

LP2981-N Micropower 100 mA Ultra Low-Dropout Regulator in SOT-23 Package

Check for Samples: [LP2981-N](#)

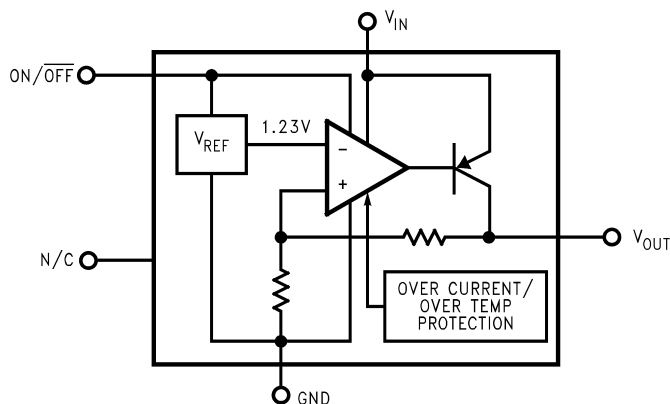
FEATURES

- Ultra Low Dropout Voltage
- Output Voltage Accuracy 0.75% (A Grade)
- Specified 100 mA Output Current
- < 1 μ A Quiescent Current when Shutdown
- Low Ground Pin Current at All Load Currents
- High Peak Current Capability (300 mA Typical)
- Wide Supply Voltage Range (16V Max)
- Fast Dynamic Response to Line and Load
- Low Z_{OUT} Over Wide Frequency Range
- Overtemperature/Overcurrent Protection
- -40°C to $+125^{\circ}\text{C}$ Junction Temperature Range

APPLICATIONS

- Cellular Phone
- Palmtop/Laptop Computer
- Personal Digital Assistant (PDA)
- Camcorder, Personal Stereo, Camera

Block Diagram



DESCRIPTION

The LP2981-N is a 100 mA, fixed-output voltage regulator designed specifically to meet the requirements of battery-powered applications.

Using an optimized VIP (Vertically Integrated PNP) process, the LP2981-N delivers unequaled performance in all specifications critical to battery-powered designs:

Dropout Voltage. Typically 200 mV @ 100 mA load, and 7 mV @ 1 mA load.

Ground Pin Current. Typically 600 μ A @ 100 mA load, and 80 μ A @ 1 mA load.

Sleep Mode. Less than 1 μ A quiescent current when ON/OFF pin is pulled low.

Precision Output. 0.75% tolerance output voltages available (A grade).

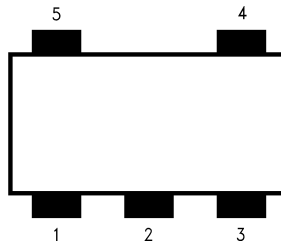
Nine voltage options, from 2.5V to 5.0V, are available as standard products.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

All trademarks are the property of their respective owners.

Connection Diagram



**Figure 1. 5-Lead Small Outline Package (SOT-23)
Top View
See Package Number DBV0005A**

PIN DESCRIPTIONS

| Name | Pin Number | Function |
|------------------|------------|-------------------------------------------------------|
| V _{IN} | 1 | Input Voltage |
| GND | 2 | Common Ground (device substrate) |
| ON/OFF | 3 | Logic high enable input |
| N/C | 4 | Post package trim - do not connect to this pin |
| V _{OUT} | 5 | Regulated output voltage |



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.

ABSOLUTE MAXIMUM RATINGS⁽¹⁾⁽²⁾

| | |
|--------------------------------------------------|-------------------------|
| Storage Temperature Range | -65°C to +150°C |
| Operating Junction Temperature Range | -40°C to +125°C |
| Lead Temperature (Soldering, 5 sec.) | 260°C |
| ESD Rating ⁽³⁾ | 2 kV |
| Power Dissipation ⁽⁴⁾ | Internally Limited |
| Input Supply Voltage (Survival) | -0.3V to +16V |
| Input Supply Voltage (Operating) | 2.1V to +16V |
| Shutdown Input Voltage (Survival) | -0.3V to +16V |
| Output Voltage (Survival ⁽⁵⁾) | -0.3V to +9V |
| I _{OUT} (Survival) | Short Circuit Protected |
| Input-Output Voltage (Survival, ⁽⁶⁾) | -0.3V to +16V |

- (1) Absolute maximum ratings indicate limits beyond which damage to the component may occur. Electrical specifications do not apply when operating the device outside of its rated operating conditions.
- (2) If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/Distributors for availability and specifications.
- (3) The ESD rating of pins 3 and 4 for the SOT-23 package is 1 kV.
- (4) The maximum allowable power dissipation is a function of the maximum junction temperature, T_{J(MAX)}, the junction-to-ambient thermal resistance, θ_{JA}, and the ambient temperature, T_A. The maximum allowable power dissipation at any ambient temperature is calculated using:

$$P_{(MAX)} = \frac{T_{J(MAX)} - T_A}{\theta_{JA}}$$

The value of θ_{JA} for the SOT-23 package is 220°C/W. Exceeding the maximum allowable power dissipation will cause excessive die temperature, and the regulator will go into thermal shutdown.
- (5) If used in a dual-supply system where the regulator load is returned to a negative supply, the LP2981-N output must be diode-clamped to ground.
- (6) The output PNP structure contains a diode between the V_{IN} and V_{OUT} terminals that is normally reverse-biased. Reversing the polarity from V_{IN} to V_{OUT} will turn on this diode (see [APPLICATION HINTS](#)).

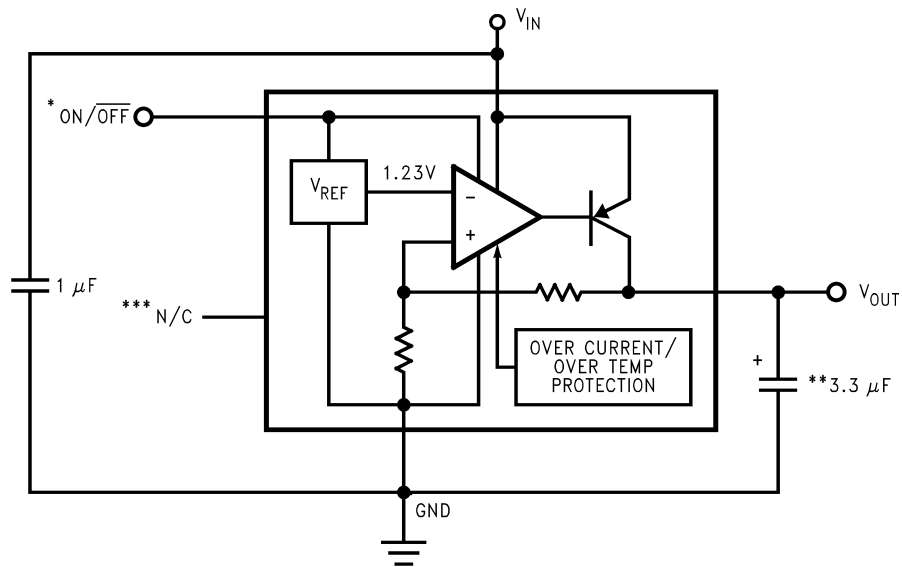
ELECTRICAL CHARACTERISTICS

Limits in standard typeface are for $T_J = 25^\circ\text{C}$, and limits in **boldface type** apply over the full operating temperature range. Unless otherwise specified: $V_{IN} = V_{O(NOM)} + 1\text{V}$, $C_{IN} = 1\ \mu\text{F}$, $I_L = 1\ \text{mA}$, $C_{OUT} = 4.7\ \mu\text{F}$, $V_{ON/OFF} = 2\text{V}$.

| Symbol | Parameter | Conditions | Typ | LP2981AI-XX ⁽¹⁾ | | LP2981I-XX ⁽¹⁾ | | Units |
|----------------------------------------|-------------------------------------|-----------------------------------------------------------|-------------|----------------------------|-----------------------|---------------------------|-----------------------|---------------|
| | | | | Min | Max | Min | Max | |
| ΔV_O | Output Voltage Tolerance | $I_L = 1\ \text{mA}$ | | -0.75 | 0.75 | -1.25 | 1.25 | % V_{NOM} |
| | | $1\ \text{mA} < I_L < 100\ \text{mA}$ | | -1.0 | 1.0 | -2.0 | 2.0 | |
| | | | | -2.5 | 2.5 | -3.5 | 3.5 | |
| $\frac{\Delta V_O}{\Delta V_{IN}}$ | Output Voltage Line Regulation | $V_{O(NOM)} + 1\text{V}$ $\leq V_{IN} \leq 16\text{V}$ | 0.007 | | 0.014 0.032 | | 0.014 0.032 | %/V |
| $V_{IN}-V_O$ | Dropout Voltage ⁽²⁾ | $I_L = 0$ | 1 | | 3 5 | | 3 5 | mV |
| | | $I_L = 1\ \text{mA}$ | 7 | | 10 15 | | 10 15 | |
| | | $I_L = 25\ \text{mA}$ | 70 | | 100 150 | | 100 150 | |
| | | $I_L = 100\ \text{mA}$ | 200 | | 250 375 | | 250 375 | |
| I_{GND} | Ground Pin Current | $I_L = 0$ | 65 | | 95 125 | | 95 125 | μA |
| | | $I_L = 1\ \text{mA}$ | 80 | | 110 170 | | 110 170 | |
| | | $I_L = 25\ \text{mA}$ | 200 | | 300 550 | | 300 550 | |
| | | $I_L = 100\ \text{mA}$ | 600 | | 800 1500 | | 800 1500 | |
| | | $V_{ON/OFF} < 0.3\text{V}$ | 0.01 | | 0.8 | | 0.8 | |
| | | $V_{ON/OFF} < 0.15\text{V}$ | 0.05 | | 2 | | 2 | |
| $V_{ON/OFF}$ | ON/OFF Input Voltage ⁽³⁾ | High = O/P ON | 1.4 | 1.6 | | 1.6 | | V |
| | | Low = O/P OFF | 0.50 | | 0.15 | | 0.15 | |
| $I_{ON/OFF}$ | ON/OFF Input Current | $V_{ON/OFF} = 0$ | 0.01 | | -1 | | -1 | μA |
| | | $V_{ON/OFF} = 5\text{V}$ | 5 | | 15 | | 15 | |
| $I_{O(PK)}$ | Peak Output Current | $V_{OUT} \geq V_{O(NOM)} - 5\%$ | 400 | 150 | | 150 | | mA |
| e_n | Output Noise Voltage (RMS) | BW = 300 Hz–50 kHz, $C_{OUT} = 10\ \mu\text{F}$ | 160 | | | | | μV |
| $\frac{\Delta V_{OUT}}{\Delta V_{IN}}$ | Ripple Rejection | $f = 1\ \text{kHz}$ $C_{OUT} = 10\ \mu\text{F}$ | 63 | | | | | dB |
| $I_{O(MAX)}$ | Short Circuit Current | $R_L = 0$ (Steady State) ⁽⁴⁾ | 150 | | | | | mA |

- (1) Limits are 100% production tested at 25°C . Limits over the operating temperature range are specified through correlation using Statistical Quality Control (SQC) methods. The limits are used to calculate TI's Average Outgoing Quality Level (AOQL).
- (2) Dropout voltage is defined as the input to output differential at which the output voltage drops 100 mV below the value measured with a 1V differential.
- (3) The ON/OFF inputs must be properly driven to prevent misoperation. For details, refer to [APPLICATION HINTS](#).
- (4) See [TYPICAL PERFORMANCE CHARACTERISTICS](#) curve(s).

TYPICAL APPLICATION CIRCUIT



*ON/OFF input must be actively terminated. Tie to V_{IN} if this function is not to be used.

**Minimum Output Capacitance is shown to insure stability over full load current range. More capacitance provides superior dynamic performance and additional stability margin (see [APPLICATION HINTS](#)).

***Do not make connections to this pin.

TYPICAL PERFORMANCE CHARACTERISTICS

Unless otherwise specified: $T_A = 25^\circ\text{C}$, $V_{IN} = V_{O(NOM)} + 1\text{V}$, $C_{OUT} = 4.7\ \mu\text{F}$, $C_{IN} = 1\ \mu\text{F}$ all voltage options, ON/OFF pin tied to V_{IN} .

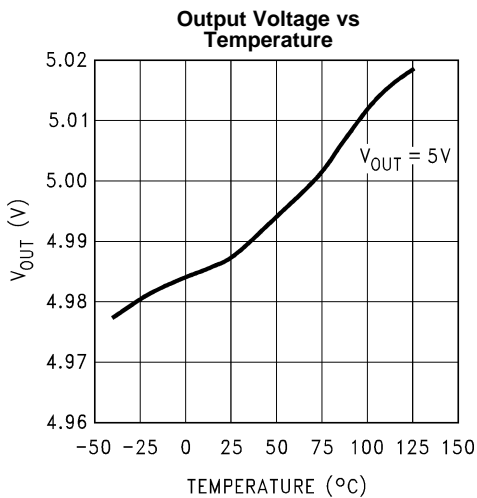


Figure 2.

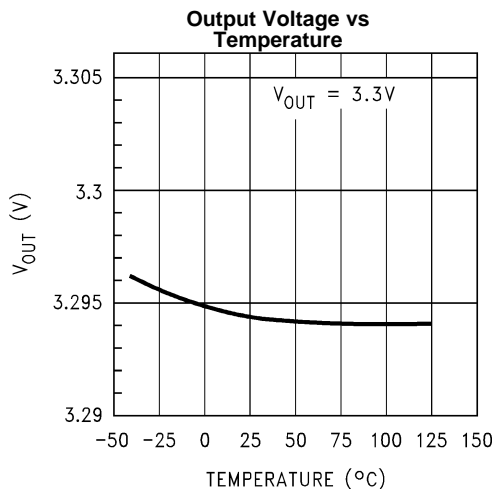


Figure 3.

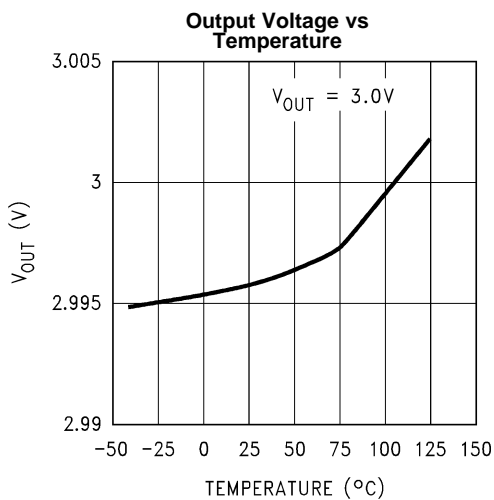


Figure 4.

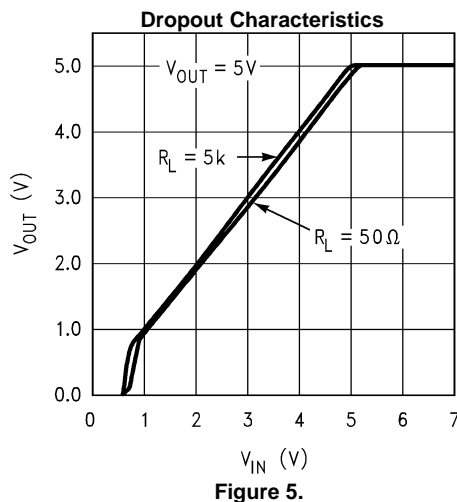


Figure 5.

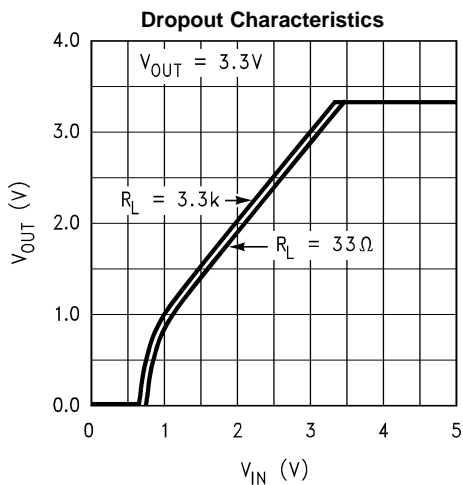


Figure 6.

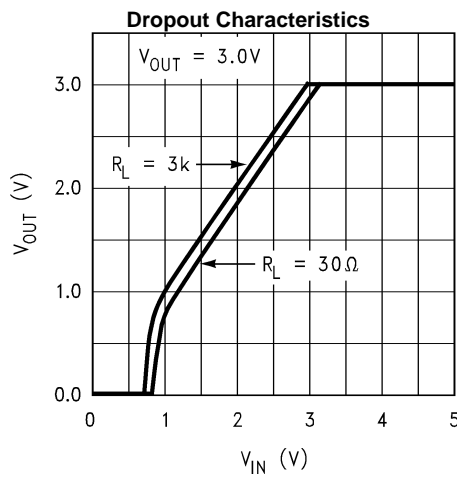


Figure 7.

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

Unless otherwise specified: $T_A = 25^\circ\text{C}$, $V_{IN} = V_{O(NOM)} + 1\text{V}$, $C_{OUT} = 4.7\ \mu\text{F}$, $C_{IN} = 1\ \mu\text{F}$ all voltage options, ON/OFF pin tied to V_{IN} .

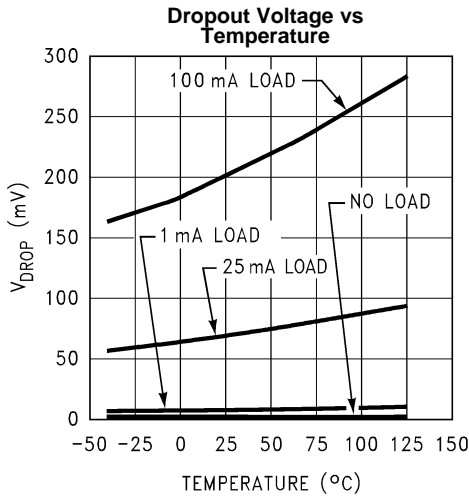


Figure 8.

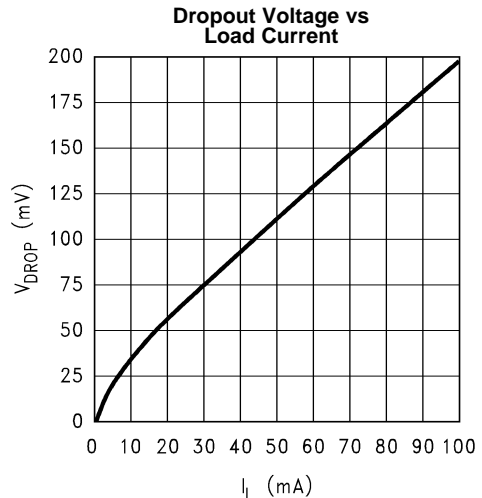


Figure 9.

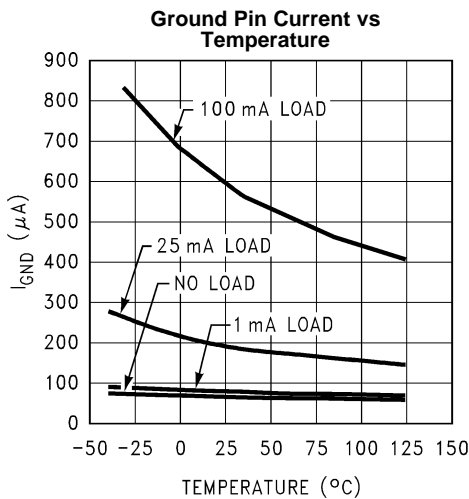


Figure 10.

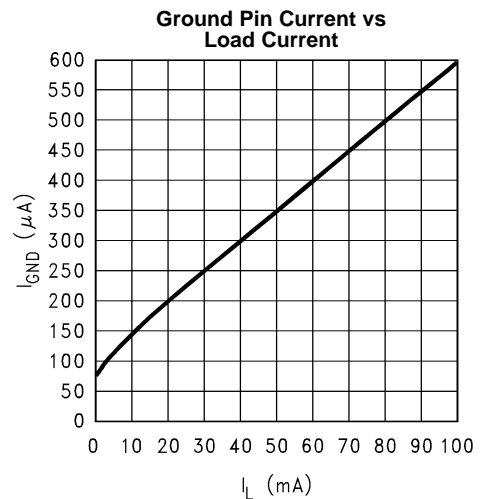


Figure 11.

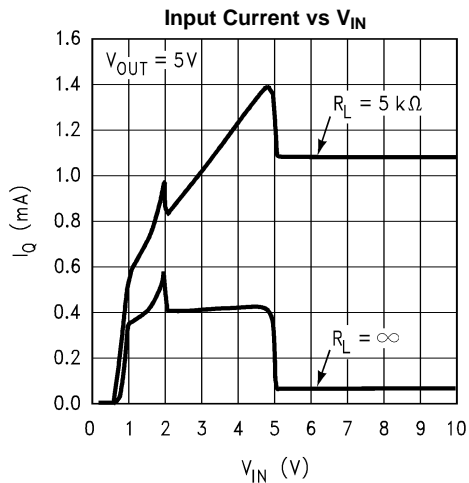


Figure 12.

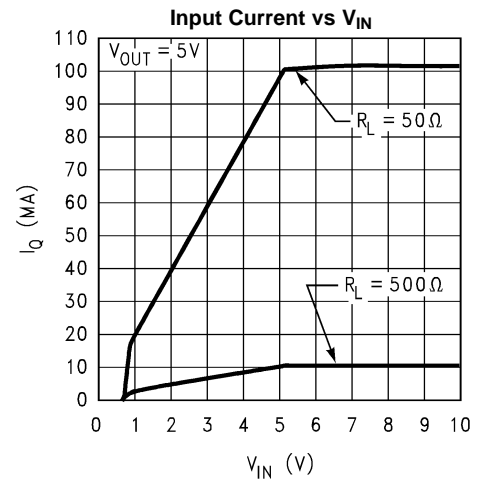
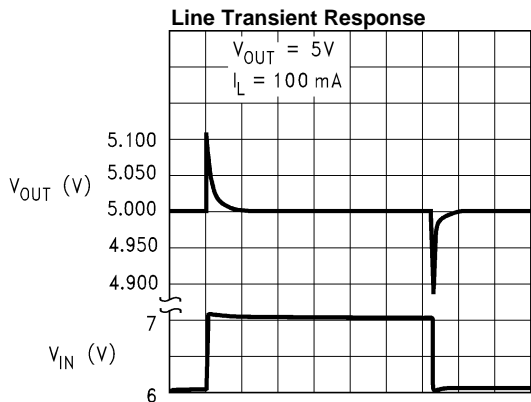


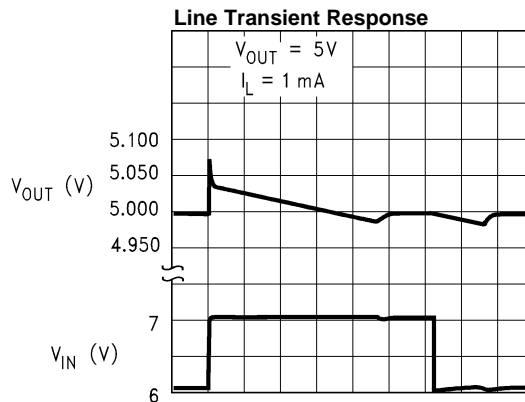
Figure 13.

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

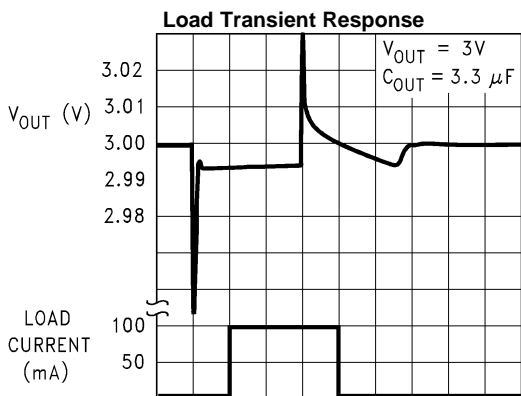
Unless otherwise specified: $T_A = 25^\circ\text{C}$, $V_{IN} = V_{O(NOM)} + 1\text{V}$, $C_{OUT} = 4.7\ \mu\text{F}$, $C_{IN} = 1\ \mu\text{F}$ all voltage options, ON/OFF pin tied to V_{IN} .



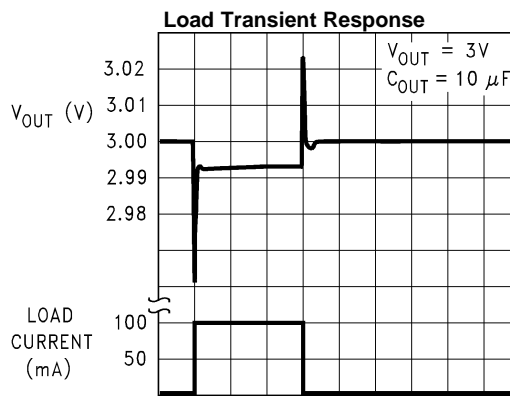
20 $\mu\text{s}/\text{div}$ →
Figure 14.



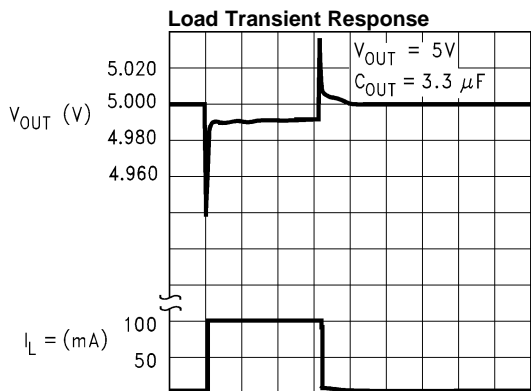
20 $\mu\text{s}/\text{div}$ →
Figure 15.



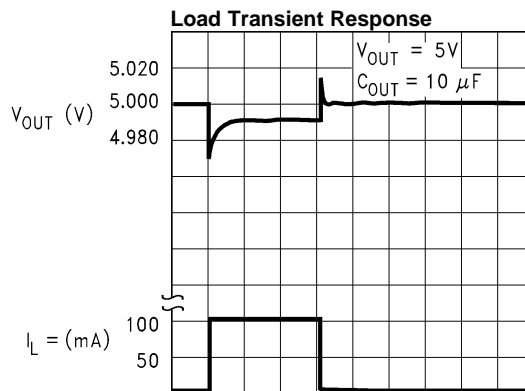
10 $\mu\text{s}/\text{div}$ →
Figure 16.



10 $\mu\text{s}/\text{div}$ →
Figure 17.



10 $\mu\text{s}/\text{div}$ →
Figure 18.



10 $\mu\text{s}/\text{div}$ →
Figure 19.

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

Unless otherwise specified: $T_A = 25^\circ\text{C}$, $V_{IN} = V_{O(NOM)} + 1\text{V}$, $C_{OUT} = 4.7\ \mu\text{F}$, $C_{IN} = 1\ \mu\text{F}$ all voltage options, ON/OFF pin tied to V_{IN} .

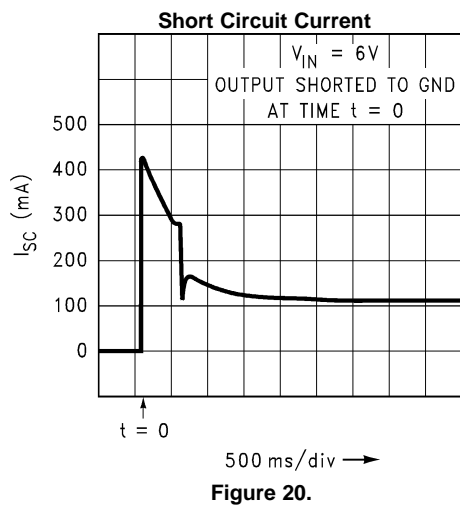


Figure 20.

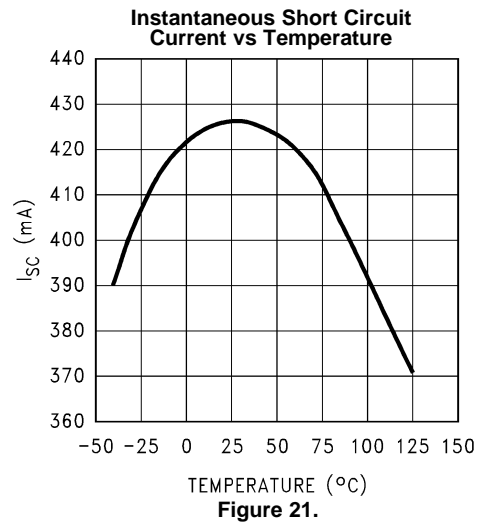


Figure 21.

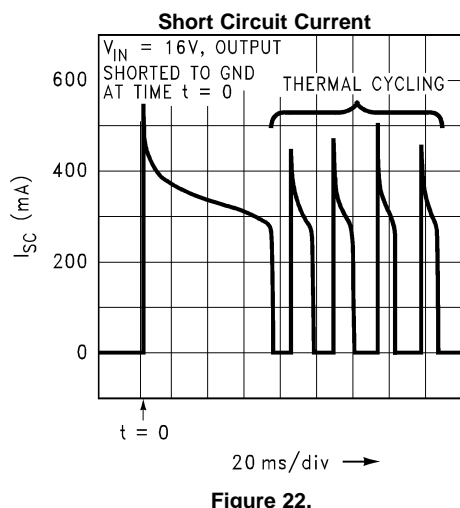


Figure 22.

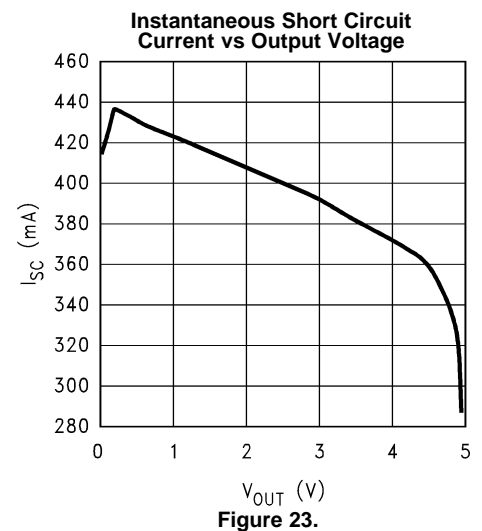


Figure 23.

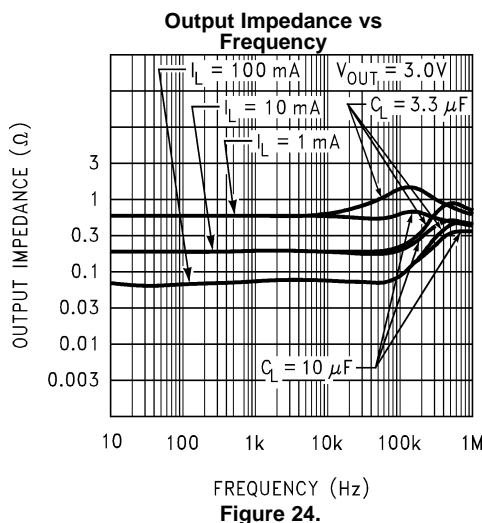


Figure 24.

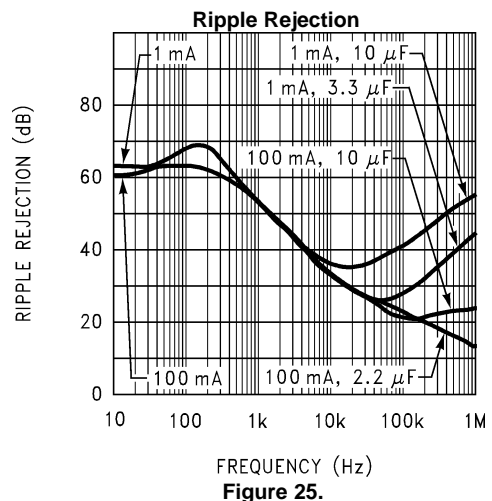


Figure 25.

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

Unless otherwise specified: $T_A = 25^\circ\text{C}$, $V_{IN} = V_{O(NOM)} + 1\text{V}$, $C_{OUT} = 4.7\ \mu\text{F}$, $C_{IN} = 1\ \mu\text{F}$ all voltage options, ON/OFF pin tied to V_{IN} .

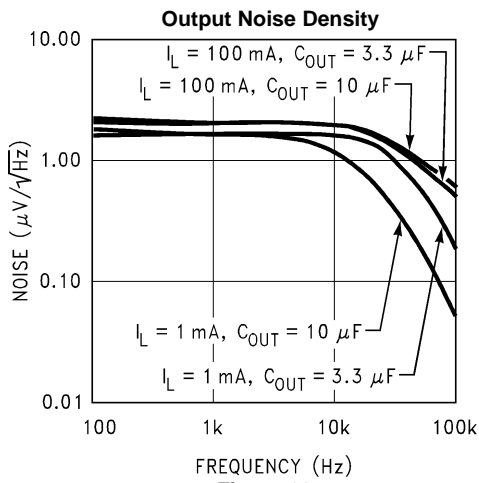


Figure 26.

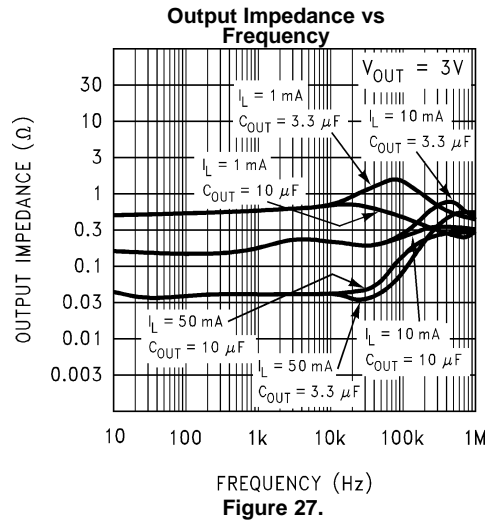


Figure 27.

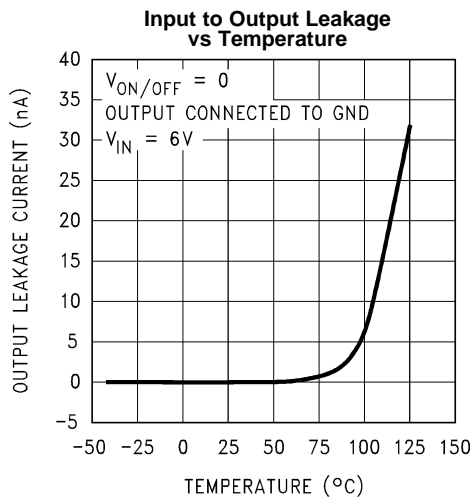


Figure 28.

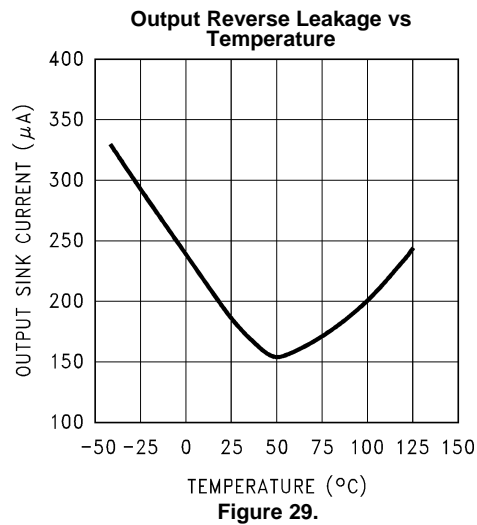


Figure 29.

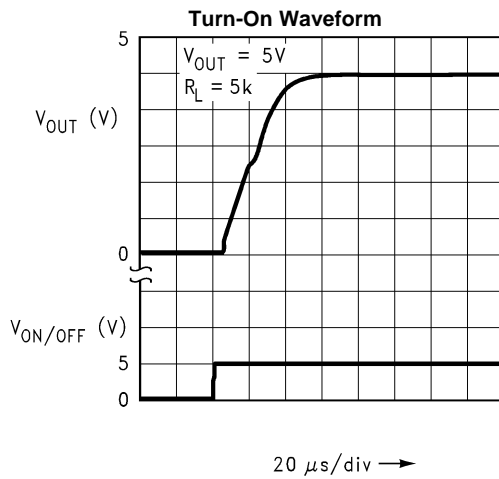


Figure 30.

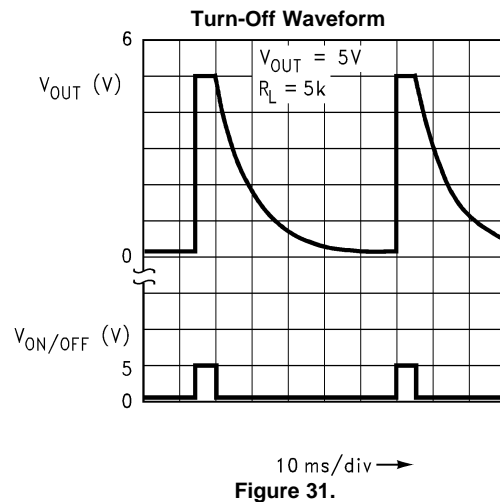
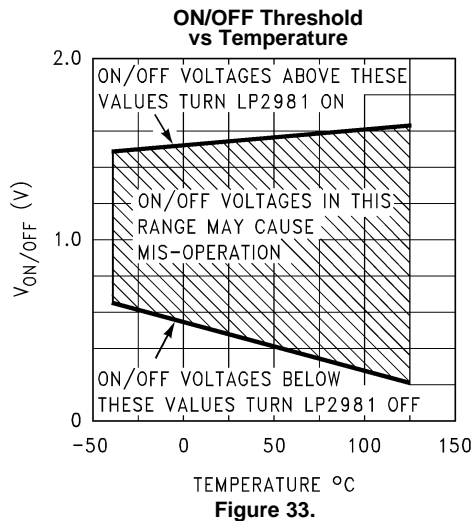
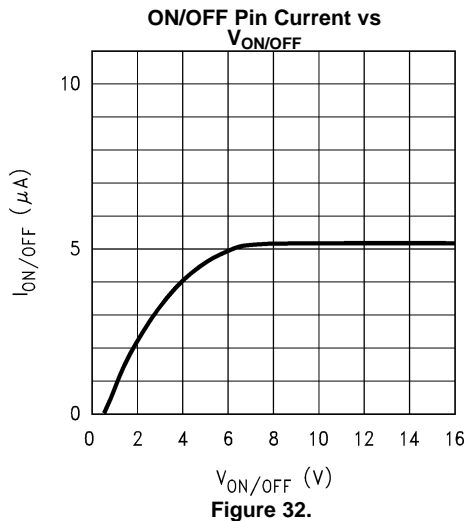


Figure 31.

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

Unless otherwise specified: $T_A = 25^\circ\text{C}$, $V_{IN} = V_{O(NOM)} + 1\text{V}$, $C_{OUT} = 4.7 \mu\text{F}$, $C_{IN} = 1 \mu\text{F}$ all voltage options, ON/OFF pin tied to V_{IN} .



APPLICATION HINTS

EXTERNAL CAPACITORS

Like any low-dropout regulator, the external capacitors used with the LP2981-N must be carefully selected to assure regulator loop stability.

Input Capacitor:

An input capacitor whose value is $\geq 1 \mu\text{F}$ is required with the LP2981-N (amount of capacitance can be increased without limit).

This capacitor must be located a distance of not more than 0.5" from the input pin of the LP2981-N and returned to a clean analog ground. Any good quality ceramic or tantalum can be used for this capacitor.

Output Capacitor:

The output capacitor must meet both the requirement for minimum amount of capacitance and E.S.R. (equivalent series resistance) value. Curves are provided which show the allowable ESR range as a function of load current for various output voltages and capacitor values (refer to [Figure 34](#), [Figure 35](#), [Figure 36](#), and [Figure 37](#)).

NOTE

Important: The output capacitor must maintain its ESR in the stable region over the full operating temperature range to assure stability. Also, capacitor tolerance and variation with temperature must be considered to assure the minimum amount of capacitance is provided at all times.

This capacitor should be located not more than 0.5" from the output pin of the LP2981-N and returned to a clean analog ground.

CAPACITOR CHARACTERISTICS

Tantalum:

Tantalum capacitors are the best choice for use with the LP2981-N. Most good quality tantalums can be used with the LP2981-N, but check the manufacturer's data sheet to be sure the ESR is in range.

It is important to remember that ESR increases at lower temperatures and a capacitor that is near the upper limit for stability at room temperature can cause instability when it gets cold.

In applications which must operate at very low temperatures, it may be necessary to parallel the output tantalum capacitor with a ceramic capacitor to prevent the ESR from going up too high (see below for important information on ceramic capacitors).

Ceramic:

Ceramic capacitors are not recommended for use at the output of the LP2981-N. This is because the ESR of a ceramic can be low enough to go below the minimum stable value for the LP2981-N. A 2.2 μF ceramic was measured and found to have an ESR of about 15 m Ω , which is low enough to cause oscillations.

If a ceramic capacitor is used on the output, a 1 Ω resistor should be placed in series with the capacitor.

Aluminum:

Because of large physical size, aluminum electrolytics are not typically used with the LP2981-N. They must meet the same ESR requirements over the operating temperature range, more difficult because of their steep increase at cold temperature.

An aluminum electrolytic can exhibit an ESR increase of as much as 50X when going from 20°C to -40°C. Also, some aluminum electrolytics are not operational below -25°C because the electrolyte can freeze.

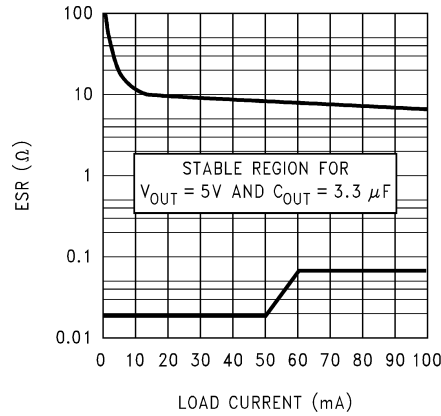


Figure 34. 5V/3.3 μF ESR Curves

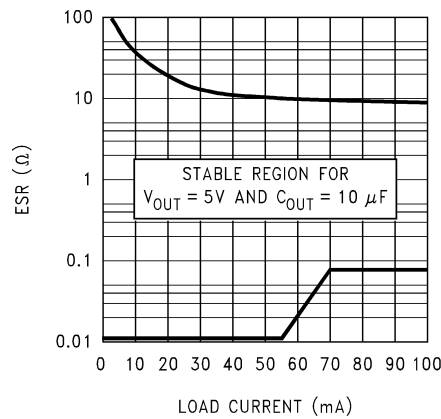


Figure 35. 5V/10 μF ESR Curves

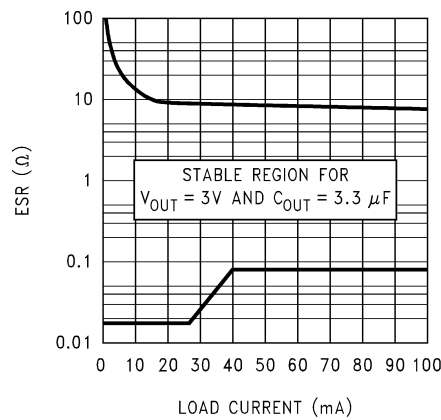


Figure 36. 3V/3.3 μF ESR Curves

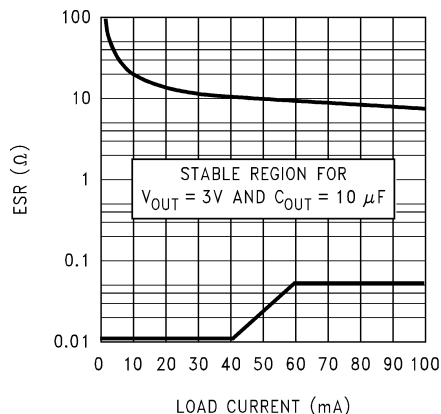


Figure 37. 3V/10 μ F ESR Curves

REVERSE CURRENT PATH

The internal PNP power transistor used as the pass element in the LP2981-N has an inherent diode connected between the regulator output and input. During normal operation (where the input voltage is higher than the output) this diode is reverse biased (See Figure 38).

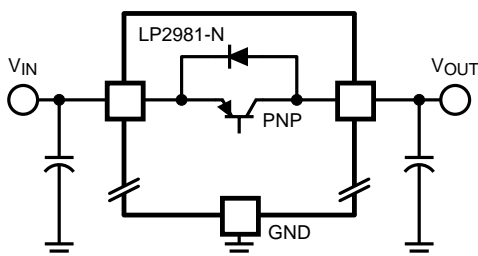


Figure 38. LP2981-N Reverse Current Path

However, if the input voltage is more than a V_{BE} below the output voltage, this diode will turn ON and current will flow into the regulator output. In such cases, a parasitic SCR can latch which will allow a high current to flow into the V_{IN} pin and out the ground pin, which can damage the part.

The internal diode can also be turned on if the input voltage is abruptly stepped down to a voltage which is a V_{BE} below the output voltage.

In any application where the output voltage may be higher than the input voltage, an external Schottky diode must be connected from V_{IN} to V_{OUT} (cathode on V_{IN} , anode on V_{OUT}). See Figure 39, to limit the reverse voltage across the LP2981-N to 0.3V (see Absolute Maximum Ratings)

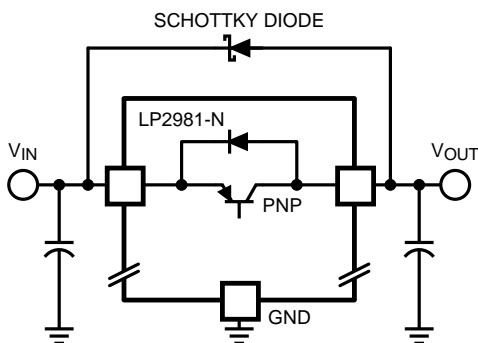


Figure 39. Adding External Schottky Diode Protection

ON/OFF INPUT OPERATION

The LP2981-N is shut off by pulling the ON/OFF input low, and turned on by driving the input high. If this feature is not to be used, the ON/OFF input should be tied to V_{IN} to keep the regulator on at all times (the ON/OFF input must **not** be left floating).

To ensure proper operation, the signal source used to drive the ON/OFF input must be able to swing above and below the specified turn-on/turn-off voltage thresholds which specify an ON or OFF state (see [ELECTRICAL CHARACTERISTICS](#)).

The ON/OFF signal may come from either a totem-pole output, or an open-collector output with pull-up resistor to the LP2981-N input voltage or another logic supply. The high-level voltage may exceed the LP2981-N input voltage, but must remain within the [Absolute Maximum Ratings](#) for the ON/OFF pin.

It is also important that the turn-on/turn-off voltage signals applied to the ON/OFF input have a slew rate which is greater than 40 mV/ μ s.

NOTE

IMPORTANT: The regulator shutdown function will not operate correctly if a slow-moving signal is applied to the ON/OFF input.

REVISION HISTORY

| Changes from Revision J (April 2013) to Revision K | Page |
|------------------------------------------------------------------------------------------------------------------|--------------------------|
| <hr/> <ul style="list-style-type: none">• Changed layout of National Data Sheet to TI format | <hr/> 14 |

PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|----------------------|---------------|--------------|--------------------|------|----------------|----------------------------|-------------------------|----------------------|--------------|-------------------------|-------------------------|
| LP2981AIM5-2.5 | NRND | SOT-23 | DBV | 5 | 1000 | TBD | Call TI | Call TI | -40 to 125 | L0CA | |
| LP2981AIM5-2.5/NOPB | ACTIVE | SOT-23 | DBV | 5 | 1000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L0CA | Samples |
| LP2981AIM5-3.0/NOPB | ACTIVE | SOT-23 | DBV | 5 | 1000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L05A | Samples |
| LP2981AIM5-3.3 | NRND | SOT-23 | DBV | 5 | 1000 | TBD | Call TI | Call TI | -40 to 125 | L04A | |
| LP2981AIM5-3.3/NOPB | ACTIVE | SOT-23 | DBV | 5 | 1000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L04A | Samples |
| LP2981AIM5-3.6 | NRND | SOT-23 | DBV | 5 | 1000 | TBD | Call TI | Call TI | -40 to 125 | L0JA | |
| LP2981AIM5-3.6/NOPB | ACTIVE | SOT-23 | DBV | 5 | 1000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L0JA | Samples |
| LP2981AIM5-5.0 | NRND | SOT-23 | DBV | 5 | 1000 | TBD | Call TI | Call TI | -40 to 125 | L03A | |
| LP2981AIM5-5.0/NOPB | ACTIVE | SOT-23 | DBV | 5 | 1000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L03A | Samples |
| LP2981AIM5X-3.0/NOPB | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L05A | Samples |
| LP2981AIM5X-3.3 | NRND | SOT-23 | DBV | 5 | 3000 | TBD | Call TI | Call TI | -40 to 125 | L04A | |
| LP2981AIM5X-3.3/NOPB | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L04A | Samples |
| LP2981AIM5X-3.6/NOPB | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L0JA | Samples |
| LP2981AIM5X-5.0 | NRND | SOT-23 | DBV | 5 | 3000 | TBD | Call TI | Call TI | -40 to 125 | L03A | |
| LP2981AIM5X-5.0/NOPB | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L03A | Samples |
| LP2981IM5-2.5 | NRND | SOT-23 | DBV | 5 | 1000 | TBD | Call TI | Call TI | -40 to 125 | L0CB | |
| LP2981IM5-2.5/NOPB | ACTIVE | SOT-23 | DBV | 5 | 1000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L0CB | Samples |
| LP2981IM5-3.0/NOPB | ACTIVE | SOT-23 | DBV | 5 | 1000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L05B | Samples |
| LP2981IM5-3.3 | NRND | SOT-23 | DBV | 5 | 1000 | TBD | Call TI | Call TI | -40 to 125 | L04B | |
| LP2981IM5-3.3/NOPB | ACTIVE | SOT-23 | DBV | 5 | 1000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L04B | Samples |

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish (6) | MSL Peak Temp (3) | Op Temp (°C) | Device Marking (4/5) | Samples |
|---------------------|---------------|--------------|-----------------|------|-------------|-------------------------|-------------------------|----------------------|--------------|-------------------------|-------------------------|
| LP2981IM5-3.6/NOPB | ACTIVE | SOT-23 | DBV | 5 | 1000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L0JB | Samples |
| LP2981IM5-5.0 | NRND | SOT-23 | DBV | 5 | 1000 | TBD | Call TI | Call TI | -40 to 125 | L03B | |
| LP2981IM5-5.0/NOPB | ACTIVE | SOT-23 | DBV | 5 | 1000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L03B | Samples |
| LP2981IM5X-3.0/NOPB | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L05B | Samples |
| LP2981IM5X-3.3 | NRND | SOT-23 | DBV | 5 | 3000 | TBD | Call TI | Call TI | -40 to 125 | L04B | |
| LP2981IM5X-3.3/NOPB | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L04B | Samples |
| LP2981IM5X-3.6/NOPB | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L0JB | Samples |
| LP2981IM5X-5.0 | NRND | SOT-23 | DBV | 5 | 3000 | TBD | Call TI | Call TI | -40 to 125 | L03B | |
| LP2981IM5X-5.0/NOPB | ACTIVE | SOT-23 | DBV | 5 | 3000 | Green (RoHS & no Sb/Br) | CU SN | Level-1-260C-UNLIM | -40 to 125 | L03B | Samples |

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

⁽⁵⁾ Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "-" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

⁽⁶⁾ Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

Important Information and Disclaimer:The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION

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 |
|----------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| LP2981AIM5-2.5 | SOT-23 | DBV | 5 | 1000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981AIM5-2.5/NOPB | SOT-23 | DBV | 5 | 1000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981AIM5-3.0/NOPB | SOT-23 | DBV | 5 | 1000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981AIM5-3.3 | SOT-23 | DBV | 5 | 1000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981AIM5-3.3/NOPB | SOT-23 | DBV | 5 | 1000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981AIM5-3.6 | SOT-23 | DBV | 5 | 1000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981AIM5-3.6/NOPB | SOT-23 | DBV | 5 | 1000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981AIM5-5.0 | SOT-23 | DBV | 5 | 1000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981AIM5-5.0/NOPB | SOT-23 | DBV | 5 | 1000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981AIM5X-3.0/NOPB | SOT-23 | DBV | 5 | 3000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981AIM5X-3.3 | SOT-23 | DBV | 5 | 3000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981AIM5X-3.3/NOPB | SOT-23 | DBV | 5 | 3000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981AIM5X-3.6/NOPB | SOT-23 | DBV | 5 | 3000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981AIM5X-5.0 | SOT-23 | DBV | 5 | 3000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981AIM5X-5.0/NOPB | SOT-23 | DBV | 5 | 3000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981IM5-2.5 | SOT-23 | DBV | 5 | 1000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981IM5-2.5/NOPB | SOT-23 | DBV | 5 | 1000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981IM5-3.0/NOPB | SOT-23 | DBV | 5 | 1000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |

| 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 |
|---------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| LP2981IM5-3.3 | SOT-23 | DBV | 5 | 1000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981IM5-3.6/NOPB | SOT-23 | DBV | 5 | 1000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981IM5-5.0 | SOT-23 | DBV | 5 | 1000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981IM5-5.0/NOPB | SOT-23 | DBV | 5 | 1000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981IM5X-3.0/NOPB | SOT-23 | DBV | 5 | 3000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981IM5X-3.3 | SOT-23 | DBV | 5 | 3000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981IM5X-3.3/NOPB | SOT-23 | DBV | 5 | 3000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981IM5X-3.6/NOPB | SOT-23 | DBV | 5 | 3000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981IM5X-5.0 | SOT-23 | DBV | 5 | 3000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |
| LP2981IM5X-5.0/NOPB | SOT-23 | DBV | 5 | 3000 | 178.0 | 8.4 | 3.2 | 3.2 | 1.4 | 4.0 | 8.0 | Q3 |

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

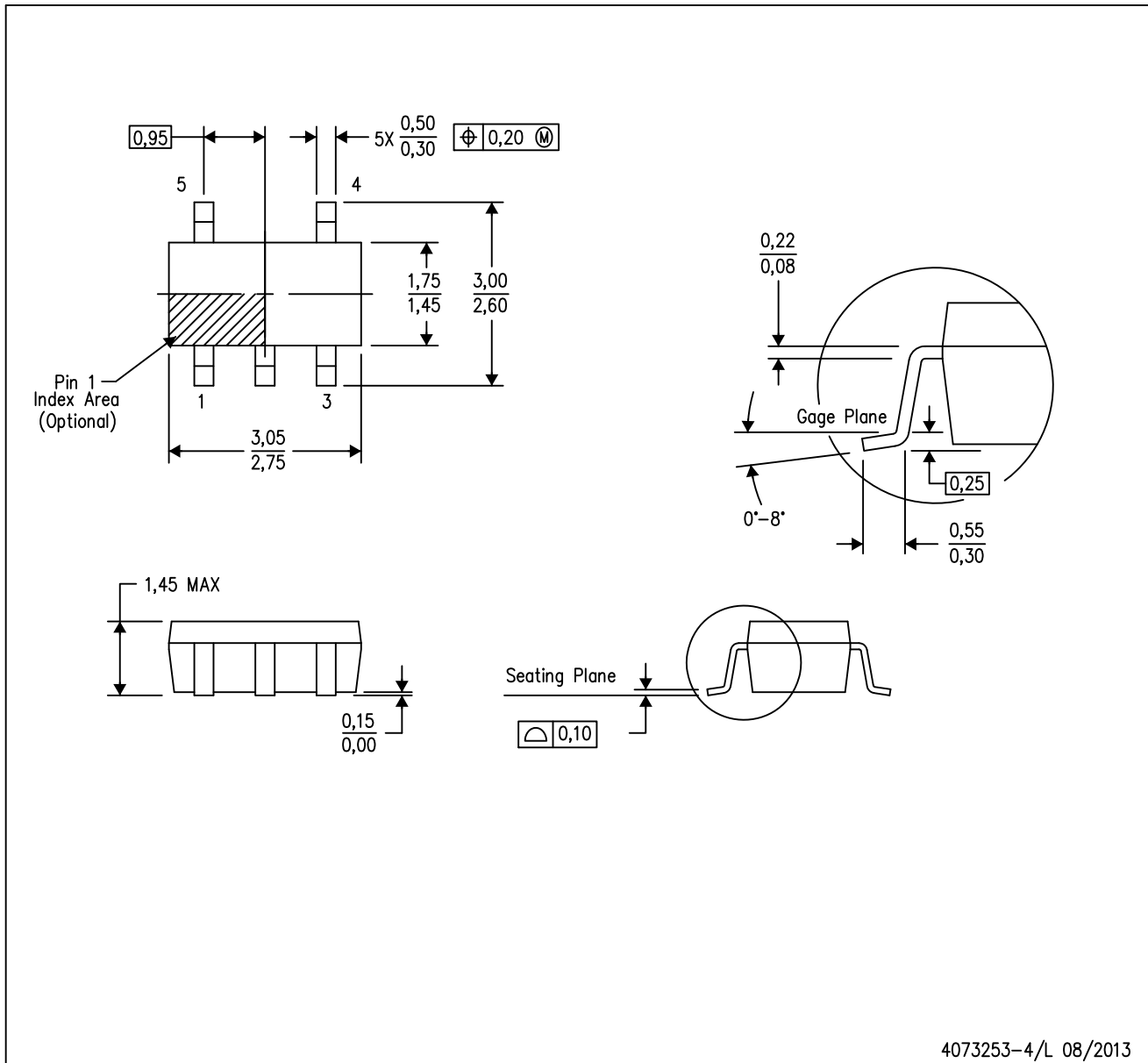
| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|---------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| LP2981AIM5-2.5 | SOT-23 | DBV | 5 | 1000 | 210.0 | 185.0 | 35.0 |
| LP2981AIM5-2.5/NOPB | SOT-23 | DBV | 5 | 1000 | 210.0 | 185.0 | 35.0 |
| LP2981AIM5-3.0/NOPB | SOT-23 | DBV | 5 | 1000 | 210.0 | 185.0 | 35.0 |
| LP2981AIM5-3.3 | SOT-23 | DBV | 5 | 1000 | 210.0 | 185.0 | 35.0 |
| LP2981AIM5-3.3/NOPB | SOT-23 | DBV | 5 | 1000 | 210.0 | 185.0 | 35.0 |
| LP2981AIM5-3.6 | SOT-23 | DBV | 5 | 1000 | 210.0 | 185.0 | 35.0 |
| LP2981AIM5-3.6/NOPB | SOT-23 | DBV | 5 | 1000 | 210.0 | 185.0 | 35.0 |

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|----------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| LP2981AIM5-5.0 | SOT-23 | DBV | 5 | 1000 | 210.0 | 185.0 | 35.0 |
| LP2981AIM5-5.0/NOPB | SOT-23 | DBV | 5 | 1000 | 210.0 | 185.0 | 35.0 |
| LP2981AIM5X-3.0/NOPB | SOT-23 | DBV | 5 | 3000 | 210.0 | 185.0 | 35.0 |
| LP2981AIM5X-3.3 | SOT-23 | DBV | 5 | 3000 | 210.0 | 185.0 | 35.0 |
| LP2981AIM5X-3.3/NOPB | SOT-23 | DBV | 5 | 3000 | 210.0 | 185.0 | 35.0 |
| LP2981AIM5X-3.6/NOPB | SOT-23 | DBV | 5 | 3000 | 210.0 | 185.0 | 35.0 |
| LP2981AIM5X-5.0 | SOT-23 | DBV | 5 | 3000 | 210.0 | 185.0 | 35.0 |
| LP2981AIM5X-5.0/NOPB | SOT-23 | DBV | 5 | 3000 | 210.0 | 185.0 | 35.0 |
| LP2981IM5-2.5 | SOT-23 | DBV | 5 | 1000 | 210.0 | 185.0 | 35.0 |
| LP2981IM5-2.5/NOPB | SOT-23 | DBV | 5 | 1000 | 210.0 | 185.0 | 35.0 |
| LP2981IM5-3.0/NOPB | SOT-23 | DBV | 5 | 1000 | 210.0 | 185.0 | 35.0 |
| LP2981IM5-3.3 | SOT-23 | DBV | 5 | 1000 | 210.0 | 185.0 | 35.0 |
| LP2981IM5-3.6/NOPB | SOT-23 | DBV | 5 | 1000 | 210.0 | 185.0 | 35.0 |
| LP2981IM5-5.0 | SOT-23 | DBV | 5 | 1000 | 210.0 | 185.0 | 35.0 |
| LP2981IM5-5.0/NOPB | SOT-23 | DBV | 5 | 1000 | 210.0 | 185.0 | 35.0 |
| LP2981IM5X-3.0/NOPB | SOT-23 | DBV | 5 | 3000 | 210.0 | 185.0 | 35.0 |
| LP2981IM5X-3.3 | SOT-23 | DBV | 5 | 3000 | 210.0 | 185.0 | 35.0 |
| LP2981IM5X-3.3/NOPB | SOT-23 | DBV | 5 | 3000 | 210.0 | 185.0 | 35.0 |
| LP2981IM5X-3.6/NOPB | SOT-23 | DBV | 5 | 3000 | 210.0 | 185.0 | 35.0 |
| LP2981IM5X-5.0 | SOT-23 | DBV | 5 | 3000 | 210.0 | 185.0 | 35.0 |
| LP2981IM5X-5.0/NOPB | SOT-23 | DBV | 5 | 3000 | 210.0 | 185.0 | 35.0 |

MECHANICAL DATA

DBV (R-PDSO-G5)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
 - D. Falls within JEDEC MO-178 Variation AA.

DBV (R-PDSO-G5)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
 - D. Publication IPC-7351 is recommended for alternate designs.
 - E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products

| | |
|------------------------------|--------------------------------------------------------------------------------------|
| Audio | www.ti.com/audio |
| Amplifiers | amplifier.ti.com |
| Data Converters | dataconverter.ti.com |
| DLP® Products | www.dlp.com |
| DSP | dsp.ti.com |
| Clocks and Timers | www.ti.com/clocks |
| Interface | interface.ti.com |
| Logic | logic.ti.com |
| Power Mgmt | power.ti.com |
| Microcontrollers | microcontroller.ti.com |
| RFID | www.ti-rfid.com |
| OMAP Applications Processors | www.ti.com/omap |
| Wireless Connectivity | www.ti.com/wirelessconnectivity |

Applications

| | |
|-------------------------------|------------------------------------------------------------------------------------------|
| Automotive and Transportation | www.ti.com/automotive |
| Communications and Telecom | www.ti.com/communications |
| Computers and Peripherals | www.ti.com/computers |
| Consumer Electronics | www.ti.com/consumer-apps |
| Energy and Lighting | www.ti.com/energy |
| Industrial | www.ti.com/industrial |
| Medical | www.ti.com/medical |
| Security | www.ti.com/security |
| Space, Avionics and Defense | www.ti.com/space-avionics-defense |
| Video and Imaging | www.ti.com/video |

TI E2E Community

e2e.ti.com