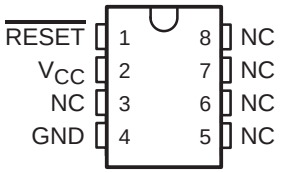
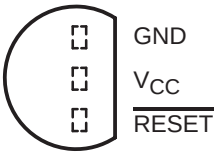
- **Power-On Reset Generator**
- **Automatic Reset Generation After Voltage Drop**
- **Low Standby Current . . . 20 μA**
- **$\overline{\text{RESET}}$ Output Defined When V_{CC} Exceeds 1 V**
- **Precision Threshold Voltage 4.55 V ±120 mV**
- **High Output Sink Capability . . . 20 mA**
- **Comparator Hysteresis Prevents Erratic Resets**

D PACKAGE
(TOP VIEW)

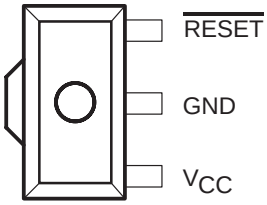


NC–No internal connection

LP PACKAGE
(TOP VIEW)



PK PACKAGE
(TOP VIEW)



GND is in electrical contact with the tab.

description/ordering information

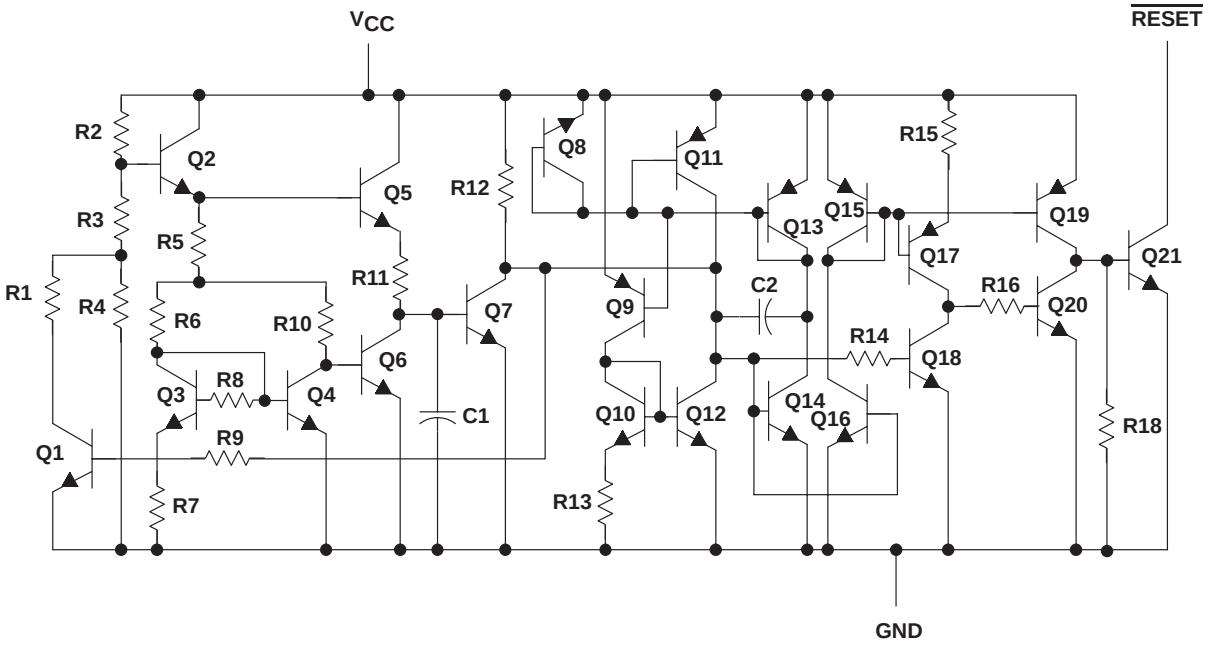
The TL7757 is a supply-voltage supervisor designed for use in microcomputer and microprocessor systems. The supervisor monitors the supply voltage for undervoltage conditions. During power up, when the supply voltage, V_{CC}, attains a value approaching 1 V, the $\overline{\text{RESET}}$ output becomes active (low) to prevent undefined operation. If the supply voltage drops below threshold voltage level (V_{IT-}), the $\overline{\text{RESET}}$ output goes to the active (low) level until the supply undervoltage fault condition is eliminated.

ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 70°C	SOIC (D)	Tube of 75	TL7757CD	7757C
		Reel of 2500	TL7757CDR	
	SOT (PK)	Reel of 1000	TL7757CPK	T7
	TO226 / TO-92 (LP)	Bulk of 1000	TL7757CLP	TL7757C
		Reel of 2000	TL7757CLPR	
–40°C to 85°C	SOIC (D)	Tube of 75	TL7757ID	7757I
		Reel of 2500	TL7757IDR	
	SOT (PK)	Reel of 1000	TL7757IPK	7I
	TO226 / TO-92 (LP)	Bulk of 1000	TL7757ILP	TL7757I
		Reel of 2000	TL7757ILPR	

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

equivalent schematic



ACTUAL DEVICE COMPONENT COUNT	
Transistors	27
Resistors	20
Capacitors	2

absolute maximum ratings over operating junction temperature range (unless otherwise noted)†

Supply voltage range, V_{CC} (see Note 1) . . . . . –0.3 V to 20 V
Off-state output voltage range (see Note 1) . . . . . –0.3 V to 20 V
Output current, I_O . . . . . 30 mA
Package thermal impedance, θ_{JA} (see Notes 2 and 3): D package . . . . . 97°C/W
LP package . . . . . 140°C/W
PK package . . . . . 52°C/W
Operating virtual junction temperature, T_J . . . . . 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds . . . . . 260°C
Storage temperature range, T_{stg} . . . . . –65°C to 150°C

† 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.

NOTES: 1. All voltage values are with respect to network terminal ground.
2. Maximum power dissipation is a function of $T_J(max)$, θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) – T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.
3. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions

			MIN	MAX	UNIT
V_{CC}	Supply voltage		1	7	V
V_{OH}	High-level output voltage			15	V
I_{OL}	Low-level output current			20	mA
T_A	Operating free-air temperature	TL7757C	0	70	°C
		TL7757I	–40	85	

electrical characteristics at specified free-air temperature

PARAMETER		TEST CONDITIONS	T_A	TL7757C			UNIT
				MIN	TYP	MAX	
$V_{IT–}$	Negative-going input threshold voltage at V_{CC}		25°C	4.43	4.55	4.67	V
			0°C to 70°C	4.4		4.7	
V_{hys}†	Hysteresis at V_{CC}		25°C	40	50	60	mV
			0°C to 70°C	30		70	
V_{OL}	Low-level output voltage	I_{OL} = 20 mA, V_{CC} = 4.3 V	25°C		0.4	0.8	V
			0°C to 70°C			0.8	
I_{OH}	High-level output current	V_{CC} = 7 V, V_{OH} = 15 V, See Figure 1	25°C			1	µA
			0°C to 70°C			1	
V_{res}‡	Power-up reset voltage	R_L = 2.2 kΩ, V_{CC} slew rate ≤ 5 V/µs	25°C		0.8	1	V
			0°C to 70°C			1.2	
I_{CC}	Supply current	V_{CC} = 4.3 V	25°C		1400	2000	µA
			0°C to 70°C			2000	
		V_{CC} = 5.5 V	0°C to 70°C			40	

† This is the difference between positive-going input threshold voltage, V_{IT+}, and negative-going input threshold voltage, $V_{IT–}$.
‡ This is the lowest voltage at which $\overline{\text{RESET}}$ becomes active.

switching characteristics at specified free-air temperature

PARAMETER		TEST CONDITIONS	T_A	TL7757C			UNIT
				MIN	TYP	MAX	
t_{PLH}	Propagation delay time, low-to-high-level output	V_{CC} slew rate ≤ 5 V/µs, See Figures 2 and 3	25°C		3.4	5	µs
			0°C to 70°C			5	
t_{PHL}	Propagation delay time, high-to-low-level output	See Figures 2 and 3	25°C		2	5	µs
			0°C to 70°C			5	
t_r	Rise time	V_{CC} slew rate ≤ 5 V/µs, See Figures 2 and 3	25°C		0.4	1	µs
			0°C to 70°C			1	
t_f	Fall time	See Figures 2 and 3	25°C		0.05	1	µs
			0°C to 70°C			1	
$t_{w(min)}$	Minimum pulse duration at V_{CC} for output response		25°C			5	µs
			0°C to 70°C			5	

electrical characteristics at specified free-air temperature

PARAMETER		TEST CONDITIONS	T_A	TL7757I			UNIT
				MIN	TYP	MAX	
V_{IT-}	Negative-going input threshold voltage at V_{CC}		25°C	4.43	4.55	4.67	V
			–40°C to 85°C	4.4		4.7	
V_{hys}†	Hysteresis at V_{CC}		25°C	40	50	60	mV
			–40°C to 85°C	30		70	
V_{OL}	Low-level output voltage	I_{OL} = 20 mA, V_{CC} = 4.3 V	25°C		0.4	0.8	V
			–40°C to 85°C			0.8	
I_{OH}	High-level output current	V_{CC} = 7 V, V_{OH} = 15 V, See Figure 1	25°C			1	µA
			–40°C to 85°C			1	
V_{res}‡	Power-up reset voltage	R_L = 2.2 kΩ, V_{CC} slew rate ≤ 5 V/µs	25°C		0.8	1	V
			–40°C to 85°C			1.2	
I_{CC}	Supply current	V_{CC} = 4.3 V	25°C		1400	2000	µA
			–40°C to 85°C			2100	
		V_{CC} = 5.5 V	–40°C to 85°C			40	

† This is the difference between positive-going input threshold voltage, V_{IT+}, and negative-going input threshold voltage, V_{IT-}.
‡ This is the lowest voltage at which $\overline{\text{RESET}}$ becomes active.

switching characteristics at specified free-air temperature

PARAMETER		TEST CONDITIONS	T_A	TL7757I			UNIT
				MIN	TYP	MAX	
t_{PLH}	Propagation delay time, low-to-high-level output	V_{CC} slew rate ≤ 5 V/µs, See Figures 2 and 3	25°C		3.4	5	µs
			–40°C to 85°C			5	
t_{PHL}	Propagation delay time, high-to-low-level output	See Figures 2 and 3	25°C		2	5	µs
			–40°C to 85°C			5	
t_r	Rise time	V_{CC} slew rate ≤ 5 V/µs, See Figures 2 and 3	25°C		0.4	1	µs
			–40°C to 85°C			1	
t_f	Fall time	See Figures 2 and 3	25°C		0.05	1	µs
			–40°C to 85°C			1	
$t_{w(min)}$	Minimum pulse duration at V_{CC} for output response		25°C			5	µs
			–40°C to 85°C			5	

PARAMETER MEASUREMENT INFORMATION

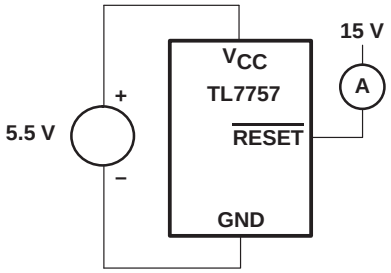
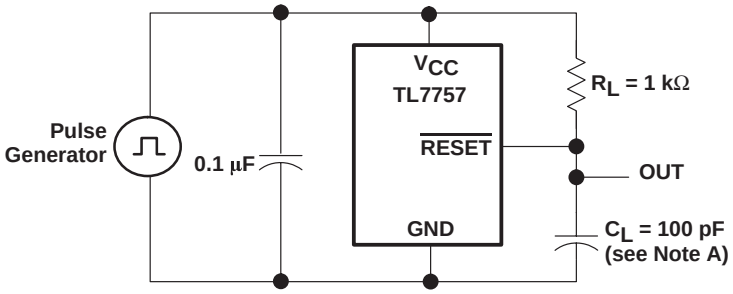
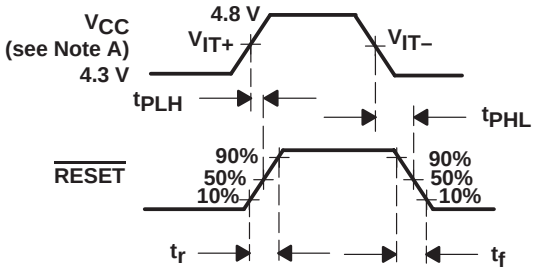


Figure 1. Test Circuit for Output Leakage Current



NOTE A: Includes jig and probe capacitance

Figure 2. Test Circuit for $\overline{\text{RESET}}$ Output Switching Characteristics



NOTE A: V_{CC} slew rate ≤ 5 μs

Figure 3. Switching Diagram

TYPICAL CHARACTERISTICS†

Table of Graphs

		FIGURE
V_{CC}	Supply voltage vs $\overline{\text{RESET}}$ output voltage	4
I_{CC}	Supply current vs Supply voltage	5
I_{CC}	Supply current vs Free-air temperature	6
V_{OL}	Low-level output voltage vs Low-level output current	7
V_{OL}	Low-level output voltage vs Free-air temperature	8
I_{OL}	Output current vs Supply voltage	9
V_{IT-}	Input threshold voltage (negative-going V_{CC}) vs Free-air temperature	10
V_{res}	Power-up reset voltage vs Free-air temperature	11
V_{res}	Power-up reset voltage and supply voltage vs Time	12
	Propagation delay time	13

SUPPLY VOLTAGE vs $\overline{\text{RESET}}$ OUTPUT VOLTAGE

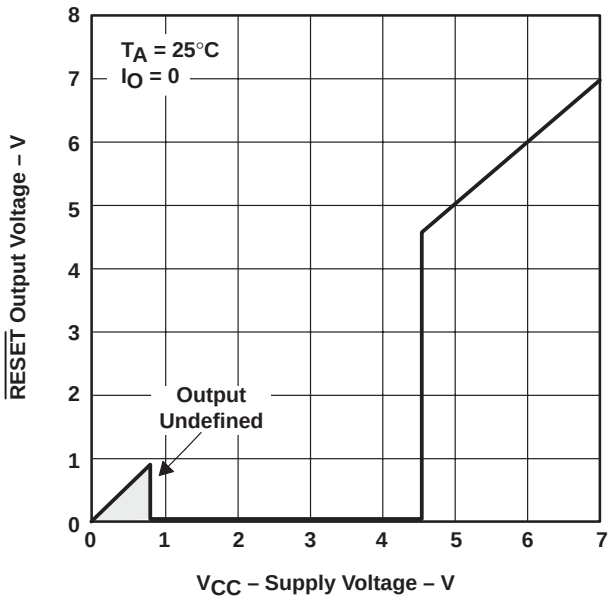


Figure 4

SUPPLY CURRENT vs SUPPLY VOLTAGE

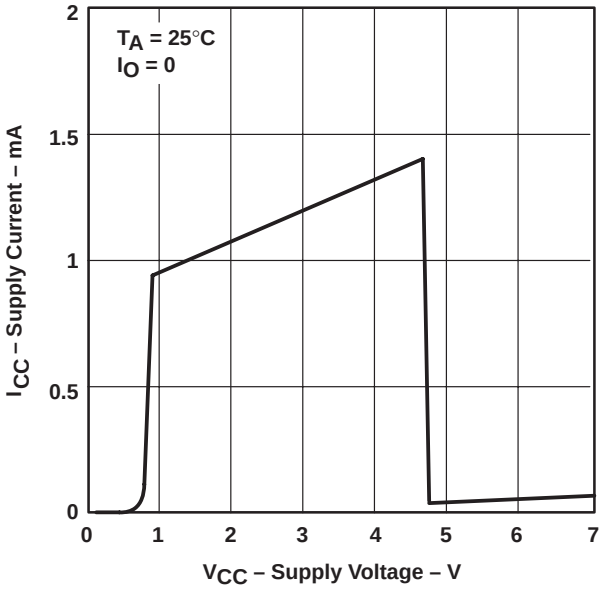


Figure 5

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS†

SUPPLY CURRENT vs FREE-AIR TEMPERATURE

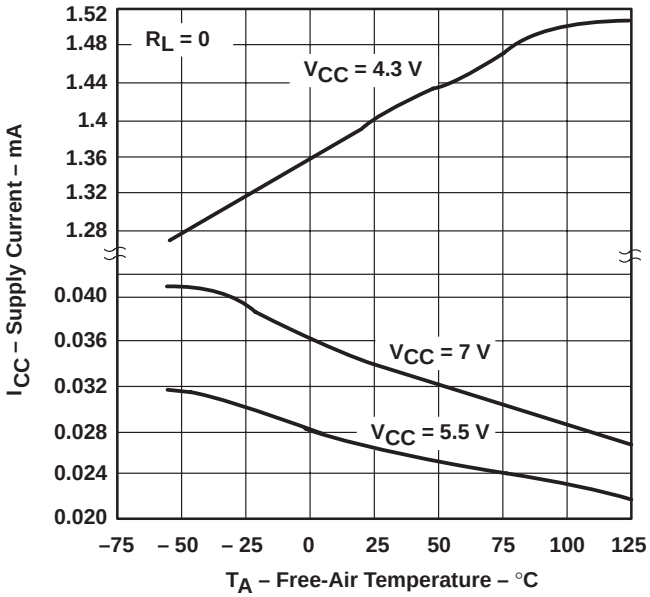


Figure 6

LOW-LEVEL OUTPUT VOLTAGE vs LOW-LEVEL OUTPUT CURRENT

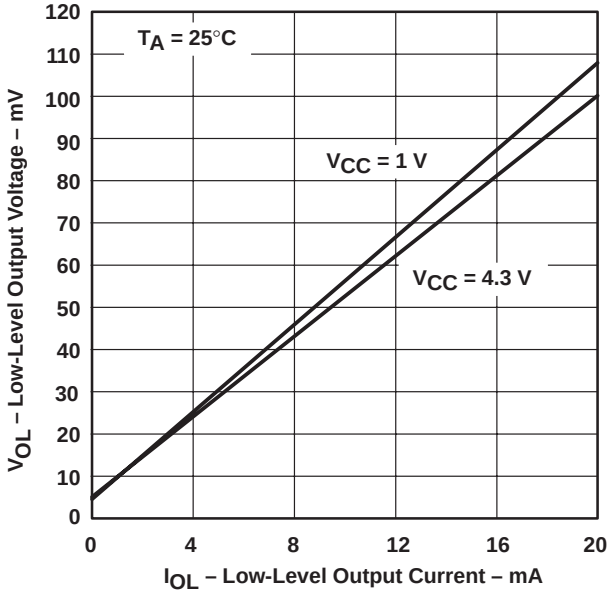


Figure 7

LOW-LEVEL OUTPUT VOLTAGE vs FREE-AIR TEMPERATURE

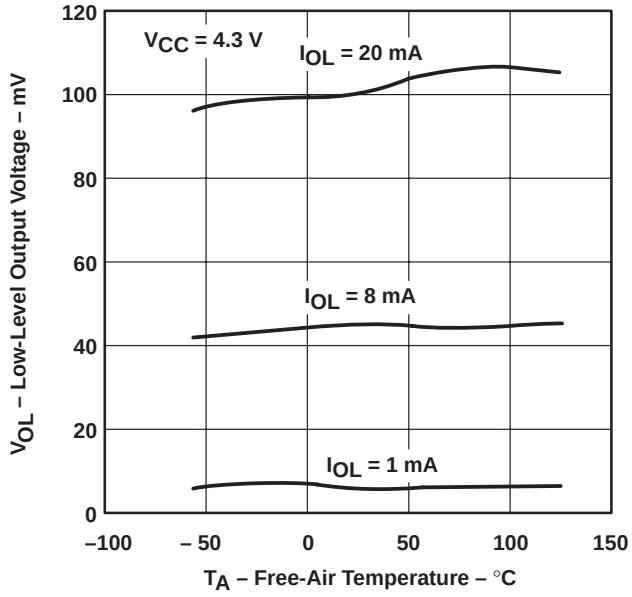


Figure 8

OUTPUT CURRENT vs SUPPLY VOLTAGE

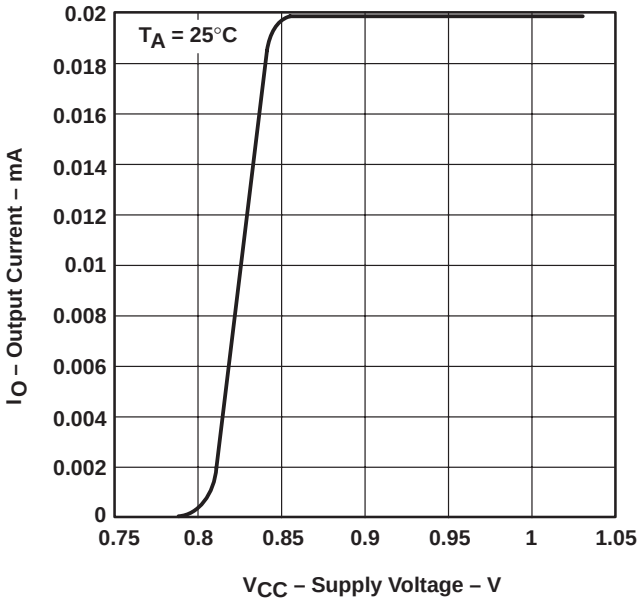


Figure 9

† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

TYPICAL CHARACTERISTICS†

INPUT THRESHOLD VOLTAGE (NEGATIVE-GOING V_{CC}) vs FREE-AIR TEMPERATURE

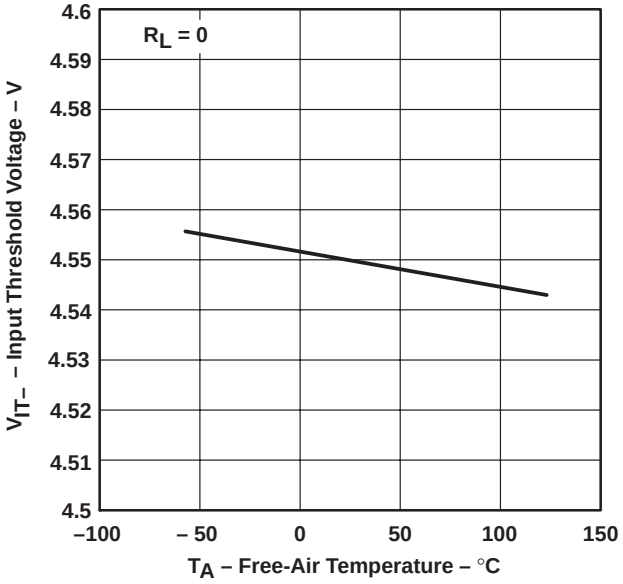


Figure 10

POWER-UP RESET VOLTAGE vs FREE-AIR TEMPERATURE

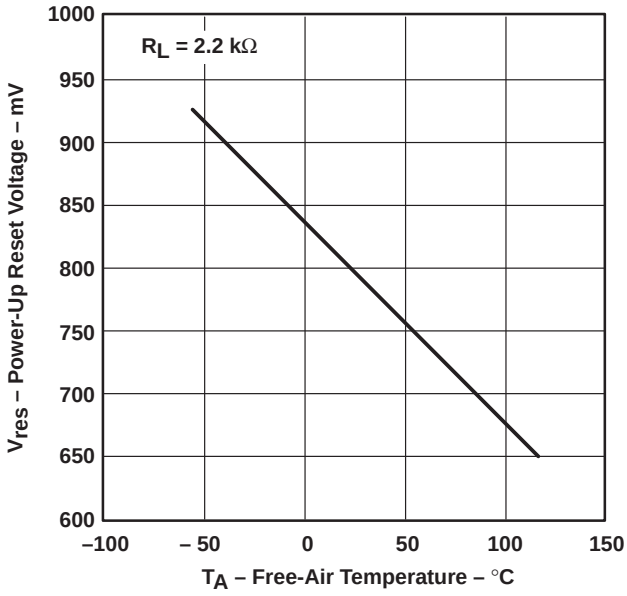


Figure 11

POWER-UP RESET VOLTAGE AND SUPPLY VOLTAGE vs TIME

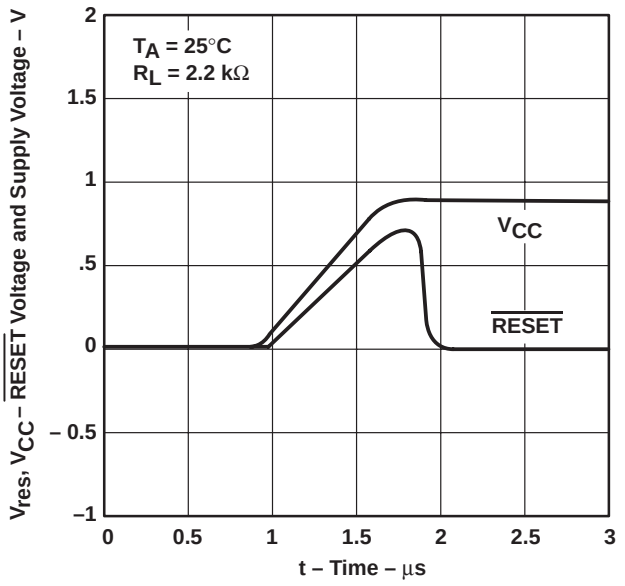


Figure 12

PROPAGATION DELAY TIME

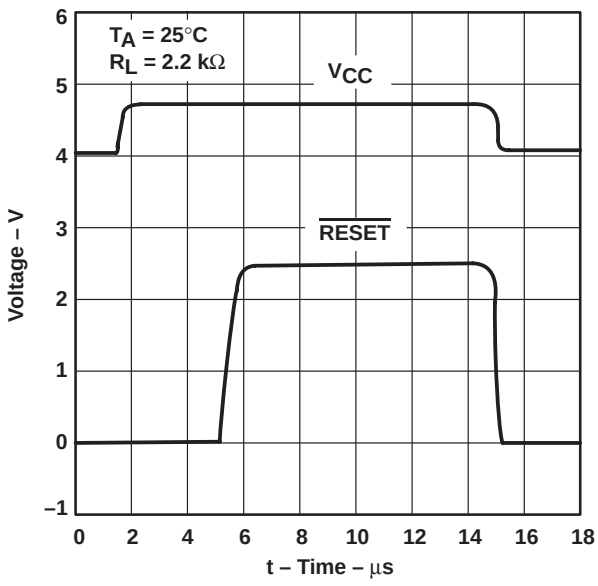
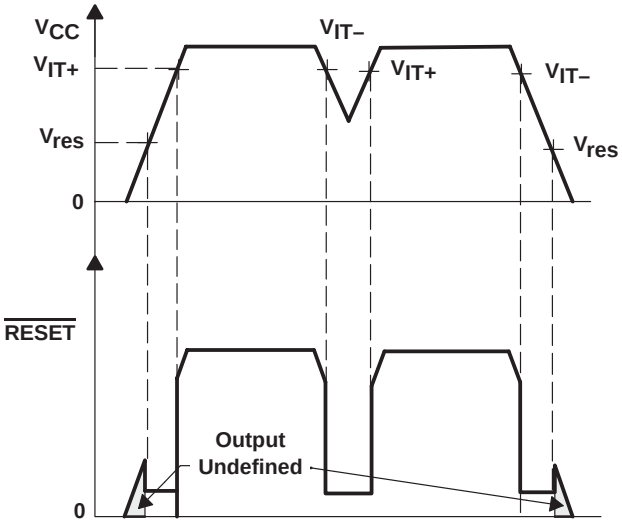


Figure 13

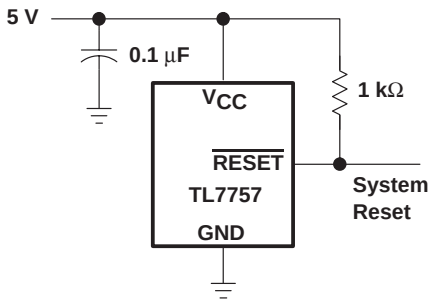
† Data at high and low temperatures are applicable only within the rated operating free-air temperature ranges of the various devices.

APPLICATION INFORMATION

TYPICAL TIMING DIAGRAM



TYPICAL APPLICATION DIAGRAM



PACKAGING INFORMATION

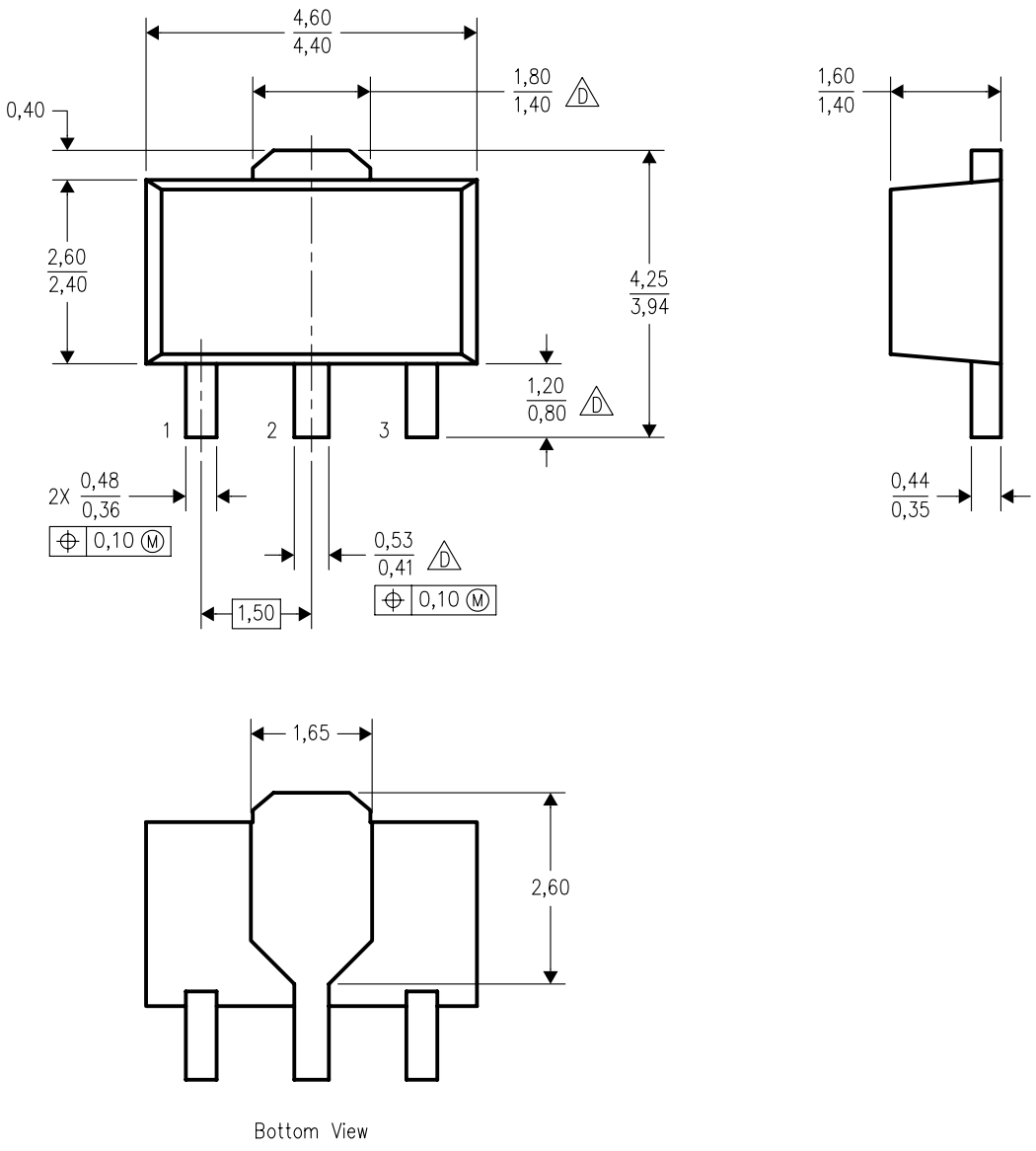
Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
TL7757CD	ACTIVE	SOIC	D	8	75	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
TL7757CDR	ACTIVE	SOIC	D	8	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
TL7757CLP	ACTIVE	TO-92	LP	3	1000	None	Call TI	Level-NC-NC-NC
TL7757CLPR	ACTIVE	TO-92	LP	3	2000	None	Call TI	Level-NC-NC-NC
TL7757CPK	ACTIVE	SOT-89	PK	3	1000	None	Call TI	Level-1-220C-UNLIM
TL7757ID	ACTIVE	SOIC	D	8	75	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
TL7757IDR	ACTIVE	SOIC	D	8	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
TL7757ILP	ACTIVE	TO-92	LP	3	1000	None	Call TI	Level-NC-NC-NC
TL7757ILPR	ACTIVE	TO-92	LP	3	2000	None	Call TI	Level-NC-NC-NC
TL7757IPK	ACTIVE	SOT-89	PK	3	1000	None	Call TI	Level-1-220C-UNLIM
TL7757MD	OBSOLETE	SOIC	D	8		None	Call TI	Call TI
TL7757MDR	OBSOLETE	SOIC	D	8		None	Call TI	Call TI
TL7757MLP	OBSOLETE	TO-92	LP	3		None	Call TI	Call TI

(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 - May not be currently available - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
None: Not yet available Lead (Pb-Free).
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.
Green (RoHS & no Sb/Br): TI defines "Green" to mean "Pb-Free" and in addition, uses package materials that do not contain halogens, including bromine (Br) or antimony (Sb) above 0.1% of total product weight.

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDECindustry standard classifications, and peak solder temperature.

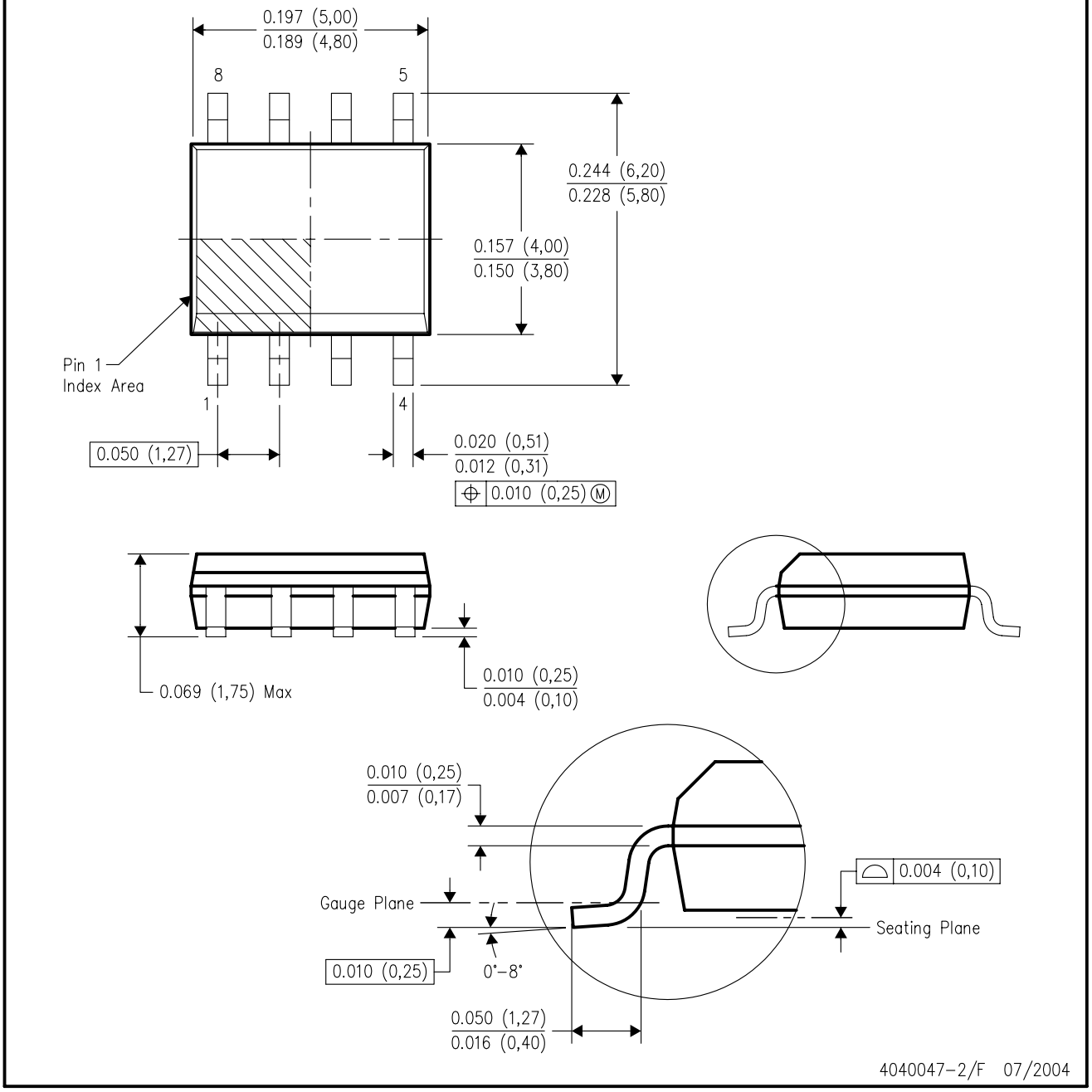
PK (R–PSSO–F3) PLASTIC SINGLE–IN–LINE PACKAGE



4040234/C 07/2004

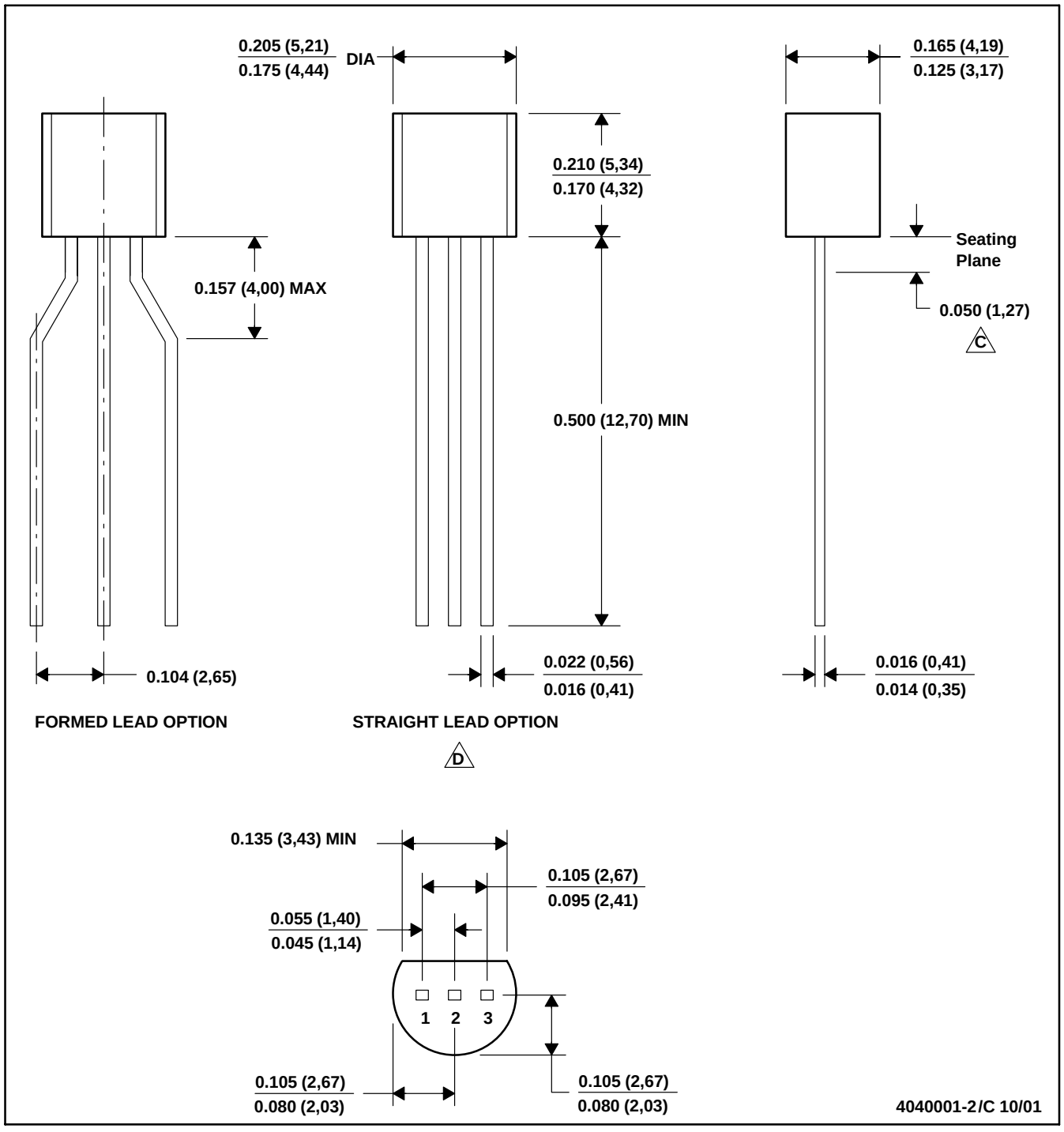
NOTES:
A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5–1994.
B. This drawing is subject to change without notice.
C. The center lead is in electrical contact with the tab.
D. Falls within JEDEC TO–243 variation AA, except minimum lead length, pin 2 minimum lead width, and minimum tab width.

D (R–PDSO–G8) PLASTIC SMALL–OUTLINE PACKAGE



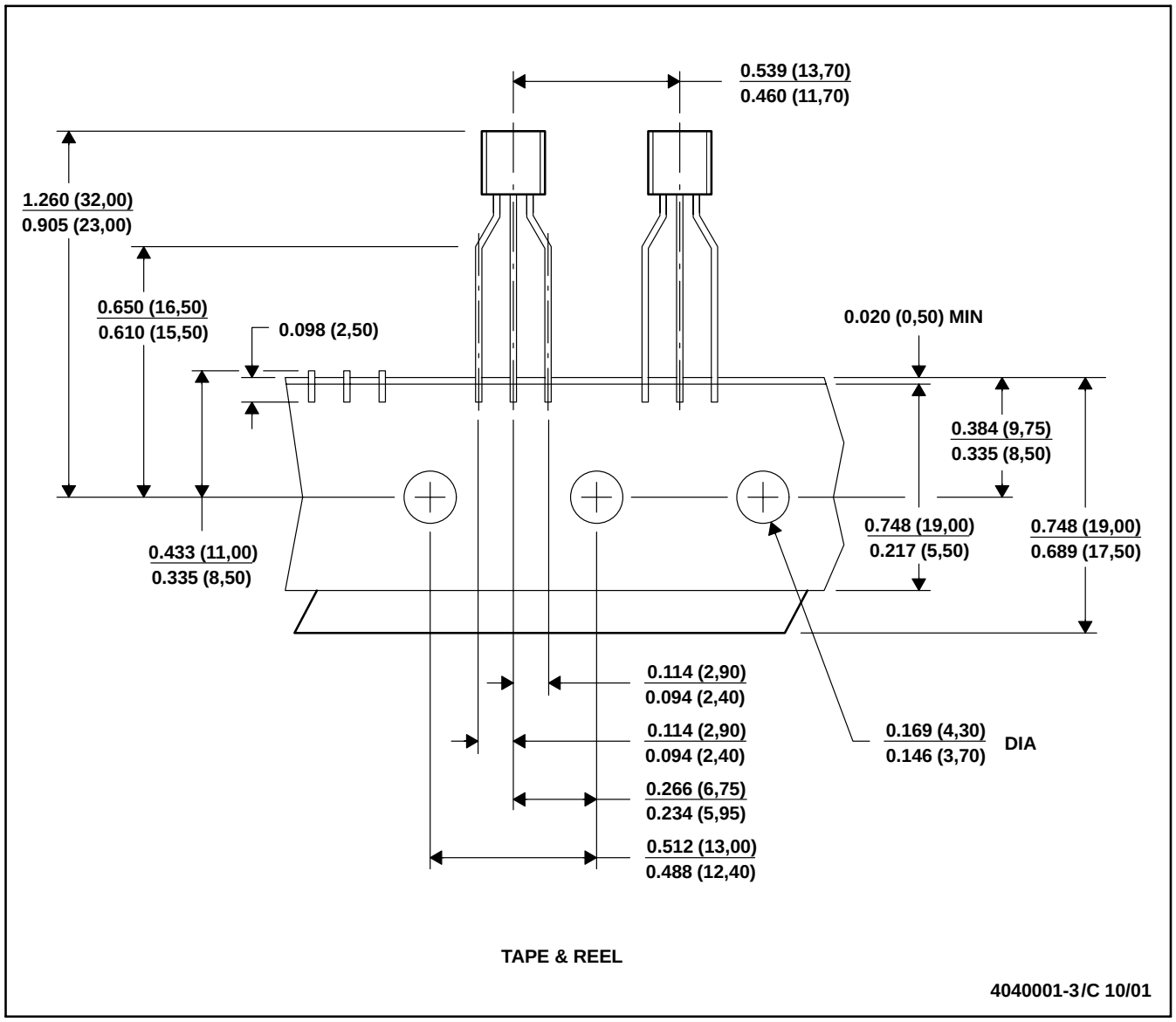
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
D. Falls within JEDEC MS–012 variation AA.

LP (O-PBCY-W3) **PLASTIC CYLINDRICAL PACKAGE**



NOTES: A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Lead dimensions are not controlled within this area
D. FAlls within JEDEC TO -226 Variation AA (TO-226 replaces TO-92)
E. Shipping Method:
Straight lead option available in bulk pack only.
Formed lead option available in tape & reel or ammo pack.

LP (O-PBCY-W3) **PLASTIC CYLINDRICAL PACKAGE**



NOTES: A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Tape and Reel information for the Format Lead Option package.

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