

# UNISONIC TECHNOLOGIES CO., LTD

# LP2950/2951

# LINEAR INTEGRATED CIRCUIT

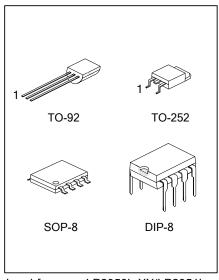
# 100 mA LOW-DROPOUT VOLTAGE REGULATOR

#### ■ DESCRIPTION

The UTC **LP2950/2951** are monolithic integrated voltage regulators with low dropout voltage, and low quiescent current. It includes many features that suitable for different applications.

#### ■ FEATURES

- \* Fixed output versions, 2.5V, 3V, 3.3V, 3.6V and 5V, are available.
- \* High accuracy output voltage.
- \* Extremely low guiescent current and dropout voltage.
- \* Extremely tight load and line regulation.
- \* Current and thermal limiting.
- \* Very low temperature coefficient.
- \* Logic controlled shutdown and err flog available for 8 pin package.
- \* Output voltage programmable for LP2951.

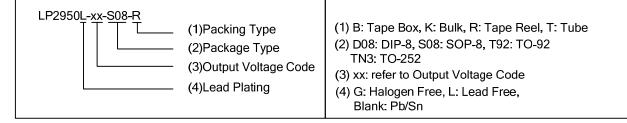


Lead-free: LP2950L-XX/LP2951L Halogen-free: LP2950G-XX/LP2951G

#### ORDERING INFORMATION

|                 | Dookaga          | Dooking          |         |           |  |
|-----------------|------------------|------------------|---------|-----------|--|
| Normal          | Lead Free        | Halogen Free     | Package | Packing   |  |
| LP2950-xx-D08-T | LP2950L-xx-D08-T | LP2950G-xx-D08-T | DIP-8   | Tube      |  |
| LP2950-xx-S08-T | LP2950L-xx-S08-T | LP2950G-xx-S08-T | SOP-8   | Tube      |  |
| LP2950-xx-S08-R | LP2950L-xx-S08-R | LP2950G-xx-S08-R | SOP-8   | Tape Reel |  |
| LP2950-xx-T92-B | LP2950L-xx-T92-B | LP2950G-xx-T92-B | TO-92   | Tape Box  |  |
| LP2950-xx-T92-K | LP2950L-xx-T92-K | LP2950G-xx-T92-K | TO-92   | Bulk      |  |
| LP2950-xx-TN3-T | LP2950L-xx-TN3-T | LP2950G-xx-TN3-T | TO-252  | Tube      |  |
| LP2950-xx-TN3-R | LP2950L-xx-TN3-R | LP2950G-xx-TN3-R | TO-252  | Tape Reel |  |
| LP2951-D08-T    | LP2951L-D08-T    | LP2951G-D08-T    | DIP-8   | Tube      |  |
| LP2951-S08-T    | LP2951L-S08-T    | LP2951G-S08-T    | SOP-8   | Tube      |  |
| LP2951-S08-R    | LP2951L-S08-R    | LP2951G-S08-R    | SOP-8   | Tape Reel |  |

Note: Pin Assignment: I:VIN O:VOUT G:GND

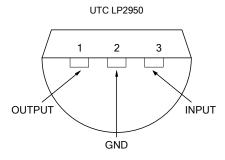


#### ■ OUTPUT VOLTAGE CODE(For LP2950)

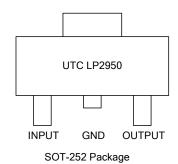
| OUTPUT VOLTAGE | CODE |
|----------------|------|
| 2.5V           | 25   |
| 3.0V           | 30   |
| 3.3V           | 33   |
| 3.6V           | 36   |
| 5.0V           | 50   |

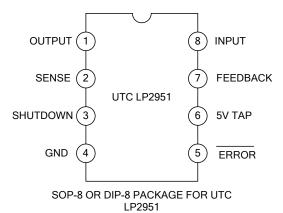
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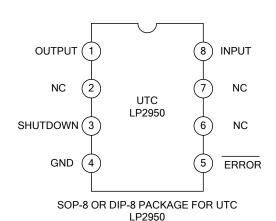
#### ■ PIN CONFIGURATIONS



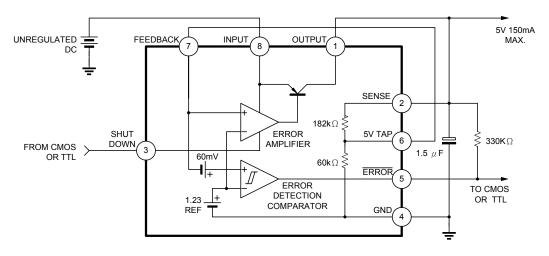
TO-92 Plastic Package Bottom View







#### BLOCK DIAGRAM



FOR UTC LP2951

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                      | SYMBOL           | RATINGS            | UNIT |
|--------------------------------|------------------|--------------------|------|
| Supply Voltage                 | Vcc              | -0.3 ~ +30         | V    |
| Feedback Voltage               | $V_{FB}$         | -1.5 ~ +30         | V    |
| Shutdown Voltage               | $V_{SHDN}$       | -0.3 ~ +30         | V    |
| Power Dissipation              | P <sub>D</sub>   | Internally Limited | W    |
| Operation Junction Temperature | TJ               | -40 ~ +125         | °C   |
| Storage Temperature            | T <sub>STG</sub> | -65 ~ +150         | °C   |

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

### ■ THERMAL DATA

| PARAMETER           |        | SYMBOL                    | RATING | UNIT |  |
|---------------------|--------|---------------------------|--------|------|--|
|                     | TO-92  | 252<br>-8 θ <sub>JA</sub> | 160    | ,    |  |
| lunation to Ambient | TO-252 |                           | 92     | °C/W |  |
| Junction-to-Ambient | SOP-8  |                           | 180    |      |  |
|                     | DIP-8  |                           | 105    |      |  |
|                     | TO-92  |                           | 83     | °C/W |  |
| Junction-to-Case    | TO-252 | $\theta_{JC}$             | 6      |      |  |
|                     | SOP-8  |                           | 45     |      |  |

### ■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, V<sub>IN</sub>=6V, I<sub>L</sub>=100μA, C<sub>L</sub>=1μF, unless otherwise specified.)

### For All Version:

| PARAMETER                              | SYMBOL             | TEST CONDITION                                    | MIN                    | TYP       | MAX                    | UNIT   |
|--|--------------------|---|------------------------|-----------|------------------------|--------|
| Output Voltage                         | V <sub>OUT</sub>   | T <sub>J</sub> =25°C (Note 1)                     | V <sub>OUT</sub> ×0.98 | $V_{OUT}$ | V <sub>OUT</sub> ×1.02 | V      |
|  |                    | -25°C≦TJ≦+85°C(Note 1)                            | V <sub>OUT</sub> ×0.98 | $V_{OUT}$ | V <sub>OUT</sub> ×1.02 | V      |
| Output Voltage                         | V <sub>OUT</sub>   | $100\mu A \le I_L \le 100mA$ , $T_J \le T_J(max)$ | V <sub>OUT</sub> ×0.98 | $V_{OUT}$ | V <sub>OUT</sub> ×1.02 | V      |
| Output Voltage Temperature Coefficient | TcVo               |   | 20                     |           | 100                    | ppm/°C |
| Line Regulation                        | $\Delta V_{OUT}$   | 6V≦V <sub>IN</sub> ≦30V                           | 0.03                   | 0.1       | 0.2                    | %      |
| Load Regulation                        | $\Delta V_{OUT}$   | $100\mu A \le I_L \le 100 \text{ mA}$             | 0.04                   | 0.1       | 0.2                    | %      |
| Dropout Voltago                        | V <sub>D</sub>     | I <sub>L</sub> =100μA                             | 50                     | 80        | 150                    | mV     |
| Dropout Voltage                        |                    | I <sub>L</sub> =100mA (Note 2)                    | 380                    | 450       | 600                    |        |
| Ground Current                         | I <sub>G</sub>     | I <sub>L</sub> =100μA                             | 75                     | 120       | 140                    | μА     |
|  |                    | I <sub>L</sub> =100mA                             | 8                      | 12        | 14                     | mA     |
| Dropout Ground Current                 |                    | V <sub>IN</sub> =4.5V,I <sub>L</sub> =100μA       | 110                    | 170       | 200                    | μΑ     |
| Current Limit                          | I <sub>LIMIT</sub> | V <sub>OUT</sub> =0                               | 160                    | 200       | 220                    | mA     |
| Output Noise (10Hz ~ 100KHz)           |                    | C <sub>L</sub> =1μF                               |                        |           | 430                    |        |
| (Bypass=0.01μF pins 7 to 1             | eN                 | C <sub>L</sub> =200μF                             |                        |           | 160                    | μV     |
| (LP2951))                              |                    | C <sub>L</sub> =3.3μF                             |                        |           | 100                    |        |

## ■ ELECTRICAL CHARACTERISTICS(Cont.)

### For UTC LP2951 8-Pin Version Only

| PARAMETER  |       | SYMBOL               | TEST CONDITION   | MIN  | TYP   | MAX  | UNIT   |
|--|-------|----------------------|--|------|-------|------|--------|
| Reference Voltage                                |       | $V_{REF}$            |  | 1.22 | 1.235 | 1.25 | V      |
| Reference Voltage                                |       | $V_{REF}$            | Over temperature(Note 4)   | 1.19 |       | 1.27 | V      |
| Feedback pin Bias Curre                          | ent   | I <sub>FB</sub>      |  |      | 20    | 40   | nA     |
| Reference Voltage Temperature<br>Coefficient     |       | V <sub>REF(TC)</sub> |  |      | 50    |      | ppm/°C |
| Feedback Bias Current<br>Temperature Coefficient |       | I <sub>FB(TC)</sub>  |  |      | 0.1   |      | nA/°C  |
| Error Comparator                                 |       |                      |  |      |       |      |        |
| Output Leakage Current                           | t     | I <sub>O(LEAK)</sub> | V <sub>OH</sub> =30V   |      |       | 1    | μА     |
| Output Low Voltage                               |       | $V_{OL}$             | V <sub>IN</sub> =4.5V, I <sub>OL</sub> =400μA  |      |       | 250  | mV     |
| Threshold Voltage                                | Upper | $V_{THU}$            | (Note 3)   | 3.2  |       |      | %VO    |
| Threshold Voltage                                | Lower | $V_{THL}$            | (Note 3)   |      |       | 7.6  | %VO    |
| Hysteresis                                       |       | $V_{HYS}$            | (Note 3)   |      | 15    |      | mV     |
| Shutdown Input                                   |       |                      |  |      |       |      |        |
| Input Logio Voltago                              | Low   | $V_{IL}$             | Regulator ON   |      | 1.3   | 0.70 | V      |
| Input Logic Voltage                              | High  | $V_{IH}$             | Regulator OFF  | 2.0  |       |      | v      |
| Shutdown Pin Input Current                       |       | 1                    | V <sub>SHDN</sub> =2.4V  |      | 30    | 50   | μА     |
|  |       | I <sub>SHDN</sub>    | V <sub>SHDN</sub> =30V   |      | 450   | 600  | μА     |
| Regulator Output Current<br>Shutdown             |       | I <sub>DFF</sub>     | V <sub>SHDN</sub> ≥2V, V <sub>IN</sub> ≤30V, V <sub>OUT</sub> =0<br>Feedback pin tied to 5V Tap. |      | 3     | 10   | μА     |

Note: 1. Additional conditions for 8-pin versions are FB pin tied to  $5V_{TAP}$ , Output tied to Sense ( $V_{OUT}$ =5V) and  $V_{SHDN} \le 0.8V$ .

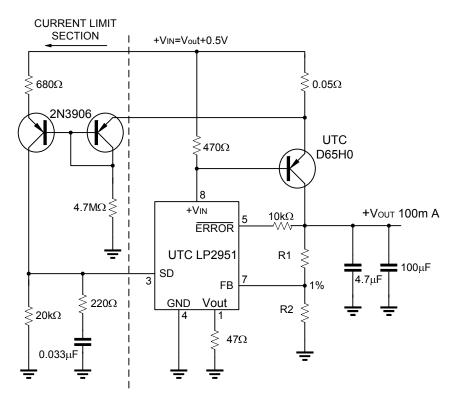
<sup>2.</sup> Dropout Voltage is defined as the input to output differential at which the output voltage drops 100mV below its nominal value measured at 1V differential.

<sup>3.</sup> Comparator thresholds are expressed in terms of percentage value of voltage output.

 $<sup>4.\,</sup>V_{REF} \!\! \leq \!\! V_{OUT} \!\! \leq \!\! (V_{IN}\!\! - \!\! 1V),\, 2.3V \!\! \leq \!\! V_{IN} \!\! \leq \!\! 30V,\, 100 \mu A \!\! \leq \!\! I_L \!\! \leq \!\! 100 mA,\, T_J \!\! \leq \!\! T_{J(MAX)}$ 

### TYPICAL APPLICATION CIRCUIT

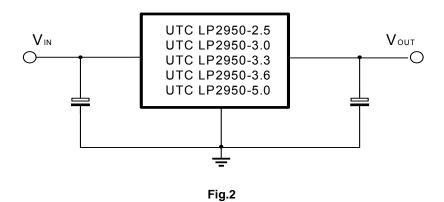
# 10 Ampere Low Dropout Regulator



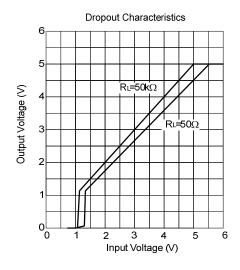
Vout=1.23V\*(1+R1/R2)

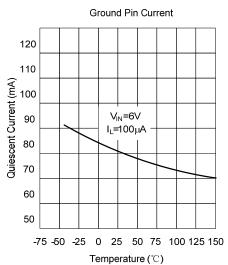
For 5V output use internal resistors. Wire pin 6 to 7 and wire pin 2 to +Vout

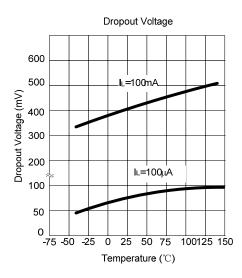
Fig.1

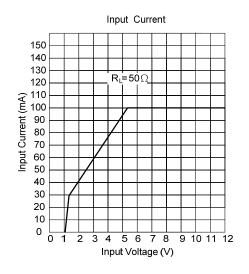


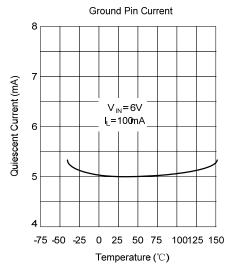
### ■ TYPICAL CHARACTERISTICS

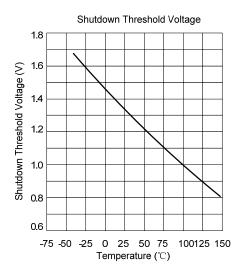




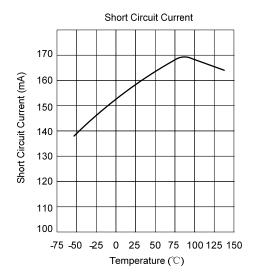


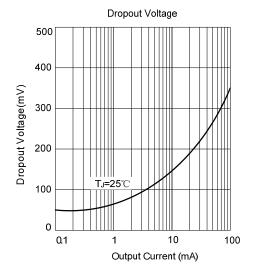






■ TYPICAL CHARACTERISTICS(Cont.)





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