MP28600

Ultra-Low 600nA Quiescent Current, Down to 0.1V V_{IN}, Synchronous Boost Converter

DESCRIPTION

The MP28600 is a synchronous boost converter with an ultra-low quiescent current (I_Q). The device is designed for battery-powered products where high efficiency under light-load conditions is critical to achieve a long battery life.

The MP28600 can start up from an input voltage (V_{IN}) as low as 0.7V, and it can work down to a 0.1V V_{IN} after start-up. The MP28600 features pulse-skip mode (PSM) to achieve high efficiency conversion under light-load conditions.

The MP28600 features boost mode and down mode for different V_{IN} conditions. In down mode, the output voltage (V_{OUT}) can still be regulated at its target value, even when V_{IN} exceeds V_{OUT}.

The MP28600 is available in a space-saving SOT563 (1.6mmx1.6mm) package.

FEATURES

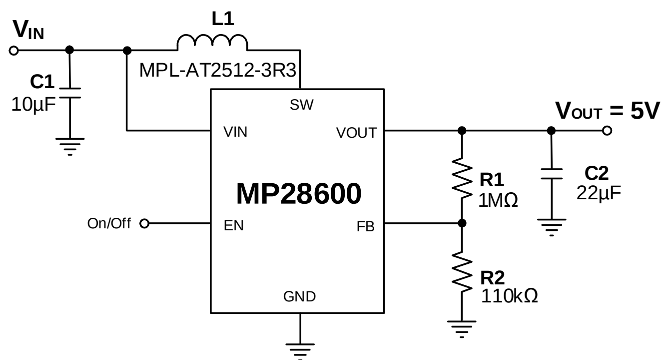
- 0.7V to 5.25V Start-Up Voltage (V_{ST}) Range
- 0.1V to 5.25V Operating Input Voltage (V_{IN}) Range
- 2.5V to 5.25V Output Voltage (V_{OUT}) Range
- Pulse-Skip Mode (PSM)
- 600nA Quiescent Current (I_Q)
- 1A Fixed Switching Current Limit
- Up to 88% Efficiency at a 10µA Load with Fixed-V_{OUT} Versions
- Automatic Switching between Boost Mode and Down Mode
- True Disconnection during Shutdown
- 150°C Thermal Shutdown Protection
- Available in an SOT563 (1.6mmx1.6mm) Package

MPL Optimized Performance with MPS Inductor MPL-AT Series

APPLICATIONS

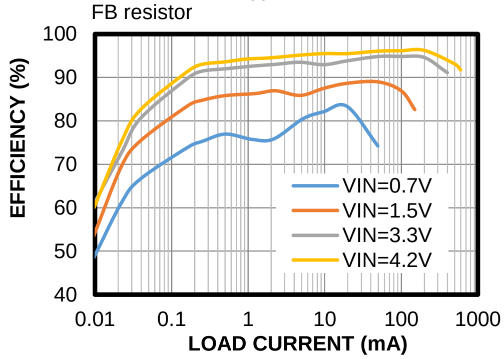
- Memory LCD Bias
- Wearable Applications
- Portable Products
- Low-Power Wireless Applications
- Battery and Supercapacitor Charging

TYPICAL APPLICATION



Efficiency vs. Load Current

MP28600GTF, V_{OUT} = 5V, with external FB resistor



ORDERING INFORMATION

Part Number*	Package	Top Marking	V_{OUT} Range	MSL Rating
MP28600GTF	SOT563	*See Below*	Adjustable	1
MP28600GTF-33**			3.3V	
MP28600GTF-50**			5V	

* For Tape & Reel, add suffix -Z (e.g. MP28600GTF-Z).

** Contact MPS sales for a fixed-output version.

TOP MARKING (MP28600GTF)

BRXY
LLL

BRX: Product code of MP28600GTF
Y: Year code
LLL: Lot number

TOP MARKING (MP28600GTF-33)

CAPY
LLL

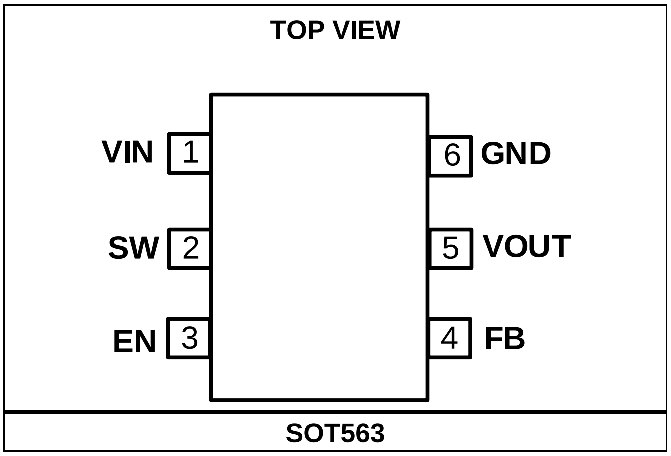
CAP: Product code of MP28600GTF-33
Y: Year code
LLL: Lot number

TOP MARKING (MP28600GTF-50)

CAQY
LLL

CAQ: Product code of MP28600GTF-50
Y: Year code
LLL: Lot number

PACKAGE REFERENCE



PIN FUNCTIONS

Pin #	Name	Pin Functions
1	VIN	**Input power supply pin.** VIN must be bypassed locally.
2	SW	**Switching node of output power stage.** Connect the inductor to SW.
3	EN	**Chip enable control pin.** EN has internal pull-up circuit. Float EN or pull the EN pin up externally to enable the IC.
4	FB	**Feedback setting pin.** For the fixed-output version, connect the FB pin to the output voltage (V_{OUT}) directly. For the adjustable-output version, connect a resistor divider from VOUT to FB to configure V_{OUT}.
5	VOUT	**Boost converter output.** The VOUT pin is the source of the internal synchronous rectifier. Place the output capacitor as close as possible to the VOUT and GND pins.
6	GND	**IC ground pin.**

ABSOLUTE MAXIMUM RATINGS (1)

SW ....-0.3V (-1V for <10ns) to +6.5V (+8V for <10ns)
All other pins ....-0.3V to +6.5V
Continuous power dissipation (T_A = 25°C) (2) 1.27W (4)
Junction temperature (T_J) ....150°C
Lead temperature ....260°C
Storage temperature .... -65°C to +150°C

Recommended Operating Conditions (3)

Start-up input voltage (V_{ST}) ....0.7V to 5.25V
Operation input voltage (V_{IN}).........0.1V to 5.25V
Output voltage (V_{OUT})....................2.5V to 5.25V
Operating junction temp (T_J) .... -40°C to +125°C

Thermal Resistance θ_{JA} θ_{JC}

SOT563
EVL28600-TF-00A (4) ....98........35....°C/W
JESD51-7 (5)...........................119.......67... °C/W

Notes:

1) Exceeding these ratings may damage the device.
2) The maximum allowable power dissipation is a function of the maximum junction temperature, T_J (MAX), the junction-to-ambient thermal resistance, θ_{JA}, and the ambient temperature, T_A. The maximum allowable continuous power dissipation at any ambient temperature is calculated by P_D (MAX) = (T_J (MAX) - T_A) / θ_{JA}. Exceeding the maximum allowable power dissipation can cause excessive die temperature, and the regulator may go into thermal shutdown. Internal thermal shutdown circuitry protects the device from permanent damage.
3) The device is not guaranteed to function outside of its operating conditions.
4) Measured on the EVL28600-TF-00A, a 2-layer, 51mmx51mm, 1oz PCB.
5) The value of θ_{JA} given in this table is only valid for comparison with other packages and cannot be used for design purposes. These values were calculated in accordance with JESD51-7, and simulated on a specified JEDEC board. They do not represent the performance obtained in an actual application.

ELECTRICAL CHARACTERISTICS

V_{IN} = V_{EN} = 3.3V, V_{OUT} = 5V, T_J = -40°C to +125°C [6], typical values are tested at T_J = 25°C, unless otherwise noted.

Parameter	Symbol	Condition	Min	Typ	Max	Units
Power Supply						
Minimum start-up input voltage	V_{ST}	From VIN pin, closed loop, load = 100kΩ		0.5	0.6	V
Shutdown current	I_{SD}	V_{EN} = 0V, V_{IN} = 3.3V, V_{OUT} = 0V, measured on VIN pin, T_J ≤ 85°C		0.1	0.8	µA
		V_{EN} = 0V, V_{IN} = 0V and 1.2V, V_{OUT} = 3.3V, measured on VOUT pin, T_J ≤ 85°C		0.1	0.8	µA
Quiescent current	I_Q	V_{FB} = 0.53V, no switching, measured on VIN pin, T_J ≤ 85°C, MP28600GTF		0.1	0.4	µA
		V_{FB} = 0.53V, no switching, measured on VOUT pin, T_J ≤ 85°C, MP28600GTF		0.6	2	µA
Enable (EN) Control						
EN logic high	V_{EN_H}		0.6			V
EN logic low	V_{EN_L}	T_J ≤ 85°C			0.05	V
EN pin sink current	I_{EN_SINK}	V_{EN} = 5V		0	100	nA
EN pin source current	I_{EN_SOURCE}	V_{EN} = 0V, V_{IN} = 3.3V, V_{OUT} = 0V		10	100	nA
		V_{EN} = 0V, V_{IN} = 1.2V, V_{OUT} = 5V		10	100	nA
EN turn-on delay	t_{EN_ON}	EN rising to switching		300		µs
EN turn-off delay	t_{EN_OFF}	EN falling to stop switching		4		µs
Loop Control						
Output voltage (V_{OUT}) accuracy (MP28600GTF-50)	V_{OUT}	T_J = 25°C, pulse-width modulation (PWM) mode	4.925	5	5.075	V
		T_J = -40°C to 125°C, PWM mode	4.875	5	5.125	V
		PSM mode		5		V
V_{OUT} accuracy (MP28600GTF-33)		T_J = 25°C, PWM mode	3.25	3.3	3.35	V
		T_J = -40°C to 125°C, PWM mode	3.2	3.3	3.4	V
		Pulse-skip mode (PSM)		3.3		V
FB reference voltage (MP28600GTF)	V_{REF}	T_J = 25°C	0.495	0.5	0.505	V
		T_J = -40°C to 125°C	0.492	0.5	0.508	V
V_{OUT} over-voltage protection (OVP) rising	V_{OVP_R}		5.25	5.4		V
V_{OUT} OVP falling	V_{OVP_F}		5.1	5.3		V
Power Switch						
High-side MOSFET (HS-FET) on resistance	R_{HS}			0.25		Ω
Low-side MOSFET (LS-FET) on resistance	R_{LS}			0.21		Ω
Starting FET on resistance	R_{ST}			5		Ω
Inductor peak current limit	I_{LIMIT}		0.9	1	1.2	A
HS switching zero-current detection (ZCD) current	I_{ZCD}			50		mA
Maximum switching frequency	f_{SW}	V_{IN} = 3.3V V_{OUT} = 5V, I_{OUT} = 0.4A		0.8		MHz
Minimum on time [7]	t_{ON_MIN}			80		ns

ELECTRICAL CHARACTERISTICS *(continued)*

V_{IN} = V_{EN} = 3.3V, V_{OUT} = 5V, T_J = -40°C to +125°C [6], typical values are tested at T_J = 25°C, unless otherwise noted.

Parameter	Symbol	Condition	Min	Typ	Max	Units
Mode change threshold	V_{MODE}	Boost mode to down mode test V_{OUT} - V_{IN}		200		mV
		Down mode to boost mode test V_{OUT} - V_{IN}		300		mV
Thermal Protection						
Thermal shutdown [7]	T_{SD}			150		°C
Thermal shutdown hysteresis [7]	T_{SD-HYS}			25		°C

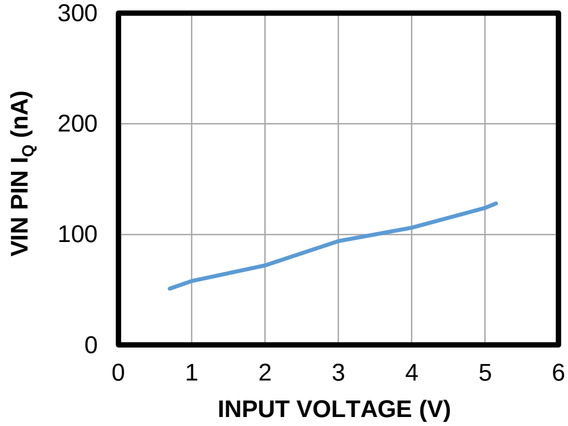
Notes:

6) Guaranteed by over-temperature (OT) correlation. Not tested in production.
7) Guaranteed by sample characterization, not production tested

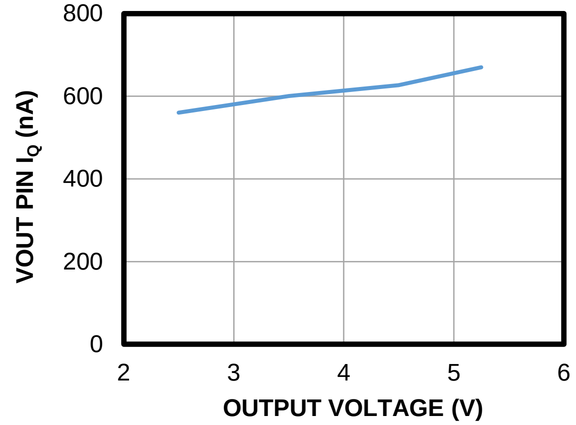
TYPICAL CHARACTERISTICS

V_{IN} = 3.3V, V_{OUT} = 5V, T_A = 25°C, unless otherwise noted.

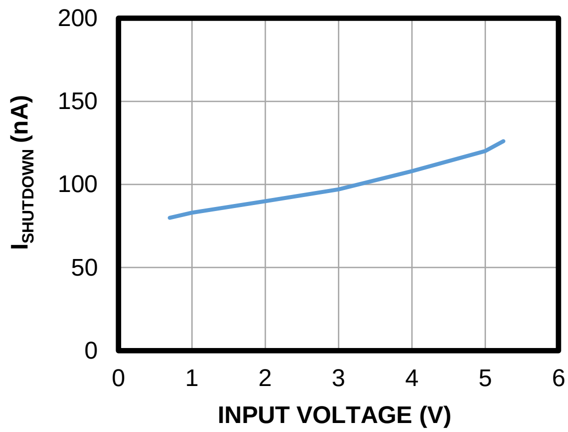
VIN Pin I_Q vs. Input Voltage
V_{OUT} = 5.25V



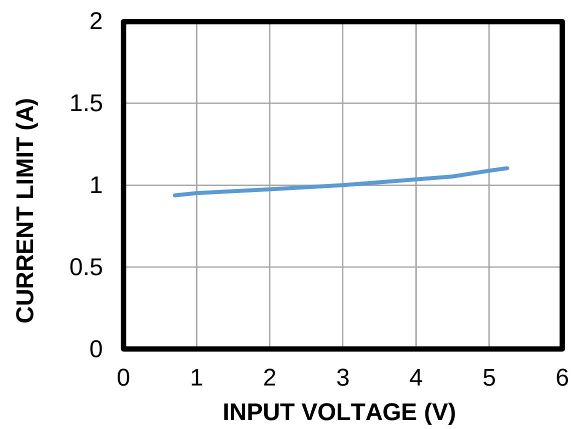
VOUT Pin I_Q vs. Output Voltage
V_{IN} = 1.5V



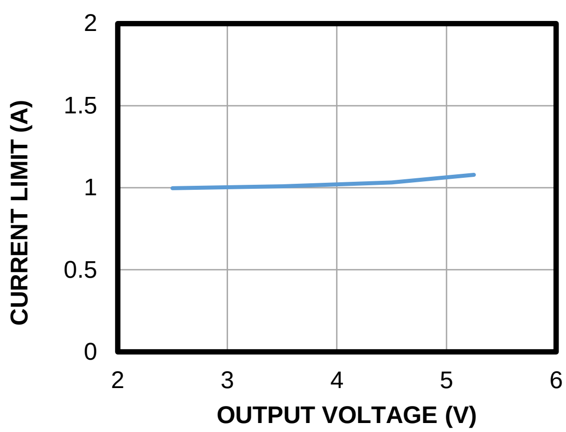
Shutdown Current vs. Input Voltage



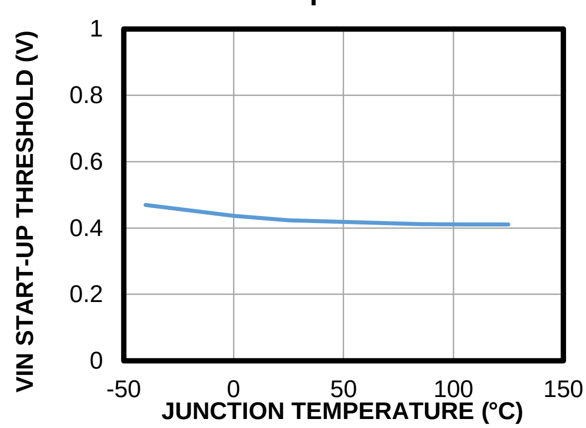
Current Limit vs. Input Voltage



Current Limit vs. Output Voltage



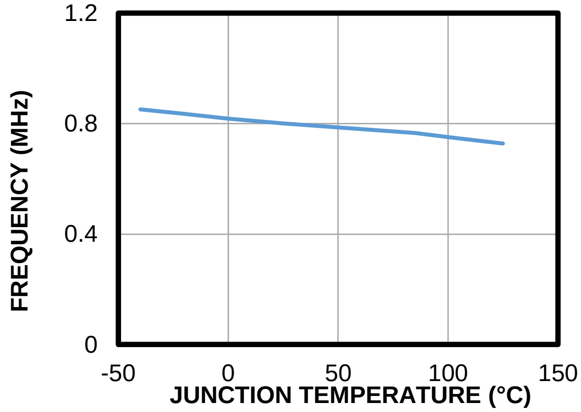
VIN Start-Up Threshold vs. Junction Temperature



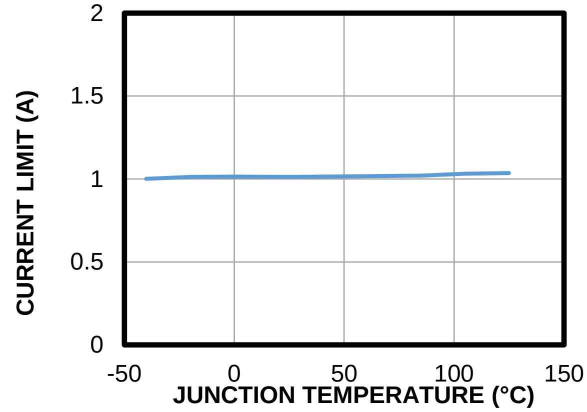
TYPICAL CHARACTERISTICS *(continued)*

V_{IN} = 3.3V, V_{OUT} = 5V, T_A = 25°C, unless otherwise noted.

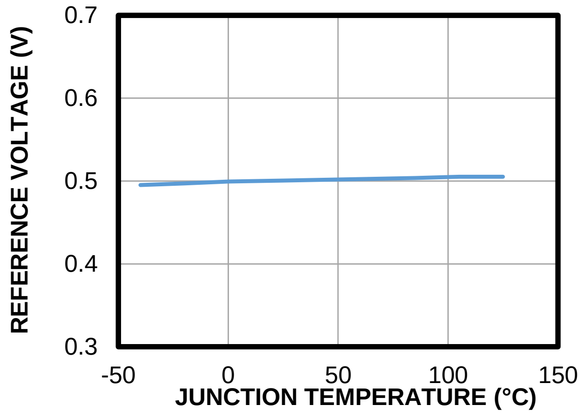
Frequency vs. Junction Temperature



Current Limit vs. Junction Temperature

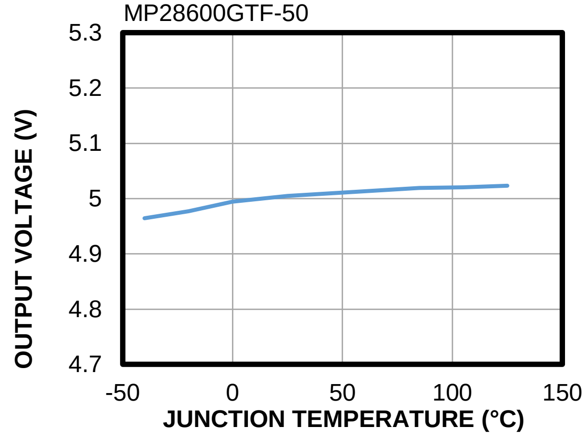


Reference Voltage vs. Junction Temperature



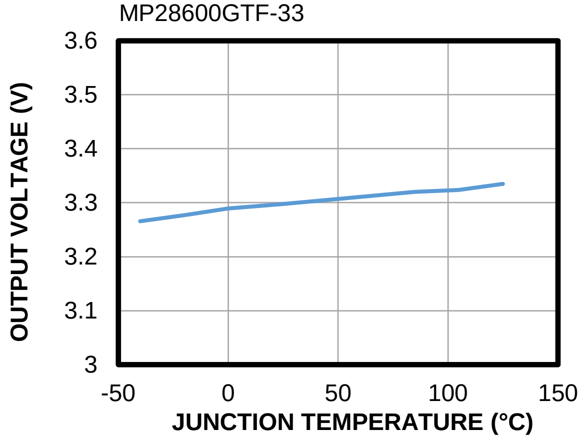
Output Voltage vs. Junction Temperature

MP28600GTF-50



Output Voltage vs. Junction Temperature

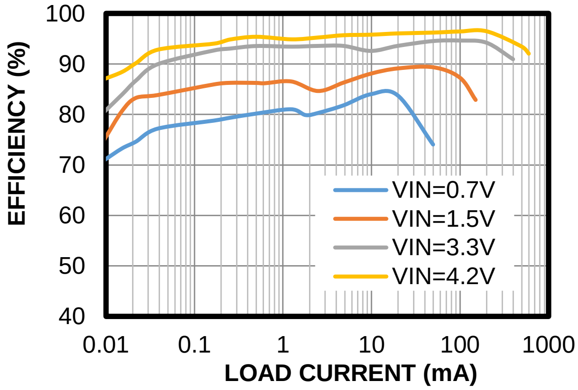
MP28600GTF-33



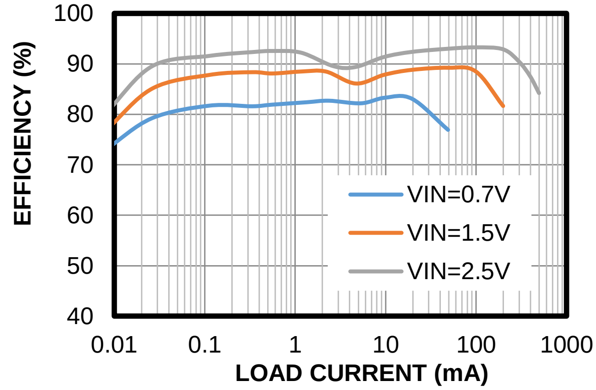
TYPICAL PERFORMANCE CHARACTERISTICS

V_{IN} = 3.3V, V_{OUT} = 5V, L = 3.3µH, T_A = 25°C, based on the MP28600GTF with external FB resistor, unless otherwise noted.

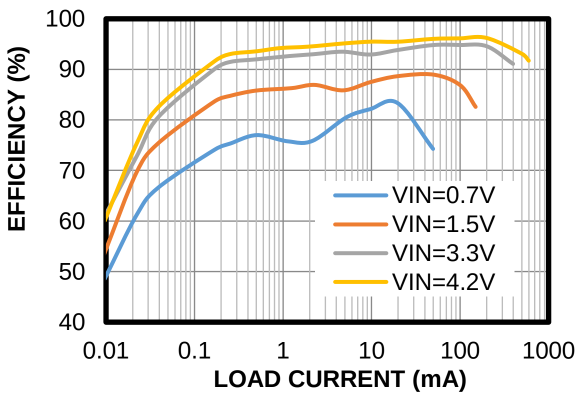
Efficiency vs. Load Current
MP28600GTF-50



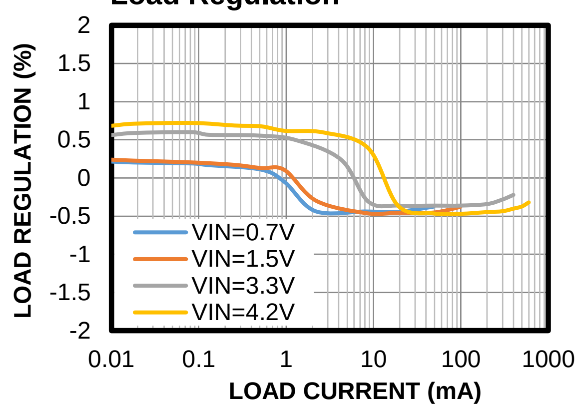
Efficiency vs. Load Current
MP28600GTF-33



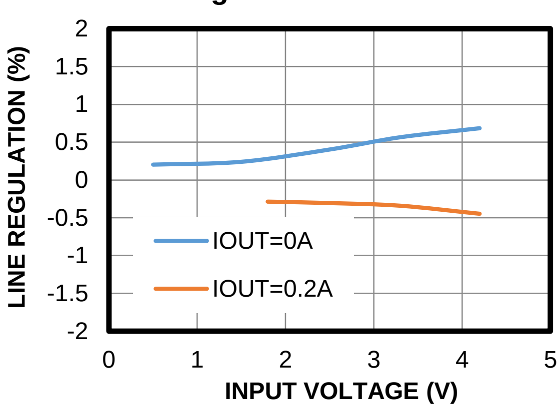
Efficiency vs. Load Current
MP28600GTF, R_{FBH} = 1MΩ



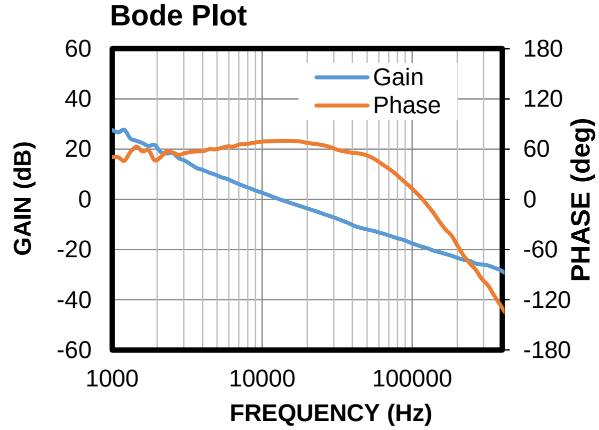
Load Regulation



Line Regulation

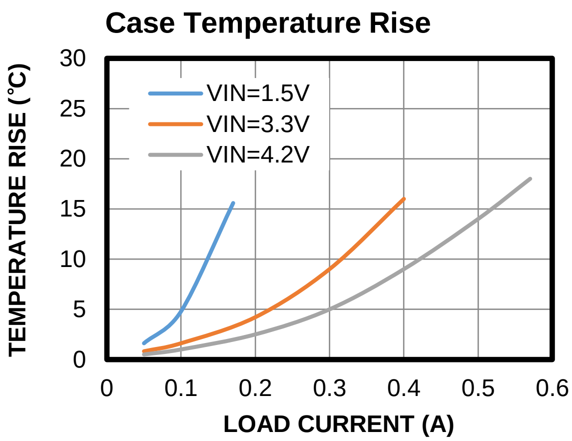


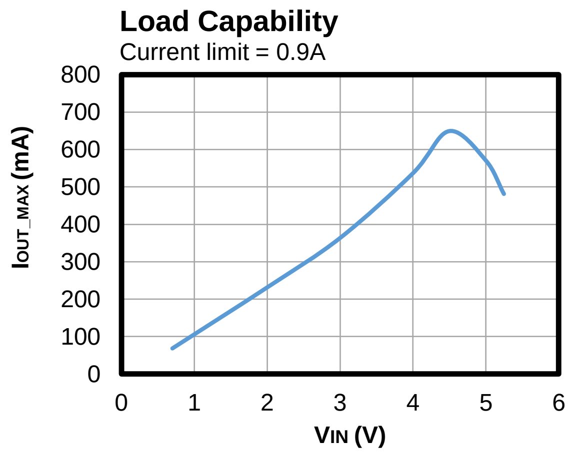
Bode Plot



TYPICAL PERFORMANCE CHARACTERISTICS *(continued)*

V_{IN} = 3.3V, V_{OUT} = 5V, L = 3.3µH, T_A = 25°C, based on the MP28600GTF with external FB resistor, unless otherwise noted.



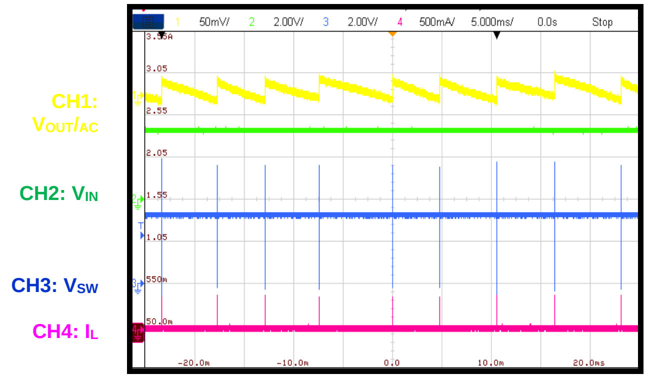


TYPICAL PERFORMANCE CHARACTERISTICS *(continued)*

V_{IN} = 3.3V, V_{OUT} = 5V, L = 3.3µH, T_A = 25°C, unless otherwise noted.

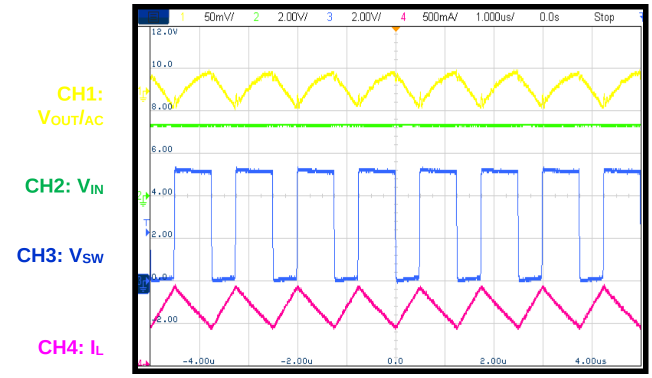
Steady State

I_{OUT} = 0A



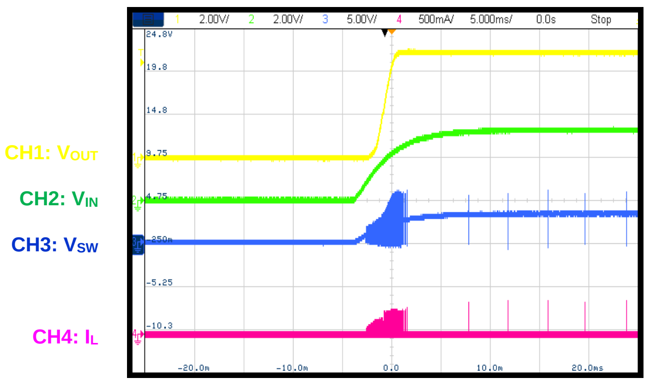
Steady State

I_{OUT} = 0.4A



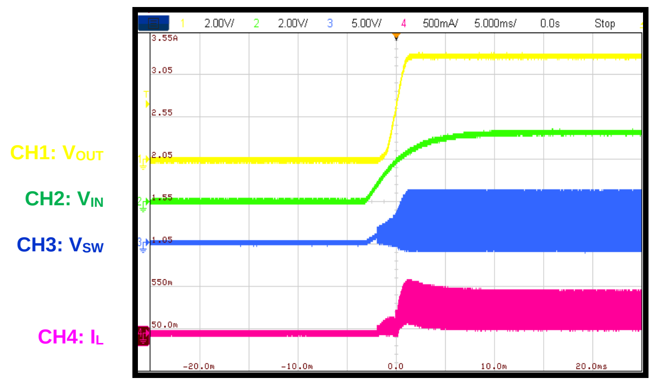
Start-Up through VIN

I_{OUT} = 0A



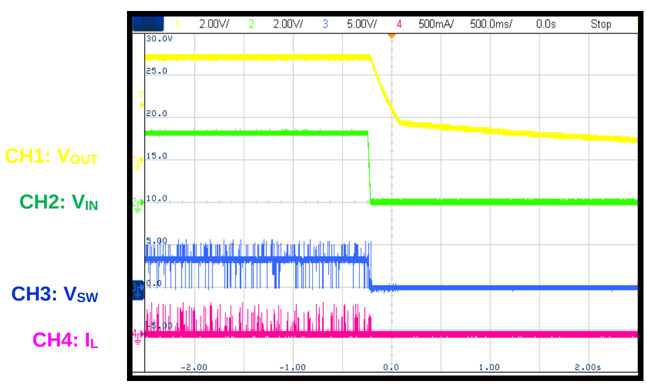
Start-Up through VIN

R_{LOAD} = 30Ω



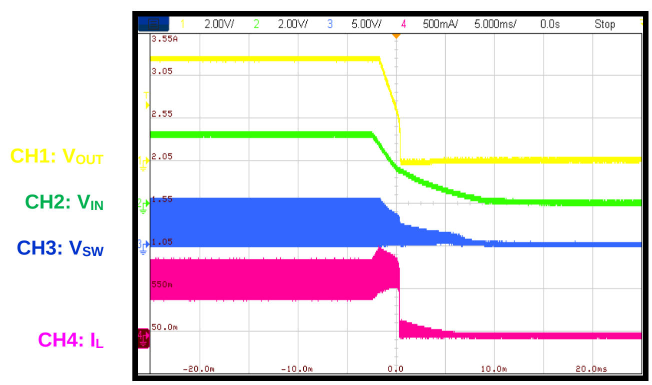
Shutdown through VIN

I_{OUT} = 0A



Shutdown through VIN

I_{OUT} = 0.4A

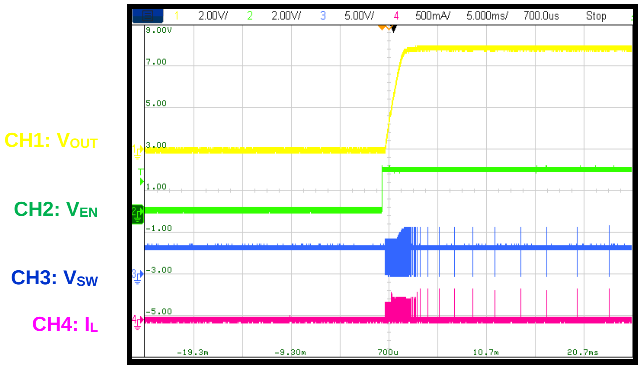


TYPICAL PERFORMANCE CHARACTERISTICS *(continued)*

V_{IN} = 3.3V, V_{OUT} = 5V, L = 3.3µH, T_A = 25°C, unless otherwise noted.

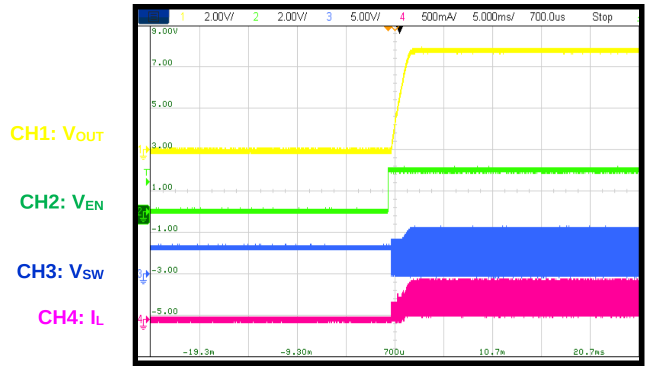
Start-Up through EN

I_{OUT} = 0A



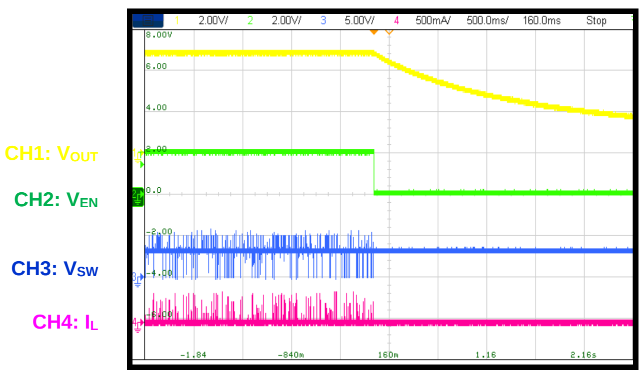
Start-Up through EN

R_{LOAD} = 30Ω



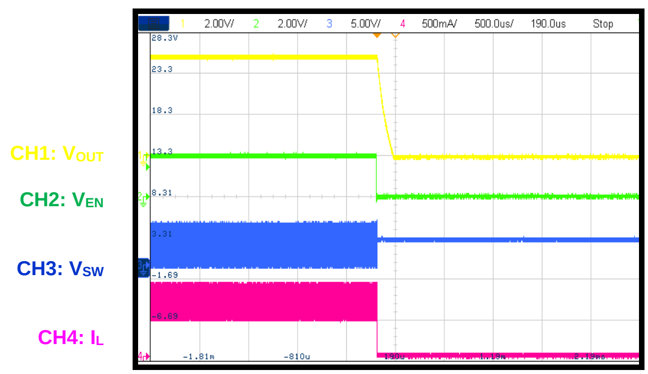
Shutdown through EN

I_{OUT} = 0A



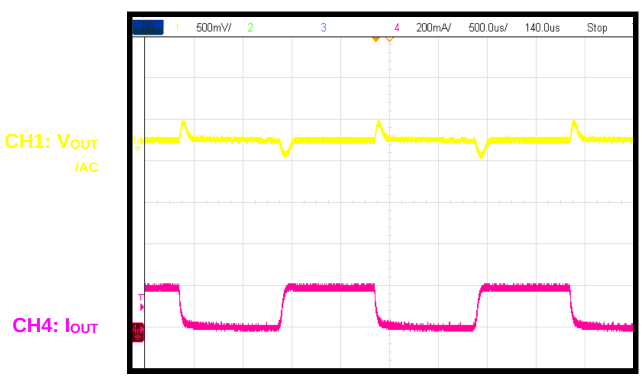
Shutdown through EN

I_{OUT} = 0.4A



Load Transient Response

I_{OUT} = 0A to 0.2A, slew rate = 800mA/µs (e-load)



Load Transient Response

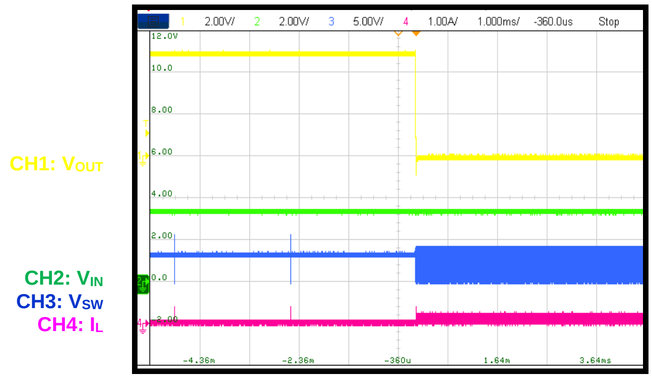
I_{OUT} = 0.2A to 0.4A, slew rate = 800mA/µs (e-load)

TYPICAL PERFORMANCE CHARACTERISTICS *(continued)*

V_{IN} = 3.3V, V_{OUT} = 5V, L = 3.3μH, T_A = 25°C, unless otherwise noted.

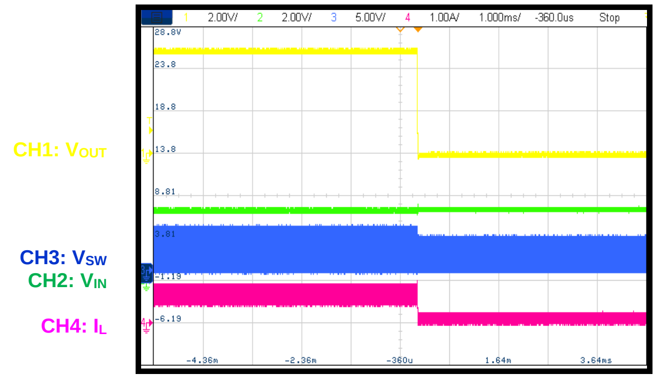
SCP Entry

I_{OUT} = 0A to short



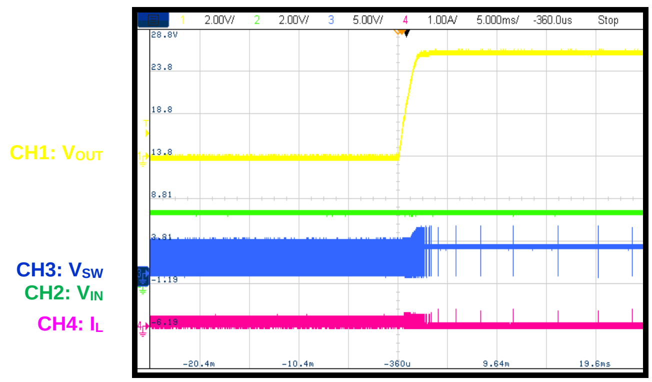
SCP Entry

I_{OUT} = 0.4A to short



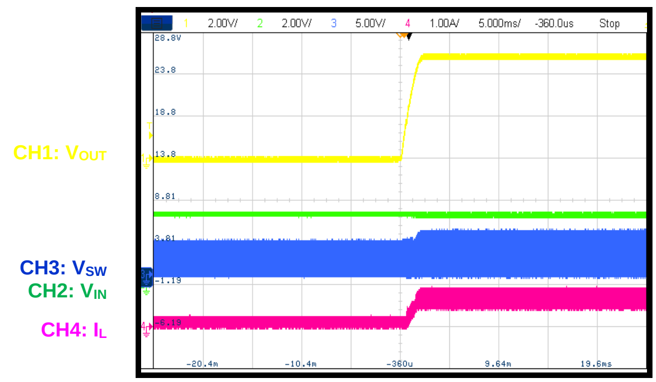
SCP Recovery

I_{OUT} = short to 0A



SCP Recovery

R_{LOAD} = short to 30Ω



FUNCTIONAL BLOCK DIAGRAM

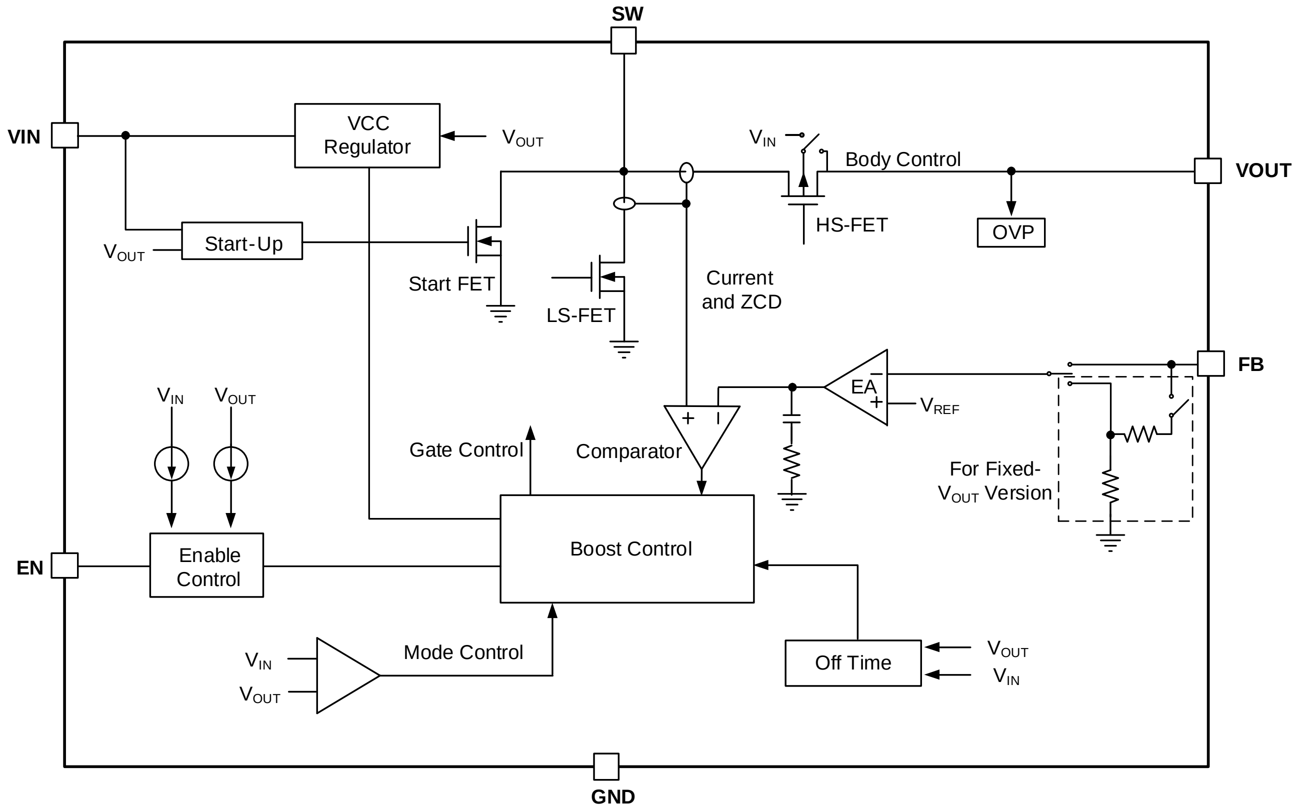


Figure 1: Functional Block Diagram

OPERATION

The MP28600 device is a synchronous boost converter with an ultra-low quiescent current (I_Q). It features pulse-skip mode (PSM) to achieve high efficiency conversion under light-load conditions. The MP28600 generates an output voltage (V_{OUT}) from the wide 0.1V to 5.25V input voltage (V_{IN}) range.

The MP28600 provides a fixed-V_{OUT} version and an adjustable-V_{OUT} version. When V_{IN} exceeds V_{OUT}, V_{OUT} can still be regulated in down mode. Figure 1 on page 14 shows the internal block diagram, and the sections below describe the functions in detail.

Power Supply

The MP28600 can start up from a 0.7V to 5.25V V_{IN} range. The internal VCC is powered from the higher voltage resource between V_{IN} and V_{OUT}. This allows the MP28600 to maintain a low on resistance (R_{ON}) and high efficiency, even when V_{IN} drops to as low as 0.1V.

The internal VCC has reverse circuits between VIN and VOUT, which prevents current flow from the VCC pin to VIN or VOUT pin.

Start-Up

The MP28600 can start up from a low V_{IN}. During start-up, the starting FET switches with an open loop. At the same time, the inductor's peak current and maximum turn-on time are limited. After the starting FET turns off, the inductor energy is transferred to the VOUT pin's capacitor. Open-loop switching continues until V_{OUT} rises to 1.8V.

Once V_{OUT} is charged and exceeds 1.8V, the MP28600 stops open-loop switching and starts closed-loop switching based on V_{OUT} regulation. If VOUT has a biased voltage that exceeds 1.8V, the MP28600 starts with closed-loop switching. The integrated soft-start function controls V_{OUT} so that is increases smoothly.

Open-loop functionality is disabled if V_{OUT} exceeds 1.8V, and is re-enabled if V_{OUT} discharges below 1.8V.

Enable (EN) Control

The EN pin can enable and disable the MP28600. Figure 2 shows the EN pin's internal pull-up circuit.

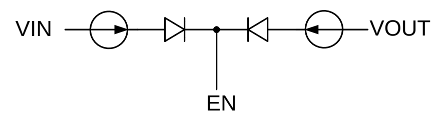


Figure 2: EN Pull-Up Circuit

When the VIN start-up voltage (V_{ST}) exceeds 0.7V, floating the EN pin can enable the IC automatically. After V_{OUT} charges up, the EN pin is internally pulled up to VOUT. The MP28600 can work well under low V_{IN} conditions.

After pulling EN low, the MP28600 shuts down the internal switching circuit and VOUT pull-up current, but the VIN pull-up current always exists.

Output Voltage (V_{OUT}) Regulation

The MP28600 supports fixed-V_{OUT} and adjustable-V_{OUT} options.

The V_{OUT} signal is fed into the internal error amplifier through the FB divider or internal feedback circuit, and the output of the error amplifier (COMP) controls the inductor's peak current. The MP28600 ramps up the inductor current (I_L) at the beginning of one cycle. Once the current signal triggers the COMP threshold, the low-side MOSFET (LS-FET) turns off and the high-side MOSFET (HS-FET) turns on for one constant-off-time period to charge the output capacitor. The MP28600 ramps I_L up and down again until V_{OUT} reaches the regulation level.

Under light-load conditions, the average I_L drops, and the MP28600 runs in discontinuous conduction mode (DCM). In DCM, the peak current stays at a constant value. If the load current continues to decrease, the switching frequency (f_{SW}) stretches down to a very low level to achieve high efficiency under light loads.

Operation Mode

The MP28600 supports different operation modes under different V_{IN} conditions. Table 1 shows the detailed operation conditions.

Table 1: Operation Mode

Conditions	Mode
V_{OUT} <1.8V	Open loop
$V_{OUT} \geq$ 1.8V and $V_{OUT} \geq V_{IN} + V_{MODE}$	Boost mode
$V_{OUT} \geq$ 1.8V and $V_{OUT} < V_{IN} + V_{MODE}$	Down mode

In boost mode, the MP28600 works with constant-off-time control.

In down mode, V_{OUT} is regulated at the target value even when $V_{IN} > V_{OUT}$. In down mode, the voltage drop across the P-channel MOSFET (P-FET) and the power loss both increase, which must be taken into account for thermal consideration.

Overload and Short-Circuit Protection (SCP)

The MP28600 supports a cycle-by-cycle current limit function. If the inductor's peak current reaches the 1A current-limit threshold, the LS-FET turns off to stop I_L from increasing further. V_{OUT} drops if I_L is limited.

After V_{OUT} drops below (V_{IN} + 200mV), the MP28600 enters down mode. The peak current is still limited by the cycle-by-cycle current limit in down mode.

If V_{OUT} continues to drop below 1.8V, the IC enters open-loop switching mode.

Over-Voltage Protection (OVP)

The MP28600 provides output over-voltage protection (OVP) to protect the device in abnormal cases, such as when the external feedback resistor divider is wrongly configured. If V_{OUT} exceeds the 5.4V OVP threshold, the device stops switching. Once V_{OUT} falls below 5.3V, the device starts operating again.

Thermal Protection

Thermal shutdown prevents the IC from operating at exceedingly high temperatures. When the die temperature exceeds 150°C, the IC shuts downs. The IC resumes normal operation when the die temperature drops to 25°C.

APPLICATION INFORMATION

Setting the Output Voltage (V_{OUT})

There are two methods to set V_{OUT}. For a fixed-V_{OUT} version, the FB pin should be connected to VOUT. The MP28600 offers a diverse array of fixed-voltage versions.

For an adjustable-V_{OUT} version, the external resistor divider is used to set V_{OUT}. The feedback resistor (R1) must be selected for stability and dynamic response. Typically, a 100kΩ to 1MΩ resistor is suitable for most cases. The feedback resistors have leakage, which decreases light-load efficiency. After R1 is selected, R2 can be calculated with Equation (1):

$$R2 = \frac{V_{REF}}{V_{OUT} - V_{REF}} \times R1 \qquad (1)$$

Where V_{REF} = 0.5V.

Selecting the Inductor

MPL **Optimized Performance with MPS Inductor MPL-AT Series**

The MP28600 can use small surface-mount chip inductors due to its 1A peak current limit.

An inductor is required to transfer the energy between the input source and the output capacitors. A larger-value inductor results in less ripple current and a lower peak inductor current, reducing stress on the power MOSFET. However, a larger-value inductor has a larger physical size, higher series resistance, and a lower saturation current.

The inductance can be estimated with Equation (2):

$$L = \frac{V_{IN}(V_{OUT} - V_{IN})}{f_{SW} \times V_{OUT} \times \Delta I_L} \qquad (2)$$

Where ΔI_L is the inductor ripple current.

Choose the inductor ripple current to be approximately 20% to 50% of the maximum inductor peak current. Typically, a 3.3µH inductor is recommended.

The inductor should have a low DC resistance (DCR) to reduce the resistive power loss. The saturated current should be high enough to support the peak current.

MPS inductors are optimized and tested for use with our complete line of integrated circuits.

Table 2 lists our power inductor recommendations. Select a part number based on your design requirements.

Table 2: Power Inductor Selection

Part Number	Inductor Value	Manufacturer
MPL-AT	0.47µH to 10µH	MPS
MPL-AT2514-3R3	3.3µH	MPS
MPL-AT2512-2R2	2.2µH	MPS
MPL-AT2514-4R7	4.7µH	MPS

Visit MonolithicPower.com under Products > Inductors for more information.

Selecting the Input Capacitor

The input capacitor (C1) is used to maintain the DC input voltage. Low-ESR ceramic capacitors are recommended. The input voltage ripple can be calculated with Equation (3):

$$\Delta V_{IN} = \frac{V_{IN}}{8 \times f_{SW}^2 \times L \times C1} \times (1 - \frac{V_{IN}}{V_{OUT}}) \qquad (3)$$

Where f_{SW} is the switching frequency, and L is the inductance.

Selecting the Output Capacitor

The boost converter has a discontinuous output current, and requires an output capacitor (C2) to supply AC current to the load. For the best performance, low-ESR ceramic capacitors are recommended. The output voltage ripple can be estimated with Equation (4):

$$\Delta V_{OUT} = \frac{V_{OUT}}{f_{SW} \times R_L \times C2} \times (1 - \frac{V_{IN}}{V_{OUT}}) \qquad (4)$$

Where R_L is the load resistance.

Ceramic capacitors with X5R or X7R dielectrics are highly recommended because of their low ESR and small temperature coefficients.

Design Example

Table 3 on page 18 shows a design example following the application guidelines for the specifications below.

Table 3: Design Example

V_{IN}	0.7V to 5.25V
V_{OUT}	5V
Maximum I_{OUT}	50mA to 650mA (8)

The detailed application schematic is shown in Figure 4 on page 19. The typical performance and circuit waveforms are shown in the Typical Performance Characteristics section starting on page 9. For more device applications, refer to the related evaluation board datasheet.

Note:

8) The maximum I_{OUT} range is affected by V_{IN}. See the Load Capability curve on page 10 for more details.

PCB Layout Guidelines

Efficient PCB layout is critical for high-frequency switching power supplies. A poor layout can result in reduced performance, excessive EMI, resistive loss, and system instability. For the best results, refer to Figure 3 and follow the guidelines below:

1. Place the output capacitor from the VOUT and GND pins as close as possible to the VOUT and GND pins to reduce the PCB parasitic inductance.
2. Connect a small RC snubber between SW and GND. This is especially useful under extreme conditions (e.g. V_{IN} > 4.5V) when the IC works in down mode with a heavy load, since the SW spike may exceed 8V.
3. Place the input capacitor and inductor as close as possible to the IC.
4. Make the SW trace as short as possible.
5. Route the feedback loop far away from noise sources, such as the SW trace.
6. Place the feedback resistor divider as close as possible to the FB and GND pins.
7. Tie the ground return of the input/output capacitor close to the GND pin with a large GND copper area.

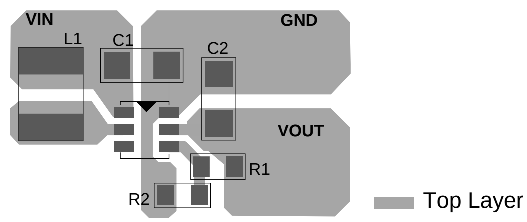


Figure 3: Recommended PCB Layout

TYPICAL APPLICATION CIRCUITS

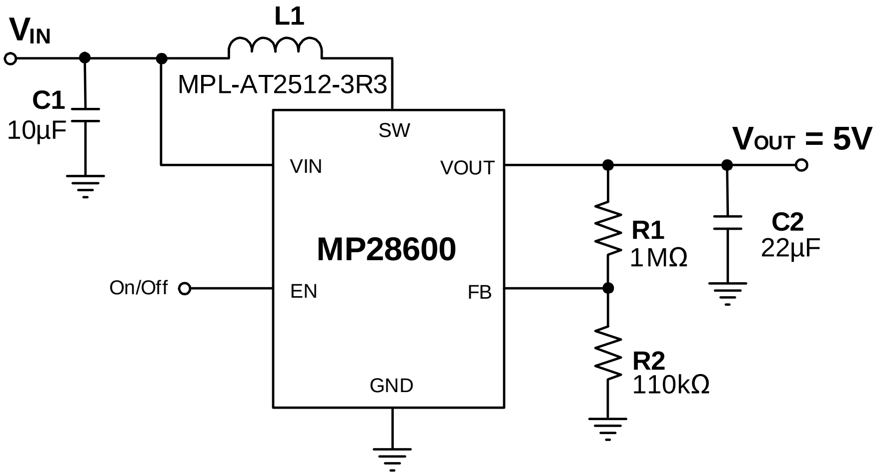


Figure 4: Typical Application Circuit (Configurable-Output Version)

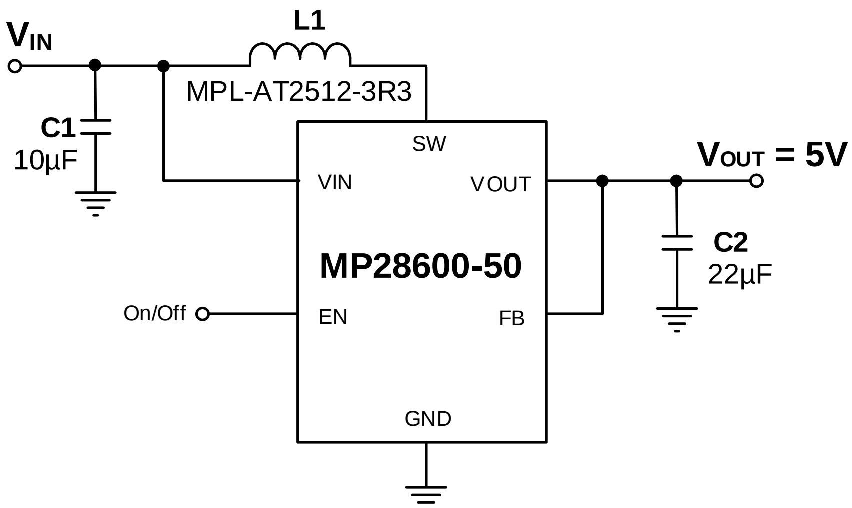


Figure 5: Typical Application Circuit (5V Fixed-Output Version)

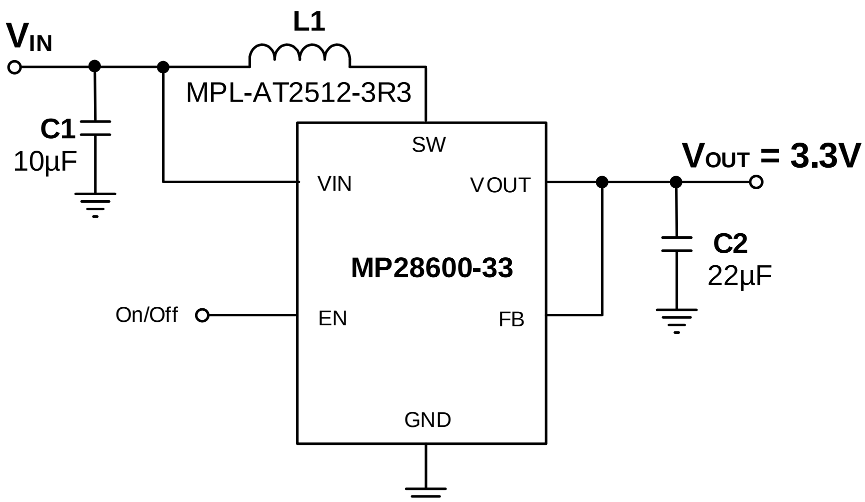
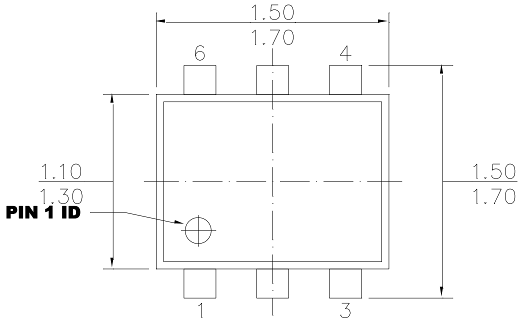


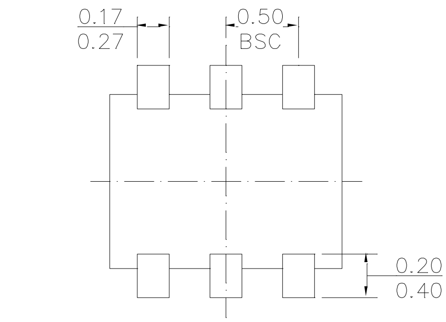
Figure 6: Typical Application Circuit (3.3V Fixed-Output Version)

PACKAGE INFORMATION

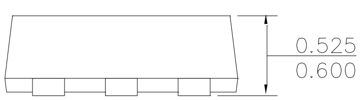
SOT563



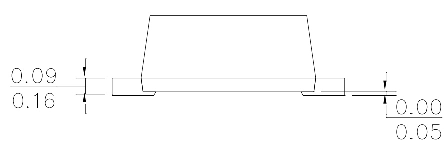
TOP VIEW



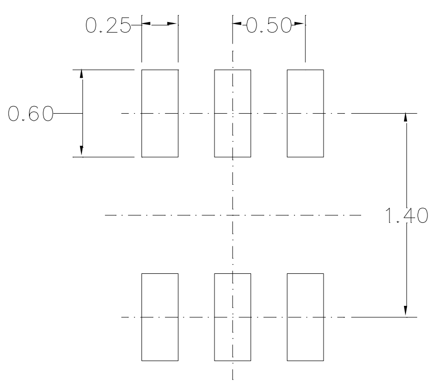
BOTTOM VIEW



FRONT VIEW



SIDE VIEW

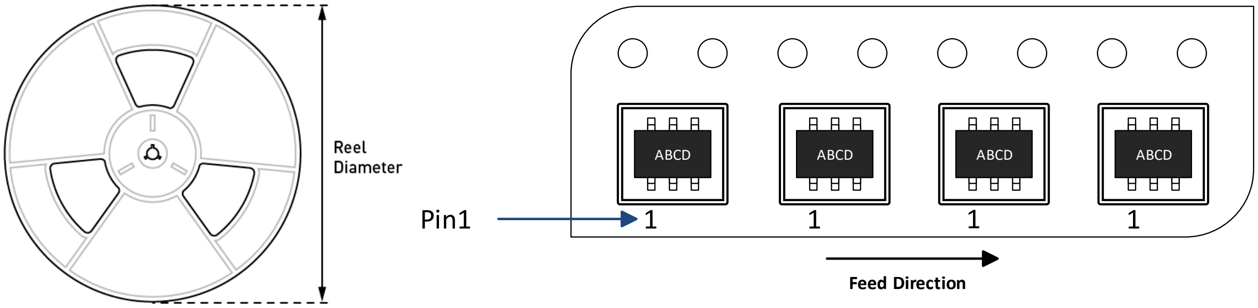


RECOMMENDED LAND PATTERN

NOTE:

1) ALL DIMENSIONS ARE IN MILLIMETERS.
2) PACKAGE LENGTH DOES NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURR.
3) PACKAGE WIDTH DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION.
4) LEAD COPLANARITY (BOTTOM OF LEADS AFTER FORMING) SHALL BE 0.10 MILLIMETERS MAX.
5) DRAWING CONFORMS TO JEDEC MO-293, VARIATION UAAD.
6) DRAWING IS NOT TO SCALE.

CARRIER INFORMATION



Part Number	Package Description	Quantity/ Reel	Quantity/ Tube	Quantity/ Tray	Reel Diameter	Carrier Tape Width	Carrier Tape Pitch
MP28600GTF-Z	SOT563	5000	N/A	N/A	7in	8mm	4mm

REVISION HISTORY

Revision #	Revision Date	Description	Pages Updated
1.0	2/6/2025	Initial Release	-