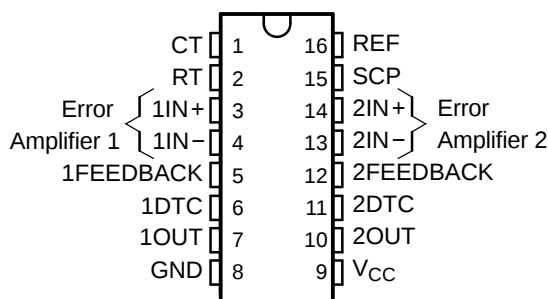


## FEATURES

- **Controlled Baseline**
  - One Assembly/Test Site, One Fabrication Site
- **Enhanced Diminishing Manufacturing Sources (DMS) Support**
- **Enhanced Product-Change Notification**
- **Qualification Pedigree <sup>(1)</sup>**
- **Complete Pulse-Width Modulation (PWM) Power-Control Circuitry**
- **Completely Synchronized Operation**
- **Internal Undervoltage Lockout Protection**
- **Wide Supply-Voltage Range**
- **Internal Short-Circuit Protection**
- **Oscillator Frequency . . . 500 kHz Max**
- **Variable Dead Time Provides Control Over Total Range**
- **Internal Regulator Provides a Stable 2.5-V Reference Supply**

(1) Component qualification in accordance with JEDEC and industry standards to ensure reliable operation over an extended temperature range. This includes, but is not limited to, Highly Accelerated Stress Test (HAST) or biased 85/85, temperature cycle, autoclave or unbiased HAST, electromigration, bond intermetallic life, and mold compound life. Such qualification testing should not be viewed as justifying use of this component beyond specified performance and environmental limits.

**D PACKAGE  
(TOP VIEW)**



## DESCRIPTION/ORDERING INFORMATION

The TL1451A-EP incorporates on a single monolithic chip all the functions required in the construction of two pulse-width modulation (PWM) control circuits. Designed primarily for power-supply control, the TL1451A-EP contains an on-chip 2.5-V regulator, two error amplifiers, an adjustable oscillator, two dead-time comparators, undervoltage lockout circuitry, and dual common-emitter output transistor circuits.

The uncommitted output transistors provide common-emitter output capability for each controller. The internal amplifiers exhibit a common-mode voltage range from 1.04 V to 1.45 V. The dead-time control (DTC) comparator has no offset unless externally altered and can provide 0% to 100% dead time. The on-chip oscillator can be operated by terminating RT and CT. During low  $V_{CC}$  conditions, the undervoltage lockout control circuit feature locks the outputs off until the internal circuitry is operational.

The TL1451A-EP is characterized for operation from  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ .

## ORDERING INFORMATION

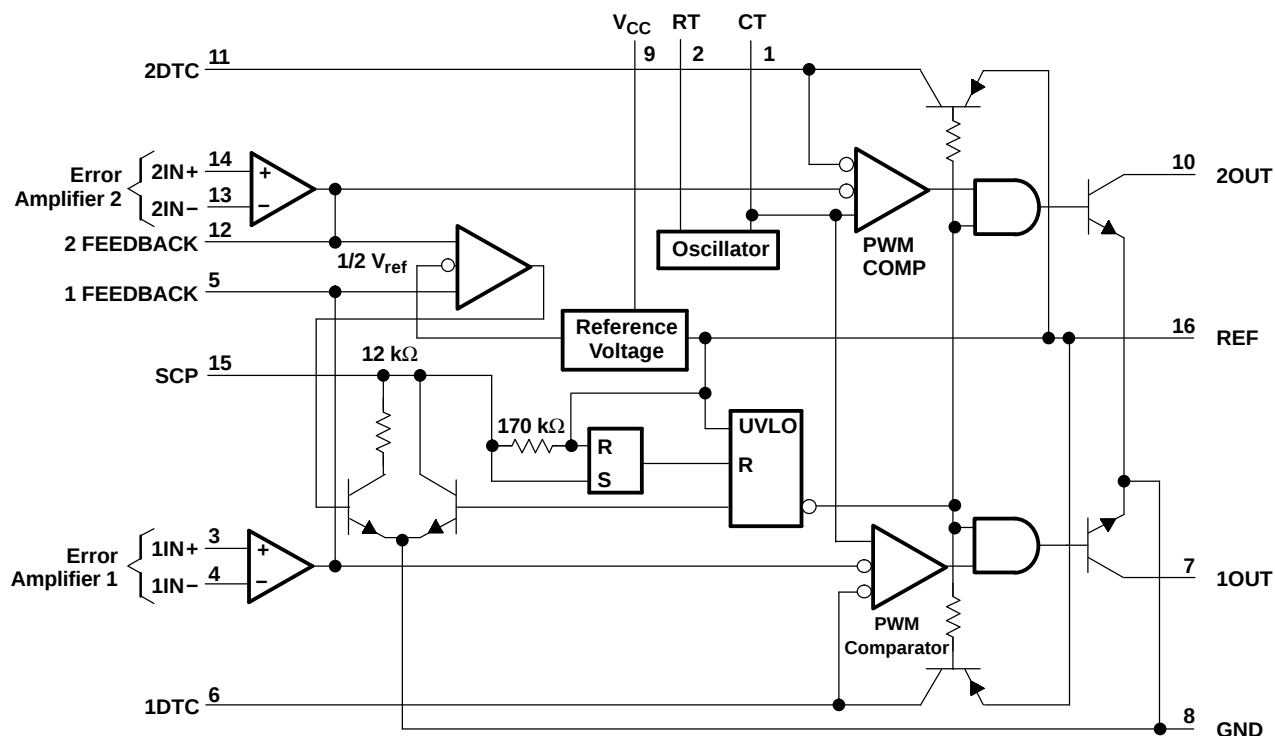
| $T_A$                                          | PACKAGE <sup>(1)</sup> |               | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|------------------------------------------------|------------------------|---------------|-----------------------|------------------|
| $-55^{\circ}\text{C}$ to $125^{\circ}\text{C}$ | SOIC – D               | Tape and reel | TL1451AMDREP          | TL1451EPG4       |

(1) Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

# FUNCTIONAL BLOCK DIAGRAM



## COMPONENT COUNT

|             |     |
|-------------|-----|
| Resistors   | 65  |
| Capacitors  | 8   |
| Transistors | 105 |
| JFETs       | 18  |

## Absolute Maximum Ratings<sup>(1)</sup>

over operating free-air temperature range

|                                    |                                      |          | MIN                                 | MAX | UNIT |
|------------------------------------|--------------------------------------|----------|-------------------------------------|-----|------|
| V <sub>CC</sub>                    | Supply voltage                       |          |                                     | 51  | V    |
| V <sub>I</sub>                     | Amplifier input voltage              |          |                                     | 20  | V    |
| V <sub>O</sub>                     | Collector output voltage             |          |                                     | 51  | V    |
| I <sub>O</sub>                     | Collector output current             |          |                                     | 21  | mA   |
| Continuous power total dissipation |                                      |          | See Dissipation Rating Table        |     |      |
| T <sub>A</sub>                     | Operating free-air temperature range | M suffix | –55                                 | 125 | °C   |
| T <sub>stg</sub>                   | Storage temperature range            |          | –65                                 | 150 | °C   |
| Lead temperature                   |                                      |          | 1,6 mm (1/16 in) from case for 10 s |     |      |
|                                    |                                      |          |                                     | 260 | °C   |

- (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.

### Dissipation Ratings

| PACKAGE | $T_A \leq 25^\circ\text{C}$<br>POWER RATING | DERATING FACTOR<br>ABOVE $T_A = 25^\circ\text{C}$ | $T_A = 70^\circ\text{C}$<br>POWER RATING | $T_A = 85^\circ\text{C}$<br>POWER RATING | $T_A = 125^\circ\text{C}$<br>POWER RATING |
|---------|---------------------------------------------|---------------------------------------------------|------------------------------------------|------------------------------------------|-------------------------------------------|
| D       | 1088 mW                                     | 8.7 mW/°C                                         | 696 mW                                   | 566 mW                                   | 218 mW                                    |

### Recommended Operating Conditions

|                                      | MIN      | MAX   | UNIT   |
|--------------------------------------|----------|-------|--------|
| $V_{CC}$ Supply voltage              | 3.6      | 50    | V      |
| $V_I$ Amplifier input voltage        | 1.05     | 1.45  | V      |
| $V_O$ Collector output voltage       |          | 50    | V      |
| $I_O$ Collector output current       |          | 20    | mA     |
| Current into feedback terminal       |          | 45    | μA     |
| $R_F$ Feedback resistor              | 100      |       | kΩ     |
| $C_T$ Timing capacitor               | 150      | 15000 | pF     |
| $R_T$ Timing resistor                | 5.1      | 100   | kΩ     |
| Oscillator frequency                 | 1        | 500   | kHz    |
| $T_A$ Operating free-air temperature |          |       |        |
|                                      | M suffix | –55   | 125 °C |

### Reference Section Electrical Characteristics

over recommended operating free-air temperature range,  $V_{CC} = 6\text{ V}$ ,  $f = 200\text{ kHz}$  (unless otherwise noted)

| PARAMETER                              | TEST CONDITIONS                         |                                           | MIN    | TYP <sup>(1)</sup> | MAX  | UNIT |
|----------------------------------------|-----------------------------------------|-------------------------------------------|--------|--------------------|------|------|
| Output voltage (pin 16)                | $I_O = 1\text{ mA}$                     | $T_A = 25^\circ\text{C}$                  | 2.4    | 2.5                | 2.6  | V    |
|                                        |                                         | $T_A = \text{MIN and } 125^\circ\text{C}$ | 2.35   | 2.46               | 2.65 |      |
| Output voltage change with temperature |                                         |                                           | –0.63% | ±4% <sup>(2)</sup> |      |      |
| Input voltage regulation               | $V_{CC} = 3.6\text{ V to } 40\text{ V}$ | $T_A = 25^\circ\text{C}$                  |        | 2                  | 12.5 | mV   |
|                                        |                                         | $T_A = 125^\circ\text{C}$                 |        | 0.7                | 15   |      |
|                                        |                                         | $T_A = \text{MIN}$                        |        | 0.3                | 30   |      |
| Output voltage regulation              | $I_O = 0.1\text{ mA to } 1\text{ mA}$   | $T_A = 25^\circ\text{C}$                  |        | 1                  | 7.5  | mV   |
|                                        |                                         | $T_A = 125^\circ\text{C}$                 |        | 0.3                | 14   |      |
|                                        |                                         | $T_A = \text{MIN}$                        |        | 0.3                | 20   |      |
| Short-circuit output current           | $V_O = 0$                               |                                           | 3      | 10                 | 30   | mA   |

(1) All typical values are at  $T_A = 25^\circ\text{C}$ , unless otherwise indicated.

(2) These parameters are not production tested.

## Undervoltage Lockout Section Electrical Characteristics

over recommended operating free-air temperature range,  $V_{CC} = 6\text{ V}$ ,  $f = 200\text{ kHz}$  (unless otherwise noted)

| PARAMETER                            | TEST CONDITIONS           | MIN  | TYP <sup>(1)</sup> | MAX | UNIT |
|--------------------------------------|---------------------------|------|--------------------|-----|------|
| Upper threshold voltage ( $V_{CC}$ ) | $T_A = 25^\circ\text{C}$  |      | 2.72               |     | V    |
|                                      | $T_A = 125^\circ\text{C}$ |      | 1.7                |     |      |
|                                      | $T_A = \text{MIN}$        |      | 3.15               |     |      |
| Lower threshold voltage ( $V_{CC}$ ) | $T_A = 25^\circ\text{C}$  |      | 2.6                |     | V    |
|                                      | $T_A = 125^\circ\text{C}$ |      | 1.65               |     |      |
|                                      | $T_A = \text{MIN}$        |      | 3.09               |     |      |
| Hysteresis ( $V_{CC}$ )              | $T_A = 25^\circ\text{C}$  | 80   | 120                |     | mV   |
|                                      | $T_A = 125^\circ\text{C}$ | 10   | 50                 |     |      |
|                                      | $T_A = \text{MIN}$        | 10   | 60                 |     |      |
| Reset threshold voltage ( $V_{CC}$ ) | $T_A = 25^\circ\text{C}$  | 1.5  |                    |     | V    |
|                                      | $T_A = 125^\circ\text{C}$ | 0.95 |                    |     |      |
|                                      | $T_A = \text{MIN}$        | 1.5  |                    |     |      |

(1) All typical values are at  $T_A = 25^\circ\text{C}$ , unless otherwise indicated.

## Short-Circuit Protection Control Section Electrical Characteristics

over recommended operating free-air temperature range,  $V_{CC} = 6\text{ V}$ ,  $f = 200\text{ kHz}$  (unless otherwise noted)

| PARAMETER                               | TEST CONDITIONS           | MIN | TYP <sup>(1)</sup> | MAX | UNIT       |
|-----------------------------------------|---------------------------|-----|--------------------|-----|------------|
| Input threshold voltage (SCP)           | $T_A = 25^\circ\text{C}$  | 650 | 700                | 750 | mV         |
|                                         | $T_A = 125^\circ\text{C}$ | 400 | 478                | 650 |            |
|                                         | $T_A = \text{MIN}$        | 800 | 880                | 950 |            |
| Standby voltage (SCP)                   |                           | 140 | 185                | 230 | mV         |
| Latched input voltage (SCP)             | $T_A = 25^\circ\text{C}$  |     | 60                 | 120 | mV         |
|                                         | $T_A = 125^\circ\text{C}$ |     | 70                 | 120 |            |
|                                         | $T_A = \text{MIN}$        |     | 60                 | 120 |            |
| Equivalent timing resistance            |                           |     | 170                |     | k $\Omega$ |
| Comparator threshold voltage (FEEDBACK) |                           |     | 1.18               |     | V          |

(1) All typical values are at  $T_A = 25^\circ\text{C}$ , unless otherwise indicated.

## Oscillator Section Electrical Characteristics

over recommended operating free-air temperature range,  $V_{CC} = 6\text{ V}$ ,  $f = 200\text{ kHz}$  (unless otherwise noted)

| PARAMETER                         | TEST CONDITIONS                                      |                           | MIN | TYP <sup>(1)</sup> | MAX                       | UNIT |
|-----------------------------------|------------------------------------------------------|---------------------------|-----|--------------------|---------------------------|------|
| Frequency                         | $C_T = 330\text{ pF}$ ,<br>$R_T = 10\text{ k}\Omega$ | $T_A = 25^\circ\text{C}$  |     | 200                |                           | kHz  |
|                                   |                                                      | $T_A = 125^\circ\text{C}$ |     | 195                |                           |      |
|                                   |                                                      | $T_A = \text{MIN}$        |     | 193                |                           |      |
| Standard deviation of frequency   | $C_T = 330\text{ pF}$ ,<br>$R_T = 10\text{ k}\Omega$ |                           |     | 2%                 |                           |      |
| Frequency change with voltage     | $V_{CC} = 3.6\text{ V to }40\text{ V}$               | $T_A = 25^\circ\text{C}$  |     | 1%                 |                           |      |
|                                   |                                                      | $T_A = 125^\circ\text{C}$ |     | 1%                 |                           |      |
|                                   |                                                      | $T_A = \text{MIN}$        |     | 3%                 |                           |      |
| Frequency change with temperature |                                                      |                           |     | 1.37%              | $\pm 10\%$ <sup>(2)</sup> |      |

(1) All typical values are at  $T_A = 25^\circ\text{C}$ , unless otherwise indicated.

(2) These parameters are not production tested.

## Dead-Time Control Section Electrical Characteristics

over recommended operating free-air temperature range,  $V_{CC} = 6\text{ V}$ ,  $f = 200\text{ kHz}$  (unless otherwise noted)

| PARAMETER                                            | TEST CONDITIONS                            | MIN                | TYP <sup>(1)</sup> | MAX                 | UNIT          |
|------------------------------------------------------|--------------------------------------------|--------------------|--------------------|---------------------|---------------|
| Input bias current (DTC)                             | $T_A = 25^\circ\text{C}$                   |                    |                    | 1                   | $\mu\text{A}$ |
|                                                      | $T_A = \text{MIN}$ and $125^\circ\text{C}$ |                    |                    | 3                   |               |
| Latch mode (source) current (DTC)                    |                                            | -80                | -145               |                     | $\mu\text{A}$ |
| Latched input voltage (DTC)                          | $T_A = 25^\circ\text{C}$                   | 2.3                |                    |                     | V             |
|                                                      | $T_A = 125^\circ\text{C}$                  | 2.22               | 2.32               |                     |               |
|                                                      | $T_A = \text{MIN}$                         | 2.28               | 2.4                |                     |               |
| Input threshold voltage at $f = 10\text{ kHz}$ (DTC) | Zero duty cycle                            |                    | 2.05               | 2.25 <sup>(2)</sup> | V             |
|                                                      | Maximum duty cycle                         | 1.2 <sup>(2)</sup> | 1.45               |                     |               |

(1) All typical values are at  $T_A = 25^\circ\text{C}$ , unless otherwise indicated.

(2) These parameters are not production tested.

## Error-Amplifier Section Electrical Characteristics

over recommended operating free-air temperature range,  $V_{CC} = 6\text{ V}$ ,  $f = 200\text{ kHz}$  (unless otherwise noted)

| PARAMETER                          | TEST CONDITIONS                                  | MIN                       | TYP <sup>(1)</sup> | MAX       | UNIT          |
|------------------------------------|--------------------------------------------------|---------------------------|--------------------|-----------|---------------|
| Input offset voltage               | $V_O (\text{FEEDBACK}) = 1.25\text{ V}$          | $T_A = 25^\circ\text{C}$  |                    | $\pm 7$   | mV            |
|                                    |                                                  | $T_A = 125^\circ\text{C}$ |                    | $\pm 10$  |               |
|                                    |                                                  | $T_A = \text{MIN}$        |                    | $\pm 12$  |               |
| Input offset current               | $V_O (\text{FEEDBACK}) = 1.25\text{ V}$          | $T_A = 25^\circ\text{C}$  |                    | $\pm 100$ | nA            |
|                                    |                                                  | $T_A = 125^\circ\text{C}$ |                    | $\pm 100$ |               |
|                                    |                                                  | $T_A = \text{MIN}$        |                    | $\pm 200$ |               |
| Input bias current                 | $V_O (\text{FEEDBACK}) = 1.25\text{ V}$          | $T_A = 25^\circ\text{C}$  | 160                | 500       | nA            |
|                                    |                                                  | $T_A = 125^\circ\text{C}$ | 100                | 500       |               |
|                                    |                                                  | $T_A = \text{MIN}$        | 142                | 700       |               |
| Common-mode input voltage range    | $V_{CC} = 3.6\text{ V}$ to $40\text{ V}$         | 1.05 to 1.45              |                    |           | V             |
| Open-loop voltage amplification    | $R_F = 200\text{ k}\Omega$                       | $T_A = 25^\circ\text{C}$  | 70                 | 80        | dB            |
|                                    |                                                  | $T_A = 125^\circ\text{C}$ | 70                 | 80        |               |
|                                    |                                                  | $T_A = \text{MIN}$        | 64                 | 80        |               |
| Unity-gain bandwidth               |                                                  |                           | 1.5                |           | MHz           |
| Common-mode rejection ratio        |                                                  | 60                        | 80                 |           | dB            |
| Positive output voltage swing      |                                                  | 2                         |                    |           | V             |
| Negative output voltage swing      |                                                  |                           |                    | 1         | V             |
| Output (sink) current (FEEDBACK)   | $V_{ID} = -0.1\text{ V}$ , $V_O = 1.25\text{ V}$ | $T_A = 25^\circ\text{C}$  | 0.5                | 1.6       | mA            |
|                                    |                                                  | $T_A = 125^\circ\text{C}$ | 0.4                | 1.8       |               |
|                                    |                                                  | $T_A = \text{MIN}$        | 0.3                | 1.7       |               |
| Output (source) current (FEEDBACK) | $V_{ID} = 0.1\text{ V}$ , $V_O = 1.25\text{ V}$  | $T_A = 25^\circ\text{C}$  | -45                | -70       | $\mu\text{A}$ |
|                                    |                                                  | $T_A = 125^\circ\text{C}$ | -25                | -50       |               |
|                                    |                                                  | $T_A = \text{MIN}$        | -15                | -70       |               |

(1) All typical values are at  $T_A = 25^\circ\text{C}$ , unless otherwise indicated.

## Output Section Electrical Characteristics

over recommended operating free-air temperature range,  $V_{CC} = 6\text{ V}$ ,  $f = 200\text{ kHz}$  (unless otherwise noted)

| PARAMETER                    | TEST CONDITIONS           | MIN | TYP <sup>(1)</sup> | MAX | UNIT          |
|------------------------------|---------------------------|-----|--------------------|-----|---------------|
| Collector off-state current  | $V_O = 50\text{ V}$       |     |                    | 10  | $\mu\text{A}$ |
| Output saturation voltage    | $T_A = 25^\circ\text{C}$  |     | 1.2                | 2   | V             |
|                              | $T_A = 125^\circ\text{C}$ |     | 1.6                | 2.4 |               |
|                              | $T_A = \text{MIN}$        |     | 1.36               | 2.2 |               |
| Short-circuit output current | $V_O = 6\text{ V}$        |     | 90                 |     | mA            |

(1) All typical values are at  $T_A = 25^\circ\text{C}$ , unless otherwise indicated.

## PWM Comparator Section Electrical Characteristics

over recommended operating free-air temperature range,  $V_{CC} = 6\text{ V}$ ,  $f = 200\text{ kHz}$  (unless otherwise noted)

| PARAMETER                                                 | TEST CONDITIONS    | MIN                | TYP <sup>(1)</sup> | MAX                 | UNIT |
|-----------------------------------------------------------|--------------------|--------------------|--------------------|---------------------|------|
| Input threshold voltage at $f = 10\text{ kHz}$ (FEEDBACK) | Zero duty cycle    |                    | 2.05               | 2.25 <sup>(2)</sup> | V    |
|                                                           | Maximum duty cycle | 1.2 <sup>(2)</sup> | 1.45               |                     |      |

(1) All typical values are at  $T_A = 25^\circ\text{C}$ , unless otherwise indicated.

(2) These parameters are not production tested.

## Total Device Electrical Characteristics

over recommended operating free-air temperature range,  $V_{CC} = 6\text{ V}$ ,  $f = 200\text{ kHz}$  (unless otherwise noted)

| PARAMETER              | TEST CONDITIONS           | MIN | TYP <sup>(1)</sup> | MAX | UNIT |
|------------------------|---------------------------|-----|--------------------|-----|------|
| Standby supply current | Off-state                 |     | 1.3                | 1.8 | mA   |
| Average supply current | $R_T = 10\text{ k}\Omega$ |     | 1.7                | 2.4 | mA   |

(1) All typical values are at  $T_A = 25^\circ\text{C}$ , unless otherwise indicated.

## PARAMETER MEASUREMENT INFORMATION

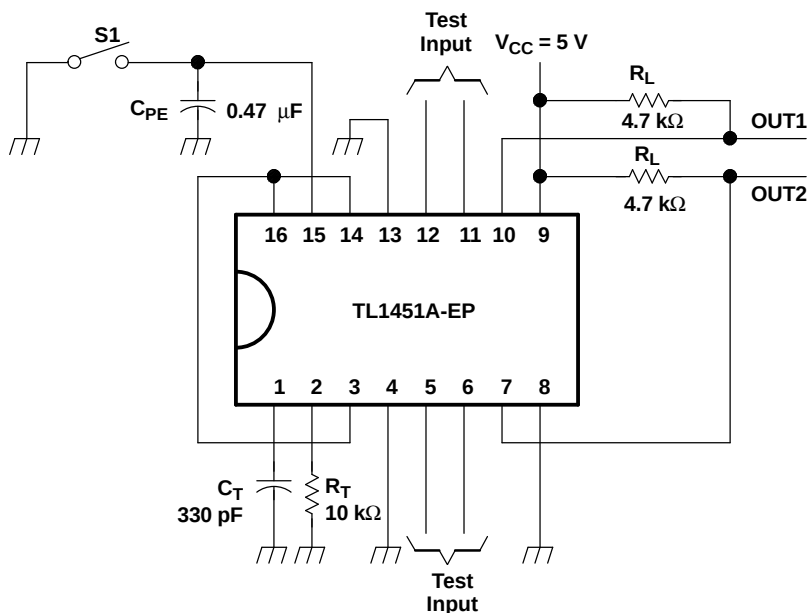
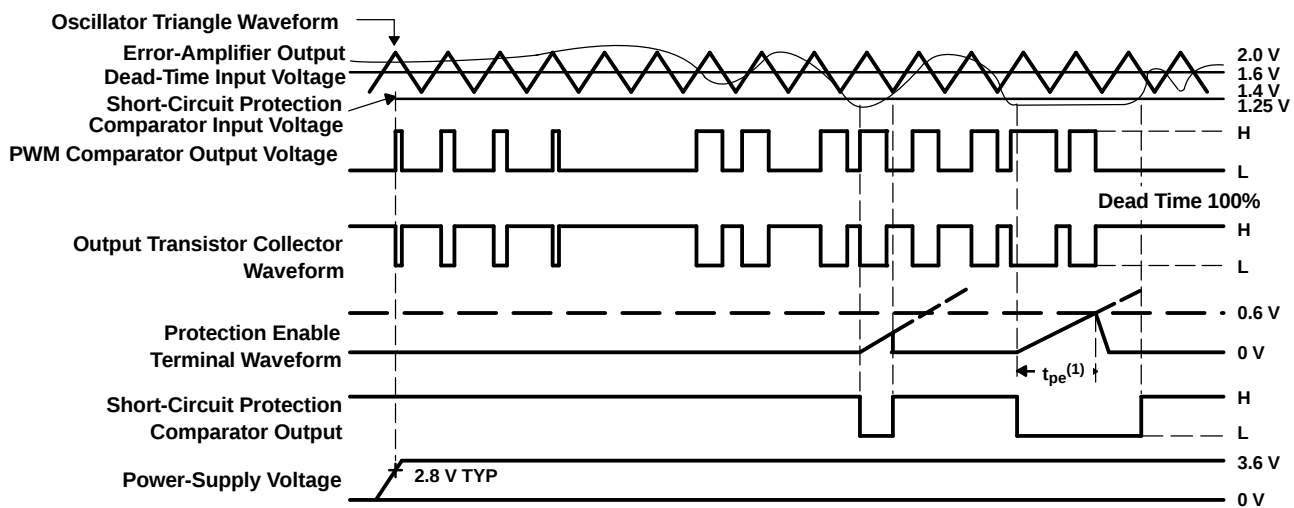


Figure 1. Test Circuit



(1) Protection enable time,  $t_{pe} = (0.051 \times 10^6 \times C_{pe})$  in seconds

Figure 2. TL1451A-EP Timing

### TYPICAL CHARACTERISTICS

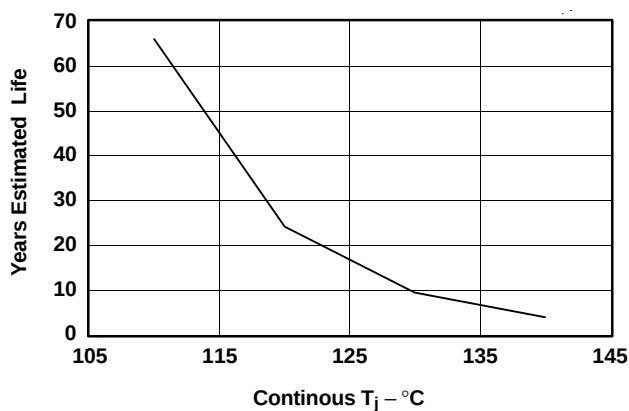


Figure 3. Estimated Device Life at Elevated Temperatures for Wirebond Voiding Fail Mode

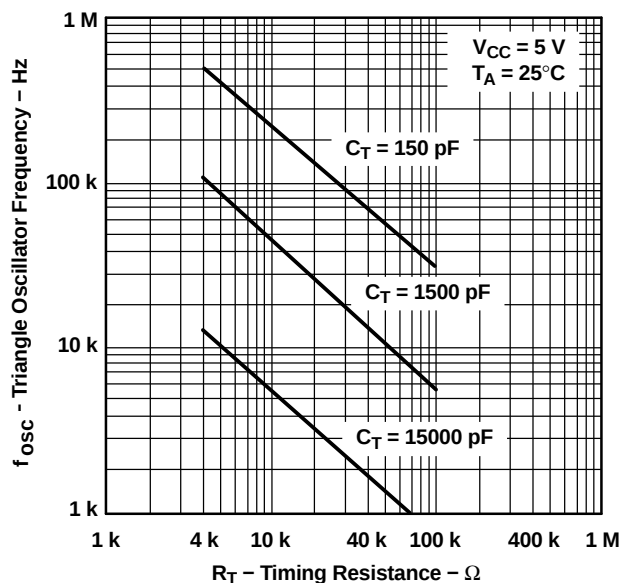


Figure 4. Triangle Oscillator Frequency vs Timing Resistance

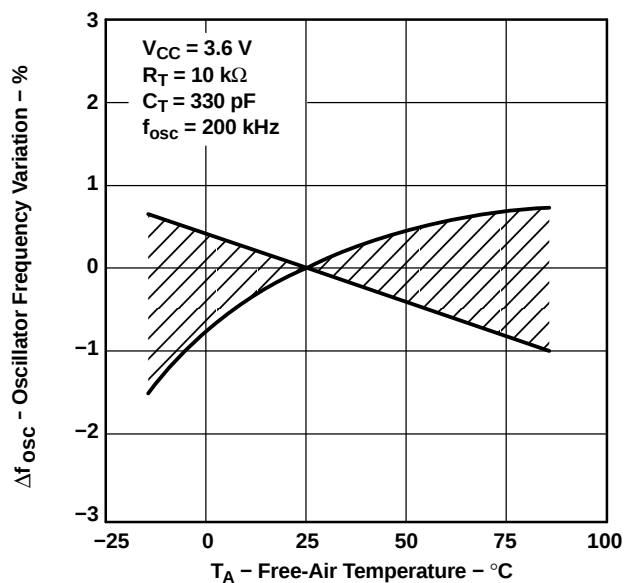


Figure 5. Oscillator Frequency Variation vs Free-Air Temperature

TYPICAL CHARACTERISTICS (continued)

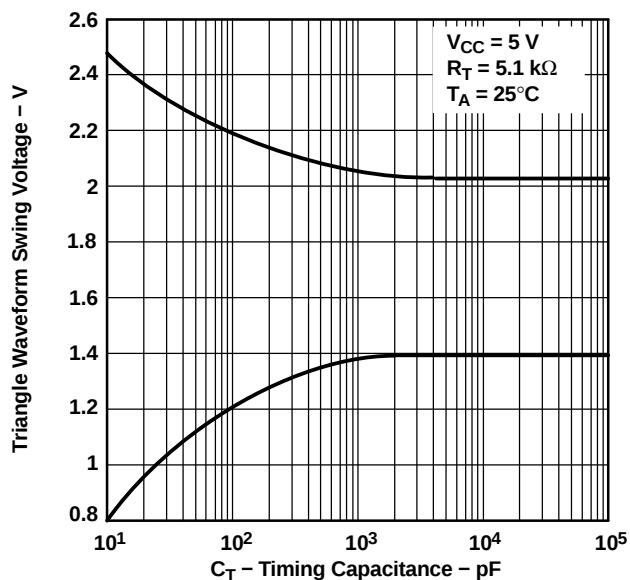


Figure 6. Triangle Waveform Swing Voltage vs Timing Capacitance

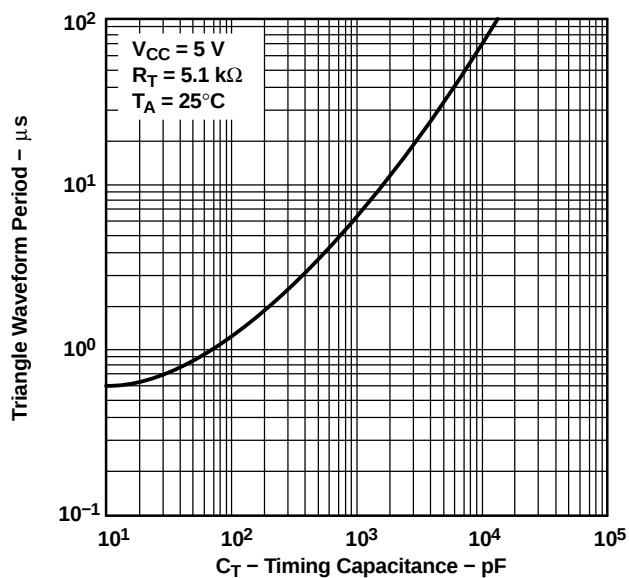


Figure 7. Triangle Waveform Period vs Timing Capacitance

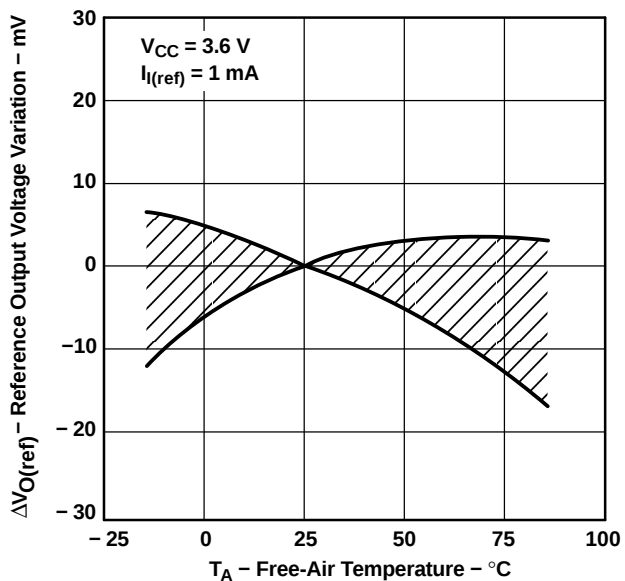


Figure 8. Reference Output Voltage Variation vs Free-Air Temperature

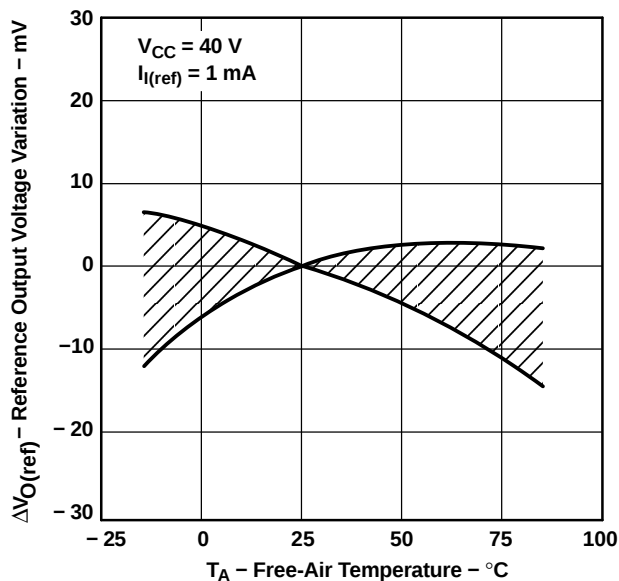


Figure 9. Reference Output Voltage Variation vs Free-Air Temperature

# TYPICAL CHARACTERISTICS (continued)

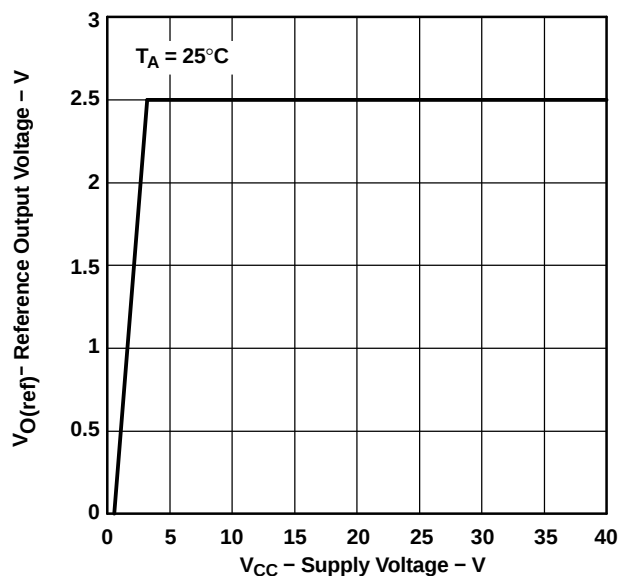


Figure 10. Reference Output Voltage vs Supply Voltage

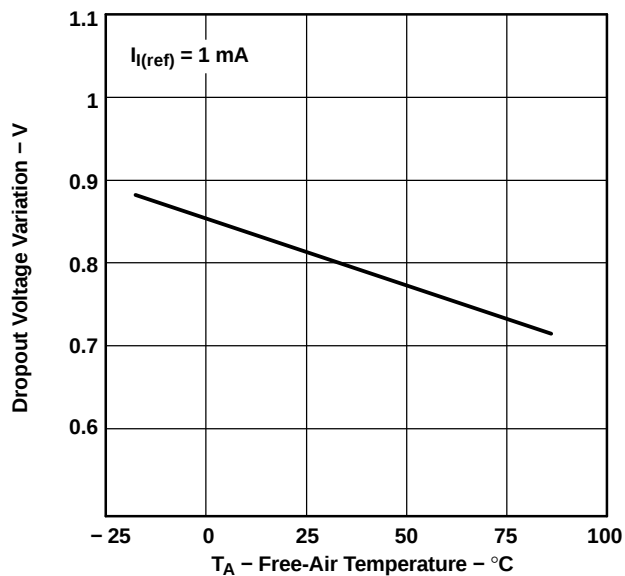


Figure 11. Dropout Voltage Variation vs Free-air Temperature

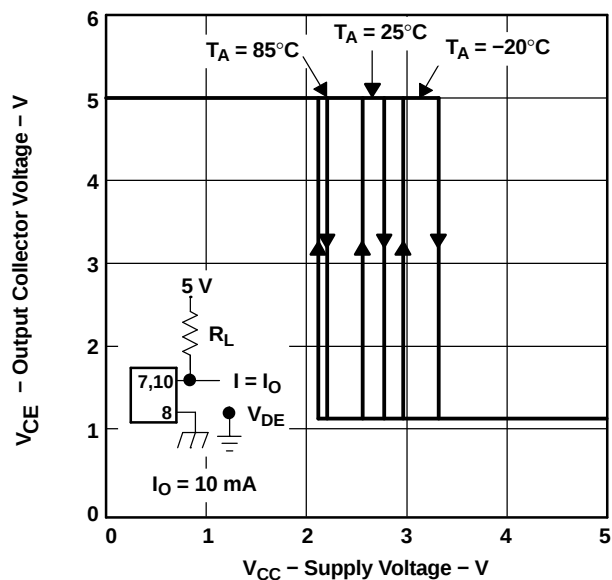


Figure 12. Undervoltage Lockout Hysteresis Characteristics

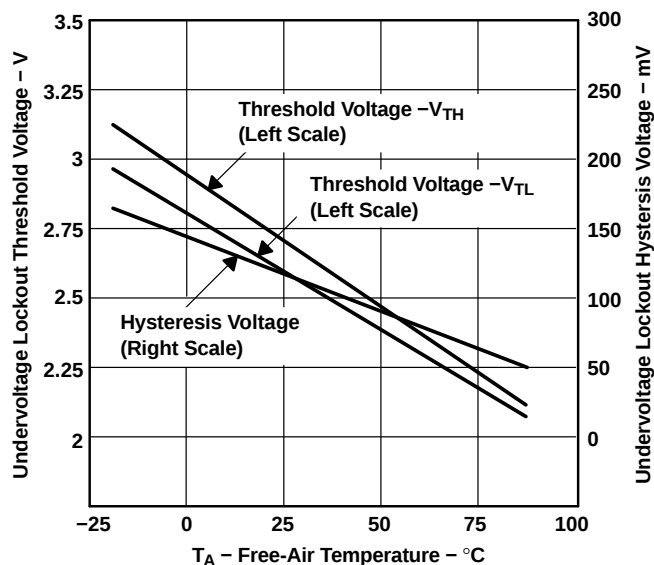


Figure 13. Undervoltage Lockout Characteristics

### TYPICAL CHARACTERISTICS (continued)

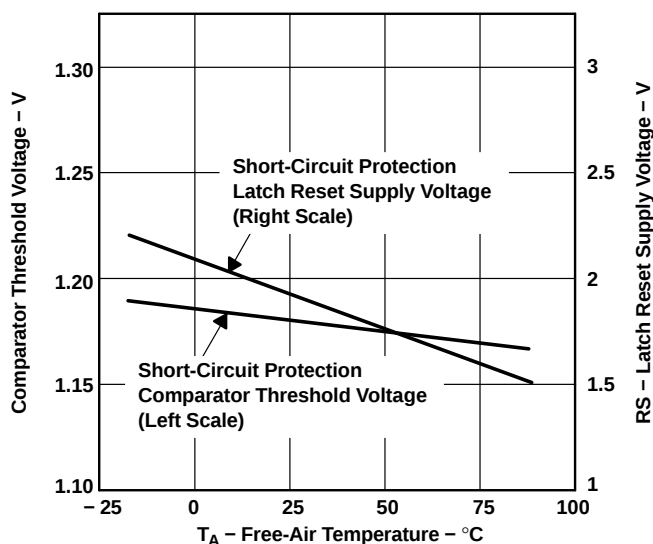


Figure 14. Short-Circuit Protection Characteristics

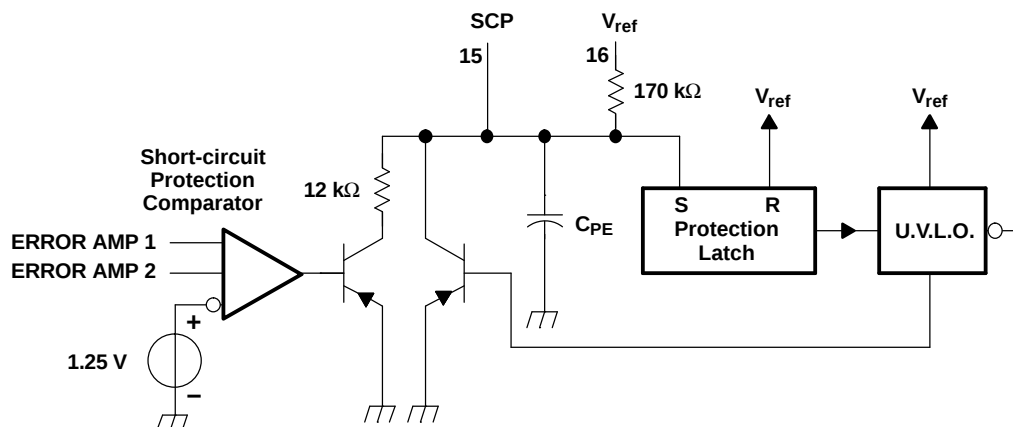
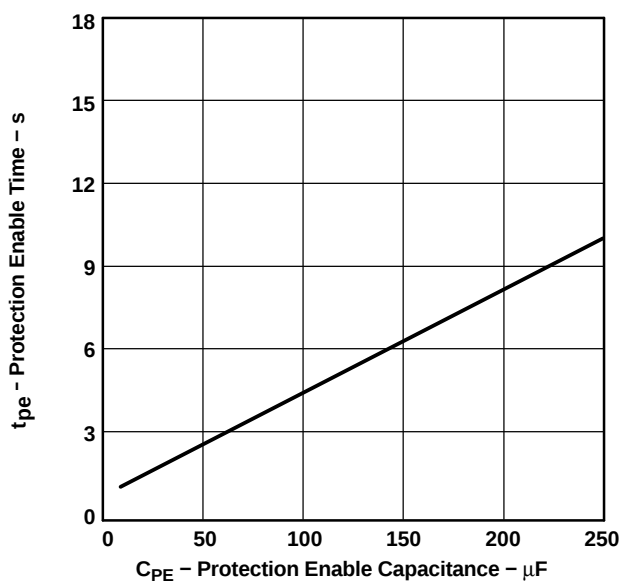


Figure 15. Protection Enable Time vs Protection Enable Capacitance

### TYPICAL CHARACTERISTICS (continued)

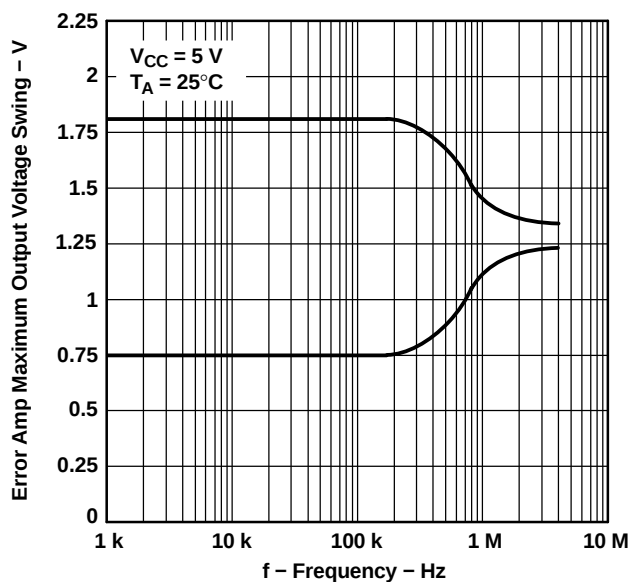


Figure 16. Error Amplifier Maximum Output Voltage Swing vs Frequency

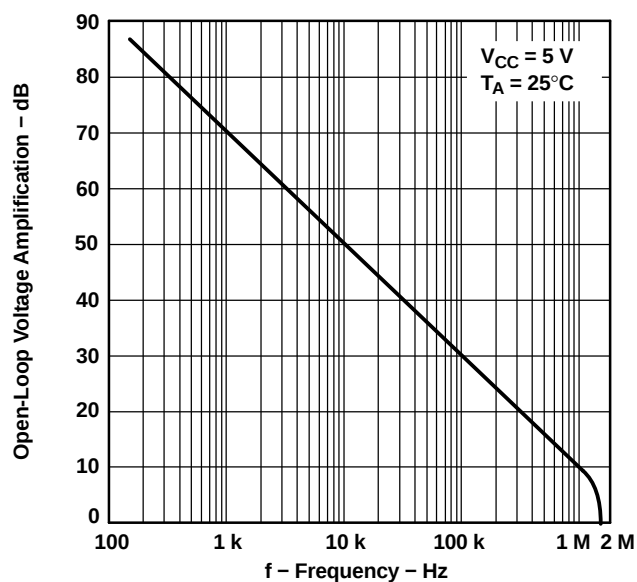


Figure 17. Open-Loop Voltage Amplification vs Frequency

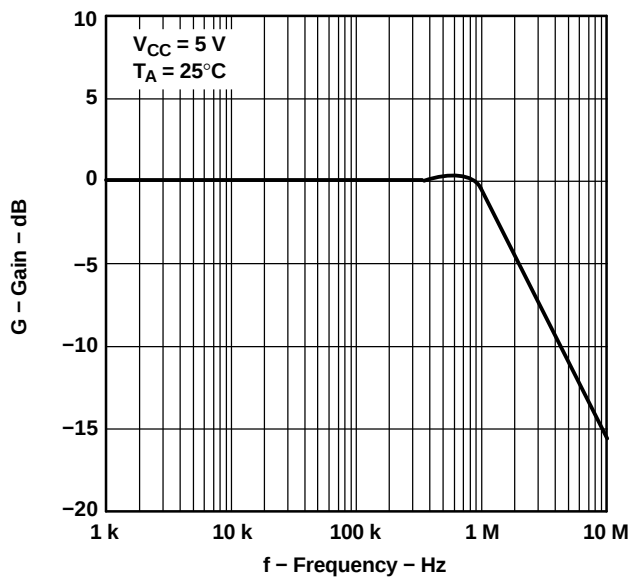


Figure 18. Gain  
(Amplifier in Unity-Gain Configuration vs Frequency)

TYPICAL CHARACTERISTICS (continued)

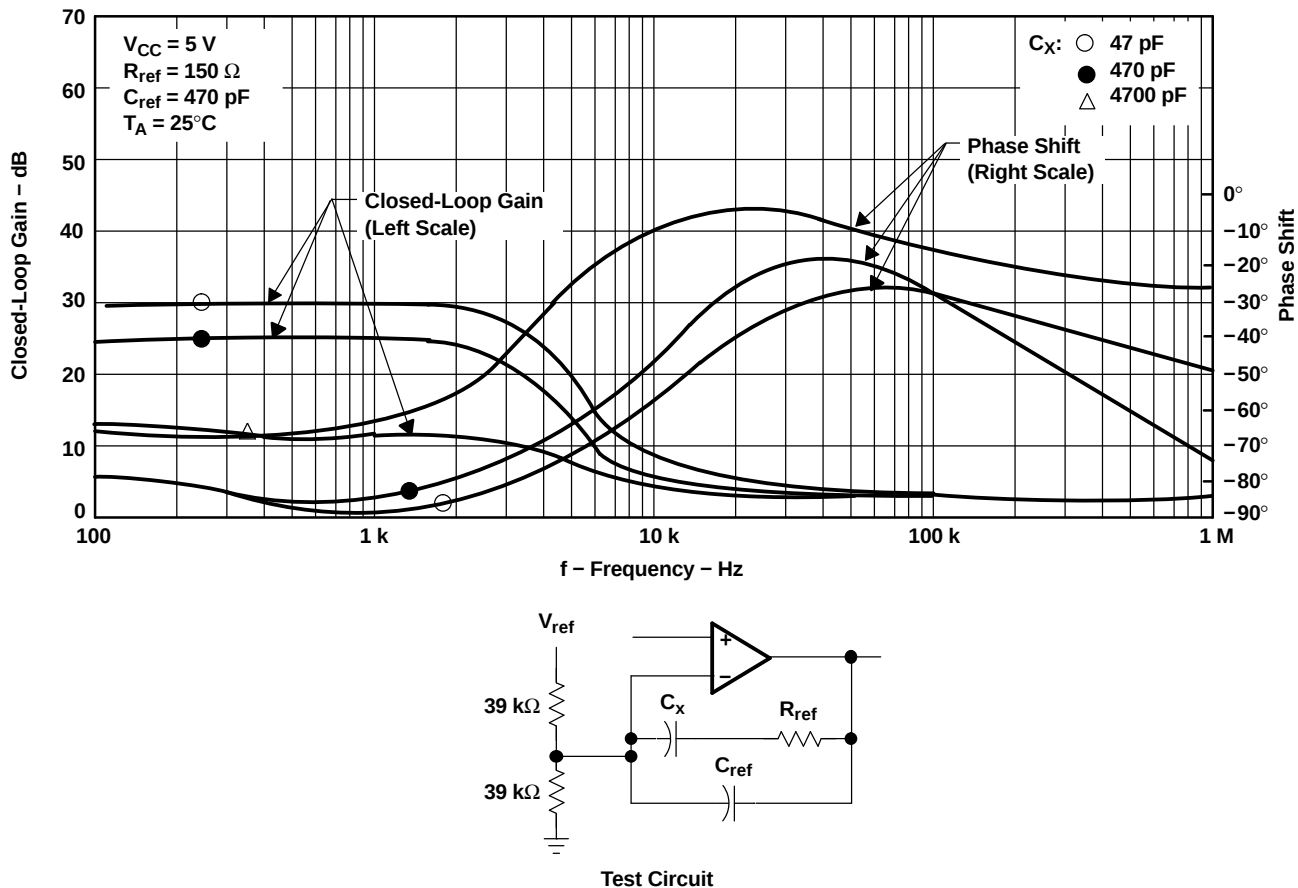


Figure 19. Closed-Loop Gain and Phase Shift vs Frequency

TYPICAL CHARACTERISTICS (continued)

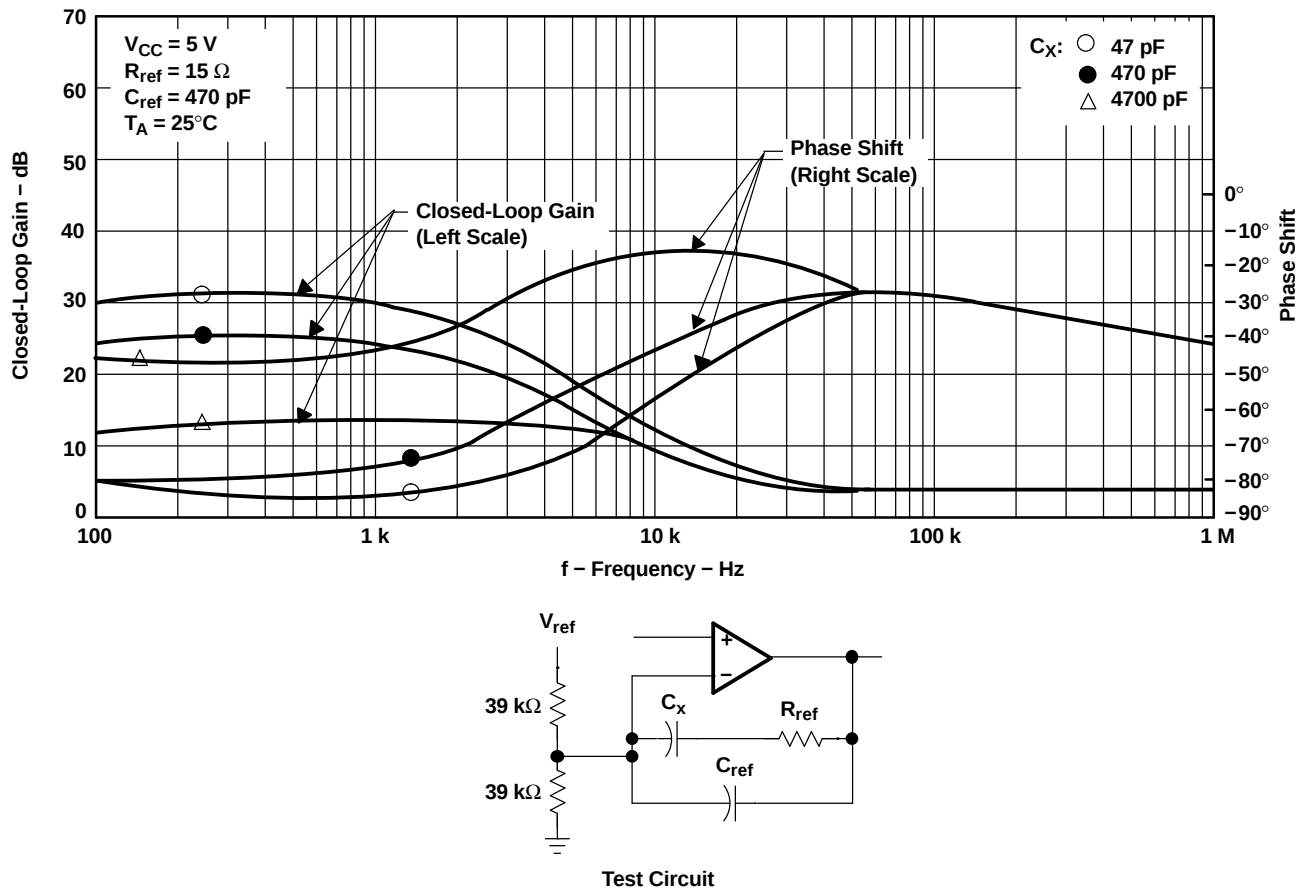


Figure 20. Closed-Loop Gain and Phase Shift vs Frequency

TYPICAL CHARACTERISTICS (continued)

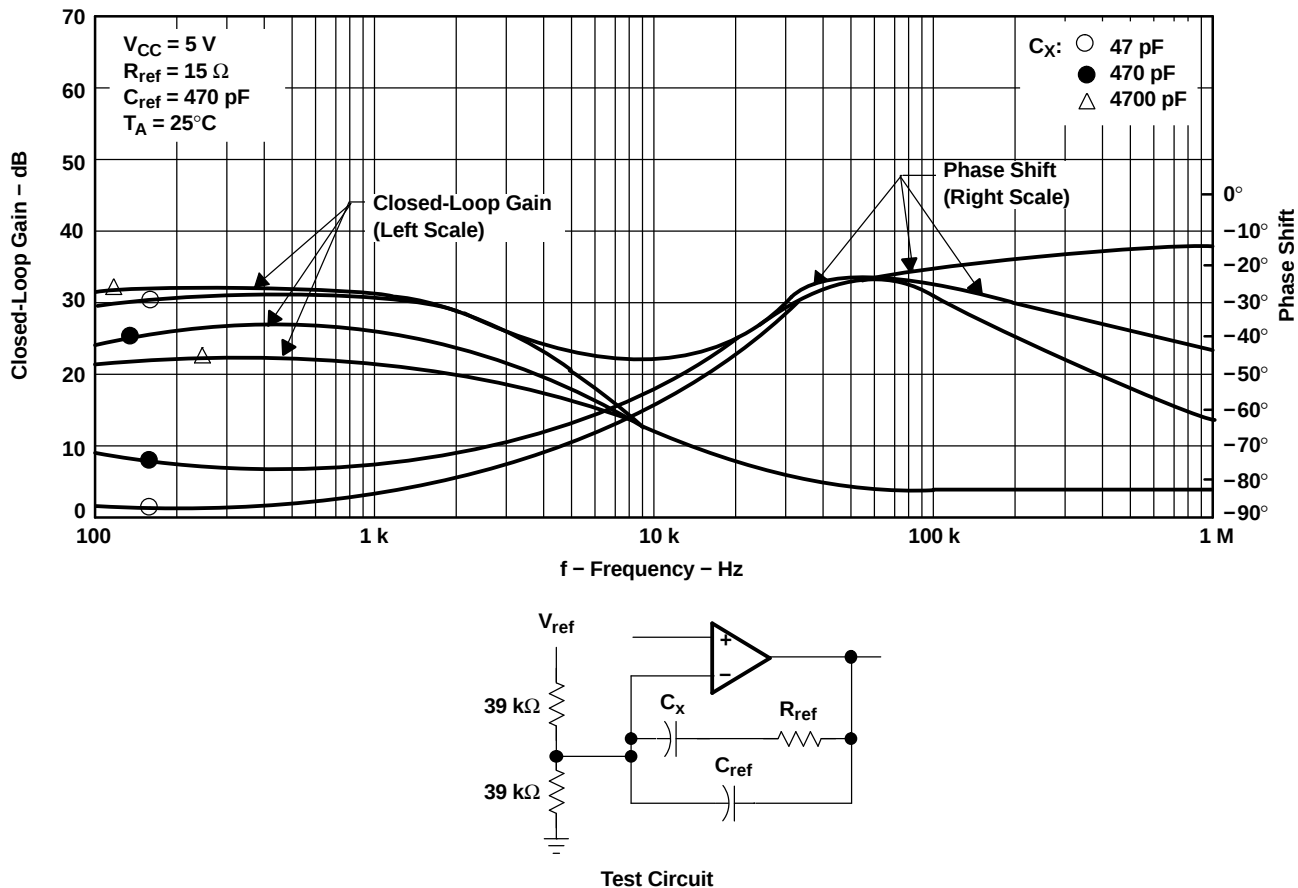


Figure 21. Closed-Loop Gain and Phase Shift vs Frequency

TYPICAL CHARACTERISTICS (continued)

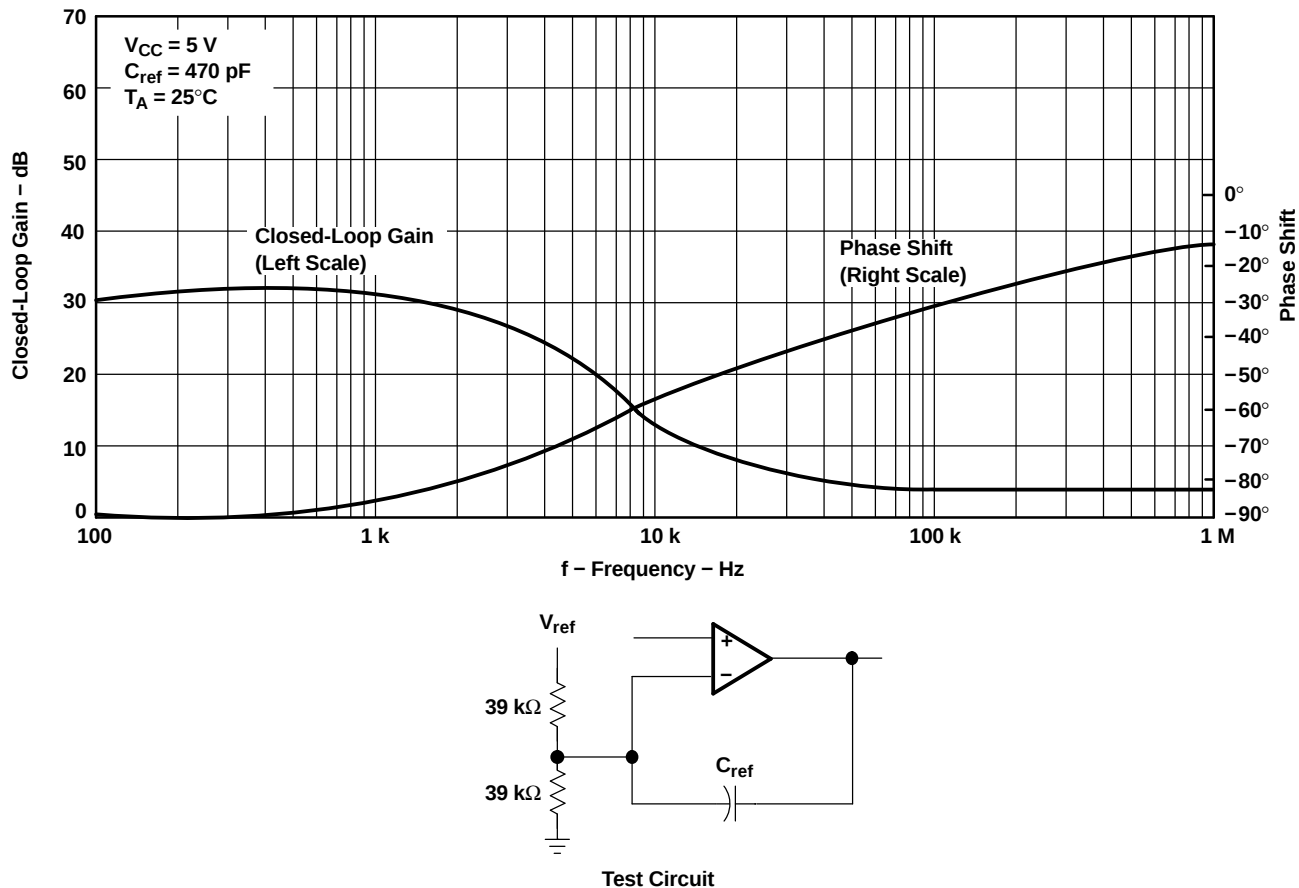


Figure 22. Closed-Loop Gain and Phase Shift vs Frequency

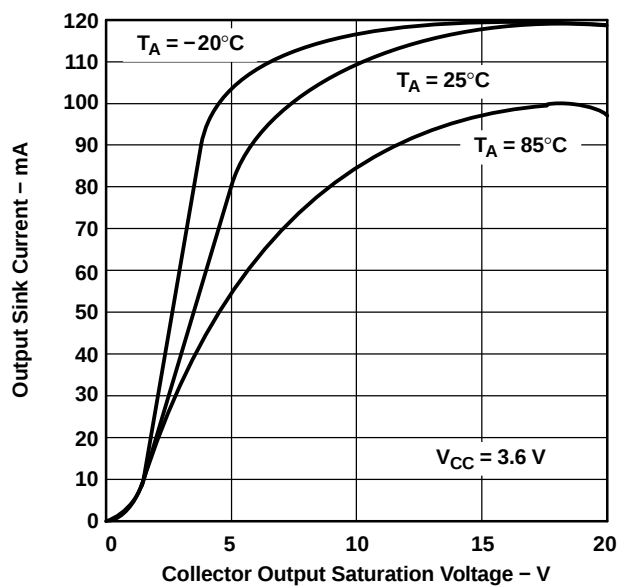


Figure 23. Output Sink Current vs Collector Output Saturation Voltage

TYPICAL CHARACTERISTICS (continued)

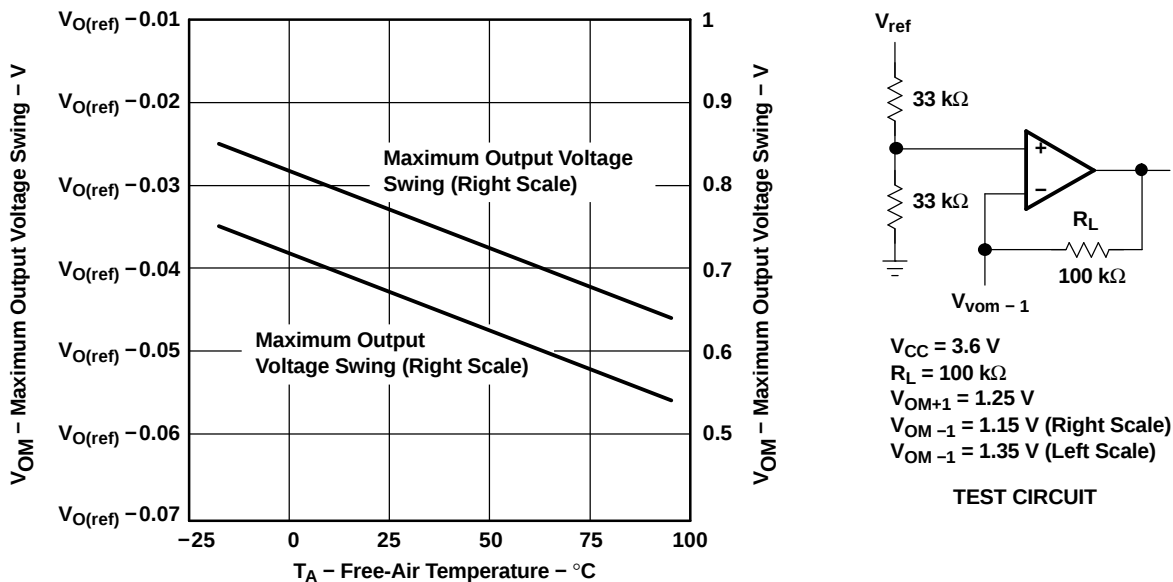


Figure 24. Maximum Output Voltage Swing vs Free-Air Temperature

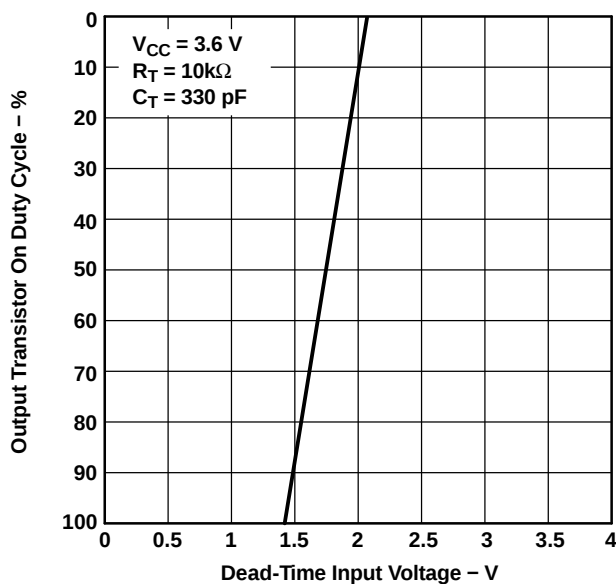


Figure 25. Output Transistor On Duty Cycle vs Dead-Time Input Voltage

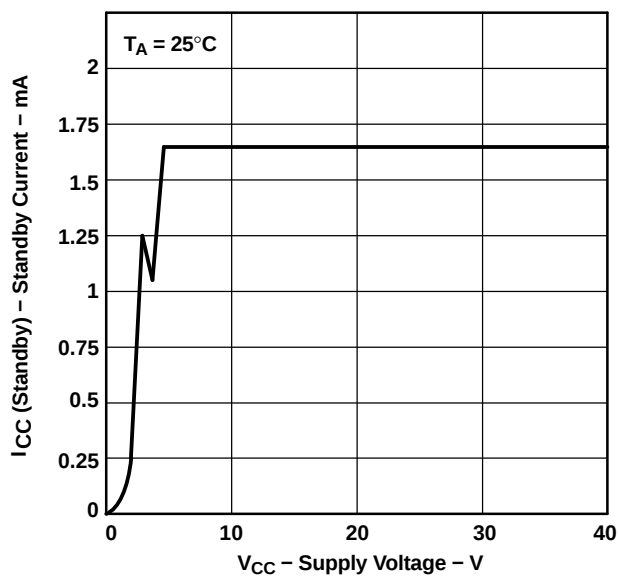


Figure 26. Standby Current vs Supply Voltage

### TYPICAL CHARACTERISTICS (continued)

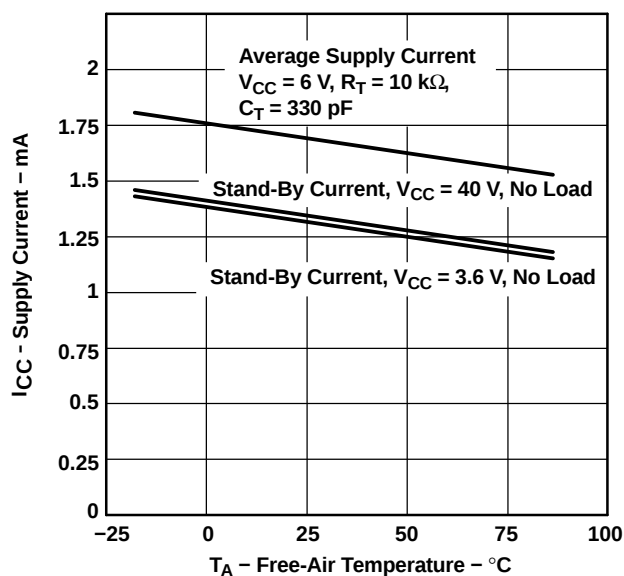


Figure 27. Standby Current vs Free-Air Temperature

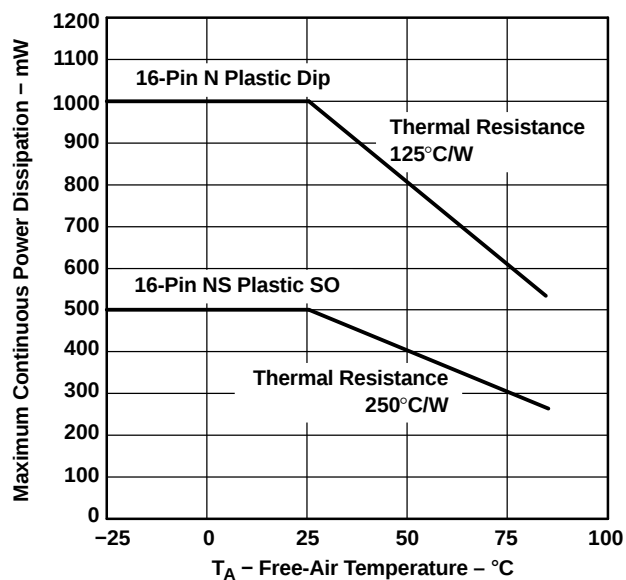


Figure 28. Maximum Continuous Power Dissipation vs Free-Air Temperature

# APPLICATION INFORMATION

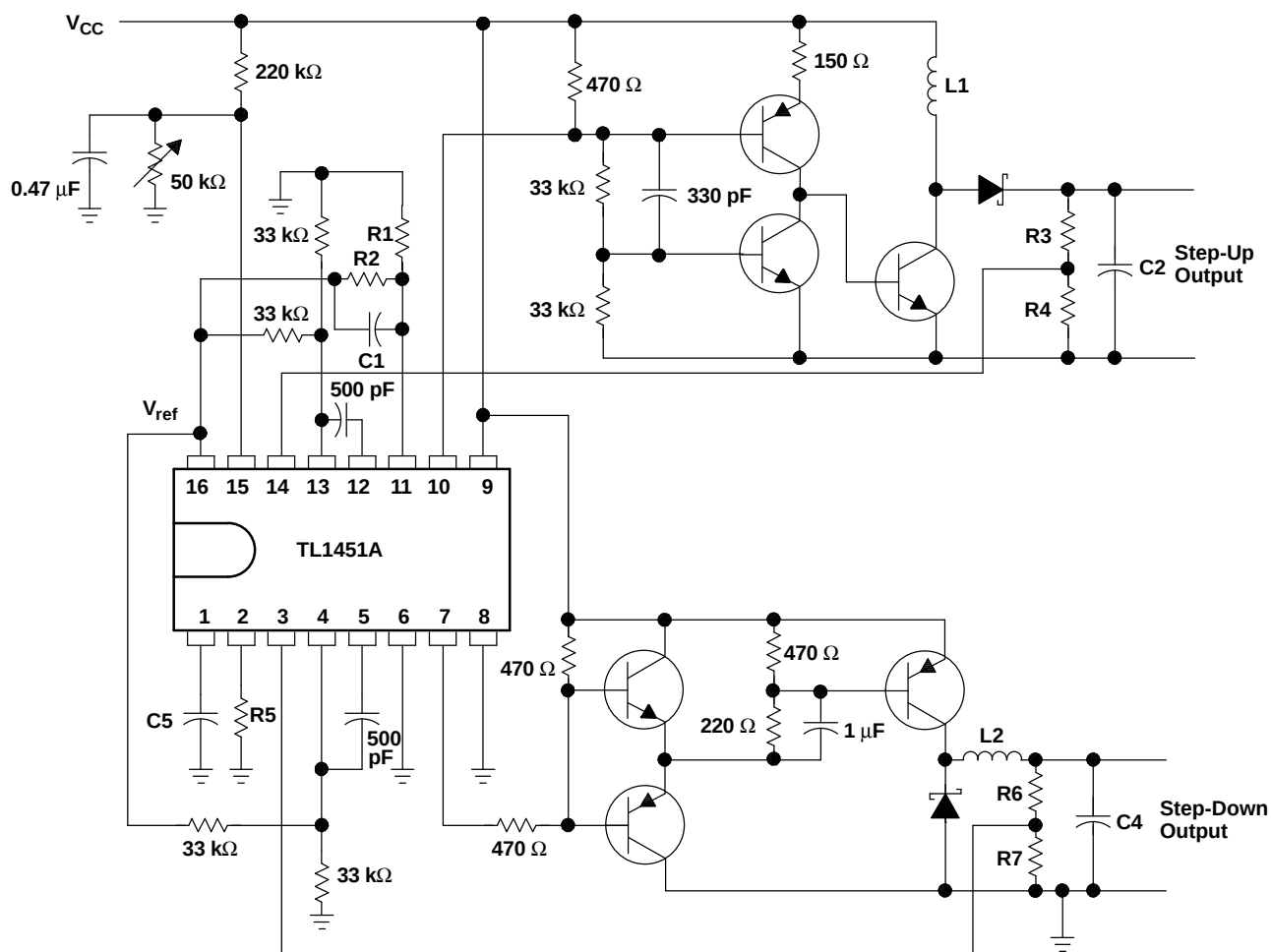


Figure 29. High-Speed Dual Switching Regulator

## PACKAGING INFORMATION

| Orderable part number          | Status<br>(1) | Material type<br>(2) | Package   Pins | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6) |
|--------------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| <a href="#">TL1451AMDREP</a>   | Active        | Production           | SOIC (D)   16  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | TL1451EP            |
| TL1451AMDREP.A                 | Active        | Production           | SOIC (D)   16  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | TL1451EP            |
| <a href="#">V62/06611-01XE</a> | Active        | Production           | SOIC (D)   16  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -55 to 125   | TL1451EP            |

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

<sup>(2)</sup> **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

<sup>(3)</sup> **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

<sup>(4)</sup> **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

<sup>(5)</sup> **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

<sup>(6)</sup> **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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### OTHER QUALIFIED VERSIONS OF TL1451A-EP :

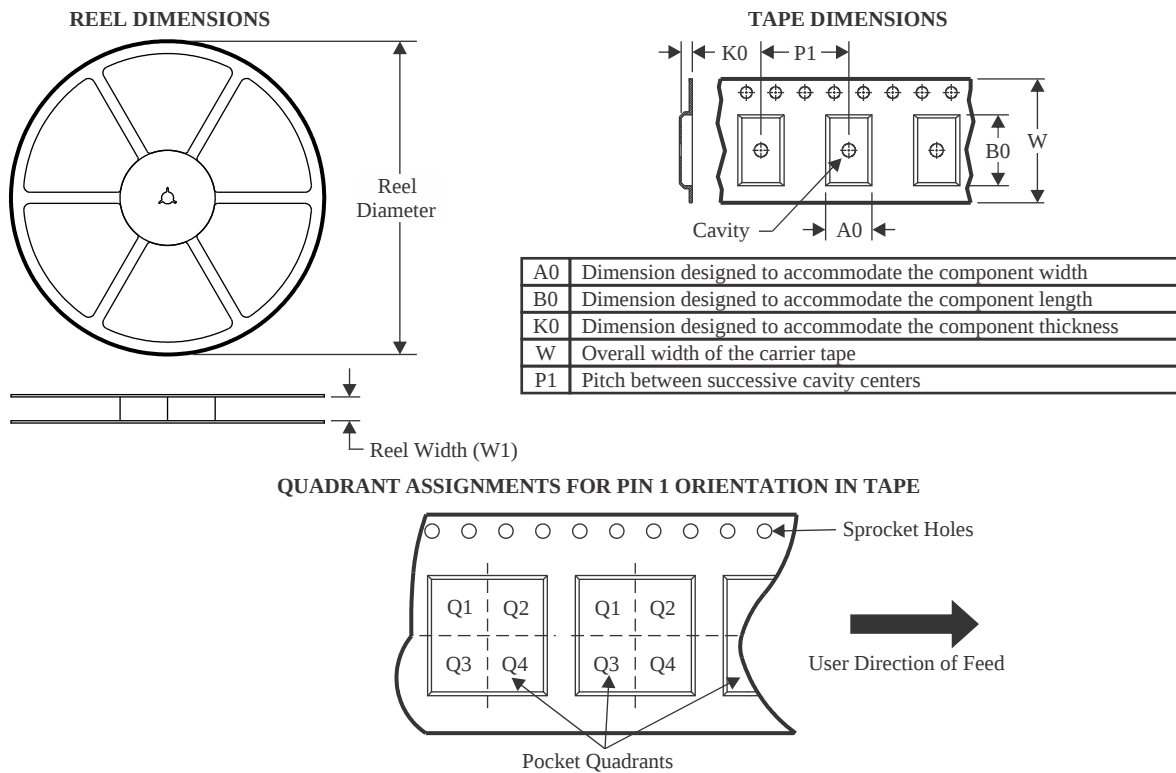
- Catalog : [TL1451A](#)

- Automotive : [TL1451A-Q1](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

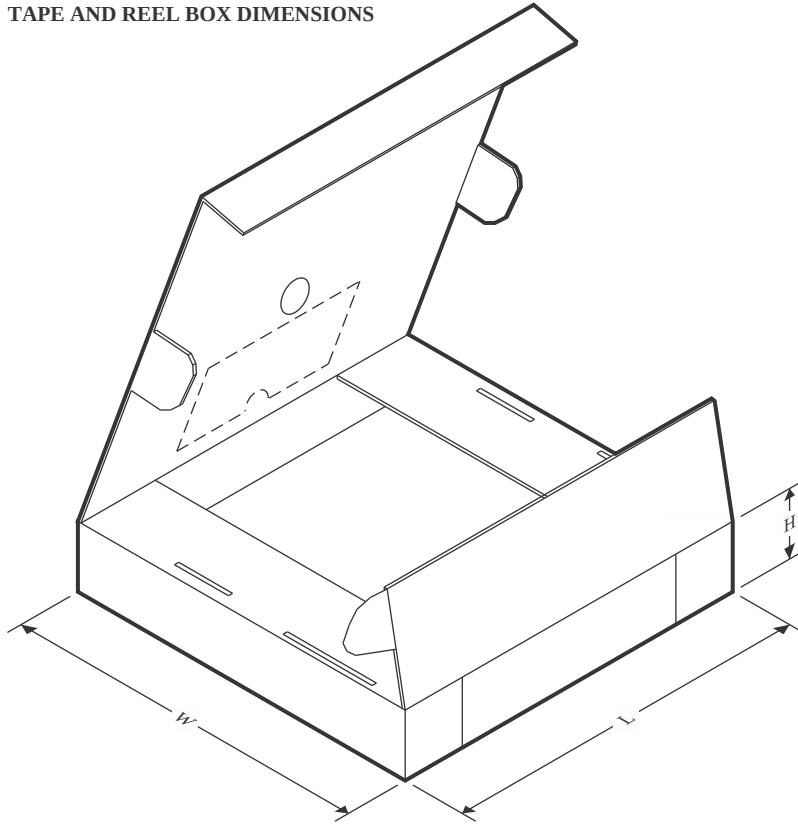
## TAPE AND REEL INFORMATION



\*All dimensions are nominal

| Device       | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|--------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| TL1451AMDREP | SOIC         | D               | 16   | 2500 | 330.0              | 16.4               | 6.5     | 10.3    | 2.1     | 8.0     | 16.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS

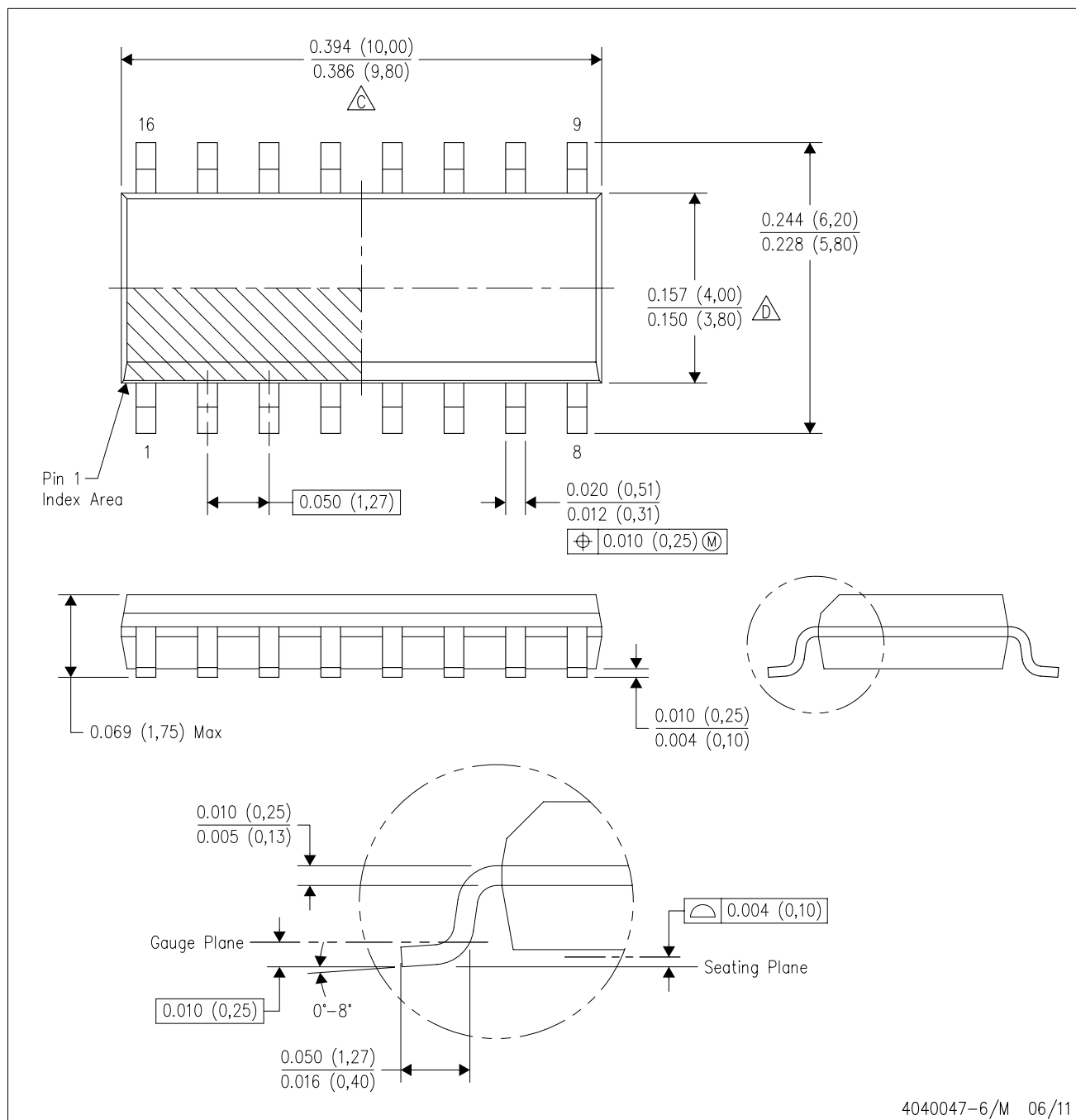


\*All dimensions are nominal

| Device       | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|--------------|--------------|-----------------|------|------|-------------|------------|-------------|
| TL1451AMDREP | SOIC         | D               | 16   | 2500 | 350.0       | 350.0      | 43.0        |

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - $\triangle C$  Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
  - $\triangle D$  Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AC.

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