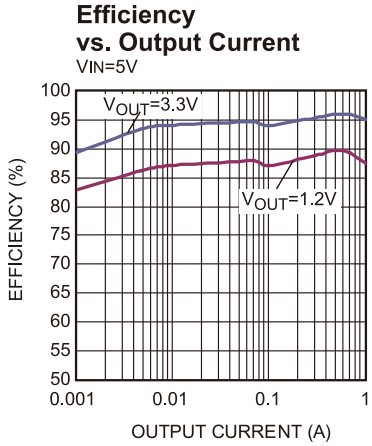
- Low I_Q: 11µA
- 2.2MHz Switching Frequency
- EN for Power Sequencing
- Power Good Only for Fixed Output Version
- Wide 2.3V-to-5.5V Operating Input Range
- Output Adjustable from 0.6V
- Up to 1A Output Current
- 120mΩ and 80mΩ Internal Power MOSFET Switches
- Output Discharge
- 100% Duty Cycle
- Short-Circuit Protection with Hiccup Mode
- Stable with Low ESR Output Ceramic Capacitors
- Available in a Tiny SOT Package

APPLICATIONS

- Wireless/Networking Cards
- Portable and Mobile Devices
- Battery Powered Devices
- Low Voltage I/O System Power

EV2141N-TF-00A EVALUATION BOARD

Board Number	MPS IC Number
EV2141N-TF-00A	MP2141NGTF



EVALUATION BOARD SCHEMATIC

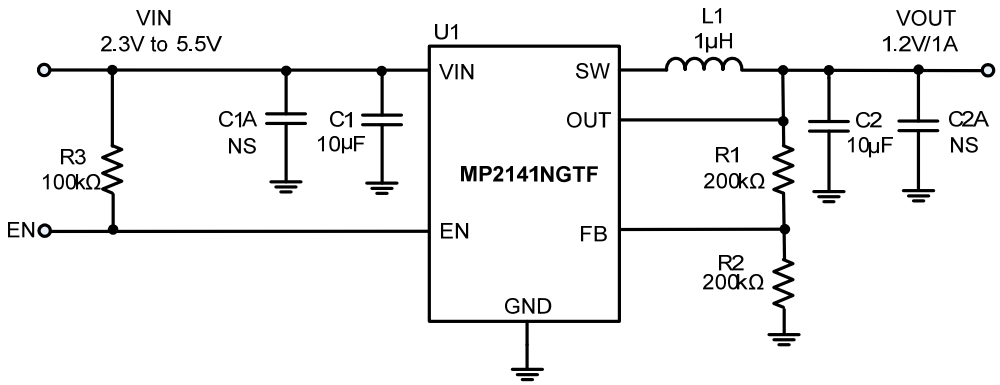


Figure 1—Typical Application Circuit for MP2141NGTF

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

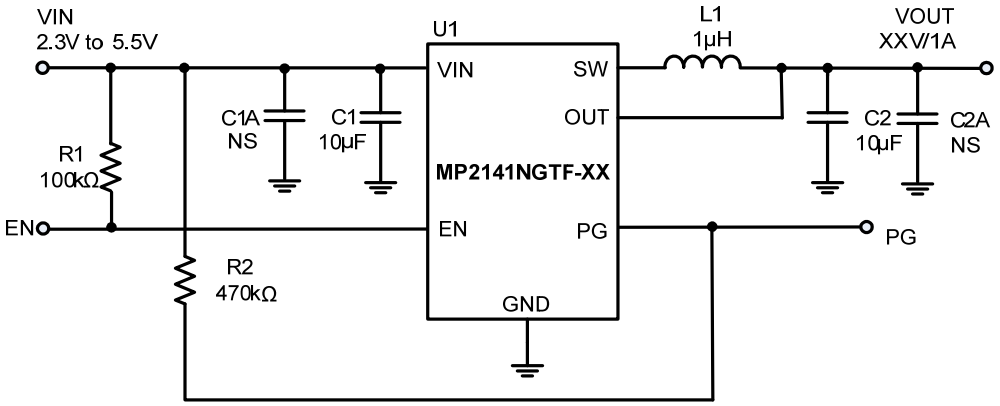


Figure 2—Typical Application Circuit for MP2141NGTF-XX

Note: 1. V_{IN}<3.3V may need more input capacitor;
2. V_{IN}>V_{OUT} for application.

EV2141N-TF-00A BILL OF MATERIALS

Table 1. MP2141NGTF Bill of Materials

Qty	RefDes	Value	Description	Package	Manufacturer	Manufacturer P/N
2	C1, C2	10μF	Ceramic Cap,10V,X5R	0805	muRata	GRM21BR61A106KE19L
1	R1	200k	Film Res.1%,	0402	any	
1	R2	200k	Film Res.1%	0402	any	
1	R3	100k	Film Res.1%	0402	any	
1	L1	1.0μH	Inductor, Rdc=45mΩ, Isat=3.8A	2520	CYNTEC CO. LTD.	PIFE25201B-1R0MS
1	U1		Step-down Switcher	Tiny SOT	MPS	MP2141NGTF
0	C1A, C2A	NS				

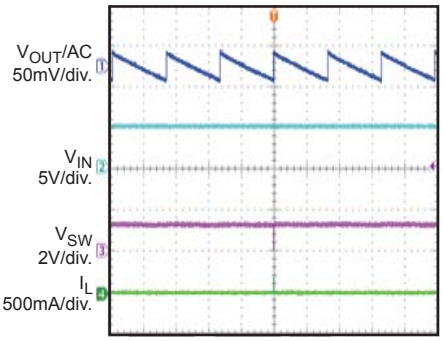
Table 2. MP2141NGTF-XX Bill of Materials

Qty	RefDes	Value	Description	Package	Manufacturer	Manufacturer P/N
2	C1, C2	10μF	Ceramic Cap,10V,X5R	0805	muRata	GRM21BR61A106KE19L
1	R1	100k	Film Res.1%	0402	any	
1	R2	470k	Film Res.1%	0402	any	
1	L1	1.0μH	Inductor, Rdc=45mΩ, Isat=3.8A	2520	CYNTEC CO. LTD.	PIFE25201B-1R0MS
1	U1		Step-down Switcher	Tiny SOT	MPS	MP2141NGTF-XX
0	C1A, C2A	NS				

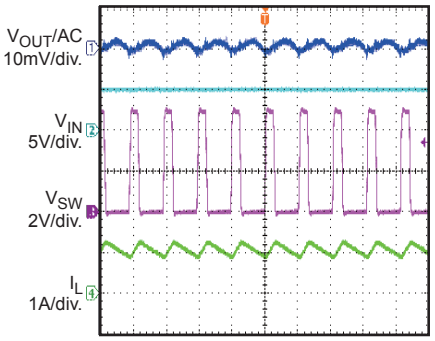
EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT} = 1.2V, L =1.0µH, T_A = +25ºC, unless otherwise noted.

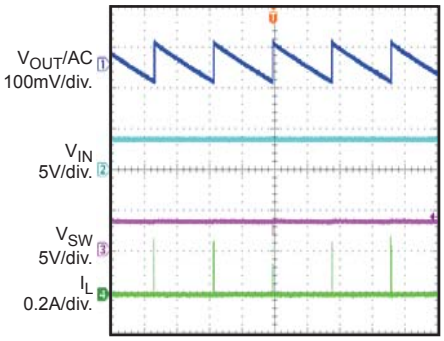
Steady State
without Load



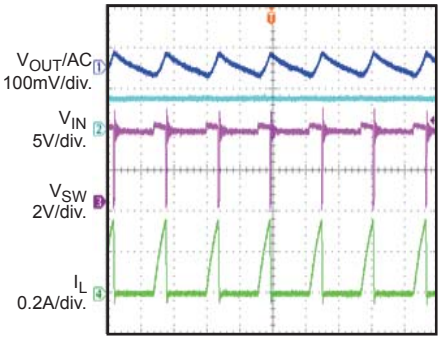
Steady State
with 1A Load



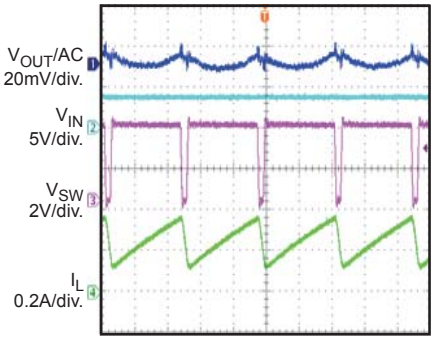
Steady State
V_{IN}=3.6V, V_{OUT}=3.3V, I_{OUT}=0A , AAM



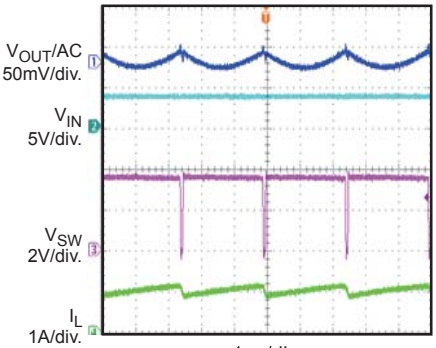
Steady State
V_{IN}=3.6V, V_{OUT}=3.3V, I_{OUT}=0.05A, AAM



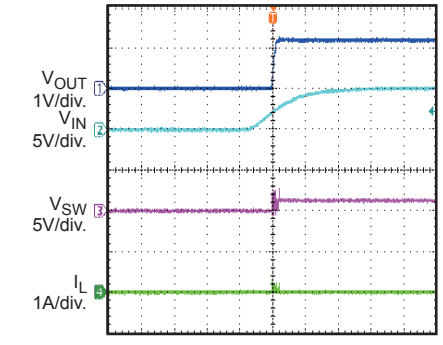
Steady State
V_{IN}=3.6V, V_{OUT}=3.3V, I_{OUT}=0.25A, AAM



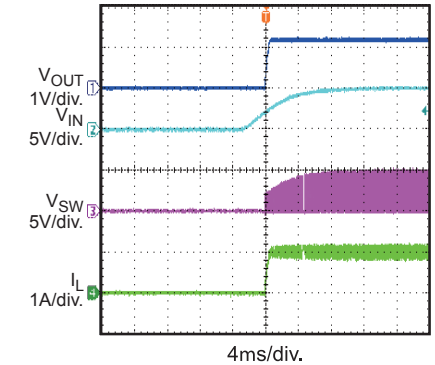
Steady State
V_{IN}=3.6V, V_{OUT}=3.3V, I_{OUT}=1A



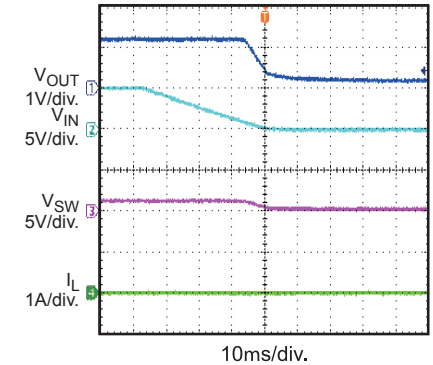
V_{IN} Power Up
without Load



V_{IN} Power Up
with 1A Load



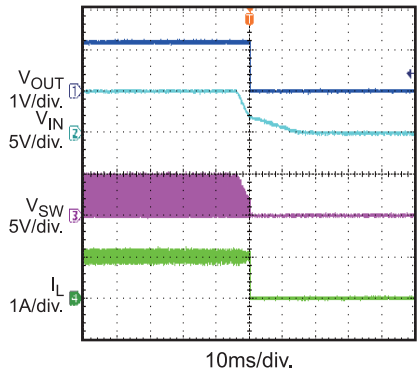
V_{IN} Shut Down
without Load



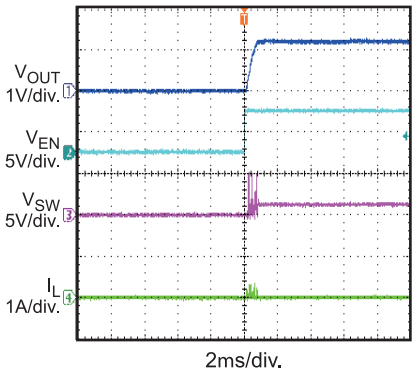
EVB TEST RESULTS *(continued)*

Performance waveforms are tested on the evaluation board.
V_{IN} = 5V, V_{OUT} = 1.2V, L =1.0µH, T_A = +25ºC, unless otherwise noted.

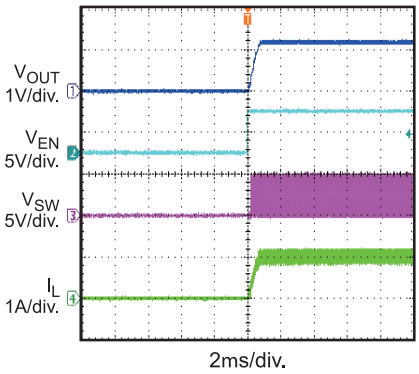
V_{IN} Shut Down
with 1A Load



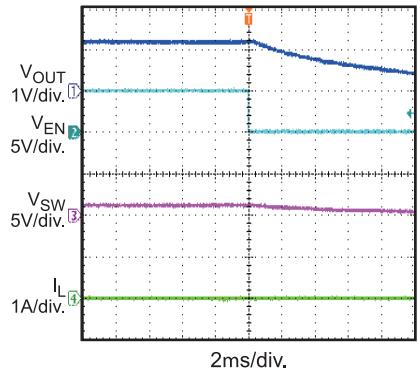
EN Start Up
without Load



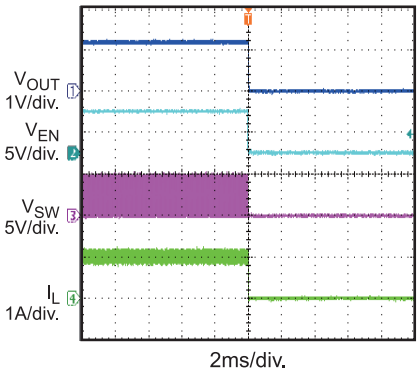
EN Start Up
with 1A Load



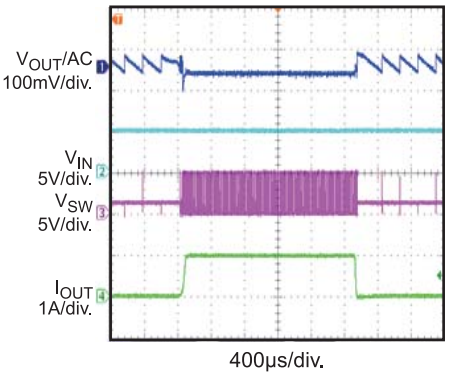
EN Shut Down
without Load



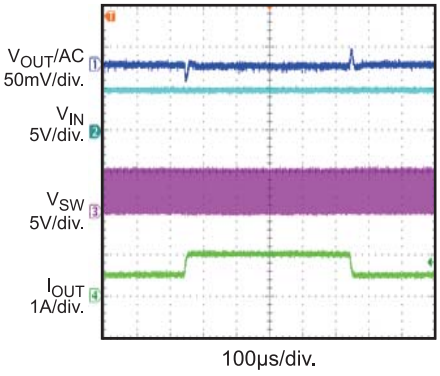
EN Shut Down
with 1A Load



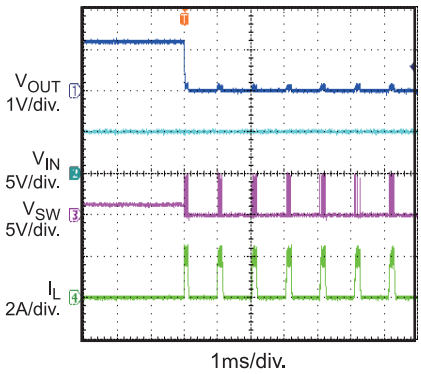
Load Transient Response
I_{OUT}= 0A to 1A



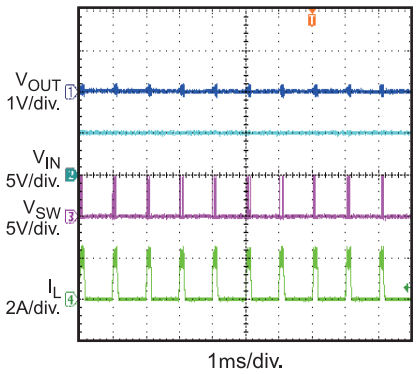
Load Transient Response
I_{OUT}= 0.5A to 1A



Short Circuit Entry



Short Circuit



EVB TEST RESULTS *(continued)*

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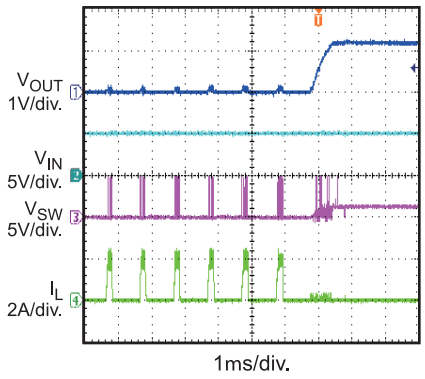
Short Circuit Recovery



PRINTED CIRCUIT BOARD LAYOUT

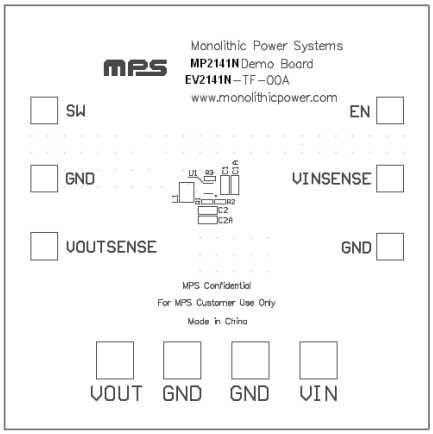


Figure 3—Top Silk Layer

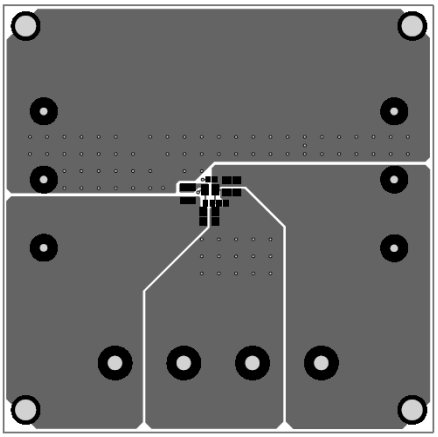


Figure 4—Top Layer

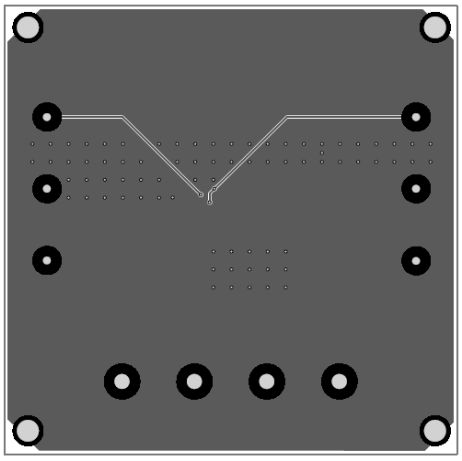


Figure 5—Bottom Layer