



## LR9102

CMOS IC

### LOW NOISE 300mA LDO REGULATOR

#### DESCRIPTION

The UTC **LR9102** 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 **LR9102**, 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 **LR9102** 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 **LR9102**.

The UTC **LR9102** 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

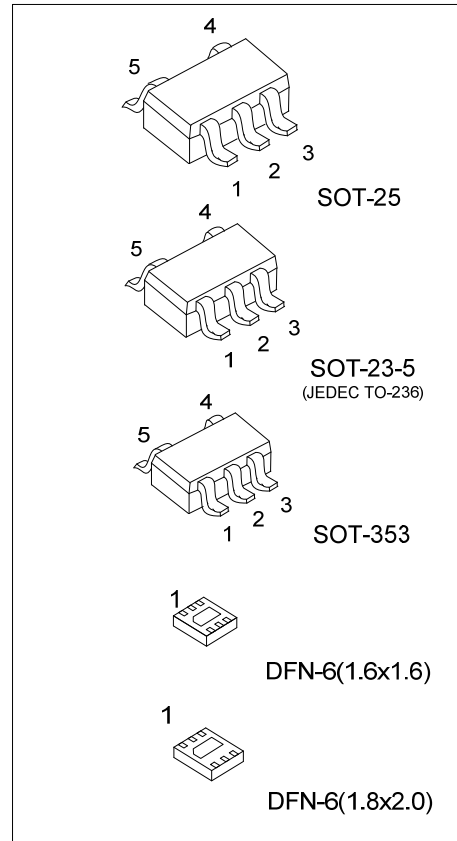
- \* Ultra Supply Current: 50 $\mu$ A (Typ.)
- \* Standby Mode: 0.1 $\mu$ A (Typ.)
- \* Very Low Dropout Voltage: 0.14V (Typ.)  
@ I<sub>OUT</sub>=300mA, V<sub>OUT</sub>=2.85V
- \* Ripple Rejection: 75dB (Typ.)  
@ f=1kHz, V<sub>OUT</sub>=2.85V
- \* Temperature-Drift Coefficient of Output Voltage:  $\pm$ 50ppm/ $^{\circ}$ C (Typ.)
- \* Well Line Regulation: 0.02%/V (Typ.)
- \* Output Voltage Accuracy:  $\pm$ 1.0%
- \* Internal Fold Back Protection Circuit: 50mA (Typ.) @ short mode
- \* C<sub>IN</sub>=C<sub>OUT</sub>=1 $\mu$ F or more (Ceramic capacitors) are recommended to be used with this IC

#### ORDERING INFORMATION

Ordering Number	Package	Packing
LR9102G-xx-AE5-R	SOT-23-5	Tape Reel
LR9102G-xx-AF5-R	SOT-25	Tape Reel
LR9102G-xx-AL5-R	SOT-353	Tape Reel
LR9102G-xx-K06-1616-R	DFN-6(1.6 $\times$ 1.6)	Tape Reel
LR9102G-xx-K06-1820-R	DFN-6(1.8 $\times$ 2.0)	Tape Reel

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

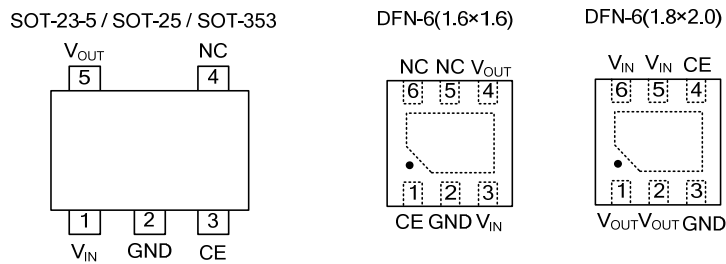
<p>LR9102G-xx-AE5-R</p>	<p>(1) R: Tape Reel  (2) AE5: SOT-23-5, AF5: SOT-25, AL5: SOT-353  K06-1616: DFN-6(1.6<math>\times</math>1.6), K06-1820: DFN-6(1.8<math>\times</math>2.0)  (3) xx: refer to Marking Information  (4) G: Halogen Free and Lead Free</p>
-------------------------	--



## MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-23-5 SOT-25 SOT-353	15: 1.5V 18: 1.8V 25: 2.5V 28 :2.8V 2J: 2.85V	
DFN-6(1.6×1.6) DFN-6(1.8×2.0)	30: 3.0V 33: 3.3V	

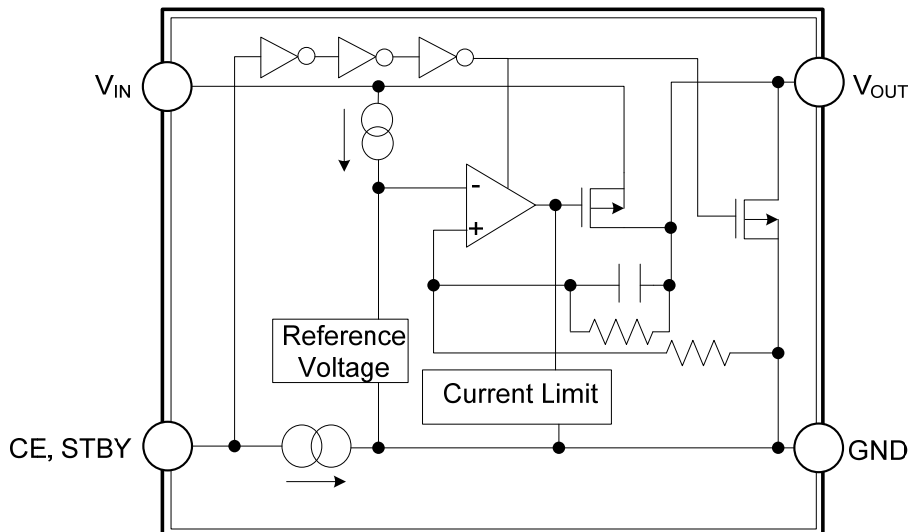
## PIN CONFIGURATION



## PIN DESCRIPTION

PIN NO.			PIN NAME	DESCRIPTION
SOT-23-5 SOT-25 SOT-353	DFN-6 (1.6×1.6)	DFN-6 (1.8×2.0)		
1	3	5, 6	$V_{IN}$	Input Pin
2	2	3	GND	Ground Pin
3	1	4	CE	Chip Enable Pin. Active when this Pin is high.
4	5, 6	-	NC	No Connection
5	4	1, 2	$V_{OUT}$	Output Pin

## BLOCK DIAGRAM



## ■ 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-23-5/SOT-25 SOT-353	$P_D$	420	mW
	DFN-6(1.6×1.6)		138	mW
	DFN-6(1.8×2.0)		100	mW
Junction Temperature		$T_J$	+125	°C
Operating Temperature		$T_{OPR}$	-40~+85	°C
Storage Temperature		$T_{STG}$	-55~+125	°C

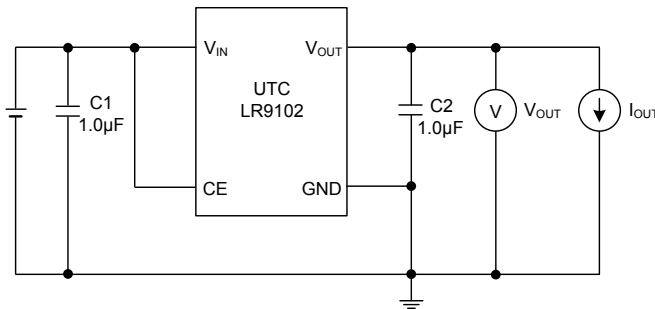
Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

## ■ ELECTRICAL CHARACTERISTICS

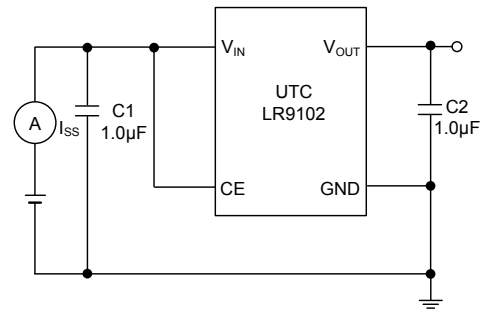
( $T_A=25^{\circ}\text{C}$ ,  $V_{IN}=\text{Set } V_{OUT}+1\text{V}$ ,  $I_{OUT}=1\text{mA}$ ,  $C_I=C_O=1\mu\text{F}$ , unless otherwise specified)

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	+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	90	μA
Supply Current (Standby)		$I_{ST-BY}$	$V_{CE}=0\text{V}$		0.1	2	μA
Short Current Limit		$I_{LIMIT}$	$V_{OUT}=0\text{V}$		50		mA
CE Pull-down Current		$I_{PD}$			0.3		μA
CE Input Voltage	High	$V_{CEH}$		1.2			V
	Low	$V_{CEL}$				0.3	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 $0.2\text{V}_{P-P}$ $V_{IN}=\text{Set } V_{OUT}+1\text{V}$ , $I_{OUT}=30\text{mA}$ (In case that $V_{OUT}=2.0\text{V}$ , $V_{IN}=3\text{V}$ )		75		dB
Dropout Voltage		$V_D$	$I_{OUT}=300\text{mA}$	$1.2\text{V} \leq V_{OUT} < 1.5\text{V}$	0.30	0.50	V
				$1.5\text{V} \leq V_{OUT} < 1.7\text{V}$	0.22	0.32	
				$1.7\text{V} \leq V_{OUT} < 2.0\text{V}$	0.20	0.28	
				$2.0\text{V} \leq V_{OUT} < 2.5\text{V}$	0.17	0.24	
				$2.5\text{V} \leq V_{OUT} < 2.8\text{V}$	0.14	0.20	
				$2.8\text{V} \leq V_{OUT} \leq 5.0\text{V}$	0.12	0.19	
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
			$4.0\text{V} < V_{OUT} \leq 5.0\text{V}$ , $V_{SET}+0.5\text{V} \leq V_{IN} \leq 6.5\text{V}$				
Output Voltage Temperature Coefficient		$\frac{\Delta V_{OUT}}{\Delta T}$	$-40^{\circ}\text{C} \leq T_{OPR} \leq 85^{\circ}\text{C}$		±50		ppm/°C
Low Output Nch Tr. ON Resistance		$R_{LOW}$	$V_{IN}=4.0\text{V}$ , $V_{CE}=0\text{V}$		70		Ω

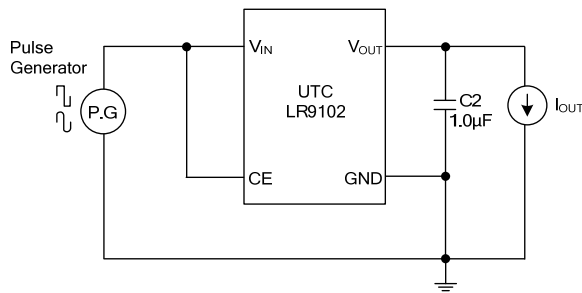
## ■ TEST CIRCUIT



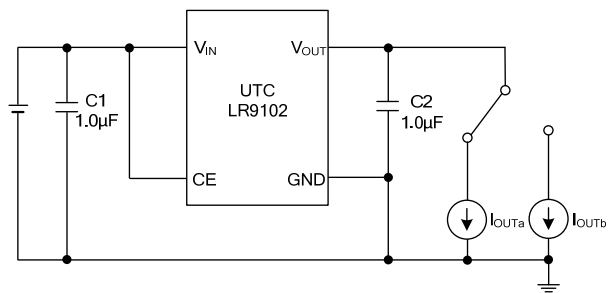
Basic Test Circuit



Test Circuit for Supply Current

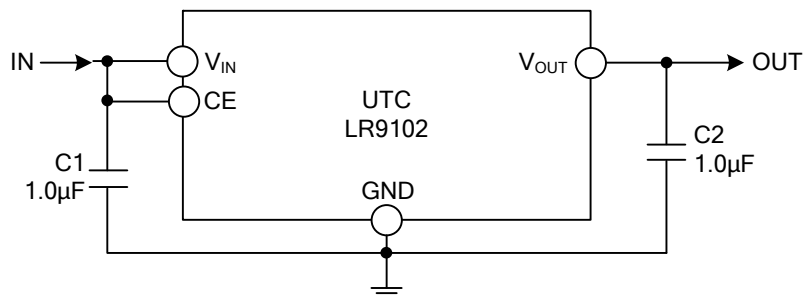


Test Circuit for Ripple Rejection



Test Circuit for Load Transient Response

## ■ TYPICAL APPLICATION CIRCUIT



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.