20V/300mA Low Power Low Noise LDO Regulator

·Data Sheet

GM1207

Features Low noise:

8.5 µVRMS, independent of fixed output voltage values Power supply rejection ratio (PSRR): 92 dB (10 kHz) Input voltage range: 1.9 V to 20 V Output voltage: Fixed output voltages: 1.5 V, 1.8 V, 2.5 V, 3.3 V, and 5.0 V

Adjustable output voltage range: 1.2 V to VIN – VDO GM1207AUJZ-1-R7 Adjustable output voltage range: 1.22 V to

VIN – VDO

Maximum output current: 300 mA

Accuracy over line, load and temperature:

±1.2% (TJ = ÿ55°C to +125°C) ±1.6% (TJ = ÿ55°C to +150°C) Low Dropout Voltage: 240 mV (typical,

IOUT = 300 mA, VOUT = 5 V) User Programmable Soft-Start (DFN package only) Low Quiescent Current, IGND = 22 ÿA (typical, no load) Low Shutdown Current: 1.1 ÿA (VIN = 20V) Stable with 2.2 ÿF Ceramic Output Capacitors Accurate Enable Operating Ambient Temperature (TA) Range: ÿ55°C to +125°C Operating Junction Temperature (TJ) Range: ÿ55°C to +150°C 6-Lead DFN and 5-Lead SOT-23 Packages

Typical Applications

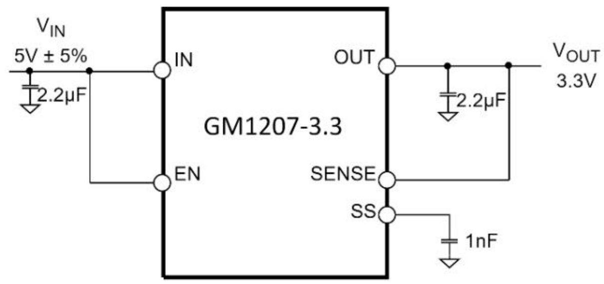

Figure 1. Fixed output 3.3V

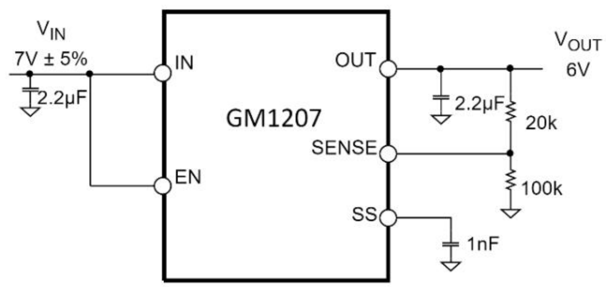

Figure 2. 5V adjustable output to 6V

Application

Adaptation for Noise Sensitive Applications

ADC and DAC Circuits, Precision Amplifiers and VCO Control Power Communications and Infrastructure Medical

Imaging

Industrial and Instrumentation

Automotive Electronics

Overview

The GM1207 is a CMOS, low dropout (LDO) linear regulator that operates from a 1.9V to 20V supply with a maximum output current of 300 mA. This high input voltage LDO is suitable for regulating high-performance analog and mixed-signal circuits powered from 20V to 1.2V. The device uses an advanced proprietary architecture to provide high power supply rejection, low noise characteristics while maintaining low quiescent current, and only requires a small 2.2ÿF ceramic output capacitor to achieve excellent line and load transient response performance. The GM1207 regulator output noise is 8.5ÿVRMS, which is independent of the fixed option output voltage of 5V and below.

The GM1207 is available in 6 fixed output voltage options. Column voltage version: 1.2V (adjustable), 1.22V (adjustable), 1.5V, 1.8V, 2.5V, 3.3V and 5.0V.

Each fixed output voltage can be set at an initial setting by an external feedback voltage divider. This allows the GM1207 to provide an output voltage of 1.2V to VIN ÿ VDO with high PSRR and low noise.

The GM1207 is available in 6-pin DFN and 5-pin SOT-23 packages. The DFN package supports user programmable soft-start via an external capacitor.

Manbasemi Technology (Suzhou) Co., Ltd. A1605, Phase IV, International Science Park, Suzhou Industrial Park, Suzhou, Jiangsu. Technical support and document feedback: tech@manbasemi.com, manbasemi.com

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Revision History

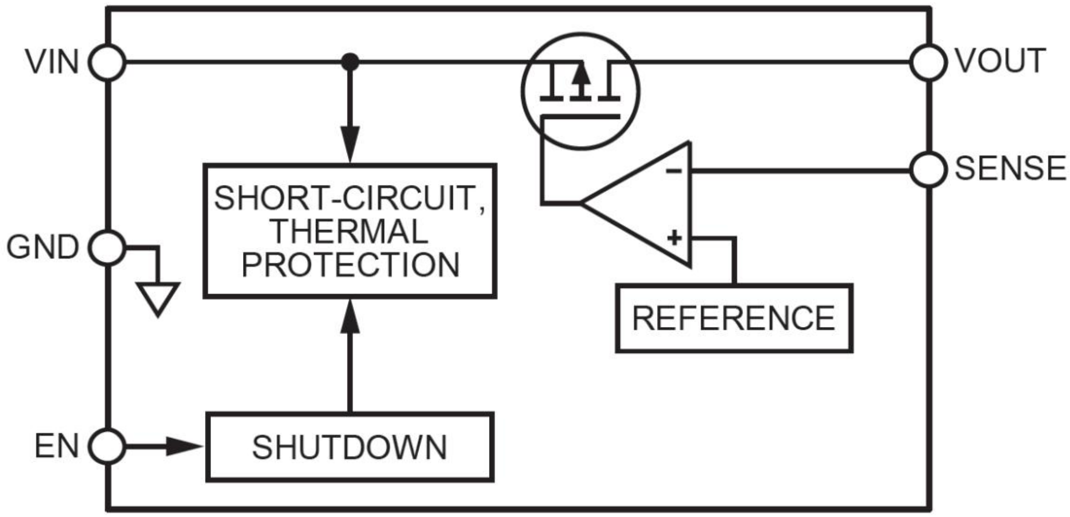
2/24 — Rev.0

First Draft

4/24 — Rev.A

Update electrical characteristics

Block Diagram



Pin Configuration and Function Description

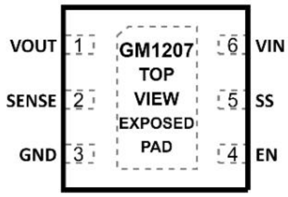


Figure 3. 5-pin DFN-6 pin configuration

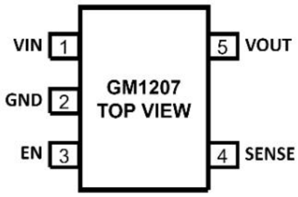


Figure 4. 3-pin SOT-23 pin configuration

Table **1.** Pin Function Description

Pin No. **6 Pin**		Pin Name	illustrate
DFN-6	5-pin **TODAY-23**		
1	5	VOUT	Regulated Output Voltage. Bypass VOUT to GND with a 2.2 µF or greater capacitor.
2	4	SENSE/BYP	Sense Input (SENSE). Connect to the load. An external resistor divider can also be used to set the output voltage higher than the fixed If you want to be compatible with the traditional BYP noise reduction function, you need to change the BYP capacitor to a 0ÿ resistor.
3	2	GND	land.
4	3	EN	Enable pin controls the operation of LDO. When EN is connected to a high level, the regulator starts. When EN is connected to a low level, the regulator To achieve automatic start-up, connect EN to VIN.
5	Not applicable	SS	soft start. An external capacitor connected to this pin determines the soft start time. Leave this pin open for 500 ÿs typical startup time. Do not connect this pin to ground.
6	1	VIN	Regulator Input Supply. Bypass VIN to GND with a 2.2 µF or greater capacitor.
Not applicable	Not applicable	NC	Do not connect.
N/A	N/A	PG	Output voltage good. Open-drain output.
EPAD	is not applicable to	EP	Exposed pad. The exposed pad on the bottom of the package can enhance the heat dissipation performance and is connected to the GND inside the package. It is recommended that the exposed pad be connected to the ground plane on the board.

Absolute Maximum Ratings

Table **1:**

parameter	Rating
VIN to GND	ÿ0.3 V to +28 V
VOUT to GND	ÿ0.3 V to VIN
EN to GND	ÿ0.3 V to +28 V
SENSE to GND	ÿ0.3 V to +6 V
SS to GND	ÿ0.3 V to VIN or +6 V
Storage Temperature	ÿ65°C to +150°C
Range Operating Ambient Temperature (TA) Range	ÿ55°C to +125°C
Operating Junction Temperature (TJ) Range	ÿ55°C to +150°C
Soldering Conditions	JEDEC J-STD-020

Application to conditions at or above the maximum ratings may cause permanent damage to the product.

The above table is only a reference pressure rating. It is not recommended to use the product under the conditions shown in the above table.

Operation at or above the conditions shown in the table above. Operation exceeding the maximum operating conditions for a long time may may affect the reliability of the product.

Thermal resistance

ÿJA applies to the worst case, when the device is soldered on a circuit board for surface-mount packaging.

Table 2:

Package Type	ÿJA Unit	
5-pin SOT-23	170	°C/W
6-pin DFN	72	°C/W

Electrical Characteristics

Unless otherwise noted, VIN = maximum (VOUT + 1V, 1.9 V), CIN = 2.2µF, COUT = 2.2µF, VOUT(nom) (1) = 1.2V, IOUT = 10mA, TJ = ÿ55°C to +150°C (for min./max. specifications), TA = 25°C (for typical specifications).

Table 3.

symbol	Parameter	Test Conditions/Comments	Min	Typ	Max	Unit
COME	Input voltage range		1.9		20	In
IGND	Working power supply current	IOUT= 0 µA		22	140	µA
		IOUT = 10mA		70	200	µA
		IOUT = 300 mA		460	960	µA
IGND-SD	Shutdown current	EN = GNDÿVIN = 20V		1.1	15	µA
VOUT	Output voltage accuracy	100 µA < IOUT < 300 mAÿVIN =ÿVOUT + 1 Vÿÿ20 Vÿ TJ = -40°C to +125°C	-1.2		+1.2	%
		100 µA < IOUT < 300 mAÿVIN =ÿVOUT + 1 Vÿÿ20 V	-1.6		+1.6	%
ÿVOUT/ÿVIN	Voltage Regulation ÿVOUT/	VIN = (VOUT + 1 V) to 20 V	–0.015		+0.015	%V
ÿIOUT	Load Regulation [1]	IOUT = 1 mA to 300 mA		0.002	0.004	%/mA
SENSEI-BIAS	SENSE input bias current	100 µA < IOUT < 300 mAÿVIN =ÿVOUT + 1Vÿÿ 20 V		10	300	nA
VDROPOUT	voltage dropout [2]	IOUT= 10mA, TJ = ÿ55°C to +125°C		30	60	mV
		IOUT= 10mA			105	mV
		IOUT= 200 mA, TJ = ÿ55°C to +125°C		173	320	mV
		IOUT= 200 mA			410	mV
		IOUT= 300 mA, TJ = ÿ55°C to +125°C		266	590	mV
		IOUT= 300 mA			680	mV
t START-UP	Startup time [3]	VOUT = 5V		500		µs
SSI-SOURCE	soft-start source current limit	SS =GND		1.2		µA
ı LIMIT	threshold [4]		350	450	600	mA
TSSD	Thermal Shutdown Threshold	TJ Rise		165		°C
TSSD-HYS	Thermal Shutdown Threshold Thermal Shutdown Hysteresis			15		°C
UVLO	Undervoltage threshold					
UVLORISE	input voltage rises			1.74	1.89	In
UVLOFALL	Input voltage drops		1.40	1.64		In
IN	Precision EN Input	2.7V ÿ VIN ÿ 20V				
ENHIGH	logic high		1.12	1.20	1.28	In
ENLOW	logic low		1.02	1.10	1.18	In
IEN-LKG	leakage current	EN = VIN or GND		0.04	1	µA
tEN-DLY	delay time	EN rises from 0 V to VIN is 0.1 ×		440		µs
OUTNOISE	Output noise	VOUT 10 Hz to 100 kHz, all output voltage options		8.5		µVRMS
PSRR	Power Supply Rejection Ratio	1MHzÿVIN = 7VÿVOUT = 5V		52		dB
		100 kHz, VIN = 7 V, VOUT = 5 V		68		dB
		10 kHz, VIN = 7 V, VOUT = 5 V		92		dB

1Based on endpoint calculations using 1mA and 300mA loads.

2Dropout voltage is defined as the input-to-output voltage difference when the input voltage is set to the nominal output voltage. The dropout voltage is only applicable for output voltages above 1.8V.

3Start-up time is defined as the time from the rising edge of EN to when OUT reaches 90% of its nominal value.

4The current limit threshold is defined as the current at which the output voltage drops to 90% of the rated typical value. For example, The current limit for a 5.0V output voltage is defined as the current that causes the output voltage to drop to 90% of 5.0V or 4.5V current.

Typical Performance

Specifications Unless otherwise noted, VIN = MAX(VOUT + 1V, 1.9 V), IOUT = 10mA, CIN = 2.2μF, COUT = 2.2μF.

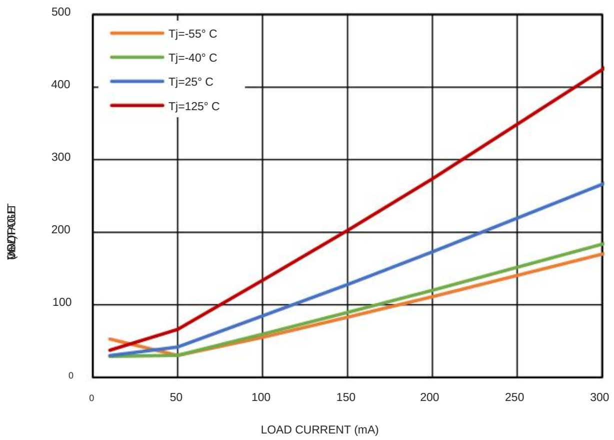


Figure 5. 3.3V dropout voltage vs. load current

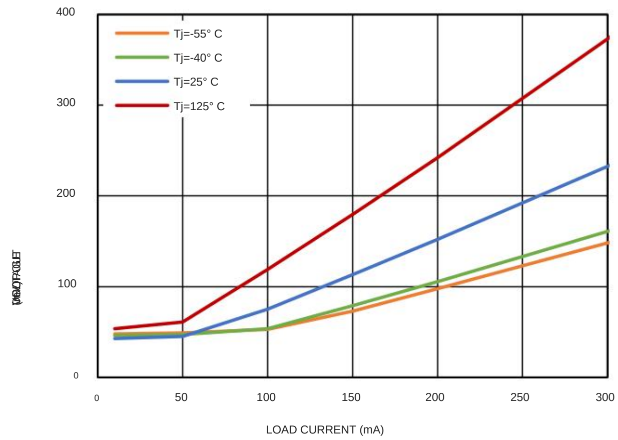


Figure 6. 5.0V dropout voltage vs. load current

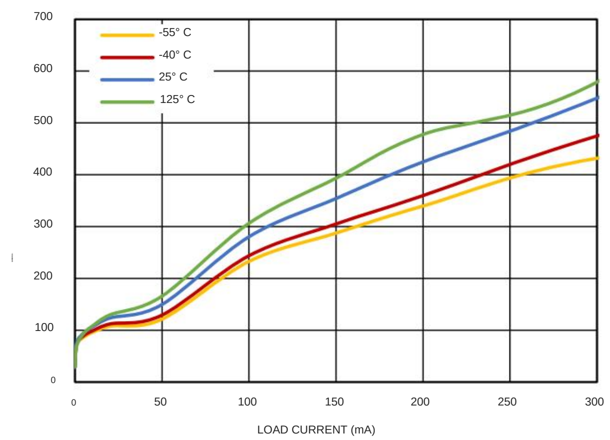


Figure 7. Quiescent current vs. load current, VIN=4.3V

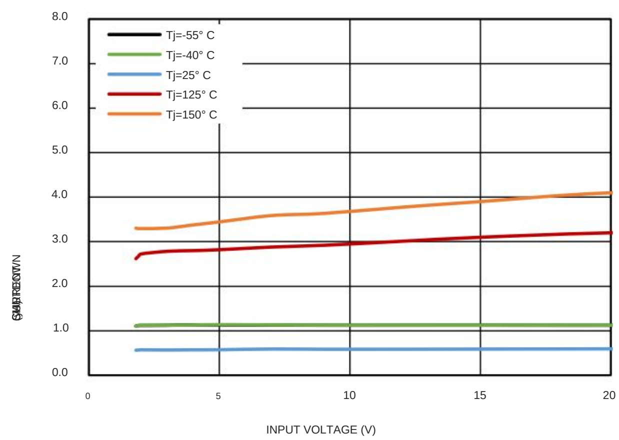


Figure 8. Shutdown current vs. input voltage

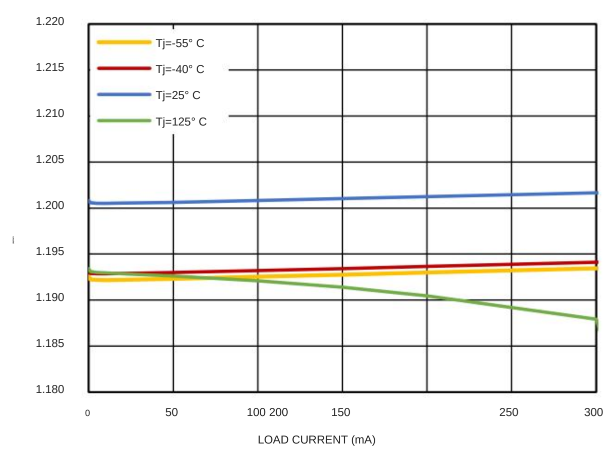


Figure 9. 1.2V output voltage and load current relationship

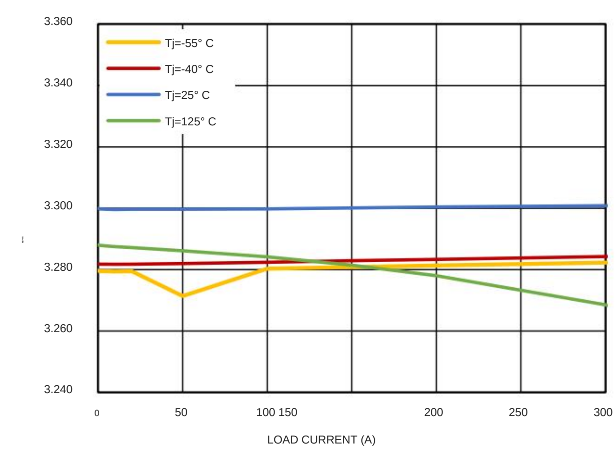


Figure 10. Relationship between 3.3V output voltage and load current

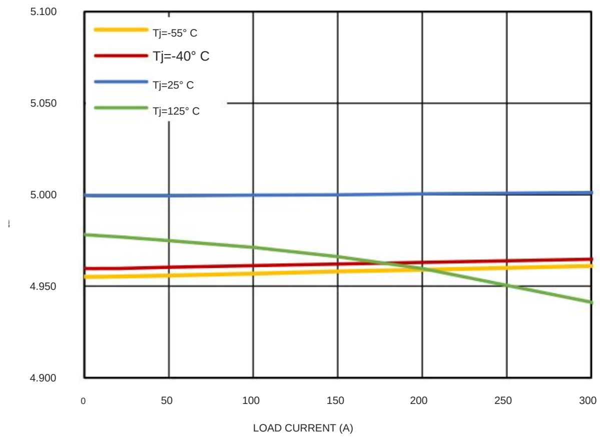


Figure 11. 5.0V output voltage and load current relationship

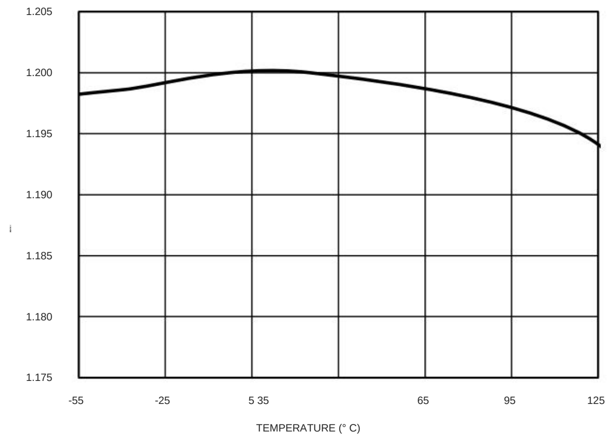


Figure 12. 1.2V SENSE pin voltage accuracy

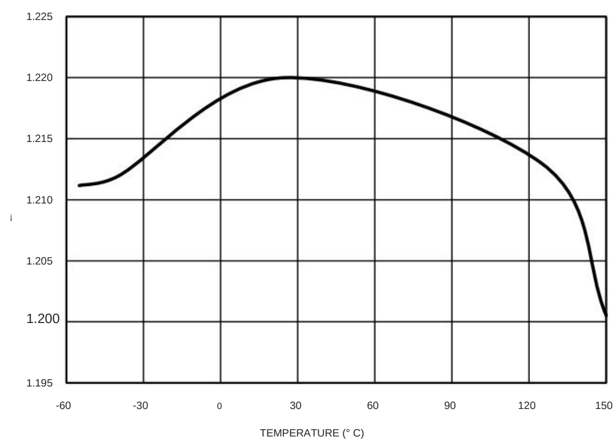


Figure 13. 1.22V SENSE pin voltage accuracy

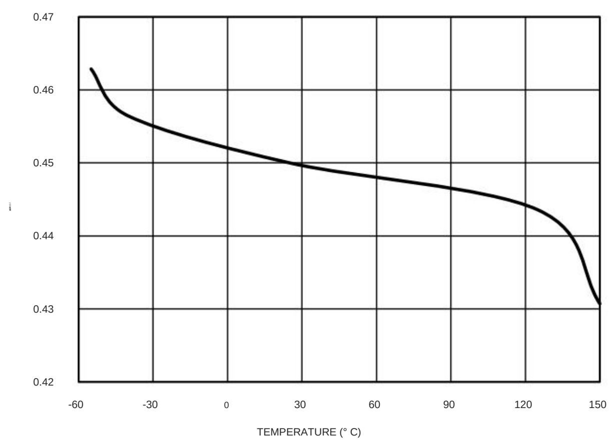


Figure 14. Output Current Limit vs. Temperature

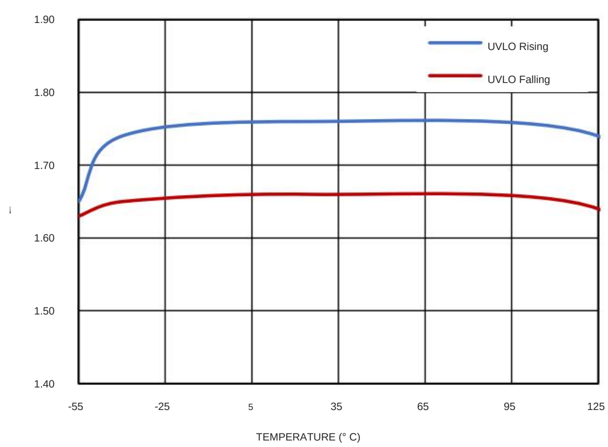


Figure 15. UVLO threshold vs. temperature

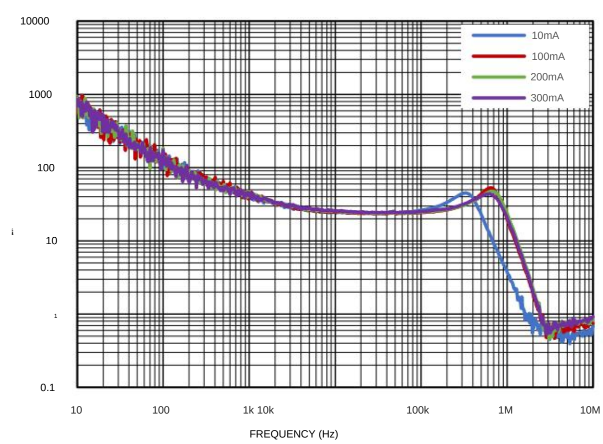


Figure 16. Output Noise Spectral Density, VIN=5V, VOUT=3.3V

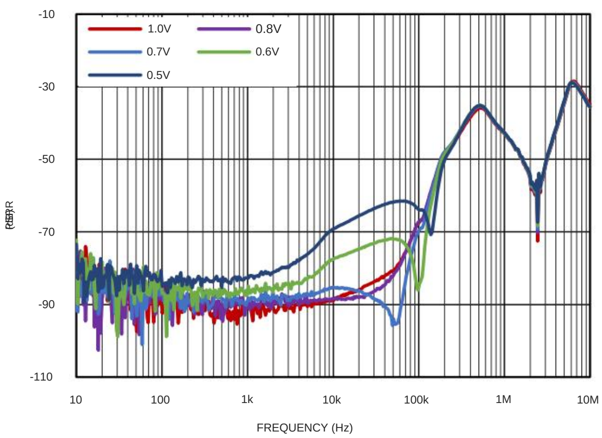


Figure 17. Supply voltage ripple rejection ratio vs. dropout voltage, VOUT=3.3V

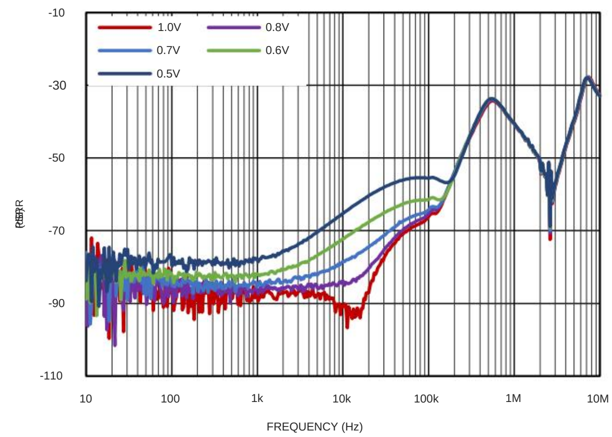


Figure 18. Relationship between power supply voltage ripple rejection ratio and voltage dropout, VOUT=5.0V

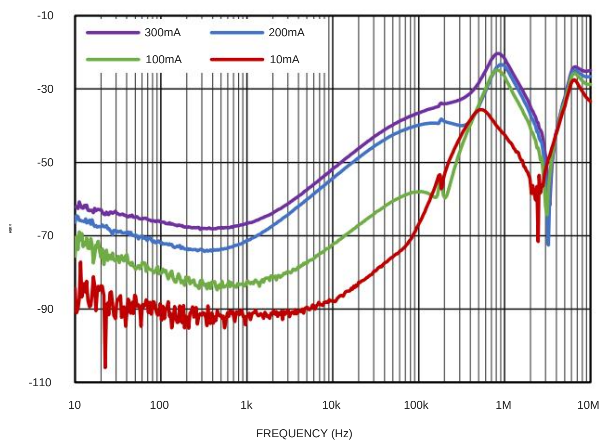


Figure 19. Supply voltage ripple rejection ratio vs. load, VOUT=3.3V

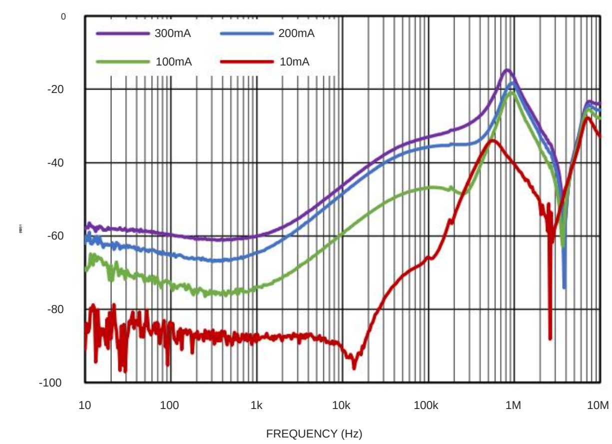


Figure 20. Power supply voltage ripple rejection ratio vs. load, VOUT=5.0V

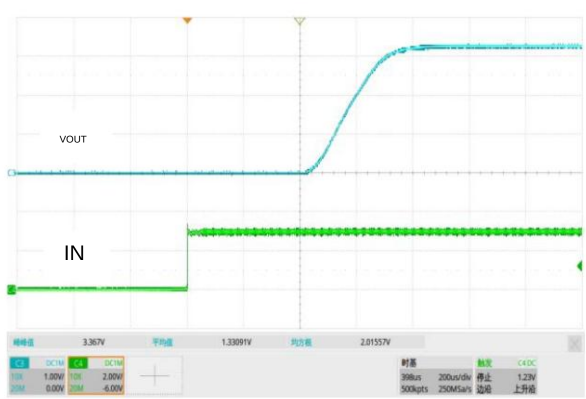


Figure 21. Soft start, VIN=4.3V, VOUT=3.3V, IOUT=300mA

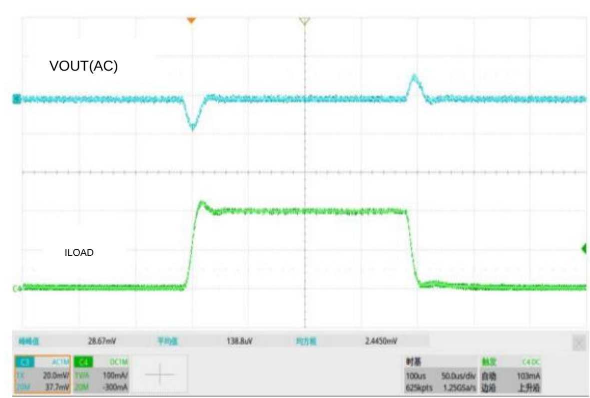


Figure 22. Load transient response, VIN=4.3V, VOUT=3.3V, IOUT=1mA to 200mA

How it works

The GM1207 is a low quiescent current, LDO linear regulator that operates from a 1.9 V to 20 V supply with a maximum output current of 300 mA. The typical quiescent current is as low as 460 ÿA at full load, making the GM1207 ideal for portable equipment. At room temperature, the typical power consumption in shutdown mode is only 1.1 ÿA.

The GM1207 is optimized to achieve excellent transient performance with small 2.2 µF ceramic capacitors.

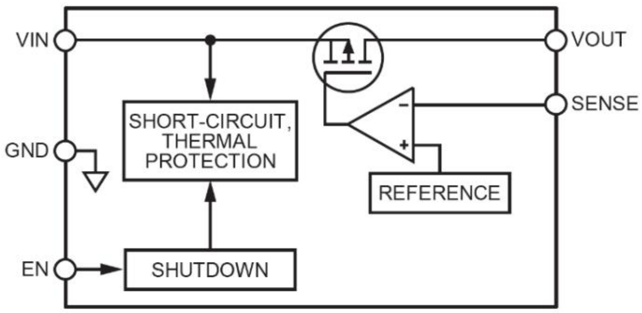


Figure 23. Internal block diagram

The GM1207 has a built-in reference voltage source, an error amplifier, a feedback voltage divider, and a PMOS pass tube. The output current is provided by the PMOS pass tube, which is controlled by the error amplifier. The error amplifier compares the reference voltage with the feedback voltage at the output and amplifies the difference. If the feedback voltage is lower than the reference voltage, the gate of the PMOS device will be pulled down to pass more current and increase the output voltage. If the feedback voltage is higher than the reference voltage, the gate of the PMOS device will be pulled up to pass less current and reduce the output voltage.

The GM1207 is available in a variety of fixed output voltage options ranging from 1.2V to 5.0V. The architecture of the GM1207 allows any fixed output voltage to be

For example, a fixed 5 V output can be set to a 6 V output according to the following formula:

VOUT = 5 Vÿ1 + R1/R2ÿ

Where R1 and R2 are the resistors in the output resistor divider, as shown in Figure 24. To set the adjustable GM1207 output voltage, replace 5 V with 1.2 V in the above equation.

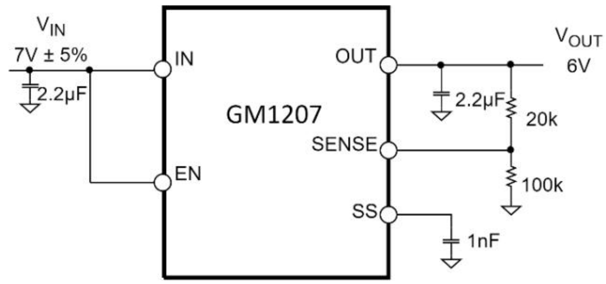


Figure 24. Typical adjustable output voltage application schematic

It is recommended that the value of R2 be less than 200 kÿ to minimize the output voltage error caused by the SENSE pin input current. For example, when R1 and R2 are both 200 kÿ and the default output voltage is 1.2 V, the adjustable output voltage is 2.4 V. Assuming a typical input current of 10 nA at 25°C, the output voltage error caused by the SENSE pin input current is 1 mV or 0.04%.

Under normal operating conditions, the GM1207 uses the EN pin to enable and disable the VOUT pin. When EN is high, VOUT is turned on; when EN is low, VOUT is turned off. To achieve automatic startup, EN can be connected to VIN.

Application Information

The GM1207 is a high voltage, low noise, high precision, low dropout linear regulator capable of supplying 300mA with a typical dropout voltage of 300mV. The input voltage operating range is 1.9V to 20V. The fixed output voltage is 1.2V to 5.0V. The output voltage can be adjusted from 1.2V to 20V-VDO by setting an external resistor. Output

capacitor

The GM1207 is designed to use small ceramic capacitors to save space, but general-purpose capacitors can also be used as long as the equivalent series resistance (ESR) value requirements are taken into account. The ESR of the output capacitor will affect the stability of the LDO control loop. To ensure

For stable operation of the GM1207, it is recommended to use a capacitor of at least 2.2 µF with an ESR of 0.3 ÿ or less. The output capacitor also affects the transient response to load current changes. Using a larger output capacitor value can improve the transient response of the GM1207 to large load current changes.

The GM1207 device is designed to operate over an input voltage supply range of 1.9 V to 20 V. The input voltage range provides enough margin for the device to achieve a stable output. If the input supply is noisy, additional input capacitance with low ESR may help improve the output noise performance. Input Capacitor

Connecting a

2.2 µF capacitor from VIN to GND can reduce the circuit's sensitivity to PCB layout, especially when long input traces or high signal source impedance are encountered. If output capacitance greater than 2.2 µF is required, a higher input capacitance can be selected.

Input and Output Capacitor Characteristics

Any good quality ceramic capacitor can be used with the GM1207 as long as the minimum capacitance and maximum ESR requirements are met. Ceramic capacitors can be manufactured with a wide variety of dielectrics, with different characteristics over temperature and applied voltage. The capacitor must have a dielectric sufficient to ensure the minimum capacitance over the necessary temperature range and dc bias conditions. X5R or X7R dielectrics with voltage ratings from 6.3 V to 100 V are recommended. Y5V and Z5U dielectrics have poor temperature and dc bias

characteristics and are not recommended. Figure 25 shows the capacitance vs. voltage bias characteristics of a 0805, 2.2 ÿF, 10 V, X5R capacitor. The voltage stability of a capacitor is greatly affected by the size of the capacitor and the voltage rating. In general, capacitors with larger packages or higher voltage ratings have better stability. The temperature variation of the X5R dielectric is approximately ±15% over the ÿ55°C to +85°C temperature range and is not a function of package or voltage rating.

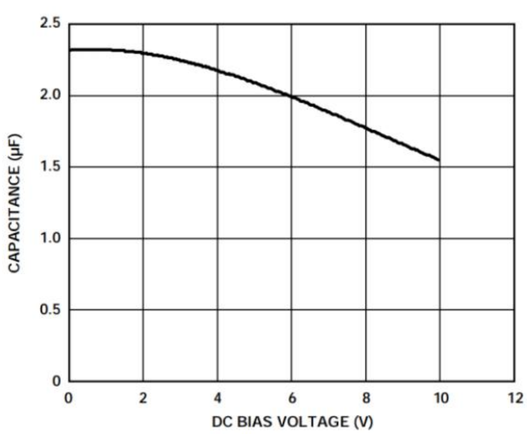


Figure 25. Capacitance vs. voltage characteristics

Taking into account the variation of capacitance with temperature, component tolerance, and voltage, the worst-case capacitance can be determined using the following formula.

CEFF = CBIAS ×ÿ1 ÿ *TEMPCOÿ*×*ÿ1* ÿ *TOLÿ*

in:

CBIAS is the effective capacitance at the operating voltage.

TEMPCO is the worst-case temperature coefficient of capacitance.

TOL is the worst-case component tolerance.

In this example, the worst-case temperature coefficient (TEMPCO) of the X5R dielectric in the ÿ55°C to +85°C range is assumed to be 15%. As shown in Figure 25, at 5 V , assuming a 10% capacitance tolerance (TOL) , CBIAS = 2.09 ÿF. This is

obtained from the following formula:

CEFF = 2.09 ÿF ×ÿ1 ÿ 0.15ÿ×ÿ1 ÿ 0.1ÿ= 1.59 ÿF

Therefore, the capacitors selected in this example meet the minimum capacitance requirements of the LDO over temperature and tolerance at the selected output

voltage. To guarantee the performance of the GM1207, the effects of DC bias, temperature, and tolerance on the capacitor performance must be evaluated for each

application. Programmable Precision Enable

Under normal operating conditions, the GM1207 uses the EN pin to enable and disable the VOUT pin. As shown in Figure 26, when the rising voltage on EN crosses the upper threshold (nominal 1.2 V), VOUT turns on. When the falling voltage on EN crosses the lower threshold (nominal 1.1 V), VOUT turns off. The hysteresis of the EN threshold is approximately 100 mV.

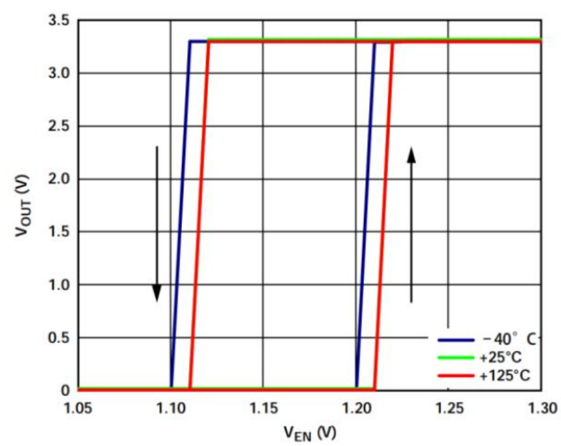


Figure 26. Typical *VOUT* response to *EN* pin operation

The upper and lower thresholds are user programmable and can be set to 1.2 V above the nominal threshold using two resistors. The resistor values, REN1 and REN2, are determined as follows:

REN2 = 10 kÿ to 100 kÿ nominal

REN1 = *REN2* × *(VIN* ÿ 1.2 V) / 1.2 V

in:

VIN is the desired turn-on voltage.

The hysteresis voltage rises by a factor of (REN1 + REN2) / REN1. In the example shown in Figure 27, the enable threshold is 3.6 V and the hysteresis is 300 mV.

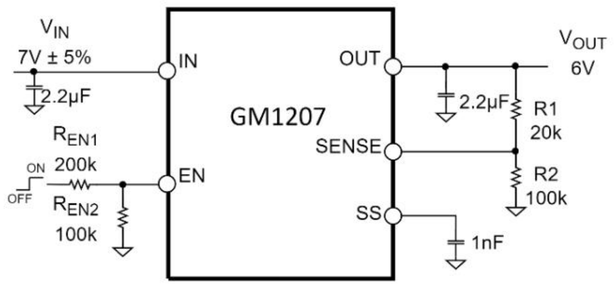


Figure 27. Typical voltage divider for the EN pin.

Typical hysteresis for the EN pin is shown in Figure 26. This prevents noise on the EN pin from causing switching oscillations when passing through the threshold point.

The GM1207 utilizes a built-in soft-start function (SS pin open) to limit inrush current when the output is enabled. For the 3.3 V option, the startup time from crossing the EN active threshold to the output reaching 90% of its final value is approximately 500 ÿs. The startup time depends on the output voltage setting. Soft Start

An external capacitor connected to the SS pin determines the soft-start time. Leave the SS pin open for a typical start-up time of 500 ÿs . Do not connect this pin to ground. When using an external soft-start capacitor (CSS), the soft-start time is determined by the following equation:

$$SSTIME ÿÿsÿ = 500\ ÿs + 0.6 \times CSS$$

Where CSS is in Farads. Noise Reduction

in Adjustable Mode The ultra-low

output noise characteristics of the GM1207 are achieved by maintaining unity gain in the LDO error amplifier and setting the reference voltage equal to the output voltage. Generally speaking, this architecture is not suitable for adjustable output voltage LDOs. However, the GM1207 architecture allows any fixed output voltage to be set to a higher voltage through an external voltage divider. For example, a fixed 5 V output can be set to a 6 V output according to the following formula (see Figure 28):

VOUT = 5 Vÿ1 + R1/R2ÿ

The disadvantage of using the GM1207 in this manner is that the output voltage noise is proportional to the output voltage. Therefore, it is best to choose a fixed output voltage close to the target voltage to minimize the increase in output noise. The adjustable LDO

circuit can be modified to reduce the output voltage noise to a level similar to that of the fixed output GM1207. The circuit shown in Figure 28 adds two components to the output voltage setting resistor divider: CNR and RNR, which are connected in parallel with R1 to reduce the ac gain of the error amplifier. RNR is selected to be small relative to R2. If RNR is 1% to 10% of R2, the minimum ac gain of the error amplifier is about 0.1 dB to 0.8 dB. The actual gain depends on the parallel combination of RNR and R1. This gain ensures that the error amplifier always operates at a gain slightly greater than unity. CNR should be selected so that the reactance of CNR is equal to R1 ÿ RNR at frequencies between 1 Hz and 50 Hz . The frequency thus set will

cause the ac gain of the error amplifier to be 3 dB lower than the dc gain.

The noise of an adjustable LDO can be calculated by the following formula, assuming a fixed output The noise of the LDO is about 8.5 ÿV:

Noise = 8.5 ÿV × (*RPAR* + R2) / R2

Among them, RPAR is the parallel combination of *R1* and RNR.

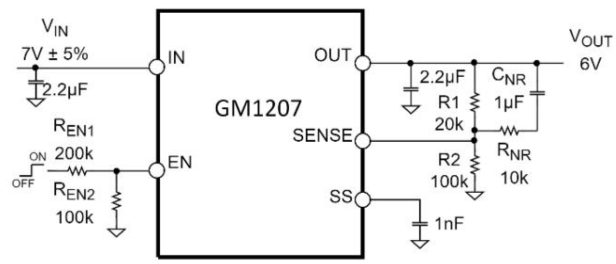


Figure 28. Noise optimization

Based on the component values shown in Figure 28, the GM1207 has the following characteristics:

• DC Gain: 10 (20 dB) • 3 dB Roll-off Frequency:

1.75 Hz

• High frequency AC gain: 1.099 (0.82dB)

• Theoretical noise reduction factor: 9.1 (19.2 dB) • Measured

RMS noise of adjustable LDO without noise reduction: 54 µV RMS • Measured RMS noise of adjustable

LDO with noise reduction: 9.2 µV RMS • Measured noise reduction is approximately 15.3 dB Current Limit

and Thermal Overload Protection The GM1207

has built-in current limiting and

thermal overload protection circuits to prevent damage due to excessive power dissipation. The current limiting circuit is activated when the output load reaches 450 mA (typical). When the output load exceeds 450 mA, the output voltage is reduced to maintain a constant current limit. The thermal overload protection circuit limits the junction temperature to

less than 165°C (typical). Under extreme conditions (i.e., high ambient temperature and/or high power dissipation), when the junction temperature begins to rise above 165°C, the output turns off, reducing the output current to zero. When the junction temperature drops below 150°C, the output turns on again and the output current returns to the operating value. Consider the case where a load short occurs at VOUT to ground.

First, the current limit feature of the GM1207 kicks in, so only 450 mA is conducted into the short circuit. If the self-heating of the junction is large enough to raise its temperature above 165°C, the thermal shutdown feature activates, turning the output off, and the output current drops to 0. When the junction temperature cools down to below 150°C, the output turns on, conducting 450 mA into the short path, again causing the junction temperature to rise above 150°C. Thermal oscillations in the junction temperature range of 150°C to 165°C cause the current to oscillate between 450 mA and 0 mA; the oscillations continue as long as the output is shorted.

Current limiting and thermal overload protection protect the device from accidental overload conditions. To ensure stable operation, the power dissipation in the device must be limited externally so that the junction temperature does not exceed 150°C.

Thermal Considerations

In applications where the input-to-output voltage difference is small, the GM1207 does not generate much heat. However, in applications where the ambient temperature is high and/or the input voltage is large, The heat dissipated by the package can be so great that the die junction temperature can exceed the maximum junction temperature of 150°C.

When the junction temperature exceeds 165°C, the converter enters thermal shutdown mode. It will only recover when the junction temperature drops to 150°C and below to avoid permanent damage. Therefore, in order to ensure reliable performance of the device under all conditions, thermal analysis of the specific application must be performed. The junction temperature of the chip is the sum of the ambient temperature and the package temperature rise caused by power dissipation.

To ensure reliable operation of the device, the junction temperature of the GM1207 must not exceed 150°C. To ensure that the junction temperature is below this maximum junction temperature, the user needs to pay attention to the parameters that cause the junction temperature to vary. These parameters include the ambient temperature, the power dissipation of the power device, and the thermal resistance between the junction and the surrounding air (ÿJA). The ÿJA value depends on the package filler used and the amount of copper used to solder the package GND pin to the PCB.

To calculate the junction temperature of GM1207, we use the following formula

$$TJ = TA + (PD \times ÿJA)$$

in:

TA is the ambient temperature.

PD is the power consumption of the chip, which is calculated by the following formula:

$$PD = [\ ÿ VIN\ ÿ\ VOUTÿ \times ILOAD] + ÿVIN \times IGNDÿ$$

in:

VIN and VOUT are the input and output voltages respectively.

ILOAD is the load current.

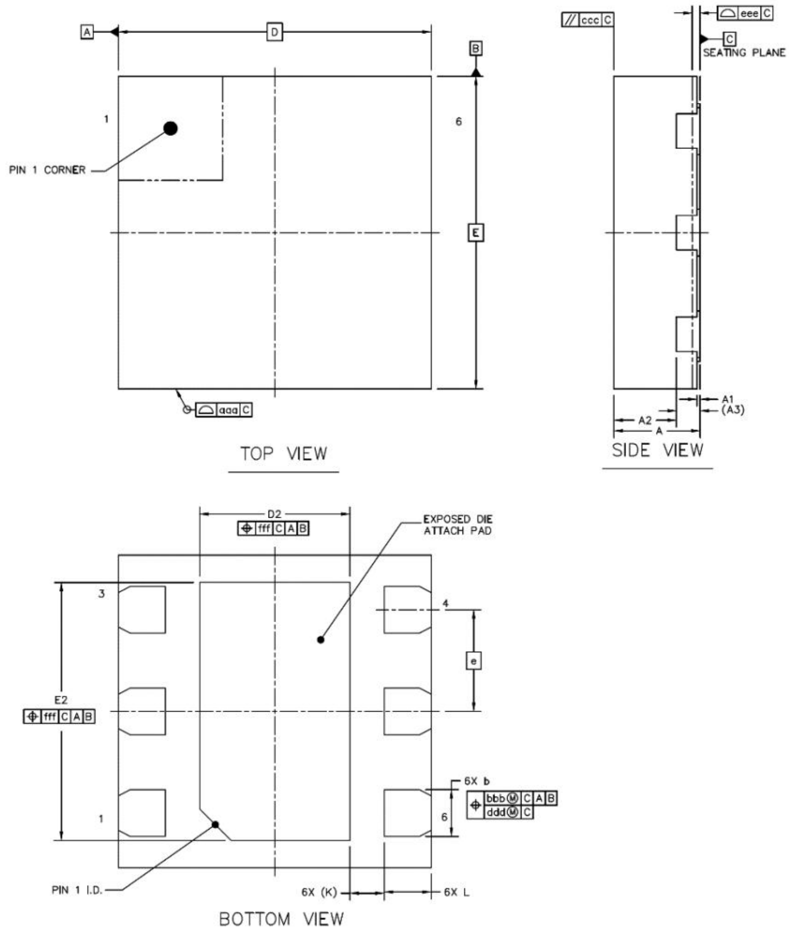
IGND is the ground current.

The power dissipation caused by the ground current is quite small and can be ignored. Therefore, the calculation formula for the junction temperature can be simplified to:

$$TJ = TA + [(VIN – VOUT) \times ILOAD] \times ÿJA$$

As shown in the equation, for a given ambient temperature, input-to-output voltage difference, and continuous load current, the minimum PCB copper size requirement must be met to ensure that the junction temperature does not rise above 150°C.

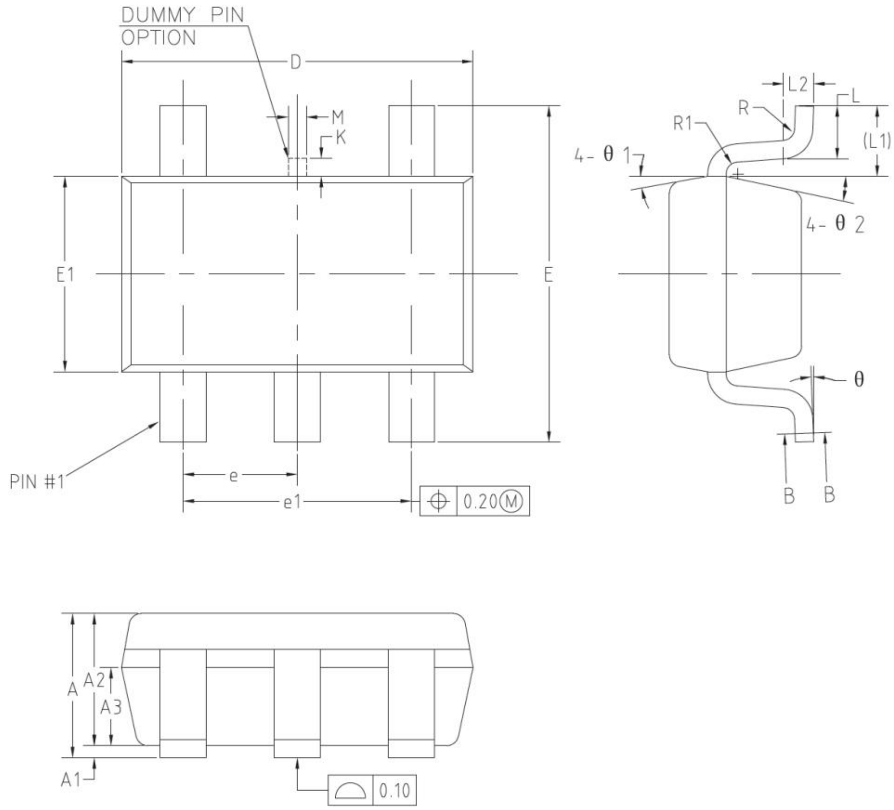
Dimensions



		SYMBOL	MIN	NOM	MAX
TOTAL THICKNESS		A	0.5	0.55	0.6
STAND OFF		A1	0	0.02	0.05
MOLD THICKNESS		A2	---	0.4	---
L/F THICKNESS		A3	0.152 REF		
LEAD WIDTH		b	0.25	0.3	0.35
BODY SIZE	X	D	2 BSC		
	Y	E	2 BSC		
LEAD PITCH		e	0.65 BSC		
EP SIZE	X	D2	0.86	0.96	1.06
	Y	E2	1.55	1.65	1.75
LEAD LENGTH		L	0.25	0.3	0.35
LEAD TIP TO EXPOSED PAD EDGE		K	0.22 REF		
PACKAGE EDGE TOLERANCE		aaa	0.1		
MOLD FLATNESS		ccc	0.1		
COPLANARITY		eee	0.05		
LEAD OFFSET		bbb	0.1		
		ddd	0.05		
EXPOSED PAD OFFSET		fff	0.1		

Figure 29. 6-pin DFN-6

(1. Control size: mm



SYMBOL	MIN	NOM	MAX
A	—	—	1.25
A1	0	—	0.15
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.34	—	0.45
b1	0.34	0.38	0.41
c	0.12	—	0.20
c1	0.12	0.15	0.16
D	2.826	2.926	3.026
E	2.60	2.80	3.00
E1	1.526	1.626	1.700
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
K	0	—	0.20
L	0.30	0.40	0.60
L1	0.59REF		
L2	0.25BSC		
M	0.10	0.15	0.20
R	0.05	—	0.20
R1	0.05	—	0.20
θ	0°	—	8°
θ 1	8°	10°	12°
θ 2	10°	12°	14°

Figure 30. 5-lead SOT-23

Ordering Guide

Model 1	Temperature	Package	Package Options
GM1207ACPZ-R7	Range ÿ40°C to +150°C	DescriptionDFN -6, 1.2V SENSE	CP-6-1
GM1207ACPZ-3.0-R7	ÿ40°C to +150°C ÿ40°C	VoltageDFN-6, 3.0V SENSE	CP-6-1
GM1207ACPZ-3.3-R7	to +150°C ÿ40°C to	VoltageDFN-6, 3.3V SENSE	CP-6-1
GM1207ACPZ-5.0-R7	+150°C ÿ55°C to +150°C	VoltageDFN-6, 5.0V SENSE	CP-6-1
GM1207MCPZ-R7	GM1207MCPZ-3.0-R7	VoltageDFN-6, 1.2V SENSE	CP-6-1
ÿ55°C to +150°C GM1207MCPZ-5.0-R7	ÿ55°C to +150°C ÿ40°C to	VoltageDFN-6, 3.0V SENSE	CP-6-1
+150°C ÿ40°C to +150°C ÿ40°C to +150°C	ÿ55°C to +150°C	VoltageDFN-6, 5.0V SENSE	CP-6-1
GM1207AUJZ-R7	GM1207MUJZ-3.0-R7	VoltageSOT-23, 1.2V SENSE	UJ-5
GM1207AUJZ-3.0-R7	ÿ55°C to +150°C	VoltageSOT-23, 3.0V SENSE	UJ-5
GM1207AUJZ-3.3-R7	GM1207MUJZ-5.0-R7	VoltageSOT-23, 3.3V SENSE	UJ-5
GM1207AUJZ-5.0-R7	ÿ55°C to +150°C to	VoltageSOT-23, 5.0V SENSE	UJ-5
GM1207MUJZ-R7	+150°C ÿ40°C to +150°C	VoltageSOT-23, 1.2V SENSE	UJ-5
		VoltageSOT-23, 3.0V SENSE	UJ-5
		VoltageSOT-23, 5.0V SENSE	UJ-5
GM1207AUJZ-1-R7		VoltageSOT-23, 1.22V SENSE Voltage	UJ-5

1 Z = RoHS compliant part.