



Linear Voltage Regulator – LM2940-8

Positive Fixed 8V Voltage Regulator in bare die form

Rev 1.1
3/11/17

Description

The LM2940-8 positive voltage regulator features the ability to source 1A of output current with a dropout voltage of typically 0.5V & a maximum of 1V over the entire temperature range. A quiescent current reduction circuit has been included which reduces the ground current when the differential between the input voltage & the output voltage exceeds approximately 3V. The quiescent current with 1A of output current & an input-output differential of 5V is therefore only 30 mA. Higher quiescent currents only exist when the regulator is in the dropout mode ($V_{IN} - V_{OUT} \leq 3V$).

Features:

- Dropout voltage typically 0.5V @ $I_o = 1A$
- Output current in excess of 1A
- Reverse battery protection
- Internal short circuit current limit
- Full Military Temperature Range.

Ordering Information

The following part suffixes apply:

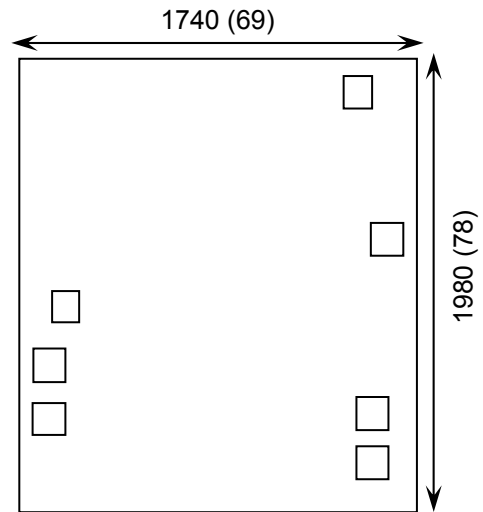
- No suffix - MIL-STD-883 /2010B Visual Inspection
- "H" - MIL-STD-883 /2010B Visual Inspection
+ MIL-PRF-38534 Class H LAT
- "K" - MIL-STD-883 /2010A Visual Inspection (Space)
+ MIL-PRF-38534 Class K LAT

LAT = Lot Acceptance Test.

For further information on LAT process flows see below.

www.siliconsupplies.com/quality/bare-die-lot-qualification

Die Dimensions in μm (mils)



Supply Formats:

- Default – Die in Waffle Pack (100 per tray capacity)
- Sawn Wafer on Tape – By specific request
- Unsawn Wafer – By specific request
- Tape & Reel – By specific request
- TO-3 hermetic package – By specific request

Mechanical Specification

| | | |
|------------------------|--------------------------------------|-----------------------|
| Die Size (Unsawn) | 1740 x 1980 69 x 78 | μm mils |
| Minimum Bond Pad Size | 116 x 134 4.57 x 5.28 | μm mils |
| Die Thickness | 280 (± 10) 11 (± 0.4) | μm mils |
| Top Metal Composition | Al 1%Si 1.1 μm | |
| Back Metal Composition | Ti/Ni/Ag 3 μm | |

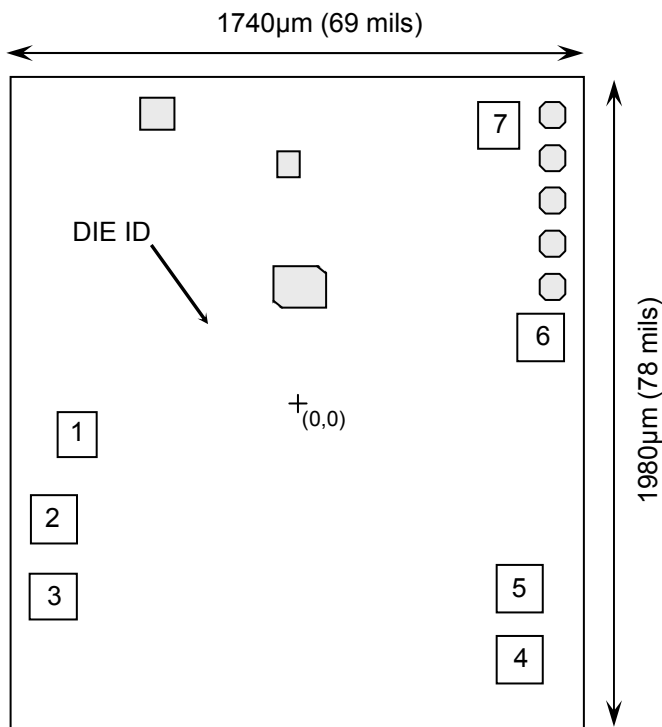




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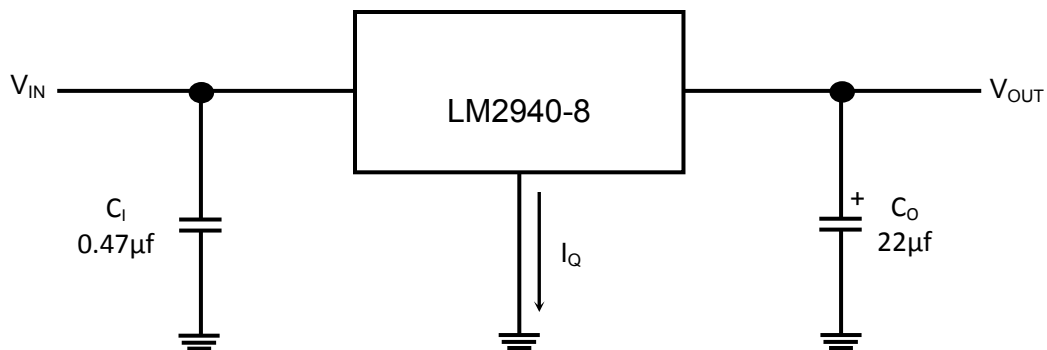
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Pad Layout and Functions



| PAD | FUNCTION | COORDINATES (µm) | |
|--------------------------|----------|------------------|-------|
| | | X | Y |
| 1 | GND | -667 | -94 |
| 2 | VCC | -738.5 | -352 |
| 3 | VCC | -738.5 | -584 |
| 4 | OUT | 675.5 | -776 |
| 5 | OUT | 675.5 | -559 |
| 6 | OUT | 739.5 | 201.5 |
| 7 | GND | 775 | 877 |
| CONNECT CHIP BACK TO GND | | | |

Typical Application





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Absolute Maximum Ratings

| PARAMETER | SYMBOL | VALUE | UNIT |
|------------------------------|-----------|--------------------|------|
| Input Voltage | V_{IN} | 26 | V |
| Power Dissipation | P_D | Internally Limited | |
| Operating Temperature Range | - | -55 to 125 | °C |
| Maximum Junction Temperature | T_J | 150 | °C |
| Storage Temperature | T_{STG} | -65 to 150 | °C |

DC Electrical Characteristics $T_J = 25^\circ\text{C}$, $V_{IN} = V_{OUT} + 5\text{V}$, $I_{OUT} = 1\text{A}$, $C_O = 22\mu\text{F}$ unless otherwise specified

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|--|------------------|--|------|------|------|---------------------|
| Output Voltage | V_{OUT} | $9.4\text{V} \leq V_{IN} \leq 26\text{V}$, $5\text{mA} \leq I_{OUT} \leq 1\text{A}$ | 7.76 | 8.00 | 8.24 | V |
| | | $T_J = 125^\circ\text{C}$ | 7.60 | - | 8.40 | |
| Line Regulation | ΔV_{OUT} | $V_{OUT} + 2\text{V} \leq V_{IN} \leq 26\text{V}$, $I_{OUT} = 5\text{mA}$ | - | 20 | 80 | mV |
| | | $T_J = 125^\circ\text{C}$ | - | - | 80 | |
| Load Regulation | ΔV_{OUT} | $50\text{mA} \leq I_{OUT} \leq 1\text{A}$ | - | 55 | 80 | mV |
| | | $T_J = 125^\circ\text{C}$ | - | - | 130 | |
| Output Impedance | R_{OUT} | 100mA DC and 20mA _{RMS} , $f_O = 120\text{Hz}$ | - | 55 | - | mΩ |
| | | $T_J = 125^\circ\text{C}$ | - | - | 1000 | |
| Quiescent Current | I_Q | $V_{OUT} + 2\text{V} \leq V_{IN} \leq 26\text{V}$, $I_{OUT} = 5\text{mA}$ | - | 10 | 15 | mA |
| | | $T_J = 125^\circ\text{C}$ | - | - | 20 | |
| | | $V_{IN} = V_{OUT} + 5\text{V}$, $I_{OUT} = 1\text{A}$ | - | 30 | 45 | mA |
| | | $T_J = 125^\circ\text{C}$ | - | - | 60 | |
| Output Noise Voltage | e_N | 10Hz-100KHz, $I_{OUT} = 5\text{mA}$ | - | 240 | - | μV_{RMS} |
| | | $T_A = 125^\circ\text{C}$ | - | - | 1000 | |
| Ripple Rejection | RR | $f_O = 120\text{Hz}$, 1V _{RMS} , $I_{OUT} = 100\text{mA}$ | 54 | 66 | - | dB |
| | | $T_J = 125^\circ\text{C}$ | 48 | - | - | |
| Long Term Stability | | | - | 32 | - | mV/1000hr |
| Dropout Voltage | V_D | $I_{OUT} = 1\text{A}$ | - | 0.5 | 0.8 | V |
| | | $T_J = 125^\circ\text{C}$ | - | - | 1.0 | |
| | | $I_{OUT} = 100\text{mA}$ | - | 0.13 | 0.15 | |
| | | $T_J = 125^\circ\text{C}$ | - | - | 0.20 | |
| Short Circuit Current | I_{SC} | Note 1 | - | 2.5 | - | A |
| Maximum Line Transient | T_{IN} | $R_{OUT} = 100\Omega$, $T \leq 100\text{ms}$ | 60 | 75 | - | V |
| | | $T_J = 125^\circ\text{C}$, $R_{OUT} = 100\Omega$, $T \leq 20\text{ms}$ | 40 | - | - | |
| Reverse Polarity DC Input Voltage | V_{RIN} | $R_{OUT} = 100\Omega$, $T_J = 25^\circ\text{C}$ to 125°C | -15 | -30 | - | V |
| Reverse Polarity Transient Input Voltage | V_{TRRI} | $R_{OUT} = 100\Omega$, $T \leq 100\text{ms}$ | -50 | -75 | - | V |
| | | $T_J = 125^\circ\text{C}$, $R_{OUT} = 100\Omega$, $T \leq 20\text{ms}$ | -45 | - | - | |

Notes: 1. Output current will decrease with temperature increase but will not drop below 1A at the maximum specified temperature.





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Typical Performance Characteristics

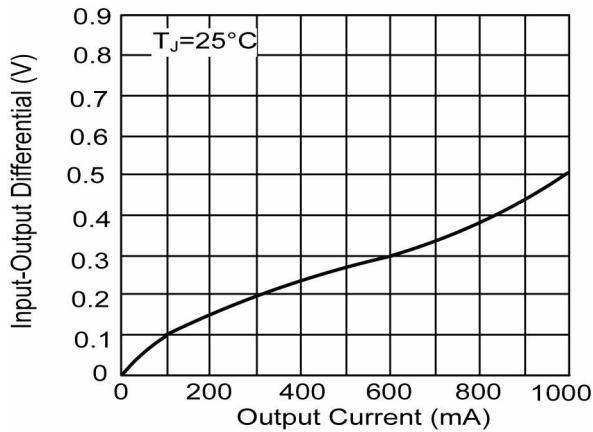


FIGURE 1. Dropout Voltage versus Output Current

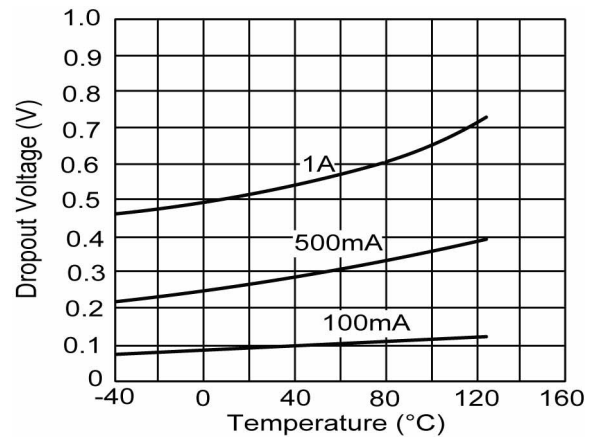


FIGURE 2. Dropout Voltage versus Temperature

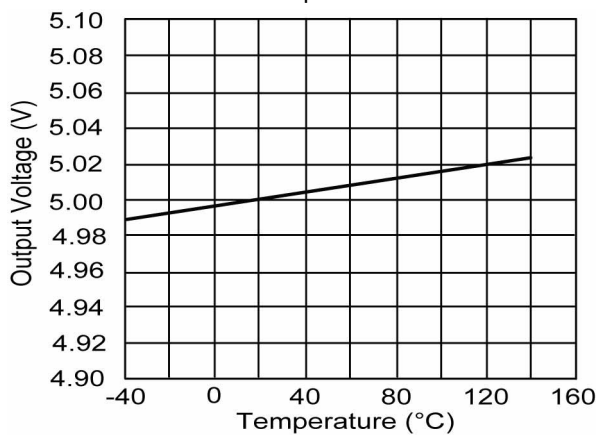


FIGURE 3. Output Voltage versus Temperature

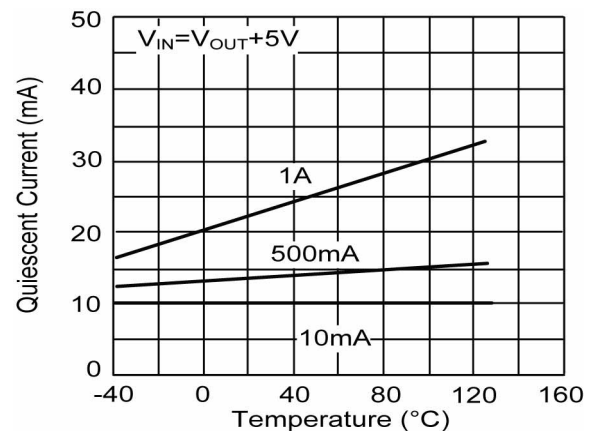


FIGURE 4. Quiescent Current versus Temperature

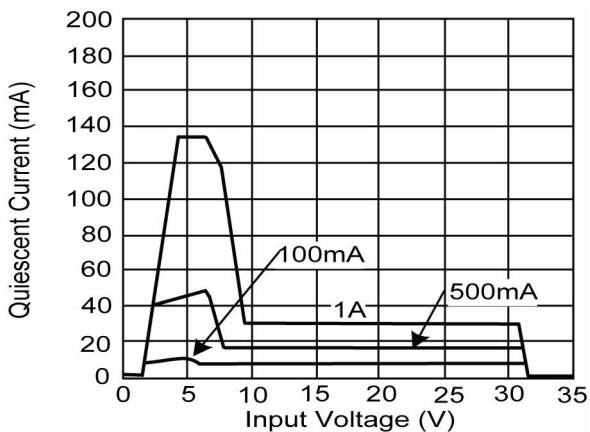


FIGURE 5. Quiescent Current versus Input Voltage

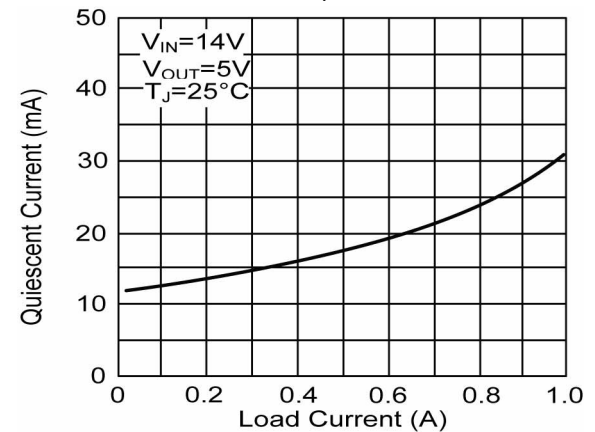


FIGURE 6. Quiescent Current versus Load Current





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Typical Performance Characteristics (Continued)

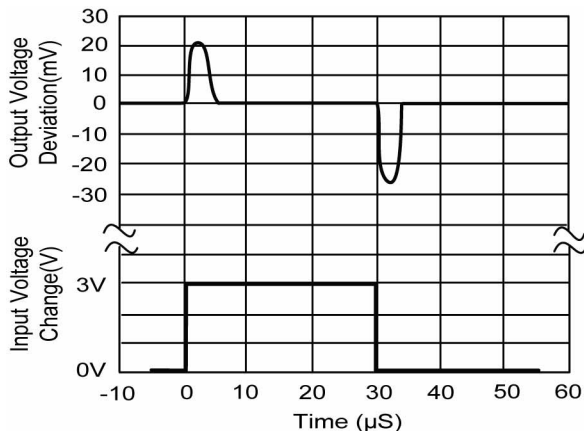


FIGURE 7. Line Transient Response

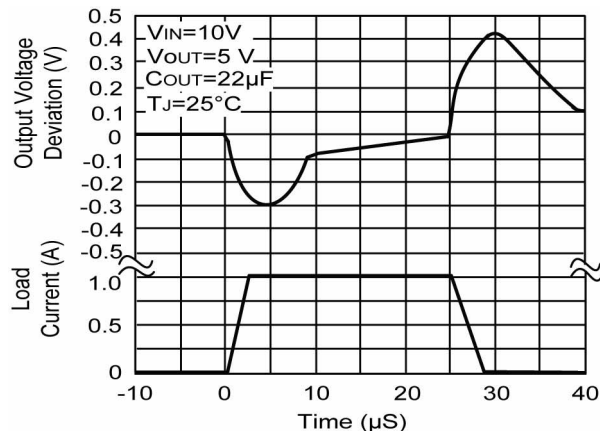


FIGURE 8. Load Transient Response

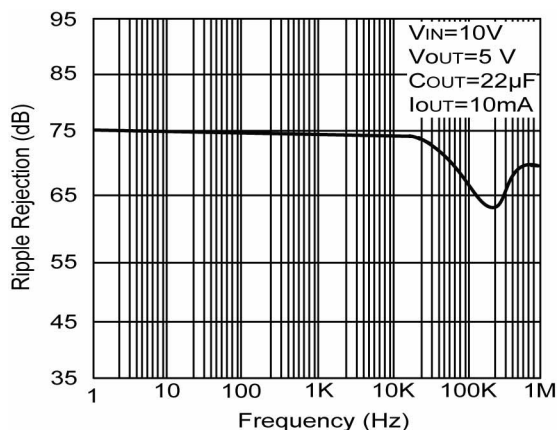


FIGURE 9. Ripple Rejection versus Frequency

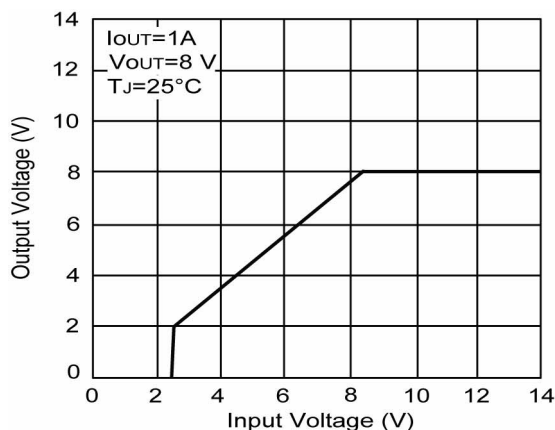


FIGURE 10. Low Voltage Behaviour

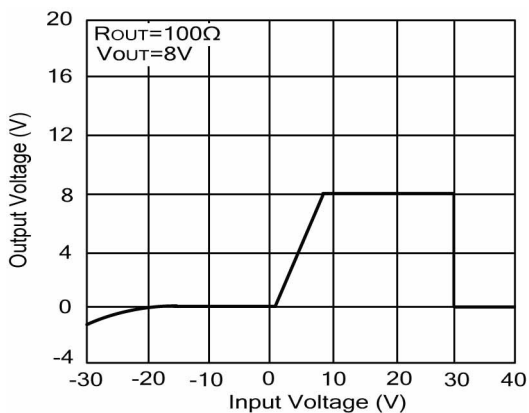


FIGURE 11. Output at Voltage extreme

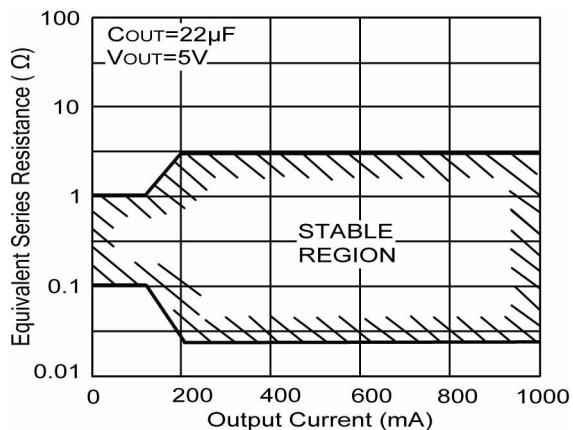


FIGURE 12. Output Capacitor ESR





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Typical Performance Characteristics (Continued)

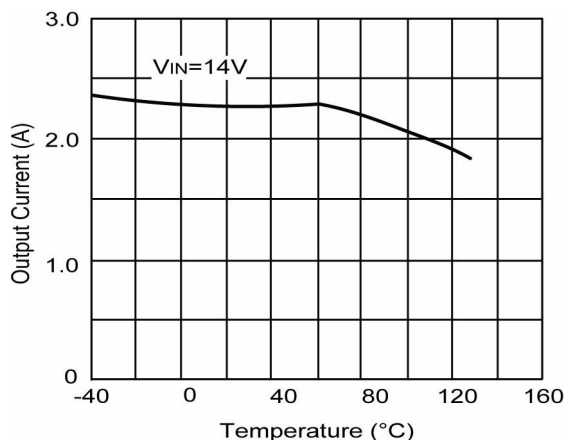


FIGURE 21. Peak Output Current

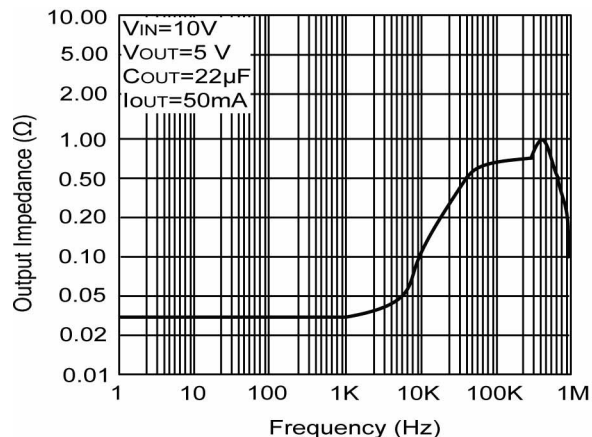


FIGURE 22. Output Impedance

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