

# TLx84xB High-Performance Current-Mode Pwm Controllers

## 1 Features

- Low Start-Up Current (<0.5mA)
- Trimmed Oscillator Discharge Current
- Current Mode Operation to 500kHz
- Automatic Feed-Forward Compensation
- Latching PWM for Cycle-by-Cycle Current Limiting
- Internally Trimmed Reference With Undervoltage Lockout
- High-Current Totem-Pole Output Undervoltage Lockout With Hysteresis
- Double-Pulse Suppression

## 2 Applications

- Switching regulators of any polarity
- Transformer-coupled DC/DC convertors

## 3 Description

The TL284xB and TL384xB series of control integrated circuits provide the features that are necessary to implement off-line or dc-to-dc fixed-frequency current-mode control schemes, with a minimum number of external components. Internally implemented circuits include an undervoltage lockout (UVLO) and a precision reference that is trimmed for accuracy at the error amplifier input. Other internal circuits include logic to ensure latched operation, a pulse-width modulation (PWM) comparator that also provides current-limit control, and a totem-pole output stage designed to source or sink high-peak current. The output stage, suitable for driving N-channel MOSFETs, is low when the output stage is in the off state.

The TL284xB and TL384xB series are pin compatible with the standard TL284x and TL384x with the following improvements. The start-up current is specified to be 0.5mA (max), while the oscillator discharge current is trimmed to 8.3mA (typ). In addition, during undervoltage lockout conditions, the output has a maximum saturation voltage of 1.2V while sinking 10mA ( $V_{CC} = 5V$ ).

Major differences between members of these series are the UVLO thresholds and maximum duty-cycle ranges. Typical UVLO thresholds of 16V (on) and 10V (off) on the TLx842B and TLx844B devices make them ideally suited to off-line applications. The corresponding typical thresholds for the TLx843B and TLx845B devices are 8.4V (on) and 7.6V (off). The TLx842B and TLx843B devices can operate to duty cycles approaching 100%. A duty-cycle range of 0% to 50% is obtained by the TLx844B and TLx845B by

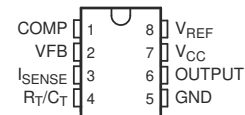
the addition of an internal toggle flip-flop, which blanks the output off every other clock cycle. The TL284xB-series devices are characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ . The TL384xB-series devices are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

### Package Information

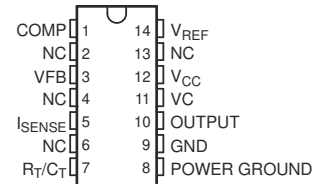
| PART NUMBER | PACKAGE <sup>(1)</sup> | PACKAGE SIZE <sup>(2)</sup> |
|-------------|------------------------|-----------------------------|
| TLx84x      | D (SOIC, 8)            | 4.90mm × 6.00mm             |
|             | D (SOIC, 14)           | 8.65mm × 6.00mm             |
|             | P (PDIP, 8)            | 9.81mm × 9.43mm             |

- (1) For all available packages, see the orderable addendum at the end of the data sheet.
- (2) The package size (length × width) is a nominal value and includes pins, where applicable.

D (SOIC) OR P (PDIP) PACKAGE  
(TOP VIEW)



D (SOIC) PACKAGE  
(TOP VIEW)



NC – No internal connection

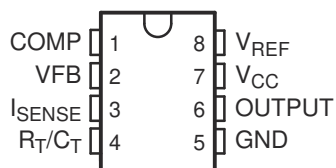


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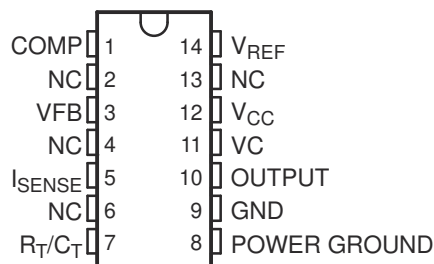
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## 4 Pin Configuration and Functions

**D (SOIC) OR P (PDIP) PACKAGE  
(TOP VIEW)**



**D (SOIC) PACKAGE  
(TOP VIEW)**



NC – No internal connection

| PIN          |             |                 | Type <sup>(1)</sup> | DESCRIPTION                         |
|--------------|-------------|-----------------|---------------------|-------------------------------------|
| NAME         | D (14 pins) | D or P (8 pins) |                     |                                     |
| COMP         | 1           | 1               | I/O                 | Error amplifier compensation pin    |
| GND          | 9           | 5               | -                   | Device power supply ground terminal |
| ISENSE       | 5           | 3               | I                   | Current sense comparator input      |
| NC           | 2, 4, 6, 13 | -               | -                   | Do not connect                      |
| OUTPUT       | 10          | 6               | O                   | PWM Output                          |
| POWER GROUND | 8           | -               | -                   | Output PWM ground terminal          |
| REF          | 14          | 8               | O                   | Oscillator voltage reference        |
| RT/CT        | 7           | 4               | I/O                 | Oscillator RC input                 |
| VC           | 11          | -               | -                   | Output PWM positive voltage supply  |
| VCC          | 12          | 7               | -                   | Device positive voltage supply      |
| VFB          | 3           | 2               | I                   | Error amplifier input               |

(1) I = Input; O = Output; I/O = Input or Output

## 5 Specifications

### 5.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted) <sup>(1)</sup> <sup>(2)</sup>

|                      |                                     |                            | MIN  | MAX           | UNIT |
|----------------------|-------------------------------------|----------------------------|------|---------------|------|
| V <sub>CC</sub>      | Supply voltage                      | Low impedance source       |      | 30            | V    |
|                      |                                     | I <sub>CC</sub> < 30 mA    |      | Self limiting |      |
| V <sub>I</sub>       | Analog input voltage range          | VFB and I <sub>SENSE</sub> | −0.3 | 6.3           | V    |
| I <sub>CC</sub>      | Supply current                      |                            |      | 30            | mA   |
| I <sub>O</sub>       | Output current                      |                            |      | ±1            | A    |
| I <sub>O(sink)</sub> | Error amplifier output sink current |                            |      | 10            | mA   |
|                      | Output energy                       | Capacitive load            |      | 5             | μJ   |
| T <sub>J</sub>       | Virtual junction temperature        |                            |      | 150           | °C   |
| T <sub>stg</sub>     | Storage temperature range           |                            | −65  | 150           | °C   |

- (1) Operation outside the *Absolute Maximum Ratings* may cause permanent device damage. *Absolute Maximum Ratings* do not imply functional operation of the device at these or any other conditions beyond those listed under *Recommended Operating Conditions*. If used outside the *Recommended Operating Conditions* but within the *Absolute Maximum Ratings*, the device may not be fully functional, and this may affect device reliability, functionality, performance, and shorten the device lifetime.
- (2) All voltages are with respect to the device GND terminal.

### 5.2 ESD Ratings

|                    |                         |                                                                                          | VALUE | UNIT |
|--------------------|-------------------------|------------------------------------------------------------------------------------------|-------|------|
| V <sub>(ESD)</sub> | Electrostatic discharge | Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins <sup>(1)</sup>              | ±3000 | V    |
|                    |                         | Charged device model (CDM), per JEDEC specification JESD22-C101, all pins <sup>(2)</sup> | ±2000 |      |

- (1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
- (2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

### 5.3 Recommended Operating Conditions

|                     |                                    |                                | MIN  | NOM | MAX | UNIT |
|---------------------|------------------------------------|--------------------------------|------|-----|-----|------|
| V <sub>CC</sub>     | Supply voltage                     | V <sub>CC</sub>                |      |     | 30  | V    |
|                     |                                    | VC <sup>(1)</sup>              |      |     | 30  |      |
| V <sub>I</sub>      | Input voltage                      | R <sub>T</sub> /C <sub>T</sub> | 0    |     | 5.5 | V    |
|                     |                                    | VFB and I <sub>SENSE</sub>     | 0    |     | 5.5 |      |
| V <sub>O</sub>      | Output voltage                     | OUTPUT                         | 0    |     | 30  | V    |
|                     |                                    | POWER GROUND <sup>(1)</sup>    | −0.1 |     | 1   |      |
| I <sub>CC</sub>     | Supply current, externally limited |                                |      |     | 25  | mA   |
| I <sub>O</sub>      | Average output current             |                                |      |     | 200 | mA   |
| I <sub>O(ref)</sub> | Reference output current           |                                |      |     | −20 | mA   |
| f <sub>osc</sub>    | Oscillator frequency               |                                |      | 100 | 500 | kHz  |
| T <sub>J</sub>      | Operating free-air temperature     | TL284xB                        | −40  |     | 85  | °C   |
|                     |                                    | TL384xB                        | 0    |     | 70  |      |

- (1) The recommended voltages for VC and POWER GROUND apply only to the 14-pin D package.

## 5.4 Thermal Information

| THERMAL METRIC <sup>(1)</sup>                           | TLx84xB |        |         | UNIT |
|---------------------------------------------------------|---------|--------|---------|------|
|                                                         | D       | P      | D       |      |
|                                                         | 8 PINS  | 8 PINS | 14 PINS |      |
| R <sub>θJA</sub> Junction-to-ambient thermal resistance | 117.4   | 74.1   | 87.9    | °C/W |

(1) For more information about traditional and new thermal metrics, see the [Semiconductor and IC Package Thermal Metrics](#) application note.

## 5.5 Reference Section Electrical Characteristics

V<sub>CC</sub> = 15 V<sup>(1)</sup>, R<sub>T</sub> = 10 kΩ, C<sub>T</sub> = 3.3 nF, over recommended operating free-air temperature range (unless otherwise specified)

| PARAMETER                                         | TEST CONDITIONS                                                   | TL284xB |                    |      | TL384xB |                    |      | UNIT  |
|---------------------------------------------------|-------------------------------------------------------------------|---------|--------------------|------|---------|--------------------|------|-------|
|                                                   |                                                                   | MIN     | TYP <sup>(2)</sup> | MAX  | MIN     | TYP <sup>(2)</sup> | MAX  |       |
| Output voltage                                    | I <sub>O</sub> = 1 mA, T <sub>J</sub> = 25°C                      | 4.95    | 5                  | 5.05 | 4.9     | 5                  | 5.1  | V     |
| Line regulation                                   | V <sub>CC</sub> = 12 V to 25 V                                    |         | 6                  | 20   |         | 6                  | 20   | mV    |
| Load regulation                                   | I <sub>O</sub> = 1 mA to 20 mA                                    |         | 6                  | 25   |         | 6                  | 25   | mV    |
| Average temperature coefficient of output voltage |                                                                   |         | 0.2                | 0.4  |         | 0.2                | 0.4  | mV/°C |
| Output voltage, worst-case variation              | V <sub>CC</sub> = 12 V to 25 V,<br>I <sub>O</sub> = 1 mA to 20 mA | 4.9     |                    | 5.1  | 4.82    |                    | 5.18 | V     |
| Output noise voltage                              | f = 10 Hz to 10 kHz, T <sub>J</sub> = 25°C                        |         | 50                 |      |         | 50                 |      | μV    |
| Output-voltage long-term drift                    | After 1000 h at T <sub>J</sub> = 25°C                             |         | 5                  | 25   |         | 5                  | 25   | mV    |
| Short-circuit output current                      |                                                                   | –30     | –100               | –180 | –30     | –100               | –180 | mA    |

(1) Adjust V<sub>CC</sub> above the start threshold before setting V<sub>CC</sub> to 15 V.

(2) All typical values are at T<sub>J</sub> = 25°C.

## 5.6 Oscillator Section Electrical Characteristics

V<sub>CC</sub> = 15 V<sup>(1)</sup>, R<sub>T</sub> = 10 kΩ, C<sub>T</sub> = 3.3 nF, over recommended operating free-air temperature range (unless otherwise specified)  
(3)

| PARAMETER             | TEST CONDITIONS                                                          | TL284xB |                    |     | TL384xB |                    |     | UNIT |
|-----------------------|--------------------------------------------------------------------------|---------|--------------------|-----|---------|--------------------|-----|------|
|                       |                                                                          | MIN     | TYP <sup>(2)</sup> | MAX | MIN     | TYP <sup>(2)</sup> | MAX |      |
| Initial accuracy      | T <sub>J</sub> = 25°C                                                    | 47      | 52                 | 57  | 47      | 52                 | 57  | kHz  |
|                       | T <sub>A</sub> = T <sub>low</sub> to T <sub>high</sub>                   | 44      |                    | 60  | 44      |                    | 60  |      |
|                       | T <sub>J</sub> = 25°C, R <sub>T</sub> = 6.2 kΩ,<br>C <sub>T</sub> = 1 nF | 225     | 250                | 275 | 225     | 250                | 275 |      |
| Voltage stability     | V <sub>CC</sub> = 12 V to 25 V                                           |         | 0.2                | 1   |         | 0.2                | 1   | %    |
| Temperature stability |                                                                          |         | 5                  |     |         | 5                  |     | %    |
| Amplitude             | Peak to peak                                                             |         | 1.7                |     |         | 1.7                |     | V    |
| Discharge current     | T <sub>J</sub> = 25°C, R <sub>T</sub> /C <sub>T</sub> = 2 V              | 7.8     | 8.3                | 8.8 | 7.8     | 8.3                | 8.8 | mA   |
|                       | R <sub>T</sub> /C <sub>T</sub> = 2 V                                     | 7.5     |                    | 8.8 | 7.6     |                    | 8.8 |      |

(1) Adjust V<sub>CC</sub> above the start threshold before setting it to 15 V.

(2) All typical values are at T<sub>J</sub> = 25°C.

(3) Output frequency equals oscillator frequency for the TL3842B and TL3843B. Output frequency is one-half the oscillator frequency for the TL3844B and TL3845B.

## 5.7 Error-Amplifier Section Electrical Characteristics

$V_{CC} = 15\text{ V}^{(1)}$ ,  $R_T = 10\text{ k}\Omega$ ,  $C_T = 3.3\text{ nF}$ , over recommended operating free-air temperature range (unless otherwise specified)

| PARAMETER                       | TEST CONDITIONS                                  | TL284xB |                    |      | TL384xB |                    |      | UNIT          |
|---------------------------------|--------------------------------------------------|---------|--------------------|------|---------|--------------------|------|---------------|
|                                 |                                                  | MIN     | TYP <sup>(2)</sup> | MAX  | MIN     | TYP <sup>(2)</sup> | MAX  |               |
| Feedback input voltage          | COMP = 2.5 V                                     | 2.45    | 2.5                | 2.55 | 2.42    | 2.5                | 2.58 | V             |
| Input bias current              |                                                  |         | –0.3               | –1   |         | –0.3               | –2   | $\mu\text{A}$ |
| Open-loop voltage amplification | $V_O = 2\text{ V to }4\text{ V}$                 | 65      | 90                 |      | 65      | 90                 |      | dB            |
| Gain-bandwidth product          |                                                  | 0.7     | 1                  |      | 0.7     | 1                  |      | MHz           |
| Supply-voltage rejection ratio  | $V_{CC} = 12\text{ V to }25\text{ V}$            | 60      | 70                 |      | 60      | 70                 |      | dB            |
| Output sink current             | VFB = 2.7 V, COMP = 1.1 V                        | 2       | 6                  |      | 2       | 6                  |      | mA            |
| Output source current           | VFB = 2.3 V, COMP = 5 V                          | –0.5    | –0.8               |      | –0.5    | –0.8               |      | mA            |
| High-level output voltage       | VFB = 2.3 V,<br>$R_L = 15\text{ k}\Omega$ to GND | 5       | 6                  |      | 5       | 6                  |      | V             |
| Low-level output voltage        | VFB = 2.7 V,<br>$R_L = 15\text{ k}\Omega$ to GND |         | 0.7                | 1.1  |         | 0.7                | 1.1  | V             |

(1) Adjust  $V_{CC}$  above the start threshold before setting it to 15 V.

(2) All typical values are at  $T_J = 25^\circ\text{C}$ .

## 5.8 Current-Sense Section Electrical Characteristics

$V_{CC} = 15\text{ V}^{(4)}$ ,  $R_T = 10\text{ k}\Omega$ ,  $C_T = 3.3\text{ nF}$ , over recommended operating free-air temperature range (unless otherwise specified)

| PARAMETER                                         | TEST CONDITIONS                       | TL284xB |                    |      | TL384xB |                    |      | UNIT          |
|---------------------------------------------------|---------------------------------------|---------|--------------------|------|---------|--------------------|------|---------------|
|                                                   |                                       | MIN     | TYP <sup>(1)</sup> | MAX  | MIN     | TYP <sup>(1)</sup> | MAX  |               |
| Voltage amplification <sup>(2) (3)</sup>          |                                       | 2.85    | 3                  | 3.15 | 2.85    | 3                  | 3.15 | V/V           |
| Current-sense comparator threshold <sup>(2)</sup> | COMP = 5 V                            | 0.9     | 1                  | 1.1  | 0.9     | 1                  | 1.1  | V             |
| Supply-voltage rejection ratio <sup>(2)</sup>     | $V_{CC} = 12\text{ V to }25\text{ V}$ |         | 70                 |      |         | 70                 |      | dB            |
| Input bias current                                |                                       |         | –2                 | –10  |         | –2                 | –10  | $\mu\text{A}$ |
| Delay time to output                              | VFB = 0 V to 2 V                      |         | 150                | 300  |         | 150                | 300  | ns            |

(1) All typical values are at  $T_J = 25^\circ\text{C}$ .

(2) Measured at the trip point of the latch, with VFB at 0 V.

(3) Measured between  $I_{SENSE}$  and COMP, with the input changing from 0 V to 0.8 V.

(4) Adjust  $V_{CC}$  above the start threshold before setting  $V_{CC}$  to 15 V.

## 5.9 Output Section Electrical Characteristics

$V_{CC} = 15\text{ V}^{(2)}$ ,  $R_T = 10\text{ k}\Omega$ ,  $C_T = 3.3\text{ nF}$ , over recommended operating free-air temperature range (unless otherwise specified)

| PARAMETER                 | TEST CONDITIONS                                | TL284xB |                    |     | TL384xB |                    |     | UNIT |
|---------------------------|------------------------------------------------|---------|--------------------|-----|---------|--------------------|-----|------|
|                           |                                                | MIN     | TYP <sup>(1)</sup> | MAX | MIN     | TYP <sup>(1)</sup> | MAX |      |
| High-level output voltage | $I_{OH} = -20\text{ mA}$                       | 13      | 13.5               |     | 13      | 13.5               |     | V    |
|                           | $I_{OH} = -200\text{ mA}$                      | 12      | 13.5               |     | 12      | 13.5               |     |      |
| Low-level output voltage  | $I_{OL} = 20\text{ mA}$                        |         | 0.1                | 0.4 |         | 0.1                | 0.4 | V    |
|                           | $I_{OL} = 200\text{ mA}$                       |         | 1.5                | 2.2 |         | 1.5                | 2.2 |      |
| Rise time                 | $C_L = 1\text{ nF}$ , $T_J = 25^\circ\text{C}$ |         | 25                 | 150 |         | 25                 | 150 | ns   |
| Fall time                 | $C_L = 1\text{ nF}$ , $T_J = 25^\circ\text{C}$ |         | 25                 | 150 |         | 25                 | 150 | ns   |
| UVLO saturation           | $V_{CC} = 5\text{ V}$ , $I_{OL} = 1\text{ mA}$ |         | 0.7                | 1.2 |         | 0.7                | 1.2 | V    |

(1) All typical values are at  $T_J = 25^\circ\text{C}$ .

(2) Adjust  $V_{CC}$  above the start threshold before setting  $V_{CC}$  to 15 V.

## 5.10 Undervoltage-Lockout Section Electrical Characteristics

$V_{CC} = 15\text{ V}^{(2)}$ ,  $R_T = 10\text{ k}\Omega$ ,  $C_T = 3.3\text{ nF}$ , over recommended operating free-air temperature range (unless otherwise specified)

| PARAMETER                                | TEST CONDITIONS  | TL284xB |                    |     | TL384xB |                    |      | UNIT |
|------------------------------------------|------------------|---------|--------------------|-----|---------|--------------------|------|------|
|                                          |                  | MIN     | TYP <sup>(1)</sup> | MAX | MIN     | TYP <sup>(1)</sup> | MAX  |      |
| Start threshold voltage                  | TLx842B, TLx844B | 15      | 16                 | 17  | 14.5    | 16                 | 17.5 | V    |
|                                          | TLx843B, TLx845B | 7.8     | 8.4                | 9   | 7.8     | 8.4                | 9    |      |
| Minimum operating voltage after start-up | TLx842B, TLx844B | 9       | 10                 | 11  | 8.5     | 10                 | 11.5 | V    |
|                                          | TLx843B, TLx845B | 7       | 7.6                | 8.2 | 7       | 7.6                | 8.2  |      |

(1) All typical values are at  $T_J = 25^\circ\text{C}$ .

(2) Adjust  $V_{CC}$  above the start threshold before setting  $V_{CC}$  to 15 V.

## 5.11 Pulse-Width Modulator Section Electrical Characteristics

$V_{CC} = 15\text{ V}^{(2)}$ ,  $R_T = 10\text{ k}\Omega$ ,  $C_T = 3.3\text{ nF}$ , over recommended operating free-air temperature range (unless otherwise specified)

| PARAMETER          | TEST CONDITIONS  | TL284xB |                    |     | TL384xB |                    |     | UNIT |
|--------------------|------------------|---------|--------------------|-----|---------|--------------------|-----|------|
|                    |                  | MIN     | TYP <sup>(1)</sup> | MAX | MIN     | TYP <sup>(1)</sup> | MAX |      |
| Maximum duty cycle | TLx842B, TLx843B | 92      | 96                 | 100 | 92      | 96                 | 100 | %    |
|                    | TLx844B, TLx845B | 46      | 48                 | 50  | 46      | 48                 | 50  |      |
| Minimum duty cycle |                  |         |                    | 0   |         |                    | 0   | %    |

(1) All typical values are at  $T_J = 25^\circ\text{C}$ .

(2) Adjust  $V_{CC}$  above the start threshold before setting it to 15 V.

## 5.12 Supply Voltage Electrical Characteristics

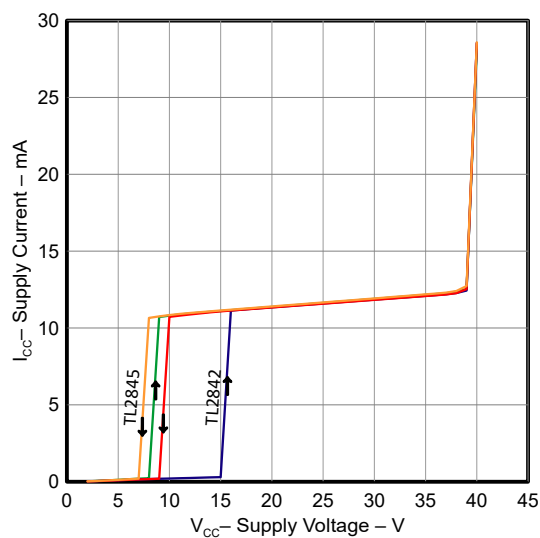
$V_{CC} = 15\text{ V}^{(2)}$ ,  $R_T = 10\text{ k}\Omega$ ,  $C_T = 3.3\text{ nF}$ , over recommended operating free-air temperature range (unless otherwise specified)

| PARAMETER                | TEST CONDITIONS            | TL284xB |                    |     | TL384xB |                    |     | UNIT |
|--------------------------|----------------------------|---------|--------------------|-----|---------|--------------------|-----|------|
|                          |                            | MIN     | TYP <sup>(1)</sup> | MAX | MIN     | TYP <sup>(1)</sup> | MAX |      |
| Start-up current         |                            |         | 0.3                | 0.5 |         | 0.3                | 0.5 | mA   |
| Operating supply current | VFB and $I_{SENSE}$ at 0 V |         | 11                 | 17  |         | 11                 | 17  | mA   |
| Limiting voltage         | $I_{CC} = 25\text{ mA}$    | 30      | 39                 |     | 30      | 39                 |     | V    |

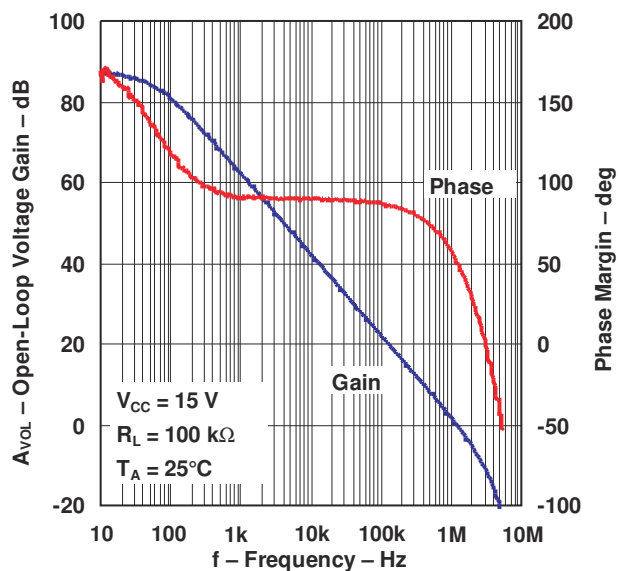
(1) All typical values are at  $T_J = 25^\circ\text{C}$ .

(2) Adjust  $V_{CC}$  above the start threshold before setting it to 15 V.

## 5.13 Typical Characteristics

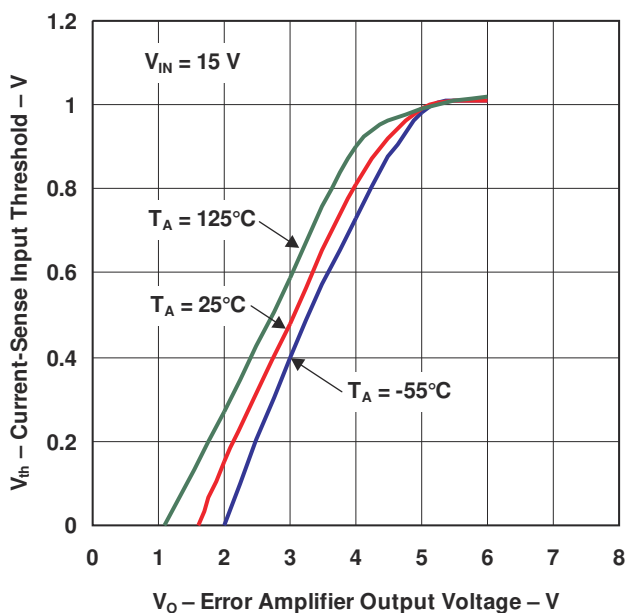


**Figure 5-1. Supply Current vs Supply Voltage**

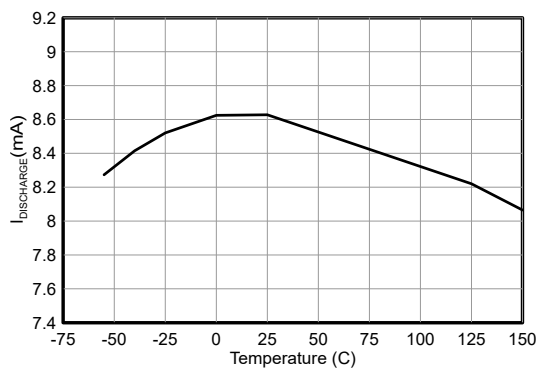


**Figure 5-2. Error Amplifier Open-Loop Gain And Phase vs Frequency**





**Figure 5-3. Current-Sense Input Threshold vs Error Amplifier Output Voltage**



**Figure 5-4. Oscillator Discharge Current vs Temperature**

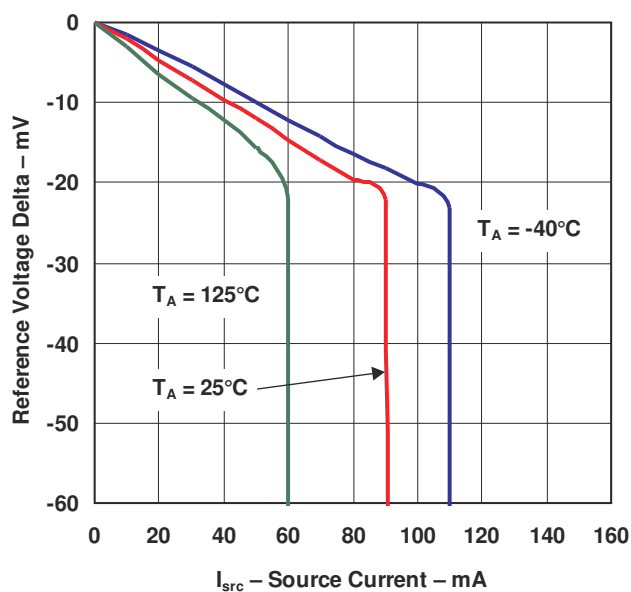


Figure 5-5. Reference Voltage vs Source Current

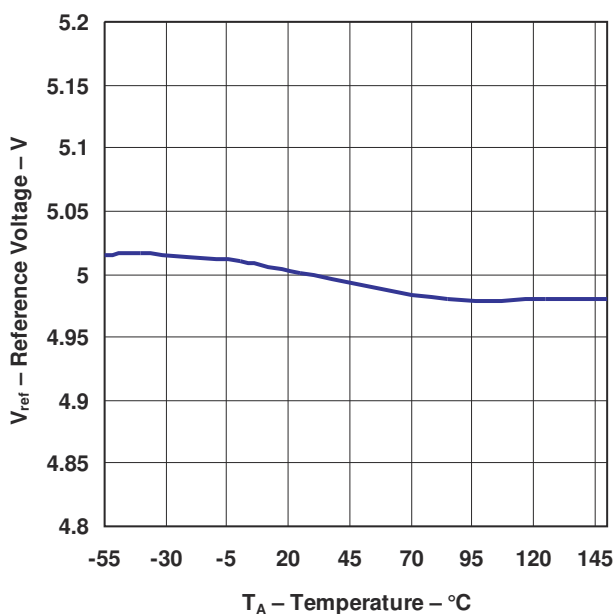
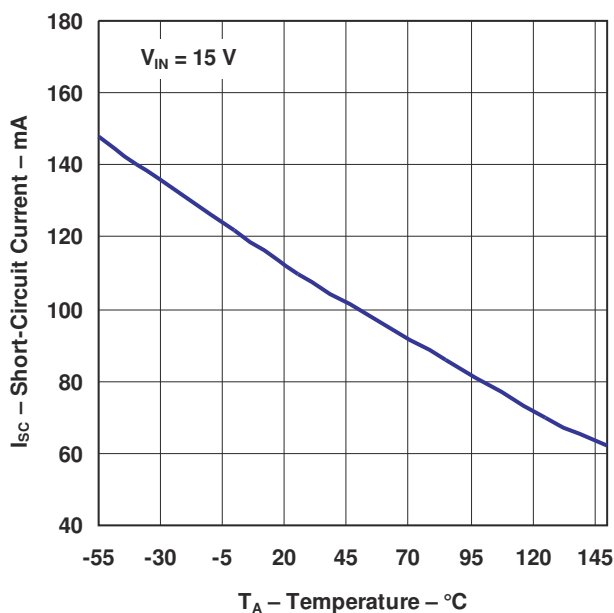
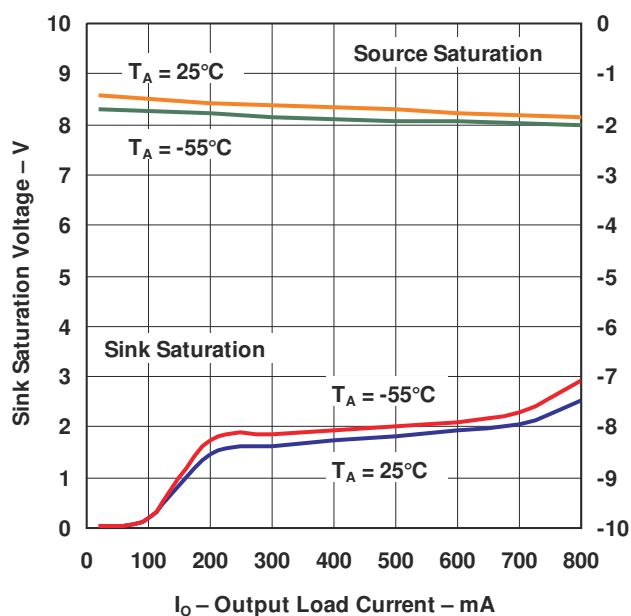


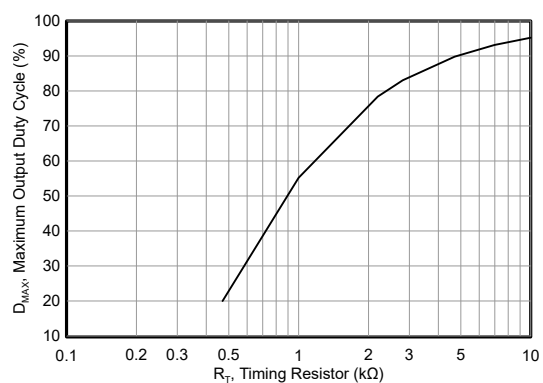
Figure 5-6. Reference Voltage vs Temperature



**Figure 5-7. Reference Short-Circuit Current vs Temperature**



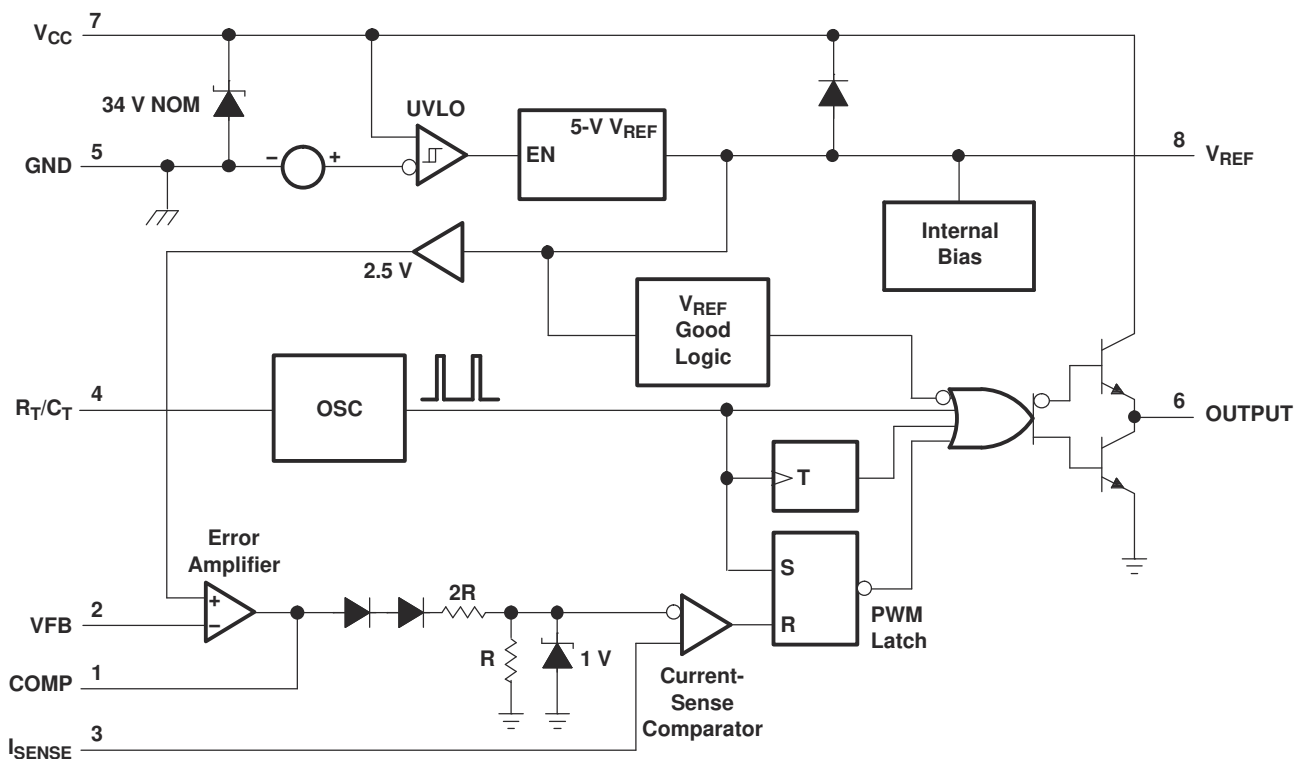
**Figure 5-8. Output Saturation Voltage vs Load Current**



**Figure 5-9. Maximum Output Duty Cycle vs Timing Resistor**

## 6 Detailed Description

## 6.1 Functional Block Diagram



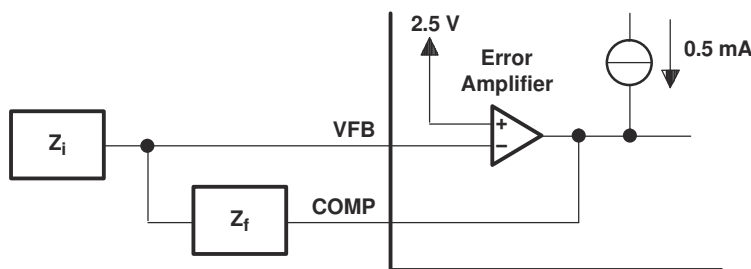
## 7 Application and Implementation

### Note

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes, as well as validating and testing their design implementation to confirm system functionality.

### 7.1 Application Information

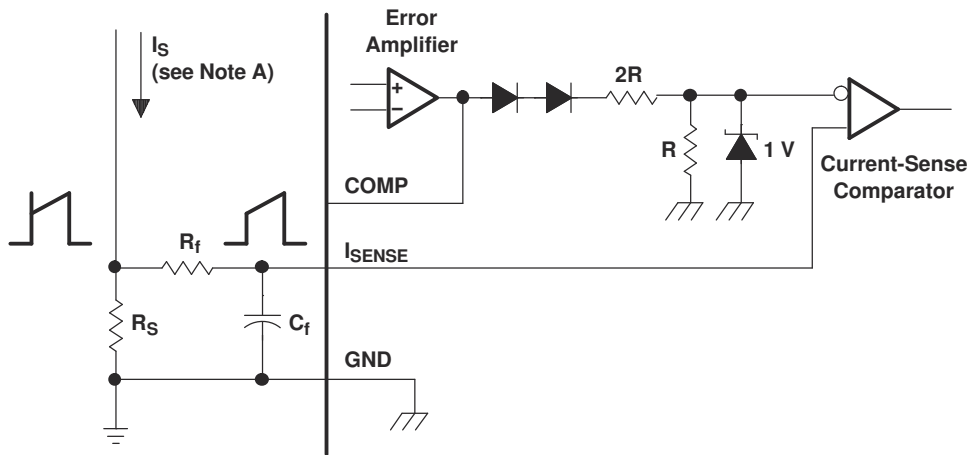
The error-amplifier configuration circuit is shown in Figure 7-1.



A. Error amplifier can source or sink up to 0.5 mA.

**Figure 7-1. Error-Amplifier Configuration**

The current-sense circuit is shown in Figure 7-2.



A. Peak current ( $I_S$ ) is determined by the formula:  $I_{S(max)} = 1\text{ V}/R_S$

B. A small RC filter formed by resistor  $R_f$  and capacitor  $C_f$  may be required to suppress switch transients.

**Figure 7-2. Current-Sense Circuit**

The oscillator frequency is set using the circuit shown in Figure 7-3. The frequency is calculated as:

$$f = 1 / R_T C_T$$

For  $R_T > 5\text{ k}\Omega$ :

$$f \approx 1.72 / R_T C_T$$

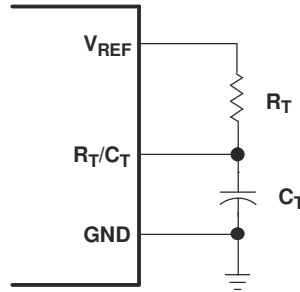


Figure 7-3. Oscillator Section

## 7.2 Shutdown Technique

The PWM controller (see Figure 7-4) can be shut down by two methods: either raise the voltage at  $I_{SENSE}$  above 1 V or pull the COMP terminal below a voltage two diode drops above ground. Either method causes the output of the PWM comparator to be high (refer to block diagram). The PWM latch is reset dominant so that the output remains low until the next clock cycle after the shutdown condition at the COMP or  $I_{SENSE}$  terminal is removed. In one example, an externally latched shutdown can be accomplished by adding an SCR that resets by cycling  $V_{CC}$  below the lower UVLO threshold. At this point, the reference turns off, allowing the SCR to reset.

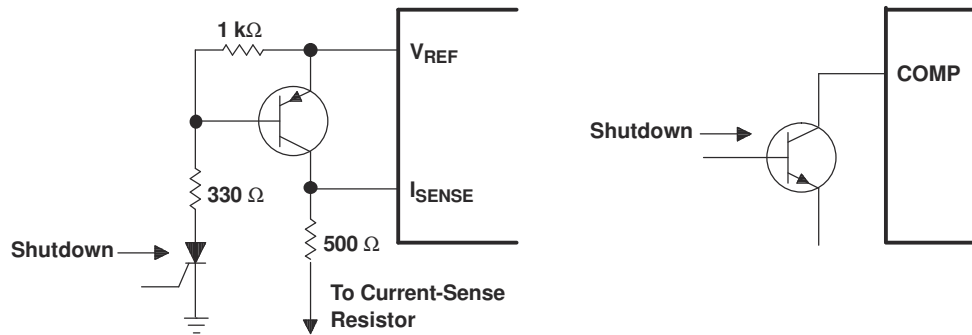


Figure 7-4. Shutdown Techniques

A fraction of the oscillator ramp can be summed resistively with the current-sense signal to provide slope compensation for converters requiring duty cycles over 50% (see Figure 7-5). Note that capacitor C forms a filter with R2 to suppress the leading-edge switch spikes.

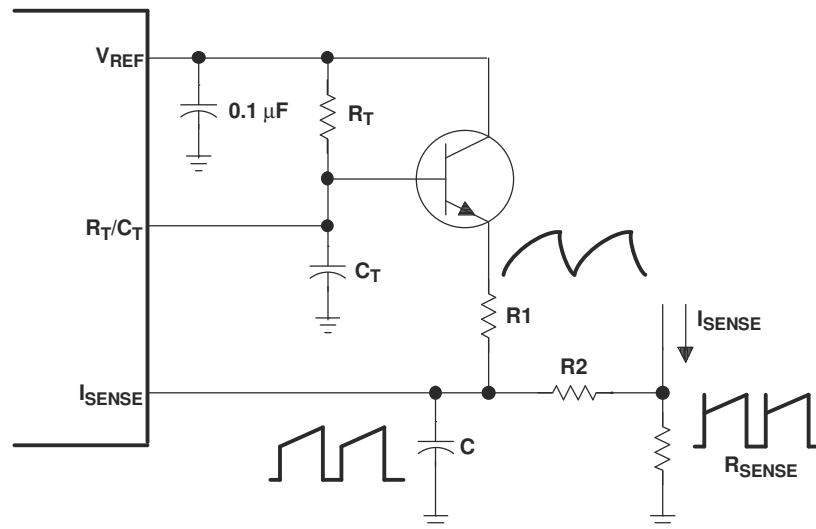


Figure 7-5. Slope Compensation

## 7.3 Open-Loop Laboratory Test Fixture

In the open-loop laboratory test fixture (see Figure 7-6), high peak currents associated with loads necessitate careful grounding techniques. Timing and bypass capacitors should be connected close to the GND terminal in a single-point ground. The transistor and 5-k $\Omega$  potentiometer sample the oscillator waveform and apply an adjustable ramp to the I<sub>SENSE</sub> terminal.

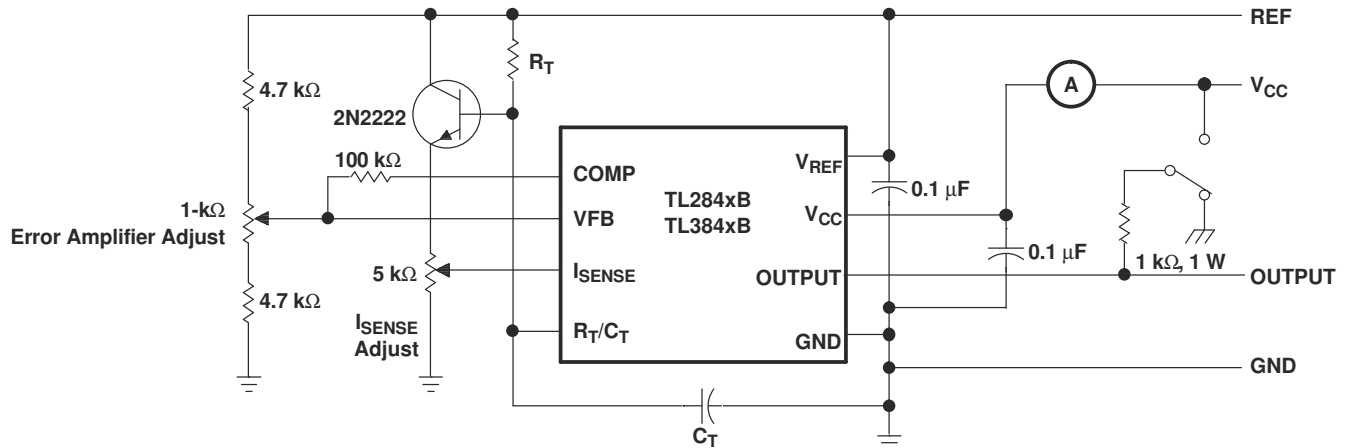
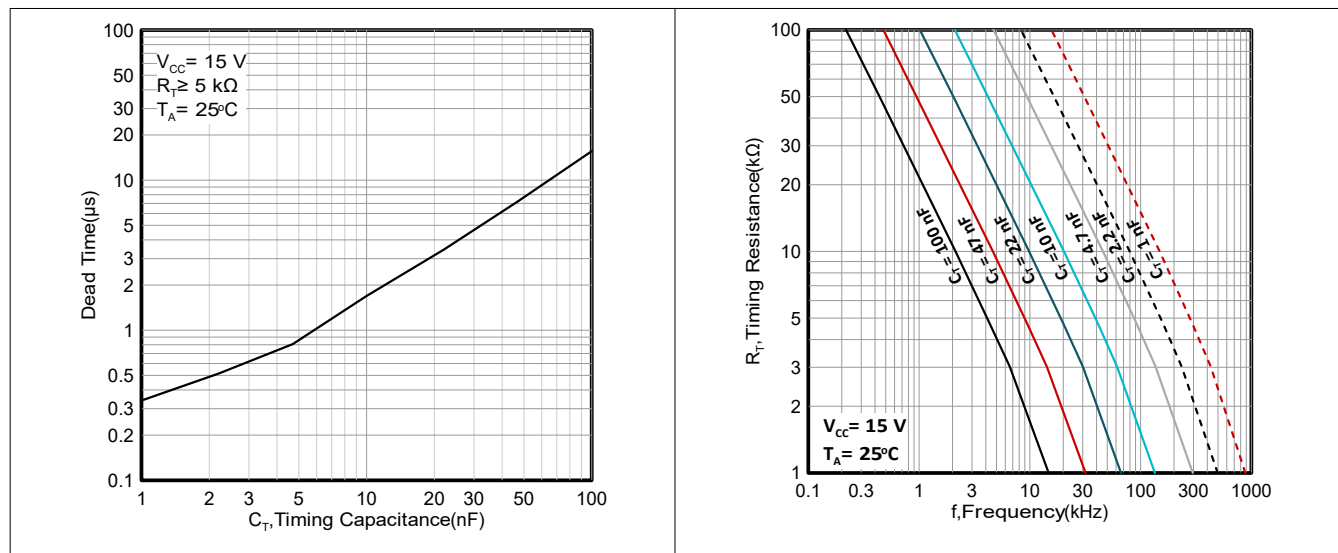


Figure 7-6. Open-Loop Laboratory Test Fixture

## 7.4 Typical Application

### 7.4.1 Application Curves



## 8 Device and Documentation Support

### 8.1 Related Links

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to sample or buy.

Table 8-1. Related Links

| PARTS   | PRODUCT FOLDER             | SAMPLE & BUY               | TECHNICAL DOCUMENTS        | TOOLS & SOFTWARE           | SUPPORT & COMMUNITY        |
|---------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| TL284xB | <a href="#">Click here</a> | <a href="#">Click here</a> | <a href="#">Click here</a> | <a href="#">Click here</a> | <a href="#">Click here</a> |



**Table 8-1. Related Links (continued)**

| PARTS   | PRODUCT FOLDER             | SAMPLE & BUY               | TECHNICAL DOCUMENTS        | TOOLS & SOFTWARE           | SUPPORT & COMMUNITY        |
|---------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| TL384xB | <a href="#">Click here</a> | <a href="#">Click here</a> | <a href="#">Click here</a> | <a href="#">Click here</a> | <a href="#">Click here</a> |

## 8.2 Trademarks

All trademarks are the property of their respective owners.

## 8.3 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

## 8.4 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

## 9 Revision History

| Changes from Revision B (July, 2007) to Revision C (October, 2024)                                                                                            | Page |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| • Updated the numbering format for tables, figures, and cross-references throughout the document.....                                                         | 1    |
| • Changed ESD ratings, CDM rating from $\pm 3000V$ to $\pm 2000V$ .....                                                                                       | 4    |
| • Changed thermal information for D-8, D-14, and P-8 packages.....                                                                                            | 5    |
| • Changed Electrical Char. table, TOTAL STANDBY CURRENT, VCC Zener voltage, typical value from 34V to 39V.....                                                | 5    |
| • Changed in Electrical Char. table, Oscillator Section: at $T_j=25^{\circ}C$ , min. value from 49kHz to 47kHz, max. value from 55kHz to 57kHz.....           | 5    |
| • Changed in Electrical Char. table, Oscillator Section: at $T_A=T_{low}$ to $T_{high}$ , min. value from 48kHz to 44kHz, max. value from 56kHz to 60kHz..... | 5    |
| • Changed in Electrical Char. table, OUTPUT Section: Rise and fall time, typical value from 50ns to 25ns.....                                                 | 7    |
| • Changed in Electrical Char. table, PWM: maximum duty cycle of TLx842/3B, minimum value from 94% to 92%.....                                                 | 7    |
| • Changed in Electrical Char. table, PWM: maximum duty cycle of TLx844/5B, minimum value from 47% to 46%.....                                                 | 7    |
| • Changed Part numbers edited.....                                                                                                                            | 7    |
| • Updated the <i>Typical Characteristics</i> graphs for $I_{discharge}$ and $T_a$ , $I_{VCC-V_{CC}}$ , and $D_{max}$ and $R_t$ .....                          | 8    |
| • Updated Application Curves for $t_{deadtime-Ct}$ and $R_t-f$ .....                                                                                          | 16   |

## 10 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

## 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="#">TL2842BD</a>    | Obsolete      | Production           | SOIC (D)   14  | -                     | -           | Call TI                              | Call TI                           | -40 to 85    | TL2842B             |
| <a href="#">TL2842BD-8</a>  | Obsolete      | Production           | SOIC (D)   8   | -                     | -           | Call TI                              | Call TI                           | -40 to 85    | 2842B               |
| <a href="#">TL2842BDR</a>   | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | TL2842B             |
| <a href="#">TL2842BDR-8</a> | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | 2842B               |
| TL2842BDR-8.A               | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | 2842B               |
| TL2842BDR.A                 | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | TL2842B             |
| <a href="#">TL2842BP</a>    | NRND          | Production           | PDIP (P)   8   | 50   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -40 to 85    | TL2842BP            |
| TL2842BP.A                  | NRND          | Production           | PDIP (P)   8   | 50   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -40 to 85    | TL2842BP            |
| <a href="#">TL2843BD</a>    | Obsolete      | Production           | SOIC (D)   14  | -                     | -           | Call TI                              | Call TI                           | -40 to 85    | TL2843B             |
| <a href="#">TL2843BD-8</a>  | Obsolete      | Production           | SOIC (D)   8   | -                     | -           | Call TI                              | Call TI                           | -40 to 85    | 2843B               |
| <a href="#">TL2843BDR</a>   | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | TL2843B             |
| <a href="#">TL2843BDR-8</a> | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | 2843B               |
| TL2843BDR-8.A               | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | 2843B               |
| TL2843BDR.A                 | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | TL2843B             |
| TL2843BDRG4-8               | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | 2843B               |
| <a href="#">TL2843BP</a>    | NRND          | Production           | PDIP (P)   8   | 50   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -40 to 85    | TL2843BP            |
| TL2843BP.A                  | NRND          | Production           | PDIP (P)   8   | 50   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | -40 to 85    | TL2843BP            |
| <a href="#">TL2844BD-8</a>  | Obsolete      | Production           | SOIC (D)   8   | -                     | -           | Call TI                              | Call TI                           | -40 to 85    | 2844B               |
| <a href="#">TL2844BDR</a>   | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | TL2844B             |
| <a href="#">TL2844BDR-8</a> | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | 2844B               |
| TL2844BDR-8.A               | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | 2844B               |
| TL2844BDR.A                 | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | TL2844B             |
| TL2844BDRG4-8               | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | 2844B               |
| <a href="#">TL2845BD</a>    | Obsolete      | Production           | SOIC (D)   14  | -                     | -           | Call TI                              | Call TI                           | -40 to 85    | TL2845B             |
| <a href="#">TL2845BD-8</a>  | Obsolete      | Production           | SOIC (D)   8   | -                     | -           | Call TI                              | Call TI                           | -40 to 85    | 2845B               |
| <a href="#">TL2845BDR</a>   | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | TL2845B             |
| <a href="#">TL2845BDR-8</a> | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | 2845B               |
| TL2845BDR-8.A               | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | 2845B               |
| TL2845BDR.A                 | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | TL2845B             |

| 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) |
|-----------------------------|---------------|----------------------|----------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| TL2845BDRG4-8               | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | -40 to 85    | 2845B               |
| <a href="#">TL3842BD</a>    | Obsolete      | Production           | SOIC (D)   14  | -                     | -           | Call TI                              | Call TI                           | 0 to 70      | TL3842B             |
| <a href="#">TL3842BD-8</a>  | Obsolete      | Production           | SOIC (D)   8   | -                     | -           | Call TI                              | Call TI                           | 0 to 70      | 3842B               |
| <a href="#">TL3842BDR</a>   | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | TL3842B             |
| <a href="#">TL3842BDR-8</a> | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 3842B               |
| TL3842BDR-8.A               | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 3842B               |
| TL3842BDR.A                 | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | TL3842B             |
| <a href="#">TL3842BP</a>    | Obsolete      | Production           | PDIP (P)   8   | -                     | -           | Call TI                              | Call TI                           | 0 to 70      | TL3842BP            |
| <a href="#">TL3843BD</a>    | Obsolete      | Production           | SOIC (D)   14  | -                     | -           | Call TI                              | Call TI                           | 0 to 70      | TL3843B             |
| <a href="#">TL3843BD-8</a>  | Obsolete      | Production           | SOIC (D)   8   | -                     | -           | Call TI                              | Call TI                           | 0 to 70      | 3843B               |
| <a href="#">TL3843BDR</a>   | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | TL3843B             |
| <a href="#">TL3843BDR-8</a> | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 3843B               |
| TL3843BDR-8.A               | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 3843B               |
| TL3843BDR.A                 | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | TL3843B             |
| <a href="#">TL3843BP</a>    | Active        | Production           | PDIP (P)   8   | 50   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | TL3843BP            |
| TL3843BP.A                  | Active        | Production           | PDIP (P)   8   | 50   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | TL3843BP            |
| <a href="#">TL3844BD-8</a>  | Obsolete      | Production           | SOIC (D)   8   | -                     | -           | Call TI                              | Call TI                           | 0 to 70      | 3844B               |
| <a href="#">TL3844BDR</a>   | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | TL3844B             |
| <a href="#">TL3844BDR-8</a> | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 3844B               |
| TL3844BDR-8.A               | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 3844B               |
| TL3844BDR.A                 | Active        | Production           | SOIC (D)   14  | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | TL3844B             |
| <a href="#">TL3844BP</a>    | NRND          | Production           | PDIP (P)   8   | 50   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | TL3844BP            |
| TL3844BP.A                  | NRND          | Production           | PDIP (P)   8   | 50   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | TL3844BP            |
| <a href="#">TL3845BD</a>    | Obsolete      | Production           | SOIC (D)   14  | -                     | -           | Call TI                              | Call TI                           | 0 to 70      | TL3845B             |
| <a href="#">TL3845BD-8</a>  | Obsolete      | Production           | SOIC (D)   8   | -                     | -           | Call TI                              | Call TI                           | 0 to 70      | 3845B               |
| <a href="#">TL3845BDR</a>   | Obsolete      | Production           | SOIC (D)   14  | -                     | -           | Call TI                              | Call TI                           | 0 to 70      | TL3845B             |
| <a href="#">TL3845BDR-8</a> | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 3845B               |
| TL3845BDR-8.A               | Active        | Production           | SOIC (D)   8   | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 70      | 3845B               |
| <a href="#">TL3845BP</a>    | Active        | Production           | PDIP (P)   8   | 50   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | TL3845BP            |
| TL3845BP.A                  | Active        | Production           | PDIP (P)   8   | 50   TUBE             | Yes         | NIPDAU                               | N/A for Pkg Type                  | 0 to 70      | TL3845BP            |

<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.

**Important Information and Disclaimer:** The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

#### **OTHER QUALIFIED VERSIONS OF TL2843B :**

- Automotive : [TL2843B-Q1](#)

NOTE: Qualified Version Definitions:

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

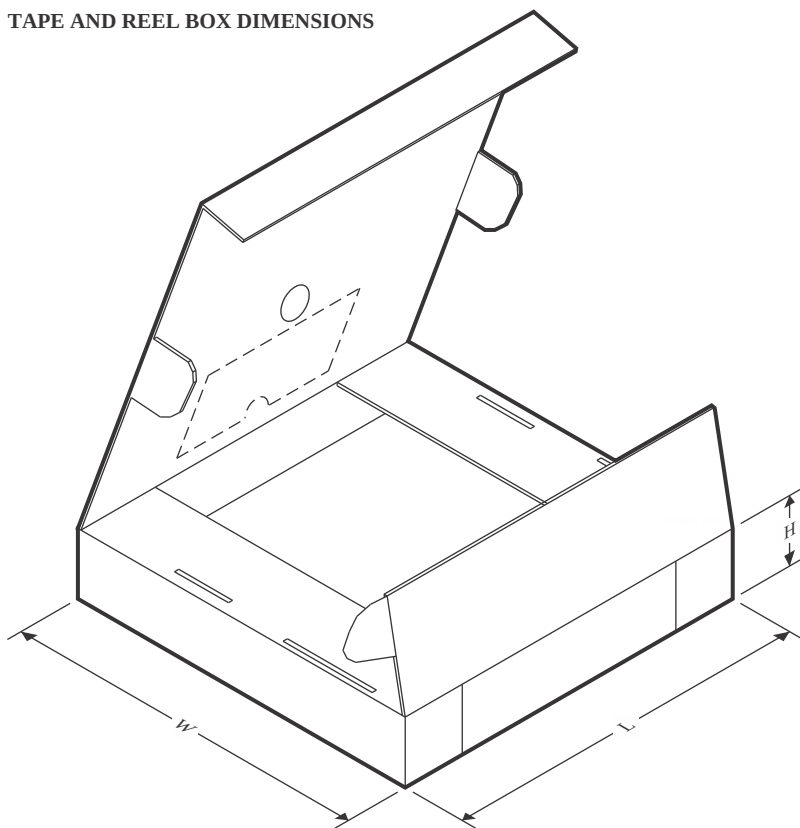
## TAPE AND REEL INFORMATION



\*All dimensions are nominal

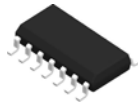
| Device      | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|-------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| TL2842BDR   | SOIC         | D               | 14   | 2500 | 330.0              | 16.4               | 6.5     | 9.0     | 2.1     | 8.0     | 16.0   | Q1            |
| TL2842BDR-8 | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TL2843BDR   | SOIC         | D               | 14   | 2500 | 330.0              | 16.4               | 6.5     | 9.0     | 2.1     | 8.0     | 16.0   | Q1            |
| TL2843BDR-8 | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TL2844BDR   | SOIC         | D               | 14   | 2500 | 330.0              | 16.4               | 6.5     | 9.0     | 2.1     | 8.0     | 16.0   | Q1            |
| TL2844BDR-8 | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TL2845BDR   | SOIC         | D               | 14   | 2500 | 330.0              | 16.4               | 6.5     | 9.0     | 2.1     | 8.0     | 16.0   | Q1            |
| TL2845BDR-8 | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TL3842BDR   | SOIC         | D               | 14   | 2500 | 330.0              | 16.4               | 6.5     | 9.0     | 2.1     | 8.0     | 16.0   | Q1            |
| TL3842BDR-8 | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TL3843BDR   | SOIC         | D               | 14   | 2500 | 330.0              | 16.4               | 6.5     | 9.0     | 2.1     | 8.0     | 16.0   | Q1            |
| TL3843BDR-8 | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TL3844BDR   | SOIC         | D               | 14   | 2500 | 330.0              | 16.4               | 6.5     | 9.0     | 2.1     | 8.0     | 16.0   | Q1            |
| TL3844BDR-8 | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TL3845BDR-8 | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS

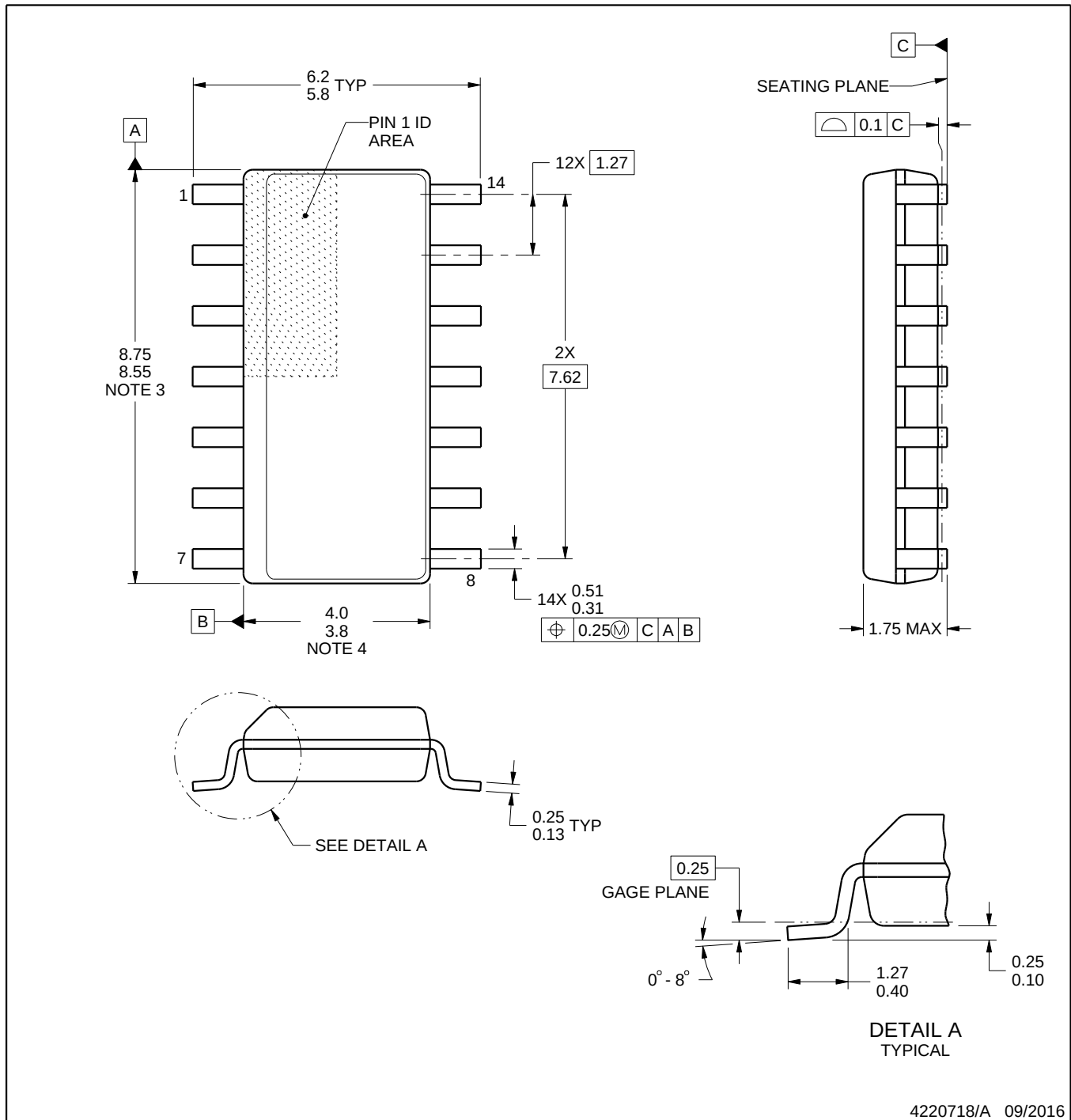


\*All dimensions are nominal

| Device      | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|-------------|--------------|-----------------|------|------|-------------|------------|-------------|
| TL2842BDR   | SOIC         | D               | 14   | 2500 | 353.0       | 353.0      | 32.0        |
| TL2842BDR-8 | SOIC         | D               | 8    | 2500 | 353.0       | 353.0      | 32.0        |
| TL2843BDR   | SOIC         | D               | 14   | 2500 | 353.0       | 353.0      | 32.0        |
| TL2843BDR-8 | SOIC         | D               | 8    | 2500 | 353.0       | 353.0      | 32.0        |
| TL2844BDR   | SOIC         | D               | 14   | 2500 | 353.0       | 353.0      | 32.0        |
| TL2844BDR-8 | SOIC         | D               | 8    | 2500 | 353.0       | 353.0      | 32.0        |
| TL2845BDR   | SOIC         | D               | 14   | 2500 | 353.0       | 353.0      | 32.0        |
| TL2845BDR-8 | SOIC         | D               | 8    | 2500 | 353.0       | 353.0      | 32.0        |
| TL3842BDR   | SOIC         | D               | 14   | 2500 | 353.0       | 353.0      | 32.0        |
| TL3842BDR-8 | SOIC         | D               | 8    | 2500 | 353.0       | 353.0      | 32.0        |
| TL3843BDR   | SOIC         | D               | 14   | 2500 | 353.0       | 353.0      | 32.0        |
| TL3843BDR-8 | SOIC         | D               | 8    | 2500 | 353.0       | 353.0      | 32.0        |
| TL3844BDR   | SOIC         | D               | 14   | 2500 | 353.0       | 353.0      | 32.0        |
| TL3844BDR-8 | SOIC         | D               | 8    | 2500 | 353.0       | 353.0      | 32.0        |
| TL3845BDR-8 | SOIC         | D               | 8    | 2500 | 353.0       | 353.0      | 32.0        |

**D0014A****PACKAGE OUTLINE****SOIC - 1.75 mm max height**

SMALL OUTLINE INTEGRATED CIRCUIT

**NOTES:**

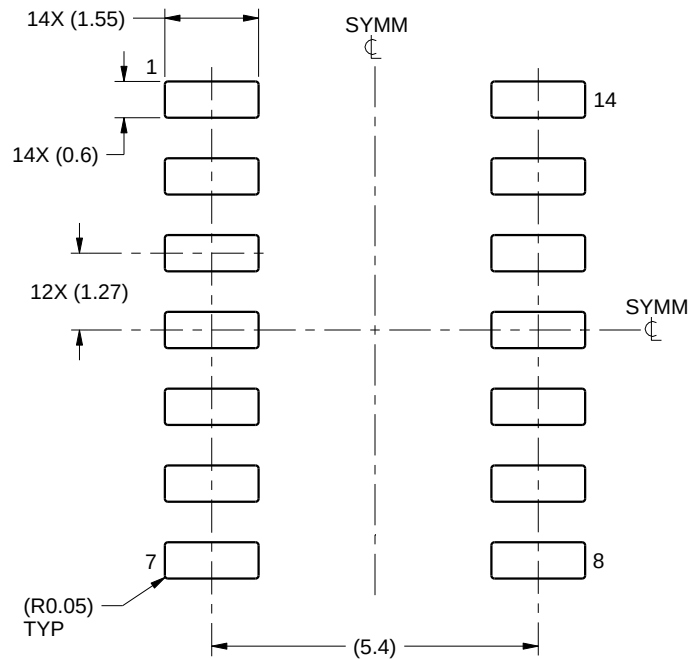
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm, per side.
5. Reference JEDEC registration MS-012, variation AB.

# EXAMPLE BOARD LAYOUT

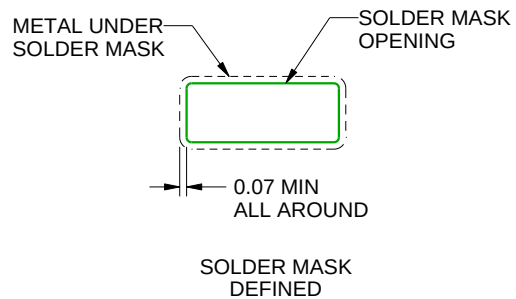
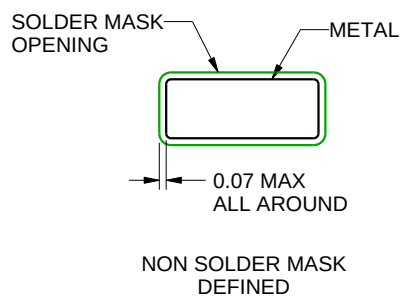
D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE  
SCALE:8X



SOLDER MASK DETAILS

4220718/A 09/2016

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

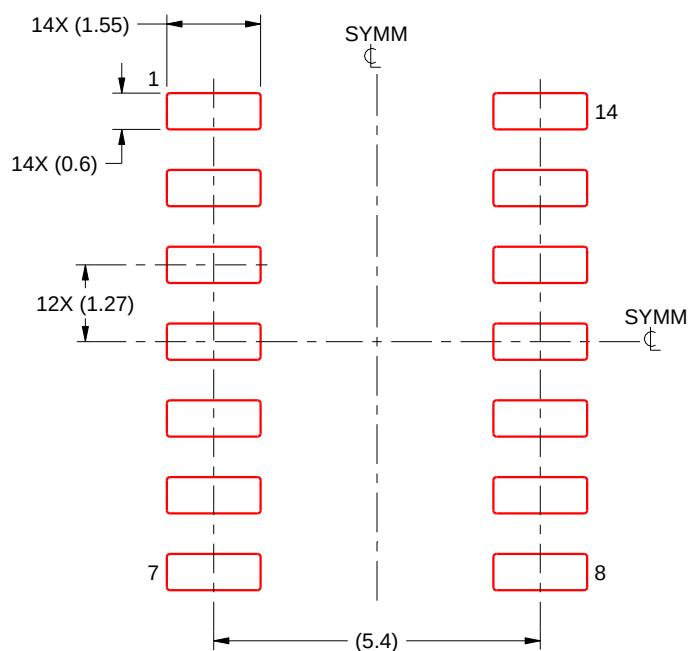


## EXAMPLE STENCIL DESIGN

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:8X

4220718/A 09/2016

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.



## PACKAGE OUTLINE

**SOIC - 1.75 mm max height**

SMALL OUTLINE INTEGRATED CIRCUIT



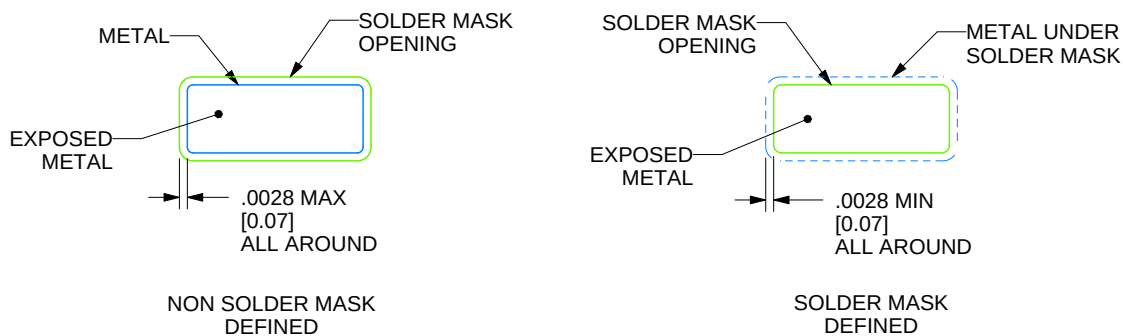
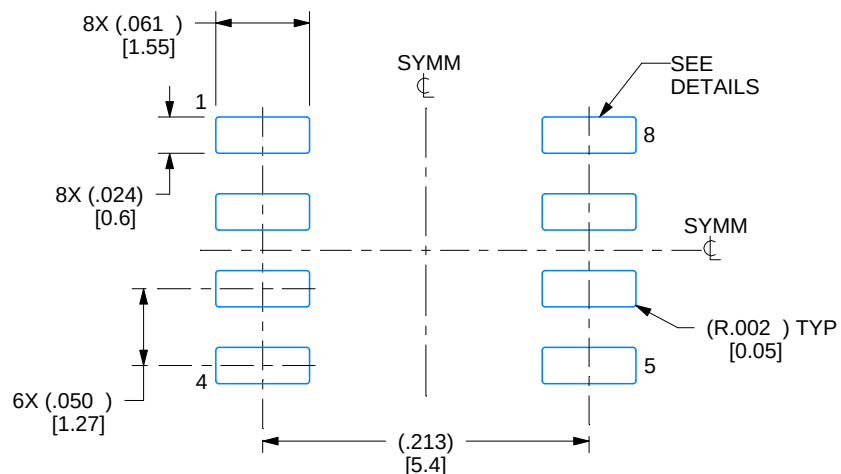
1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 [0.15] per side.
4. This dimension does not include interlead flash.
5. Reference JEDEC registration MS-012, variation AA.

# EXAMPLE BOARD LAYOUT

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



4214825/C 02/2019

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

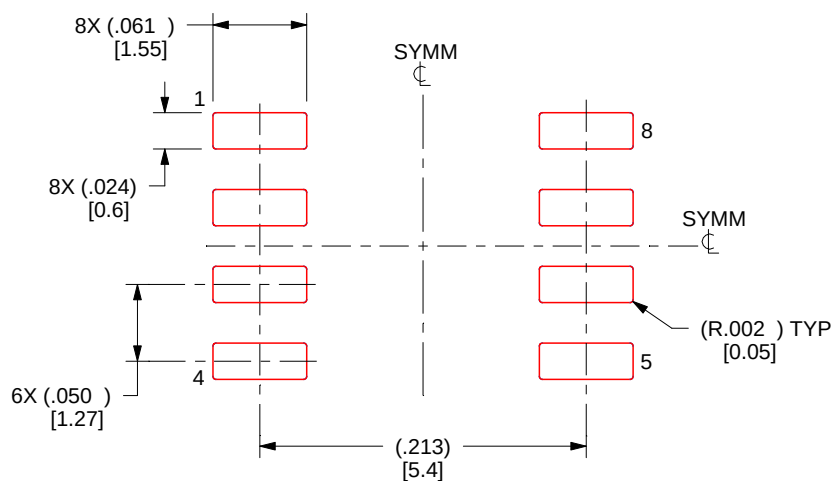
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

## EXAMPLE STENCIL DESIGN

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE  
BASED ON .005 INCH [0.125 MM] THICK STENCIL  
SCALE:8X

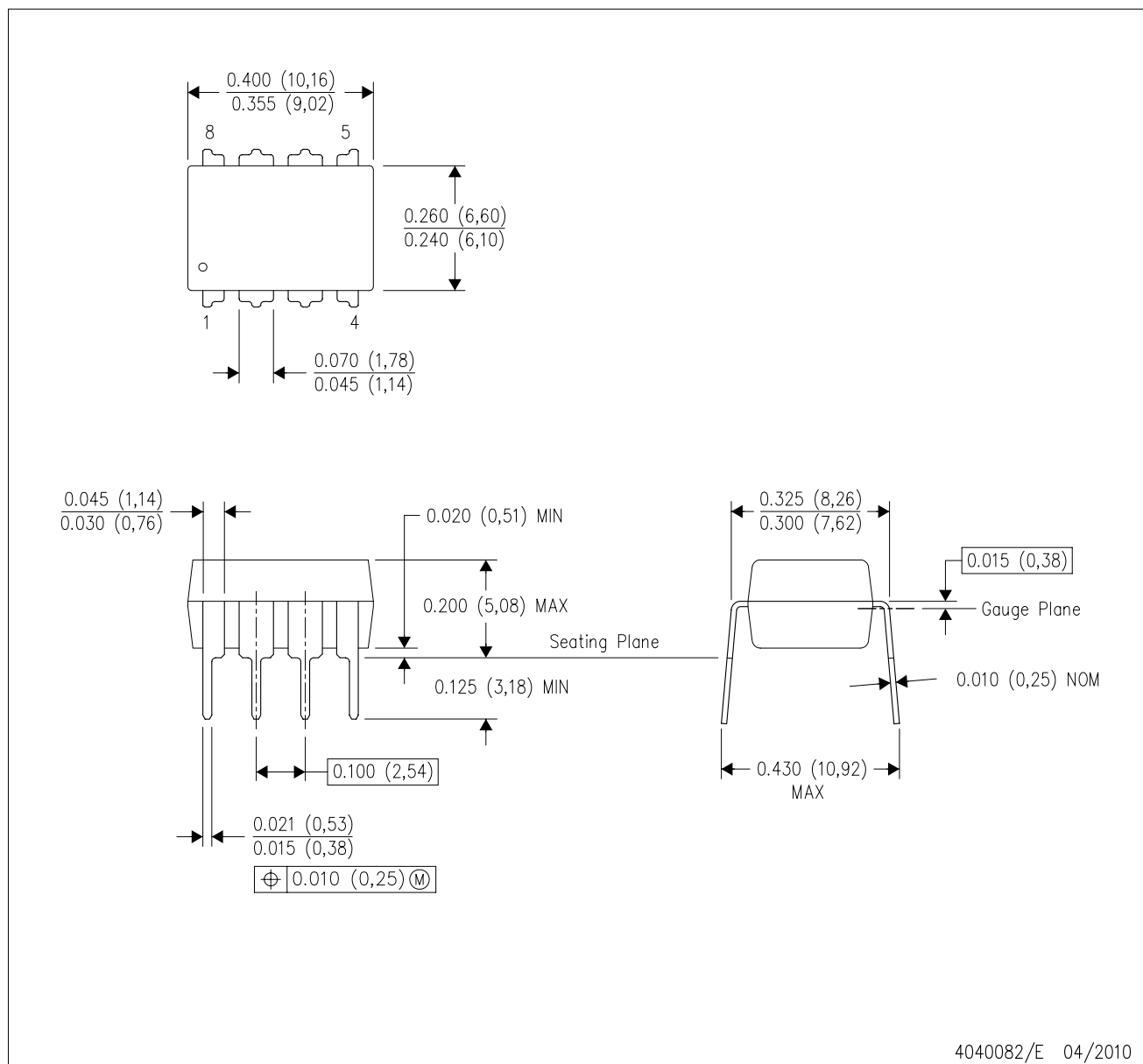
4214825/C 02/2019

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Falls within JEDEC MS-001 variation BA.

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