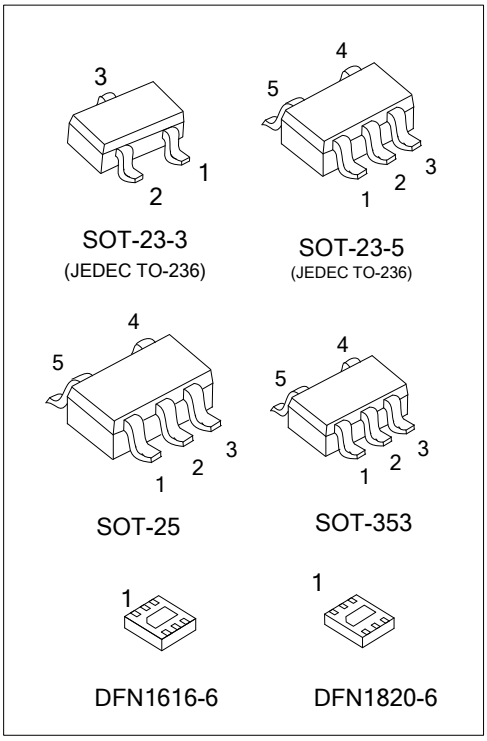
LR9102/A

CMOS IC

LOW NOISE 300mA LDO REGULATOR



■ DESCRIPTION

The UTC **LR9102/A** 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/A**, 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/A** 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/A**, with auto discharge function at off state.

The UTC **LR9102/A** 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.

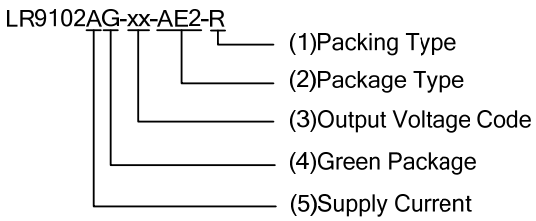
■ FEATURES

* Ultra Supply Current: LR9102: 50μA (Typ.)
  LR9102A: 90μA (Typ.)
* Standby Mode: 0.1μA (Typ.)
* Very Low Dropout Voltage: 0.12V (Typ.)
  @I_{OUT} =300mA, V_{OUT} =2.85V
* Ripple Rejection: 75dB (Typ.)
  @ f=1kHz,V_{OUT}=2.85V
* Temperature-Drift Coefficient of Output Voltage: ±50ppm/°C (Typ.)
* Well Line Regulation: 0.02%/ V (Typ.)
* Output Voltage Accuracy: ±1.0%
* Internal Fold Back Protection Circuit: 50mA (Typ.) @ short mode
* C_{IN}=C_{OUT}=1μF or more (Ceramic capacitors) are recommended to be used with this IC

■ ORDERING INFORMATION

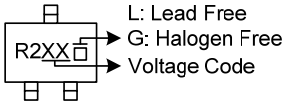
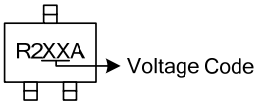
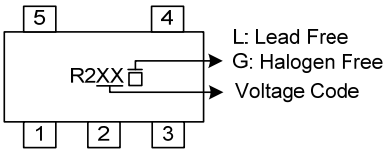
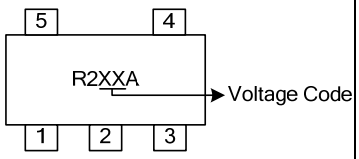
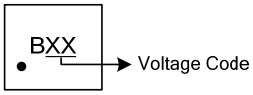
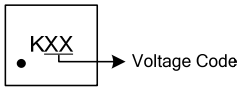
Ordering Number		Package	Packing
Lead Free	Halogen Free		
LR9102L-xx-AE2-R	LR9102G-xx-AE2-R	SOT-23-3	Tape Reel
LR9102L-xx-AE5-R	LR9102G-xx-AE5-R	SOT-23-5	Tape Reel
LR9102L -xx-AF5-R	LR9102G -xx-AF5-R	SOT-25	Tape Reel
LR9102L-xx-AL5-R	LR9102G-xx-AL5-R	SOT-353	Tape Reel
LR9102L-xx-K06-1616-R	LR9102G-xx-K06-1616-R	DFN1616-6	Tape Reel
LR9102L-xx-K06-1820-R	LR9102G-xx-K06-1820-R	DFN1820-6	Tape Reel
LR9102AL-xx-AE2-R	LR9102AG-xx-AE2-R	SOT-23-3	Tape Reel
LR9102AL-xx-AE5-R	LR9102AG-xx-AE5-R	SOT-23-5	Tape Reel
LR9102AL -xx-AF5-R	LR9102AG -xx-AF5-R	SOT-25	Tape Reel
LR9102AL-xx-AL5-R	LR9102AG-xx-AL5-R	SOT-353	Tape Reel
LR9102AL-xx-K06-1616-R	LR9102AG-xx-K06-1616-R	DFN1616-6	Tape Reel
LR9102AL-xx-K06-1820-R	LR9102AG-xx-K06-1820-R	DFN1820-6	Tape Reel

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

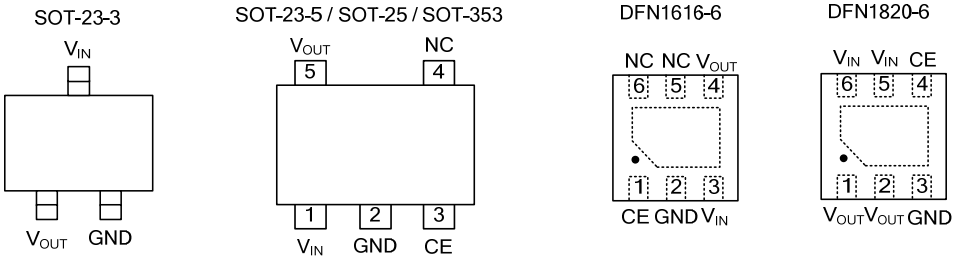


(1) R: Tape Reel
(2) AE2: SOT-23-3, AE5: SOT-23-5, AF5: SOT-25, AL5: SOT-353, K06-1616: DFN1616-6, K06-1820: DFN1820-6
(3) xx: refer to Marking Information
(4) G: Halogen Free and Lead Free, L: Lead Free
(5) refer to ELECTRICAL CHARACTERISTICS

■ MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING	
		LR9102	LR9102A
SOT-23-3	10: 1.0V 11: 1.1V 12: 1.2V 13: 1.3V 15: 1.5V 18: 1.8V 25: 2.5V 27: 2.7V 28 :2.8V 2J: 2.85V 29: 2.9V 30: 3.0V 33: 3.3V 36: 3.6V		
SOT-23-5 SOT-25 SOT-353			
DFN1616-6 DFN1820-6			

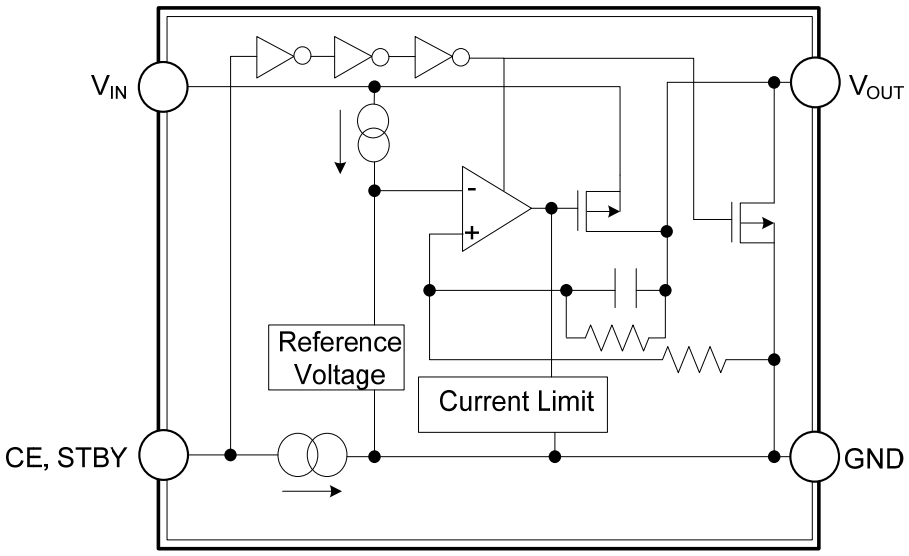
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.				PIN NAME	DESCRIPTION
SOT-23-3	SOT-23-5 SOT-25 SOT-353	DFN1616-6	DFN1820-6		
3	1	3	5, 6	V_{IN}	Input Pin
1	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
2	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-23-3	P_D	280	mW
	SOT-23-5/SOT-25 SOT-353		300	mW
	DFN1616-6		100	mW
	DFN1820-6		138	mW
Junction Temperature		T_J	+125	°C
Operating Temperature		T_{OPR}	-40 ~ +85	°C
Storage Temperature		T_{STG}	-55 ~ +125	°C

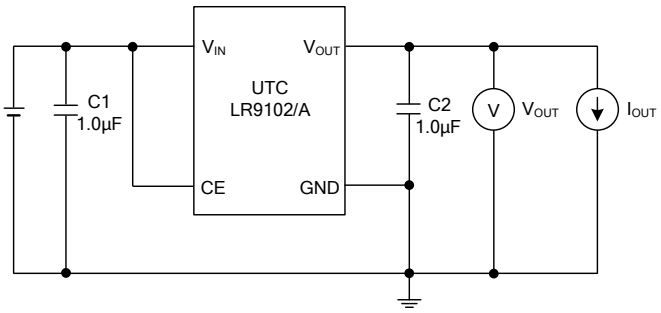
Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS

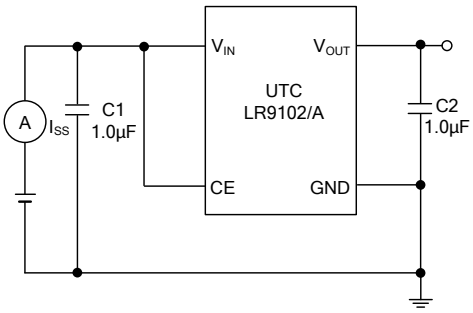
(T_A=25°C, V_{IN}=Set V_{OUT}+1V, I_{OUT}=1mA, C_I=C_O=1μF, unless otherwise specified)

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		+20	mV
Input Voltage		V_{IN}					6	V
Load Regulation		ΔV_{OUT}	1mA≤I_{OUT}≤150mA			20	40	mV
Output Current		I_{OUT}			300			mA
Supply Current		I_{SS}	I_{OUT}=0A	LR9102		50	90	μA
				LR9102A		90	130	μA
Supply Current (Standby)		I_{ST-BY}	V_{CE}=0V			0.1	2	μA
Short Current Limit		I_{LIMIT}	V_{OUT}=0V			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=10Hz to 100kHz, I_{OUT}=30mA			30		μVrms
Ripple Rejection		RR	f=1kHz, Ripple 0.2V_{P-P} V_{IN}=Set V_{OUT}+1V, I_{OUT}=30mA (In case that V_{OUT}=2.0V, V_{IN}=3V)			75		dB
Dropout Voltage		V_D	I_{OUT}=300mA	1.0V ≤V_{OUT} <1.2V		0.60	1.00	V
				1.2V ≤V_{OUT} <1.5V		0.38	0.70	
				1.5V ≤V_{OUT} <1.7V		0.30	0.40	
				1.7V ≤V_{OUT} <2.0V		0.20	0.28	
				2.0V ≤V_{OUT} <2.5V		0.17	0.24	
				2.5V ≤V_{OUT} <2.8V		0.14	0.20	
				2.8V ≤V_{OUT} ≤5.0V		0.12	0.19	
Line Regulation		$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	1.0V≤V_{OUT}≤4.0V, V_{SET}+0.5V≤V_{IN}≤5V			0.02	0.10	%/V
			4.0V<V_{OUT}≤5.0V, V_{SET}+0.5V≤V_{IN}≤6.5V					
Output Voltage Temperature Coefficient		$\frac{\Delta V_{OUT}}{\Delta T}$	-40°C ≤ T_{OPR} ≤ 85°C			±50		ppm/°C
Low Output Nch Tr. ON Resistance		R_{LOW}	V_{IN}=4.0,V_{CE}=0V			70		Ω

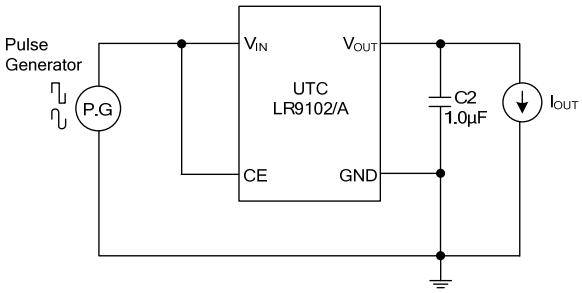
■ TEST CIRCUIT



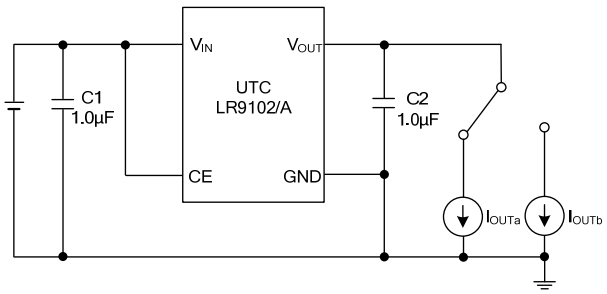
Basic Test Circuit



Test Circuit for Supply Current



Test Circuit for Ripple Rejection



Test Circuit for Load Transient Response

■ TYPICAL APPLICATION CIRCUIT