



LM2954

LINEAR INTEGRATED CIRCUIT

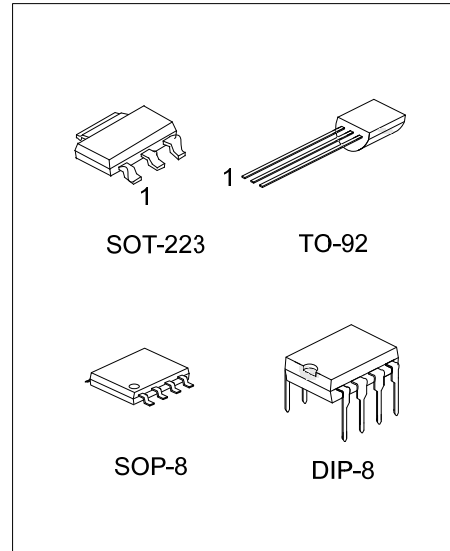
300mA LOW-DROPOUT VOLTAGE REGULATOR

DESCRIPTION

The UTC **LM2954** is a monolithic integrated voltage regulator with low dropout voltage, and low quiescent current. It includes many features that suitable for different applications with TO-92, DIP-8, SOP-8 and SOT-223 packages.

FEATURES

- *High Accuracy Fixed Output.
- *Output Voltage Programmable and Logic Controlled Shutdown And Error Flag Available for DIP and SOP Package.
- *Extremely Low Quiescent Current And Dropout Voltage.
- *Extremely Tight Load And Line Regulation.
- *Current and Thermal Limiting.
- *Very low Temperature Coefficient.



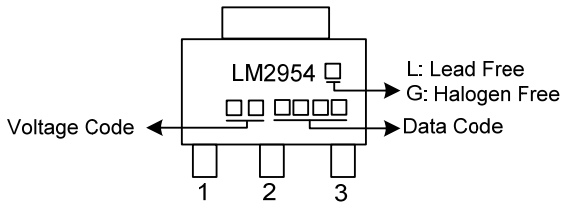
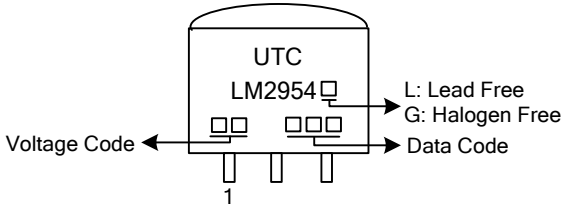
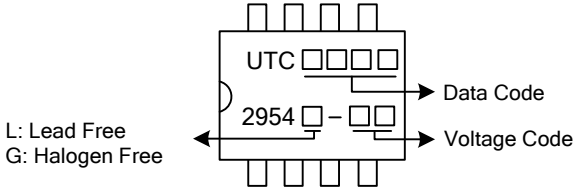
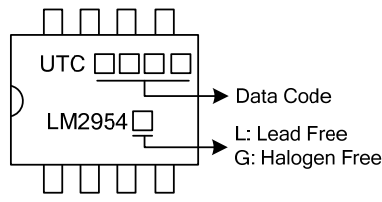
ORDERING INFORMATION

| Ordering Number | | Package | Pin assignment | | | Packing |
|------------------|------------------|---------|-----------------------------|---|---|-----------|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| LM2954L-xx-AA3-R | LM2954G-xx-AA3-R | SOT-223 | I | G | O | Tape Reel |
| LM2954L-xx-D08-T | LM2954G-xx-D08-T | DIP-8 | refer to Pin Configurations | | | Tube |
| LM2954L-xx-S08-R | LM2954G-xx-S08-R | SOP-8 | | | | Tape Reel |
| LM2954L-xx-S08-T | LM2954G-xx-S08-T | SOP-8 | O G I | | | Tube |
| LM2954L-xx-T92-B | LM2954G-xx-T92-B | TO-92 | | | | Tape Box |
| LM2954L-xx-T92-K | LM2954G-xx-T92-K | TO-92 | O | G | I | Bulk |

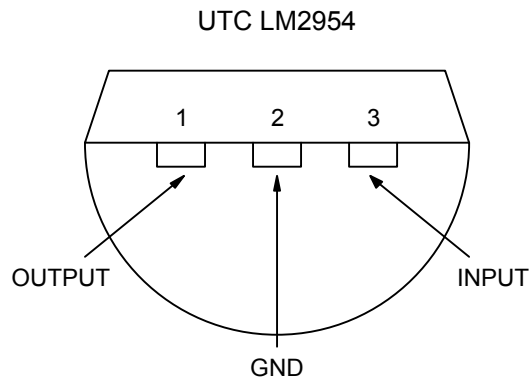
Note: 1. Pin assignment: I: V_{IN} O: V_{OUT} G: GND
2. xx: Output Voltage

| | |
|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>LM2954L-xx-AA3-R</p> <p>(1) Packing Type (2) Package Type (3) Output Voltage Code (4) Lead Free</p> | <p>(1) B: Tape Box, K: Bulk, R: Tape Reel, T: Tube (2) AA3: SOT-223, D08: DIP-08, S08: SOP-8, T92: TO-92 (3) xx: 3.3V:33, 5.0V:50, ADJ:AD (4) G: Halogen Free, L: Lead Free</p> |
|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

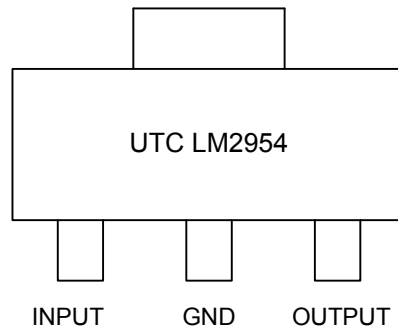
MARKING INFORMATION

| PACKAGE | VOLTAGE CODE | MARKING |
|-------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SOT-223 | 33:3.3V 50:5.0V |  <p>Diagram of SOT-223 package marking: The package is labeled 'LM2954'. On the left side, there are four small squares representing the Voltage Code. On the right side, there are four small squares representing the Data Code. Below the package, pins 1, 2, and 3 are indicated. To the right of the package, the text 'L: Lead Free' and 'G: Halogen Free' is shown.</p> |
| TO-92 | 3.3:3.3V 5.0:5.0V |  <p>Diagram of TO-92 package marking: The package is labeled 'UTC' and 'LM2954'. On the left side, there are four small squares representing the Voltage Code. On the right side, there are four small squares representing the Data Code. Below the package, pin 1 is indicated. To the right of the package, the text 'L: Lead Free' and 'G: Halogen Free' is shown.</p> |
| SOP-8/DIP-8 | 3.3:3.3V 5.0:5.0V |  <p>Diagram of SOP-8/DIP-8 package marking (top): The package is labeled 'UTC' and '2954'. On the top side, there are four small squares representing the Data Code. On the bottom side, there are four small squares representing the Voltage Code. To the left of the package, the text 'L: Lead Free' and 'G: Halogen Free' is shown.</p> |
| | ADJ |  <p>Diagram of SOP-8/DIP-8 package marking (bottom): The package is labeled 'UTC' and 'LM2954'. On the top side, there are four small squares representing the Data Code. On the bottom side, there are four small squares representing the Voltage Code. To the right of the package, the text 'L: Lead Free' and 'G: Halogen Free' is shown.</p> |

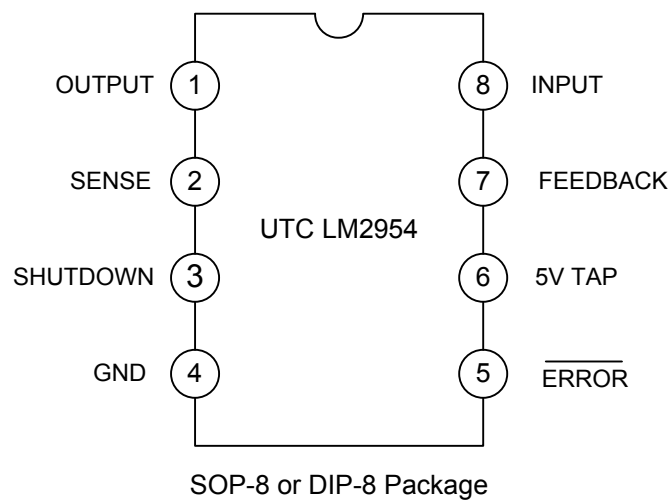
■ PIN CONFIGURATIONS



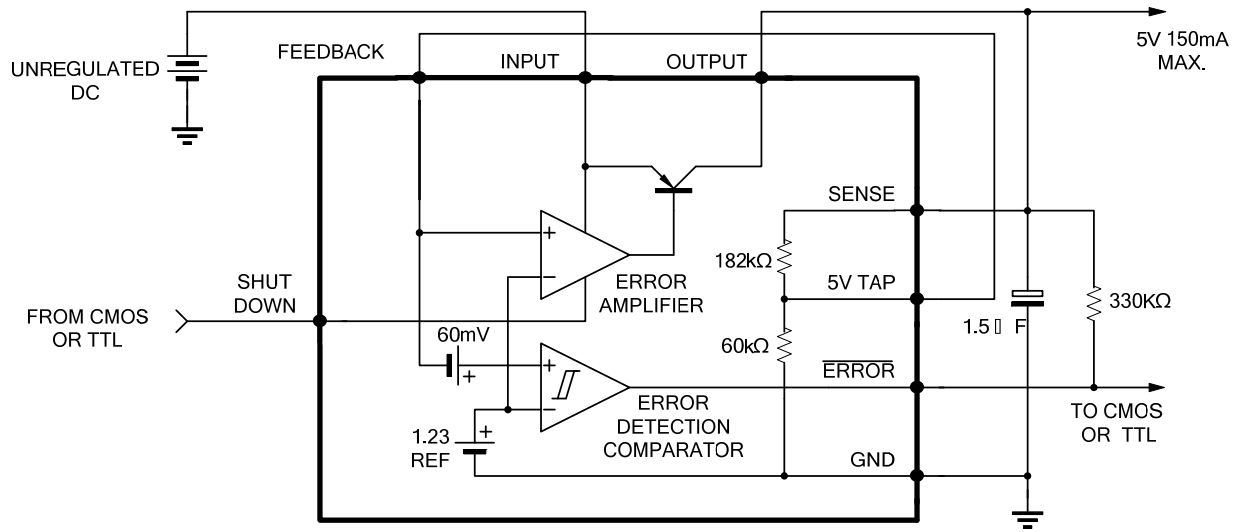
TO-92 Plastic Package Bottom View



SOT-223 Package



■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | VALUE | UNIT |
|---------------------------|------------|------------|------|
| Supply Voltage | V_{CC} | -0.3 ~ +30 | V |
| Feedback Voltage | V_{FB} | -1.5 ~ +30 | V |
| Shutdown Voltage | V_{SHDN} | -0.3 ~ +30 | V |
| Comparator Output Voltage | V_{OUT} | -0.3 ~ +30 | V |
| Junction Temperature | T_J | +125 | °C |
| Operating Temperature | T_{OPR} | -40 ~ +85 | °C |
| Storage temperature | T_{STG} | -40 ~ +150 | °C |

Note: 1. Absolute maximum ratings are those values beyond which the device which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. The device is guaranteed to meet performance specification within 0°C~+70°C operating temperature range and assured by design from -20°C~+85°C, characteristic and correlation with static process control.

■ ELECTRICAL CHARACTERISTICS ($T_J=25^\circ\text{C}$, $V_{IN}=6\text{V}$, $I_L=100\mu\text{A}$, $C_L=1\mu\text{F}$, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-----------------------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|------|---------------|
| Output Voltage | V_{OUT} | $T_J=25^\circ\text{C}$ | 3.23 | 3.3 | 3.37 | V |
| | | | 4.90 | 5.0 | 5.10 | |
| Output Voltage Temperature Coefficient | $T_C V_O$ | | 20 | | 100 | ppm/°C |
| Line Regulation | ΔV_{OUT} | $6\text{V} \leq V_{IN} \leq 30\text{V}$ | | 0.1 | 0.2 | % |
| Load Regulation | ΔV_{OUT} | $100\mu\text{A} \leq I_L \leq 300\text{mA}$ | | 0.2 | 0.5 | |
| Dropout Voltage | V_D | $I_L=100\text{mA}$ | | | 400 | mV |
| | | $I_L=200\text{mA}$ (note 2) | 380 | 450 | 600 | |
| Ground Current | I_{GND} | $I_L=100\mu\text{A}$ | 0.075 | 0.12 | 0.23 | mA |
| | | $I_L=200\text{mA}$ | 8 | 12 | 14 | |
| Dropout Ground Current | I_D | $V_{IN}=4.5\text{V}, I_L=100\mu\text{A}$ | | | 230 | μA |
| Current Limit | I_{LIMIT} | $V_{OUT}=0$ | 300 | | | mA |
| Output Noise (10Hz to 100KHz) | e_N | $C_L=1\mu\text{F}$ | | | 430 | μV |
| | | $C_L=200\mu\text{F}$ | | | 160 | |
| | | $C_L=3.3\mu\text{F}$ | | | 100 | |
| LM2954-ADJ FOR 8-PIN VERSION ONLY | | | | | | |
| Reference Voltage | V_{REF} | | 1.22 | 1.235 | 1.25 | V |
| Reference Voltage | V_{REF} | $V_{REF} \leq V_{OUT} \leq (V_{IN}-1\text{V})$, $2.3\text{V} \leq V_{IN} \leq 18\text{V}$, $100\mu\text{A} \leq I_L \leq 100\text{mA}$, $T_J \leq T_{JMAX}$ | 1.19 | | 1.27 | V |
| Feedback Pin Bias Current | $I_{B(FB)}$ | | | 20 | 40 | nA |
| Reference Voltage Temperature Coefficient | $T_C V_{REF}$ | | | 50 | | ppm/°C |
| Feedback Bias Current Temperature Coefficient | $T_{C I_O}$ | | | 0.1 | | nA/°C |

■ ELECTRICAL CHARACTERISTICS(Cont.)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-----------------------------------|----------------|-----------------------------------------------------------------------------------|------|------|------|-------------|
| ERROR COMPARATOR | | | | | | |
| Output Leakage Current | $I_{O(LEAK)}$ | $V_{OH}=30V$ | | | 1 | μA |
| Output Low Voltage | V_{OL} | $V_{IN}=4.5V, I_{OL}=400\mu A$ | | | 250 | mV |
| Upper Threshold Voltage | $V_{THD(UP)}$ | (Note 3) | 3.2 | | | $\%V_{OUT}$ |
| Lower Threshold Voltage | $V_{THD(LOW)}$ | (Note 3) | | | 7.6 | $\%V_{OUT}$ |
| Hysteresis | V_{HYS} | (Note 3) | | 15 | | mV |
| SHUTDOWN INPUT | | | | | | |
| Input Logic Voltage | $V_{I(LOG)}$ | Low (Regulator ON) | | 1.3 | 0.70 | V |
| | | High (Regulator OFF) | 2.0 | | | |
| Shutdown Pin Input Current | $I_{I(SHDN)}$ | $V_{SHDN}=2.4V$ | | 30 | 50 | μA |
| | | $V_{SHDN}=30V$ | | 450 | 600 | μA |
| Regulator Output Current Shutdown | $I_{O(SHDN)}$ | $V_{SHDN} \cong 2V, V_{IN} \cong 30V, V_{OUT}=0,$ Feedback pin tied to 5V Tap. | | 3 | 10 | μA |

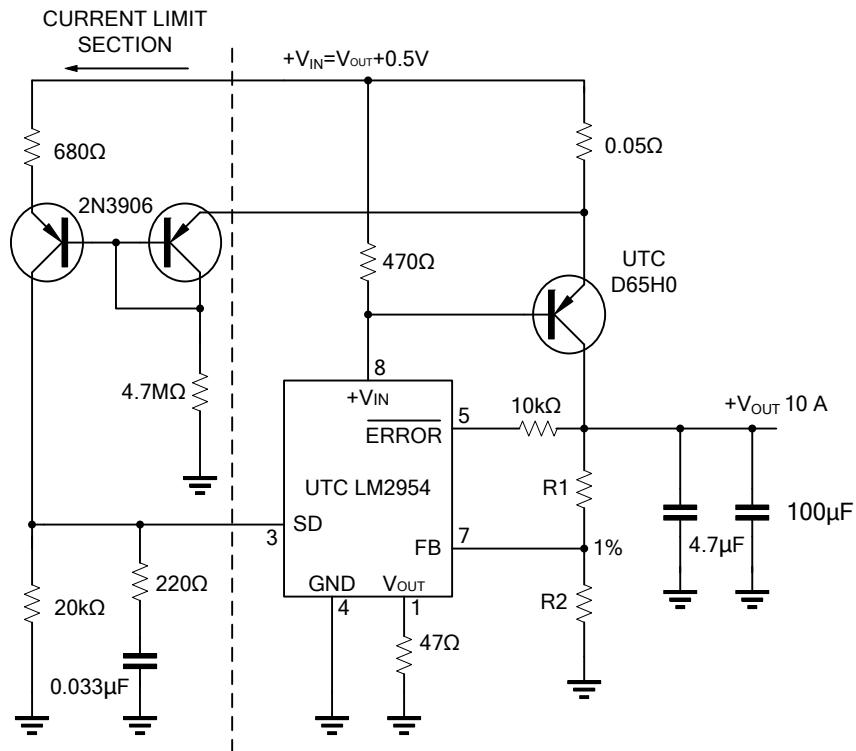
Note 1: Additional conditions for 8-pin versions are feedback tied to 5V Tap an Output tied to Output Sense ($V_{OUT}=5V$) and $V_{SHDN} \cong 0.8V$.

Note 2: Dropout voltage is defined as the input to output differential at which the output voltage drops 100mV below its nominal value measured at 1V differential.

Note 3: Comparator thresholds are expressed in terms of percentage value of voltage output.

■ APPLICATION CIRCUIT (10A Low Dropout Regulator)

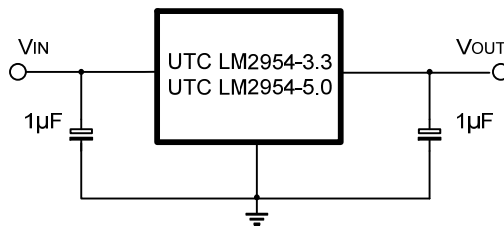
For 8 Pins



$$V_{OUT} = 1.23V * (1 + R1/R2)$$

For 5V output use internal resistors. Wire pin 6 to 7 and wire pin 2 to +V_{OUT}

For 3 Pins



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