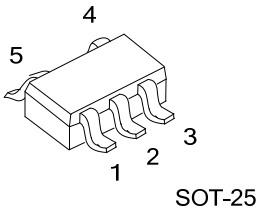
# LR1122D

**CMOS IC**

## LOW NOISE 200mA LDO REGULATOR



SOT-25

## ■ DESCRIPTION

The UTC **LR1122D** 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 **LR1122D**, 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 **LR1122D** 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 **LR1122D**.

The UTC **LR1122D** 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: 18μA (Typ.)
* Standby Mode: 0.1μA (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: ±30ppm/°C (Typ.)
* Well Line Regulation: 0.02%/ V (Typ.)
* Output Voltage Accuracy: ±0.8% (Typ.)
* Internal Fold Back Protection Circuit: 40mA (Typ.) @ short mode
* $C_{IN}$=$C_{OUT}$=1μF or more (Ceramic capacitors) are recommended to be used with this IC

## ■ ORDERING INFORMATION

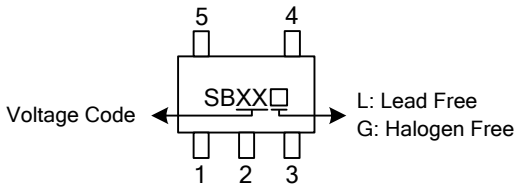
| Ordering Number | | Package | Packing |
|---|---|---|---|
| Lead Free | Halogen Free | | |
| LR1122DL-xx-AF5-R | LR1122DG-xx-AF5-R | SOT-25 | Tape Reel |

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

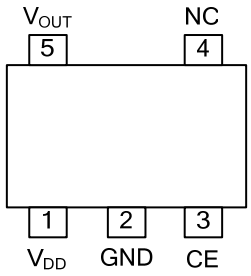
LR1122DL-xx-AF5-R
- (1)Packing Type
- (2)Package Type
- (3)Output Voltage Code
- (4)Lead Free
- (5)Designation of Mask Option

(1) R: Tape Reel
(2) AF5: SOT-25
(3) xx: Refer to Marking Information
(4) G: Halogen Free, L: Lead Free
(5) D: active high, with auto discharge function at OFF state.

## ■ MARKING

| PACKAGE | VOLTAGE CODE | MARKING |
|---|---|---|
| SOT-25 | 12:1.2V<br>15:1.5V<br>16:1.6V<br>18:1.8V<br>20:2.0V<br>25:2.5V<br>2J:2.85V<br>30:3.0V<br>33:3.3V |  |

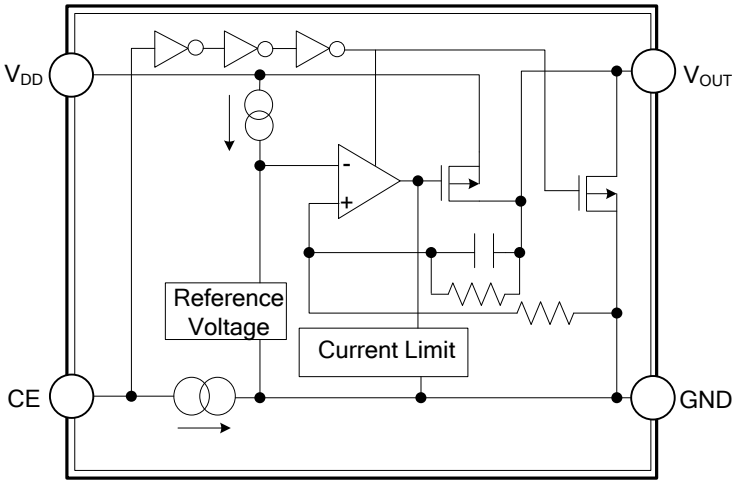
## ■ PIN CONFIGURATION




## ■ PIN DESCRIPTIONS

| PIN NO. | PIN NAME | DESCRIPTION |
|---|---|---|
| 1 | $V_{DD}$ | 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 | $V_{IN}$ | 6.0 | V |
| Input Voltage(CE Pin) | $V_{CE}$ | 6.0 | V |
| Output Voltage | $V_{OUT}$ | -0.3~ $V_{IN}$+0.3 | V |
| Output Current | $I_{OUT}$ | 300 | mA |
| Power Dissipation | $P_D$ | 420 | mW |
| Junction Temperature | $T_J$ | +125 | °C |
| Operating Temperature | $T_{OPR}$ | -40~+85 | °C |
| Storage Temperature | $T_{STG}$ | -55~+125 | °C |

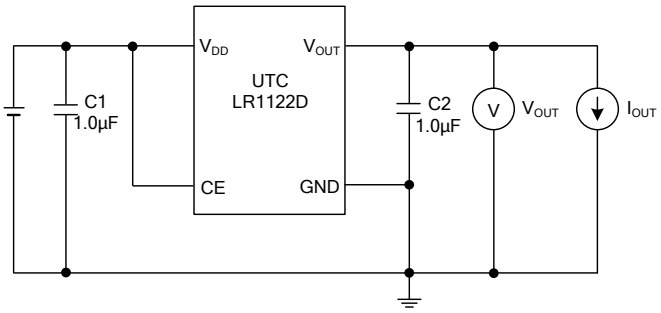
Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

## ■ ELECTRICAL CHARACTERISTICS

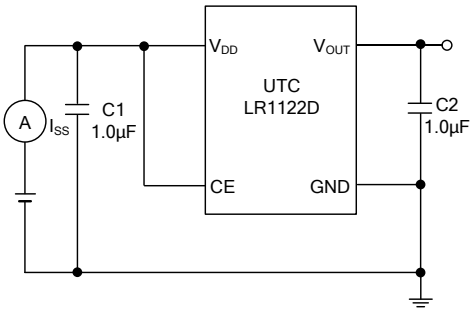
($T_A$=25°C, $V_{IN}$=Set $V_{OUT}$+1V, $I_{OUT}$=1mA, $C_I$ =$C_O$=1μF, unless otherwise specified)

| PARAMETER | | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|---|
| Output Voltage | | $V_{OUT}$ | $V_{IN}$ = Set $V_{OUT}$+1V | $V_{OUT}$ > 2.0V | ×0.992 | | ×1.008 | V |
| | | | | $V_{OUT}$ ≤ 2.0V | -16 | | +16 | mV |
| Input Voltage | | $V_{IN}$ | | | | | 5.0 | V |
| Load Regulation | | $\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$ | 1mA≤$I_{OUT}$≤150mA | | | 20 | 40 | mV |
| Output Current | | $I_{OUT}$ | | | 200 | | | mA |
| Supply Current | | $I_{SS}$ | $I_{OUT}$=0A | | | 18 | 25 | μA |
| Supply Current (Standby) | | $I_{ST-BY}$ | $V_{CE}$=0V | | | 0.1 | 2 | μA |
| Short Current Limit | | $I_{LIMIT}$ | $V_{OUT}$=0V | | | 40 | | mA |
| CE Pull-down Current | | $I_{PD}$ | | | | 0.3 | | μA |
| CE Input Voltage | High | $V_{CEH}$ | | | 1.5 | | | V |
| | Low | $V_{CEL}$ | | | | | 0.3 | V |
| Output Noise | | eN | $B_W$=10Hz to 100kHz, $I_{OUT}$ =30mA | | | 30 | | μVrms |
| Ripple Rejection | | RR | f=1kHz, Ripple 0.2$V_{P-P}$<br>$V_{IN}$=Set $V_{OUT}$+1V, $I_{OUT}$=30mA<br>(In case that $V_{OUT}$=2.0V, $V_{IN}$=3V) | | | 75 | | dB |
| Dropout Voltage | | $V_D$ | $I_{OUT}$=150mA | 1.2V≤$V_{OUT}$＜1.5V | | 0.40 | 0.50 | V |
| | | | | 1.5V≤$V_{OUT}$＜1.7V | | 0.24 | 0.38 | |
| | | | | 1.7V≤$V_{OUT}$＜2.0V | | 0.21 | 0.34 | |
| | | | | 2.0V≤$V_{OUT}$＜2.5V | | 0.17 | 0.30 | |
| | | | | 2.5V≤$V_{OUT}$＜2.8V | | 0.14 | 0.25 | |
| | | | | 2.8V≤$V_{OUT}$＜3.3V | | 0.13 | 0.23 | |
| Line Regulation | | $\frac{\Delta V_{OUT}}{\Delta V_{IN}}$ | Set $V_{OUT}$+0.5V≤$V_{IN}$≤5V | | | 0.02 | 0.10 | %/V |
| Output Voltage Temperature Coefficient | | $\frac{\Delta V_{OUT}}{\Delta T}$ | -40°C≤$T_{OPR}$≤85°C | | | ±30 | | ppm/°C |
| Low Output Nch Tr. ON Resistance | | $R_{LOW}$ | VIN=4.0,VCE=0V | | | 70 | | Ω |

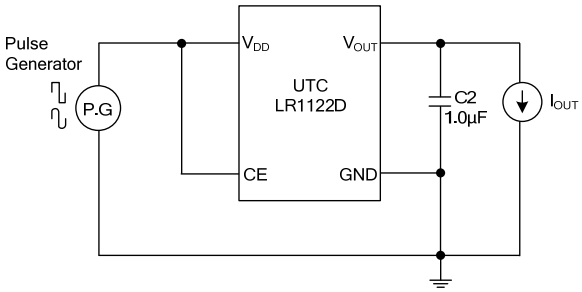
## ■ TEST CIRCUIT



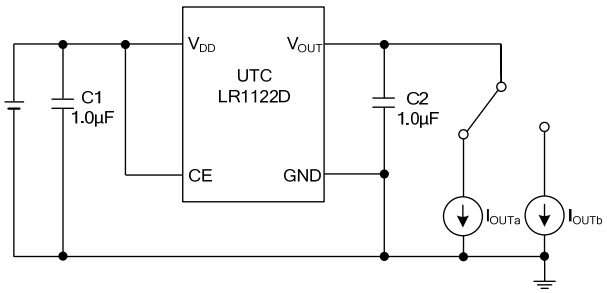

Basic Test Circuit




Test Circuit for Supply Current

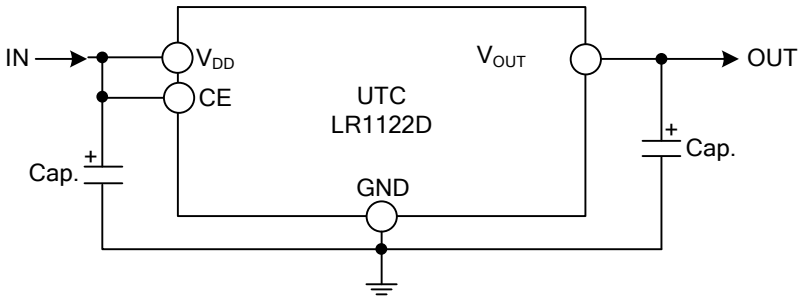



Test Circuit for Ripple Rejection

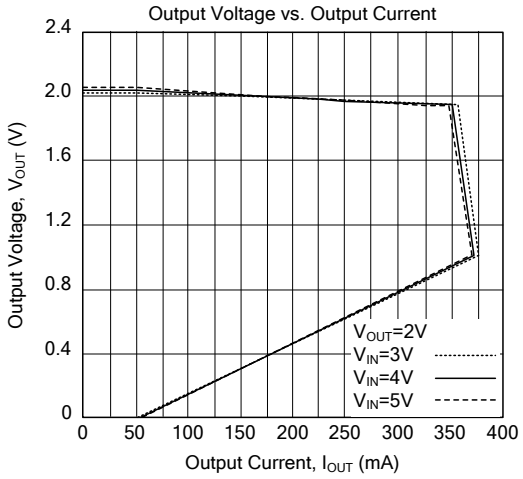


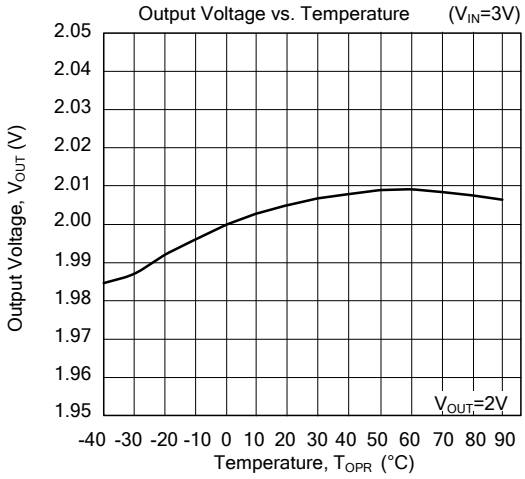

Test Circuit for Load Transient Response

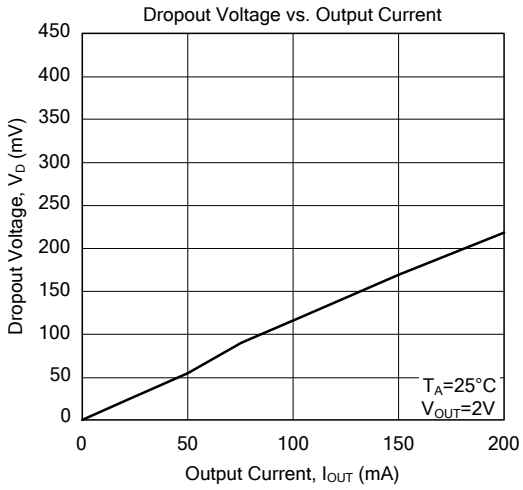
## ■ TYPICAL APPLICATION CIRCUIT

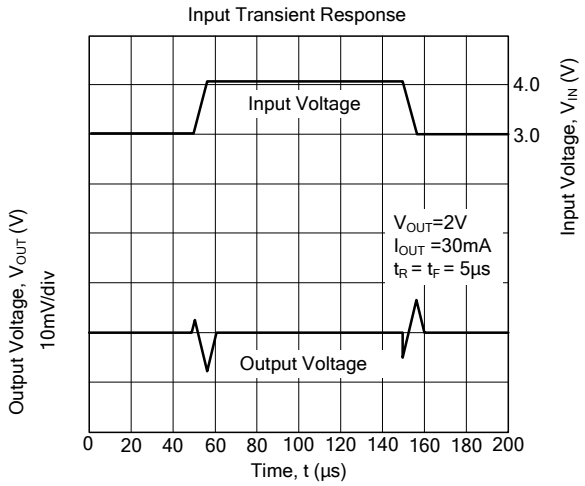


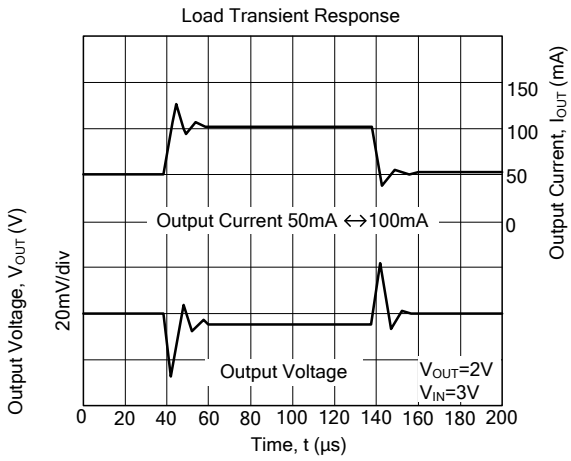
## ■ TYPICAL CHARACTERISTICS

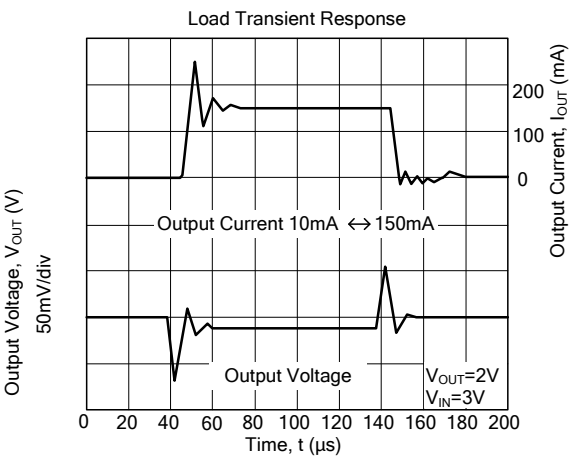


## ■ TYPICAL CHARACTERISTICS(Cont.)