



LR78XX

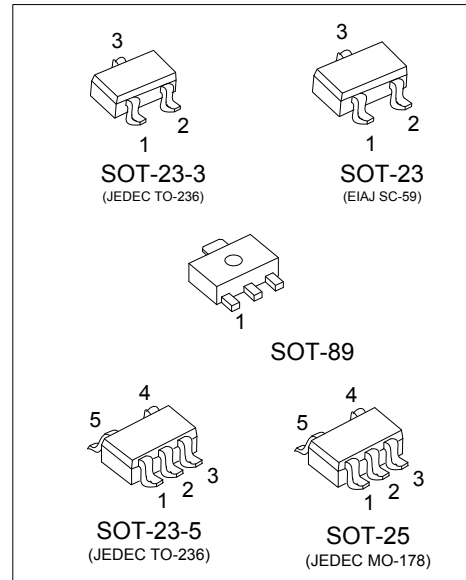
CMOS IC

LOW NOISE 500mA LDO REGULATOR

DESCRIPTION

The UTC **LR78XX** is a COMS positive linear regulator. One of its feature is the very low quiescent current typical as low as 4.3μA and its dropout voltage is extremely low with 500mA output current, and high ripple rejection. Each of these ICs consists of a voltage reference unit, an error amplifier, resistor-net for voltage setting, a short current limit circuit, a chip enable circuit, and so on.

These ICs perform with low dropout voltage and the chip-enable function. The supply current at no load of this IC is only 4.3μA, and the line transient response and the load transient response of the UTC **LR78XX** Series are excellent, thus these ICs are very suitable for the power supply for hand-held communication equipment.



FEATURES

- * Low supply current Typ. 4.3μA
- * Standby mode Typ. 0.1μA
- * Output Voltage Range 1.2V~5.0V
- * Excellent line regulation Typ. 0.02%/V
- * Built-in fold back protection circuit
- * Ceramic capacitors are recommended to be used with this IC
C_{IN}=C_{OUT}=1μF

ORDERING INFORMATION

| Ordering Number | | Package | Packing |
|-----------------|---------------|----------|-----------|
| Lead Free | Halogen Free | | |
| LR78XXL-AB3-R | LR78XXG-AB3-R | SOT-89 | Tape Reel |
| LR78XXL-AE2-R | LR78XXG-AE2-R | SOT-23-3 | Tape Reel |
| LR78XXL-AE3-R | LR78XXG-AE3-R | SOT-23 | Tape Reel |
| LR78XXL-AE5-R | LR78XXG-AE5-R | SOT-23-5 | Tape Reel |
| LR78XXL-AF5-R | LR78XXG-AF5-R | SOT-25 | Tape Reel |

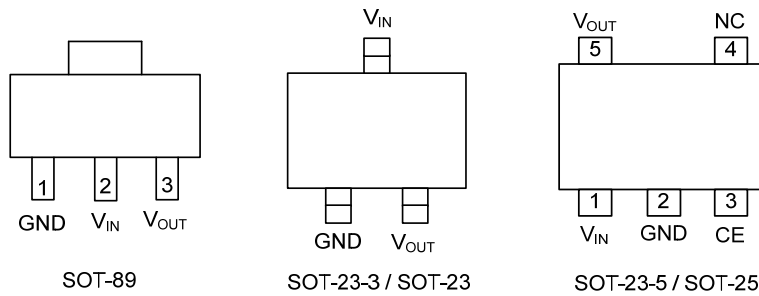
Note: xx: Output Voltage, refer to Marking Information.

| | |
|----------------------|---|
| <p>LR78XXG-AB3-R</p> | <p>(1) R: Tape Reel (2) AB3: SOT-89, AE2: SOT-23-3, AE3: SOT-23, AE5: SOT-23-5, AF5: SOT-25 (3) G: Halogen Free and Lead Free, L: Lead Free (4) xx: refer to Marking Information</p> |
|----------------------|---|

MARKING INFORMATION

| PACKAGE | VOLTAGE CODE | MARKING |
|--------------------|--|---------|
| SOT-23-3 SOT-23 | 15: 1.5V 20: 2.0V 25: 2.5V 28: 2.8V 33: 3.3V 36: 3.6V 50: 5.0V | |
| SOT-23-5 SOT-25 | | |
| SOT-89 | | |

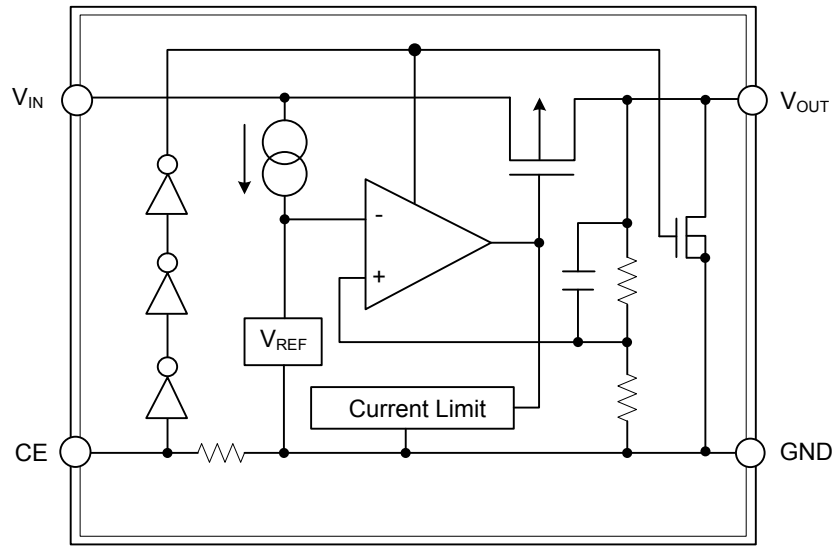
PIN CONFIGURATION



PIN DESCRIPTION

| PIN NO. | | | PIN NAME | DESCRIPTION |
|--------------------|--------------------|--------|-----------|-----------------|
| SOT-23-3 SOT-23 | SOT-23-5 SOT-25 | SOT-89 | | |
| 1 | 2 | 1 | GND | Ground pin |
| 2 | 5 | 3 | V_{OUT} | Output pin |
| 3 | 1 | 2 | V_{IN} | Input pin |
| - | 3 | - | CE | Chip enable pin |
| - | 4 | - | NC | No connection |

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|-----------------------------|----------|-----------|---------------------|------|
| Input Voltage | | V_{IN} | 8 | V |
| Input Voltage (CE Pin) | | V_{CE} | 8 | V |
| Output Voltage | | V_{OUT} | -0.3 ~ $V_{IN}+0.3$ | V |
| Output Current | | I_{OUT} | 500 | mA |
| Power Dissipation | SOT-23-3 | P_D | 280 | mW |
| | SOT-23 | | | |
| | SOT-23-5 | | 300 | mW |
| | SOT-25 | | 360 | mW |
| | SOT-89 | | 500 | mW |
| Operating Temperature Range | | T_{OPT} | -40 ~ +85 | °C |
| Storage Temperature Range | | 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

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|---------------------------------|---|----------------|-----------|----------------|----------|
| Output Voltage | V_{OUT} | $V_{IN} = \text{Set } V_{OUT}+1V, 1mA \leq I_{OUT} \leq 30mA$ | $\times 0.980$ | | $\times 1.020$ | V |
| Output Current | I_{OUT} | $V_{IN}-V_{OUT}=1.0V$ | 500 | | | mA |
| Load Regulation | $\Delta V_{OUT}/\Delta I_{OUT}$ | $V_{IN}=\text{Set } V_{OUT}+1V, 1mA \leq I_{OUT} \leq 150mA, 1.2V \leq V_{OUT} < 2.0V,$ | | 28 | 55 | mV |
| | | $2.0V \leq V_{OUT} < 3.0V$ | | 33 | 66 | mV |
| | | $3.0V \leq V_{OUT}$ | | 35 | 80 | mV |
| Dropout Voltage | V_{DIF} | refer to the ELECTRICAL CHARACTERISTICS by OUTPUT VOLTAGE | | | | |
| Supply Current | I_{SS} | $V_{IN}=\text{Set } V_{OUT}+1V, I_{OUT}=0mA$ | | 4.3 | | μA |
| Supply Current (Standby) | $I_{standby}$ | $V_{IN}=\text{Set } V_{OUT}+1V, V_{CE}=\text{GND}$ | | 0.1 | | μA |
| Line Regulation | $\Delta V_{OUT}/\Delta V_{IN}$ | $\text{Set } V_{OUT}+0.5V \leq V_{IN} \leq 6.0V, I_{OUT}=30mA$ | | 0.02 | 0.10 | %/V |
| Ripple Rejection | RR | $f=1kHz$ | | 50 | | dB |
| | | $f=10kHz, \text{Ripple } 0.2V_{p-p}, V_{IN}-V_{OUT}=1.0V, I_{OUT}=30mA$ | | 45 | | dB |
| Input Voltage | V_{IN} | | 1.8 | | 8.0 | V |
| Output Voltage Temperature Coefficient | $\Delta V_{OUT}/\Delta T$ | $I_{OUT}=30mA, -40^\circ C \leq T_{OPT} \leq 85^\circ C$ | | ± 100 | | ppm/°C |
| Short Current Limit | I_{LIM} | $V_{OUT}=0V$ | | 80 | | mA |
| CE Pull-Down Resistance | I_{PD} | | | 0.5 | | μA |
| CE Input Voltage "H" | V_{CEH} | | 1.5 | | 6.0 | V |
| CE Input Voltage "L" | V_{CEL} | | 0.0 | | 0.3 | V |
| On Resistance of Nch Tr. for auto-discharge (Only for D version) | R_{LOW} | $V_{CE}=0V$ | | 70 | | Ω |

■ ELECTRICAL CHARACTERISTICS BY OUTPUT VOLTAGE

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT | |
|-----------------|-----------|-----------------|----------------------------|-----|------|------|---|
| Dropout Voltage | V_{DIF} | $I_{OUT}=150mA$ | $V_{OUT}=1.2V$ | | 0.52 | | V |
| | | | $1.5V < V_{OUT} \leq 1.6V$ | | 0.38 | | V |
| | | | $1.6V < V_{OUT} \leq 1.7V$ | | 0.32 | | V |
| | | | $1.7V < V_{OUT} \leq 2.0V$ | | 0.28 | | V |
| | | | $2.0V < V_{OUT} \leq 2.7V$ | | 0.16 | | V |
| | | | $2.7V < V_{OUT} \leq 5.0V$ | | 0.14 | | V |

■ TEST CIRCUIT

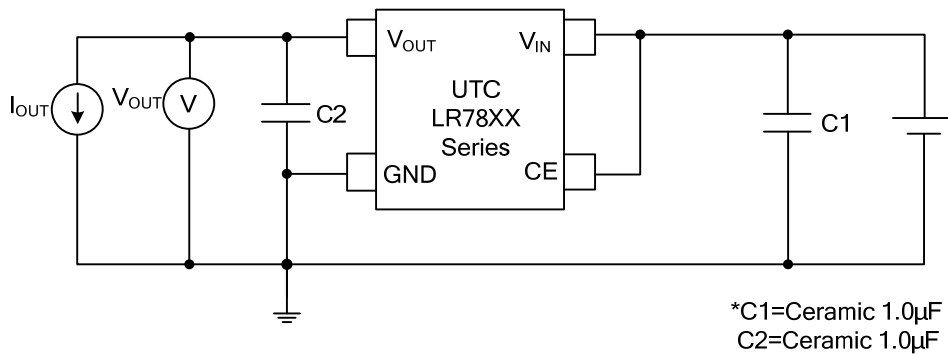


Fig.1 Standard test Circuit

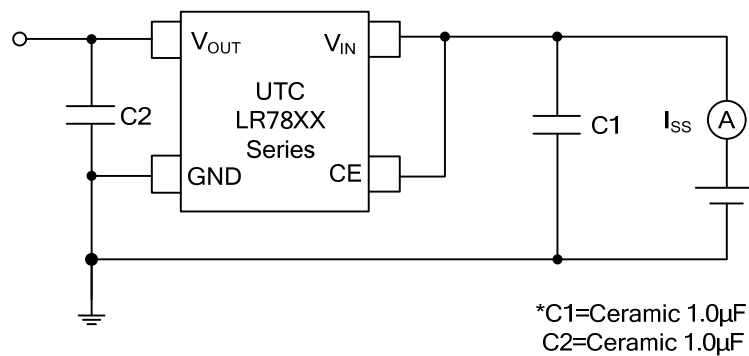


Fig.2 Supply Current Test Circuit

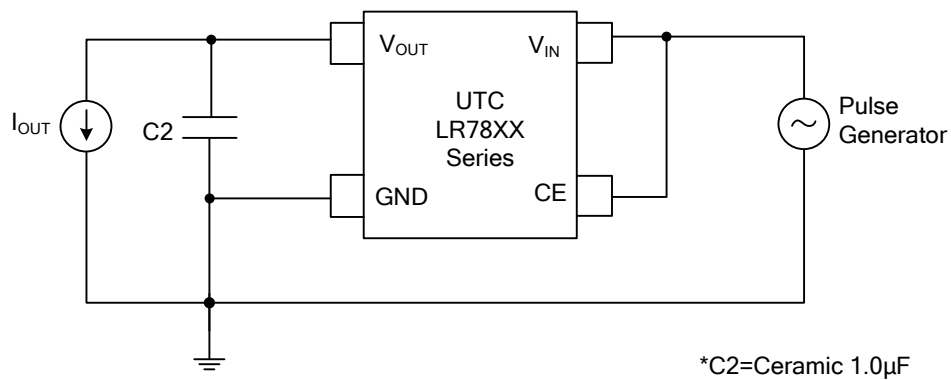
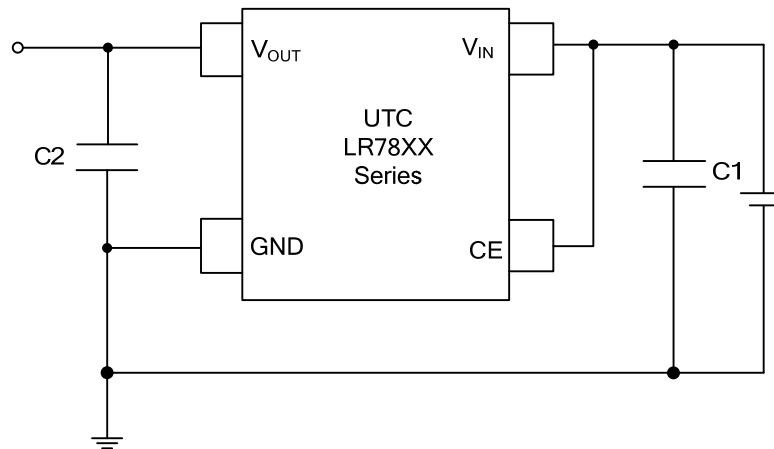


Fig.3 Ripple Rejection, Line Transient

■ TYPICAL APPLICATION CIRCUIT



(External Components)

C1 Ceramic 1.0 μ F

C2 Ceramic 1.0 μ F

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