

### 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 <sub>IN</sub>	2.3 – 5.5	V
Output Voltage	V <sub>OUT</sub>	1.2	V
Output Current	I <sub>OUT</sub>	1	A

Note: V<sub>IN</sub><3.3V may need more input capacitor.

### FEATURES

- Low I<sub>Q</sub>: 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

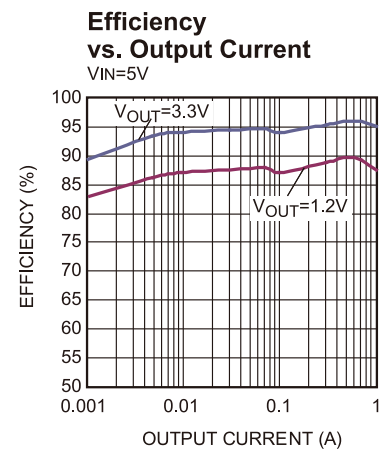
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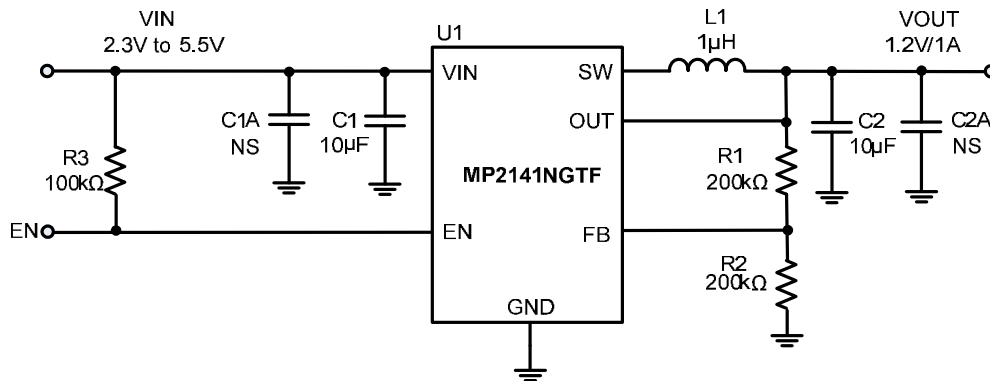
### EV2141N-TF-00A EVALUATION BOARD



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

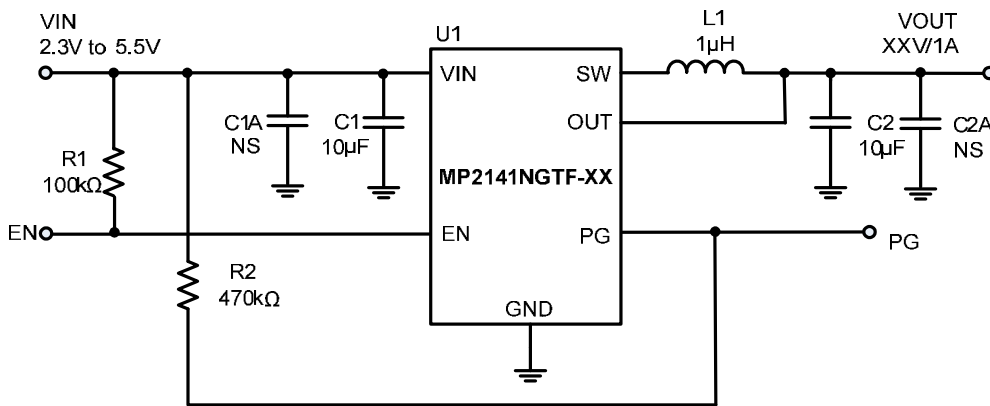


## EVALUATION BOARD SCHEMATIC



**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	10 $\mu$ F	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	1.0 $\mu$ H	Inductor, Rdc=45m $\Omega$ , Isat=3.8A	2520	CYNTEC CO. LTD.	PIFE25201B-1R0MS
1	U1		Step-down Switcher	Tiny SOT	MPS	MP2141NGTF
0	C1A, C2A	NS				

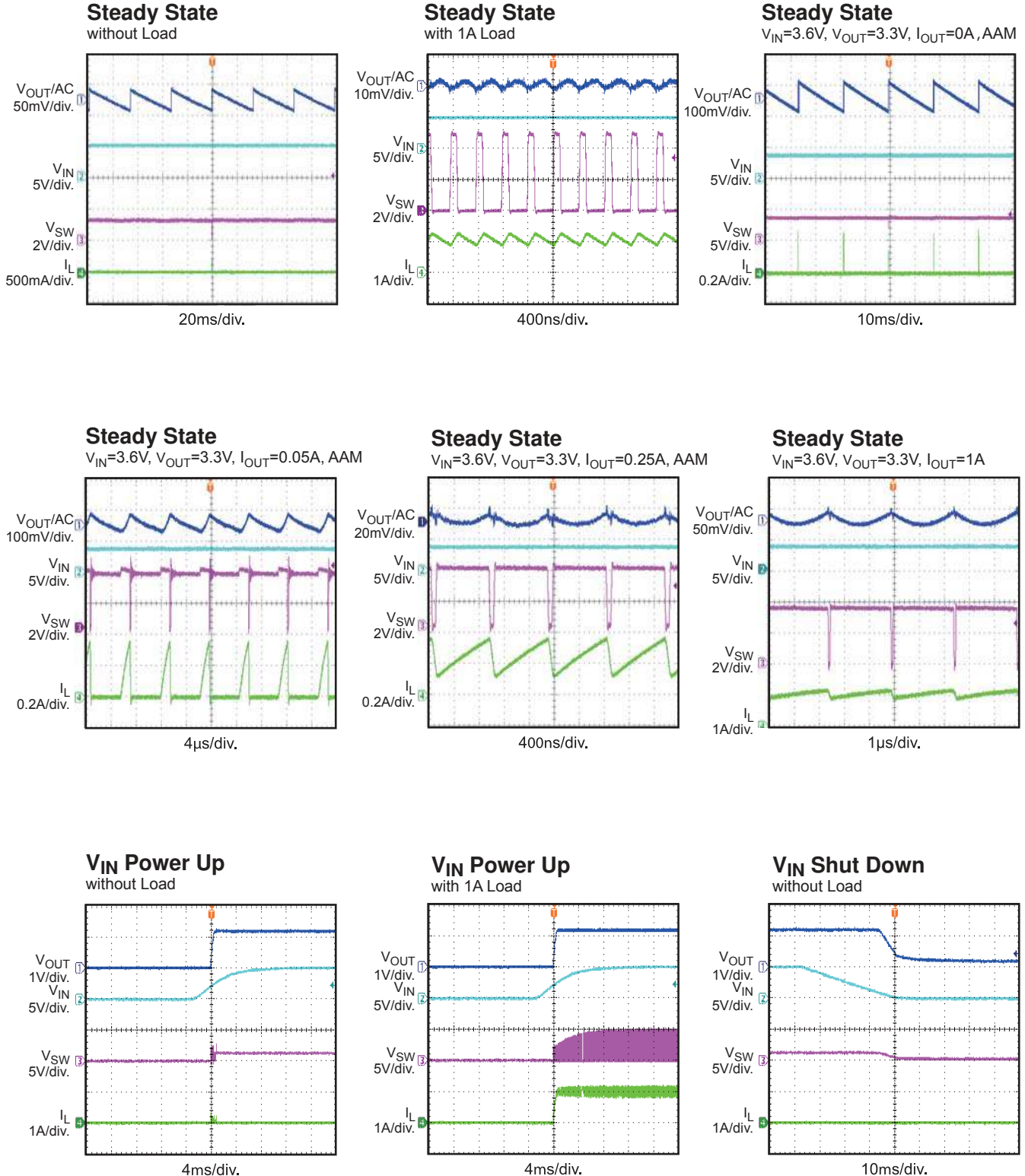
**Table 2. MP2141NGTF-XX Bill of Materials**

Qty	RefDes	Value	Description	Package	Manufacturer	Manufacturer P/N
2	C1, C2	10 $\mu$ F	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	1.0 $\mu$ H	Inductor, Rdc=45m $\Omega$ , 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.

$V_{IN} = 5V$ ,  $V_{OUT} = 1.2V$ ,  $L = 1.0\mu H$ ,  $T_A = +25^\circ C$ , unless otherwise noted.

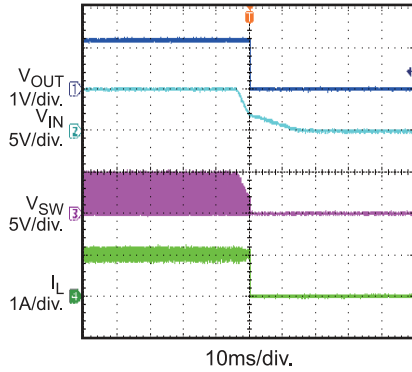


## EVB TEST RESULTS (continued)

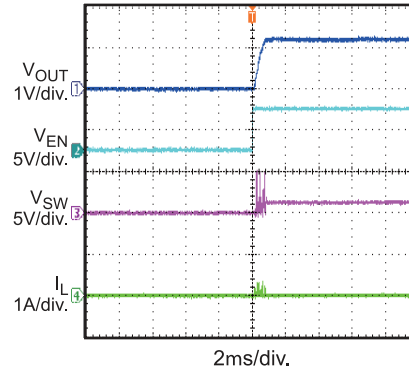
Performance waveforms are tested on the evaluation board.

V<sub>IN</sub> = 5V, V<sub>OUT</sub> = 1.2V, L = 1.0 $\mu$ H, T<sub>A</sub> = +25 $^{\circ}$ C, unless otherwise noted.

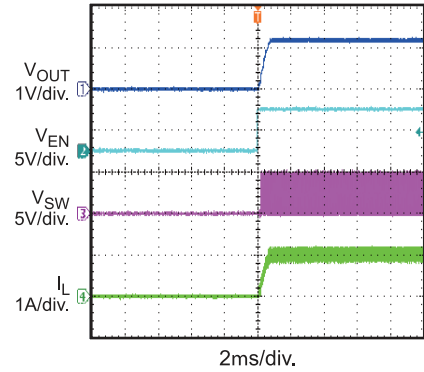
**V<sub>IN</sub> Shut Down**  
with 1A Load



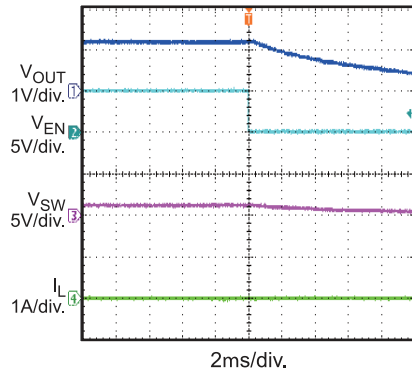
**EN Start Up**  
without Load



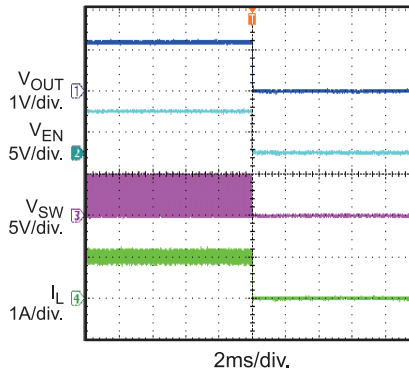
**EN Start Up**  
with 1A Load



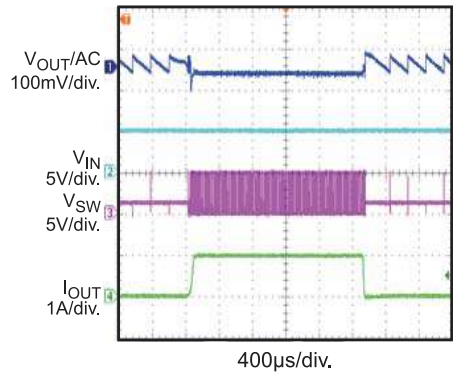
**EN Shut Down**  
without Load



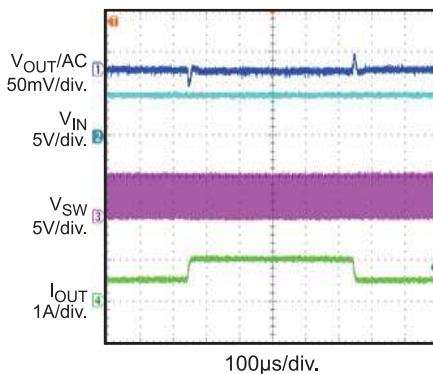
**EN Shut Down**  
with 1A Load



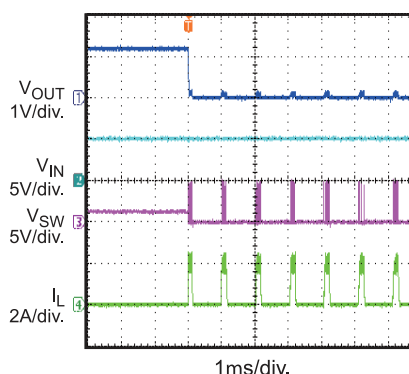
**Load Transient Response**  
I<sub>OUT</sub> = 0A to 1A



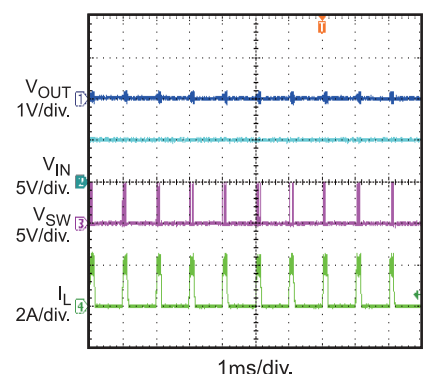
**Load Transient Response**  
I<sub>OUT</sub> = 0.5A to 1A



**Short Circuit Entry**



**Short Circuit**

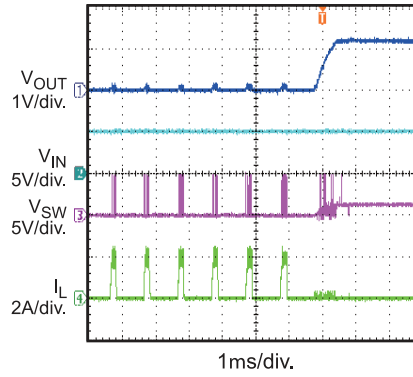


### EVB TEST RESULTS *(continued)*

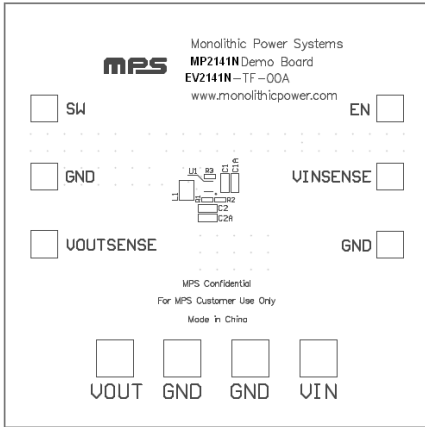
Performance waveforms are tested on the evaluation board.

V<sub>IN</sub> = 5V, V<sub>OUT</sub> = 1.2V, L = 1.0 $\mu$ H, T<sub>A</sub> = +25 $^{\circ}$ C, unless otherwise noted.

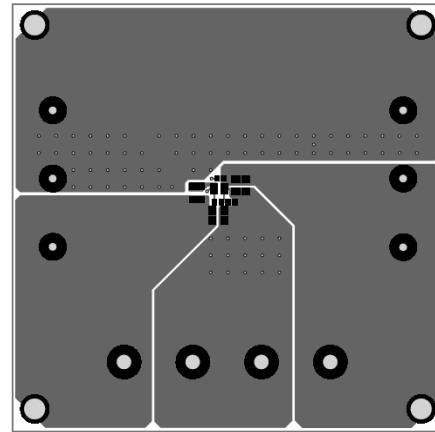
#### Short Circuit Recovery



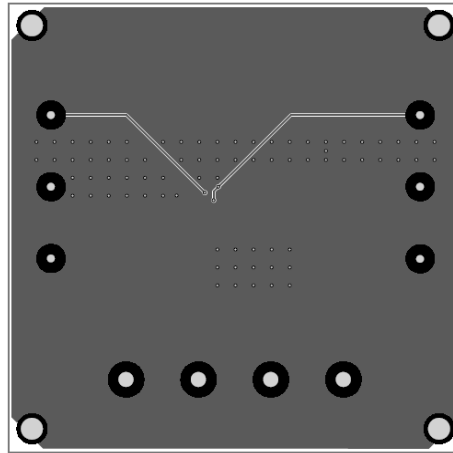
**PRINTED CIRCUIT BOARD LAYOUT**



**Figure 3—Top Silk Layer**



**Figure 4—Top Layer**



**Figure 5—Bottom Layer**

## QUICK START GUIDE(MP2141NGTF )

The output voltage of this board is set externally which can be regulated as low as 0.6V by operating from +2.3V to +5.5V input as the Figure 1. 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 2.3V 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 be around 40kΩ to 200kΩ. R2 is then given by:

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

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

## QUICK START GUIDE(MP2141NGTF-XX)

MP2141NGTF-12(-15,-18,-25,-33) board is fixed output voltage with PG function as the Figure 2:

1. Connect the positive and negative terminals of the load to the VOUT and GND pins, respectively.
2. Preset the power supply output between 2.3V 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. Fixed output versions are shown in Table 3.

**Table 3—Fixed output version information**

Part Number	Fixed V <sub>OUT</sub> (V)
MP2141NGTF-12	1.2
MP2141NGTF-15	1.5
MP2141NGTF-18	1.8
MP2141NGTF-25	2.5
MP2141NGTF-33	3.3

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