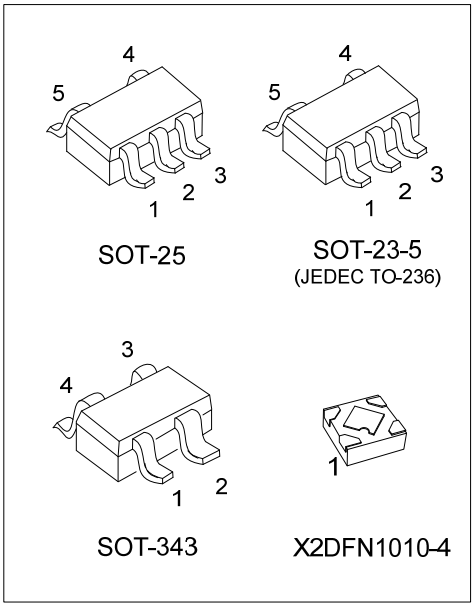
LR9103

CMOS IC

LOW NOISE 150mA LDO REGULATOR



■ DESCRIPTION

The UTC **LR9103** 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 **LR9103**, 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 **LR9103** 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 **LR9103**.

The UTC **LR9103** 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: 42μA (Typ.)
* Standby Mode: 0.5μA (Max.)
* Very Low Dropout Voltage: 0.13V (Typ.) @ I_{OUT} =150mA, V_{OUT} =2.85V
* Ripple Rejection: 65dB (Typ.) @ f=1kHz,V_{OUT}=2.85V
* Temperature-Drift Coefficient of Output Voltage: ±50ppm/°C (Typ.)
* Well Line Regulation: 0.05%/V (Typ.)
* *Output Voltage Accuracy: ±1.0%
* Internal Fold Back Protection Circuit: 50mA (Typ.) (Current at short mode)

*C_{IN}=C_{OUT}=1.0μF or more (Ceramic capacitors) are recommended to be used with this IC

■ ORDERING INFORMATION

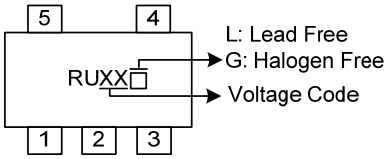
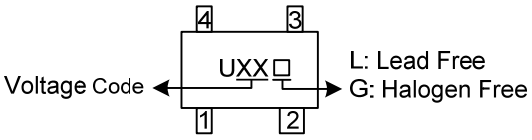
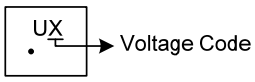
Ordering Number		Package	Packing
Lead Free	Halogen Free		
LR9103L-xx-AE5-R	LR9103G-xx-AE5-R	SOT-23-5	Tape Reel
LR9103L-xx-AF5-R	LR9103G-xx-AF5-R	SOT-25	Tape Reel
LR9103L-xx-AL4-R	LR9103G-xx-AL4-R	SOT-343	Tape Reel
LR9103L-xx-K04-1010-R	LR9103G-xx-K04-1010X2-R	X2DFN1010-4	Tape Reel

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

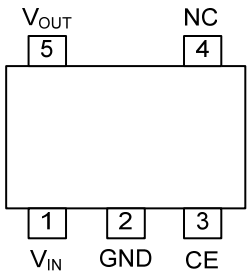
LR9103G-xx-AE5-R
- (1)Packing Type
- (2)Package Type
- (3)Output Voltage Code
- (4)Green Package

(1) R: Tape Reel
(2) AE5: SOT-23-5, AF5: SOT-25, AL4: SOT-343
K04-1010X2: X2DFN1010-4
(3) xx: refer to Marking Information
(4) G: Halogen Free and Lead Free, L: Lead Free

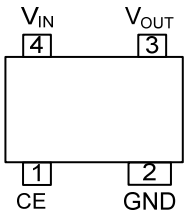
■ MARKING

PACKAGE	VOLTAGE CODE	MARKING
SOT-23-5 SOT-25	10: 1.0V 11: 1.1V 12: 1.2V 15: 1.5V 18: 1.8V 22: 2.2V 25: 2.5V 28: 2.8V 30: 3.0V 33: 3.3V	
SOT-343		
X2DFN1010-4	Z: 1.0V A: 1.1V B: 1.2V C: 1.5V D: 1.8V N: 2.2V E: 2.5V G: 2.8V J: 3.0V K: 3.3V T: 3.4V	

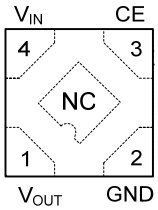
■ PIN CONFIGURATION



SOT-23-5



SOT-343

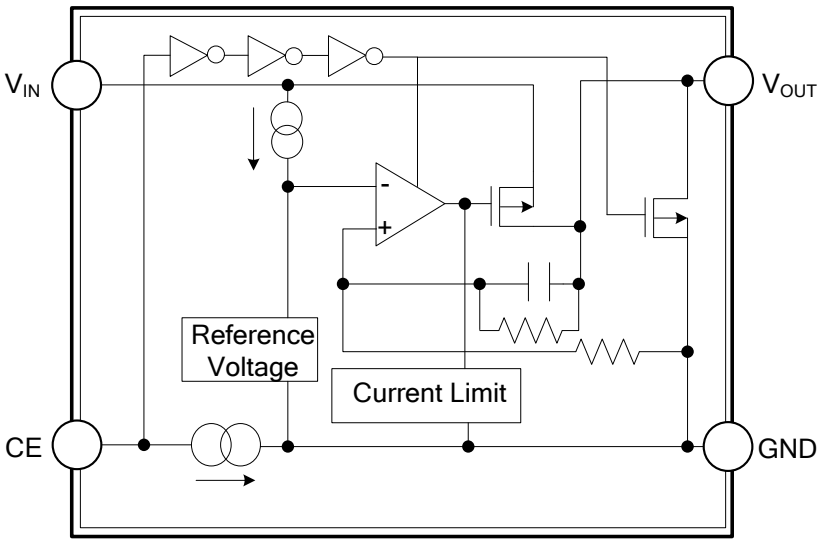


X2DFN1010-4
(TOP VIEW)

■ PIN DESCRIPTION

PIN NO.			PIN NAME	DESCRIPTION
SOT-23-5 SOT-25	SOT-343	X2DFN1010-4		
1	4	4	V_{IN}	Input Pin
2	2	2	GND	Ground Pin
3	1	3	CE	Chip Enable Pin. Active when this Pin is high.
4	-	-	NC	No Connection
5	3	1	V_{OUT}	Output Pin
-	-	Exposed Pad	NC	Thermal pad

■ 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}	200	mA
Power Dissipation	SOT-23-5 SOT-25	P_D	380	mW
	SOT-343		250	mW
	X2DFN1010-4		550 (Note 2)	mW
Junction Temperature		T_J	+125	°C
Operating Temperature		T_{OPR}	-40 ~ +85	°C
Storage Temperature		T_{STG}	-55 ~ +125	°C

Notes: 1. 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.
2. Heat Sink Area of PCB for DFN1x1-4 is recommended at least 2.5mmx4mm.

■ THERMAL DATA

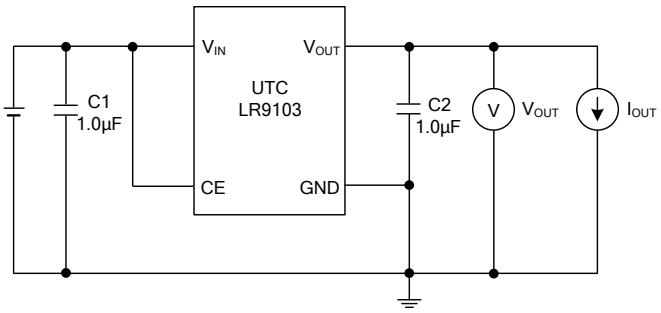
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-23-5 SOT-25	θ_{JA}	263	°C/W
	SOT-343		400	°C/W
	X2DFN1010-4		181	°C/W

■ ELECTRICAL CHARACTERISTICS

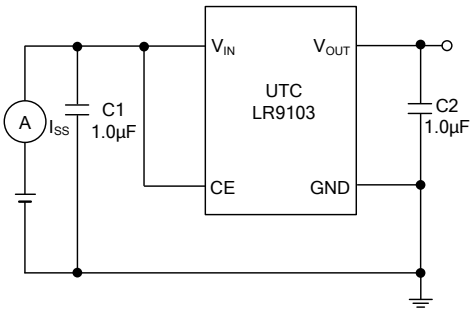
(T_A=25°C, V_{IN}= V_{OUT}+1V for V_{OUT} >1.5V ,V_{IN} =2.5V for V_{OUT} ≤1.5V,I_{OUT}=1mA, C_I =C_O=1.0μF, unless otherwise specified)

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}			150			mA
Supply Current		I_{SS}	I_{OUT}=0A			42	60	μA
Supply Current (Standby)		I_{ST-BY}	V_{CE}=0V				0.5	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}					0.4	V
Output Noise		eN	B_W=10Hz to 100kHz, I_{OUT} =30mA			30		μVrms
Power-Supply Ripple Rejection		PSRR	Ripple 0.2V_{P-P} V_{IN}=Set V_{OUT}+1V, I_{OUT}=10mA (In case that V_{OUT}=1.8V, V_{IN}=2.8V)	f=100Hz		72		dB
				f=1kHz		63		dB
				f=10kHz		44		dB
				f=100kHz		32		dB
				f=1MHz		52		dB
Dropout Voltage		V_D	I_{OUT}=150mA	1.1V≤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		0.17		
				2.5V≤V_{OUT}＜2.8V		0.14		
				2.8V≤V_{OUT}≤5.0V		0.13		
Line Regulation		$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	1.1V ≤ V_{OUT} ≤ 4.0V V_{SET}+0.5V ≤ V_{IN} ≤ 5V 4.0V < V_{OUT} ≤ 5.0V V_{SET}+0.5V ≤ V_{IN} ≤ 6.5V			0.05		%/V
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

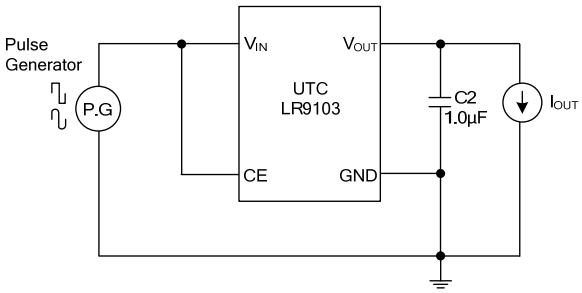
■ TEST CIRCUIT



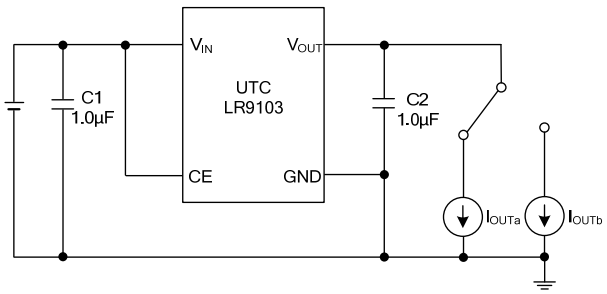
Basic Test Circuit



Test Circuit for Supply Current



Test Circuit for Ripple Rejection



Test Circuit for Load Transient Response

■ TYPICAL APPLICATION CIRCUIT