LM3480IM3X-3.3 Datasheet

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DiGi Electronics Part Number	LM3480IM3X-3.3-DG
Manufacturer	Texas Instruments
Manufacturer Product Number	LM3480IM3X-3.3
Description	IC REG LINEAR 3.3V 100MA SOT23-3
Detailed Description	Linear Voltage Regulator IC Positive Fixed 1 Output 100mA SOT-23-3

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
LM3480IM3X-3.3	Texas Instruments
Series:	Product Status:
-	Last Time Buy
Output Configuration:	Output Type:
Positive	Fixed
Number of Regulators:	Voltage - Input (Max):
1	30V
Voltage - Output (Min/Fixed):	Voltage - Output (Max):
3.3V	-
Voltage Dropout (Max):	Current - Output:
1.2V @ 100mA	100mA
Current - Quiescent (Iq):	PSRR:
2 mA	-
Control Features:	Protection Features:
-	Over Current, Over Temperature
Operating Temperature:	Mounting Type:
-40°C ~ 125°C	Surface Mount
Package / Case:	Supplier Device Package:
TO-236-3, SC-59, SOT-23-3	SOT-23-3
Base Product Number:	
LM3480	

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8542.39.0001	

LM3480 100-mA, SOT-23, Quasi Low-Dropout Linear Voltage Regulator

1 Features

- Input Voltage Range: up to 30 V
- 3.3-V, 5-V, 12-V, and 15-V Versions Available
- Packaged in the Tiny 3-Lead SOT-23 Package
- 30-V Maximum Input for Operation
- 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
- −40 to +125°C Junction Temperature Range for Operation

2 Applications

- Tiny Alternative to LM78Lxx Series and Similar Devices
- Tiny 5-V ±5% to 3.3-V, 100-mA Converter
- Post Regulator for Switching DC/DC Converter
- Bias Supply for Analog Circuits

3 Description

The LM3480 is an integrated linear voltage regulator. It features operation from an input as high as 30 V and an ensured maximum dropout of 1.2 V at the full 100-mA load. Standard packaging for the LM3480 is the 3-lead SOT-23 package.

The 5-V, 12-V, and 15-V members of the LM3480 series are intended as tiny alternatives to industry standard LM78Lxx series and similar devices. The 1.2-V quasi-low dropout of LM3480 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.

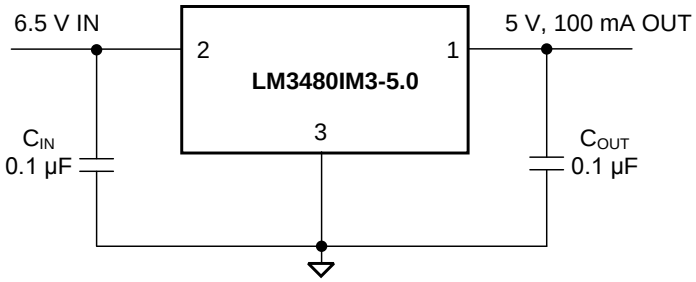
The LM3480 series also features a 3.3-V member. The SOT-23 packaging and quasi-low dropout features of the LM3480 series converge in this device to provide a very nice, very tiny, 3.3-V, 100-mA bias supply that regulates directly off the system 5-V ±5% power supply.

Device Information[1]

PART NUMBER	PACKAGE	BODY SIZE (NOM)
LM3480	SOT-23 (3)	2.92 mm × 1.30 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

Typical Application Circuit



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4 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision G (February 2015) to Revision H — **Page**

- Replaced *Functional Block Diagram* ... 10
- Changed text of *External Capacitors* subsection ... 11
- Changed text of *Output Capacitor* subsection ... 11

Changes from Revision F (December 2014) to Revision G — **Page**

- Changed pin numbers indicated in *Typical Application* drawing; fix typos ... 1
- Deleted soldering specs - found in POA ... 4
- Changed *Handling Ratings* to *ESD Ratings* format ... 4

Changes from Revision E (March 2013) to Revision F — **Page**

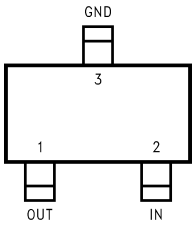
- Added *Pin Configuration and Functions* section, *Handling Rating* table, *Feature Description* section, *Device Functional Modes*, *Application and Implementation* section, *Power Supply Recommendations* section, *Layout* section, *Device and Documentation Support* section, and *Mechanical, Packaging, and Orderable Information* section; add updated *Thermal Information* ... 1

Changes from Revision D (March 2013) to Revision E — **Page**

- Changed layout of National Data Sheet to TI format ... 9

5 Pin Configuration and Functions

DBZ Package
3-Pin SOT-23
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

6 Specifications

6.1 Absolute Maximum Ratings[1][2]

	MIN	MAX	UNIT
Input voltage (IN to GND)	–0.3	35	V
Power dissipation[3]		Internally Limited	
Junction temperature[3]	–40	150	°C
Storage temperature, T_{stg}	−65	150	°C

(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, see the *Electrical Characteristics: LM3480-3.3, LM3480-5*.
(2) If Military- or Aerospace-specified devices are required, please contact the TI Sales Office/Distributors for availability and specifications.
(3) The Absolute Maximum power dissipation depends on the ambient temperature and can be calculated using $P = (T_J – T_A) / R_{\theta JA}$ where T_J is the junction temperature, T_A is the ambient temperature, and $R_{\theta JA}$ is the junction-to-ambient thermal resistance. The 370-mW rating results from substituting the Absolute Maximum junction temperature, 150°C for T_J, 50°C for T_A, and 269.6°C/W for $R_{\theta JA}$. 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 LM3480 actively limits its junction temperature to about 150°C.

6.2 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.

6.3 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)[1]

	MIN	MAX	UNIT
Maximum input voltage (IN to GND)	0	30	V
Junction temperature (T_J)	–40	125	°C

(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, see the *Electrical Characteristics: LM3480-3.3, LM3480-5*.

6.4 Thermal Information

THERMAL METRIC[1]		LM3480 SOT-23 (DBZ) 3 PINS	UNIT
$R_{\theta JA}$	Junction-to-ambient thermal resistance	269.6	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	141.1	
$R_{\theta JB}$	Junction-to-board thermal resistance	63.1	
ψ_{JT}	Junction-to-top characterization parameter	24.2	
ψ_{JB}	Junction-to-board characterization parameter	62.1	

(1) For more information about traditional and new thermal metrics, see the *IC Package Thermal Metrics* application report, SPRA953.

6.5 Electrical Characteristics: LM3480-3.3, LM3480-5

Typical and other limits apply for $T_A = T_J = 25°C$, unless otherwise specified. Nominal output voltage (V_{NOM}) = 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 ≤ 125°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 ≤ 125°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 ≤ 125°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 ≤ 125°C			4			4	
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 ≤ 125°C			1			1	
		I_{OUT} = 100 mA		0.9	1.1		0.9	1.1	V
		I_{OUT} = 100 mA −40°C ≤ T_J ≤ 125°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 $T_A = T_J = 25°C$. Typicals are not ensured.
(2) All limits are ensured. All electrical characteristics having room-temperature limits are tested during production with $T_A = T_J = 25°C$. 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.

6.6 Electrical Characteristics: LM3480-12, LM3480-15

Typical and other limits apply for $T_A = T_J = 25°C$, unless otherwise specified. Nominal output voltage (V_{NOM}) = 12 V or 15 V.[1][2][3]

PARAMETER		TEST CONDITIONS	V_{NOM} = 12 V			V_{NOM} = 15 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	11.52	12	12.48	14.4	15	15.6	V
		$V_{IN} = V_{NOM} + 1.5$ V 1 mA ≤ I_{OUT} ≤ 100 mA −40°C ≤ T_J ≤ 125°C	11.4		12.6	14.25		15.75	
ΔV_{OUT}	Line regulation	$V_{NOM} + 1.5$ V ≤ V_{IN} ≤ 30 V I_{OUT} = 1 mA		14			16		mV
		$V_{NOM} + 1.5$ V ≤ V_{IN} ≤ 30 V I_{OUT} = 1 mA −40°C ≤ T_J ≤ 125°C			40			40	
ΔV_{OUT}	Load regulation	$V_{IN} = V_{NOM} + 1.5$ V 10 mA ≤ I_{OUT} ≤ 100 mA		36			45		mV
		$V_{IN} = V_{NOM} + 1.5$ V 10 mA ≤ I_{OUT} ≤ 100 mA −40°C ≤ T_J ≤ 125°C			60			75	
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 ≤ 125°C			4			4	
V_{IN} - V_{OUT}	Dropout voltage	I_{OUT} = 10 mA		0.7	0.9		0.7	0.9	V
		I_{OUT} = 10 mA, −40°C ≤ T_J ≤ 125°C			1			1	
		I_{OUT} = 100 mA		0.9	1.1		0.9	1.1	V
		I_{OUT} = 100 mA , −40°C ≤ T_J ≤ 125°C			1.2			1.2	
e_n	Output noise voltage	V_{IN} = 10 V Bandwidth: 10 Hz to 100 kHz		360			450		μV_{rms}

(1) A typical is the center of characterization data taken with $T_A = T_J = 25°C$. Typicals are not ensured.
(2) All limits are ensured. All electrical characteristics having room-temperature limits are tested during production with $T_A = T_J = 25°C$. 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.

6.7 Typical Characteristics

Unless indicated otherwise, $V_{IN} = V_{NOM} + 1.5$ V, $C_{IN} = 0.1$ µF, $C_{OUT} = 0.1$ µF, and $T_A = 25°C$.

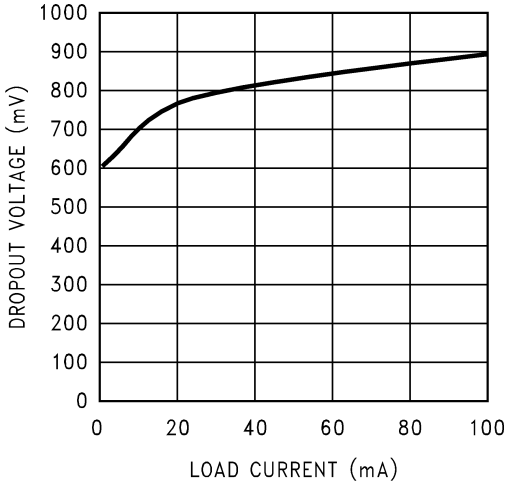


Figure 1. Dropout Voltage vs Load Current

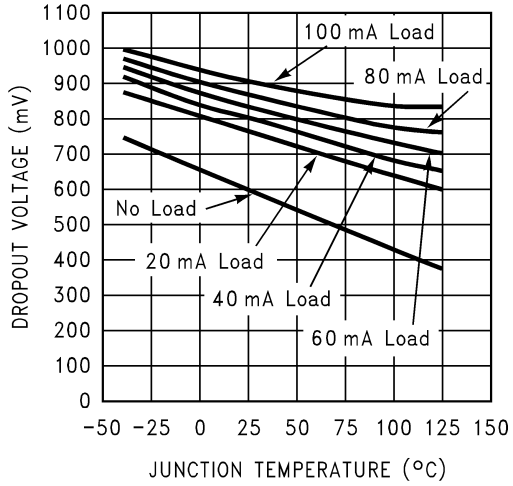


Figure 2. Dropout Voltage vs Junction Temperature

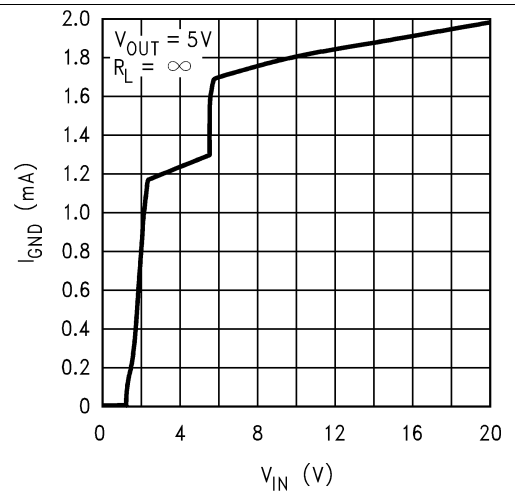


Figure 3. Ground Pin Current vs Input Voltage

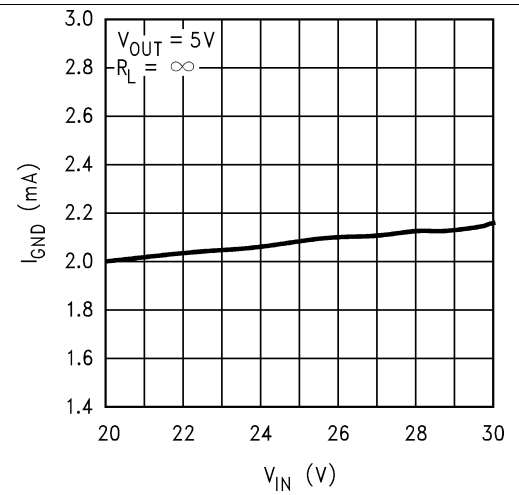


Figure 4. Ground Pin Current vs Input Voltage

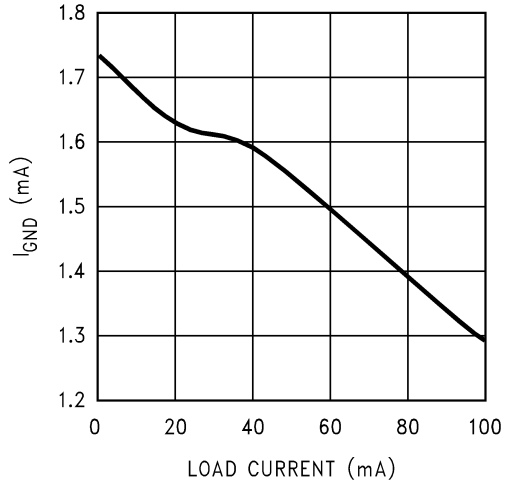


Figure 5. Ground Pin Current vs Load Current

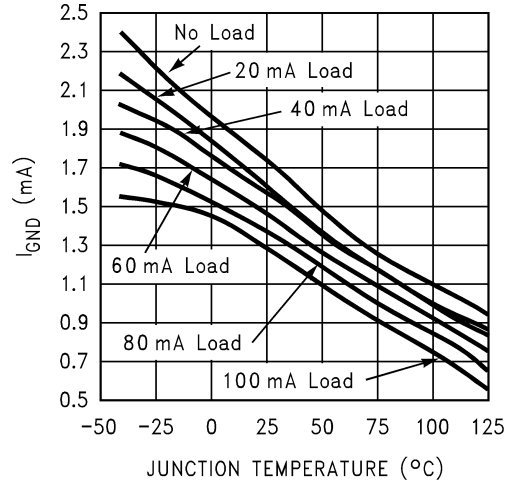


Figure 6. Ground Pin Current vs Junction Temperature

Typical Characteristics (continued)

Unless indicated otherwise, $V_{IN} = V_{NOM} + 1.5$ V, $C_{IN} = 0.1$ µF, $C_{OUT} = 0.1$ µF, and $T_A = 25°C$.

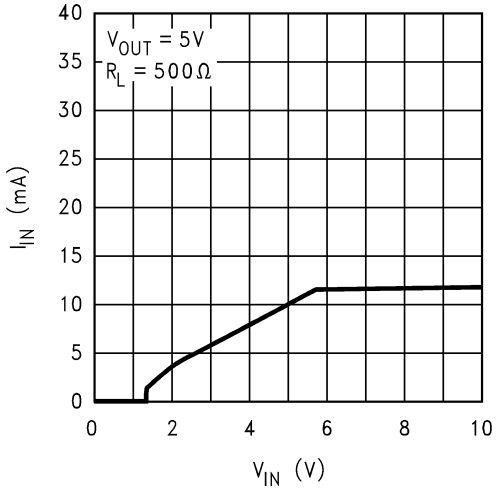


Figure 7. Input Current vs Input Voltage

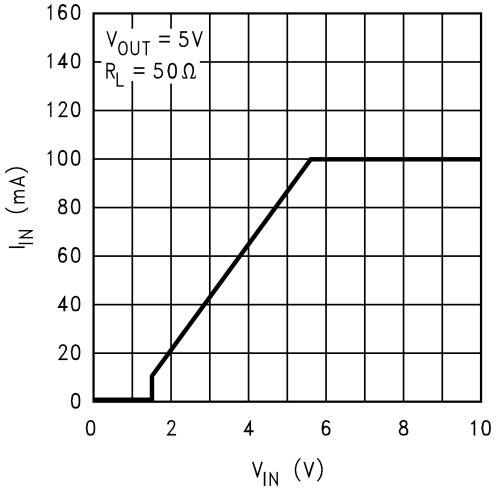


Figure 8. Input Current vs Input Voltage

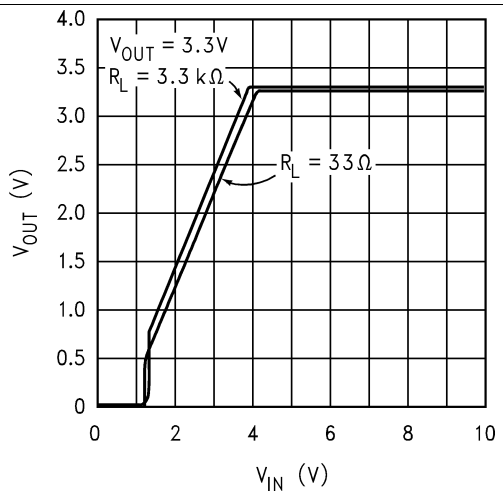


Figure 9. Output Voltage vs Input Voltage

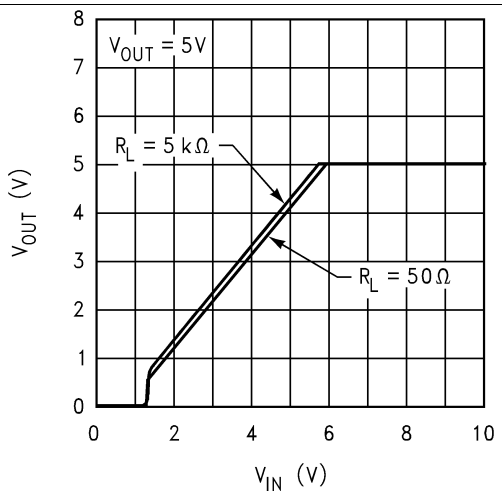


Figure 10. Output Voltage vs Input Voltage

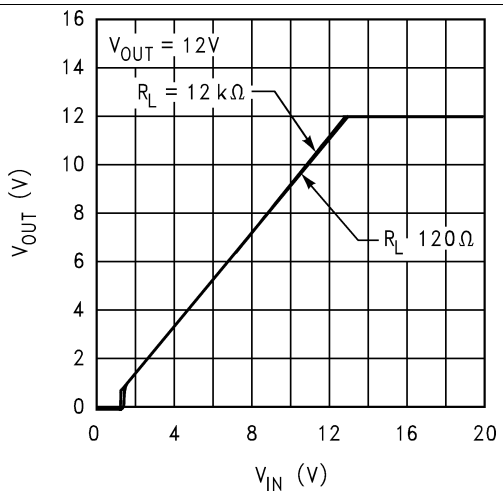


Figure 11. Output Voltage vs Input Voltage

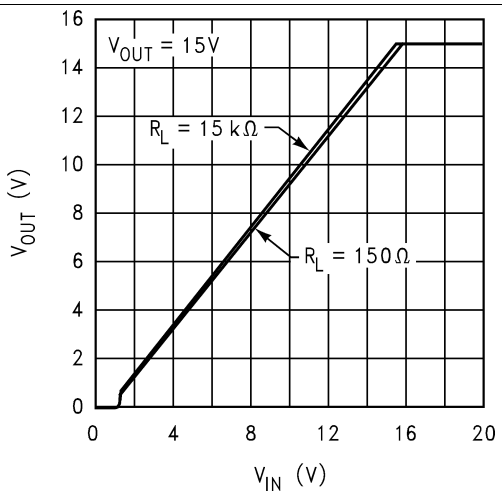


Figure 12. Output Voltage vs Input Voltage

Typical Characteristics (continued)

Unless indicated otherwise, $V_{IN} = V_{NOM} + 1.5$ V, $C_{IN} = 0.1$ µF, $C_{OUT} = 0.1$ µF, and $T_{A\ .} = 25°C$.

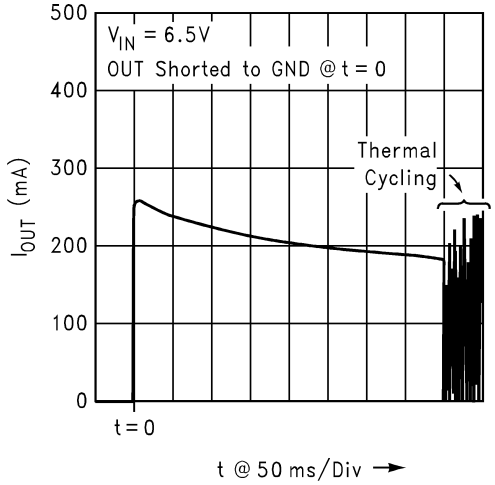


Figure 13. Output Short-Circuit Current

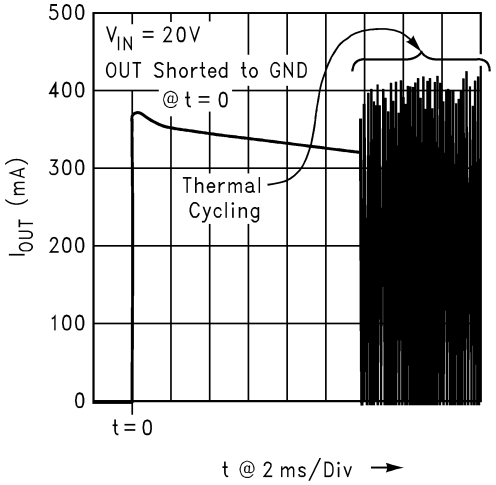


Figure 14. Output Short-Circuit Current

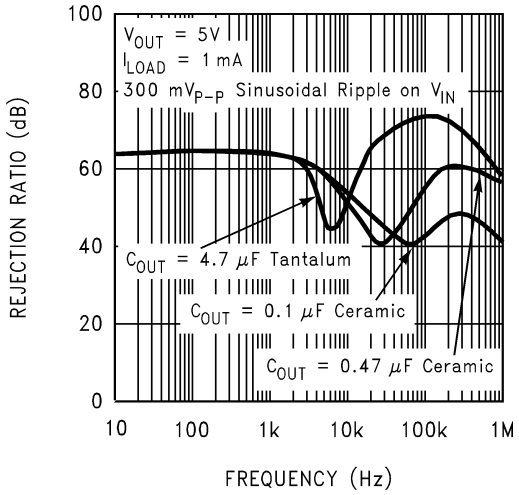


Figure 15. Power Supply Rejection Ratio

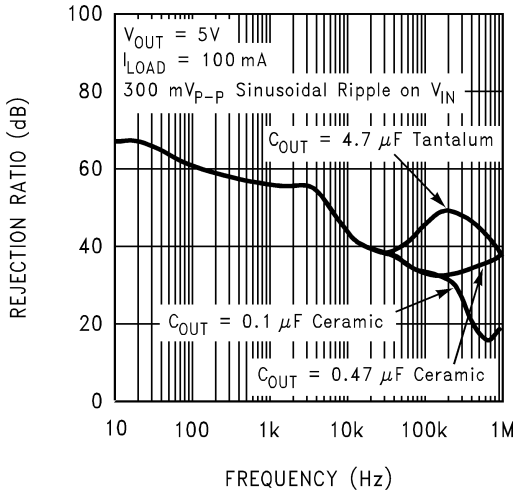


Figure 16. Power Supply Rejection Ratio

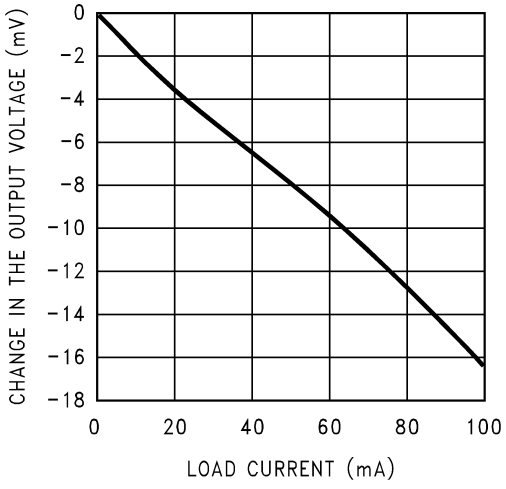


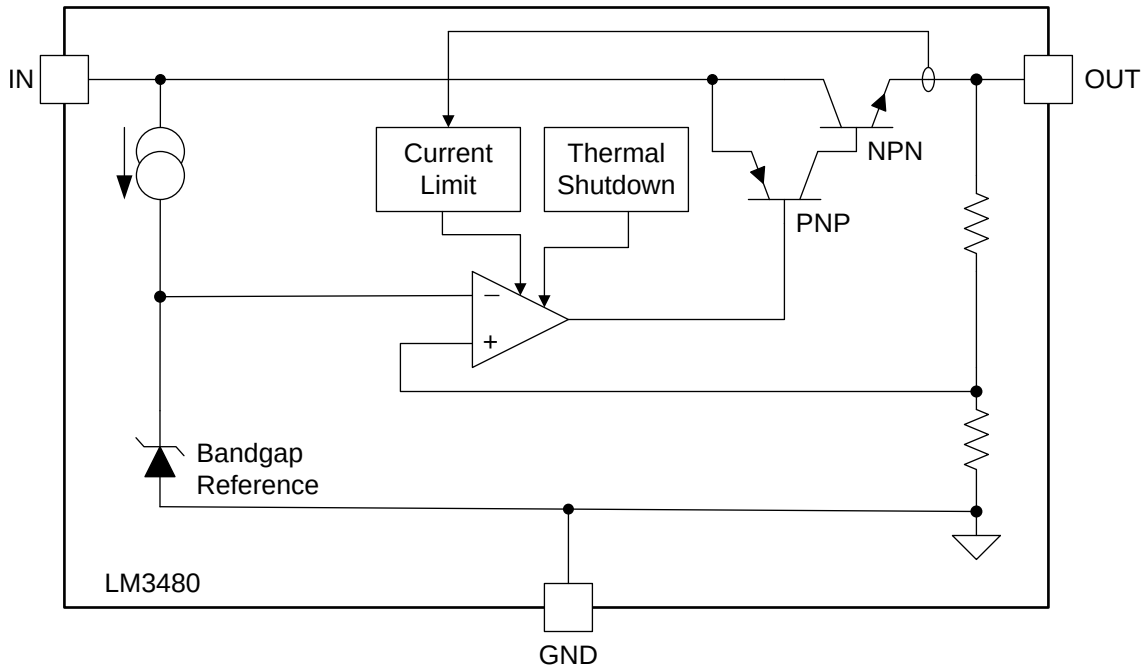
Figure 17. DC Load Regulation

7 Detailed Description

7.1 Overview

The LM3480 is an integrated linear voltage regulator with inputs that can be as high as 30 V. It ensures a maximum dropout of 1.2 V at the full load of 100 mA. The LM3480 has different output options including 3.3-V, 5-V, 12-V, and 15-V outputs, making LM3480 the tiny alternative to industry standard LM78Lxx series and similar devices.

7.2 Functional Block Diagram



7.3 Feature Description

7.3.1 3.3-V, 5-V, 12-V, and 15-V Versions Available

The 3.3-V, 5-V, 12-V, and 15-V versions of LM3480 series are intended as tiny alternatives to industry standard LM78Lxx series and similar devices.

7.3.2 1.2-V Ensured Maximum Dropout

The 1.2-V quasi-low dropout of the LM3480 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.

7.4 Device Functional Modes

7.4.1 Operation with V_{IN} = 5 V

The 3.3-V member of LM3480 can operate with an input of 5 V ±5%, its tiny SOT-23 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 and Implementation

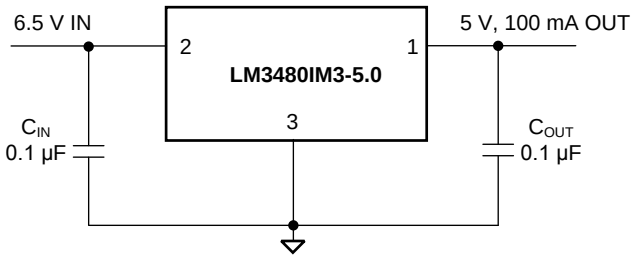
NOTE

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

8.1 Application Information

The LM3480 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, 5-V, 12-V, and 15-V versions. The implementation of LM3480 is discussed in this section.

8.2 Typical Application



8.2.1 Design Requirements

DESIGN PARAMETER	EXAMPLE VALUE
Input voltage	6.5 V
Output voltage	5 V
Output current	100 mA

8.2.2 Detailed Design Procedure

8.2.2.1 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.

8.2.2.1.1 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.

8.2.3 Application Curves

Unless indicated otherwise, V_{IN} = 6.5 V, V_{OUT} = 5 V, C_{OUT} = 0.1 µF, and T_A = 25°C

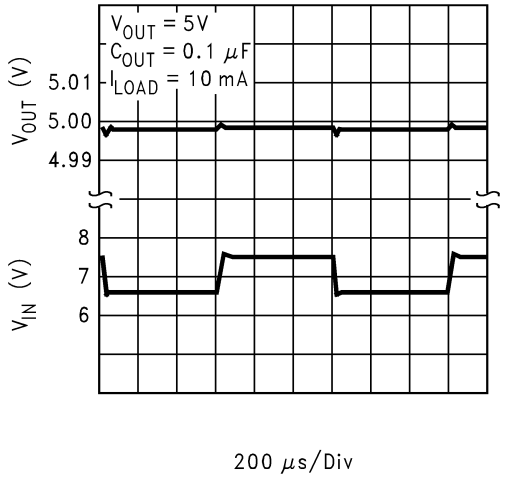


Figure 18. Line Transient Response

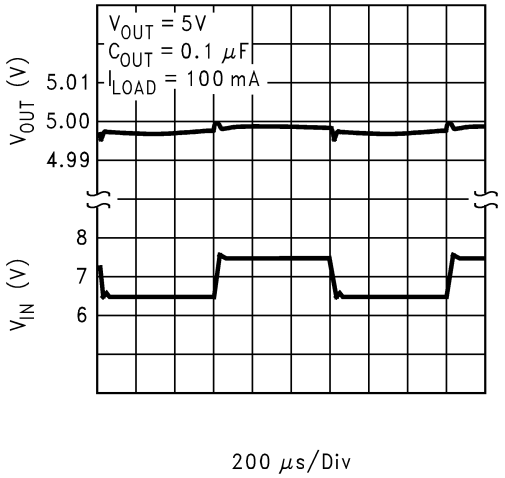


Figure 19. Line Transient Response

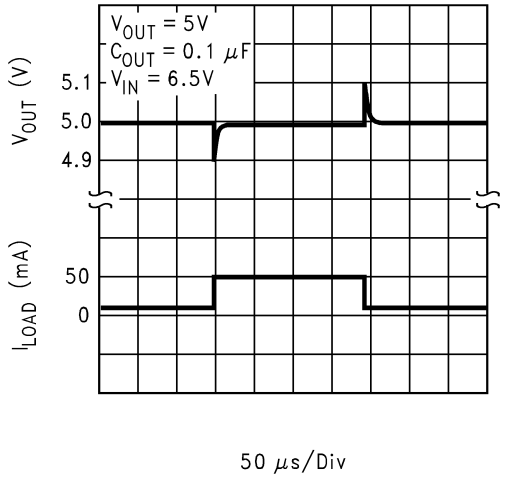


Figure 20. Load Transient Response

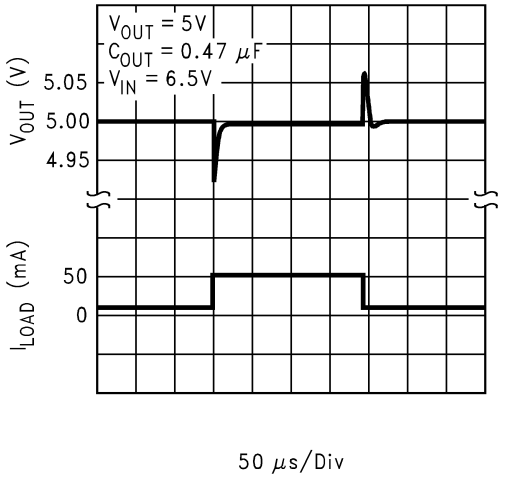


Figure 21. Load Transient Response

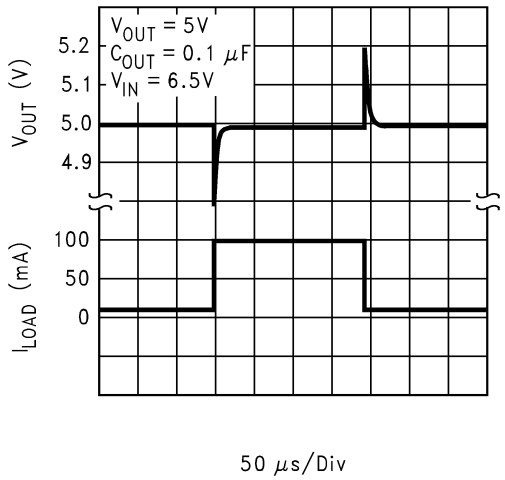


Figure 22. Load Transient Response

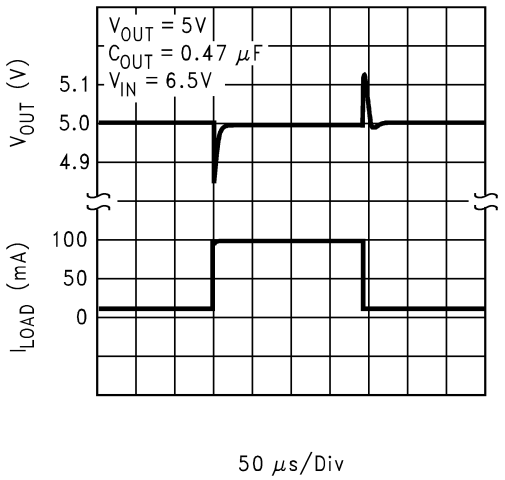


Figure 23. Load Transient Response

9 Power Supply Recommendations

The LM3480 is designed to operated from up to a 30-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.

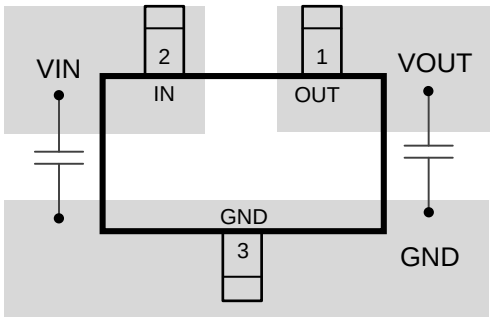
10 Layout

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 Device and Documentation Support

11.1 Community Resources

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

TI E2E™ Online Community ***TI's Engineer-to-Engineer (E2E) Community.*** Created to foster collaboration among engineers. At e2e.ti.com, you can ask questions, share knowledge, explore ideas and help solve problems with fellow engineers.

Design Support ***TI's Design Support*** Quickly find helpful E2E forums along with design support tools and contact information for technical support.

11.2 Trademarks

E2E is a trademark of Texas Instruments.
All other trademarks are the property of their respective owners.

11.3 Electrostatic Discharge Caution

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

11.4 Glossary

SLYZ022 — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

12 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package | Pins	Package qty | Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
LM3480IM3-12/NOPB	Active	Production	SOT-23 (DBZ) | 3	1000 | SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	L0C
LM3480IM3-12/NOPB.B	Active	Production	SOT-23 (DBZ) | 3	1000 | SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	L0C
LM3480IM3-15/NOPB	Active	Production	SOT-23 (DBZ) | 3	1000 | SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	L0D
LM3480IM3-15/NOPB.B	Active	Production	SOT-23 (DBZ) | 3	1000 | SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	L0D
LM3480IM3-3.3/NOPB	Active	Production	SOT-23 (DBZ) | 3	1000 | SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	L0A
LM3480IM3-3.3/NOPB.B	Active	Production	SOT-23 (DBZ) | 3	1000 | SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	L0A
LM3480IM3-5.0/NOPB	Active	Production	SOT-23 (DBZ) | 3	1000 | SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	L0B
LM3480IM3-5.0/NOPB.B	Active	Production	SOT-23 (DBZ) | 3	1000 | SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	L0B
LM3480IM3X-12/NOPB	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	L0C
LM3480IM3X-12/NOPB.B	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	L0C
LM3480IM3X-15/NOPB	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	L0D
LM3480IM3X-15/NOPB.B	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	L0D
LM3480IM3X-3.3/NOPB	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	L0A
LM3480IM3X-5.0/NOPB	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	L0B

(1) **Status:** For more details on status, see our product life cycle.

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

(4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

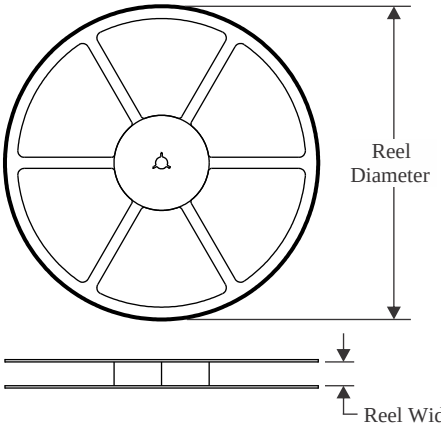
(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

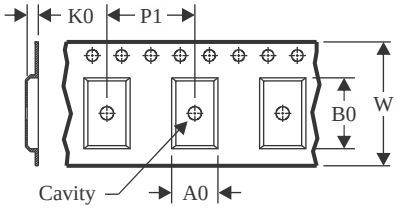
PACKAGE MATERIALS INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS

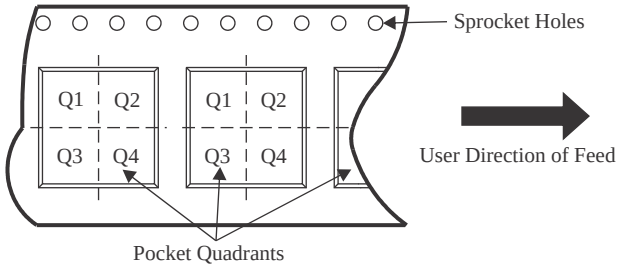


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

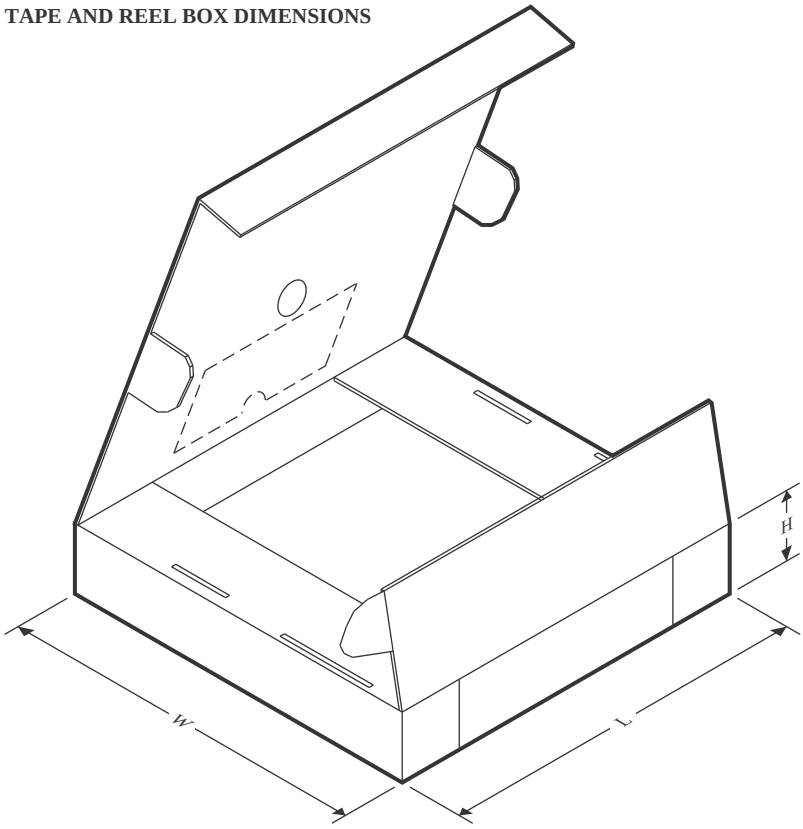


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
LM3480IM3-12/NOPB	SOT-23	DBZ	3	1000	178.0	8.4	3.3	2.9	1.22	4.0	8.0	Q3
LM3480IM3-15/NOPB	SOT-23	DBZ	3	1000	178.0	8.4	3.3	2.9	1.22	4.0	8.0	Q3
LM3480IM3-3.3/NOPB	SOT-23	DBZ	3	1000	178.0	8.4	3.3	2.9	1.22	4.0	8.0	Q3
LM3480IM3-5.0/NOPB	SOT-23	DBZ	3	1000	178.0	8.4	3.3	2.9	1.22	4.0	8.0	Q3
LM3480IM3X-12/NOPB	SOT-23	DBZ	3	3000	178.0	8.4	3.3	2.9	1.22	4.0	8.0	Q3
LM3480IM3X-15/NOPB	SOT-23	DBZ	3	3000	178.0	8.4	3.3	2.9	1.22	4.0	8.0	Q3
LM3480IM3X-3.3/NOPB	SOT-23	DBZ	3	3000	178.0	8.4	3.3	2.9	1.22	4.0	8.0	Q3
LM3480IM3X-5.0/NOPB	SOT-23	DBZ	3	3000	178.0	8.4	3.3	2.9	1.22	4.0	8.0	Q3

PACKAGE MATERIALS INFORMATION

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

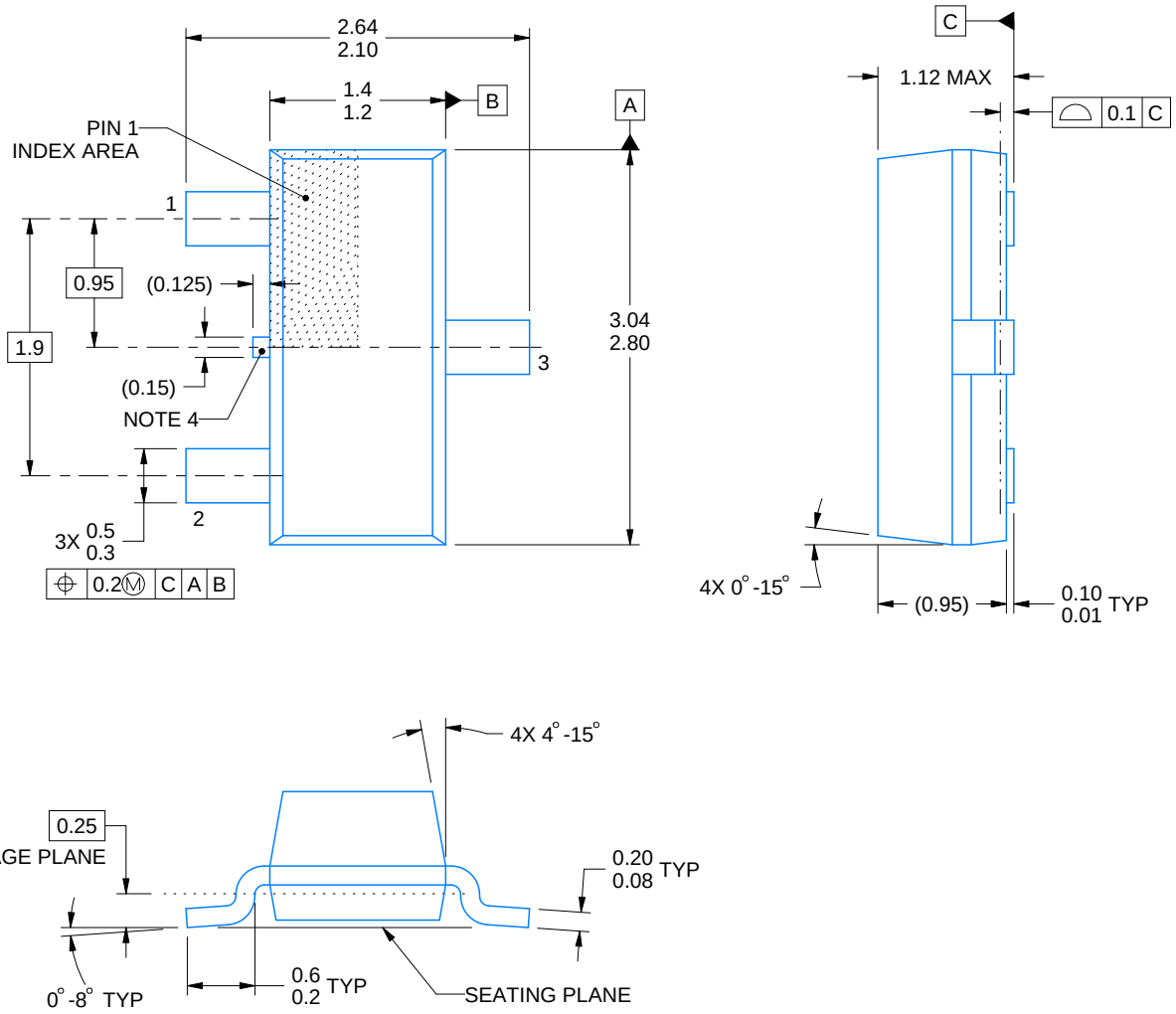
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LM3480IM3-12/NOPB	SOT-23	DBZ	3	1000	208.0	191.0	35.0
LM3480IM3-15/NOPB	SOT-23	DBZ	3	1000	208.0	191.0	35.0
LM3480IM3-3.3/NOPB	SOT-23	DBZ	3	1000	208.0	191.0	35.0
LM3480IM3-5.0/NOPB	SOT-23	DBZ	3	1000	208.0	191.0	35.0
LM3480IM3X-12/NOPB	SOT-23	DBZ	3	3000	208.0	191.0	35.0
LM3480IM3X-15/NOPB	SOT-23	DBZ	3	3000	208.0	191.0	35.0
LM3480IM3X-3.3/NOPB	SOT-23	DBZ	3	3000	208.0	191.0	35.0
LM3480IM3X-5.0/NOPB	SOT-23	DBZ	3	3000	208.0	191.0	35.0

PACKAGE OUTLINE

DBZ0003A

SOT-23 - 1.12 mm max height

SMALL OUTLINE TRANSISTOR



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NOTES:

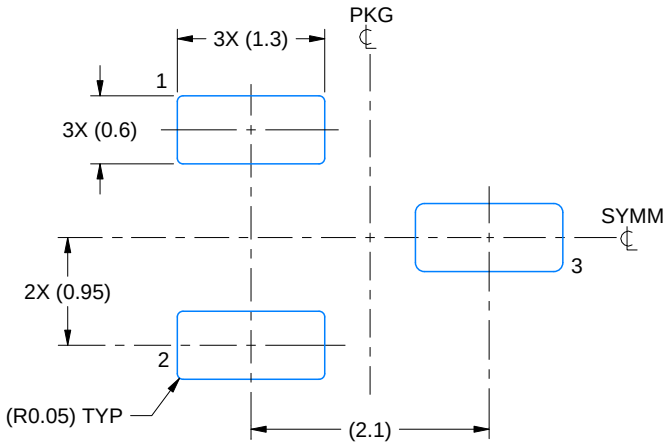
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC registration TO-236, except minimum foot length.
4. Support pin may differ or may not be present.
5. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.25mm per side

EXAMPLE BOARD LAYOUT

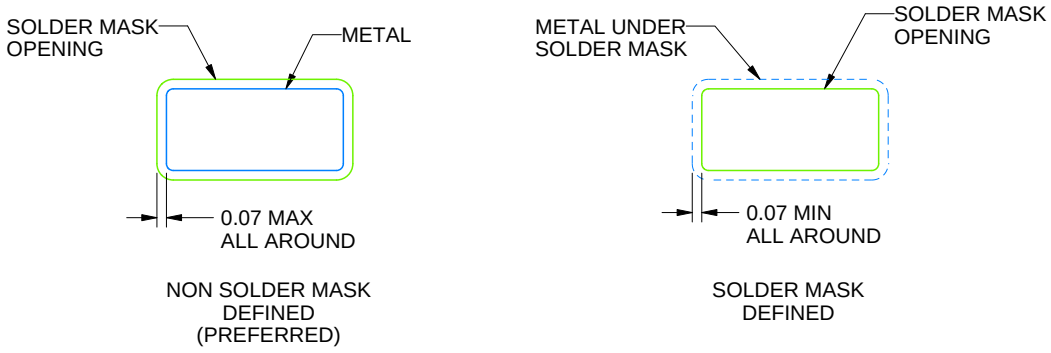
DBZ0003A

SOT-23 - 1.12 mm max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE
SCALE:15X



SOLDER MASK DETAILS

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NOTES: (continued)

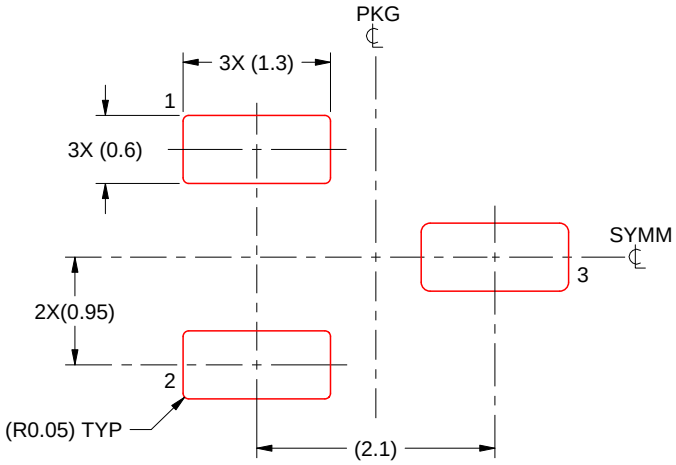
5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DBZ0003A

SOT-23 - 1.12 mm max height

SMALL OUTLINE TRANSISTOR



SOLDER PASTE EXAMPLE
BASED ON 0.125 THICK STENCIL
SCALE:15X

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NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

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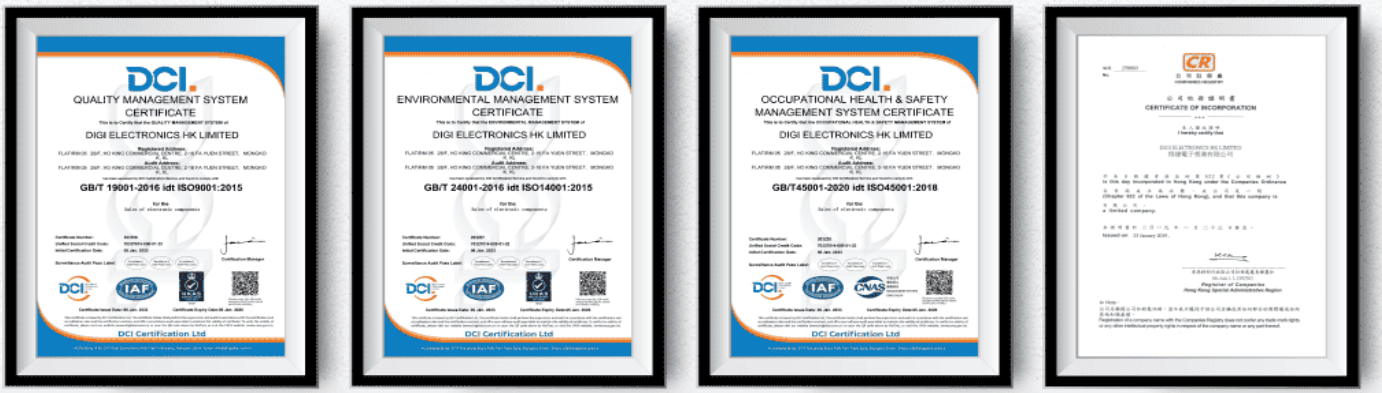

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