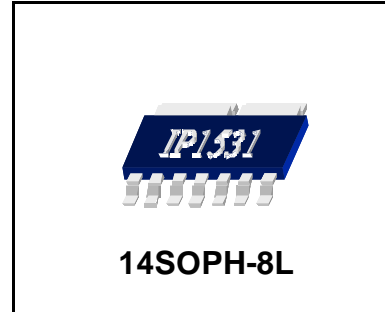


DESCRIPTION

The IP1531 is a triple output voltage LDO regulator which can provide up to 500mA of output current. The IP1531 consists of 1 fixed 3.3V and 2 adjustable regulators.



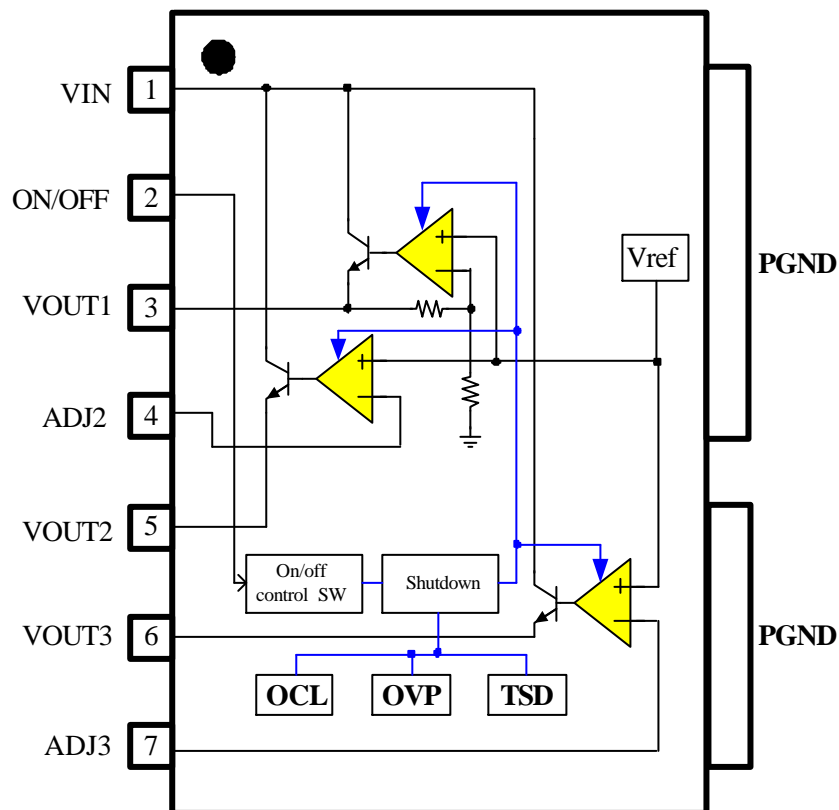
FEATURES

- 1-Fixed 3.3V LDO regulator with internal NPN TR.
- 2-Adjustable LDO regulators with internal NPN TR.
- Built-in TSD circuit.
- Built-in current limit circuit.
- Built-in over voltage protection circuit.
- Output trimmed to +/-3% Tolerance

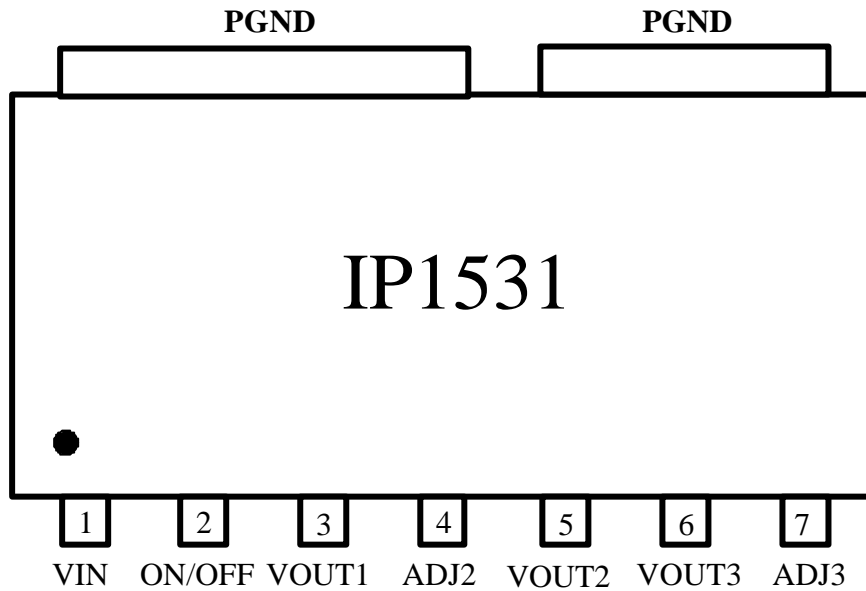
ORDERING INFORMATION

| Device | Package | Operating Temp |
|--------|-----------|----------------|
| IP1531 | 14SOPH-8L | -35°C ~ +85°C |

BLOCK DIAGRAM



PIN CONNECTIONS



PIN DESCRIPTIONS

| NO | SYMBOL | I/O | DESCRIPTION |
|----|--------|-----|---------------------------------|
| 1 | VIN | I | Input Supply Voltage |
| 2 | ON/OFF | I | ON/OFF control |
| 3 | VOUT1 | O | Regulator 1 Output (3.3V fixed) |
| 4 | ADJ2 | I | Regulator 2 Adjustable Pin |
| 5 | VOUT2 | O | Regulator 2 Output (Adjustable) |
| 6 | VOUT3 | O | Regulator 3 Output (Adjustable) |
| 7 | ADJ3 | I | Regulator 3 Adjustable Pin |
| 8 | PGND | - | Power Ground |

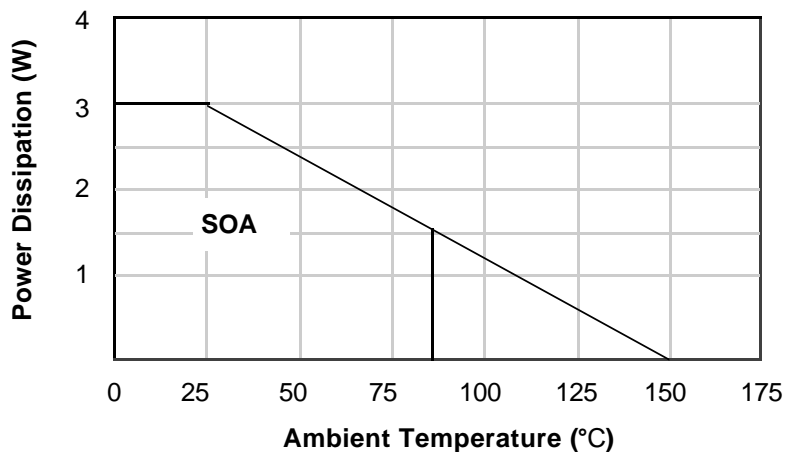
ABSOLUTE MAXIMUM RATINGS(TA=25°C)

| CHARACTERISTICS | SYMBOL | VALUE | UNIT |
|------------------------|--------|------------|------|
| Maximum supply voltage | Vccmax | 10 | V |
| Input voltage | Vinmax | 10 | V |
| Power dissipation | Pd | 3.0* | W |
| Operating temperature | Topr | -35 ~ +85 | °C |
| Storage temperature | Tstr | -55 ~ +150 | °C |

Note>

1. When mounted on 100mm X 100mm X 1mm PCB (Phenolic resin material).
2. Power dissipation reduces 24mW/°C for using above Ta=25°C
3. Do not exceed Pd and SOA.

POWER DISSIPATION CURVE



RECOMMENDED OPERATING CONDITIONS

| CHARACTERISTICS | SYMBOL | VALUE | UNIT |
|-----------------|--------|-----------|------|
| Input voltage | VIN | 4.5 ~ 6.0 | V |

ELECTRICAL CHARACTERISTICS

(Vin= 5V, Co=10uF, Ta = 25°C, unless otherwise specified.)

| Characteristics | Symbol | Condition | Min. | Typ. | Max. | Units |
|--|----------|--|-------|------|----------|-------|
| Quiescent current | Icc | Vcc=5V, No-Load | - | 7 | 12 | mA |
| OVP Detecting Voltage | Vovp | Vcc=Variable | 6.5 | - | - | V |
| Reference voltage | Vref | - | 1.212 | 1.25 | 1.288 | V |
| LDO REGULATOR 1 (3.3V FIXED TYPE) | | | | | | |
| Output Voltage | Vout1 | Io=10mA | 3.2 | 3.3 | 3.4 | V |
| Line Regulation | dVline1 | Vin=4.5~6V, Io=10mA | - | 0.01 | 0.2 | % |
| Load Regulation | dVload 1 | Ta=25°C Vin=5V, 10mA < Io < 500mA | - | 0.4 | 0.8 | % |
| Dropout voltage | Vdrop1 | Io=500mA | - | 1.1 | 1.3 | V |
| Ripple rejection | RR1 | F=120Hz, Co=10uF Tantalum Vin-Vout=2V, Io=250mA | 60 | 70 | - | dB |
| Current limit *Note | Ilimit1 | - | 500 | - | - | mA |
| Temperature stability | Temp1 | - | - | 0.5 | - | % |
| LDO REGULATOR 2 (ADJUSTABLE TYPE) | | | | | | |
| Output Voltage | Vout2 | Io=10mA | Vref | - | Vin-1.5V | V |
| Line Regulation | dVline2 | Vin=4.5~6V, Io=10mA | - | 0.01 | 0.4 | % |
| Load Regulation | dVload2 | Ta=25°C Vin=5V, 10mA < Io < 400mA | - | 0.4 | 0.8 | % |
| Dropout voltage | Vdrop2 | Io=400mA | - | 1.1 | 1.3 | V |
| Ripple rejection | RR2 | F=120Hz, Co=10uF Tantalum Vin-Vout=2V, Io=200mA | 60 | 70 | - | dB |
| Current limit *Note | Ilimit2 | Vin-Vout=3.0V | 400 | - | - | mA |
| Adjust pin current | Iadj 2 | - | - | 0.1 | - | uA |
| Minimum load current | Imin2 | - | 10 | - | - | mA |
| Temperature stability | Temp2 | - | - | 0.5 | - | % |

ELECTRICAL CHARACTERISTICS

(Vin= 5V, Co=10uF, Ta = 25°C, unless otherwise specified.)

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Units |
|--|---------|--|------|------|----------|-------|
| LDO REGULATOR 3 (ADJUSTABLE TYPE) | | | | | | |
| Output Voltage | Vout3 | Io=10mA | Vref | - | Vin-1.5V | V |
| Line Regulation | dVline3 | Vin=4.5~6V, Io=10mA | - | 0.01 | 0.4 | % |
| Load Regulation | dVload3 | Ta=25°C Vin=5V, 10mA < Io < 400mA | - | 0.4 | 0.8 | % |
| Dropout voltage | Vdrop3 | Io=400mA | - | 1.1 | 1.3 | V |
| Ripple rejection | RR3 | F=120Hz, Co=10uF Tantalum Vin-Vout=2V, Io=200mA | 60 | 70 | - | dB |
| Current limit *Note | Ilimit3 | Vin-Vout=3.0V | 400 | - | - | mA |
| Adjust pin current | Iadj 3 | - | - | 0.1 | - | uA |
| Minimum load current | Imin3 | - | 10 | - | - | mA |
| Temperature stability | Temp3 | - | - | 0.5 | - | % |
| ON/OFF CONTROL PART | | | | | | |
| On voltage | Von | Vout=Enabled | - | - | 0.8 | V |
| Off voltage | Voff | Vout=Disabled | 2.0 | - | - | V |

* Note

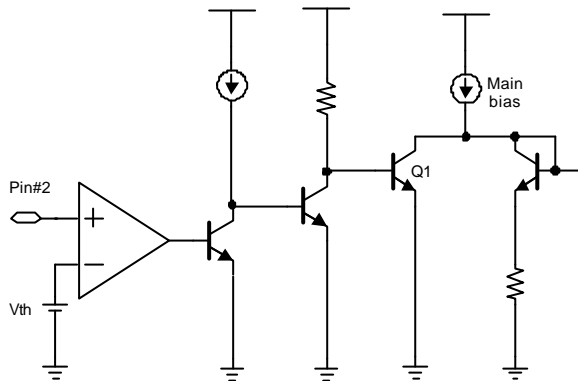
Don't exceed following current limit.

(Iout1 : 500 mA, Iout2 : 400 mA, Iout3 : 400 mA)

APPLICATION SUMMARY

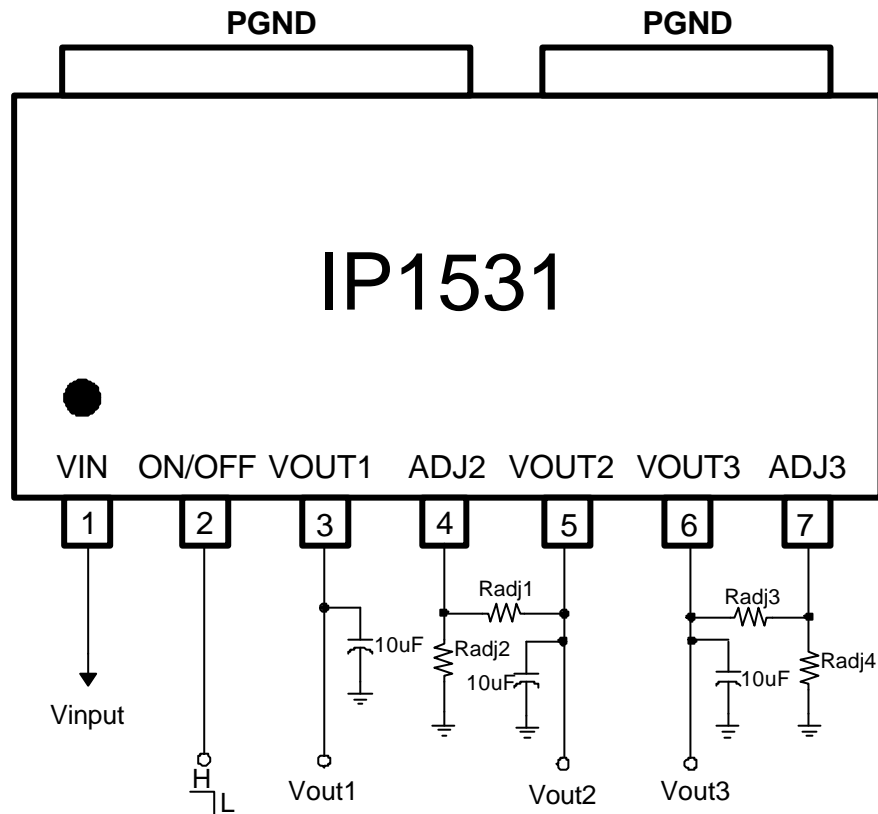
- ON / OFF

When you want to control output of the IP1531, use pin #2 as follows



As shown in figure
Pin#2 is positive input of the comparator,
and the other Input is threshold voltage.
If the voltage of the pin#2 rises above threshold voltage,
then TR Q1 will be saturated and the main bias current
will be shut down.

TYPICAL APPLICATION CIRCUIT

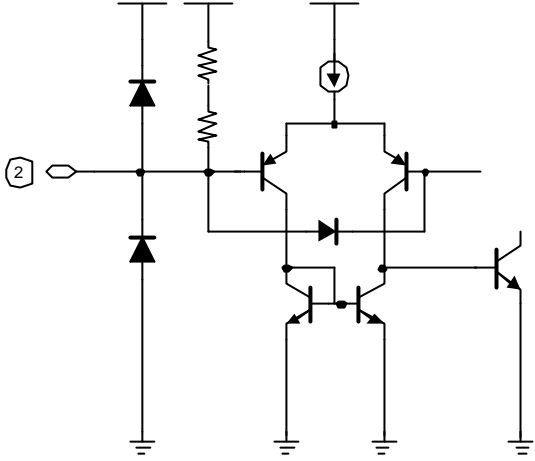
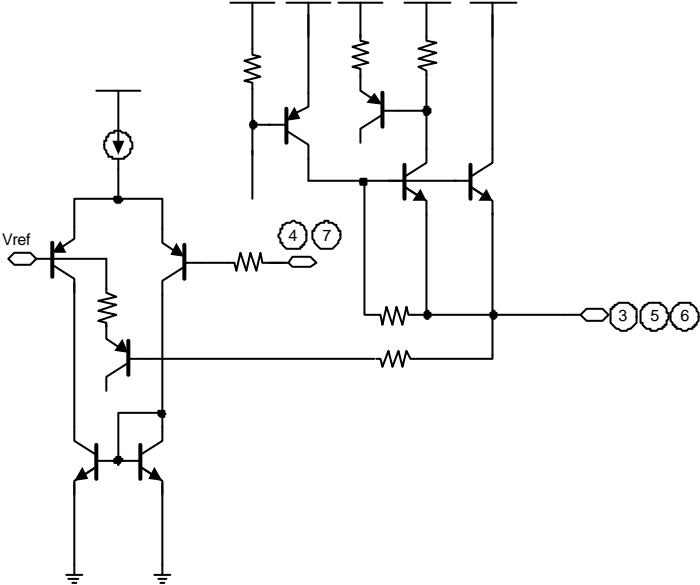


***CALCULATION OF OUTPUT VOLTAGE**

$$VOUT2 = VREF (1 + (Radj1 / Radj2)) = 1.25V (1 + (Radj1 / Radj2))$$

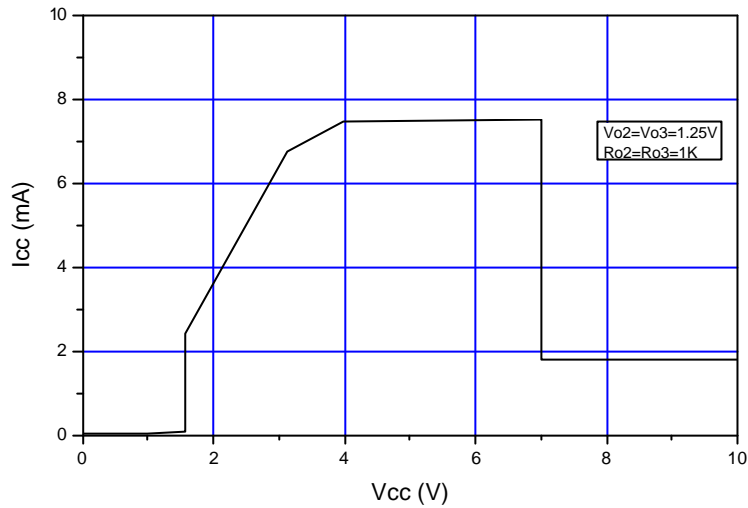
$$VOUT3 = VREF (1 + (Radj3 / Radj4)) = 1.25V (1 + (Radj3 / Radj4))$$

INTERNAL CIRCUIT

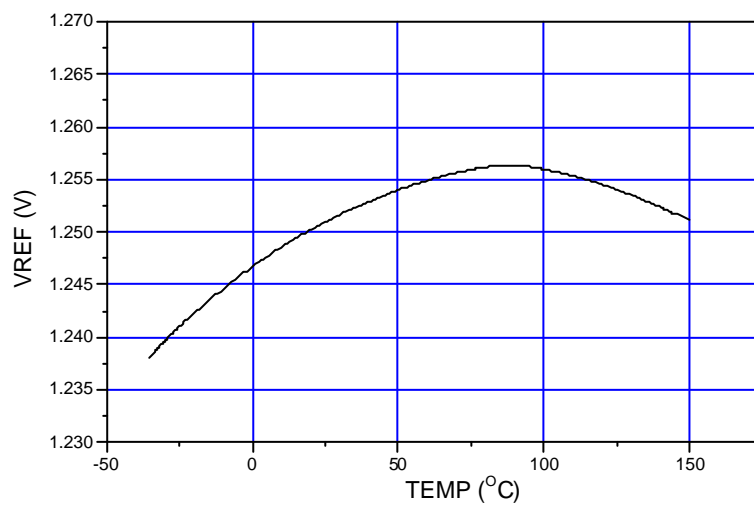
| Pin no | Pin name | Internal circuit |
|--------------|--|--|
| 2 | ON/OFF |  |
| 3,5,6 4,7 | Regulator Output1,2,3 Regulator Adjustable pin |  |

ELECTRICAL CHARACTERISTICS CURVES

QUIESCENT CURRENT

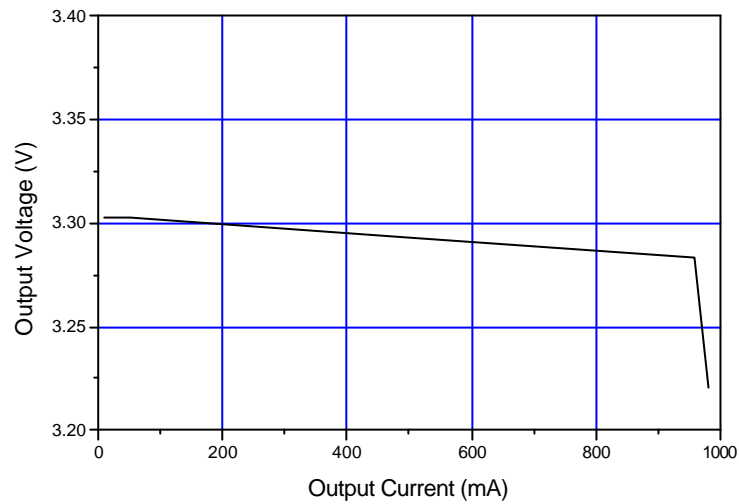


VREF TEMPERATURE STABILITY

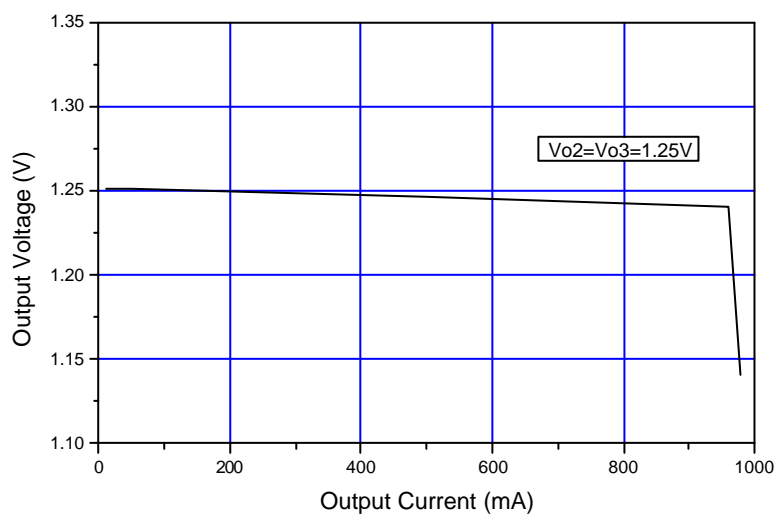


ELECTRICAL CHARACTERISTICS CURVES (Continued)

VOUT1 Load Regulation ($T_j=25^\circ\text{C}$)

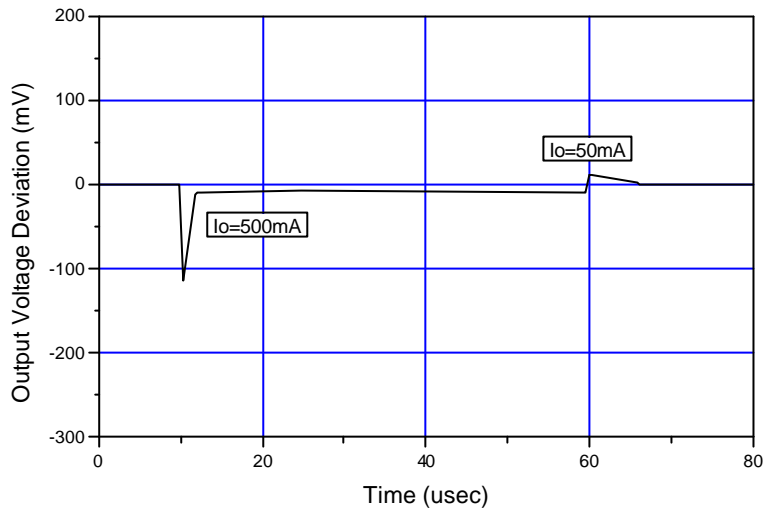


VOUT2,3 Load Regulation ($T_j=25^\circ\text{C}$)

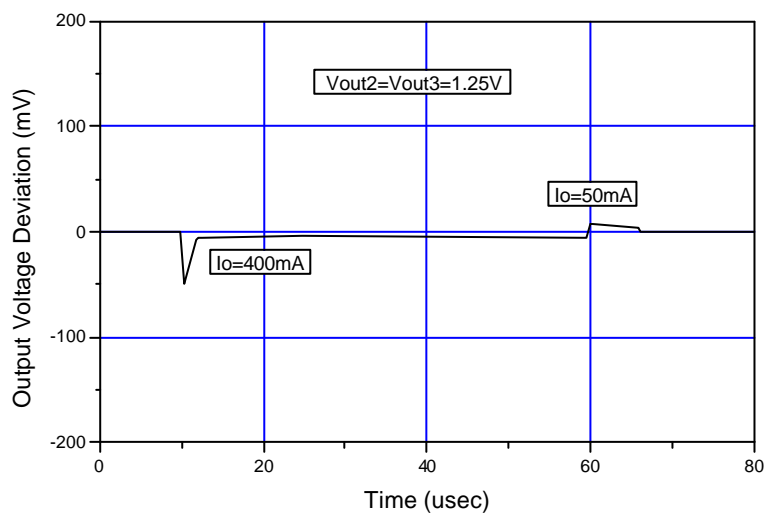


ELECTRICAL CHARACTERISTICS CURVES (Continued)

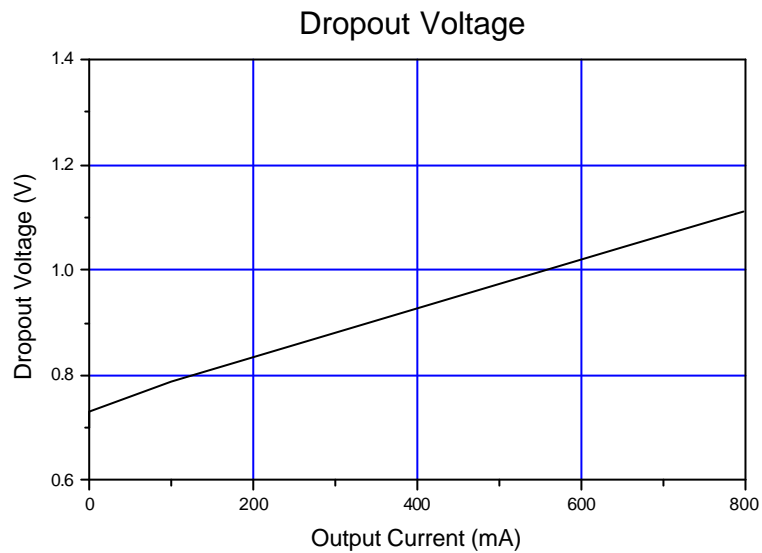
VOUT1 Load Transient Response



VOUT2,3 Load Transient Response



ELECTRICAL CHARACTERISTICS CURVES (Continued)



PACKAGE DIMENSION

14SOPH-8L

