



UR533

LINEAR INTEGRATED CIRCUIT

5A ADJUSTABLE/FIXED ULTRA LOW DROP-OUT LINEAR REGULATOR

DESCRIPTION

The UTC **UR533** is ultra-low dropout regulators with 5A output current capability. This device has been optimized for low voltage applications including V_{TT} bus termination, where transient response and minimum input voltage is critical. The UTC **UR533** is ideal for low voltage microprocessor applications requiring a regulated output from 1.3V ~ 5.7V with a power input supply of 1.75V ~ 6.5V.

Current limit ensures controlled short-circuit current. On-chip thermal limiting provides protection against any combination of overload and ambient temperature that would create excessive junction temperatures.

FEATURES

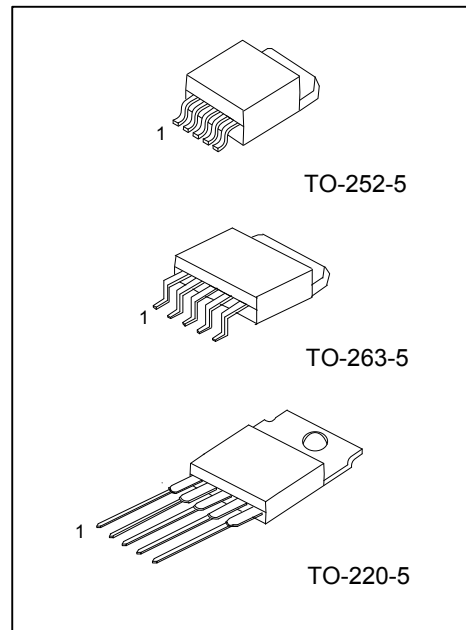
- * Ultra Low dropout voltage
- * Remote sense operation
- * Fast transient response
- * Load regulation: 0.05% typical
- * 0.5% initial accuracy
- * On-chip thermal limiting

ORDERING INFORMATION

| Ordering Number | | | Package | Packing |
|-----------------|-----------------|-----------------|----------|-----------|
| Normal | Lead Free | Halogen Free | | |
| UR533-xx-TA5-T | UR533L-xx-TA5-T | UR533G-xx-TA5-T | TO-220-5 | Tube |
| UR533-xx-TN5-R | UR533L-xx-TN5-R | UR533G-xx-TN5-R | TO-252-5 | Tape Reel |
| UR533-xx-TQ5-R | UR533L-xx-TQ5-R | UR533G-xx-TQ5-R | TO-263-5 | Tape Reel |
| UR533-xx-TQ5-T | UR533L-xx-TQ5-T | UR533G-xx-TQ5-T | TO-263-5 | Tube |

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

| | |
|--|--|
| | <p>(1) R: Tape Reel, T: Tube</p> <p>(2) TA5: TO-220-5, TN5: TO-252-5, TQ5: TO-263-5</p> <p>(3) xx: refer to Marking Information</p> <p>(4) G: Halogen Free, L: Lead Free, Blank: Pb/Sn</p> |
|--|--|



Lead-free: UR533L-xx
Halogen-free: UR533G-xx

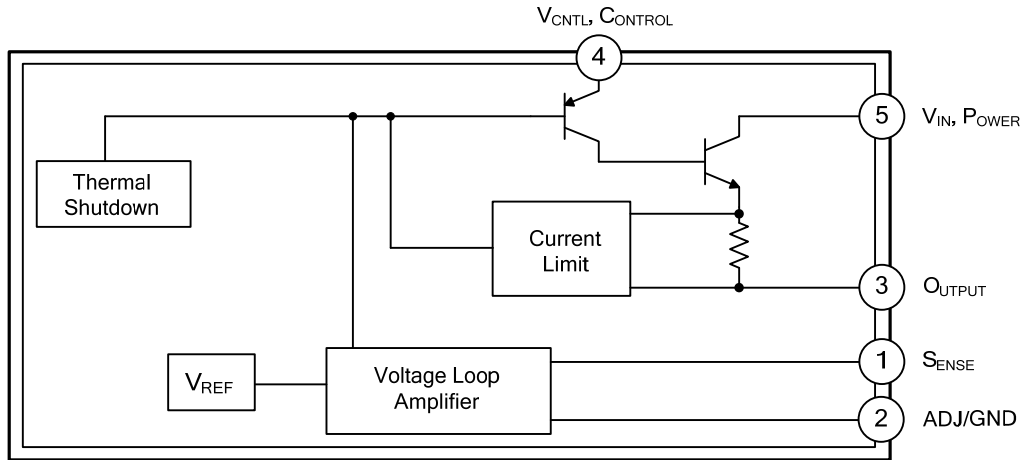
MARKING INFORMATION

| PACKAGE | VOLTAGE CODE | MARKING |
|----------|--------------|---------|
| TO-220-5 | 15 :1.5V | |
| TO-252-5 | 25 :2.5V | |
| TO-263-5 | AD:ADJ | |

PIN DESCRIPTIONS

| PIN NO. | PIN NAME | DESCRIPTION |
|---------|-------------|---|
| 1 | V_{SENSE} | Remote Voltage Sense. |
| 2 | ADJ/GND | Adjust for UR533-ADJ , the output voltage determined by feedback voltage. Ground for fixed output products(UR533-xx) |
| 3 | V_{OUT} | Output Voltage. |
| 4 | V_{CNTL} | Control Voltage. |
| 5 | V_{IN} | Input Voltage. |

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|--------------------------------|-------------------|----------|------|
| Input Voltage | V _{IN} | 7 | V |
| Control Voltage | V _{CNTL} | 13.2 | V |
| Operating Junction Temperature | T _{OPR} | -40~+85 | °C |
| Storage Temperature | T _{STG} | -65~+150 | °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.

■ THERMAL DATA

| PARAMETER | SYMBOL | RATINGS | UNIT | |
|------------------|----------|-----------------|------|------|
| Junction to Case | TO-220-5 | θ _{JC} | 3 | °C/W |
| | TO-252-5 | | 8 | °C/W |
| | TO-263-5 | | 4 | °C/W |

■ ELECTRICAL CHARACTERISTICS (T_C = 25°C, V_{OUT} = V_S, V_{ADJ} = 0V unless otherwise specified.)

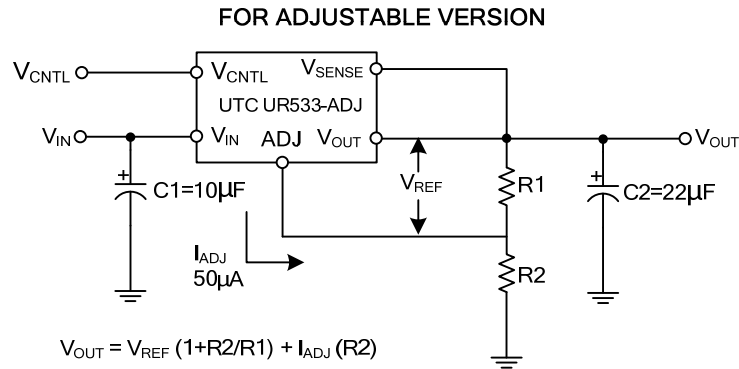
For UR533-AD(Adjustable)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|----------------------|--------------------------------------|--|------------------|-------|-------|------|
| Reference Voltage | V _{REF} | V _{IN} = 2.0V, V _{CNTL} = 2.75V, I _{OUT} = 10mA | 1.243 | 1.250 | 1.257 | V |
| | | 2.05V ≤ V _{IN} ≤ 5.5V, 2.7V ≤ V _{CNTL} ≤ 12V, 10mA ≤ I _{OUT} ≤ 5A | 1.237 | 1.250 | 1.263 | V |
| Output Voltage | V _{OUT} | 3V ≤ V _{IN} ≤ 7V, 10mA ≤ I _{OUT} ≤ 5A | V _{REF} | 1.5 | 5.7 | V |
| Line Regulation | ΔV _{OUT} | 1.75V ≤ V _{IN} ≤ 5.5V, 2.5V ≤ V _{CNTL} ≤ 12V, I _{OUT} = 10mA | | 1 | 3 | mV |
| Load Regulation | ΔV _{OUT} | V _{IN} = 2.1V, V _{CNTL} = 2.75V, 10mA ≤ I _{OUT} ≤ 5A | | 1 | 5 | mV |
| Dropout Voltage | V _{CNTL} - V _{OUT} | V _{IN} = 2.05V, ΔV _{REF} = 1%, I _{OUT} = 5A | | 1.05 | 1.18 | V |
| | V _{IN} - V _{OUT} | V _{CNTL} = 2.75V, ΔV _{REF} = 1%, I _{OUT} = 5A | | 0.4 | 0.5 | V |
| Current Limit | I _{LIMIT} | V _{IN} = 2.05V, V _{CNTL} = 2.75V | 5.2 | | | A |
| Control Pin Current | I _{CTRL} | V _{IN} = 2.05V, V _{CNTL} = 2.75V, I _{OUT} = 10mA | | 2 | 6 | mA |
| Adjust Pin Current | I _{ADJ} | V _{IN} = 2.05V, V _{CNTL} = 2.75V | | 50 | 120 | μA |
| Minimum Load Current | I _{LOAD} | V _{IN} = 3.3V, V _{CNTL} = 5V | | 5.0 | 10 | mA |
| Ripple Rejection | RR | V _{IN} = 3.75V, V _{CNTL} = 3.75V, f = 120Hz, C _{OUT} = 22μF Tantalum, I _{OUT} = 2.5A | | 80 | | dB |
| Thermal Regulation | | T _a = 25°C, 30ms pulse | | 0.002 | 0.02 | %/W |
| Thermal Shutdown | | | | 150 | | °C |

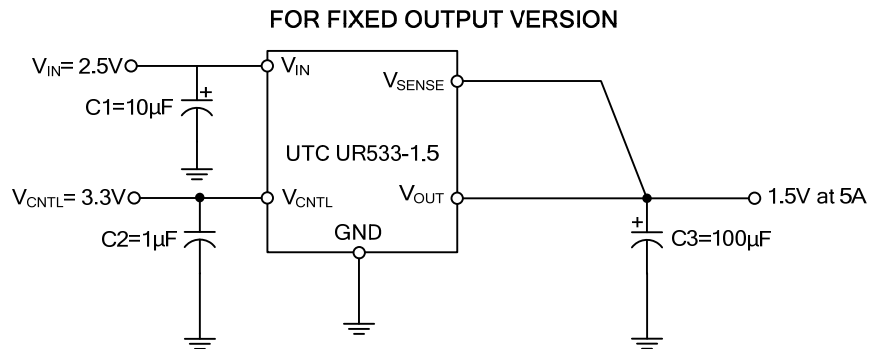
For UR533-xx(Fixed)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT | |
|----------------------|--------------------------------------|--|---|-------|------|-------|---|
| Output Voltage | UR533-15 | V _{OUT} | 3V ≤ V _{IN} ≤ 7V, 10mA ≤ I _{OUT} ≤ 5A | 1.47 | 1.5 | 1.53 | V |
| | UR533-25 | V _{OUT} | 5.1V ≤ V _{IN} ≤ 7V, 10mA ≤ I _{OUT} ≤ 5A | 2.474 | 2.5 | 2.526 | V |
| Line Regulation | ΔV _{OUT} | 1.75V ≤ V _{IN} ≤ 5.5V, 2.5V ≤ V _{CNTL} ≤ 12V, I _{OUT} = 10mA | | 1 | 3 | mV | |
| Load Regulation | ΔV _{OUT} | V _{IN} = 2.1V, V _{CNTL} = 2.75V, 10mA ≤ I _{OUT} ≤ 5A | | 1 | 5 | mV | |
| Dropout Voltage | V _{CNTL} - V _{OUT} | V _{IN} = 2.05V, ΔV _{REF} = 1%, I _{OUT} = 5A | | 1.05 | 1.18 | V | |
| Dropout Voltage | V _{IN} - V _{OUT} | V _{CNTL} = 2.75V, ΔV _{REF} = 1%, I _{OUT} = 5A | | 0.4 | 0.5 | V | |
| Current Limit | I _{LIMIT} | V _{IN} = 2.05V, V _{CNTL} = 2.75V | 5.2 | | | A | |
| Control Pin Current | I _{CTRL} | V _{IN} = 2.05V, V _{CNTL} = 2.75V, I _{OUT} = 10mA | | 2 | 6 | mA | |
| Minimum Load Current | I _{LOAD} | V _{IN} = 3.3V, V _{CNTL} = 5V | | 5.0 | 10 | mA | |
| Ripple Rejection | RR | V _{IN} = 3.75V, V _{CNTL} = 3.75V, f = 120Hz, C _{OUT} = 22μF Tantalum, I _{OUT} = 2.5A | | 80 | | dB | |
| Thermal Regulation | | T _a = 25°C, 30ms pulse | | 0.002 | 0.02 | %/W | |
| Thermal Shutdown | | | | 150 | | °C | |

■ TYPICAL APPLICATION CIRCUIT

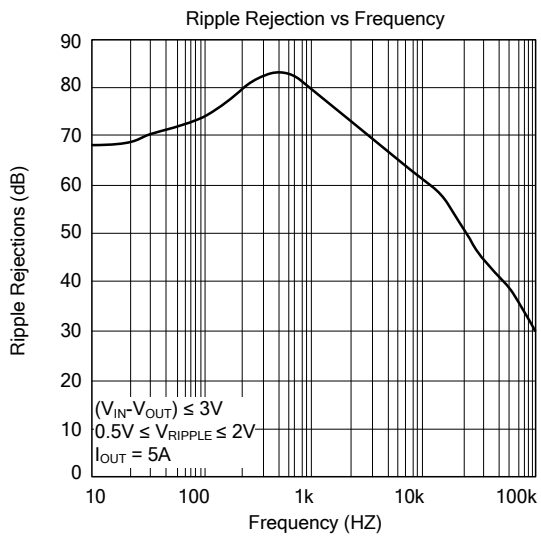
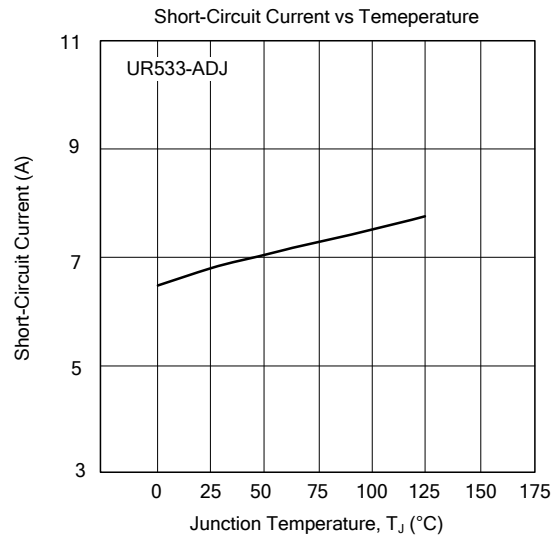
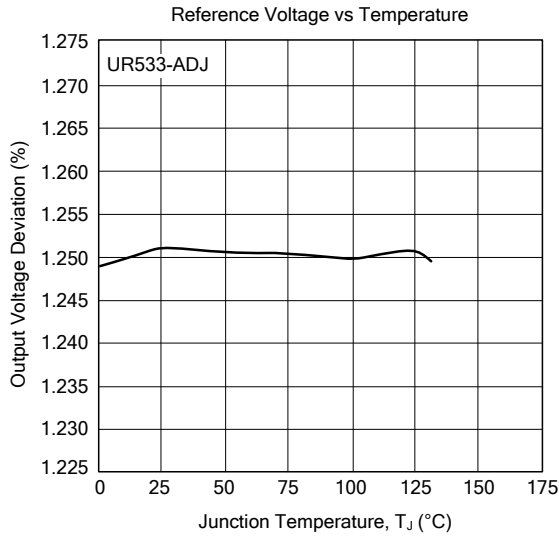
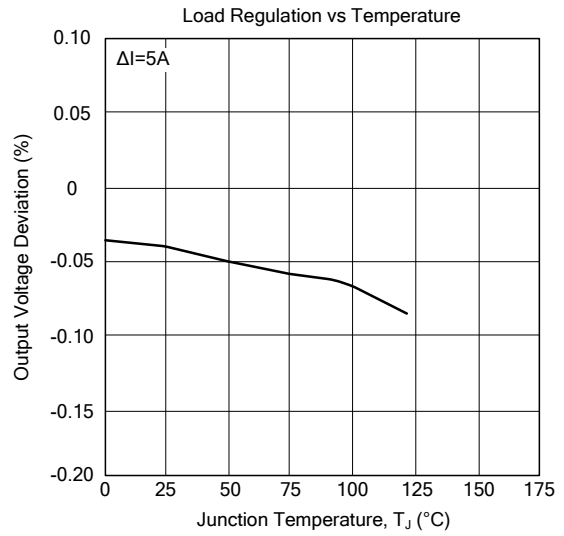
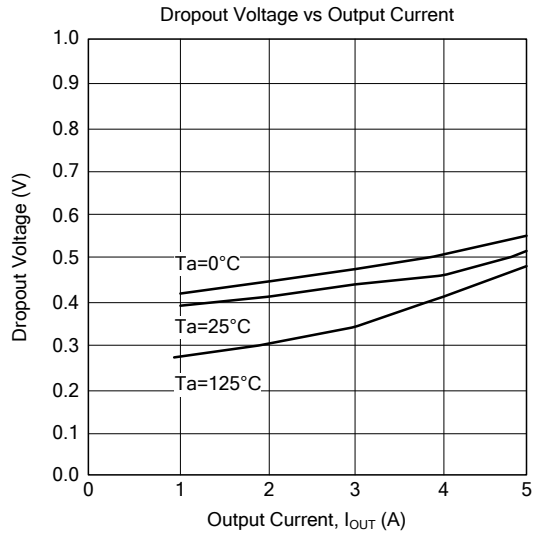


Note: C2 is recommended to use 22µF solid tantalum or 100µF aluminum electrolytic for output stability.



Note: C3 is recommended to use 22µF solid tantalum or 100µF aluminum electrolytic for output stability.

■ TYPICAL PERFORMANCE CHARACTERISTICS



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