



# 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

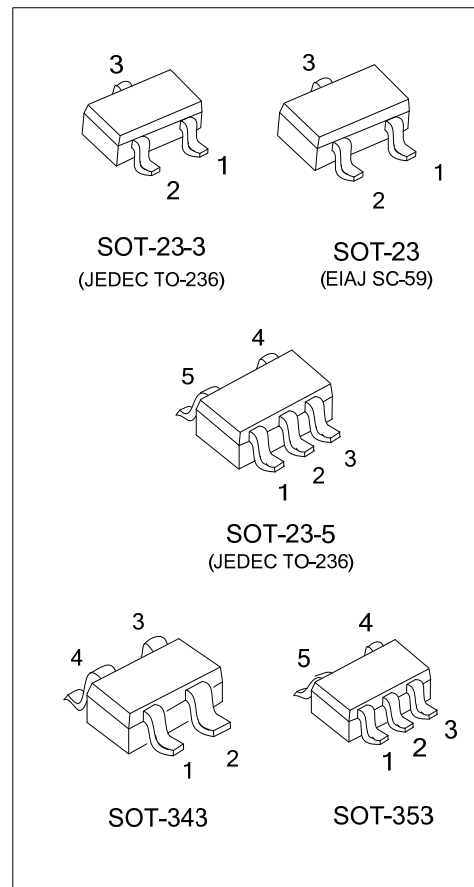
- \* Supply Current: 50μA (Typ.)
- \* Standby Mode: 0.1μA (Typ.)
- \* Ripple Rejection: 70dB (Typ.) @ f=1kHz, V<sub>OUT</sub>=2.5V
- \* Well Line Regulation: 0.02%/V (Typ.)
- \* C<sub>IN</sub>=C<sub>OUT</sub>=1μF or more (Ceramic capacitors) are recommended to be used with this IC

### ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
LR9101L-xx-AE2-R	LR9101G-xx-AE2-R	SOT-23-3	Tape Reel
LR9101L-xx-AE3-R	LR9101G-xx-AE3-R	SOT-23	Tape Reel
LR9101L-xx-AE5-R	LR9101G-xx-AE5-R	SOT-23-5	Tape Reel
LR9101L-xx-AL4-R	LR9101G-xx-AL4-R	SOT-343	Tape Reel
LR9101L-xx-AL5-R	LR9101G-xx-AL5-R	SOT-353	Tape Reel

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

<p>LR9101G-xx-AE5-R</p> <p>(1)Packing Type (2)Package Type (3)Output Voltage Code (4)Green Package</p>	<p>(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, L: Lead Free</p>
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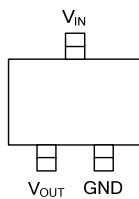


## MARKING INFORMATION

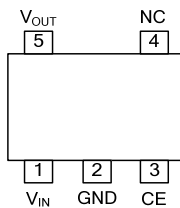
PACKAGE	VOLTAGE CODE	MARKING
SOT-23 SOT-23-3	10: 1.0V 12: 1.2V 15: 1.5V 18: 1.8V 25: 2.5V 27: 2.7V 28: 2.8V 29: 2.9V 30: 3.0V 33: 3.3V	<p>L: Lead Free G: Halogen Free Voltage Code</p>
SOT-23-5 SOT-353		<p>L: Lead Free G: Halogen Free Voltage Code</p>
SOT-343		<p>L: Lead Free G: Halogen Free</p>

## PIN CONFIGURATION

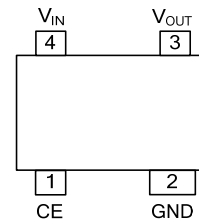
SOT-23/SOT-23-3



SOT-23-5/SOT-353



SOT-343

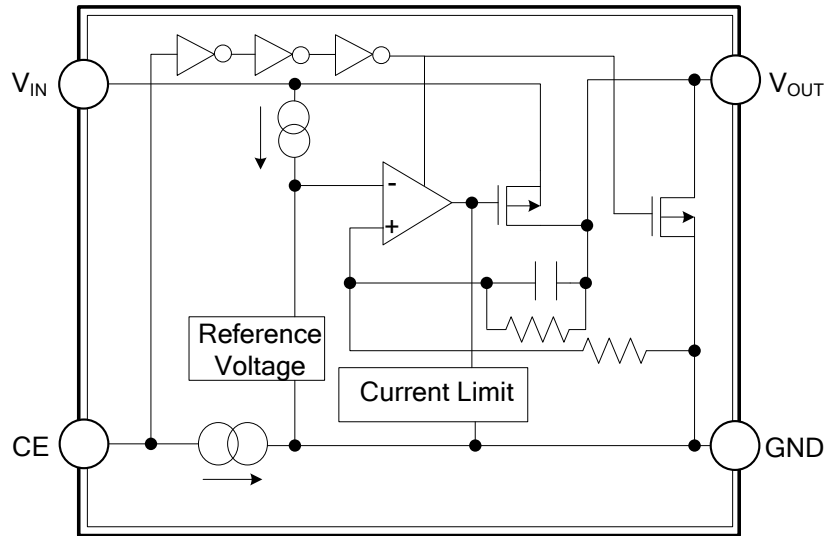


## PIN DESCRIPTION

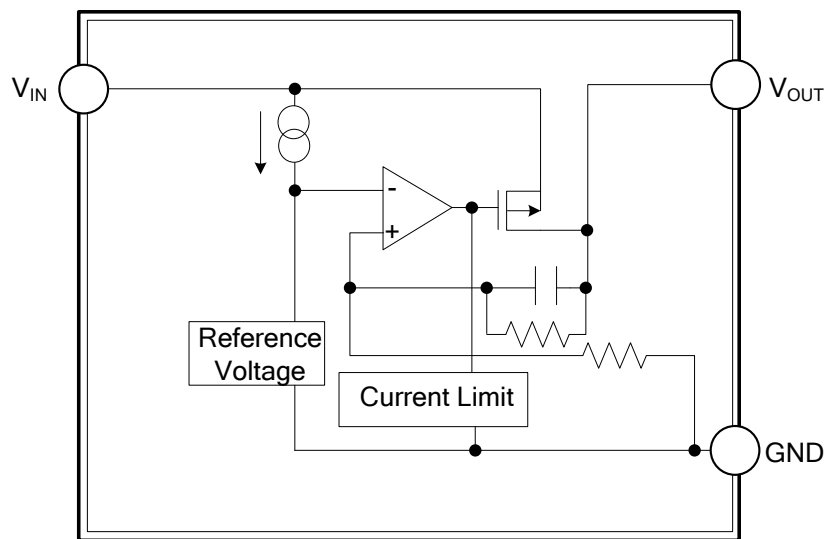
PIN NO.			PIN NAME	DESCRIPTION
SOT-23 SOT-23-3	SOT-23-5 SOT-353	SOT-343		
3	1	4	$V_{IN}$	Input Pin
1	2	2	GND	Ground Pin
-	3	1	CE	Chip Enable Pin. Active when this Pin is high.
-	4	-	NC	No Connection
2	5	3	$V_{OUT}$	Output Pin

## ■ 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		$V_{OUT}$	$-0.3 \sim V_{IN} + 0.3$	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.

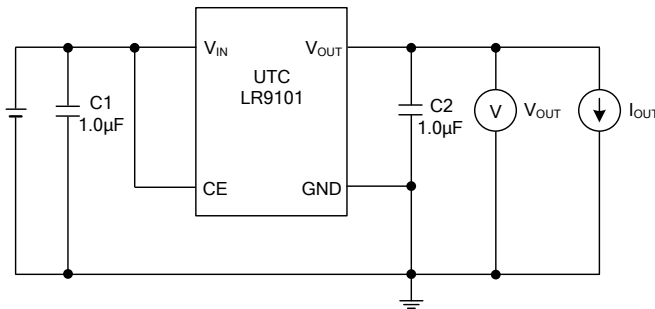
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

## ■ ELECTRICAL CHARACTERISTICS

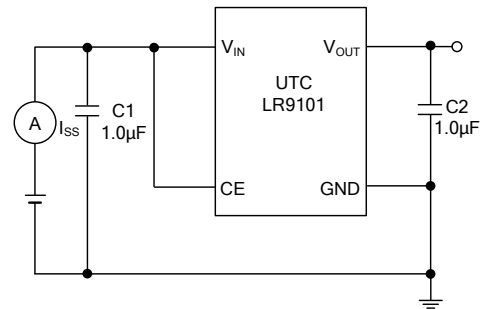
( $T_A=25^\circ\text{C}$ ,  $V_{IN}=\text{Set } V_{OUT}+1\text{V}$ ,  $I_{OUT}=1\text{mA}$ ,  $C_I=C_O=1\mu\text{F}$ , unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage		$V_{OUT}$	$V_{IN} = \text{Set } V_{OUT} + 1\text{V}$ , $V_{OUT} > 2.0\text{V}$	×0.99		×1.01	V
			$V_{OUT} \leq 2.0\text{V}$		±20		mV
Input Voltage		$V_{IN}$				6	V
Load Regulation		$\Delta V_{OUT}$	$1\text{mA} \leq I_{OUT} \leq 150\text{mA}$		20	40	mV
Output Current		$I_{OUT}$		300			mA
Supply Current		$I_{SS}$	$I_{OUT}=0\text{A}$		50		μA
Supply Current (Standby)		$I_{ST-BY}$	$V_{CE}=0\text{V}$		0.1	2	μA
Short Current Limit		$I_{LIMIT}$	$V_{OUT}=0\text{V}$		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	$B_W=10\text{Hz to } 100\text{kHz}$ , $I_{OUT}=30\text{mA}$		30		μVrms
Ripple Rejection		RR	$f=1\text{kHz}$ , Ripple $0.2V_{RMS}$ $V_{IN}=\text{Set } V_{OUT}+1\text{V}$ , $I_{OUT}=30\text{mA}$ (In case that $V_{OUT}=2.0\text{V}$ , $V_{IN}=3\text{V}$ )		70		dB
Dropout Voltage		$V_D$	$I_{OUT}=150\text{mA}$	$1.0\text{V} \leq V_{OUT} < 1.2\text{V}$	0.60		V
				$1.2\text{V} \leq V_{OUT} < 1.5\text{V}$	0.40		
				$1.5\text{V} \leq V_{OUT} < 1.7\text{V}$	0.24		
				$1.7\text{V} \leq V_{OUT} < 2.0\text{V}$	0.21		
				$2.0\text{V} \leq V_{OUT} < 2.5\text{V}$	0.19		
				$2.5\text{V} \leq V_{OUT} < 2.8\text{V}$	0.17		
Line Regulation		$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	$1.2\text{V} \leq V_{OUT} \leq 4.0\text{V}$ , $V_{SET}+0.5\text{V} \leq V_{IN} \leq 5\text{V}$		0.02	0.10	%/V

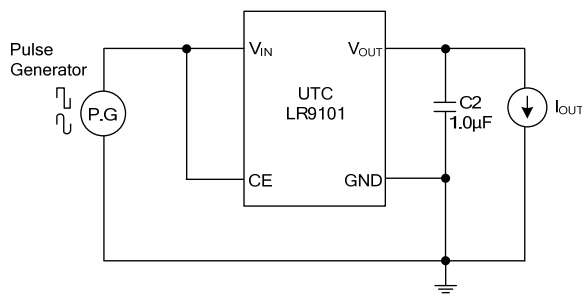
## ■ TEST CIRCUIT



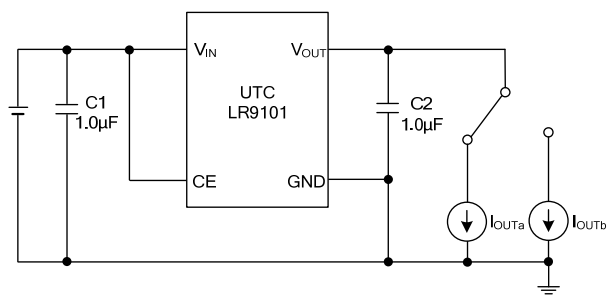
Basic Test Circuit



Test Circuit for Supply Current

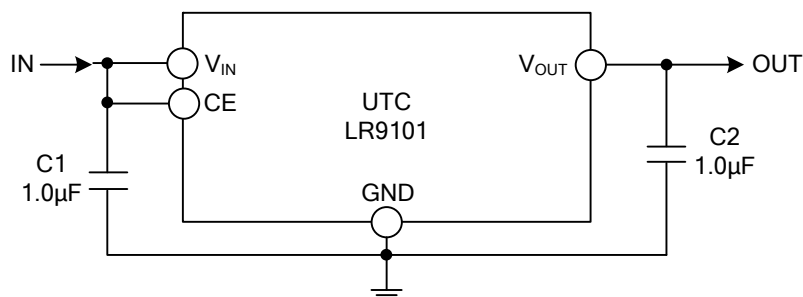


Test Circuit for Ripple Rejection



Test Circuit for Load Transient Response

## ■ TYPICAL APPLICATION CIRCUIT



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