



LD3870

LINEAR INTEGRATED CIRCUIT

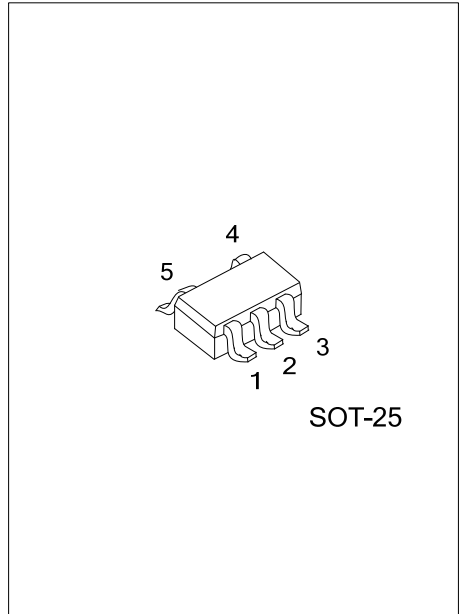
LOW DROPOUT VOLTAGE REGULATOR

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

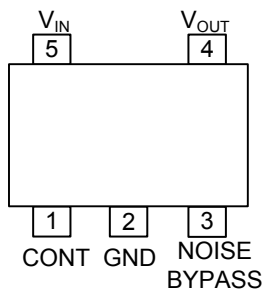
| Ordering Number | Package | Packing |
|------------------|---------|-----------|
| LD3870G-xx-AF5-R | SOT-25 | Tape Reel |

| | | |
|-------------------------|---|---|
| <p>LD3870G-xx-AF5-R</p> | <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Output Voltage Code</p> <p>(4) Green Package</p> | <p>(1) R: Tape Reel</p> <p>(2) AF5: SOT-25</p> <p>(3) xx: refer to Marking Information</p> <p>(4) G: Halogen Free and Lead Free</p> |
|-------------------------|---|---|

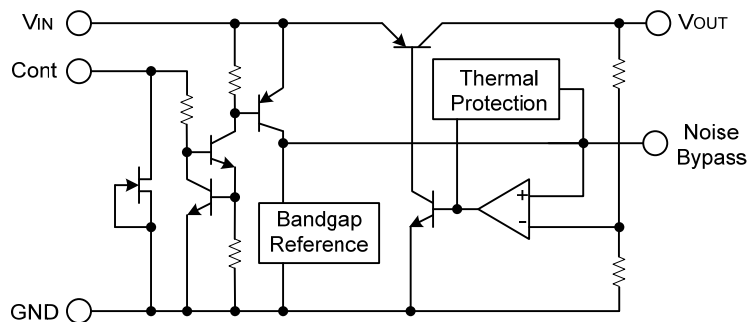
MARKING INFORMATION

| 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 | |

PIN CONFIGURATION



BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (T_A=25°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 | °C |
| Storage Temperature | T _{STG} | -40 ~ +125 | °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.

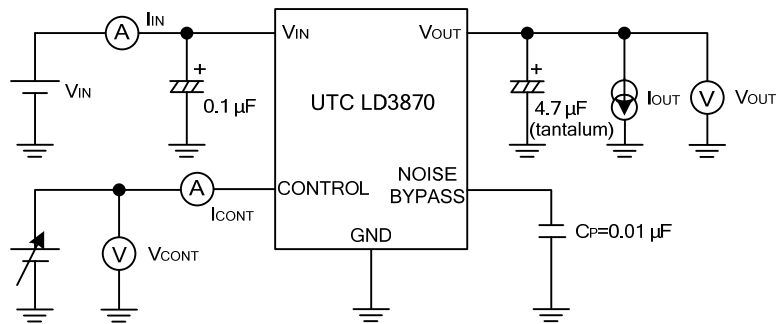
■ ELECTRICAL CHARACTERISTICS

(V_{IN}=V_{OUT}+1V, C_{IN}=0.1μF, C_{OUT}=4.7μF, C_p=0.01μF, T_A=25°C)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|---------------------------------|---|-----|------|------|-------|
| Output Voltage | V _{OUT} | I _{OUT} =30mA | -2% | | +2% | V |
| Quiescent Current | I _Q | I _{OUT} =0mA, expect I _{CONT} | | 200 | 300 | μA |
| Quiescent Current At Control OFF | I _{Q(OFF)} | V _{CONT} =0V | | | 1000 | nA |
| Output Current | I _{OUT} | V _{OUT} =0.3V | 150 | 200 | | mA |
| Line Regulation | $\Delta V_{OUT}/\Delta V_{IN}$ | V _{IN} =V _{OUT} +1V ~ V _{OUT} +6V, I _{OUT} =30mA | | | 0.10 | %/V |
| Load Regulation | $\Delta V_{OUT}/\Delta I_{OUT}$ | I _{OUT} =0 ~ 100mA | | | 0.03 | %/mA |
| Dropout Voltage | V _D | I _{OUT} =60mA | | 0.12 | 0.2 | V |
| Ripple Rejection | RR | e _{IN} =200mVrms, f=1kHz, I _{OUT} =10mA, V _{IN} =V _{OUT} +2V, V _{OUT} =3V Version | | 60 | | dB |
| Average Temperature Coefficient of Output Voltage | $\Delta V_{OUT}/\Delta T_A$ | T _A =0~85°C, I _{OUT} =10mA, V _{OUT} =3V Version | | 0.2 | | mV/°C |
| Output Noise Voltage | e _N | f=10Hz ~ 80kHz, I _{OUT} =10mA, V _{OUT} =3V Version | | 30 | | μVrms |
| Control Voltage | ON | V _{CONT(ON)} | 1.6 | | | V |
| | OFF | V _{CONT(OFF)} | | | 0.6 | V |

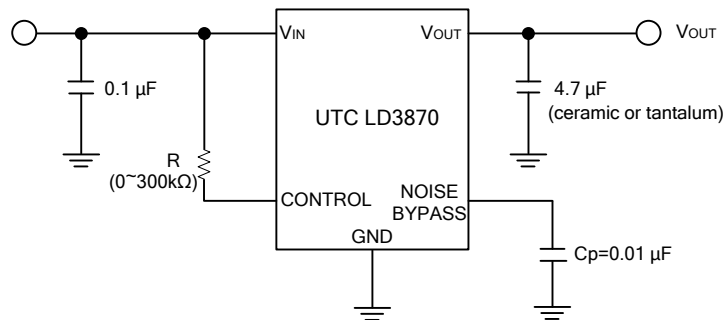
Note: The above specification is a common specification for all output voltages. Therefore, it may be different from the individual specification for a specific output voltage.

■ TEST CIRCUIT



■ TYPICAL APPLICATION

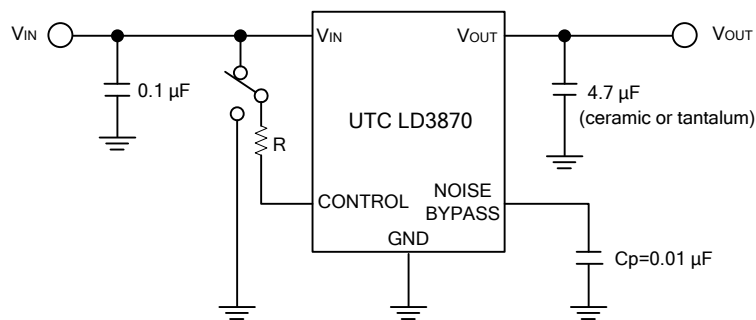
For ON/OFF Control is not required:



Connect control terminal to V_{IN} 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 C_p
 - Noise bypass capacitance C_p reduces noise generated by hand-gap reference circuit.
 - Noise level and ripple rejection will be improved when larger C_p is used.
 - Use of smaller C_p value may cause oscillation.
 - Use the C_p value of 0.01 μ F greater to avoid the problem.

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