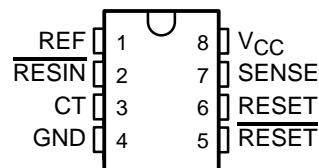


TL7702A, TL7705A, TL7709A, TL7712A, TL7715A SUPPLY-VOLTAGE SUPERVISORS

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- Power-On Reset Generator
- Automatic Reset Generation After Voltage Drop
- Wide Supply-Voltage Range
- Precision Voltage Sensor
- Temperature-Compensated Voltage Reference
- True and Complement Reset Outputs
- Externally Adjustable Pulse Duration

TL7702A, TL7709A, TL7712A, TL7715A . . . D OR P PACKAGE
TL7705A . . . D, P, OR PS PACKAGE,
(TOP VIEW)



description/ordering information

ORDERING INFORMATION

TA	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 70°C	PDIP (P)	Tube of 50	TL7702ACP	TL7702ACP
	SOIC (D)	Tube of 75	TL7702ACD	7702AC
		Reel of 2500	TL7702ACDR	
	PDIP (P)	Tube of 50	TL7705ACP	TL7705ACP
	SOIC (D)	Tube of 75	TL7705ACD	7705AC
		Reel of 2500	TL7705ACDR	
	SOP (PS)	Reel of 2000	TL7705ACPSR	T7705A
	PDIP (P)	Tube of 50	TL7709ACP	TL7709ACP
	SOIC (D)	Tube of 75	TL7709ACD	7709AC
		Reel of 2500	TL7709ACDR	
	PDIP (P)	Tube of 50	TL7712ACP	TL7709ACP
	SOIC (D)	Tube of 75	TL7712ACD	7712AC
Reel of 2500		TL7712ACDR		
PDIP (P)	Tube of 50	TL7715ACP	TL7715ACP	
SOIC (D)	Tube of 75	TL7715ACD	7715AC	
-40°C to 85°C	PDIP (P)	Tube of 50	TL7702AIP	TL7702AIP
	SOIC (D)	Tube of 75	TL7702AID	7702AI
		Reel of 2500	TL7702AIDR	
	PDIP (P)	Tube of 50	TL7705AIP	TL7705AIP
SOIC (D)	Tube of 75	TL7705AID	7705AI	
	Reel of 2500	TL7705AIDR		

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



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS
INSTRUMENTS**

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TL7702A, TL7705A, TL7709A, TL7712A, TL7715A SUPPLY-VOLTAGE SUPERVISORS

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description/ordering information (continued)

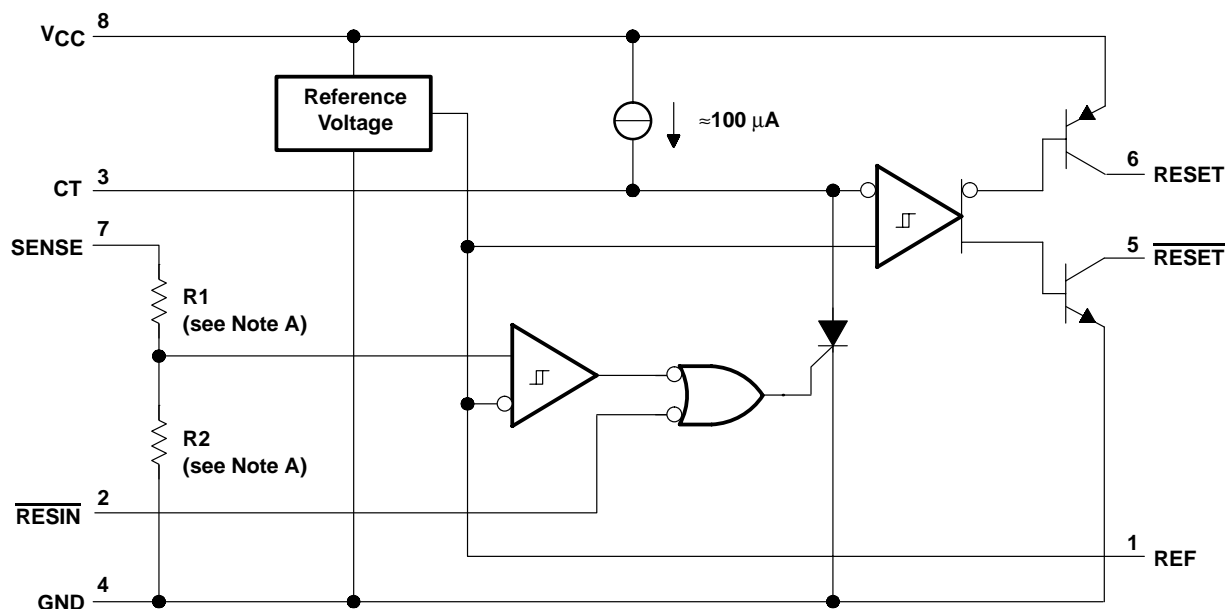
The TL77xxA family of integrated-circuit supply-voltage supervisors is designed specifically for use as reset controllers in microcomputer and microprocessor systems. The supply-voltage supervisor monitors the supply for undervoltage conditions at the SENSE input. During power up, the $\overline{\text{RESET}}$ output becomes active (low) when V_{CC} attains a value approaching 3.6 V. At this point (assuming that SENSE is above V_{IT+}), the delay timer function activates a time delay, after which outputs $\overline{\text{RESET}}$ and RESET go inactive (high and low, respectively). When an undervoltage condition occurs during normal operation, $\overline{\text{RESET}}$ and RESET go active. To ensure that a complete reset occurs, the reset outputs remain active for a time delay after the voltage at the SENSE input exceeds the positive-going threshold value. The time delay is determined by the value of the external capacitor C_T : $t_d = 1.3 \times 10^4 \times C_T$, where C_T is in farads (F) and t_d is in seconds (s).

During power down and when SENSE is below V_{IT-} , the outputs remain active until V_{CC} falls below 2 V. After this, the outputs are undefined.

An external capacitor (typically 0.1 μF) must be connected to REF to reduce the influence of fast transients in the supply voltage.

functional block diagram

The functional block diagram is shown for illustrative purposes only; the actual circuit includes a trimming network to adjust the reference voltage and sense-comparator trip point.



- NOTES: A. TL7702A: R1 = 0 Ω , R2 = open
 TL7705A: R1 = 7.8 k Ω , R2 = 10 k Ω
 TL7709A: R1 = 19.7 k Ω , R2 = 10 k Ω
 TL7712A: R1 = 32.7 k Ω , R2 = 10 k Ω
 TL7715A: R1 = 43.4 k Ω , R2 = 10 k Ω
 B. Resistor values shown are nominal.

TL7702A, TL7705A, TL7709A, TL7712A, TL7715A SUPPLY-VOLTAGE SUPERVISORS

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recommended operating conditions

		MIN	MAX	UNIT	
V _{CC}	Supply voltage	3.5	18	V	
V _{IH}	High-level input voltage at $\overline{\text{RESIN}}$	2		V	
V _{IL}	Low-level input voltage at $\overline{\text{RESIN}}$		0.6	V	
V _I	Input voltage, SENSE	TL7702A	0	See Note 2	V
		TL7705A	0	10	
		TL7709A	0	15	
		TL7712A	0	20	
		TL7715A	0	20	
I _{OH}	High-level output current, $\overline{\text{RESET}}$		-16	mA	
I _{OL}	Low-level output current, $\overline{\text{RESET}}$		16	mA	
T _A	Operating free-air temperature range	TL77xxAC	0	70	°C
		TL77xxAI	-40	85	

NOTE 2: For proper operation of the TL7702A, the voltage applied to the SENSE terminal should not exceed V_{CC} - 1 V or 6 V, whichever is less.

electrical characteristics over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITION [†]	TL77xxAC TL77xxAI			UNIT	
			MIN	TYP	MAX		
V _{OH}	High-level output voltage, $\overline{\text{RESET}}$	I _{OH} = -16 mA	V _{CC} -1.5			V	
V _{OL}	Low-level output voltage, $\overline{\text{RESET}}$	I _{OL} = 16 mA	0.4			V	
V _{ref}	Reference voltage	T _A = 25°C	2.48	2.53	2.58	V	
V _{IT-}	Negative-going input threshold voltage, SENSE	T _A = 25°C	TL7702A	2.48	2.53	2.58	V
			TL7705A	4.5	4.55	4.6	
			TL7709A	7.5	7.6	7.7	
			TL7712A	10.6	10.8	11	
			TL7715A	13.2	13.5	13.8	
V _{hys}	Hysteresis, SENSE (V _{IT+} - V _{IT-})	T _A = 25°C	TL7702A	10		mV	
			TL7705A	15			
			TL7709A	20			
			TL7712A	35			
			TL7715A	45			
I _I	RESIN	V _I = 2.4 V to V _{CC}	20			μA	
		V _I = 0.4 V	-100				
	SENSE	TL7702A	V _{ref} < V _I < V _{CC} - 1.5 V			0.5 2	
I _{OH}	High-level output current, $\overline{\text{RESET}}$	V _O = 18 V	50			μA	
I _{OL}	Low-level output current, $\overline{\text{RESET}}$	V _O = 0	-50			μA	
I _{CC}	Supply current	All inputs and outputs open	1.8	3		mA	

[†] All electrical characteristics are measured with 0.1-μF capacitors connected at REF, CT, and V_{CC} to GND.



switching characteristics over recommended operating conditions (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	TL77xxAC TL77xxAI			UNIT
		MIN	TYP	MAX	
Output pulse duration	$C_T = 0.1 \mu\text{F}$	0.65	1.2	2.6	msec
Input pulse duration at $\overline{\text{RESIN}}$		0.4			μs
$t_w(\text{S})$ Pulse duration at SENSE input to switch outputs	$V_{IH} = V_{IT-} + 200 \text{ mV}, V_{IL} = V_{IT-} - 200 \text{ mV}$	2			μs
t_{pd} Propagation delay time, $\overline{\text{RESIN}}$ to $\overline{\text{RESET}}$	$V_{CC} = 5 \text{ V}$			1	μs
t_r Rise time	$\overline{\text{RESET}}$	$V_{CC} = 5 \text{ V},$	See Note 5	0.2	μs
	$\overline{\text{RESET}}$			3.5	
t_f Fall time	$\overline{\text{RESET}}$	$V_{CC} = 5 \text{ V},$	See Note 5	3.5	μs
	$\overline{\text{RESET}}$			0.2	

† All switching characteristics are measured with 0.1- μF capacitors connected at REF and V_{CC} to GND.

NOTE 5: The rise and fall times are measured with a 4.7-k Ω load resistor at RESET and $\overline{\text{RESET}}$.

PARAMETER MEASUREMENT INFORMATION

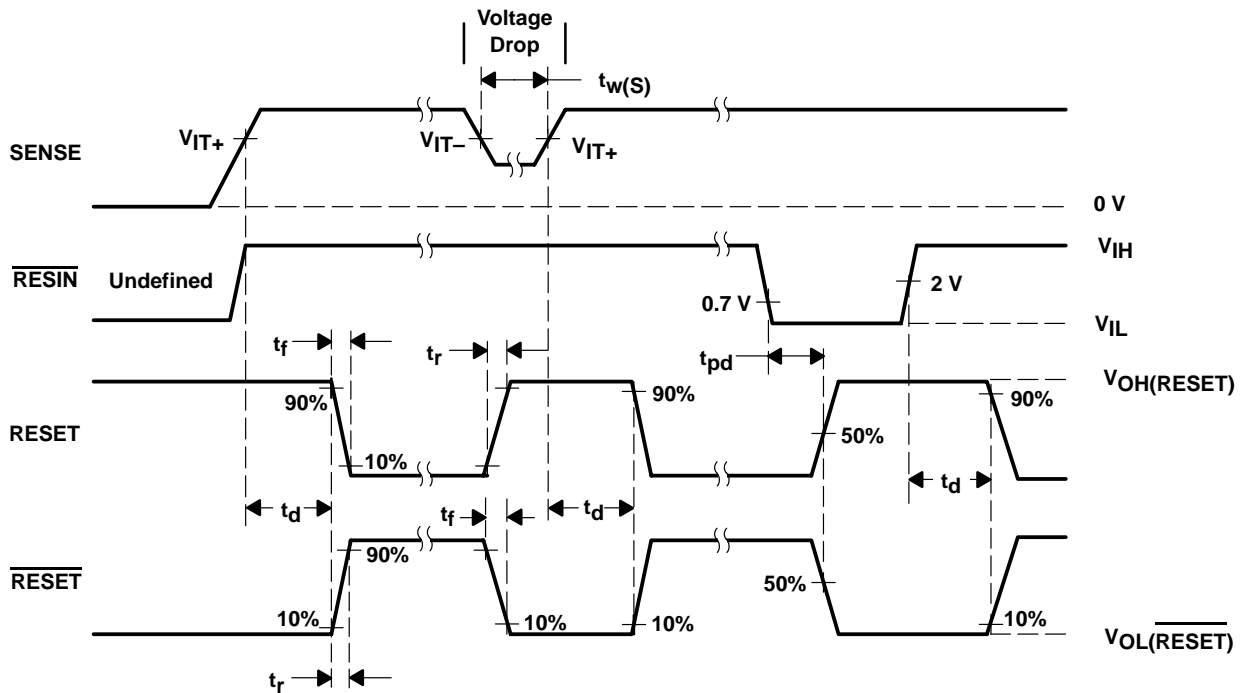


Figure 1. Voltage Waveforms

TL7702A, TL7705A, TL7709A, TL7712A, TL7715A SUPPLY-VOLTAGE SUPERVISORS

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TYPICAL CHARACTERISTICS†

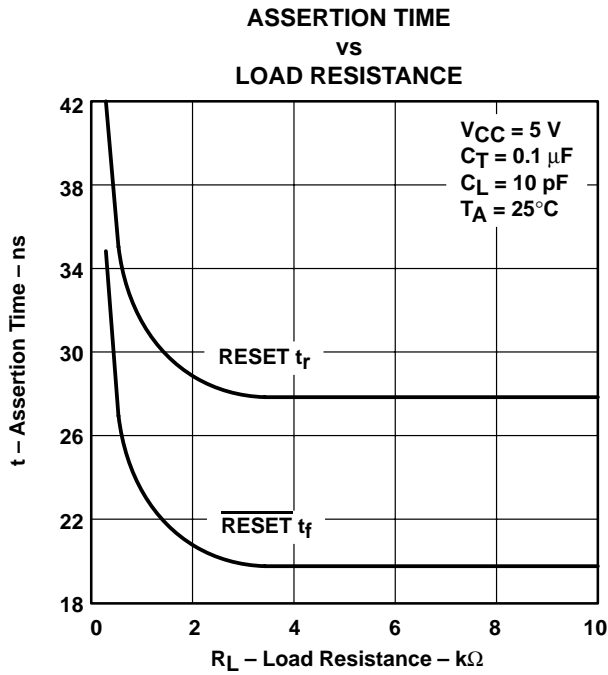


Figure 2

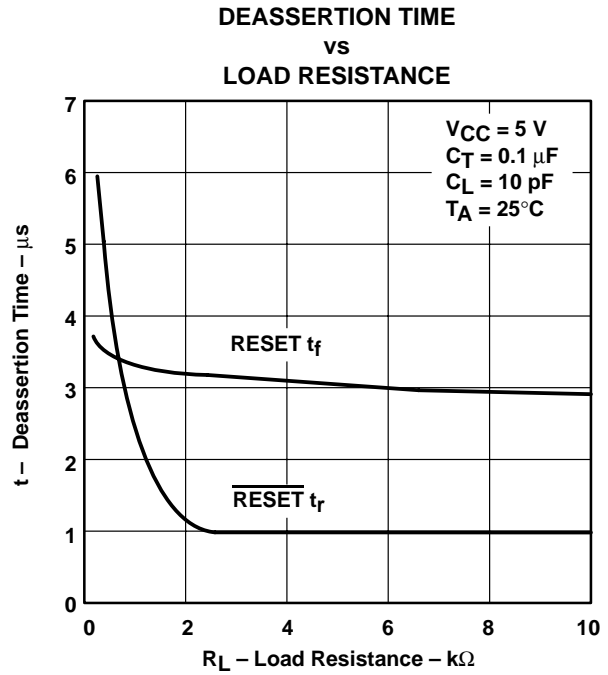


Figure 3

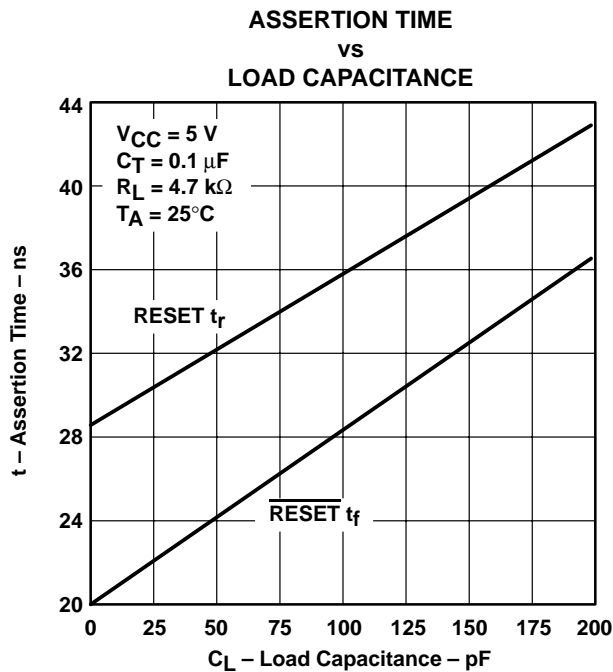


Figure 4

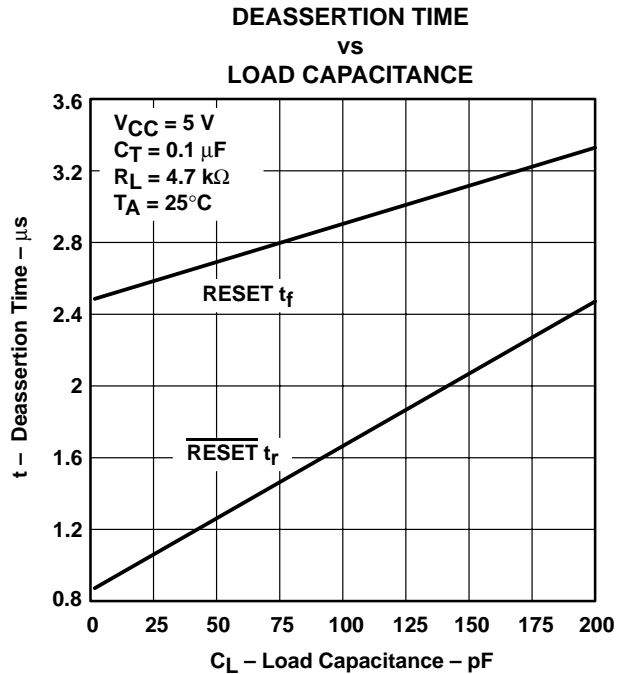
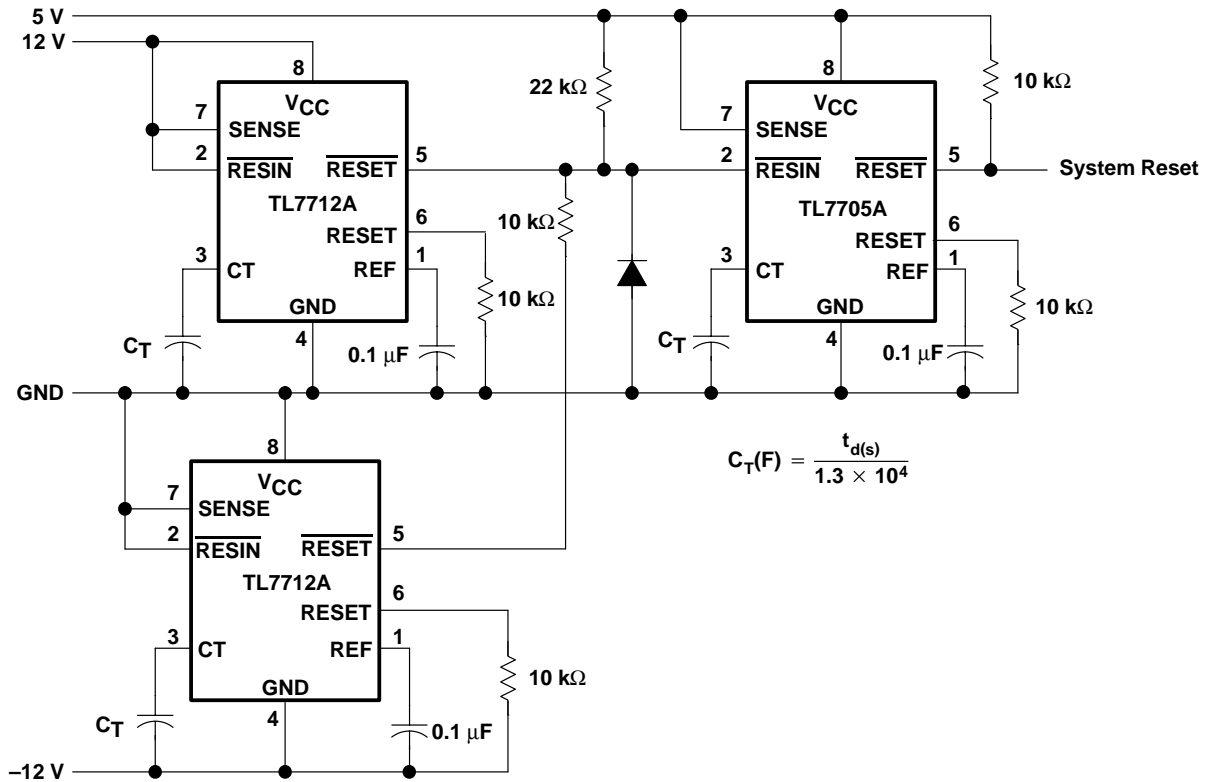


Figure 5

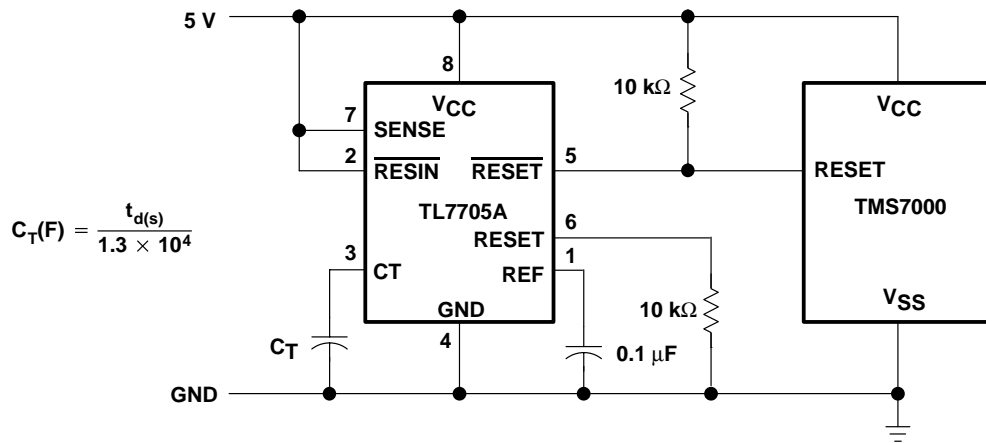
† For proper operation, both RESET and $\overline{\text{RESET}}$ should be terminated with resistors of similar value. Failure to do so may cause unwanted plateauing in either output waveform during switching.

APPLICATION INFORMATION



$$C_T(F) = \frac{t_{d(s)}}{1.3 \times 10^4}$$

Figure 6. Multiple Power-Supply System Reset Generation



$$C_T(F) = \frac{t_{d(s)}}{1.3 \times 10^4}$$

Figure 7. Reset Controller for TMS7000 System

TL7702A, TL7705A, TL7709A, TL7712A, TL7715A SUPPLY-VOLTAGE SUPERVISORS

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APPLICATION INFORMATION

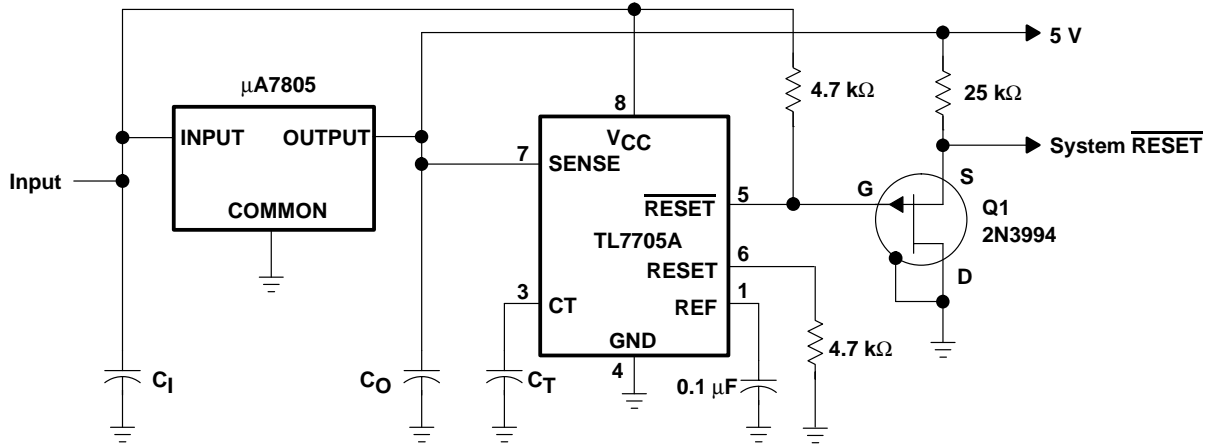


Figure 8. Eliminating Undefined States Using a P-Channel JFET

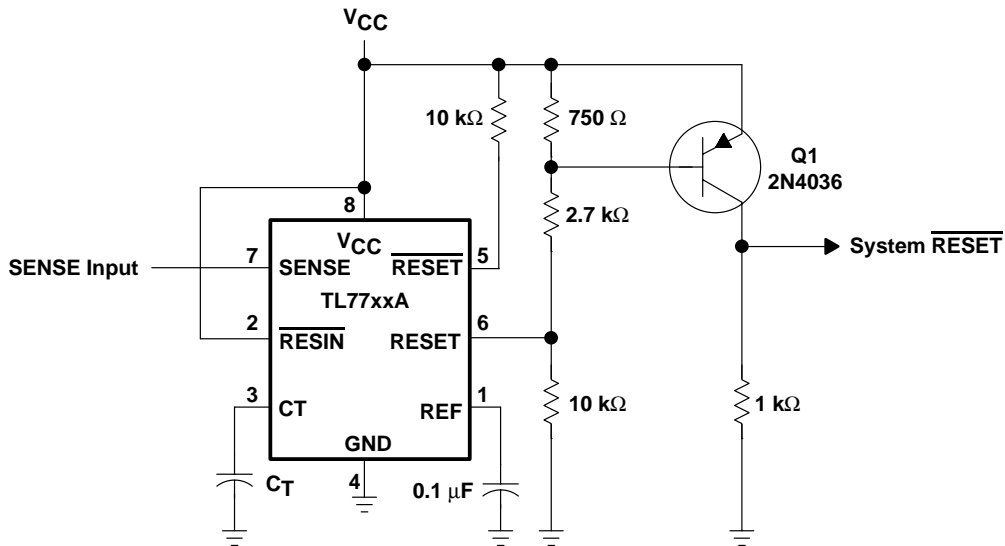
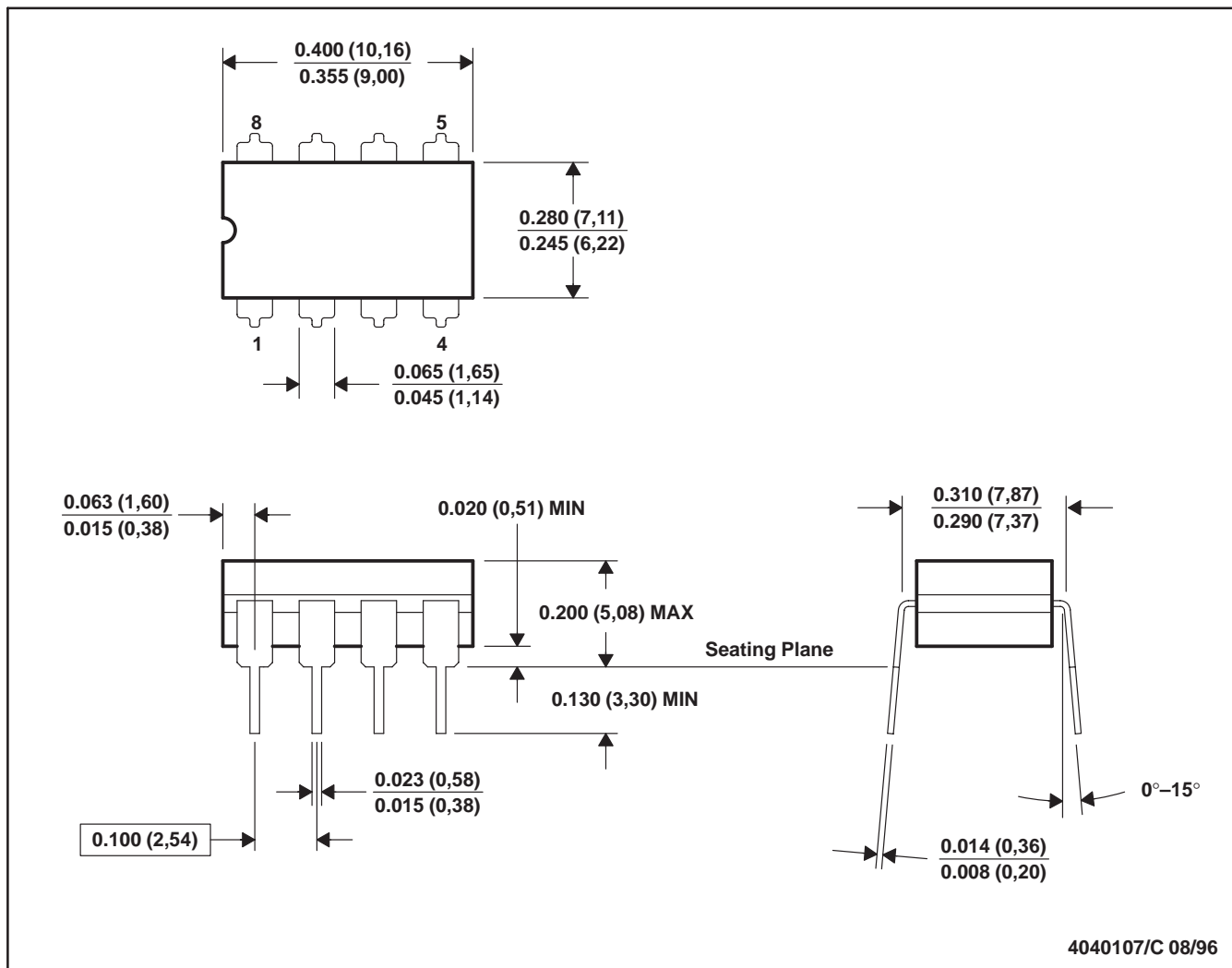


Figure 9. Eliminating Undefined States Using a pnp Transistor

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

FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

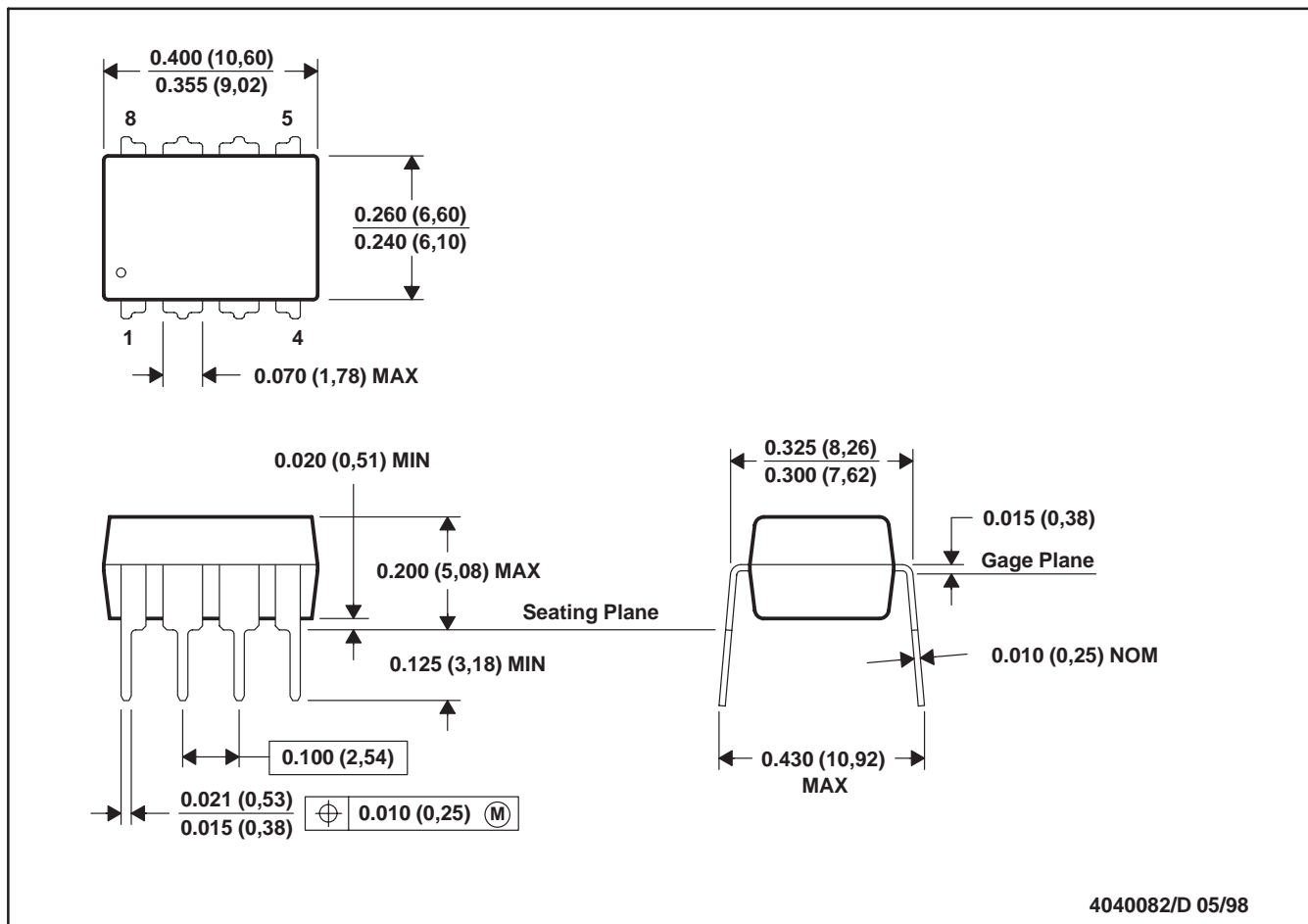
28 TERMINAL SHOWN



- 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 metal lid.
 - D. The terminals are gold plated.
 - E. Falls within JEDEC MS-004

P (R-PDIP-T8)

PLASTIC DUAL-IN-LINE



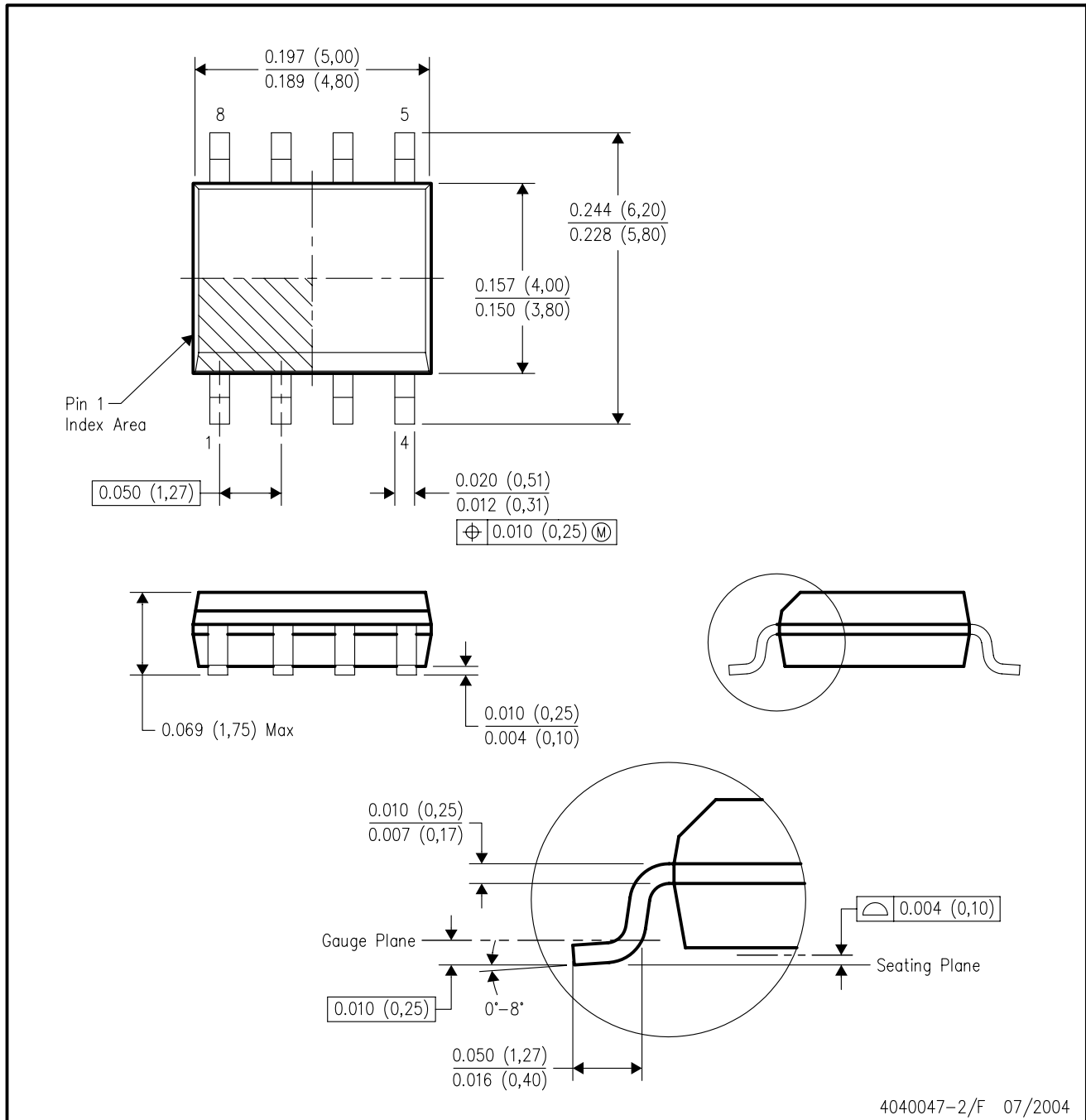
- NOTES: A. All linear dimensions are in inches (millimeters).
 B. This drawing is subject to change without notice.
 C. Falls within JEDEC MS-001

For the latest package information, go to http://www.ti.com/sc/docs/package/pkg_info.htm



D (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE

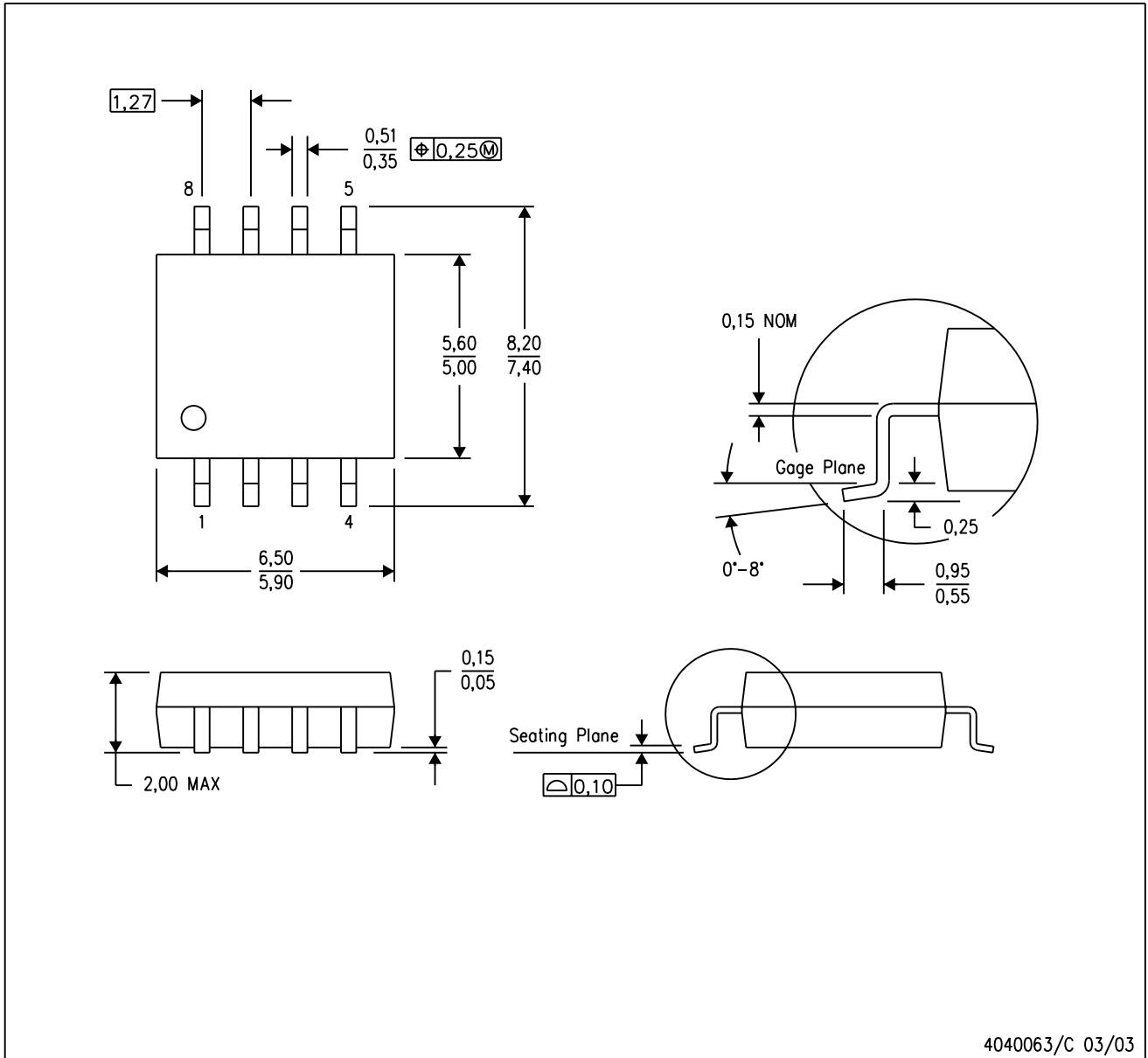


- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - D. Falls within JEDEC MS-012 variation AA.

MECHANICAL DATA

PS (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

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