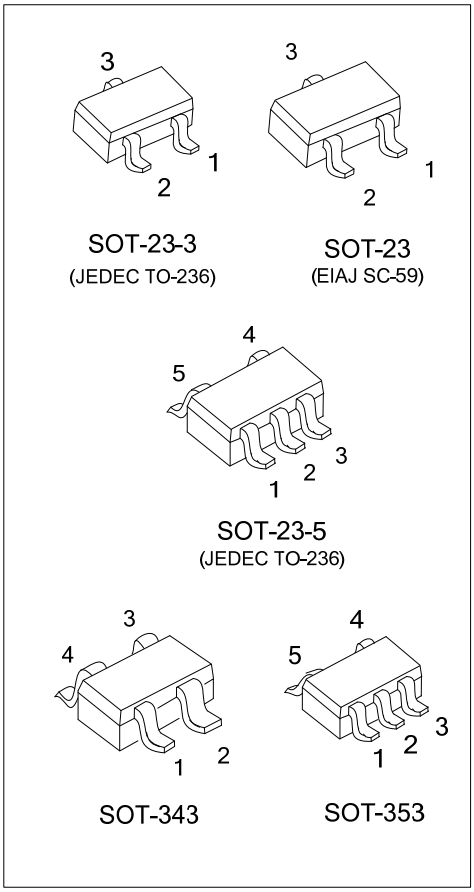
# LR9101

**CMOS IC**

## LOW NOISE 300mA LDO REGULATOR




## ■ DESCRIPTION

The UTC **LR9101** is a typical LDO (linear regulator) with the features of high output voltage accuracy, low supply current, low ON-resistance, and high ripple rejection.

During operation of the UTC **LR9101**, the dropout voltage is very low and the response of line transient and load transient are very well.

Internally, there're many functions of UTC **LR9101** which can be seen in the block figure. There are a voltage reference unit, an error amplifier, resistor-net for voltage setting, a current limit circuit, and a chip enable circuit in each UTC **LR9101**.

The UTC **LR9101** can be used as an ideal of the power supply for hand-held communication equipment, such as: power source for portable communication equipment, power source for electrical appliances, for example, cameras, VCRs and camcorders and power source for battery-powered equipment.

## ■ FEATURES

* Supply Current: 50μA (Typ.)
* Standby Mode: 0.1μA (Typ.)
* Ripple Rejection: 70dB (Typ.) @f=1kHz,$V_{OUT}$=2.5V
* Well Line Regulation: 0.02%/ V (Typ.)
* $C_{IN}$=$C_{OUT}$=1μF or more (Ceramic capacitors) are recommended to be used with this IC

## ■ ORDERING INFORMATION

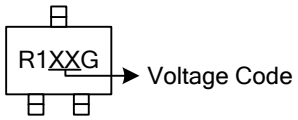
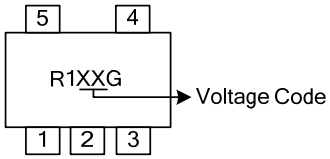
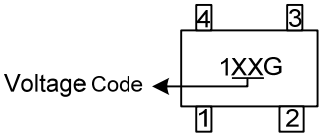
| Ordering Number | Package | Packing |
|---|---|---|
| LR9101G-xx-AE2-R | SOT-23-3 | Tape Reel |
| LR9101G-xx-AE3-R | SOT-23 | Tape Reel |
| LR9101G-xx-AE5-R | SOT-23-5 | Tape Reel |
| LR9101G-xx-AL4-R | SOT-343 | Tape Reel |
| LR9101G-xx-AL5-R | SOT-353 | Tape Reel |

Note: xx: Output Voltage, refer to Marking Information.

LR9101G-xx-AE5-R
(1)Packing Type
(2)Package Type
(3)Output Voltage Code
(4)Green Package

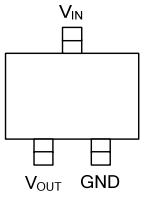
(1) R: Tape Reel
(2) AE3: SOT-23, AE2: SOT-23-3, AE5: SOT-23-5, AL4: SOT-343, AL5: SOT-353
(3) xx: refer to Marking Information
(4) G: Halogen Free and Lead Free

## ■ MARKING INFORMATION

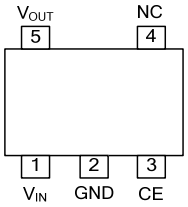
| PACKAGE | VOLTAGE CODE | MARKING |
|---|---|---|
| SOT-23<br>SOT-23-3 | 12: 1.2V<br>18: 1.8V<br>25: 2.5V<br>27: 2.7V<br>28: 2.8V<br>30: 3.0V<br>33: 3.3V |  |
| SOT-23-5<br>SOT-353 | |  |
| SOT-343 | |  |

## ■ PIN CONFIGURATION

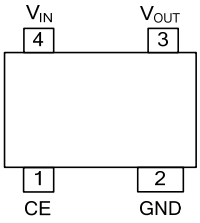
SOT-23/SOT-23-3




SOT-23-5/SOT-353




SOT-343

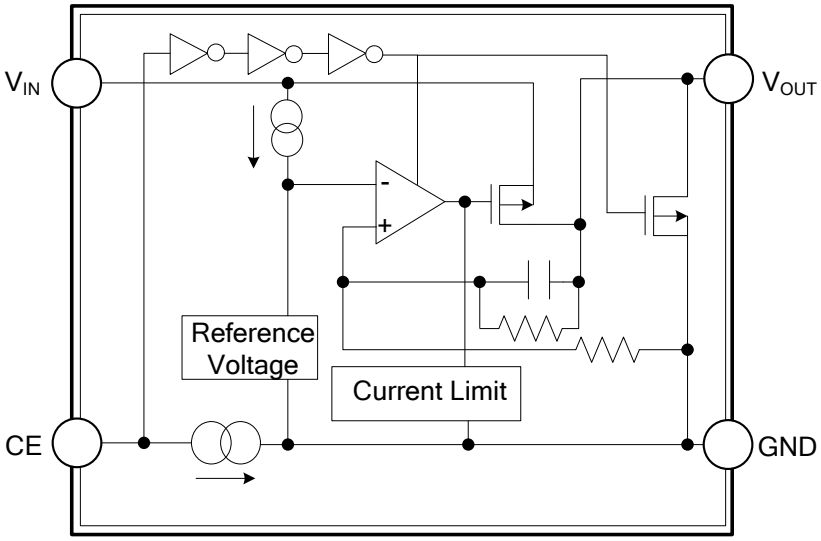



## ■ PIN DESCRIPTION

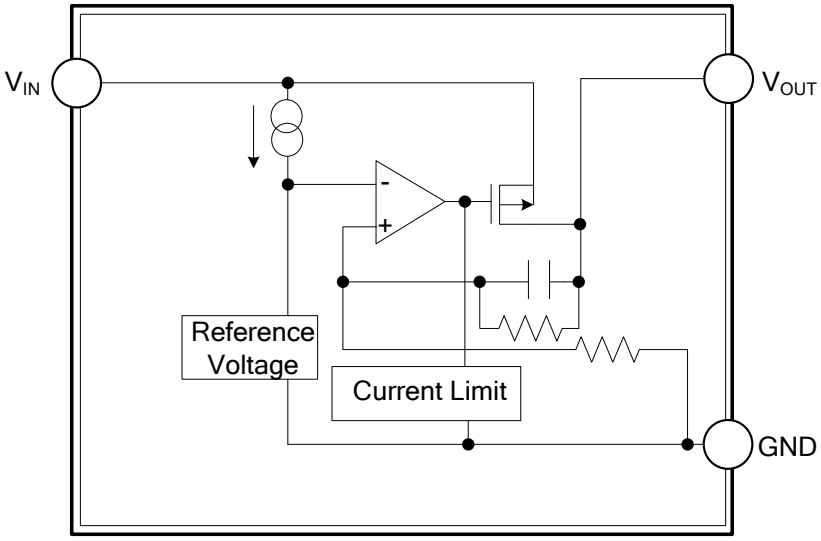
| PIN NO. | | | PIN NAME | DESCRIPTION |
|---|---|---|---|---|
| SOT-23<br>SOT-23-3 | SOT-23-5<br>SOT-353 | SOT-343 | | |
| 3 | 1 | 4 | $V_{IN}$ | Input Pin |
| 1 | 2 | 2 | GND | Ground Pin |
| - | 3 | 1 | CE | Chip Enable Pin. Active when this Pin is high. |
| - | 4 | - | NC | No Connection |
| 2 | 5 | 3 | $V_{OUT}$ | Output Pin |

## ■ BLOCK DIAGRAM

For SOT-23-5/SOT-343/SOT-353 Package




For SOT-23 Package



## ■ ABSOLUTE MAXIMUM RATING

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Input Voltage | | $V_{IN}$ | 6 | V |
| Input Voltage (CE Pin) | | $V_{CE}$ | 6 | V |
| Output Voltage | | $V_{OUT}$ | -0.3~ $V_{IN}$+0.3 | V |
| Output Current | | $I_{OUT}$ | 400 | mA |
| Power Dissipation | SOT-23/SOT-23-3 | $P_D$ | 280 | mW |
| | SOT-23-5 | | 300 | mW |
| | SOT-343 | | 250 | mW |
| | SOT-353 | | 260 | mW |
| Junction Temperature | | $T_J$ | +125 | °C |
| Operating Temperature | | $T_{OPR}$ | -40~+85 | °C |
| Storage Temperature | | $T_{STG}$ | -55~+125 | °C |

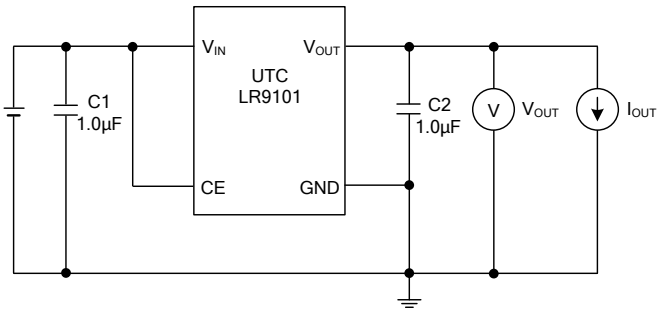
Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

## ■ ELECTRICAL CHARACTERISTICS

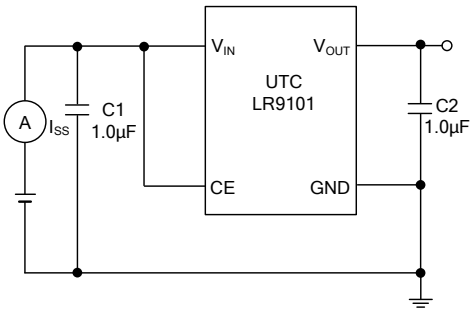
($T_A$=25°C, $V_{IN}$=Set $V_{OUT}$+1V, $I_{OUT}$=1mA, $C_I$ =$C_O$=1μF, unless otherwise specified)

| PARAMETER | | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|---|
| Output Voltage | | $V_{OUT}$ | $V_{IN}$ = Set $V_{OUT}$+1V, | $V_{OUT}$ > 2.0V | ×0.99 | | ×1.01 | V |
| | | | | $V_{OUT}$ ≤ 2.0V | | ±20 | | mV |
| Input Voltage | | $V_{IN}$ | | | | | 6 | V |
| Load Regulation | | $\Delta V_{OUT}$ | 1mA≤$I_{OUT}$≤150mA | | | 20 | 40 | mV |
| Output Current | | $I_{OUT}$ | | | 300 | | | mA |
| Supply Current | | $I_{SS}$ | $I_{OUT}$=0A | | | 50 | | μA |
| Supply Current (Standby) | | $I_{ST-BY}$ | $V_{CE}$=0V | | | 0.1 | 2 | μA |
| Short Current Limit | | $I_{LIMIT}$ | $V_{OUT}$=0V | | | 200 | | mA |
| CE Pull-down Current | | $I_{PD}$ | | | | 0.3 | | μA |
| CE Input Voltage | High | $V_{CEH}$ | | | 1.5 | | | V |
| | Low | $V_{CEL}$ | | | | 1.1 | | V |
| Output Noise | | eN | $B_W$=10Hz to 100kHz, $I_{OUT}$ =30mA | | | 30 | | μVrms |
| Ripple Rejection | | RR | f=1kHz, Ripple 0.2$V_{RMS}$<br>$V_{IN}$=Set $V_{OUT}$+1V, $I_{OUT}$=30mA<br>(In case that $V_{OUT}$=2.0V, $V_{IN}$=3V) | | | 70 | | dB |
| Dropout Voltage | | $V_D$ | $I_{OUT}$=150mA | 1.2V≤$V_{OUT}$<1.5V | | 0.40 | | V |
| | | | | 1.5V≤$V_{OUT}$<1.7V | | 0.24 | | |
| | | | | 1.7V≤$V_{OUT}$<2.0V | | 0.21 | | |
| | | | | 2.0V≤$V_{OUT}$<2.5V | | 0.19 | | |
| | | | | 2.5V≤$V_{OUT}$<2.8V | | 0.17 | | |
| | | | | 2.8V≤$V_{OUT}$≤5.0V | | 0.15 | | |
| Line Regulation | | $\frac{\Delta V_{OUT}}{\Delta V_{IN}}$ | 1.2V≤$V_{OUT}$≤4.0V,<br>$V_{SET}$+0.5V≤$V_{IN}$≤5V | | | 0.02 | 0.10 | %/V |

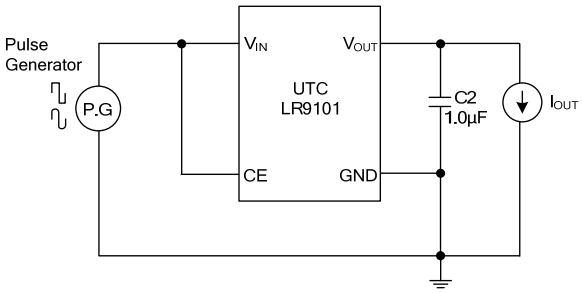
## ■ TEST CIRCUIT



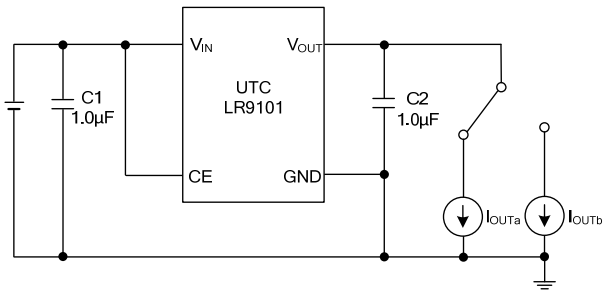

Basic Test Circuit




Test Circuit for Supply Current




Test Circuit for Ripple Rejection




Test Circuit for Load Transient Response

## ■ TYPICAL APPLICATION CIRCUIT