1. DESCRIPTION

The XB3480M3-3.3/XB3480M3-5.0 is an integrated linear voltage regulator. It features operation from an input as high as 25 V and an ensured maximum dropout of 1.2 V at the full 100-mA load. Standard packaging for the XB3480M3-3.3/XB3480M3-5.0 is the 3-lead SOT23-3 package.

The 5-V members of the XB3480 series are intended as tiny alternatives to industry standard LM78Lxx series and similar devices. The 1.2-V quasi-low dropout of XB3480 series devices makes them a nice fit in many applications where the 2-V to 2.5-V dropout of LM78Lxx series devices precludes their (LM78Lxx series devices) use.

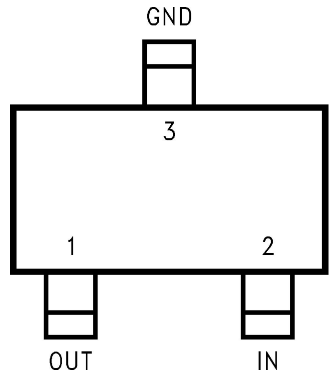
The XB3480 series features a 3.3-V and 5-V member. The SOT23-3 packaging and quasi-low dropout features of the XB3480 series converge in this device to provide a very nice, very tiny, 3.3-V, 100-mA bias supply that regulates directly off the system 5-V ±5% power supply.

2. FEATURES

- Input Voltage Range: up to 25 V
- 3.3-V, 5-V Versions Available
- Packaged in the Tiny 3-Lead SOT23-3 Package
- 1.2-V Ensured Maximum Dropout Over Full Load and Temperature Ranges
- 100-mA Ensured Minimum Load Current
- ±5% Ensured Output Voltage Tolerance Over Full Load and Temperature Ranges

3. PIN CONFIGURATIONS AND FUNCTIONS

XB3480M3-3.3
XB3480M3-5.0

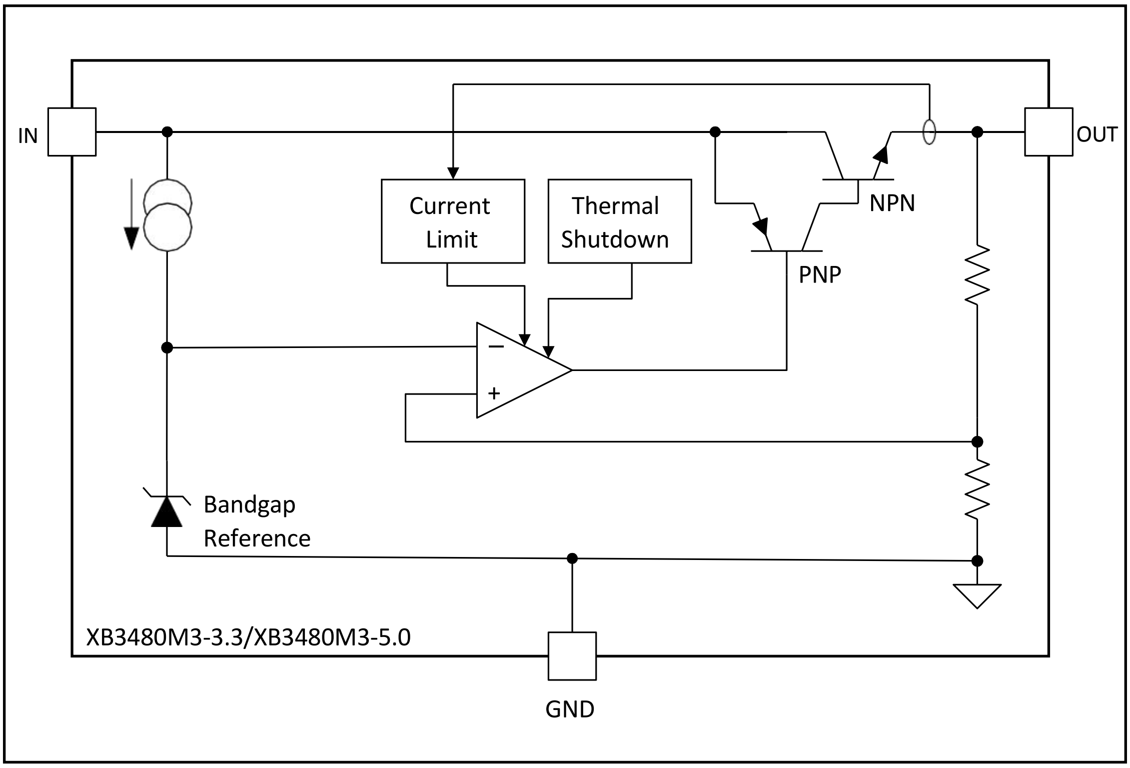


(Top View)

Pin Functions

PIN		I/O	DESCRIPTION
NAME	NO.		
OUT	1	O	Output voltage
IN	2	I	Input voltage supply
GND	3	—	Common ground

4. FUNCTIONAL BLOCK DIAGRAM



Block Diagram

5. SPECIFICATIONS

5.1. Absolute Maximum Ratings

	MIN	MAX	UNIT
Input voltage (IN to GND)	–0.3	25	V
Power dissipation[3]		250	mW
Junction temperature(Tj)[3]	–	150	℃
Storage temperature, T_{stg}	–50	150	℃

[1] Absolute Maximum Ratings are limits beyond which damage to the device may occur. Recommended Operating Conditions are conditions under which operation of the device is ensured. Recommended operating ratings do not imply ensured performance limits. For ensured performance limits and associated test conditions.

[2] The Absolute Maximum power dissipation depends on the ambient temperature and can be calculated using P = (TJ – TA) / RθJA where TJ is the junction temperature, TA is the ambient temperature, and RθJA is the junction-to-ambient thermal resistance. The 370-mW rating results from substituting the Absolute Maximum junction temperature, 150°C for TJ, 50°C for TA, and 269.6°C/W for RθJA. More power can be safely dissipated at lower ambient temperatures. Less power can be safely dissipated at higher ambient temperatures. The Absolute Maximum power dissipation can be increased by 3.7 mW for each °C below 50°C ambient. It must be derated by 3.7 mW for each °C above 50°C ambient. Heat sinking enables the safe dissipation of more power. The XB3480M3-3.3/XB3480M3-5.0 actively limits its junction temperature to about 150°C.

5.2. Thermal Resistance Characteristics

THERMAL METRIC[1]		XB3480M3-3.3 /XB3480M3-5.0	UNIT
		SOT23-3	
		3 PINS	
RθJA	Junction-to-ambient thermal resistance	269.6	°C/W
RθJC(top)	Junction-to-case (top) thermal resistance	141.1	
RθJB	Junction-to-board thermal resistance	63.1	
ψJT	Junction-to-top characterization parameter	24.2	
ψJB	Junction-to-board characterization parameter	62.1	

[1] For more information about traditional and new thermal metrics.

5.3. ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001[1]	±2000	V
		Charged-device model (CDM), per JEDEC specification JESD22-C101[2]	±500	

[1] JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
[2] JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

5.4. Recommended Operating Conditions

	MIN	MAX	UNIT
Maximum input voltage (IN to GND)	0	18	V
Operation temperature	–40	85	℃

5.5. Electrical Characteristics : XB3480M3-3.3, XB34803-5.0

Typical and other limits apply for TA = TJ = 25°C, unless otherwise specified. Nominal output voltage (VNOM) = 3.3 V or 5 V.(1) (2) (3)

PARAMETER		TEST CONDITIONS	V_{NOM} = 3.3 V			V_{NOM} = 5 V			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
V_{OUT}	Output voltage	$V_{IN} = V_{NOM} + 1.5$ V 1 mA ≤ I_{OUT} ≤ 100 mA	3.17	3.3	3.43	4.8	5	5.2	V
		$V_{IN} = V_{NOM} + 1.5$ V 1 mA ≤ I_{OUT} ≤ 100 mA −40°C ≤ T_J ≤ 85°C	3.14		3.46	4.75		5.25	
ΔV_{OUT}	Line regulation	V_{NOM} + 1.5 V ≤ V_{IN} ≤ 30 V I_{OUT} = 1 mA		10			12		mV
		V_{NOM} + 1.5 V ≤ V_{IN} ≤ 30 V I_{OUT} = 1 mA −40°C ≤ T_J ≤ 85°C			25			25	
ΔV_{OUT}	Load regulation	$V_{IN} = V_{NOM} + 1.5$ V 10 mA ≤ I_{OUT} ≤ 100 mA		20			20		mV
		$V_{IN} = V_{NOM} + 1.5$ V 10 mA ≤ I_{OUT} ≤ 100 m −40°C ≤ T_J ≤ 85°C			40			40	
I_{GND}	Ground pin current	V_{NOM} + 1.5 V ≤ V_{IN} ≤ 30 V No Load		2			2		mA
		V_{NOM} + 1.5 V ≤ V_{IN} ≤ 30 V No Load, −40°C ≤ T_J ≤ 85°C			5			5	
V_{IN} - V_{OUT}	Dropoutvoltage	I_{OUT} = 10 mA		0.7	0.9		0.7	0.9	V
		I_{OUT} = 10 mA −40°C ≤ T_J ≤ 85°C			1			1	
		I_{OUT} = 100 mA		0.9	1.1		0.9	1.1	V
		I_{OUT} = 100 mA −40°C ≤ T_J ≤ 85°C			1.2			1.2	
e_n	Output noise voltage	V_{IN} = 10 V Bandwidth: 10 Hz to 100 kHz		100			150		μV_{rms}

[1] A typical is the center of characterization data taken with TA = TJ = 25°C. Typicals are not ensured.

[2] All limits are ensured. All electrical characteristics having room-temperature limits are tested during production with TA = TJ = 25°C. All hot and cold limits are ensured by correlating the electrical characteristics to process and temperature variations and applying statistical process control.

[3] All voltages except dropout are with respect to the voltage at the GND pin.

6. TYPICAL CHARACTERISTICS

Unless indicated otherwise, VIN = VNOM + 1.5 V, CIN = 0.1 µF, COUT = 0.1 µF, and TA .= 25°C.

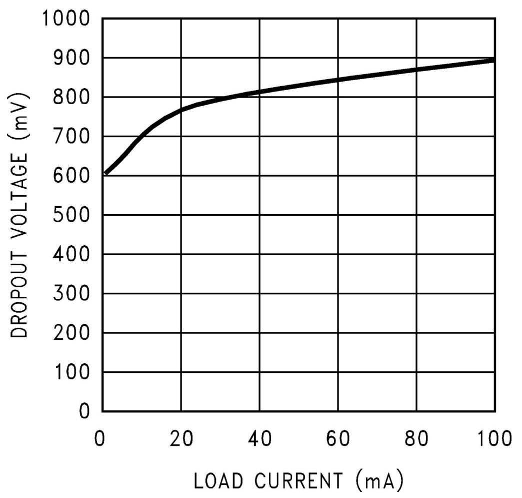


Figure 1. Dropout Voltage vs Load Current

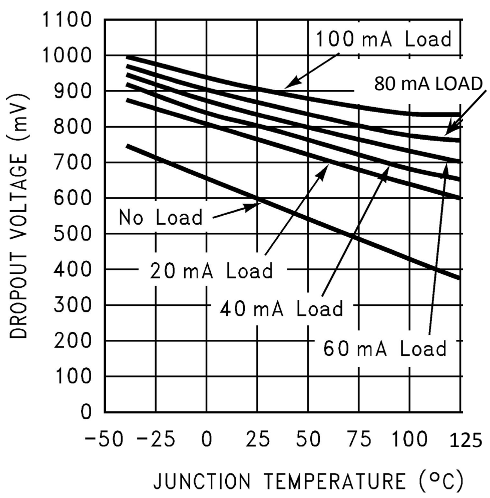


Figure 2. Dropout Voltage vs Junction Temperature

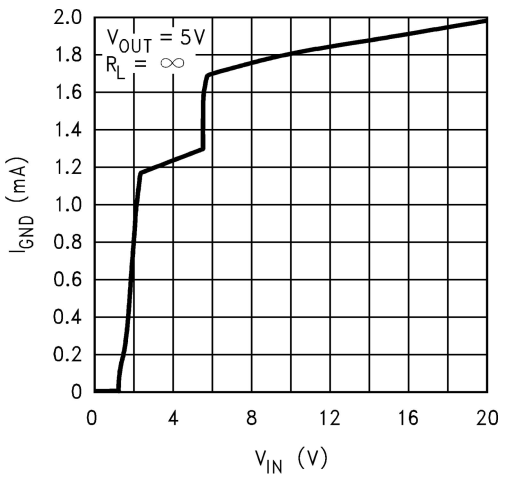


Figure 3. Ground Pin Current vs Input Voltage

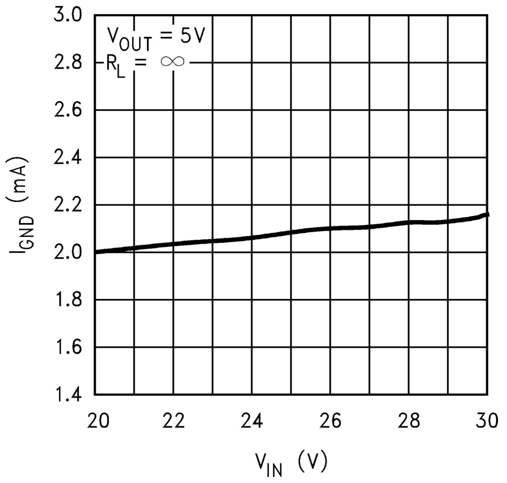


Figure 4. Ground Pin Current vs Input Voltage

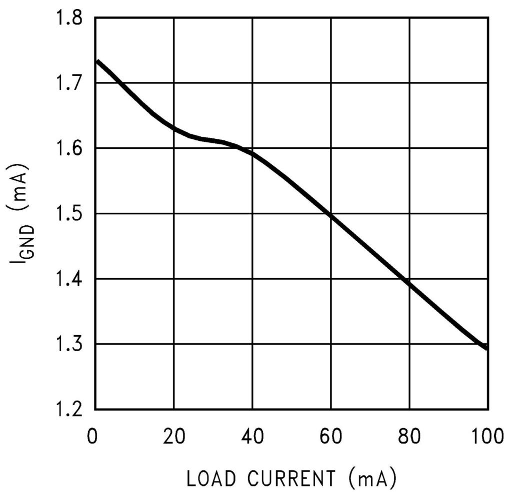


Figure 5. Ground Pin Current vs Load Current

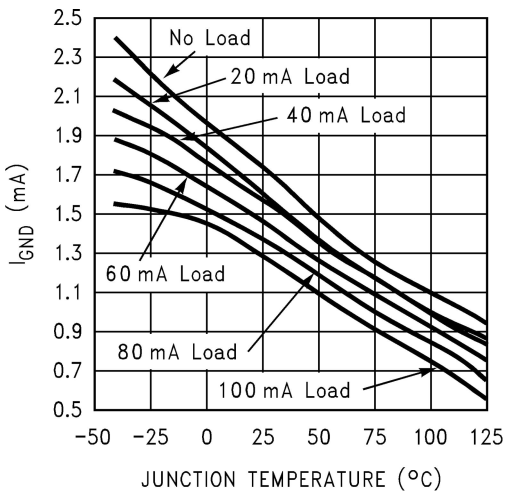


Figure 6. Ground Pin Current vs Junction

Temperature

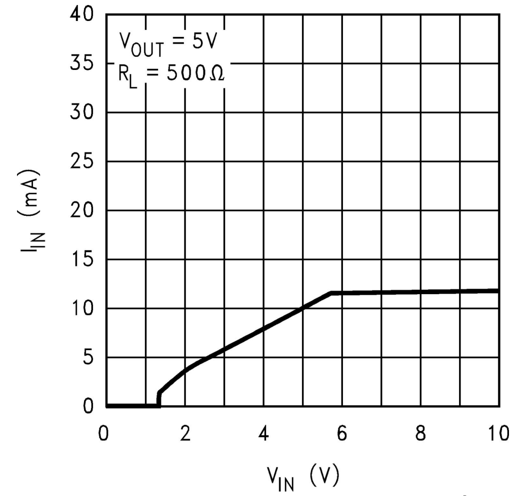


Figure 7. Input Current vs Input Voltage

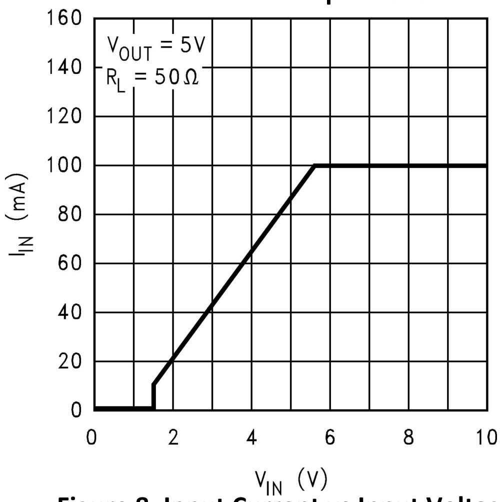


Figure 8. Input Current vs Input Voltage

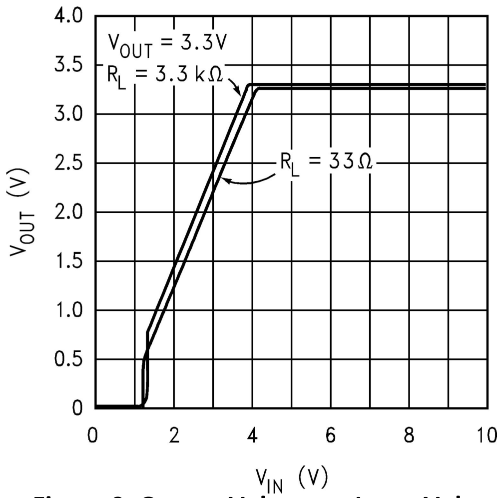


Figure 9. Output Voltage vs Input Voltage

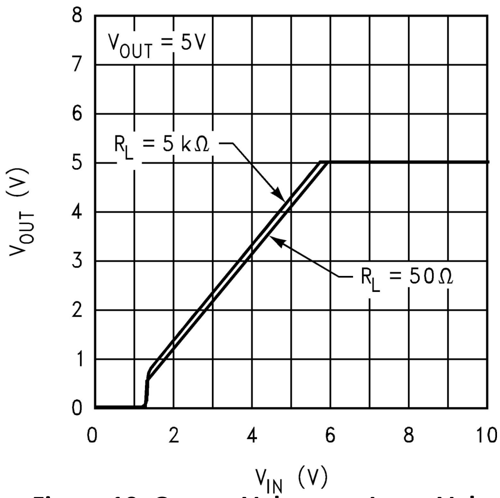


Figure 10. Output Voltage vs Input Voltage

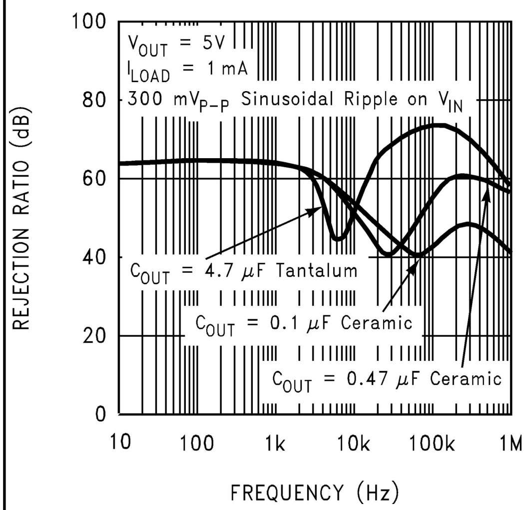


Figure 11. Power Supply Rejection Ratio

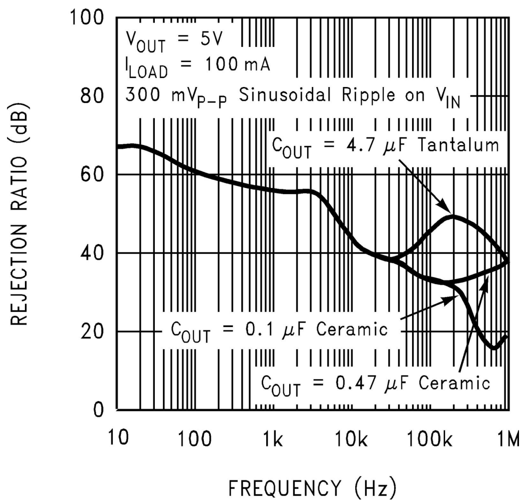


Figure 12. Power Supply Rejection Ratio

7. DETAILED DESCRIPTION

7.1. Overview

The XB3480M3-3.3/XB3480M3-5.0 is an integrated linear voltage regulator with inputs that can be as high as 25 V. It ensures a maximum dropout of 1.2 V at the full load of 100 mA. The XB3480M3-3.3/XB3480M3-5.0 has different output options including 3.3-V, 5-V outputs, making XB3480M3-3.3/XB3480M3-5.0 the tiny alternative to industry standard LM78Lxx series and similar devices.

7.2. Feature Description

7.2.1. 3.3-V, 5-V Versions Available

The 3.3-V, 5-V versions of XB3480 series are intended as tiny alternatives to industry standard LM78Lxx series and similar devices.

7.2.2. 1.2-V Ensured Maximum Dropout

The 1.2-V quasi-low dropout of the XB3480 series devices make them a nice fit in many application where the 2- V to 2.5-V dropout of LM78Lxx series devices precludes their use.

7.3. Device Functional Modes

7.3.1. Operation with VIN = 5 V

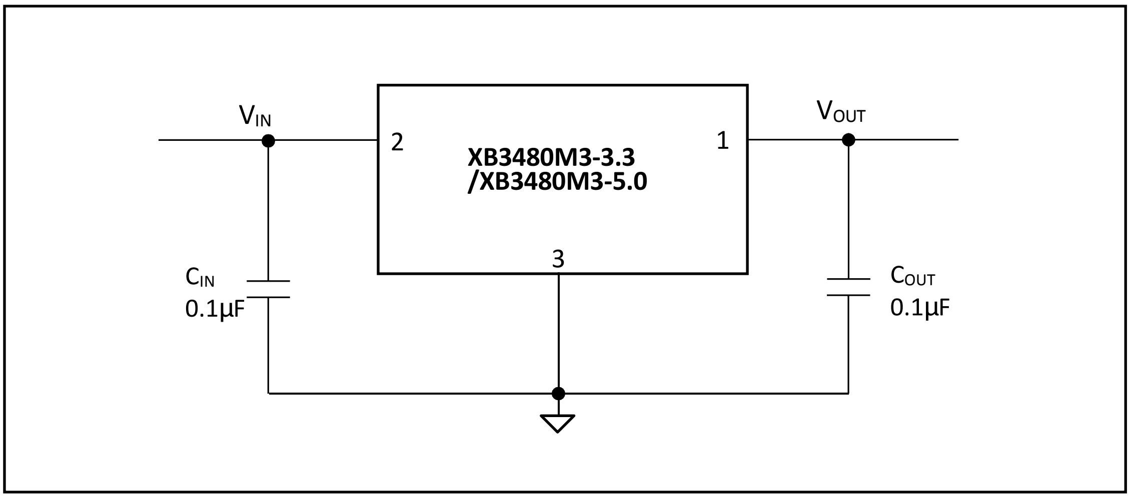
The 3.3-V member of XB3480 can operate with an input of 5 V ±5%, its tiny SOT23-3 package and quasi-low dropout makes it suitable for providing a very tiny, 3.3-V, 100-mA bias supply from 5-V power supply.

8. APPLICATION INFORMATION

8.1. Application Information

The XB3480M3-3.3/XB3480M3-5.0 is a linear voltage regulator with 1.2-V ensured maximum dropout and 100-mA ensured minimum load current. This device has 3.3-V and 5-V versions. The implementation of XB3480M3-3.3/XB3480M3-5.0 is discussed in this section.

8.2. Typical Application



8.3. Detailed Design Procedure

8.3.1. External Capacitors

A minimum input and output capacitance value of 0.1 µF is required for stability and adequate transient performance. There is no specific ESR limitation, although excessively high ESR will compromise transient performance. There is no specific limitation on a maximum capacitance value on the input or the output.

8.3.2. Output Capacitor

The minimum output capacitance required to maintain stability is 0.1 µF. Larger values of output capacitance can be used to improve transient behavior.

9. Power Supply Recommendations

The XB3480M3-3.3/XB3480M3-5.0 is designed to operated from up to a 25-V input voltage supply. This input supply must be well regulated. If the input supply is noisy, additional input capacitors with low ESR can help to improve the output noise performance.

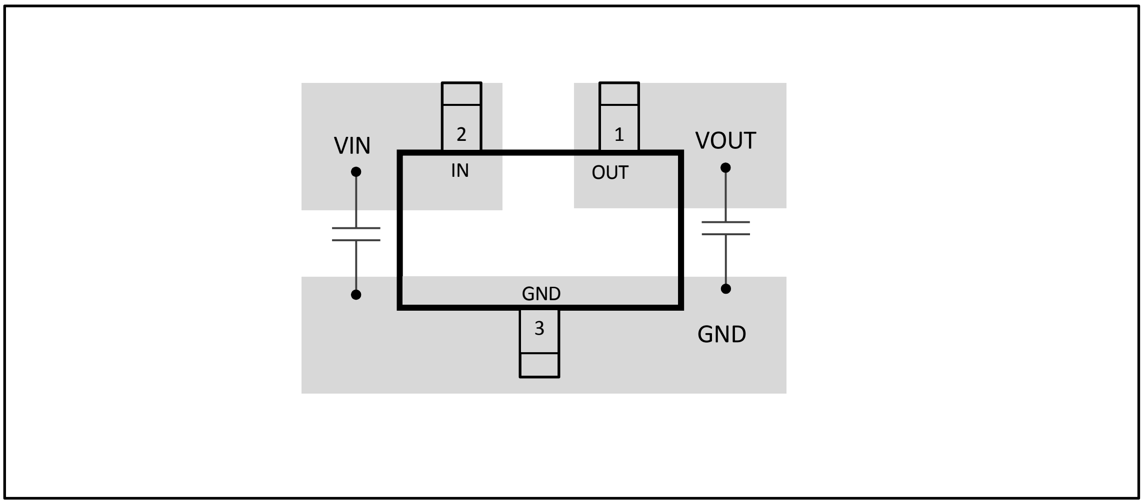
10. Layout

10.1. Layout Guidelines

For best overall performance, place all the circuit components on the same side of the circuit board and as near as practical to the respective LDO pin connections. Place ground return connections to the input and output capacitors, and to the LDO ground pin as close to each other as possible, connected by a wide, component-side, copper surface. The use of vias and long traces to create LDO circuit connections is strongly discouraged and negatively affects system performance. This grounding and layout scheme minimizes the inductive parasitic, and thereby reduces load-current transients, minimizes noise, and increases circuit stability.

A ground reference plane is also recommended and is either embedded in the PCB itself or located on the bottom side of the PCB opposite the components. This reference plane serves to assure accuracy of the output voltage, shield noise, and behaves similar to a thermal plane to spread heat from the LDO device. In most applications, this ground plane is necessary to meet thermal requirements.

10.2. Layout Example



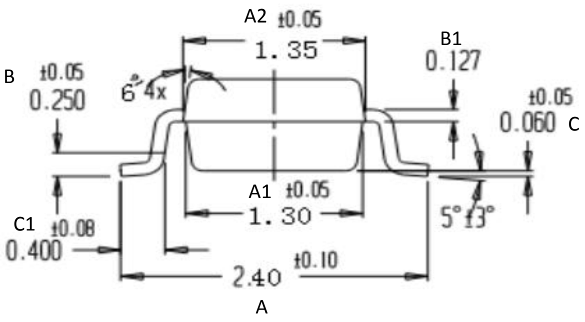
11. ORDERING INFORMATION

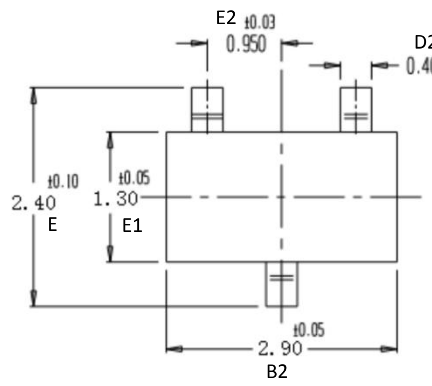
Ordering Information

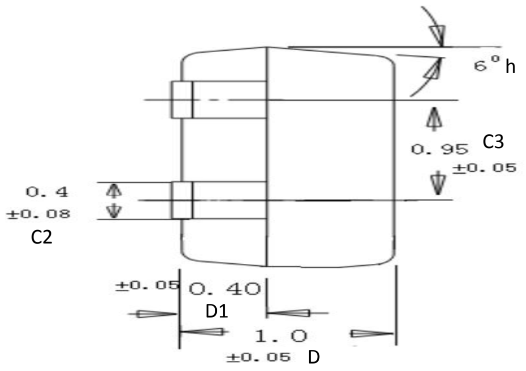
Part Number	Device Marking	Package Type	Body size (mm)	Temperature (°C)	MSL	Transport Media	Package Quantity
XB3480M3-3.3	XB3480M3-3.3	SOT23-3	2.90 * 1.30	-40 to +85	MSL3	T&R	3000
XB3480M3-5.0	XB3480M3-5.0	SOT23-3	2.90 * 1.30	-40 to +85	MSL3	T&R	3000

12. DIMENSIONAL DRAWINGS

SOT23-3







Symbol	MIN	NOM	MAX
A	2.30	2.40	2.50
A1	1.25	1.30	1.35
A2	1.30	1.35	1.40
B	0.245	0.250	0.255
B1		0.127	
B2	2.85	2.90	2.95
C	0.010	0.060	0.11
C1	0.320	0.400	0.480
C2	0.320	0.400	0.480
C3	0.90	0.95	1.00
D	0.95	1.0	1.05
D1	0.35	0.40	0.45
D2		0.400	
E	2.30	2.40	2.50
E1	1.25	1.30	1.35
E2	0.920	0.950	0.980
h		6°	