



LR9133

Preliminary

CMOS IC

LOW NOISE 300mA LDO REGULATOR

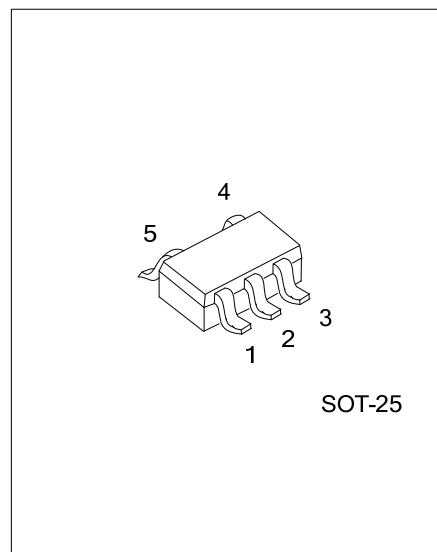
DESCRIPTION

The UTC **LR9133** 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 **LR9133**, 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 **LR9133** 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 **LR9133**.

The UTC **LR9133** 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: 36 μ A (Typ.)
- * Standby Mode: 0.1 μ A (Typ.)
- * Very Low Dropout Voltage: 0.13V (Typ.) @ $I_{OUT}=150mA$, $V_{OUT}=2.85V$
- * Ripple Rejection: 75dB (Typ.) @ $f=1kHz$, $V_{OUT}=2.85V$
- * Temperature-Drift Coefficient of Output Voltage: $\pm 100ppm/^{\circ}C$ (Typ.)
- * Well Line Regulation: 0.02%/ V (Typ.)
- * Output Voltage Accuracy: $\pm 2.0\%$
- * Internal Fold Back Protection Circuit: 80mA (Typ.) (Current at short mode)
- * $C_{IN}=C_{OUT}=1.0\mu F$ or more (Ceramic capacitors) are recommended to be used with this IC

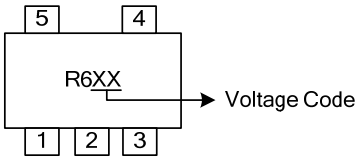
ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
LR9133L-xx-AF5-R	LR9133G-xx-AF5-R	SOT-25	Tape Reel

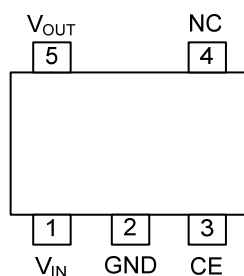
Note: xx: Output Voltage, refer to Marking Information.

LR9133G-xx-AF5-R	(1) Packing Type (2) Package Type (3) Output Voltage Code (4) Green Package	(1) R: Tape Reel (2) AF5: SOT-25 (3) xx: refer to Marking Information (4) G: Halogen Free and Lead Free, L: Lead Free
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MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-25	33: 3.3V	

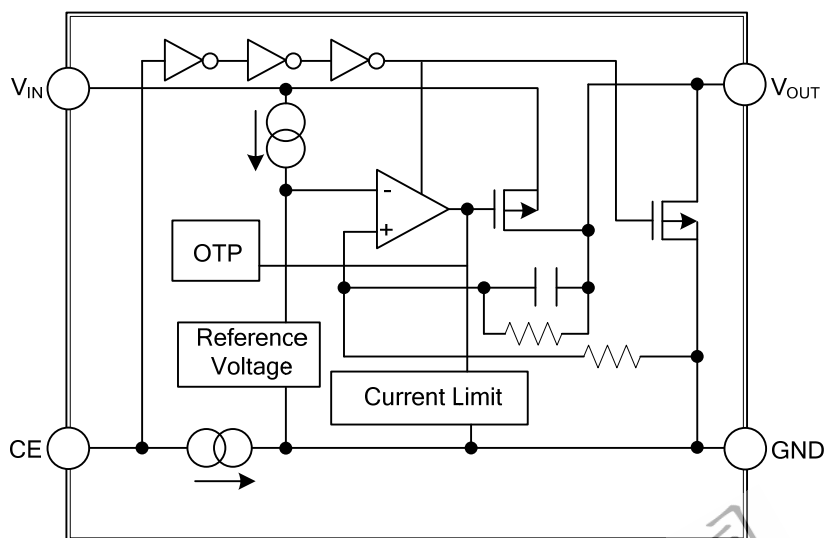
PIN CONFIGURATION



PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	V _{IN}	Input Pin
2	GND	Ground Pin
3	CE	Chip Enable Pin. Active when this Pin is high.
4	NC	No Connection
5	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}	$-0.3 \sim V_{IN}+0.3$	V
Output Current	I_{OUT}	350	mA
Power Dissipation	P_D	360	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.

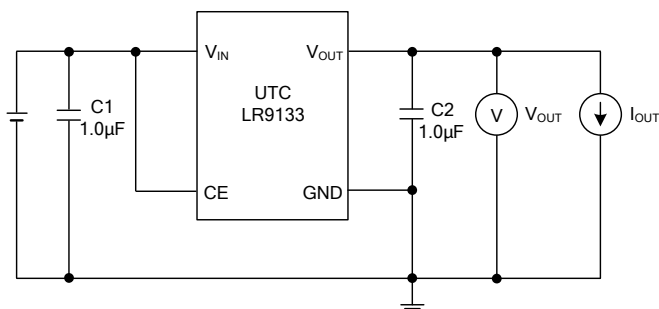
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS

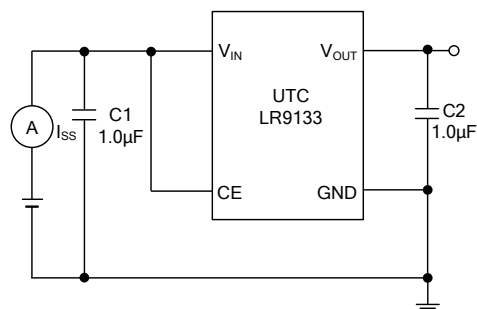
($T_A=25^\circ\text{C}$, $V_{IN}=\text{Set } V_{OUT}+1\text{V}$, $I_{OUT}=1\text{mA}$, $C_I=C_O=1.0\mu\text{F}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$V_{IN}=\text{Set } V_{OUT}+1\text{V}$	$\times 0.98$		$\times 1.02$	V
Input Voltage	V_{IN}				6	V
Load Regulation	ΔV_{OUT}	$1\text{mA} \leq I_{OUT} \leq 300\text{mA}$		20	50	mV
Output Current	I_{OUT}		300			mA
Supply Current	I_{SS}	$I_{OUT}=0\text{A}$		36	60	μA
Supply Current (Standby)	I_{ST-BY}	$V_{CE}=0\text{V}$		0.1	2	μA
Short Current Limit	I_{LIMIT}	$V_{OUT}=0\text{V}$		80		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	$B_W=10\text{Hz} \sim 100\text{kHz}$, $I_{OUT}=30\text{mA}$		30		μVrms
Ripple Rejection	RR	$f=1\text{kHz}$, Ripple 0.2V_{P-P} $V_{IN}=\text{Set } V_{OUT}+1\text{V}$, $I_{OUT}=30\text{mA}$ (In case that $V_{OUT}=2.0\text{V}$, $V_{IN}=3\text{V}$)		65		dB
Dropout Voltage	V_D	$I_{OUT}=150\text{mA}$, $2.5\text{V} \leq V_{OUT} < 2.8\text{V}$		0.14		V
		$2.8\text{V} \leq V_{OUT} \leq 5.0\text{V}$		0.13		
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	$\frac{\Delta V_{OUT}}{\Delta T}$	$-40^\circ\text{C} \leq T_{OPR} \leq 85^\circ\text{C}$		± 100		ppm/°C
Thermal Shutdown Detector Threshold Temperature	TTSD	Junction Temperature		150		°C
Thermal Shutdown Released Temperature	TTSR	Junction Temperature		120		°C
Low Output Nch Tr. ON Resistance	R_{LOW}	$V_{IN}=4.0$, $V_{CE}=0\text{V}$		70		Ω

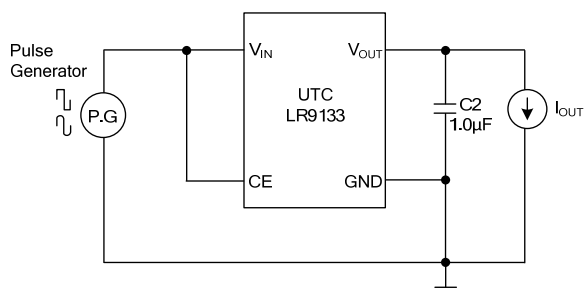
■ TEST CIRCUIT



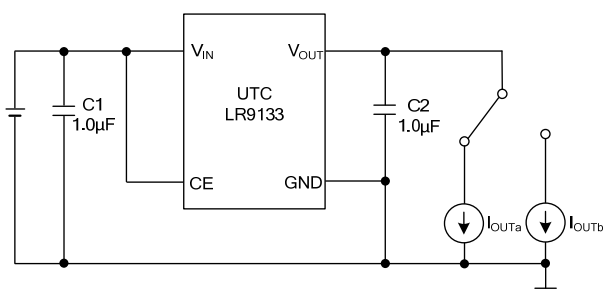
Basic Test Circuit



Test Circuit for Supply Current

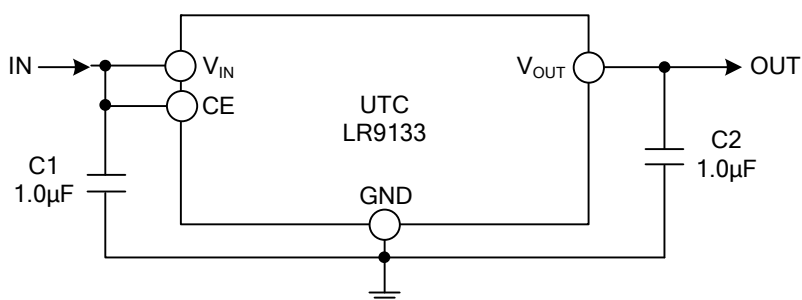


Test Circuit for Ripple Rejection



Test Circuit for Load Transient Response

■ TYPICAL APPLICATION CIRCUIT



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