

## Micropower Supply Voltage Supervisors

Check for Samples: [TLC7701](#), [TLC7725](#), [TLC7703](#) , [TLC7733](#), [TLC7705](#)

### FEATURES

- Power-On Reset Generator
- Automatic Reset Generation After Voltage Drop
- Precision Voltage Sensor
- Temperature-Compensated Voltage Reference
- Programmable Delay Time by External Capacitor
- Supply Voltage Range . . . 2 V to 6 V
- Defined RESET Output from  $V_{DD} \geq 1$  V
- Power-Down Control Support for Static RAM With Battery Backup
- Maximum Supply Current of 16  $\mu$ A
- Power Saving Totem-Pole Outputs
- Temperature Range . . . Up to  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$

### APPLICATIONS

- Medical Imaging

### DESCRIPTION

The TLC77xx family of micropower supply voltage supervisors provide reset control, primarily in microcomputer and microprocessor systems.

During power-on,  $\overline{\text{RESET}}$  is asserted when  $V_{DD}$  reaches 1 V. After minimum  $V_{DD}$  ( $\geq 2$  V) is established, the circuit monitors SENSE voltage and keeps the reset outputs active as long as SENSE voltage ( $V_{I(\text{SENSE})}$ ) remains below the threshold voltage. An internal timer delays return of the output to the inactive state to ensure proper system reset. The delay time,  $t_d$ , is determined by an external capacitor:

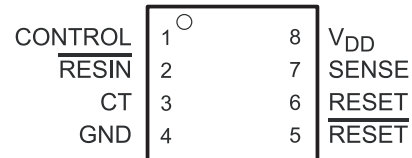
$$t_d = 2.1 \times 10^4 \times C_T$$

Where

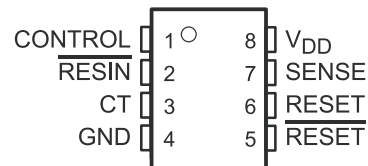
$C_T$  is in farads

$t_d$  is in seconds

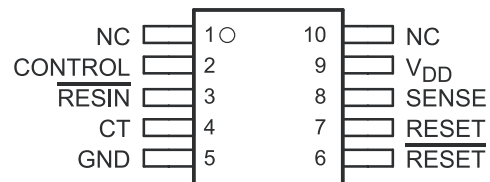
**DRB PACKAGE  
(TOP VIEW)**



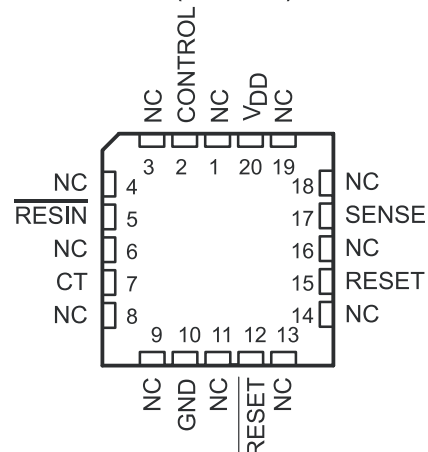
**D, JG, P OR PW PACKAGE  
(TOP VIEW)**



**U PACKAGE  
(TOP VIEW)**



**FK PACKAGE  
(TOP VIEW)**



Except for the TLC7701, which can be customized with two external resistors, each supervisor has a fixed sense threshold voltage set by an internal voltage divider. When SENSE voltage drops below the threshold voltage, the outputs become active and stay in that state until SENSE voltage returns above threshold voltage and the delay time,  $t_d$ , has expired.



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These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

## DESCRIPTION (CONTINUED)

In addition to the power-on-reset and undervoltage-supervisor function, the TLC77xx adds power-down control support for static RAM. When CONTROL is tied to GND, RESET will act as active high. The voltage monitor contains additional logic intended for control of static memories with battery backup during power failure. By driving the chip select (CS) of the memory circuit with the RESET output of the TLC77xx and with the CONTROL driven by the memory bank select signal (CSH1) of the microprocessor (see [Figure 10](#)), the memory circuit is automatically disabled during a power loss. (In this application the TLC77xx power has to be supplied by the battery.)

The TLC77xxI is characterized for operation over a temperature range of  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ ; the TLC77xxQ is characterized for operation over a temperature range of  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ ; and the TLC77xxM is characterized for operation over the full Military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ .

The 3x3 mm DRB package is also available as a non-magnetic package for medical imaging application.

## AVAILABLE OPTIONS

| $T_A$                                             | THRESHOLD<br>VOLTAGE<br>(V) | PACKAGED DEVICES                    |                         |                        |                                 |                    |                                                     |                                   |
|---------------------------------------------------|-----------------------------|-------------------------------------|-------------------------|------------------------|---------------------------------|--------------------|-----------------------------------------------------|-----------------------------------|
|                                                   |                             | SMALL<br>OUTLINE (D) <sup>(1)</sup> | CHIP<br>CARRIER<br>(FK) | CERAMIC<br>DIP<br>(JG) | CERAMIC<br>DUAL<br>FLATPACK (U) | PLASTIC DIP<br>(P) | THIN SHRINK<br>SMALL OUTLINE<br>(PW) <sup>(2)</sup> | SMALL OUTLINE<br>NO LEAD<br>(DRB) |
| $-40^{\circ}\text{C}$ to<br>$85^{\circ}\text{C}$  | 1.1                         | TCLC7701ID                          | —                       | —                      | —                               | TCLC7701IP         | TCLC7701IPWR                                        | —                                 |
|                                                   | 2.25                        | TLC7725ID                           | —                       | —                      | —                               | TLC7725IP          | TLC7725IPWR                                         | —                                 |
|                                                   | 2.63                        | TLC7703ID                           | —                       | —                      | —                               | TLC7703IP          | TLC7703IPWR                                         | —                                 |
|                                                   | 2.93                        | TLC7733ID                           | —                       | —                      | —                               | TLC7733IP          | TLC7733IPWR                                         | —                                 |
|                                                   | 4.55                        | TLC7705ID                           | —                       | —                      | —                               | TLC7705IP          | TLC7705IPWR                                         | —                                 |
|                                                   | 1.1                         | TLC7701IDBR                         | —                       | —                      | —                               | —                  | —                                                   | TLC7701IDRBT-NM                   |
| $-40^{\circ}\text{C}$ to<br>$125^{\circ}\text{C}$ | 1.1                         | TLC7701QD                           | —                       | —                      | —                               | TLC7701QP          | TLC7701QPWR                                         | —                                 |
|                                                   | 2.25                        | TLC7725QD                           | —                       | —                      | —                               | TLC7725QP          | TLC7725QPWR                                         | —                                 |
|                                                   | 2.63                        | TLC7703QD                           | —                       | —                      | —                               | TLC7703QP          | TLC7703QPWR                                         | —                                 |
|                                                   | 2.93                        | TLC7733QD                           | —                       | —                      | —                               | TLC7733QP          | TLC7733QPWR                                         | —                                 |
|                                                   | 4.55                        | TLC7705QD                           | —                       | —                      | —                               | TLC7705QP          | TLC7705QPWR                                         | —                                 |
| $-55^{\circ}\text{C}$ to<br>$125^{\circ}\text{C}$ | 2.93                        | —                                   | —                       | —                      | —                               | —                  | —                                                   | —                                 |
|                                                   | 4.55                        | —                                   | —                       | —                      | —                               | —                  | —                                                   | —                                 |

(1) The D package is available taped and reeled. Add the suffix R to the device type when ordering (e.g., TLC7705QDR).

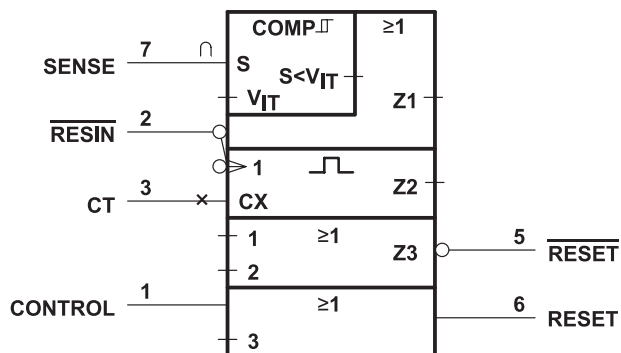
(2) The PW package is only available left-end taped and reeled (indicated by the R suffix on the device type; e.g., TLC7705QPWR).

**Table 1. FUNCTION TABLE**

| CONT<br>ROL | $\overline{\text{RESIN}}$ | $V_{I(\text{SENSE})} > V_{IT+}$ | RESE<br>T        | $\overline{\text{RESET}}$ |
|-------------|---------------------------|---------------------------------|------------------|---------------------------|
| L           | L                         | False                           | H                | L                         |
| L           | L                         | True                            | H                | L                         |
| L           | H                         | False                           | H                | L                         |
| L           | H                         | True                            | L <sup>(1)</sup> | H <sup>(1)</sup>          |
| H           | L                         | False                           | H                | L                         |
| H           | L                         | True                            | H                | L                         |
| H           | H                         | False                           | H                | L                         |
| H           | H                         | True                            | H                | H <sup>(1)</sup>          |

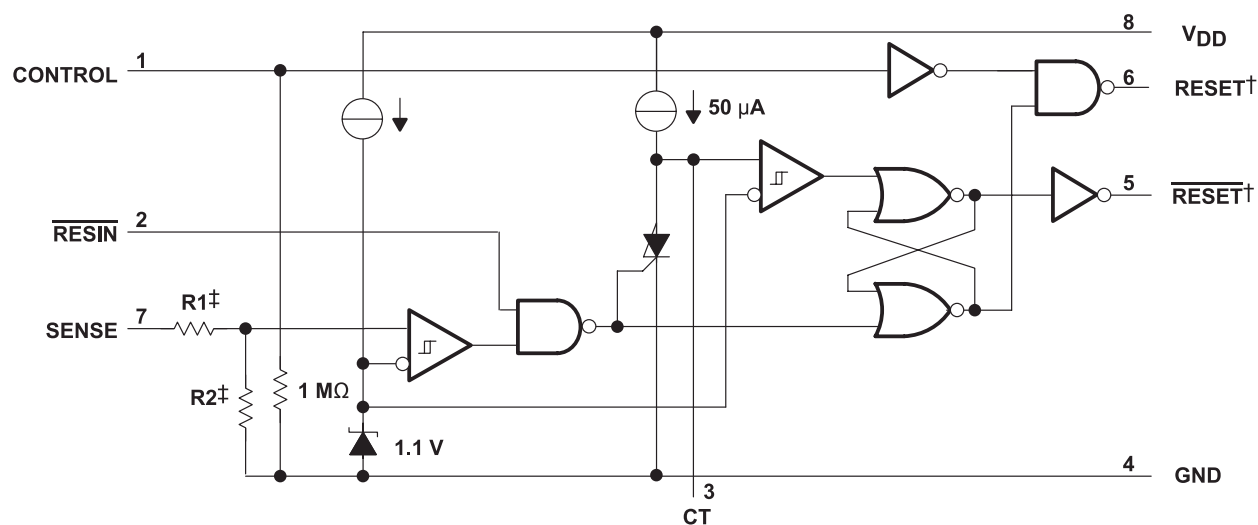
(1) RESET and  $\overline{\text{RESET}}$  states shown are valid for  $t > t_d$ .

## LOGIC SYMBOL



(1) This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

## FUNCTIONAL BLOCK DIAGRAM

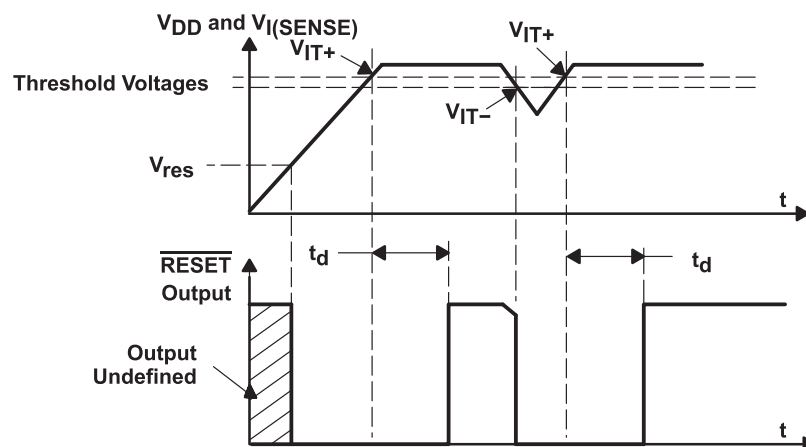


† Outputs are totem-pole configuration. External pullup or pulldown resistors are not required.

‡ Nominal values:

|         | R1 (Typ) | R2 (Typ) |
|---------|----------|----------|
| TLC7701 | 0        | $\infty$ |
| TLC7725 | 600 kΩ   | 600 kΩ   |
| TLC7703 | 698 kΩ   | 502 kΩ   |
| TLC7733 | 750 kΩ   | 450 kΩ   |
| TLC7705 | 910 kΩ   | 290 kΩ   |

## TIMING DIAGRAM



## ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>

over operating free-air temperature range (unless otherwise noted)

|                  |                                                           | VALUE                        | UNIT          |
|------------------|-----------------------------------------------------------|------------------------------|---------------|
| V <sub>DD</sub>  | Supply voltage <sup>(2)</sup>                             | 7                            | V             |
|                  | Input voltage range, CONTROL, RESIN, SENSE <sup>(2)</sup> | –0.3 to 7                    | V             |
| I <sub>OL</sub>  | Maximum low output current                                | 10                           | mA            |
| I <sub>OH</sub>  | Maximum high output current,                              | –10                          | mA            |
| I <sub>IK</sub>  | Input clamp current, (VI < 0 or VI > VDD)                 | ±10                          | mA            |
| I <sub>OK</sub>  | Output clamp current, (VO 0 or VO > VDD)                  | ±10                          | mA            |
|                  | Continuous total power dissipation                        | See Dissipation Rating Table |               |
| T <sub>A</sub>   | Operating free-air temperature range                      | TL77xxI                      | –40 to 84 °C  |
|                  |                                                           | TL77xxQ                      | –40 to 125 °C |
|                  |                                                           | TL77xxM                      | –55 to 125 °C |
| T <sub>stg</sub> | Storage temperature range                                 | –65 to 150                   | °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.
- (2) All voltage values are with respect to GND.

## DISSIPATION RATINGS

| PACKAGE | T <sub>A</sub> ≤ 25°C<br>POWER RATING | DERATING FACTOR<br>ABOVE T <sub>A</sub> = 25°C | T <sub>A</sub> = 85°C<br>POWER RATING | T <sub>A</sub> = 125°C<br>POWER RATING |
|---------|---------------------------------------|------------------------------------------------|---------------------------------------|----------------------------------------|
| D       | 725 mW                                | 5.8 mW/°C                                      | 377 mW                                | 145 mW                                 |
| DRB     |                                       |                                                |                                       |                                        |
| FK      | 1375 mW                               | 11.0 mW/°C                                     | 715 mW                                | 275 mW                                 |
| JG      | 1050 mW                               | 8.4 mW/°C                                      | 546 mW                                | 210 mW                                 |
| P       | 1000 mW                               | 8.0 mW/°C                                      | 520 mW                                | 200 mW                                 |
| PW      | 525 mW                                | 4.2 mW/°C                                      | 273 mW                                | 105 mW                                 |
| U       | 700 mW                                | 5.5 mW/°C                                      | 370 mW                                | 150 mW                                 |

## RECOMMENDED OPERATING CONDITIONS

at specified temperature range

|                 |                                                                                  | MIN                 | MAX                 | UNIT   |
|-----------------|----------------------------------------------------------------------------------|---------------------|---------------------|--------|
| V <sub>DD</sub> | Supply voltage                                                                   | 2                   | 6                   | V      |
| V <sub>I</sub>  | Input voltage                                                                    | 0                   | V <sub>DD</sub>     | V      |
| V <sub>IH</sub> | High-level input voltage at $\overline{\text{RESIN}}$ and CONTROL <sup>(1)</sup> | 0.7×V <sub>DD</sub> |                     | V      |
| V <sub>IL</sub> | Low-level input voltage at $\overline{\text{RESIN}}$ and CONTROL <sup>(1)</sup>  |                     | 0.2×V <sub>DD</sub> | V      |
| I <sub>OH</sub> | High-level output current                                                        |                     | –2                  | mA     |
| I <sub>OL</sub> | Low-level output current                                                         |                     | 2                   | mA     |
| Δt/ΔV           | input transition rise and fall rate at $\overline{\text{RESIN}}$ and CONTROL     |                     | 100                 | ns/ V  |
| T <sub>A</sub>  | Operating free-air temperature range                                             | TL77xxI             | –40                 | 85 °C  |
|                 |                                                                                  | TL77xxQ             | –40                 | 125 °C |
|                 |                                                                                  | TL77xxM             | –55                 | 125 °C |

- (1) To ensure a low supply current, V<sub>IL</sub> should be kept <0.3 V and V<sub>IH</sub> > V<sub>DD</sub> –0.3 V.

## ELECTRICAL CHARACTERISTICS

over recommended operating conditions<sup>(1)</sup> (unless otherwise noted)

| PARAMETER                                                                     |                           |  | TEST CONDITIONS                                                                                                                                 | TLC77xx  |      |      | UNIT |    |
|-------------------------------------------------------------------------------|---------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------|----------|------|------|------|----|
|                                                                               |                           |  |                                                                                                                                                 | MIN      | TYP  | MAX  |      |    |
| V <sub>OH</sub> High-level output voltage                                     | I <sub>OH</sub> = −20 μA  |  | V <sub>DD</sub> = 2 V                                                                                                                           | 1.8      |      |      | V    |    |
|                                                                               |                           |  | V <sub>DD</sub> = 2.7 V                                                                                                                         | 2.5      |      |      |      |    |
|                                                                               |                           |  | V <sub>DD</sub> = 4.5 V                                                                                                                         | 4.3      |      |      |      |    |
|                                                                               | I <sub>OH</sub> = 2 −mA   |  | V <sub>DD</sub> = 4.5 V                                                                                                                         | 3.7      |      |      |      |    |
| V <sub>OL</sub> Low-Level output voltage                                      | I <sub>OL</sub> = 20 μA   |  | V <sub>DD</sub> = 2 V                                                                                                                           |          |      | 0.2  | V    |    |
|                                                                               |                           |  | V <sub>DD</sub> = 2.7 V                                                                                                                         |          |      | 0.2  |      |    |
|                                                                               |                           |  | V <sub>DD</sub> = 4.5 V                                                                                                                         |          |      | 0.2  |      |    |
|                                                                               | I <sub>OL</sub> = 2 mA    |  | V <sub>DD</sub> = 4.5 V                                                                                                                         |          |      | 0.5  |      |    |
| V <sub>IT−</sub> Negative-going input threshold voltage, SENSE <sup>(2)</sup> |                           |  | V <sub>DD</sub> = 2 V to 6 V                                                                                                                    | TCLC7701 | 1.04 | 1.1  | 1.16 | mV |
|                                                                               |                           |  |                                                                                                                                                 | TLC7725  | 2.18 | 2.25 | 2.32 |    |
|                                                                               |                           |  |                                                                                                                                                 | TLC7703  | 2.56 | 2.63 | 2.70 |    |
|                                                                               |                           |  |                                                                                                                                                 | TLC7733  | 2.86 | 2.93 | 3    |    |
|                                                                               |                           |  |                                                                                                                                                 | TLC7705  | 4.47 | 4.55 | 4.63 |    |
| V <sub>hus</sub> Hysteresis voltage, SENSE                                    |                           |  | V <sub>DD</sub> = 2 V to 6 V                                                                                                                    | TCLC7701 | 30   |      |      | mV |
|                                                                               |                           |  |                                                                                                                                                 | TLC7725  |      |      |      |    |
|                                                                               |                           |  |                                                                                                                                                 | TLC7703  |      |      |      |    |
|                                                                               |                           |  |                                                                                                                                                 | TLC7733  |      |      |      |    |
|                                                                               |                           |  |                                                                                                                                                 | TLC7705  | 70   |      |      |    |
| V <sub>res</sub> Power-up reset voltage <sup>(3)</sup>                        |                           |  | I <sub>OL</sub> = 20 μA                                                                                                                         |          |      | 1    | V    |    |
| I <sub>I</sub> Input current                                                  | $\overline{\text{RESIN}}$ |  | V <sub>I</sub> = 0 V to V <sub>DD</sub>                                                                                                         |          |      | 2    | μA   |    |
|                                                                               | CONTROL                   |  | V <sub>I</sub> = V <sub>DD</sub>                                                                                                                |          | 7    | 15   |      |    |
|                                                                               | SENSE                     |  | V <sub>I</sub> = 5 V                                                                                                                            |          | 5    | 10   |      |    |
|                                                                               | SENSE, TLC7701 only       |  | V <sub>I</sub> = 5 V                                                                                                                            |          |      | 2    |      |    |
| I <sub>DD</sub> Supply current                                                |                           |  | $\overline{\text{RESIN}}$ = V <sub>DD</sub> , SENSE = V <sub>DD</sub> ≥ V <sub>IT</sub> max + 0.2 V, CONTROL = 0 V, Outputs open                |          | 9    | 16   | μA   |    |
| I <sub>DD(d)</sub> Supply current during t <sub>d</sub>                       |                           |  | V <sub>DD</sub> = 5 V, V <sub>CT</sub> = 0, $\overline{\text{RESIN}}$ = V <sub>DD</sub> , SENSE = V <sub>DD</sub> , CONTROL = 0 V, Outputs open |          | 120  | 150  | μA   |    |
| C <sub>I</sub> Input capacitance, SENSE                                       |                           |  | V <sub>I</sub> = 0 V to V <sub>DD</sub>                                                                                                         |          | 50   |      | pF   |    |

(1) All characteristics are measured with  $C_T = 0.1\ \mu F$ .

(2) To ensure best stability of the threshold voltage, a bypass capacitor (ceramic, 0.1 mF) should be connected near the supply terminals.

(3) The lowest supply voltage at which  $\overline{RESET}$  becomes active. The symbol  $V_{res}$  is not currently listed within EIA or JEDEC standards for semiconductor symbology. Rise time of  $V_{DD} \geq 15\ \mu s/V$ .

## ELECTRICAL CHARACTERISTICS

over recommended operating conditions<sup>(1)</sup> (unless otherwise noted)

| PARAMETER                                                              |                                                                                                                 | TEST CONDITIONS                                                                                             |                                      | TLC77xxM |                    |     | UNIT    |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|--------------------------------------|----------|--------------------|-----|---------|
|                                                                        |                                                                                                                 |                                                                                                             |                                      | MIN      | TYP <sup>(2)</sup> | MAX |         |
| $V_{OH}$ High-level output voltage                                     | $I_{OH} = -20\ \mu A$                                                                                           | $V_{DD} = 2\ V$                                                                                             | $T_A = 25^\circ C$                   | 1.8      |                    |     | V       |
|                                                                        |                                                                                                                 |                                                                                                             | $T_A = -55^\circ C\ to\ 125^\circ C$ | 1.7      |                    |     |         |
|                                                                        |                                                                                                                 | $V_{DD} = 2.7\ V$                                                                                           | $T_A = 25^\circ C$                   | 2.5      |                    |     | V       |
|                                                                        |                                                                                                                 |                                                                                                             | $T_A = -55^\circ C\ to\ 125^\circ C$ | 2.3      |                    |     |         |
|                                                                        |                                                                                                                 | $V_{DD} = 4.5\ V$                                                                                           | $T_A = 25^\circ C$                   | 4.3      |                    |     | V       |
|                                                                        |                                                                                                                 |                                                                                                             | $T_A = -55^\circ C\ to\ 125^\circ C$ | 4.2      |                    |     |         |
| $V_{OL}$ Low-level output voltage                                      | $I_{OL} = -20\ \mu A$                                                                                           | $V_{DD} = 2\ V$                                                                                             | $T_A = 25^\circ C$                   |          |                    | 0.2 | V       |
|                                                                        |                                                                                                                 |                                                                                                             | $T_A = -55^\circ C\ to\ 125^\circ C$ |          |                    | 0.2 |         |
|                                                                        |                                                                                                                 | $V_{DD} = 2.7\ V$                                                                                           | $T_A = 25^\circ C$                   |          |                    | 0.2 | V       |
|                                                                        |                                                                                                                 |                                                                                                             | $T_A = -55^\circ C\ to\ 125^\circ C$ |          |                    | 0.2 |         |
|                                                                        |                                                                                                                 | $V_{DD} = 4.5\ V$                                                                                           | $T_A = 25^\circ C$                   |          |                    | 0.2 | V       |
|                                                                        |                                                                                                                 |                                                                                                             | $T_A = -55^\circ C\ to\ 125^\circ C$ |          |                    | 0.2 |         |
|                                                                        | $I_{OL} = 2\ mA$                                                                                                | $V_{DD} = 4.5\ V$                                                                                           | $T_A = 25^\circ C$                   |          |                    | 0.5 | V       |
|                                                                        |                                                                                                                 |                                                                                                             | $T_A = -55^\circ C\ to\ 125^\circ C$ |          |                    | 0.5 |         |
|                                                                        |                                                                                                                 | $V_{DD} = 2\ V\ to\ 6\ V$                                                                                   |                                      | 2.86     | 2.93               | 3.1 | V       |
|                                                                        |                                                                                                                 |                                                                                                             |                                      | 4.3      | 4.5                | 4.8 |         |
| $V_{IT-}$ Negative-going input threshold voltage, SENSE <sup>(3)</sup> | TLC7733                                                                                                         | $V_{DD} = 2\ V\ to\ 6\ V$                                                                                   |                                      | 2.86     | 2.93               | 3.1 | V       |
|                                                                        | TLC7705                                                                                                         |                                                                                                             |                                      | 4.3      | 4.5                | 4.8 |         |
| $V_{hys}$ Hysteresis voltage, SENSE                                    | $V_{DD} = 2\ V\ to\ 6\ V$                                                                                       |                                                                                                             |                                      | 70       |                    |     | mV      |
| $V_{res}$ Power-up reset voltage <sup>(2)</sup>                        | $I_{OL} = 20\ \mu A$                                                                                            |                                                                                                             |                                      | 1        |                    |     | V       |
| $I_i$ Input current                                                    | RESIN                                                                                                           | $V_i = 0\ V\ to\ V_{DD}$                                                                                    |                                      | 2        |                    |     | $\mu A$ |
|                                                                        | CONTROL                                                                                                         | $V_i = V_{DD}$                                                                                              |                                      | 7        |                    | 15  |         |
|                                                                        | SENSE                                                                                                           | $V_i = 5\ V$                                                                                                |                                      | 5        |                    | 10  |         |
|                                                                        | SENSE, TLC7701 only                                                                                             | $V_i = 5\ V$                                                                                                |                                      | 2        |                    |     |         |
| $I_{DD}$ Supply current                                                | $\overline{RESIN} = V_{DD}$ ,<br>SENSE = $V_{DD} \geq V_{ITmax} + 0.2\ V$<br>CONTROL = $0\ V$ ,<br>Outputs open |                                                                                                             |                                      | 9        |                    | 16  | $\mu A$ |
| $I_{DD(d)}$ Supply current during $t_d$                                | TLC7733                                                                                                         | $V_{CT} = 0$ ,<br>$\overline{RESIN} = V_{DD}$ ,<br>CONTROL = $0\ V$ ,<br>SENSE = $V_{DD}$ ,<br>Outputs open | $V_{DD} = 3.3\ V$                    | 250      |                    |     | $\mu A$ |
|                                                                        | TLC7705                                                                                                         |                                                                                                             | $V_{DD} = 5\ V$                      | 120      |                    | 150 |         |
| $C_i$ Input capacitance, SENSE                                         | $V_i = 0\ V\ to\ V_{DD}$                                                                                        |                                                                                                             |                                      | 50       |                    |     | pF      |

(1) All characteristics are measured with  $C_T = 0.1\ \mu F$ .

(2) Typical values apply at  $T_A = 25^\circ C$ .

(3) To ensure best stability of the threshold voltage, a bypass capacitor (ceramic,  $0.1\ mF$ ) should be connected near the supply terminals.

## SWITCHING CHARACTERISTICS

at  $V_{DD} = 5\text{ V}$ ,  $R_L = 2\text{ k}\Omega$ ,  $C_L = 50\text{ pF}$ ,  $T_A = 25^\circ\text{C}$  (unless otherwise noted)

| PARAMETER                                                  |                                                  | MEASURED                                 |                       | TEST CONDITIONS                                                                                                                                                                                 | TLC77xx |     |     | UNIT |
|------------------------------------------------------------|--------------------------------------------------|------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----|-----|------|
|                                                            |                                                  | FROM<br>(INPUT)                          | TO<br>(OUTPUT)        |                                                                                                                                                                                                 | MIN     | TYP | MAX |      |
| t <sub>d</sub>                                             | Delay time                                       | V <sub>I(SENSE)</sub> ≥ V <sub>IT+</sub> | RESET<br>and<br>RESET | RESIN = 0.7 × V <sub>DD</sub> ,<br>CONTROL = 0.2 × V <sub>DD</sub> , C <sub>T</sub> = 100 nF,<br>T <sub>A</sub> = Full range, See timing diagram                                                | 1.1     | 2.1 | 4.2 | ms   |
| t <sub>PLH</sub>                                           | Propagation delay time, low-to-high-level output | SENSE                                    | RESET                 | V <sub>IH</sub> = V <sub>IT+</sub> .max + 0.2 V, V <sub>IL</sub> = V <sub>IT</sub> .min – 0.2 V,<br>RESIN = 0.7 × V <sub>DD</sub> , CONTROL = 0.2 × V <sub>DD</sub> ,<br>CT = NC <sup>(1)</sup> | 20      |     |     | μs   |
| t <sub>PHL</sub>                                           | Propagation delay time, high-to-low-level output |                                          | 5                     |                                                                                                                                                                                                 |         |     |     |      |
| t <sub>PLH</sub>                                           | Propagation delay time, low-to-high-level output |                                          | RESET                 |                                                                                                                                                                                                 | 5       |     |     |      |
| t <sub>PHL</sub>                                           | Propagation delay time, high-to-low-level output |                                          |                       |                                                                                                                                                                                                 | 20      |     |     |      |
| t <sub>PLH</sub>                                           | Propagation delay time, low-to-high-level output | RESIN                                    | RESET                 | V <sub>IH</sub> = 0.7 × V <sub>DD</sub> , V <sub>IL</sub> = 0.2 × V <sub>DD</sub> ,<br>SENSE = V <sub>IT+</sub> .max + 0.2 V,<br>CONTROL = 0.2 × V <sub>DD</sub> ,<br>CT = NC <sup>(1)</sup>    | 20      |     |     | μs   |
| t <sub>PHL</sub>                                           | Propagation delay time, high-to-low-level output |                                          | RESET                 |                                                                                                                                                                                                 | 40      |     |     | ns   |
| t <sub>PLH</sub>                                           | Propagation delay time, low-to-high-level output |                                          |                       |                                                                                                                                                                                                 | 45      |     |     |      |
| t <sub>PHL</sub>                                           | Propagation delay time, high-to-low-level output |                                          |                       |                                                                                                                                                                                                 | 20      |     |     | μs   |
| t <sub>PLH</sub>                                           | Propagation delay time, low-to-high-level output | CONTROL                                  | RESET                 | V <sub>IH</sub> = 0.7 × V <sub>DD</sub> , V <sub>IL</sub> = 0.2 × V <sub>DD</sub> ,<br>SENSE = V <sub>IT+</sub> .max + 0.2 V, RESIN = 0.7 × V <sub>DD</sub> ,<br>CT = NC <sup>(1)</sup>         | 38      |     |     | ns   |
| t <sub>PHL</sub>                                           | Propagation delay time, high-to-low-level output |                                          |                       |                                                                                                                                                                                                 | 38      |     |     | ns   |
| Low-level minimum pulse duration to switch RESET and RESET |                                                  | SENSE                                    |                       | V <sub>IH</sub> = V <sub>IT+</sub> .max + 0.2 V, V <sub>IL</sub> = V <sub>IT</sub> .min – 0.2 V,                                                                                                |         |     |     |      |
|                                                            |                                                  | RESIN                                    |                       | V <sub>IL</sub> = 0.2 × V <sub>DD</sub> , V <sub>IH</sub> = 0.7 × V <sub>DD</sub>                                                                                                               |         |     |     |      |
| t <sub>r</sub>                                             | Rise time                                        |                                          | RESET<br>and<br>RESET | 10% to 90%                                                                                                                                                                                      |         |     |     |      |
| t <sub>f</sub>                                             | Fall time                                        |                                          | 90% to 10%            |                                                                                                                                                                                                 |         |     |     |      |

(1) NC = No capacitor, and includes up to 100-pF probe and jig capacitance.

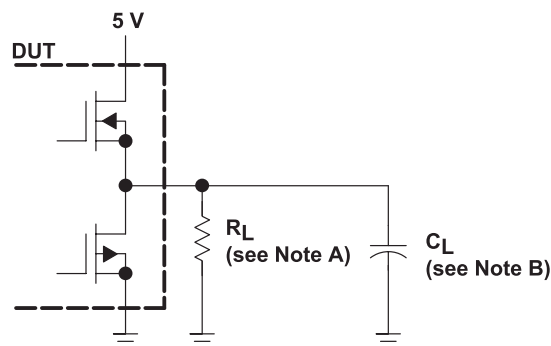
## SWITCHING CHARACTERISTICS

at  $V_{DD} = 5\text{ V}$ ,  $R_L = 2\text{ k}\Omega$ ,  $C_L = 50\text{ pF}$ ,  $T_A = 25^\circ\text{C}$  (unless otherwise noted)

| PARAMETER                                                               | MEASURED                                 |                       | TEST CONDITIONS                                                                                                                                                | T <sub>A</sub> | TLC77xxM |     |     | UNIT |
|-------------------------------------------------------------------------|------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------|-----|-----|------|
|                                                                         | FROM<br>(INPUT)                          | TO<br>(OUTPUT)        |                                                                                                                                                                |                | MIN      | TYP | MAX |      |
| t <sub>d</sub> Delay time                                               | V <sub>I(SENSE)</sub> ≥ V <sub>IT+</sub> | RESET<br>and<br>RESET | RESIN = 2.7 V, CONTROL = 0.4 V,<br>C <sub>T</sub> = 100 nF, See timing diagram                                                                                 | Full range     | 1.1      | 2.1 | 4.2 | ms   |
| t <sub>PLH</sub> Propagation delay<br>time, low-to-high-level<br>output | SENSE                                    | RESET                 | V <sub>IH</sub> = V <sub>IT+</sub> max + 0.2 V,<br>V <sub>IL</sub> = V <sub>IT-min</sub> - 0.2 V,<br>RESIN = 2.7 V, CONTROL = 0.4 V,<br>CT = NC <sup>(1)</sup> | 25°C           |          |     | 20  | µs   |
|                                                                         |                                          | Full range            |                                                                                                                                                                |                |          | 24  |     |      |
|                                                                         |                                          | RESET                 |                                                                                                                                                                | 25°C           |          |     | 5   | µs   |
|                                                                         |                                          | Full range            |                                                                                                                                                                |                |          | 7   |     |      |
| t <sub>PHL</sub> Propagation delay<br>time, high-to-low-level<br>output | SENSE                                    | RESET                 | V <sub>IH</sub> = V <sub>IT+</sub> max + 0.2 V,<br>V <sub>IL</sub> = V <sub>IT-min</sub> - 0.2 V,<br>RESIN = 2.7 V, CONTROL = 0.4 V,<br>CT = NC <sup>(1)</sup> | 25°C           |          |     | 5   | µs   |
|                                                                         |                                          | Full range            |                                                                                                                                                                |                |          | 7   |     |      |
|                                                                         |                                          | RESET                 |                                                                                                                                                                | 25°C           |          |     | 20  | µs   |
|                                                                         |                                          | Full range            |                                                                                                                                                                |                |          | 24  |     |      |
| t <sub>PLH</sub> Propagation delay<br>time, low-to-high-level<br>output | RESIN                                    | RESET                 | V <sub>IH</sub> = 2.7 V, V <sub>IL</sub> = 0.4 V,<br>SENSE = V <sub>IT+</sub> max + 0.2 V,<br>CONTROL = 0.4 V,<br>CT = NC <sup>(1)</sup>                       | 25°C           |          |     | 20  | µs   |
|                                                                         |                                          | Full range            |                                                                                                                                                                |                |          | 24  |     |      |
|                                                                         |                                          | RESET                 |                                                                                                                                                                | 25°C           |          |     | 45  | ns   |
|                                                                         |                                          | Full range            |                                                                                                                                                                |                |          | 65  |     |      |
| t <sub>PHL</sub> Propagation delay<br>time, high-to-low-level<br>output | RESIN                                    | RESET                 | V <sub>IH</sub> = 2.7 V, V <sub>IL</sub> = 0.4 V,<br>SENSE = V <sub>IT+</sub> max + 0.2 V,<br>CONTROL = 0.4 V,<br>CT = NC <sup>(1)</sup>                       | 25°C           |          |     | 40  | ns   |
|                                                                         |                                          | Full range            |                                                                                                                                                                |                |          | 60  |     |      |
|                                                                         |                                          | RESET                 |                                                                                                                                                                | 25°C           |          |     | 20  | µs   |
|                                                                         |                                          | Full range            |                                                                                                                                                                |                |          | 24  |     |      |
| t <sub>PLH</sub> Propagation delay<br>time, low-to-high-level<br>output | CONTROL                                  | RESET                 | V <sub>IH</sub> = 2.7 V, V <sub>IL</sub> = 0.4 V,<br>SENSE = V <sub>IT+</sub> max + 0.2 V,<br>RESIN = 2.7 V,<br>CT = NC <sup>(1)</sup>                         | 25°C           |          |     | 38  | ns   |
| Full range                                                              |                                          |                       |                                                                                                                                                                |                |          | 58  |     |      |
| t <sub>PHL</sub> Propagation delay<br>time, high-to-low-level<br>output |                                          |                       |                                                                                                                                                                | 25°C           |          |     | 38  | ns   |
| Full Range                                                              |                                          |                       |                                                                                                                                                                |                |          | 58  |     |      |
| Low-level minimum<br>pulse duration                                     | SENSE                                    |                       | V <sub>IH</sub> = V <sub>IT+</sub> max + 0.2 V,<br>V <sub>IL</sub> = V <sub>IT-min</sub> - 0.2 V<br><br>V <sub>IL</sub> = 0.4 V, V <sub>IH</sub> = 2.7 V       | Full range     | 3        |     |     | µs   |
|                                                                         | RESIN                                    |                       |                                                                                                                                                                |                | 1        |     |     |      |
| t <sub>r</sub> Rise time                                                |                                          | RESET<br>and<br>RESET | 10% to 90%                                                                                                                                                     | Full range     | 8        |     |     | ns/V |
| t <sub>f</sub> Fall time                                                |                                          |                       | 90% to 10%                                                                                                                                                     |                | 4        |     |     |      |

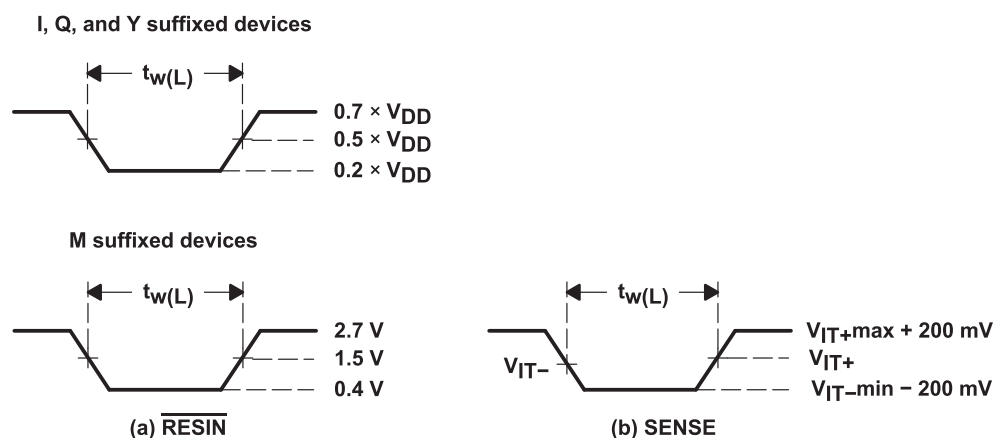
(1) NC = No capacitor, and includes up to 100-pF probe and jig capacitance.

## PARAMETER MEASUREMENT INFORMATION



NOTES: A. For switching characteristics,  $R_L = 2\text{ k}\Omega$ .  
B.  $C_L = 50\text{ pF}$  includes jig and probe capacitance.

**Figure 1. RESET and  $\overline{\text{RESET}}$  Output Configurations**



**Figure 2. Input Pulse Definition Waveforms**

## TYPICAL CHARACTERISTICS

**NORMALIZED INPUT THRESHOLD VOLTAGE**  
vs  
**TEMPERATURE**

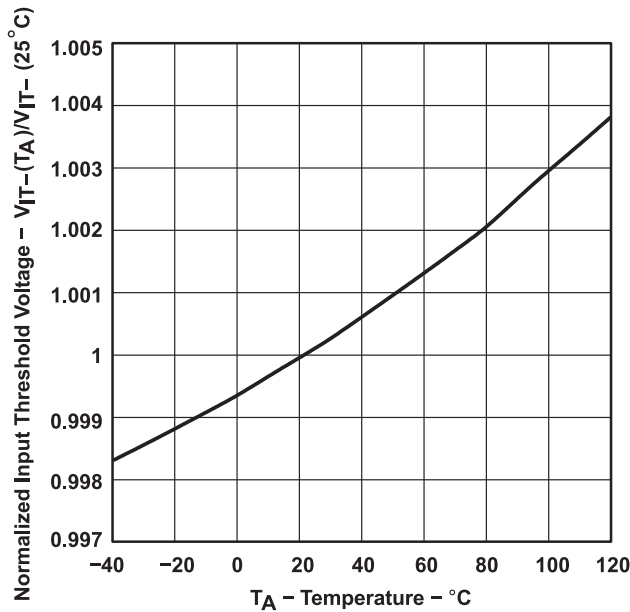


Figure 3.

**SUPPLY CURRENT**  
vs  
**SUPPLY VOLTAGE**

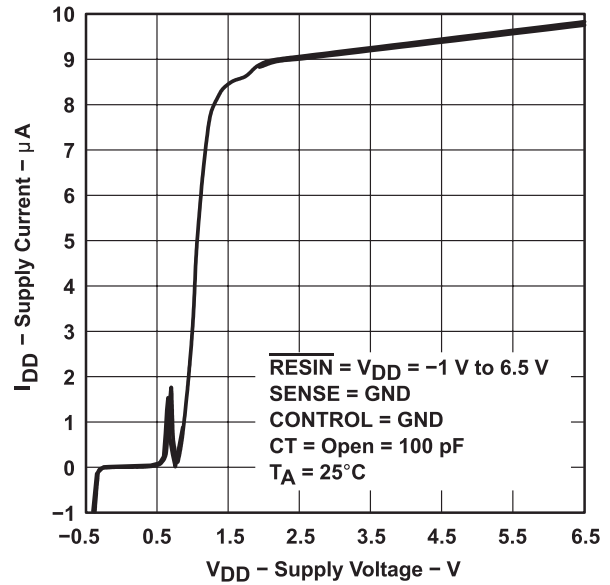


Figure 4.

**HIGH-LEVEL OUTPUT VOLTAGE**  
vs  
**HIGH-LEVEL OUTPUT CURRENT**

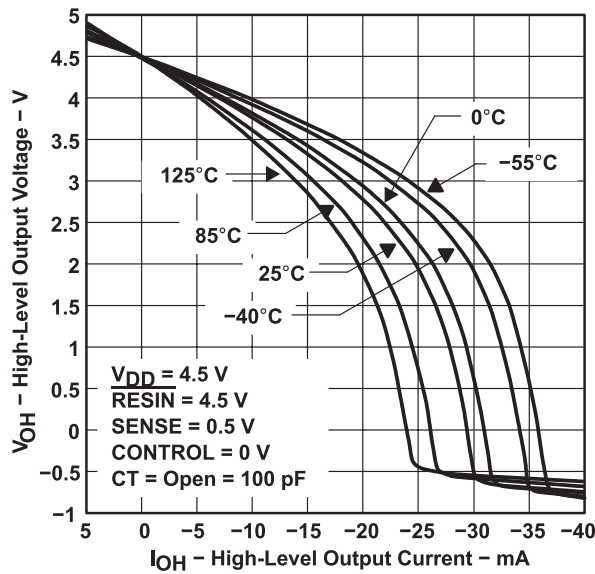


Figure 5.

**LOW-LEVEL OUTPUT VOLTAGE**  
vs  
**LOW-LEVEL OUTPUT CURRENT**

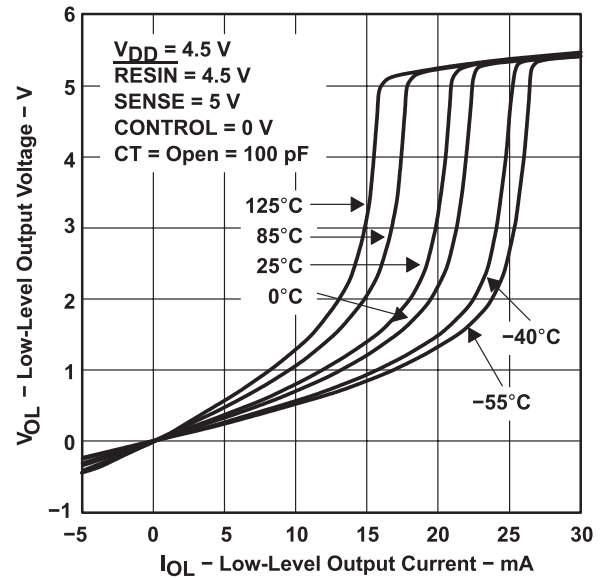


Figure 6.

## TYPICAL CHARACTERISTICS (continued)

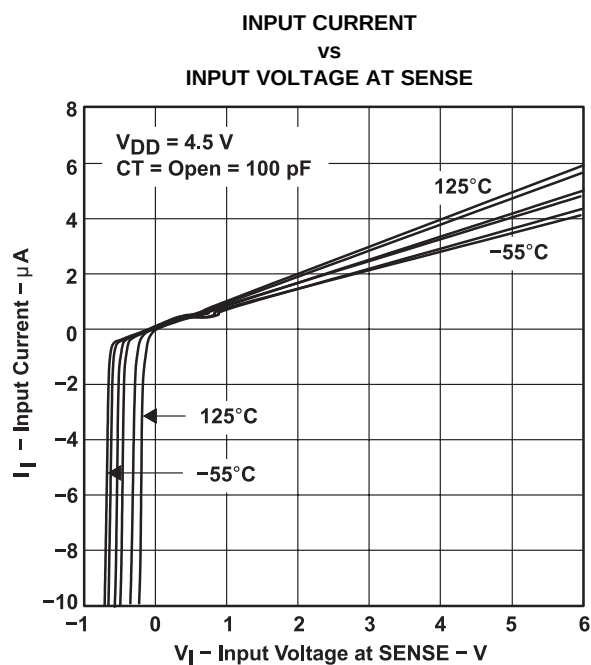


Figure 7.

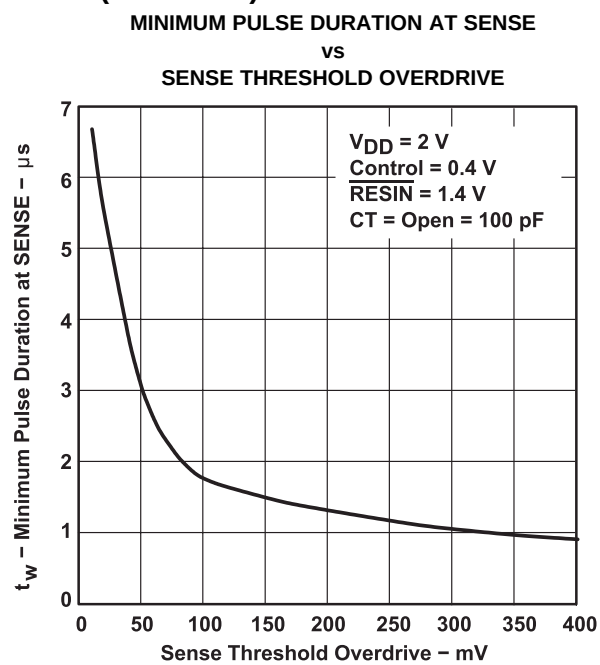


Figure 8.

## APPLICATION INFORMATION

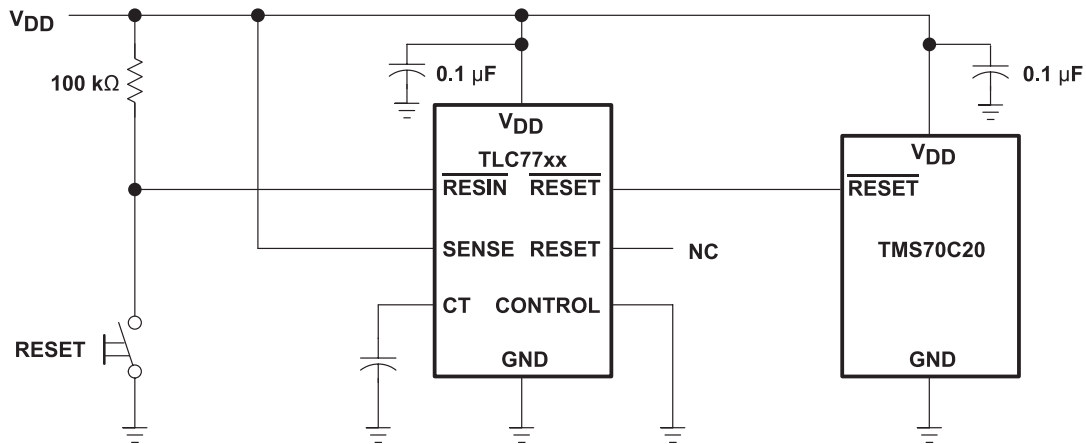


Figure 9. Reset Controller in a Microcomputer System

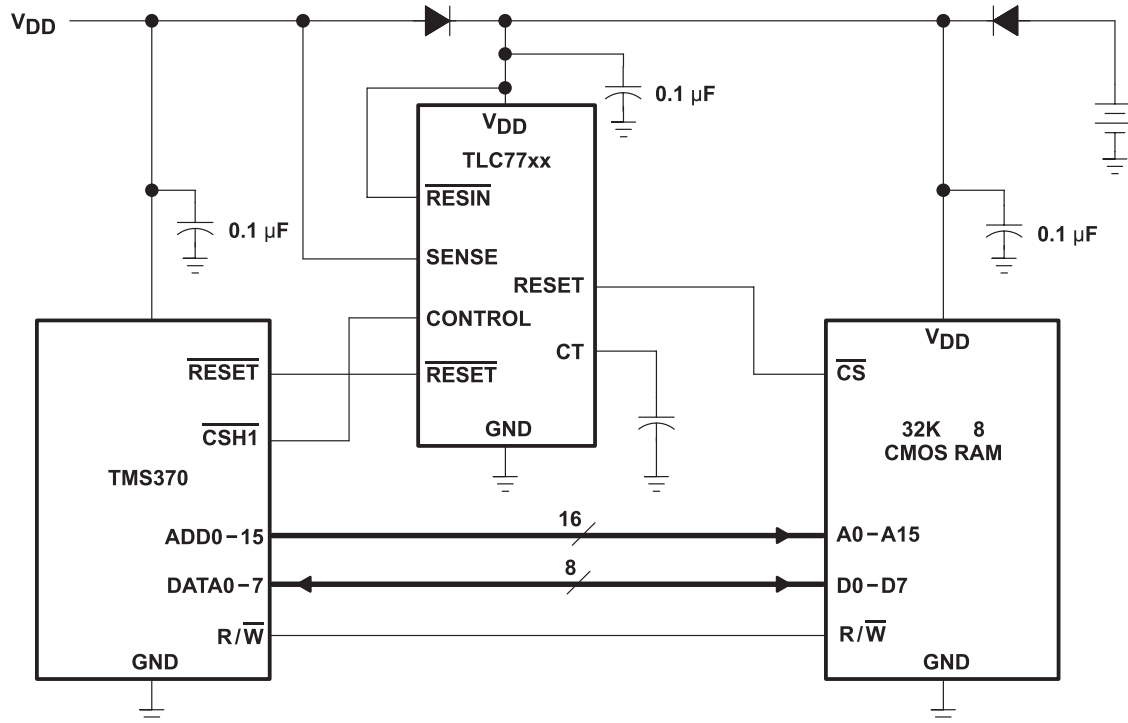


Figure 10. Data Retention During Power Down Using Static CMOS RAMs

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**Changes from Revision L (February 2003) to Revision M**

**Page**

- 
- Updated the DRB package Pin Out dimensions and Ordering Information. .... [1](#)
-

**PACKAGING INFORMATION**

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Top-Side Markings<br>(4)               | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|------------------|----------------------|--------------|----------------------------------------|-------------------------|
| 5962-9750901Q2A  | ACTIVE        | LCCC         | FK                 | 20   | 1              | TBD                        | Call TI          | Call TI              | -55 to 125   | 5962-<br>9750901Q2A<br>TLC7733<br>MFKB | <a href="#">Samples</a> |
| 5962-9750901QPA  | ACTIVE        | CDIP         | JG                 | 8    | 1              | TBD                        | Call TI          | Call TI              | -55 to 125   | 9750901QPA<br>TLC7733M                 | <a href="#">Samples</a> |
| 5962-9751301Q2A  | ACTIVE        | LCCC         | FK                 | 20   | 1              | TBD                        | Call TI          | Call TI              | -55 to 125   | 5962-<br>9751301Q2A<br>TLC7705<br>MFKB | <a href="#">Samples</a> |
| 5962-9751301QHA  | ACTIVE        | CFP          | U                  | 10   | 1              | TBD                        | Call TI          | Call TI              | -55 to 125   | 9751301QHA<br>TLC7705M                 | <a href="#">Samples</a> |
| 5962-9751301QPA  | ACTIVE        | CDIP         | JG                 | 8    | 1              | TBD                        | Call TI          | Call TI              | -55 to 125   | 9751301QPA<br>TLC7705M                 | <a href="#">Samples</a> |
| TLC7701ID        | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7701I                                 | <a href="#">Samples</a> |
| TLC7701IDG4      | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7701I                                 | <a href="#">Samples</a> |
| TLC7701IDR       | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7701I                                 | <a href="#">Samples</a> |
| TLC7701IDRBT-NM  | ACTIVE        | SON          | DRB                | 8    | 250            | Green (RoHS<br>& no Sb/Br) | CU SN            | Level-2-260C-1 YEAR  | -40 to 125   | 7701N                                  | <a href="#">Samples</a> |
| TLC7701IDRG4     | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7701I                                 | <a href="#">Samples</a> |
| TLC7701IP        | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 85    | TLC7701IP                              | <a href="#">Samples</a> |
| TLC7701IPE4      | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 85    | TLC7701IP                              | <a href="#">Samples</a> |
| TLC7701IPW       | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | Y7701                                  | <a href="#">Samples</a> |
| TLC7701IPWG4     | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | Y7701                                  | <a href="#">Samples</a> |
| TLC7701IPWLE     | OBSOLETE      | TSSOP        | PW                 | 8    |                | TBD                        | Call TI          | Call TI              | -40 to 85    |                                        |                         |
| TLC7701IPWR      | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | Y7701                                  | <a href="#">Samples</a> |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Top-Side Markings<br>(4) | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|------------------|----------------------|--------------|--------------------------|-------------------------|
| TLC7701IPWRG4    | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | Y7701                    | <a href="#">Samples</a> |
| TLC7701QD        | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7701Q                   | <a href="#">Samples</a> |
| TLC7701QDG4      | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7701Q                   | <a href="#">Samples</a> |
| TLC7701QDR       | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7701Q                   | <a href="#">Samples</a> |
| TLC7701QDRG4     | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7701Q                   | <a href="#">Samples</a> |
| TLC7701QP        | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 125   | TLC7701QP                | <a href="#">Samples</a> |
| TLC7701QPE4      | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 125   | TLC7701QP                | <a href="#">Samples</a> |
| TLC7701QPW       | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | TD701                    | <a href="#">Samples</a> |
| TLC7701QPWG4     | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | TD701                    | <a href="#">Samples</a> |
| TLC7701QPWLE     | PREVIEW       | TSSOP        | PW                 | 8    |                | TBD                        | Call TI          | Call TI              | -40 to 125   |                          |                         |
| TLC7701QPWR      | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | TD701                    | <a href="#">Samples</a> |
| TLC7701QPWRG4    | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | TD701                    | <a href="#">Samples</a> |
| TLC7703-W        | ACTIVE        | WAFERSALE    | YS                 | 0    | 6035           | TBD                        | Call TI          | Call TI              |              |                          | <a href="#">Samples</a> |
| TLC7703ID        | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7703I                   | <a href="#">Samples</a> |
| TLC7703IDG4      | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7703I                   | <a href="#">Samples</a> |
| TLC7703IDR       | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7703I                   | <a href="#">Samples</a> |
| TLC7703IDRG4     | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7703I                   | <a href="#">Samples</a> |
| TLC7703IP        | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 85    | TLC7703IP                | <a href="#">Samples</a> |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Top-Side Markings<br>(4) | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|------------------|----------------------|--------------|--------------------------|-------------------------|
| TLC7703IPE4      | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 85    | TLC7703IP                | <a href="#">Samples</a> |
| TLC7703IPW       | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   |              | Y7703                    | <a href="#">Samples</a> |
| TLC7703IPWG4     | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   |              | Y7703                    | <a href="#">Samples</a> |
| TLC7703IPWLE     | OBSOLETE      | TSSOP        | PW                 | 8    |                | TBD                        | Call TI          | Call TI              | -40 to 85    |                          |                         |
| TLC7703IPWR      | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | Y7703                    | <a href="#">Samples</a> |
| TLC7703IPWRG4    | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | Y7703                    | <a href="#">Samples</a> |
| TLC7703QD        | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7703Q                   | <a href="#">Samples</a> |
| TLC7703QDG4      | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7703Q                   | <a href="#">Samples</a> |
| TLC7703QP        | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 125   | TLC7703QP                | <a href="#">Samples</a> |
| TLC7703QPE4      | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 125   | TLC7703QP                | <a href="#">Samples</a> |
| TLC7703QPW       | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | TD703                    | <a href="#">Samples</a> |
| TLC7703QPWG4     | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | TD703                    | <a href="#">Samples</a> |
| TLC7705ID        | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7705I                   | <a href="#">Samples</a> |
| TLC7705IDG4      | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7705I                   | <a href="#">Samples</a> |
| TLC7705IDR       | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7705I                   | <a href="#">Samples</a> |
| TLC7705IDRG4     | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7705I                   | <a href="#">Samples</a> |
| TLC7705IP        | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 85    | TLC7705IP                | <a href="#">Samples</a> |
| TLC7705IPE4      | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 85    | TLC7705IP                | <a href="#">Samples</a> |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Top-Side Markings<br>(4)               | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|------------------|----------------------|--------------|----------------------------------------|-------------------------|
| TLC7705IPW       | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   |              | Y7705                                  | <a href="#">Samples</a> |
| TLC7705IPWG4     | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   |              | Y7705                                  | <a href="#">Samples</a> |
| TLC7705IPWLE     | OBSOLETE      | TSSOP        | PW                 | 8    |                | TBD                        | Call TI          | Call TI              | -40 to 85    |                                        |                         |
| TLC7705IPWR      | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | Y7705                                  | <a href="#">Samples</a> |
| TLC7705IPWRG4    | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | Y7705                                  | <a href="#">Samples</a> |
| TLC7705MFKB      | ACTIVE        | LCCC         | FK                 | 20   | 1              | TBD                        | POST-PLATE       | N / A for Pkg Type   | -55 to 125   | 5962-<br>9751301Q2A<br>TLC7705<br>MFKB | <a href="#">Samples</a> |
| TLC7705MJG       | ACTIVE        | CDIP         | JG                 | 8    | 1              | TBD                        | A42              | N / A for Pkg Type   | -55 to 125   | TLC7705<br>MJG                         | <a href="#">Samples</a> |
| TLC7705MJGB      | ACTIVE        | CDIP         | JG                 | 8    | 1              | TBD                        | A42              | N / A for Pkg Type   | -55 to 125   | 9751301QPA<br>TLC7705M                 | <a href="#">Samples</a> |
| TLC7705MUB       | ACTIVE        | CFP          | U                  | 10   | 1              | TBD                        | A42              | N / A for Pkg Type   | -55 to 125   | 9751301QHA<br>TLC7705M                 | <a href="#">Samples</a> |
| TLC7705QD        | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7705Q                                 | <a href="#">Samples</a> |
| TLC7705QDG4      | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7705Q                                 | <a href="#">Samples</a> |
| TLC7705QDR       | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7705Q                                 | <a href="#">Samples</a> |
| TLC7705QDRG4     | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7705Q                                 | <a href="#">Samples</a> |
| TLC7705QP        | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 125   | TLC7705QP                              | <a href="#">Samples</a> |
| TLC7705QPE4      | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 125   | TLC7705QP                              | <a href="#">Samples</a> |
| TLC7705QPW       | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | TD705                                  | <a href="#">Samples</a> |
| TLC7705QPWG4     | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | TD705                                  | <a href="#">Samples</a> |
| TLC7705QPWLE     | OBSOLETE      | TSSOP        | PW                 | 8    |                | TBD                        | Call TI          | Call TI              | -40 to 125   |                                        |                         |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Top-Side Markings<br>(4) | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|------------------|----------------------|--------------|--------------------------|-------------------------|
| TLC7705QPWR      | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | TD705                    | <a href="#">Samples</a> |
| TLC7705QPWRG4    | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | TD705                    | <a href="#">Samples</a> |
| TLC7725ID        | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7725I                   | <a href="#">Samples</a> |
| TLC7725IDG4      | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7725I                   | <a href="#">Samples</a> |
| TLC7725IDR       | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7725I                   | <a href="#">Samples</a> |
| TLC7725IDRG4     | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7725I                   | <a href="#">Samples</a> |
| TLC7725IP        | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 85    | TLC7725IP                | <a href="#">Samples</a> |
| TLC7725IPE4      | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 85    | TLC7725IP                | <a href="#">Samples</a> |
| TLC7725IPW       | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   |              | Y7725                    | <a href="#">Samples</a> |
| TLC7725IPWG4     | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   |              | Y7725                    | <a href="#">Samples</a> |
| TLC7725IPWLE     | OBSOLETE      | TSSOP        | PW                 | 8    |                | TBD                        | Call TI          | Call TI              | -40 to 85    |                          |                         |
| TLC7725IPWR      | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | Y7725                    | <a href="#">Samples</a> |
| TLC7725IPWRG4    | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | Y7725                    | <a href="#">Samples</a> |
| TLC7725QD        | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7725Q                   | <a href="#">Samples</a> |
| TLC7725QDG4      | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7725Q                   | <a href="#">Samples</a> |
| TLC7725QDR       | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7725Q                   | <a href="#">Samples</a> |
| TLC7725QDRG4     | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7725Q                   | <a href="#">Samples</a> |
| TLC7725QP        | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 125   | TLC7725QP                | <a href="#">Samples</a> |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Top-Side Markings<br>(4)               | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|------------------|----------------------|--------------|----------------------------------------|-------------------------|
| TLC7725QPE4      | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 125   | TLC7725QP                              | <a href="#">Samples</a> |
| TLC7725QPWLE     | OBSOLETE      | TSSOP        | PW                 | 8    |                | TBD                        | Call TI          | Call TI              | -40 to 125   |                                        |                         |
| TLC7725QPWR      | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | TD725                                  | <a href="#">Samples</a> |
| TLC7725QPWRG4    | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | TD725                                  | <a href="#">Samples</a> |
| TLC7733ID        | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7733I                                 | <a href="#">Samples</a> |
| TLC7733IDG4      | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7733I                                 | <a href="#">Samples</a> |
| TLC7733IDR       | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7733I                                 | <a href="#">Samples</a> |
| TLC7733IDRG4     | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | C7733I                                 | <a href="#">Samples</a> |
| TLC7733IP        | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 85    | TLC7733IP                              | <a href="#">Samples</a> |
| TLC7733IPE4      | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 85    | TLC7733IP                              | <a href="#">Samples</a> |
| TLC7733IPW       | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   |              | Y7733                                  | <a href="#">Samples</a> |
| TLC7733IPWG4     | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   |              | Y7733                                  | <a href="#">Samples</a> |
| TLC7733IPWR      | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | Y7733                                  | <a href="#">Samples</a> |
| TLC7733IPWRG4    | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 85    | Y7733                                  | <a href="#">Samples</a> |
| TLC7733MFKB      | ACTIVE        | LCCC         | FK                 | 20   | 1              | TBD                        | POST-PLATE       | N / A for Pkg Type   | -55 to 125   | 5962-<br>9750901Q2A<br>TLC7733<br>MFKB | <a href="#">Samples</a> |
| TLC7733MJG       | ACTIVE        | CDIP         | JG                 | 8    | 1              | TBD                        | A42              | N / A for Pkg Type   | -55 to 125   | TLC7733<br>MJG                         | <a href="#">Samples</a> |
| TLC7733MJGB      | ACTIVE        | CDIP         | JG                 | 8    | 1              | TBD                        | A42              | N / A for Pkg Type   | -55 to 125   | 9750901QPA<br>TLC7733M                 | <a href="#">Samples</a> |

| Orderable Device | Status<br>(1) | Package Type | Package<br>Drawing | Pins | Package<br>Qty | Eco Plan<br>(2)            | Lead/Ball Finish | MSL Peak Temp<br>(3) | Op Temp (°C) | Top-Side Markings<br>(4) | Samples                 |
|------------------|---------------|--------------|--------------------|------|----------------|----------------------------|------------------|----------------------|--------------|--------------------------|-------------------------|
| TLC7733QD        | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7733Q                   | <a href="#">Samples</a> |
| TLC7733QDG4      | ACTIVE        | SOIC         | D                  | 8    | 75             | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7733Q                   | <a href="#">Samples</a> |
| TLC7733QDR       | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7733Q                   | <a href="#">Samples</a> |
| TLC7733QDRG4     | ACTIVE        | SOIC         | D                  | 8    | 2500           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | C7733Q                   | <a href="#">Samples</a> |
| TLC7733QP        | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 125   | TLC7733QP                | <a href="#">Samples</a> |
| TLC7733QPE4      | ACTIVE        | PDIP         | P                  | 8    | 50             | Pb-Free<br>(RoHS)          | CU NIPDAU        | N / A for Pkg Type   | -40 to 125   | TLC7733QP                | <a href="#">Samples</a> |
| TLC7733QPW       | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | TD733                    | <a href="#">Samples</a> |
| TLC7733QPWG4     | ACTIVE        | TSSOP        | PW                 | 8    | 150            | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | TD733                    | <a href="#">Samples</a> |
| TLC7733QPWR      | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | TD733                    | <a href="#">Samples</a> |
| TLC7733QPWRG4    | ACTIVE        | TSSOP        | PW                 | 8    | 2000           | Green (RoHS<br>& no Sb/Br) | CU NIPDAU        | Level-1-260C-UNLIM   | -40 to 125   | TD733                    | <a href="#">Samples</a> |

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

<sup>(4)</sup> Multiple Top-Side Markings will be inside parentheses. Only one Top-Side Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Top-Side 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.

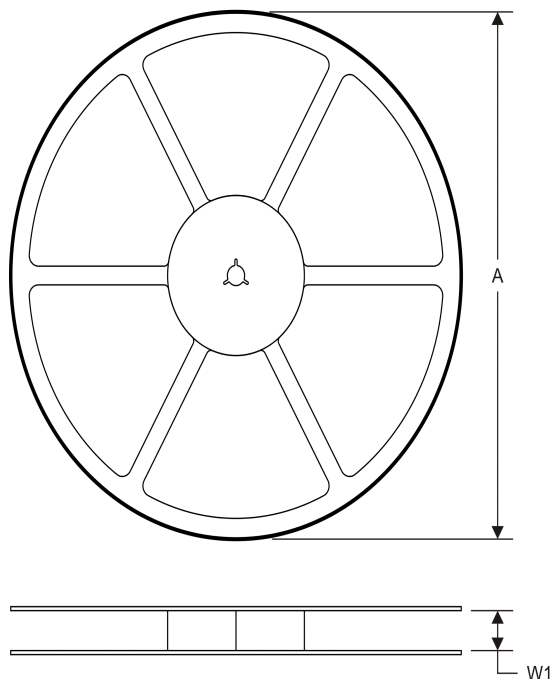
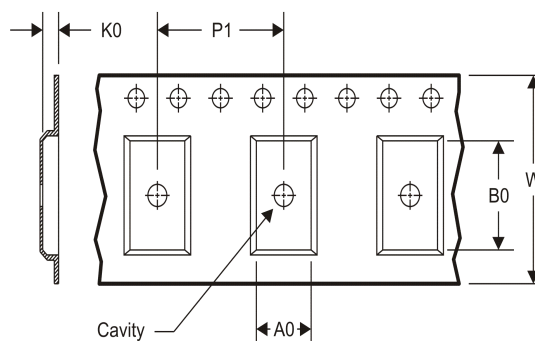
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

**OTHER QUALIFIED VERSIONS OF TLC7701, TLC7705, TLC7705M, TLC7733, TLC7733M :**

- Catalog: [TLC7705](#), [TLC7733](#)
- Automotive: [TLC7701-Q1](#), [TLC7705-Q1](#), [TLC7705-Q1](#), [TLC7733-Q1](#), [TLC7733-Q1](#)
- Enhanced Product: [TLC7701-EP](#), [TLC7705-EP](#), [TLC7705-EP](#), [TLC7733-EP](#), [TLC7733-EP](#)
- Military: [TLC7705M](#), [TLC7733M](#)

**NOTE: Qualified Version Definitions:**

- Catalog - TI's standard catalog product
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Enhanced Product - Supports Defense, Aerospace and Medical Applications
- Military - QML certified for Military and Defense Applications

**TAPE AND REEL INFORMATION**
**REEL DIMENSIONS**

**TAPE DIMENSIONS**


|    |                                                           |
|----|-----------------------------------------------------------|
| A0 | Dimension designed to accommodate the component width     |
| B0 | Dimension designed to accommodate the component length    |
| K0 | Dimension designed to accommodate the component thickness |
| W  | Overall width of the carrier tape                         |
| P1 | Pitch between successive cavity centers                   |

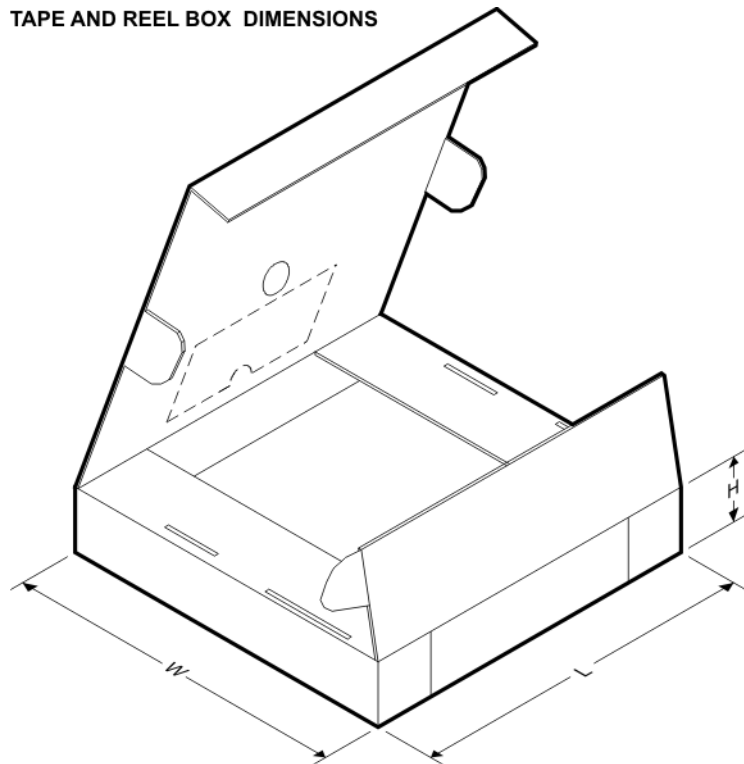
**TAPE AND REEL INFORMATION**

\*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 |
|-----------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| TLC7701IDR      | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TLC7701IDRBT-NM | SON          | DRB             | 8    | 250  | 180.0              | 12.4               | 3.3     | 3.3     | 1.1     | 8.0     | 12.0   | Q2            |
| TLC7701IPWR     | TSSOP        | PW              | 8    | 2000 | 330.0              | 12.4               | 7.0     | 3.6     | 1.6     | 8.0     | 12.0   | Q1            |
| TLC7701QDR      | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TLC7701QPWR     | TSSOP        | PW              | 8    | 2000 | 330.0              | 12.4               | 7.0     | 3.6     | 1.6     | 8.0     | 12.0   | Q1            |
| TLC7703IDR      | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TLC7703IPWR     | TSSOP        | PW              | 8    | 2000 | 330.0              | 12.4               | 7.0     | 3.6     | 1.6     | 8.0     | 12.0   | Q1            |
| TLC7705IDR      | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TLC7705IPWR     | TSSOP        | PW              | 8    | 2000 | 330.0              | 12.4               | 7.0     | 3.6     | 1.6     | 8.0     | 12.0   | Q1            |
| TLC7705QDR      | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TLC7705QPWR     | TSSOP        | PW              | 8    | 2000 | 330.0              | 12.4               | 7.0     | 3.6     | 1.6     | 8.0     | 12.0   | Q1            |
| TLC7725IDR      | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TLC7725IPWR     | TSSOP        | PW              | 8    | 2000 | 330.0              | 12.4               | 7.0     | 3.6     | 1.6     | 8.0     | 12.0   | Q1            |
| TLC7725QDR      | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TLC7725QPWR     | TSSOP        | PW              | 8    | 2000 | 330.0              | 12.4               | 7.0     | 3.6     | 1.6     | 8.0     | 12.0   | Q1            |
| TLC7733IDR      | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TLC7733IDR      | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TLC7733IPWR     | TSSOP        | PW              | 8    | 2000 | 330.0              | 12.4               | 7.0     | 3.6     | 1.6     | 8.0     | 12.0   | Q1            |

| 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 |
|-------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| TLC7733QDR  | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TLC7733QDR  | SOIC         | D               | 8    | 2500 | 330.0              | 12.4               | 6.4     | 5.2     | 2.1     | 8.0     | 12.0   | Q1            |
| TLC7733QPWR | TSSOP        | PW              | 8    | 2000 | 330.0              | 12.4               | 7.0     | 3.6     | 1.6     | 8.0     | 12.0   | Q1            |

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

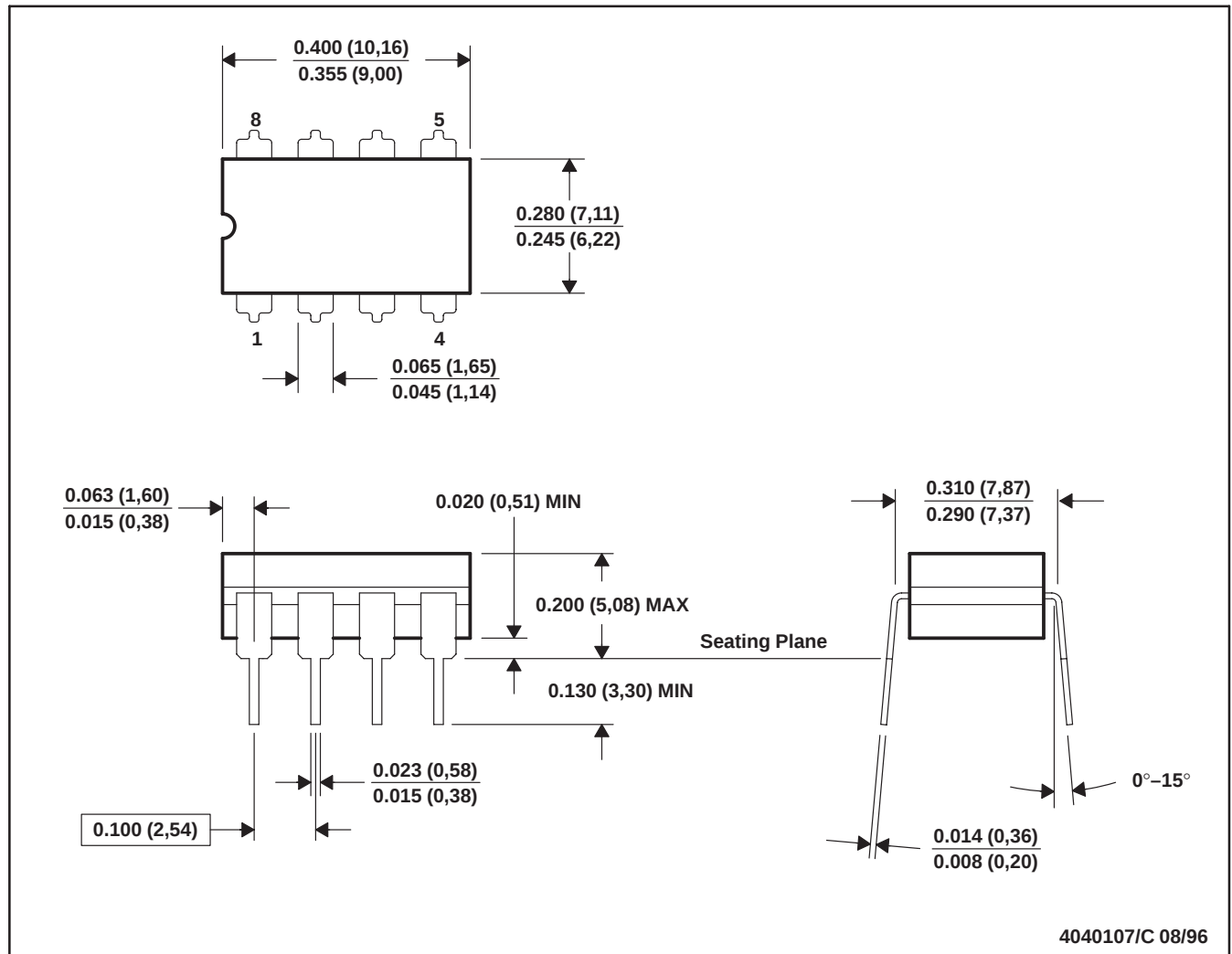
| Device          | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|-----------------|--------------|-----------------|------|------|-------------|------------|-------------|
| TLC7701IDR      | SOIC         | D               | 8    | 2500 | 367.0       | 367.0      | 35.0        |
| TLC7701IDRBT-NM | SON          | DRB             | 8    | 250  | 210.0       | 185.0      | 35.0        |
| TLC7701IPWR     | TSSOP        | PW              | 8    | 2000 | 367.0       | 367.0      | 35.0        |
| TLC7701QDR      | SOIC         | D               | 8    | 2500 | 367.0       | 367.0      | 35.0        |
| TLC7701QPWR     | TSSOP        | PW              | 8    | 2000 | 367.0       | 367.0      | 35.0        |
| TLC7703IDR      | SOIC         | D               | 8    | 2500 | 367.0       | 367.0      | 35.0        |
| TLC7703IPWR     | TSSOP        | PW              | 8    | 2000 | 367.0       | 367.0      | 35.0        |
| TLC7705IDR      | SOIC         | D               | 8    | 2500 | 367.0       | 367.0      | 35.0        |
| TLC7705IPWR     | TSSOP        | PW              | 8    | 2000 | 367.0       | 367.0      | 35.0        |
| TLC7705QDR      | SOIC         | D               | 8    | 2500 | 367.0       | 367.0      | 35.0        |
| TLC7705QPWR     | TSSOP        | PW              | 8    | 2000 | 367.0       | 367.0      | 35.0        |
| TLC7725IDR      | SOIC         | D               | 8    | 2500 | 367.0       | 367.0      | 35.0        |
| TLC7725IPWR     | TSSOP        | PW              | 8    | 2000 | 367.0       | 367.0      | 35.0        |
| TLC7725QDR      | SOIC         | D               | 8    | 2500 | 367.0       | 367.0      | 35.0        |

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| Device      | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|-------------|--------------|-----------------|------|------|-------------|------------|-------------|
| TLC7725QPWR | TSSOP        | PW              | 8    | 2000 | 367.0       | 367.0      | 35.0        |
| TLC7733IDR  | SOIC         | D               | 8    | 2500 | 367.0       | 367.0      | 35.0        |
| TLC7733IDR  | SOIC         | D               | 8    | 2500 | 367.0       | 367.0      | 35.0        |
| TLC7733IPWR | TSSOP        | PW              | 8    | 2000 | 367.0       | 367.0      | 35.0        |
| TLC7733QDR  | SOIC         | D               | 8    | 2500 | 367.0       | 367.0      | 35.0        |
| TLC7733QDR  | SOIC         | D               | 8    | 2500 | 367.0       | 367.0      | 35.0        |
| TLC7733QPWR | TSSOP        | PW              | 8    | 2000 | 367.0       | 367.0      | 35.0        |

## JG (R-GDIP-T8)

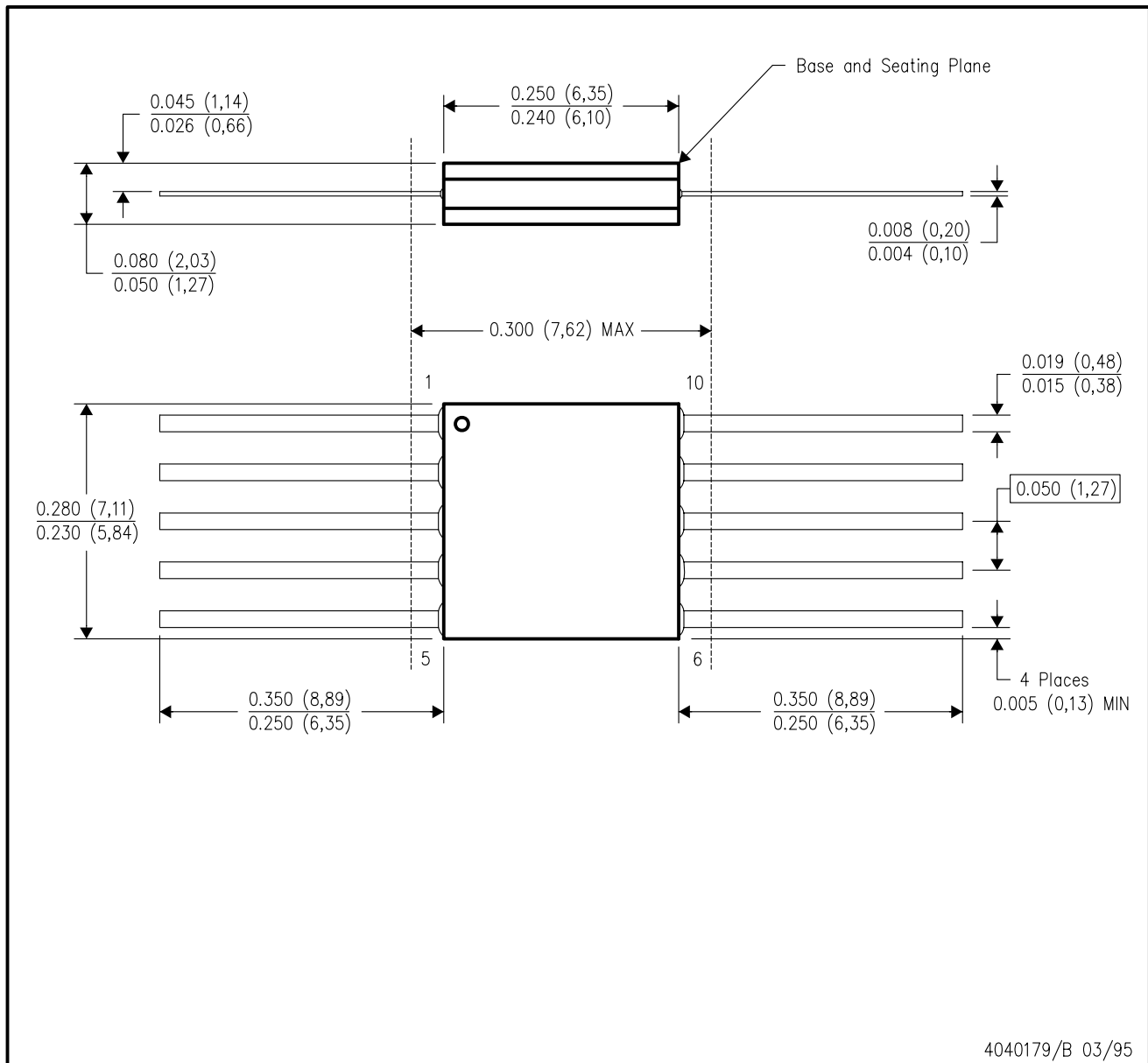
## CERAMIC DUAL-IN-LINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. This package can be hermetically sealed with a ceramic lid using glass frit.
  - D. Index point is provided on cap for terminal identification.
  - E. Falls within MIL STD 1835 GDIP1-T8

U (S-GDFP-F10)

CERAMIC DUAL FLATPACK



- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package can be hermetically sealed with a ceramic lid using glass frit.
  - Index point is provided on cap for terminal identification only.
  - Falls within MIL STD 1835 GDFP1-F10 and JEDEC MO-092AA

FK (S-CQCC-N\*\*)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



| NO. OF<br>TERMINALS<br>** | A                |                  | B                |                  |
|---------------------------|------------------|------------------|------------------|------------------|
|                           | MIN              | MAX              | MIN              | MAX              |
| 20                        | 0.342<br>(8,69)  | 0.358<br>(9,09)  | 0.307<br>(7,80)  | 0.358<br>(9,09)  |
| 28                        | 0.442<br>(11,23) | 0.458<br>(11,63) | 0.406<br>(10,31) | 0.458<br>(11,63) |
| 44                        | 0.640<br>(16,26) | 0.660<br>(16,76) | 0.495<br>(12,58) | 0.560<br>(14,22) |
| 52                        | 0.740<br>(18,78) | 0.761<br>(19,32) | 0.495<br>(12,58) | 0.560<br>(14,22) |
| 68                        | 0.938<br>(23,83) | 0.962<br>(24,43) | 0.850<br>(21,6)  | 0.858<br>(21,8)  |
| 84                        | 1.141<br>(28,99) | 1.165<br>(29,59) | 1.047<br>(26,6)  | 1.063<br>(27,0)  |



4040140/D 01/11

- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package can be hermetically sealed with a metal lid.
  - Falls within JEDEC MS-004

P (R-PDIP-T8)

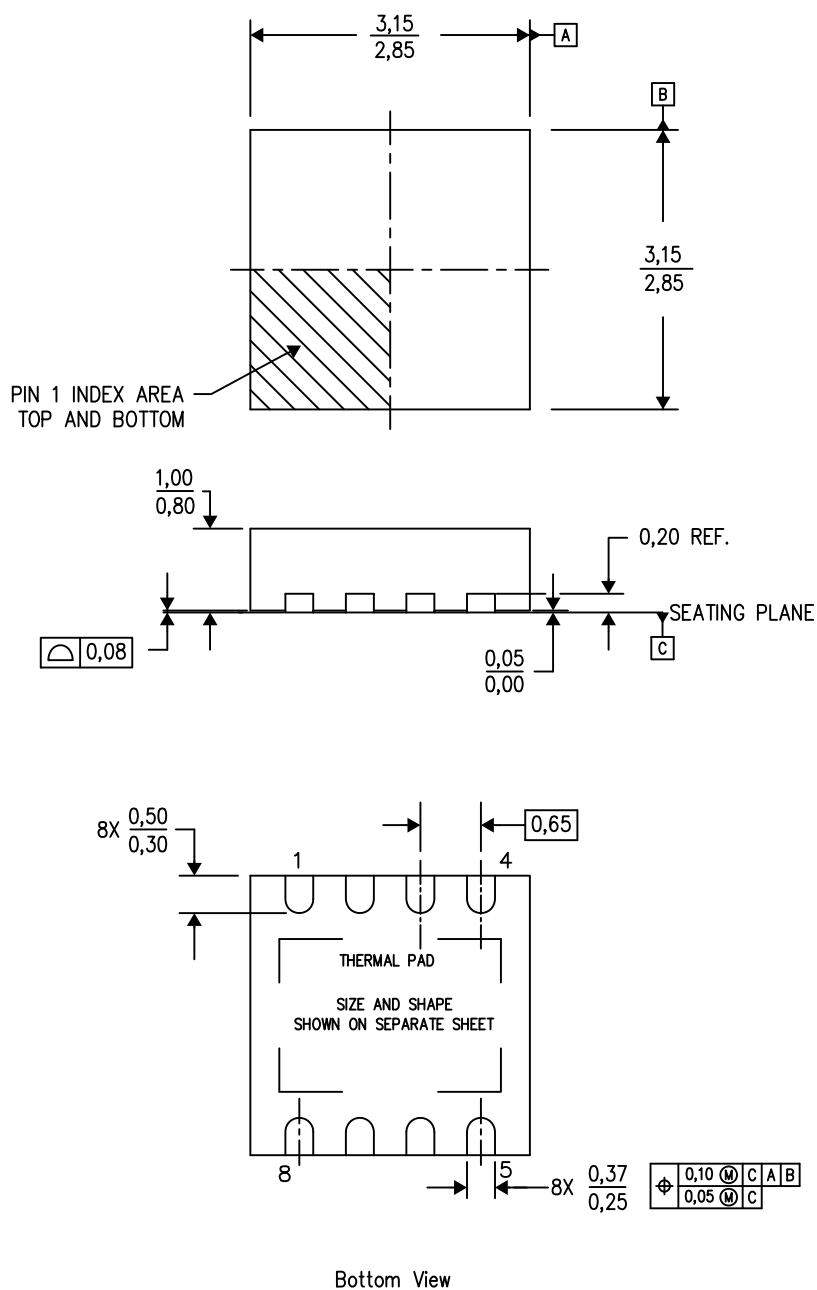
PLASTIC DUAL-IN-LINE PACKAGE



- 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.

DRB (S-PVSON-N8)

PLASTIC SMALL OUTLINE NO-LEAD



4203482-2/K 06/12

- NOTES:
- All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - This drawing is subject to change without notice.
  - Small Outline No-Lead (SON) package configuration.
  - The package thermal pad must be soldered to the board for thermal and mechanical performance.
  - See the additional figure in the Product Data Sheet for details regarding the exposed thermal pad features and dimensions.

DRB (S-PVSON-N8)

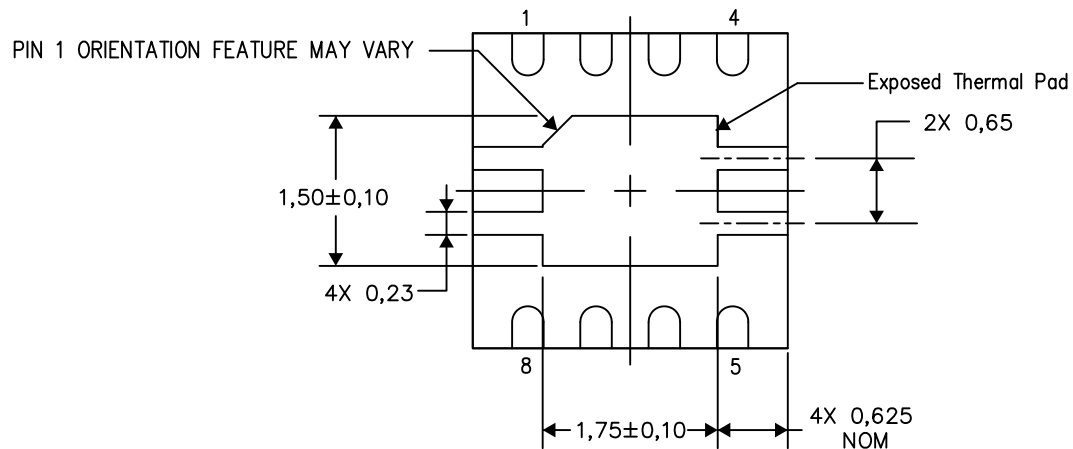
PLASTIC SMALL OUTLINE NO-LEAD

## THERMAL INFORMATION

This package incorporates an exposed thermal pad that is designed to be attached directly to an external heatsink. The thermal pad must be soldered directly to the printed circuit board (PCB). After soldering, the PCB can be used as a heatsink. In addition, through the use of thermal vias, the thermal pad can be attached directly to the appropriate copper plane shown in the electrical schematic for the device, or alternatively, can be attached to a special heatsink structure designed into the PCB. This design optimizes the heat transfer from the integrated circuit (IC).

For information on the Quad Flatpack No-Lead (QFN) package and its advantages, refer to Application Report, QFN/SON PCB Attachment, Texas Instruments Literature No. SLUA271. This document is available at [www.ti.com](http://www.ti.com).

The exposed thermal pad dimensions for this package are shown in the following illustration.



Bottom View

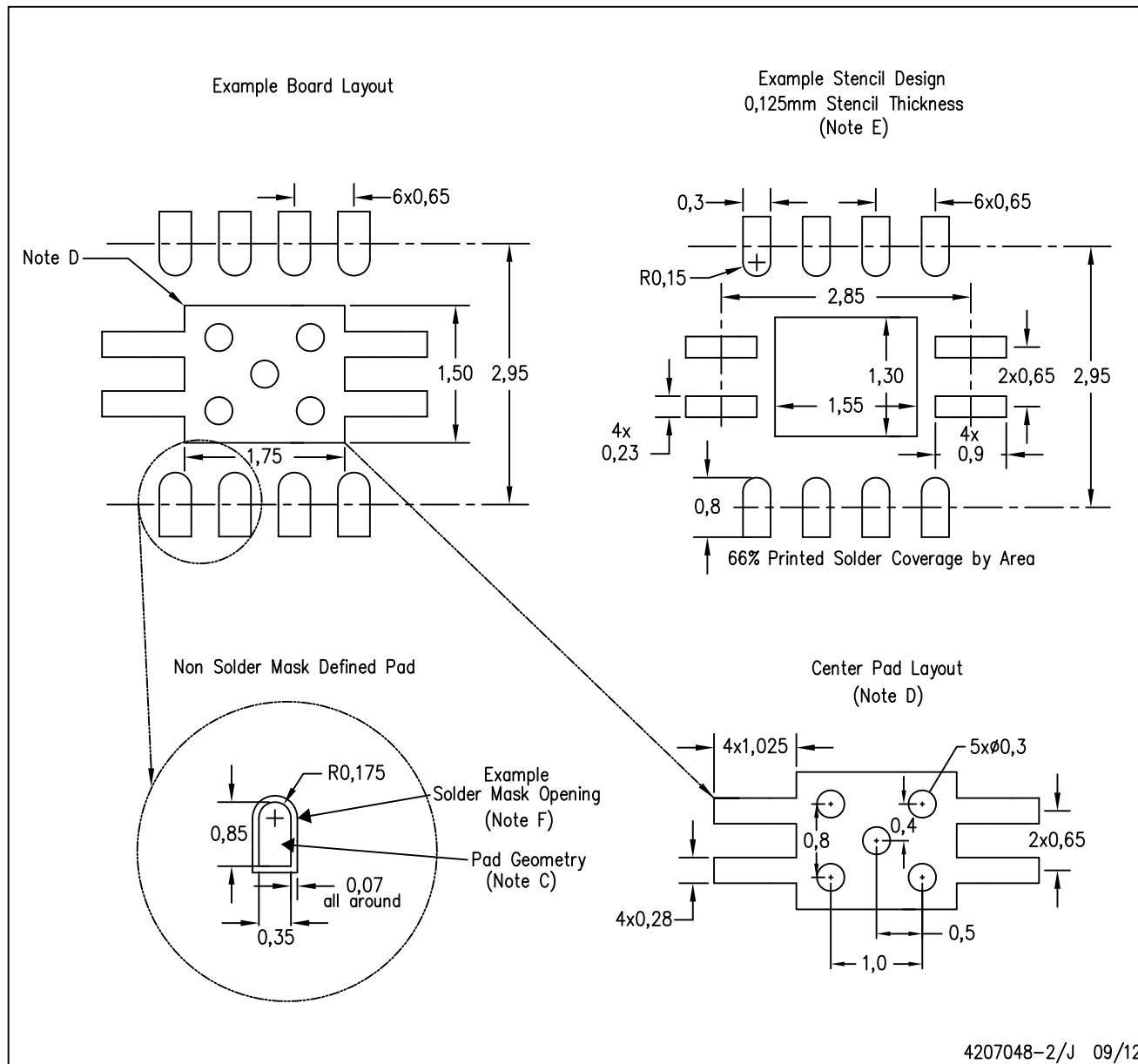
Exposed Thermal Pad Dimensions

4206340-2/N 09/12

NOTE: All linear dimensions are in millimeters

DRB (S-PVSON-N8)

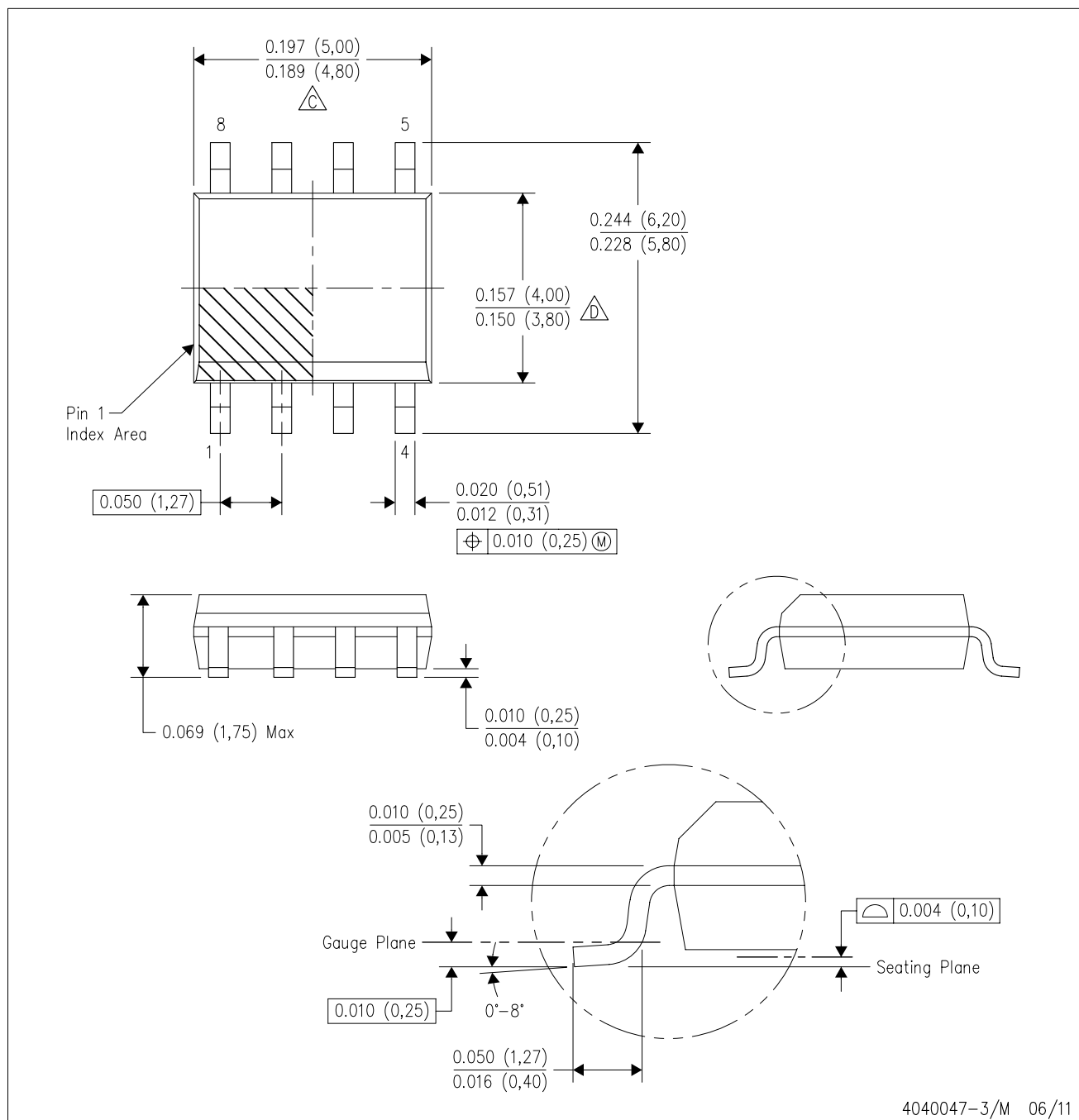
PLASTIC SMALL OUTLINE NO-LEAD



- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Publication IPC-7351 is recommended for alternate designs.
  - This package is designed to be soldered to a thermal pad on the board. Refer to Application Note, QFN Packages, Texas Instruments Literature No. SLUA271, and also the Product Data Sheets for specific thermal information, via requirements, and recommended board layout. These documents are available at [www.ti.com](http://www.ti.com) <<http://www.ti.com>>.
  - Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC 7525 for stencil design considerations.
  - Customers should contact their board fabrication site for solder mask tolerances.

D (R-PDSO-G8)

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 AA.

D (R-PDSO-G8)

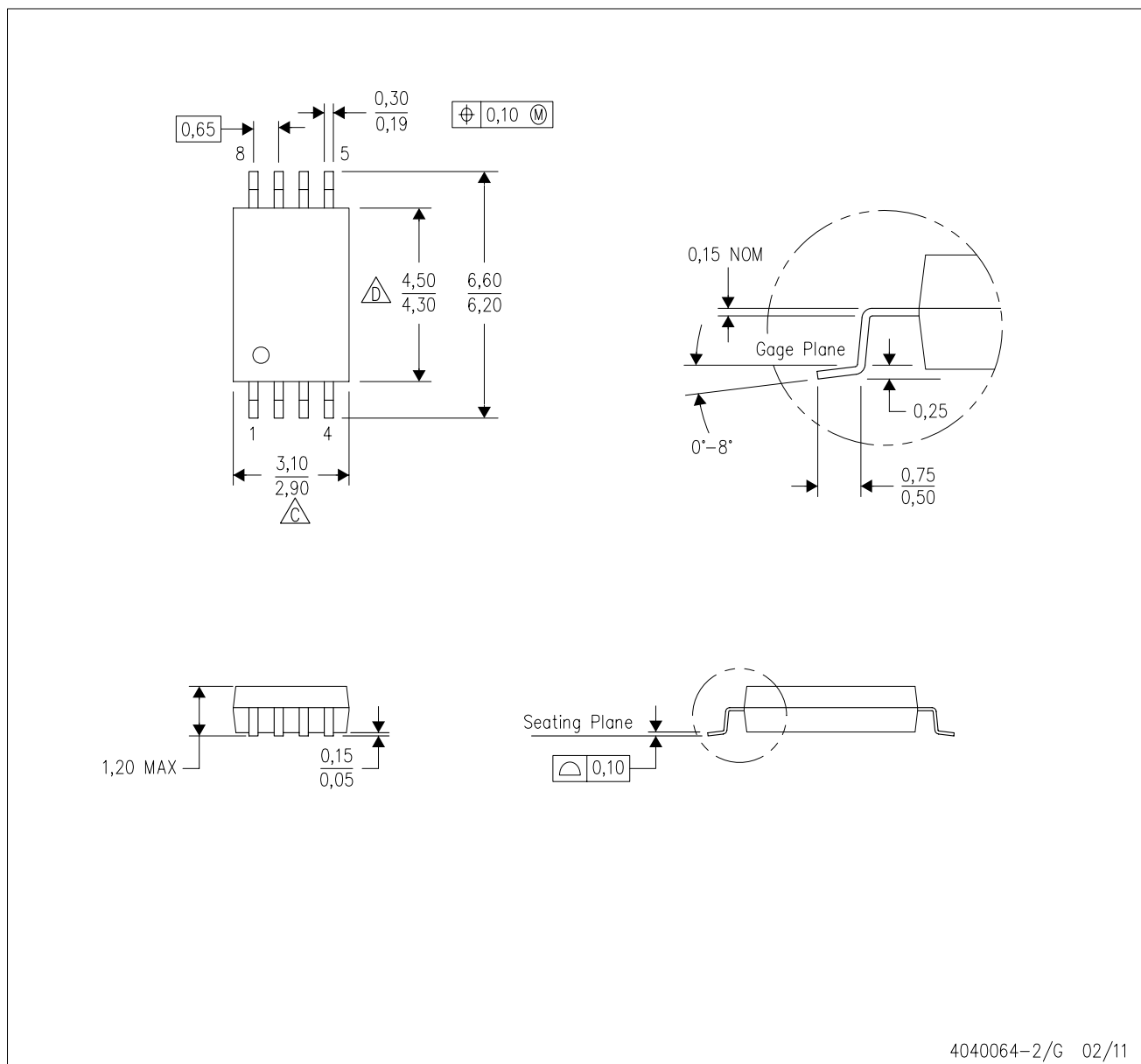
PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

PW (R-PDSO-G8)

PLASTIC SMALL OUTLINE



4040064-2/G 02/11

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
  - D. Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
  - E. Falls within JEDEC MO-153

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**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.