

**LD3870**

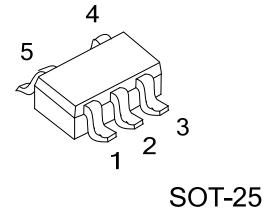
Preliminary

LINEAR INTEGRATED CIRCUIT**LOW DROPOUT VOLTAGE
REGULATOR**■ **DESCRIPTION**

The UTC **LD3870** is low dropout voltage regulator designed for cellular phone application.

■ **FEATURES**

- * High Ripple Rejection: $56\text{dB} \leq \text{RR}(\text{DC} < f < 60\text{kHz})$
66dB typ. (f=100Hz)
60dB typ. (f=1kHz)
- * Output Noise Voltage: $e_N = 30\text{mV}$, $C_p = 0.01\mu\text{F}$
- * Output Current: $I_{O(\text{MAX})} = 150\text{mA}$
- * High Precision Output: $V_O \pm 2\%$
- * Low Dropout Voltage: $V_D = 0.12\text{V}$ typ.
($I_O = 60\text{mA}$, $V_O \geq 1.8\text{V}$)
- * Input Voltage range: $+2 \sim +14\text{V}$ ($V_O = 1.5\text{V}$ Version)
- * ON/OFF Control: Active High
- * Output capacitor with 4.7uF ceramic capacitor
- * Internal Short Circuit Current Limit
- * Internal Thermal Overload Protection

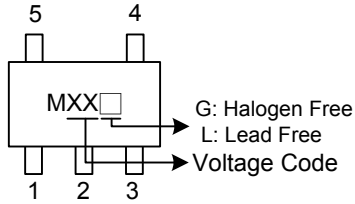
■ **ORDERING INFORMATION**

Ordering Number		Package	Packing
Lead Free	Halogen Free		
LD3870L-AF5-R	LD3870G-AF5-R	SOT-25	Tape Reel

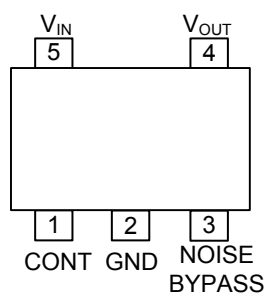
Note: xx: Output Voltage, refer to Marking Information.

LD3870G-AF5-R	
(1) Packing Type	(1) R: Tape Reel
(2) Package Type	(2) AF5: SOT-25
(3) Halogen Free	(3) G: Halogen Free, L: Lead Free

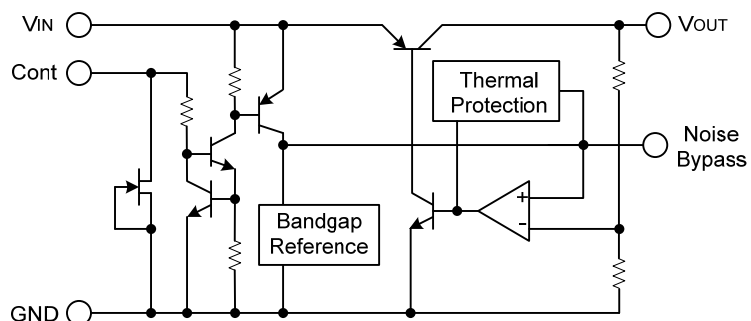
MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-25	15:1.5V 18:1.8V 25:2.5V 27:2.7V 30:3.0V 33:3.3V 50:5.0V	 G: Halogen Free L: Lead Free Voltage Code

PIN CONFIGURATION



BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS ($T_A=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	+14	V
Control Voltage	V_{CONT}	+14(Note 2)	V
Power Dissipation	P_D	200	mW
Operating Temperature	T_{OPR}	-40 ~ +85	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-40 ~ +125	$^{\circ}\text{C}$

Note 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. When input voltage is less than +14V, the absolute maximum control voltage is equal to the input voltage.

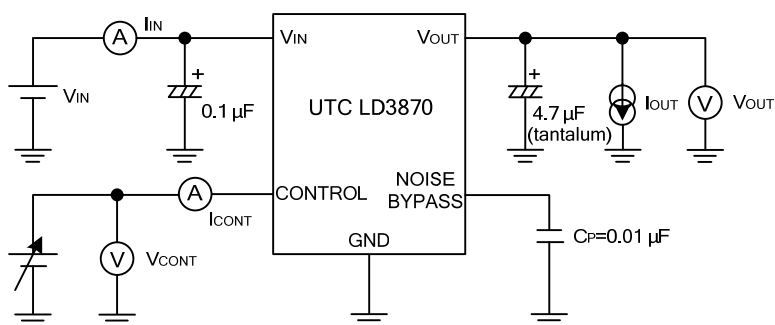
■ ELECTRICAL CHARACTERISTICS

($V_{IN}=V_{OUT}+1\text{V}$, $C_{IN}=0.1\mu\text{F}$, $C_{OUT}=4.7\mu\text{F}$, $C_p=0.01\mu\text{F}$, $T_A=25^{\circ}\text{C}$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=30\text{mA}$	-2%		+2%	V
Quiescent Current	I_Q	$I_{OUT}=0\text{mA}$, expect I_{CONT}		200	300	μA
Quiescent Current At Control OFF	$I_{Q(OFF)}$	$V_{CONT}=0\text{V}$			100	nA
Output Current	I_{OUT}	$V_{OUT}=0.3\text{V}$	150	200		mA
Line Regulation	$\Delta V_{OUT}/\Delta V_{IN}$	$V_{IN}=V_{OUT}+1\text{V} \sim V_{OUT}+6\text{V}$, $I_{OUT}=30\text{mA}$			0.10	%/V
Load Regulation	$\Delta V_{OUT}/\Delta I_{OUT}$	$I_{OUT}=0 \sim 100\text{mA}$			0.03	%/mA
Dropout Voltage	V_D	$I_{OUT}=60\text{mA}$		0.12	0.2	V
Ripple Rejection	RR	$e_{IN}=200\text{mVrms}$, $f=1\text{kHz}$, $I_{OUT}=10\text{mA}$, $V_{IN}=V_{OUT}+2\text{V}$, $V_{OUT}=3\text{V}$ Version		60		dB
Average Temperature Coefficient of Output Voltage	$\Delta V_{OUT}/\Delta T_A$	$T_A=0\sim 85^{\circ}\text{C}$, $I_{OUT}=10\text{mA}$, $V_{OUT}=3\text{V}$ Version		0.2		$\text{mV}/^{\circ}\text{C}$
Output Noise Voltage	e_N	$f=10\text{Hz} \sim 80\text{kHz}$, $I_{OUT}=10\text{mA}$, $V_{OUT}=3\text{V}$ Version		30		μVrms
Control Voltage	ON	$V_{CONT(ON)}$	1.6			V
	OFF	$V_{CONT(OFF)}$			0.6	V

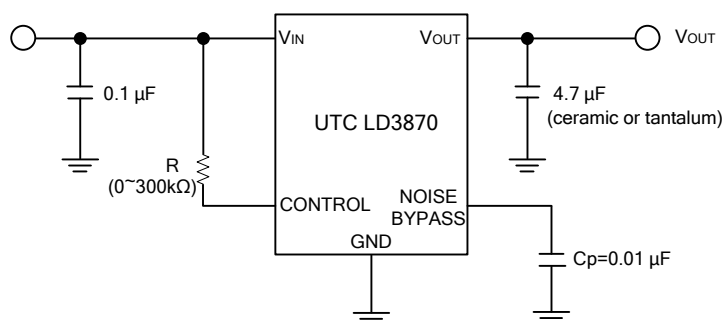
Note: The above specification is a common specification for all output voltages. Therefore, it may be different from the individual specification for a specific output voltage.

■ TEST CIRCUIT



■ TYPICAL APPLICATION

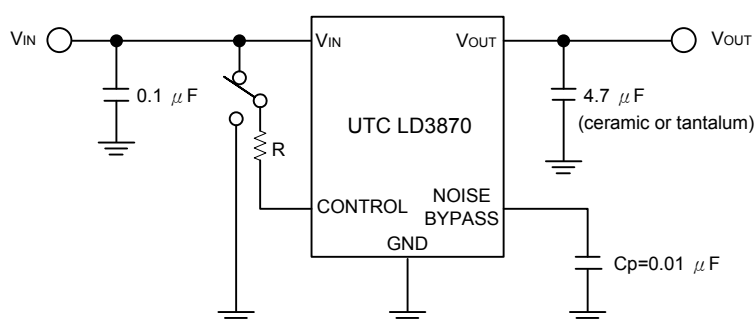
For ON/OFF Control is not required:



Connect control terminal to VIN terminal

The quiescent current can be reduced by using a resistance "R". Instead, it increases the minimum operating voltage. For further information, please refer to Figure "Output Voltage vs. Control Voltage".

For In use of ON/OFF CONTROL:



State of control terminal:

- * "H" → Output is enables.
- * "L" or "open" → Output is disabled.
- * Noise bypass Capacitance Cp
 - Noise bypass capacitance Cp reduces noise generated by hand-gap reference circuit.
 - Noise level and ripple rejection will be improved when larger Cp is used.
 - Use of smaller Cp value may cause oscillation.
 - Use the Cp value of 0.01uF greater to avoid the problem.

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