

TRIUNE PRODUCTS**Features**

- Wide input supply operating range
 - ♦ TS31023 : 5V-16V
 - ♦ TS31223 : 5V-36V
- Adjustable output voltage from 1.25V to $V_{IN} - V_{dropout}$
- 60mA output current capability
- Enable control function

Applications

- Set-top Boxes
- Automotive
- Industrial
- Medical
- Energy harvesting systems
- Wireless Power

Description

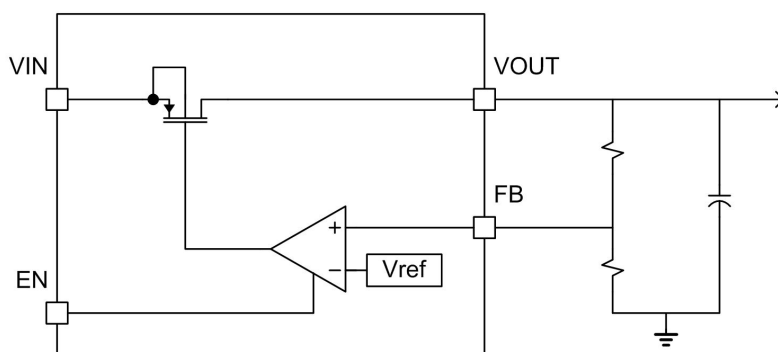
The TS31x23 high voltage linear regulator consists of a low power amplifier with a high voltage p-channel pass gate.

The linear regulator has a wide operating range, and is ideal for systems that may have large voltage transients and require the output load to remain regulated.

An analog current limit is used to limit output current and protect the regulator from external short circuits.

Summary Specification

- Packaged in a 8pin DFN (2x2)

Typical Application Circuit

Pin-out Configuration

| Pin # | Pin Symbol | I/O/P | Description |
|-------|------------|-------|--------------------------|
| 1 | GND | P | Ground |
| 2 | VOUT | O | Regulated Output Voltage |
| 3 | N/C | | No Connect |
| 4 | N/C | | No Connect |
| 5 | N/C | | No Connect |
| 6 | FB | I | Feedback Voltage |
| 7 | VIN | P | Input Voltage |
| 8 | EN | I | ENABLE Input |

Absolute Maximum Ratings

Over operating free-air temperature range unless otherwise noted(1,2)

| | | Unit |
|--|--|------|
| VIN | -0.3 to 18 (TS31023) -0.3 to 40 (TS31223) | V |
| VOUT | -0.3 to 18 (TS31023) -0.3 to 40 (TS31223) | V |
| EN, FB | -0.3 to 6.0 | V |
| Electrostatic Discharge – Human Body Model | 2 | kV |
| Maximum junction temperature, TJ | 150 | °C |
| Storage temperature range, Tstg | -65 to 150 | °C |
| Lead Temperature (soldering, 10 seconds) | 260 | °C |

Note 1: Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

Note 2: All voltage values are with respect to network ground terminal.

Thermal Characteristics

| Package DFN | θ_{JA} (°C/W) (See Note 4) | θ_{JC} (°C/W) (See Note 5) |
|----------------|--------------------------------------|--------------------------------------|
| 8 pin | 73.1 | 10.7 |

Note 4: This assumes a FR4 board only.

Note 5: This assumes a 1oz. Copper JEDEC standard board with thermal vias. See Exposed Pad section and application note for more information.

Recommended Operating Conditions

| Parameter | Min | Max | Units |
|--|------|------------------------------|-------|
| Unregulated Supply Input Voltage (VIN) | 5 | 16 (TS31023) 36 (TS31223) | V |
| Enable Input (EN) | 0 | 5 | V |
| Regulated Supply Output Voltage (VOUT) | 1.25 | VIN - V _{dropout} | V |
| Operating Junction Temperature, T _j | -40 | 125 | °C |

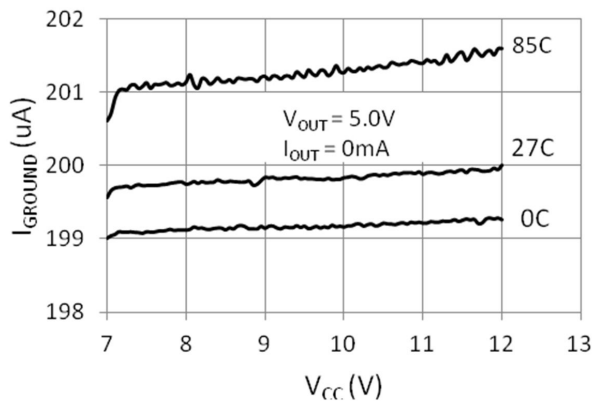
Electrical Characteristics (T=25°C unless otherwise specified)

Electrical characteristics, VIN = 12V, T_j = 25C, unless otherwise noted

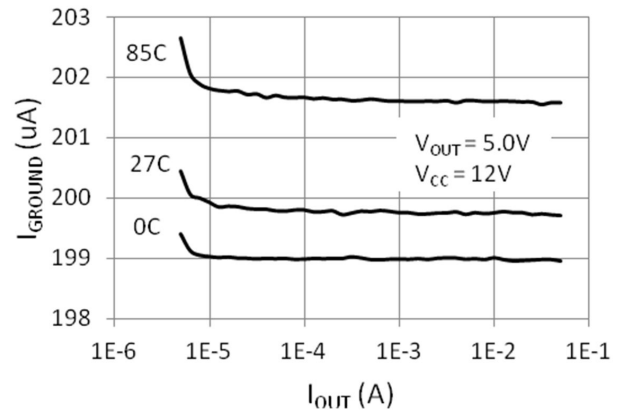
| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Units |
|------------------------------|-----------------------|--|------|------|----------------------------|-------|
| Input Supply Voltage | VIN | TS31023 | 5 | | 16 | V |
| | | TS31223 | 5 | | 36 | V |
| Output Voltage | VOUT | | 1.25 | | VIN - V _{dropout} | V |
| Feedback Voltage | FB | V _{IN} = 12V | 1.10 | 1.20 | 1.30 | V |
| Output Bypass Capacitor | C _{OUT} | | 1 | 2.2 | 4.7 | uF |
| Disabled Current | I _{off(VIN)} | EN=0V, V _{IN} =12V | | 1 | | uA |
| Quiescent Current | I _{qq(VIN)} | EN=5V, I _{OUT} = 0 | | 220 | | uA |
| Load Capability | I _{OUT} | | | | 60 | mA |
| DC Line Regulation (TS31023) | V _{Line} | V _{IN} = 5.5V to 16V, V _{OUT} =5.0V, I _{OUT} = 5mA | | 0.1 | 0.6 | % |
| DC Line Regulation (TS31223) | | V _{IN} = 5.5V to 36V, V _{OUT} =5.0V, I _{OUT} = 5mA | | 0.1 | 0.6 | % |
| DC Load Regulation (TS31023) | V _{Load} | V _{IN} = 12V, V _{OUT} =5.0V, I _{OUT} = 1mA to 60mA | | 0.02 | 0.35 | % |
| | | V _{IN} = 6V, Vout=5.0V, I _{OUT} = 1mA to 60mA | | 0.02 | 0.15 | % |
| Current Limit | I _{Limit} | V _{IN} = 12V | | 100 | | mA |

Typical Performance Characteristics

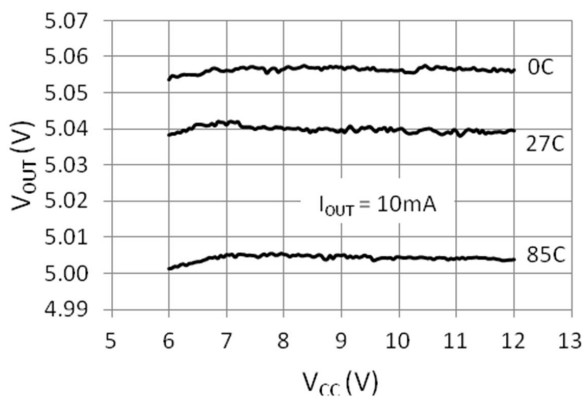
I_{qq} Performance vs. Supply Voltage



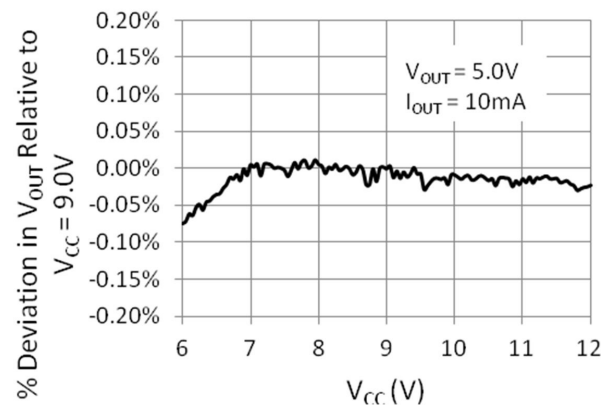
I_{qq} Performance vs. Load Current



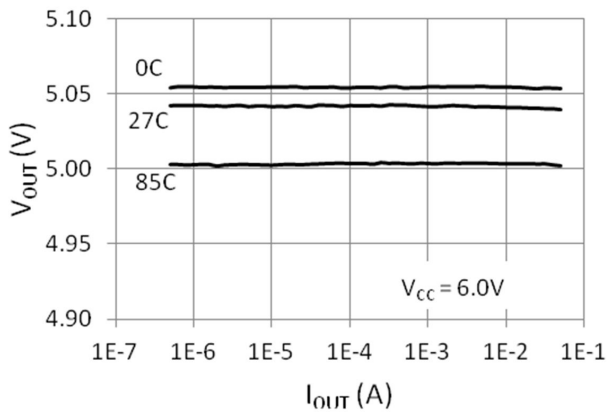
V_{OUT} Performance vs. V_{CC}



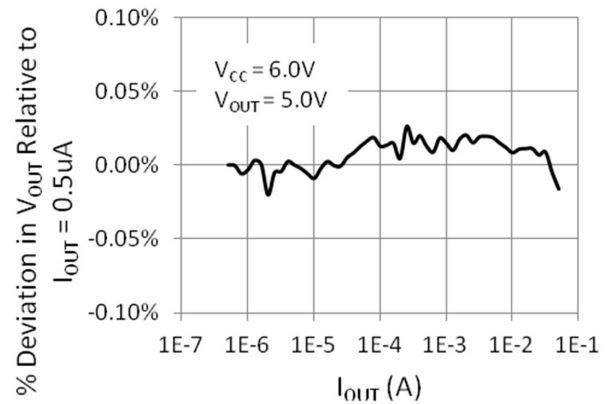
Line Regulation Performance



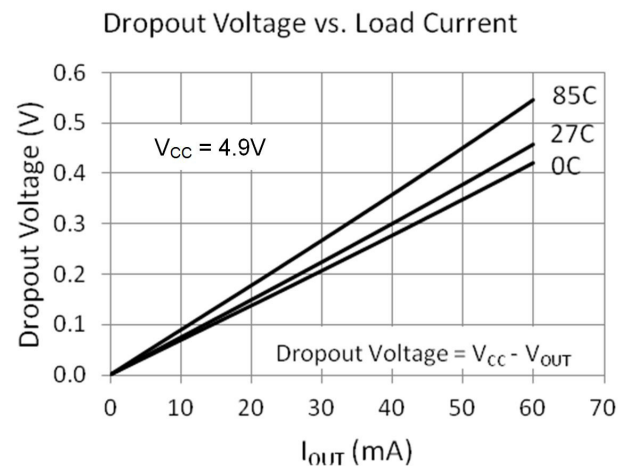
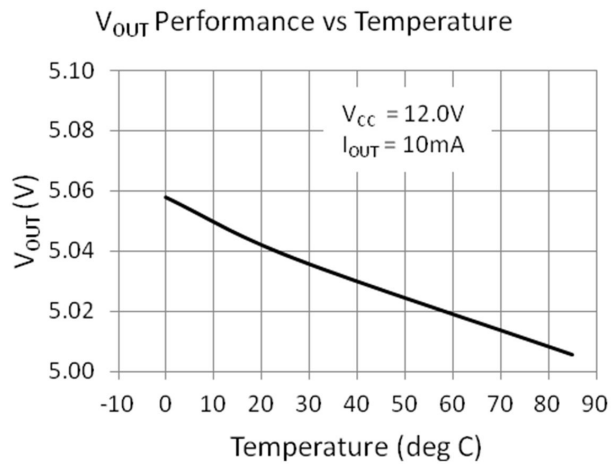
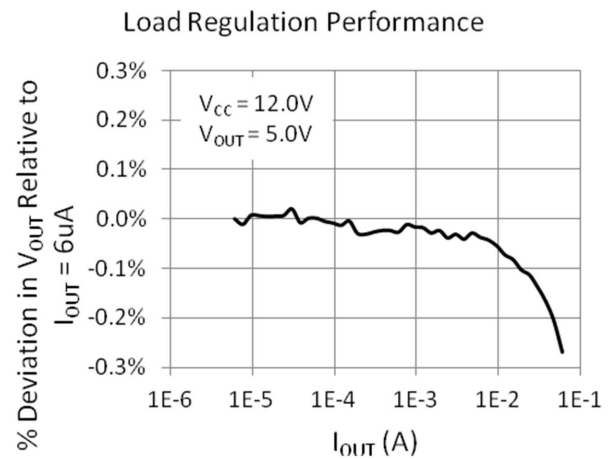
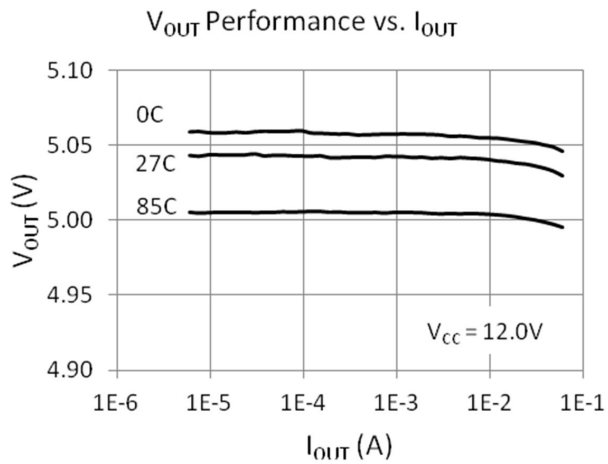
V_{OUT} Performance vs. I_{OUT}



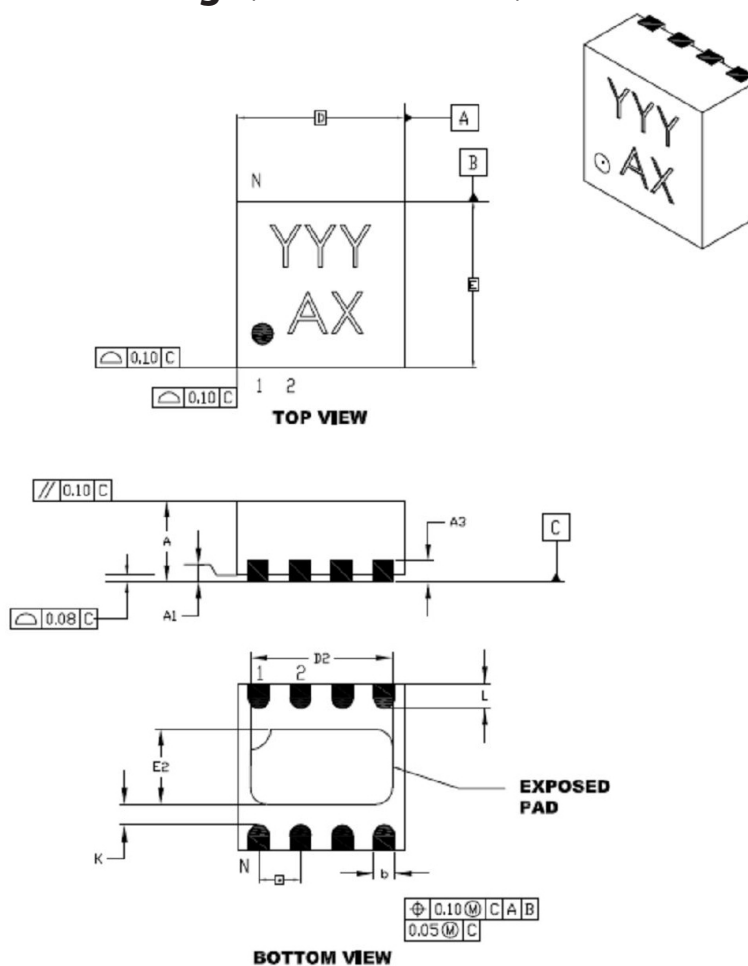
Load Regulation Performance



Typical Performance Characteristics continued

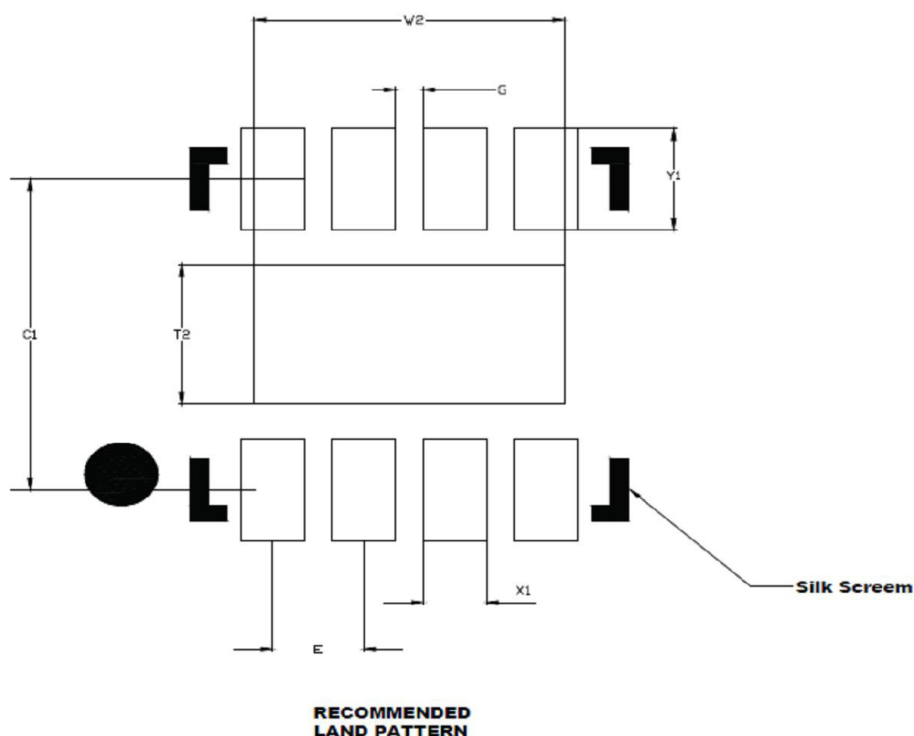


Package Mechanical Drawings (all dimensions in mm)



| Units | | Millimeters | | |
|------------------------|----|-------------|------|------|
| Dimensions Limits | | MIN | NOM | MAX |
| Number of Pins | N | 8 | | |
| Pitch | e | 0.50 BSC | | |
| Overall Height | A | 0.80 | 0.90 | 1.00 |
| Standoff | A1 | 0.00 | 0.02 | 0.05 |
| Contact Thickness | A3 | 0.20 REF | | |
| Overall Length | D | 2.00 BSC | | |
| Exposed Pad Width | E2 | 0.75 | 0.90 | 1.00 |
| Overall Width | E | 2.00 BSC | | |
| Exposed Pad Length | D2 | 1.55 | 1.70 | 1.80 |
| Contact Width | b | 0.18 | 0.25 | 0.30 |
| Contact Length | L | 0.20 | 0.30 | 0.40 |
| Contact-to-Exposed Pad | K | 0.20 | - | - |

Recommended PCB Land Pattern



| Units | | Millimeters | | |
|----------------------------|----|-------------|------|------|
| Dimensions Limits | | MIN | NOM | MAX |
| Contact Pitch | E | 0.50 BSC | | |
| Optional Center Pad Width | W2 | – | – | 1.70 |
| Optional Center Pad Length | T2 | – | – | 0.90 |
| Contact Pad Spacing | C1 | – | 2.00 | – |
| Contact Pad Width (X8) | X1 | – | – | 0.35 |
| Contact Pad Length (X8) | Y1 | – | – | 0.65 |
| Distance Between Pads | G | 0.15 | – | – |

Ordering Information

Part Number:

TS31023-QFNR

TS31223-QFNR



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