# **MP1608C**



### 5.5V, 6A, Synchronous Step-Down Converter with FCCM in SOT583 Package

### DESCRIPTION

The MP1608C is a monolithic, step-down switchmode converter with built-in internal power MOSFETs. It achieves 6A of continuous output current ( $I_{OUT}$ ) from a 2.4V to 5.5V input voltage ( $V_{IN}$ ) range, with excellent load and line regulation. The output voltage ( $V_{OUT}$ ) can be regulated to as low as 0.4V.

The constant-on-time (COT) control scheme provides fast transient response and facilitates loop stabilization. Fault protections include cycle-by-cycle current limiting and thermal shutdown.

The MP1608C is well-suited for a wide range of applications including high-performance digital signal processors (DSPs), wireless power, portable and mobile devices, and other lowpower systems.

The MP1608C requires a minimal number of readily available, standard external components. It is available in an ultra-small SOT583 package.

### FEATURES

- Wide 2.4V to 5.5V Operating Input Voltage (V<sub>IN</sub>) Range
- Up to 6A Output Current (I<sub>OUT</sub>)
- 15mΩ and 9mΩ Internal Power MOSFET Switches
- Forced Continuous Conduction Mode (FCCM)
- 1.25MHz Switching Frequency (f<sub>SW</sub>)
- Enable (EN) Function
- High Feedback Accuracy:
  - $\pm 0.75\%$  at Junction Temperature (T<sub>J</sub>) = 25°C
  - $\pm 1\%$  at T<sub>J</sub> = -40°C to +125°C
- Output Discharge Function
- Short-Circuit Protection (SCP) with Hiccup Mode
- Power Good (PG) Indication
- Available in an SOT583 Package
  - MPL Optimized Performance with MPS Inductor MPL-AL4020 Series

### APPLICATIONS

- IP Cameras
- Notebooks and PCs
- SSD/Optical Modules
- Multi-Function Printers
- Battery-Powered Devices

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. "MPS", the MPS logo, and "Simple, Easy Solutions" are trademarks of Monolithic Power Systems, Inc. or its subsidiaries.



# **TYPICAL APPLICATION**







### **ORDERING INFORMATION**

| Part Number* | Package | Top Marking | MSL Rating |
|--------------|---------|-------------|------------|
| MP1608CGTL   | SOT583  | See Below   | 1          |

\* For Tape & Reel, add suffix -Z (e.g. MP1608CGTL-Z).

# TOP MARKING BZUY LLL

BZU: Product code of MP1608CGTL Y: Year code LLL: Lot number

### PACKAGE REFERENCE





### **PIN FUNCTIONS**

| Pin # | Name | Description  |
|-------|------|--|
| 1     | VIN  | <b>Supply voltage.</b> The MP1608C operates from a 2.4V to 5.5V input. A decoupling capacitor is required to prevent large voltage spikes from appearing at the input. |
| 2, 3  | SW   | <b>Output switching node.</b> SW is the drain of the internal, high-side, P-channel MOSFET. Connect the inductor to SW to complete the converter.                      |
| 4     | GND  | Power ground.  |
| 5     | AGND | Signal ground.   |
| 6     | FB   | <b>Feedback pin.</b> An external resistor divider connected from the output to AGND, tapped to the FB pin, sets the output voltage ( $V_{OUT}$ ).                      |
| 7     | PG   | Power good indicator. The output of this pin is an open drain.   |
| 8     | EN   | On/off control.  |

### **ABSOLUTE MAXIMUM RATINGS** (1)

| Supply voltage (V <sub>IN</sub> )      | 6.5V                                     |
|--|--|
| V <sub>SW</sub>                        |  |
| 0.3V (-5V for <10ns) to +6.5V (        | +8V for <10ns)                           |
| All other pins                         | 0.3V to +6.5V                            |
| Junction temperature (T <sub>J</sub> ) | 150°C                                    |
| Lead temperature                       | 260°C                                    |
| Continuous power dissipation (T        | $_{\rm A} = 25^{\circ}{\rm C})^{(2)(4)}$ |
|  |  |
| Storage temperature                    | 65°C to +150°C                           |

### ESD Ratings

| Human body model (HE | 3M)   | ±2000V |
|----------------------|-------|--------|
| Charged-device model | (CDM) | )±750V |

#### **Recommended Operating Conditions** <sup>(3)</sup>

| Supply voltage (V <sub>IN</sub> ) | 2.4V to 5.5V       |
|-----------------------------------|--------------------|
| Output voltage (VOUT)             | 0.4V to VIN x DMAX |
| Operating junction temp (TJ       | )40°C to +125°C    |

#### 

#### Notes:

- 1) Exceeding these ratings may damage the device.
- 2) The maximum allowable power dissipation is a function of the maximum junction temperature,  $T_{\rm J}$  (MAX), the junction-to-ambient thermal resistance,  $\theta_{\rm JA}$ , and the ambient temperature,  $T_{\rm A}$ . The maximum allowable continuous power dissipation at any ambient temperature is calculated by  $P_{\rm D}$  (MAX) =  $(T_{\rm J}$  (MAX)  $T_{\rm A}) / \theta_{\rm JA}$ . 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.
- The device is not guaranteed to function outside of its operating conditions.
- 4) Measured on a EVL1608C-TL-00A, 2-layer, 63.5mmx63.5mm PCB.
- 5) Measured on a JESD51-7, 4-layer PCB. The value of  $\theta_{JA}$  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**

 $V_{IN} = 5V$ ,  $T_J = -40$ °C to +125°C <sup>(6)</sup>, typical value is tested at  $T_J = 25$ °C. The over-temperature limit is guaranteed by characterization, unless otherwise noted.

| Parameter  | Symbol                                 | Condition  | Min  | Тур  | Max  | Units |
|--|--|--|------|------|------|-------|
| Input voltage (V <sub>IN</sub> ) range                     |  |  | 2.4  |      | 5.5  | V     |
| Under-voltage lockout<br>(UVLO) rising threshold           | VINUVLO-R                              |  |      | 2.25 | 2.35 | V     |
| UVLO threshold hysteresis                                  | VINUVLO-HYS                            |  |      | 200  |      | mV    |
| Supply current (shutdown)                                  | Isd                                    | $V_{EN} = 0V, T_J = 25^{\circ}C$   |      | 0.2  | 0.5  | μA    |
| Supply current (quiescent)                                 | lq                                     |  |      | 450  |      | μA    |
|  |  | $T_J = 25^{\circ}C$  | 397  | 400  | 403  |       |
| reedback voltage   | VFB                                    | $T_J = -40^{\circ}C \text{ to } +125^{\circ}C^{(7)}$   | 396  | 400  | 404  | mv    |
| Feedback current   | IFB                                    | V <sub>FB</sub> = 0.405V   |      | 10   | 50   | nA    |
| P-channel MOSFET (P-<br>FET) switch on resistance          | Rds(on)_p                              | V <sub>IN</sub> = 5V   |      | 15   |      | mΩ    |
| N-channel MOSFET (N-<br>FET) switch on resistance          | Rds(on)_n                              | $V_{IN} = 5V$  |      | 9    |      | mΩ    |
| P-FET switch leakage                                       | $SW_{LKG_P}$                           |  |      | 0    | 1    | μA    |
| N-FET switch leakage                                       | $SW_{LKG_N}$                           | $\label{eq:VEN} \begin{split} V_{EN} &= 0V, \ V_{SW} = 5V, \\ T_J &= 25^\circ C \end{split}$ |      | 2    | 3    | μA    |
| Switching frequency  | fsw                                    | $V_{IN} = 5V, V_{OUT} = 1.2V$  | 1100 | 1250 | 1400 | kHz   |
| Minimum on time (7)  | t <sub>MIN-ON</sub>                    |  |      | 40   |      | ns    |
| P-FET peak current limit                                   | I <sub>LIMIT_PEAK</sub>                | $T_{J} = 25^{\circ}C$  | 7    | 9    | 11   | А     |
| N-FET valley current limit                                 |  | $T_J = 25^{\circ}C$  | 6    | 8    | 10   | А     |
| Soft-start time  | tss                                    | Time from 5% to 95% of<br>the nominal output<br>voltage (Vout)                               |      | 1    |      | ms    |
| Power good (PG) under-<br>voltage (UV) rising<br>threshold | Vpg_r_uv                               | FB rising edge   |      | 95   |      | %     |
| PG UV falling threshold                                    | $V_{\text{PG}\_\text{F}\_\text{UV}}$   | FB falling edge  |      | 90   |      | %     |
| Power good (PG) over-<br>voltage (OV) rising<br>threshold  | $V_{\text{PG}_{\text{R}}_{\text{OV}}}$ | Refer to $V_{FB}$  |      | 110  |      | %     |
| PG OV falling threshold                                    | Vpg_f_ov                               | Refer to V <sub>FB</sub>   |      | 105  |      | %     |
| PG rising delay  | tpg_r_dly                              | PG rising edge   |      | 50   |      | μs    |
| PG falling delay   | t <sub>PG_F_DLY</sub>                  | PG falling edge  |      | 35   |      | μs    |
| PG sink current capability                                 | V <sub>PG-L</sub>                      | Sink 1mA   |      |      | 0.4  | V     |



### ELECTRICAL CHARACTERISTICS (continued)

 $V_{IN} = 5V$ ,  $T_J = -40$ °C to +125°C <sup>(6)</sup>, typical value is tested at  $T_J = 25$ °C. The over-temperature limit is guaranteed by characterization, unless otherwise noted.

| Parameter                   | Symbol              | Condition                        | Min | Тур  | Max | Units |
|-----------------------------|---------------------|----------------------------------|-----|------|-----|-------|
| Enable (EN) turn-on delay   | ten_on_dly          | EN on to SW active               |     | 500  |     | μs    |
| EN turn-off delay           | ten_off_dly         | EN off to stop switching         |     | 10   |     | μs    |
| EN input logic low voltage  | Ven_low             |                                  |     |      | 0.4 | V     |
| EN input logic high voltage | Ven_high            |                                  | 1.2 |      |     | V     |
| EN pull-down resistor       | R <sub>EN</sub>     |                                  |     | 1.65 |     | MΩ    |
| Output discharge resistor   | RDIS                | $V_{EN} = 0V$ , $V_{OUT} = 1.2V$ |     | 54   |     | Ω     |
|                             | 1-11                | $V_{EN} = 2V$                    |     | 0.1  |     | μA    |
|                             | IEN                 | $V_{EN} = 0V$                    |     | 0    |     | μA    |
| Low-side current limit      | ILIMIT_LOW_SIDE     |                                  |     | -3   |     | А     |
| Thermal shutdown (7)        | T <sub>SD</sub>     |                                  |     | 150  |     | °C    |
| Thermal hysteresis (7)      | T <sub>SD_HYS</sub> |                                  |     | 20   |     | °C    |

#### Notes:

6) Not tested in production. Derived by over-temperature correlation.

7) Derived by sample characterization. Not tested in production.



## **TYPICAL PERFORMANCE CHARACTERISTICS**

 $V_{IN} = 5V$ ,  $V_{OUT} = 1.2V$ ,  $L = 0.47\mu$ H,  $T_A = 25^{\circ}$ C, unless otherwise noted.





### **TYPICAL PERFORMANCE CHARACTERISTICS** (continued)

 $V_{IN} = 5V$ ,  $V_{OUT} = 1.2V$ ,  $L = 0.47\mu$ H,  $T_A = 25^{\circ}$ C, unless otherwise noted.





### **TYPICAL PERFORMANCE CHARACTERISTICS** (continued)

 $V_{IN} = 5V$ ,  $V_{OUT} = 1.2V$ ,  $L = 0.47\mu$ H,  $T_A = 25^{\circ}$ C, unless otherwise noted.





CH1: VOUT

CHR1:PG

CH2: VIN

CH3: Vsw

CH4: I∟

CH4: IL

### **TYPICAL PERFORMANCE CHARACTERISTICS** (continued)

 $V_{IN} = 5V$ ,  $V_{OUT} = 1.2V$ ,  $L = 0.47\mu$ H,  $T_A = 25^{\circ}$ C, unless otherwise noted.



Start-Up through VIN

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



#### Start-Up through VIN $V_{IN} = 5V, V_{OUT} = 1.2V, I_{OUT} = 6A$



#### Shutdown through VIN



### Shutdown through VIN

VIN = 5V, VOUT = 1.2V, IOUT = 6A



### **TYPICAL PERFORMANCE CHARACTERISTICS** (continued)

 $V_{IN} = 5V$ ,  $V_{OUT} = 1.2V$ ,  $L = 0.47\mu$ H,  $T_A = 25^{\circ}$ C, unless otherwise noted.





#### Shutdown through EN





#### Shutdown through EN

 $V_{IN} = 5V, V_{OUT} = 1.2V, I_{OUT} = 6A$ 



SCP Entry V<sub>IN</sub> = 5V, V<sub>OUT</sub> = 1.2V, I<sub>OUT</sub> = 6A



# CH2: V<sub>PG</sub>

CH4: IL

### TYPICAL PERFORMANCE CHARACTERISTICS (continued)

 $V_{\text{IN}}$  = 5V,  $V_{\text{OUT}}$  = 1.2V, L = 0.47  $\mu\text{H},$  T\_A = 25 °C, unless otherwise noted.





#### Load Transient Response

 $V_{\text{IN}}$  = 5V,  $V_{\text{OUT}}$  = 1.2V,  $I_{\text{OUT}}$  = 0A to 6A, 2.5A/µs with e-load



#### Load Transient Response

 $V_{IN} = 5V$ ,  $V_{OUT} = 1.2V$ ,  $I_{OUT} = 0A$  to 3A, 2.5A/µs with e-load



#### Load Transient Response

 $V_{\text{IN}}$  = 5V,  $V_{\text{OUT}}$  = 1.2V,  $I_{\text{OUT}}$  = 3A to 6A, 2.5A/µs with e-load





# FUNCTIONAL BLOCK DIAGRAM



Figure 1: Functional Block Diagram



### OPERATION

The MP1608C uses constant-on-time (COT) control with input voltage (V<sub>IN</sub>) feed-forward to stabilize the switching frequency ( $f_{SW}$ ) across the full V<sub>IN</sub> range. It achieves 6A of continuous output current ( $I_{OUT}$ ) from a 2.4V to 5.5V V<sub>IN</sub> with excellent load and line regulation. The output voltage (V<sub>OUT</sub>) can be regulated to as low as 0.4V.

#### **Constant-On-Time (COT) Control**

Compared to fixed-frequency pulse-width modulation (PWM) control, COT control offers a simpler control loop and a faster transient response. By using  $V_{IN}$  feed-forward, the MP1608C maintains a nearly constant  $f_{SW}$  across the  $V_{IN}$  and  $V_{OUT}$  ranges. The switching pulse on time ( $t_{ON}$ ) can be calculated with Equation (1):

$$t_{\rm ON} = \frac{V_{\rm OUT}}{V_{\rm IN}} \times 0.83 \mu s \tag{1}$$

To prevent inductor current  $(I_L)$  runaway during load transients, the MP1608C has a fixed minimum off time and valley current protection.

#### Enable (EN)

When  $V_{IN}$  exceeds the under-voltage lockout (UVLO) threshold, the MP1608C can be enabled by pulling the EN pin above 1.2V. Leave the EN pin floating or pull it down to ground to disable the MP1608C. There is an internal 1.65M $\Omega$  resistor connected from EN pin to ground.

When the device is disabled, the part goes into output discharge mode automatically, and its internal discharge MOSFET provides a resistive discharge path for the output capacitor.

#### Internal Soft Start (SS)

The MP1608C has an internal soft start (SS) that ramps up  $V_{OUT}$  at a controlled slew rate to prevent overshoot during start-up. The soft-start time (t<sub>SS</sub>) is 1ms typically.

#### **Current Limit**

The MP1608C has a high-side switch current limit. When the high-side switch reaches its current limit, the MP1608C remains in hiccup mode until the current drops. This prevents  $I_L$  from continuing to rise and damaging the components.

#### Short-Circuit Protection (SCP) and Recovery

The MP1608C enters short-circuit protection (SCP) mode when it reaches the current limit, and it tries to recover with hiccup mode. The MP1608C disables the output power stage, discharges the soft-start capacitor, and then automatically tries to soft start again. If the short-circuit condition remains after soft start ends, the MP1608C repeats this cycle until the short-circuit condition disappears and the output voltage rises back to its regulation level.

#### Power Good (PG) Indicator

The MP1608C has an open-drain output and requires an external pull-up resistor ( $100k\Omega$  to  $500k\Omega$ ) for the power good indicator. When the feedback voltage (V<sub>FB</sub>) exceeds 90% of the regulation voltage, the PG pin's voltage (V<sub>PG</sub>) is pulled up to V<sub>OUT</sub> or V<sub>IN</sub> by the external resistor. If V<sub>FB</sub> exceeds this window, the internal MOSFET pulls PG to ground.

When VIN and EN are not available, PG is clamped low, even though PG is tied to an external DC source through a pull-up resistor. Figure 2 shows the relationship between the PG voltage and the pull-up current.



### **APPLICATION INFORMATION**

### **COMPONENT SELECTION**

### Setting the Output Voltage

The external resistor divider sets the output voltage (see Figure 3). Select the feedback resistor (R1, typically between  $100k\Omega$  and  $200k\Omega$ ) that reduces the VOUT leakage current. There is no strict requirement on the feedback resistor. Select R1 to exceed  $10k\Omega$ . R2 can then be estimated with Equation (2):

$$R2 = \frac{R1}{\frac{V_{OUT}}{0.4} - 1}$$
 (2)

Figure 2 shows the feedback circuit.



Figure 3: Feedback Network

Table 1 shows the recommended parameters for common  $V_{\mbox{\scriptsize OUT}}$  values.

# Table 1: Parameter Selection for Common Output Voltages

| Vоит (V) | R1 (kΩ) | R2 (kΩ) | L (µH) |
|----------|---------|---------|--------|
| 1        | 100     | 64.9    | 0.47   |
| 1.2      | 100     | 49.9    | 0.47   |
| 1.8      | 105     | 30      | 0.47   |
| 2.5      | 105     | 20      | 0.47   |
| 3.3      | 110     | 15      | 0.47   |

#### Selecting the Inductor

MPL Optimized Performance with MPS Inductor MPL-AL4020 Series

Most applications work best with a  $0.47\mu$ H to  $1.5\mu$ H inductor. Select an inductor with a DC resistance below  $25m\Omega$  to optimize efficiency.

A high-frequency, switch-mode power supply with a magnetic device has strong electromagnetic inference within the system. Do not use un-shielded power inductors, as they provide poor magnetic shielding. Shielded inductors, such as metal alloy or multi-player chip powers, are the best candidates for applications because they effectively decrease interference.

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

Table 2listsourpowerinductorrecommendations.Select a part number basedon your design requirements.

Table 2: Suggested Inductor List

| Manufacturer PN | Inductance<br>(µH) | Manufacturer |
|-----------------|--------------------|--------------|
| MPL-AL4020-R47  | 0.47               | MPS          |
| MPL-AL4020-R68  | 0.68               | MPS          |
| MPL-AL4020-1R0  | 1.0                | MPS          |

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

For most designs, calculate the inductance with Equation (3):

$$L_{1} = \frac{V_{OUT} \times (V_{IN} - V_{OUT})}{V_{IN} \times \Delta I_{L} \times f_{OSC}}$$
(3)

Where  $\Delta I_{L}$  is the inductor ripple current.

Choose an inductor current to be approximately 30% of the maximum load current. The maximum inductor peak current can be calculated with Equation (4):

$$\mathbf{I}_{\mathrm{L(MAX)}} = \mathbf{I}_{\mathrm{LOAD}} + \frac{\Delta \mathbf{I}_{\mathrm{L}}}{2}$$
(4)

### Selecting the Input Capacitor

The step-down converter has a discontinuous input current, and requires a capacitor to supply the AC current to the converter while maintaining the DC input voltage. Use low-ESR capacitors for the best performance. Ceramic capacitors with X5R or X7R dielectrics are highly recommended because of their low ESR and small temperature coefficients. For most applications, a  $10\mu$ F capacitor is sufficient. Higher output voltages may require a  $22\mu$ F capacitor to increase system stability.

The input capacitor requires an adequate ripple current rating, because it absorbs the input switching current.



Calculate the RMS current in the input capacitor with Equation (5):

$$I_{C1} = I_{LOAD} \times \sqrt{\frac{V_{OUT}}{V_{IN}}} \times \left(1 - \frac{V_{OUT}}{V_{IN}}\right)$$
(5)

The worst-case scenario occurs at  $V_{IN} = 2 \times V_{OUT}$ , estimated with Equation (6):

$$I_{C1} = \frac{I_{LOAD}}{2}$$
 (6)

For simplification, choose an input capacitor with an RMS current rating greater than half of the maximum load current.

The input capacitor can be electrolytic, tantalum, or ceramic. When using electrolytic or tantalum capacitors, add a small, high-quality,  $0.1\mu$ F ceramic capacitor as close to the IC as possible. When using ceramic capacitors, ensure that they have enough capacitance to provide sufficient charge to prevent excessive voltage ripple at the input. The input voltage ripple caused by the capacitance can be calculated with Equation (7):

$$\Delta V_{\text{IN}} = \frac{I_{\text{LOAD}}}{f_{\text{SW}} \times C1} \times \frac{V_{\text{OUT}}}{V_{\text{IN}}} \times \left(1 - \frac{V_{\text{OUT}}}{V_{\text{IN}}}\right)$$
(7)

#### **Selecting the Output Capacitor**

The output capacitor (C2, also known as  $C_{OUT}$ ) stabilizes the DC output voltage. Ceramic capacitors are recommended. Low-ESR capacitors are recommended to limit the output voltage ripple. Estimate the output voltage ripple with Equation (8):

$$\Delta V_{\text{OUT}} = \frac{V_{\text{OUT}}}{f_{\text{SW}} \times L_{1}} \times \left(1 - \frac{V_{\text{OUT}}}{V_{\text{IN}}}\right) \times \left(R_{\text{ESR}} + \frac{1}{8 \times f_{\text{SW}} \times C2}\right)$$
(8)

Where  $L_1$  is the inductance and  $R_{ESR}$  is the output capacitor's equivalent series resistance (ESR).

When using ceramic capacitors, the capacitance dominates the impedance at the switching frequency, and causes most of the output voltage ripple. For simplification, the output voltage ripple can be calculated with Equation (9):

$$\Delta V_{OUT} = \frac{V_{OUT}}{8 \times f_{SW}^2 \times L_1 \times C2} \times \left(1 - \frac{V_{OUT}}{V_{IN}}\right) \quad (9)$$

For tantalum or electrolytic capacitors, the ESR dominates the impedance at the switching

frequency. For simplification, the output ripple can be estimated with Equation (10):

$$\Delta V_{\text{OUT}} = \frac{V_{\text{OUT}}}{f_{\text{SW}} \times L_1} \times \left(1 - \frac{V_{\text{OUT}}}{V_{\text{IN}}}\right) \times R_{\text{ESR}}$$
(10)

The characteristics of the output capacitor also affect the stability of the regulation system.

#### **PCB Layout Guidelines**

Proper layout of the switching power supply is critical for efficient device functioning. Poor layout design can result in poor line or load regulation and stability issues. For the best results, refer to Figure 4 and follow the guidelines below:

- 1. Place the high-current paths (GND, VIN, and SW) very close to the device with short, direct, and wide traces.
- 2. Place the input capacitor as close as possible to the VIN and GND pins.
- 3. Place the external feedback resistors next to the FB pin.
- 4. Keep the switching node (SW) short and route it away from the feedback network.
- 5. Route the  $V_{OUT}$  sense line away from the power inductor.
- 6. Place the  $V_{OUT}$  sensing point close to  $C_{OUT}$ .
- 7. Add some GND vias around the GND pin.



Figure 4: Recommended PCB Layout

### **TYPICAL APPLICATION CIRCUITS** <sup>(8)</sup>



Figure 5: Typical Application Circuit (V<sub>IN</sub> = 2.4V to 5.5V, V<sub>OUT</sub> = 1.2V/6A)



Figure 6: Typical Application Circuit (VIN = 2.4V to 5.5V, VOUT = 1V/6A)



Figure 7: Typical Application Circuit (V<sub>IN</sub> = 2.4V to 5.5V, V<sub>OUT</sub> = 1.8V/6A)

### TYPICAL APPLICATION CIRCUITS (continued) <sup>(8)</sup>



Figure 8: Typical Application Circuit (VIN = 5V, VOUT = 2.5V/6A)



#### Note:

8) If  $V_{IN}$  < 3.3V, additional input capacitance may be required.



## **PACKAGE INFORMATION**

SOT583





TOP VIEW





FRONT VIEW





**RECOMMENDED LAND PATTERN** 

#### **NOTE:**

 ALL DIMENSIONS ARE IN MILLIMETERS.
 PACKAGE WIDTH DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION.
 LEAD COPLANARITY (BOTTOM OF LEADS AFTER FORMING) SHALL BE 0.10 MILLIMETERS MAX.
 DRAWING IS NOT TO SCALE.



## **CARRIER INFORMATION**





| Part Number  | Package<br>Description | Quantity/<br>Reel | Quantity/<br>Tube | Quantity/<br>Tray | Reel<br>Diameter | Carrier<br>Tape<br>Width | Carrier<br>Tape<br>Pitch |
|--------------|------------------------|-------------------|-------------------|-------------------|------------------|--------------------------|--------------------------|
| MP1608CGTL-Z | SOT583                 | 5000              | N/A               | N/A               | 7in              | 8mm                      | 4mm                      |



### **REVISION HISTORY**

| Revision # | <b>Revision Date</b> | Description     | Pages Updated |
|------------|----------------------|-----------------|---------------|
| 1.0        | 7/5/2024             | Initial Release | -             |

**Notice:** The information in this document is subject to change without notice. Please contact MPS for current specifications. Users should warrant and guarantee that third-party Intellectual Property rights are not infringed upon when integrating MPS products into any application. MPS will not assume any legal responsibility for any said applications.