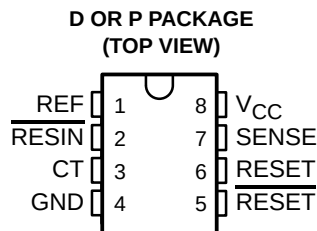


TL7702A, TL7705A, TL7709A, TL7712A, TL7715A SUPPLY-VOLTAGE SUPERVISORS

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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
- Package Options Include Plastic Small-Outline (D) Package and Standard Plastic (P) DIP



description

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.

The TL77xxAC series is characterized for operation from 0°C to 70°C. The TL77xxAI series is characterized for operation from –40°C to 85°C.

AVAILABLE OPTIONS

T _A	PACKAGED DEVICES	
	SMALL OUTLINE (D)	PLASTIC DIP (P)
0°C to 70°C	TL7702ACD TL7705ACD TL7709ACD TL7712ACD TL7715ACD	TL7702ACP TL7705ACP TL7709ACP TL7712ACP TL7715ACP
–40°C to 85°C	TL7702AID TL7705AID	TL7702AIP TL7705AIP

The D package is available taped and reeled. Add the suffix R to the device type (e.g., TL7702ACDR).



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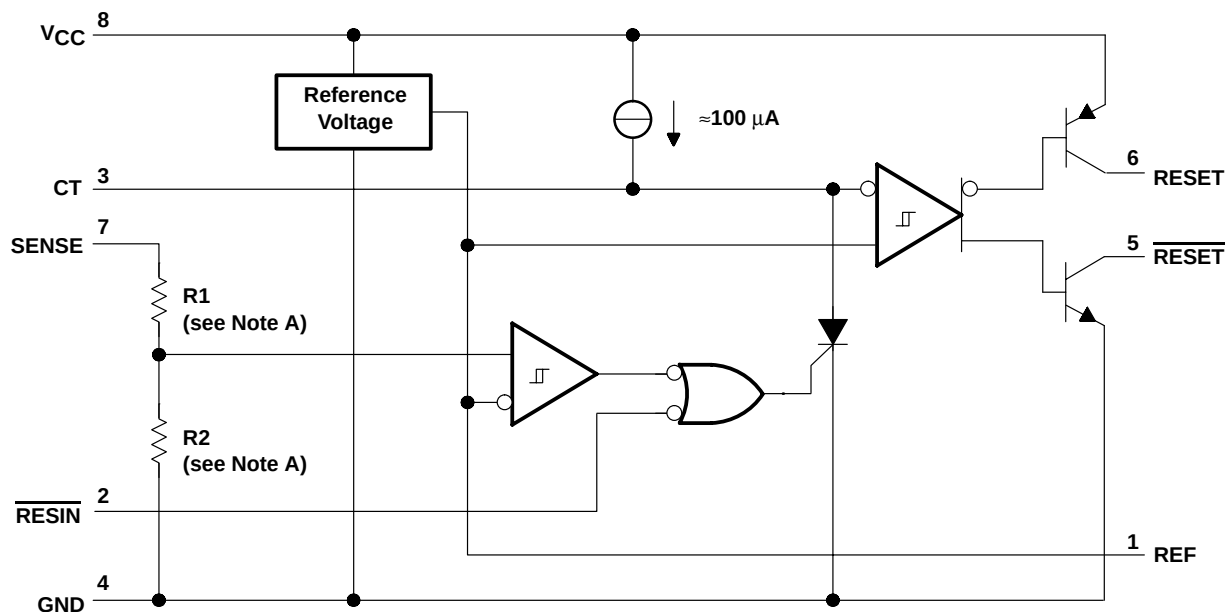
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TL7702A, TL7705A, TL7709A, TL7712A, TL7715A SUPPLY-VOLTAGE SUPERVISORS

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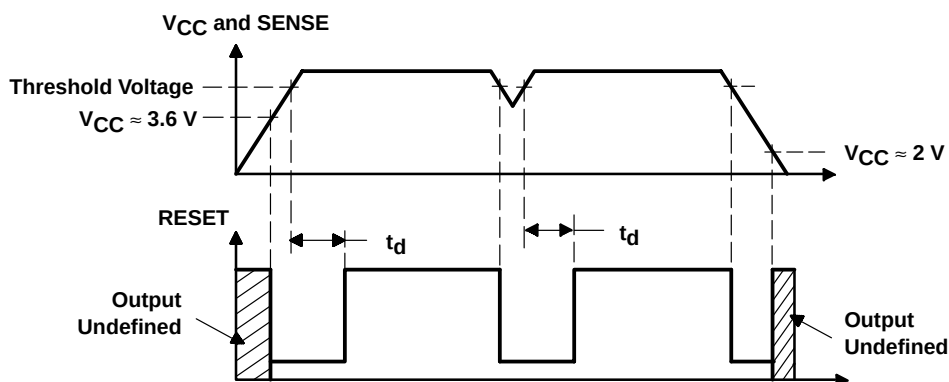
functional block diagram

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.

timing diagram



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

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absolute maximum ratings over operating free-air temperature (unless otherwise noted)[†]

Supply voltage, V_{CC} (see Note 1)	20 V
Input voltage range, V_I , $\overline{\text{RESIN}}$	–0.3 V to 20 V
Input voltage range, V_I , SENSE: TL7702A (see Note 2)	–0.3 V to 6 V
TL7705A	–0.3 V to 20 V
TL7709A	–0.3 V to 20 V
TL7712A, TL7715A	–0.3 V to 20 V
High-level output current, I_{OH} , RESET	–30 mA
Low-level output current, I_{OL} , RESET	30 mA
Package thermal impedance, θ_{JA} (see Notes 3 and 4): D package	97°C/W
P package	85°C/W
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: D or P package	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 GND.
 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.
 3. Maximum power dissipation is a function of $T_J(\text{max})$, θ_{JA} , and T_A . The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(\text{max}) - T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.
 4. The package thermal impedance is calculated in accordance with JESD 51-7.

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, RESET		–16	mA
I_{OL}	Low-level output current, RESET		16	mA
C_T	Timing capacitor		10	μF
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.



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

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electrical characteristics over recommended operating conditions (unless otherwise noted)

PARAMETER			TEST CONDITIONS†	TL77xxAC TL77xxAI			UNIT
				MIN	TYP	MAX	
V _{OH}	High-level output voltage, RESET		I _{OH} = –16 mA	V _{CC} –1.5			V
V _{OL}	Low-level output voltage, 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	TL7702A	T _A = 25°C	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–})	TL7702A	T _A = 25°C	10			mV
		TL7705A		15			
		TL7709A		20			
		TL7712A		35			
		TL7715A		45			
I _I	Input current	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, RESET		V _O = 18 V	50			μA
I _{OL}	Low-level output current, 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 μF	0.65	1.2	2.6	msec
Input pulse duration at RESIN				0.4			μs
t _{w(S)}	Pulse duration at SENSE input to switch outputs		V _{IH} = V _{IT–} +200 mV, V _{IL} = V _{IT–} –200 mV	2			μs
t _{pd}	Propagation delay time, RESIN to RESET		V _{CC} = 5 V			1	μs
t _r	Rise time	RESET	V _{CC} = 5 V, See Note 5			0.2	μs
		RESET				3.5	
t _f	Fall time	RESET	V _{CC} = 5 V, See Note 5			3.5	μs
		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-kΩ load resistor at RESET and RESET.



PARAMETER MEASUREMENT INFORMATION

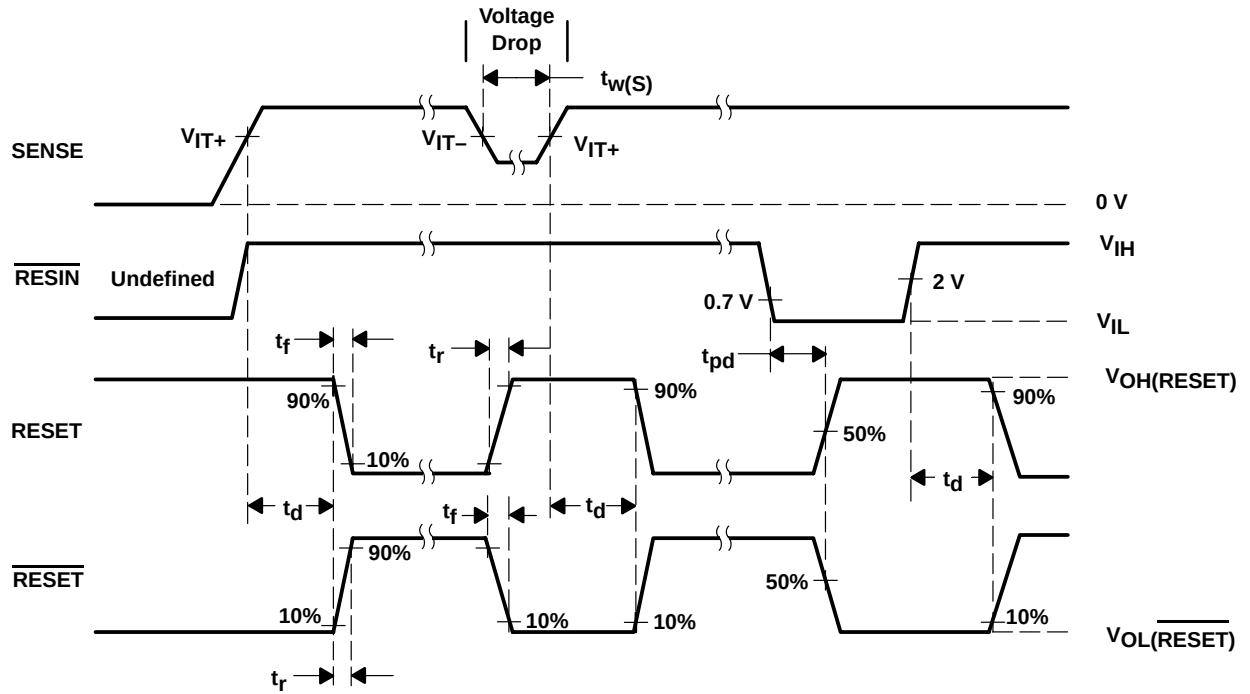
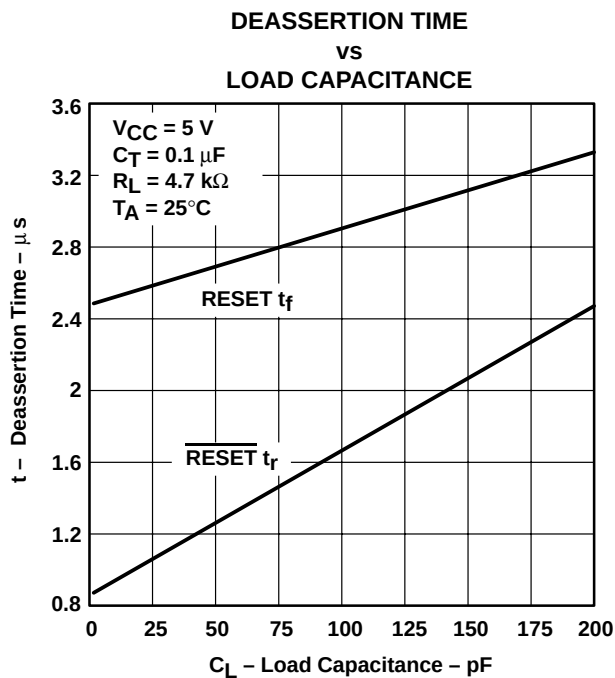
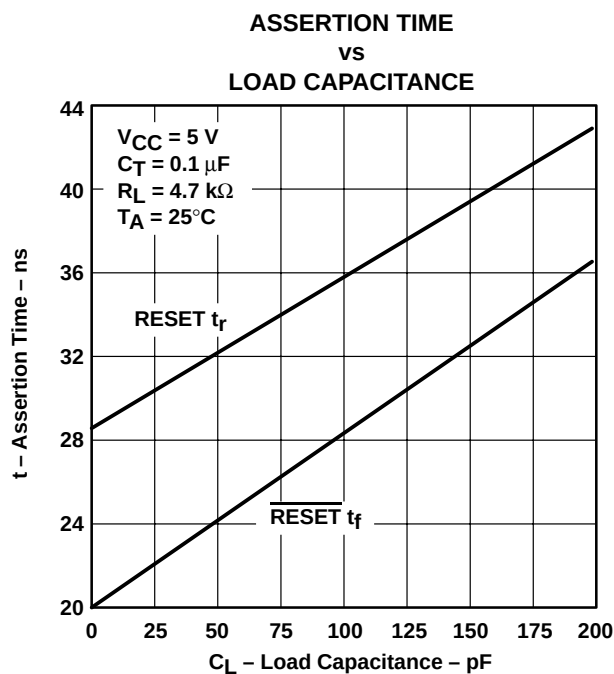
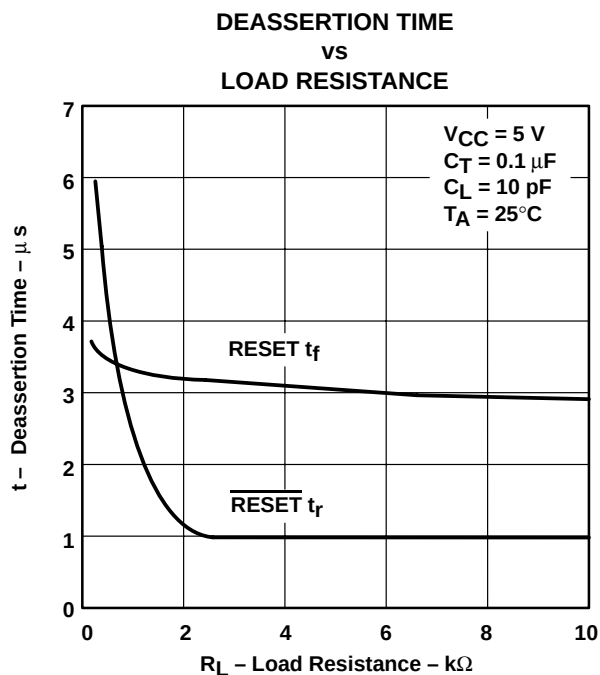
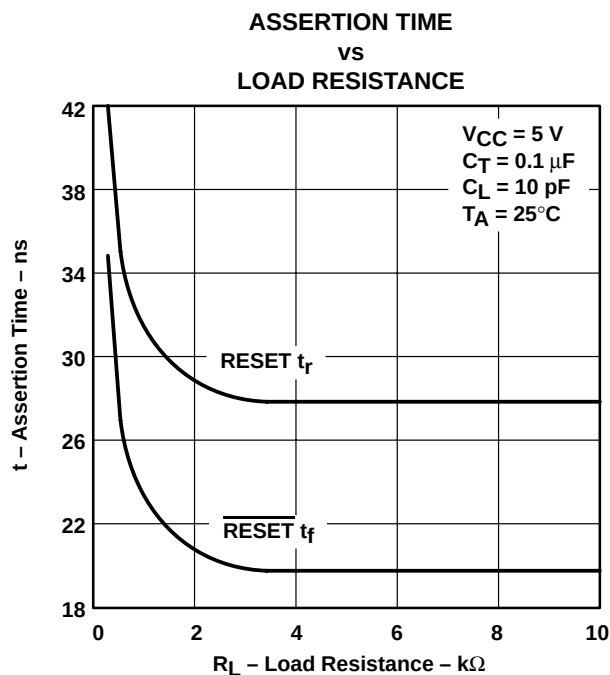


Figure 1. Voltage Waveforms

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

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TYPICAL CHARACTERISTICS†



† 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

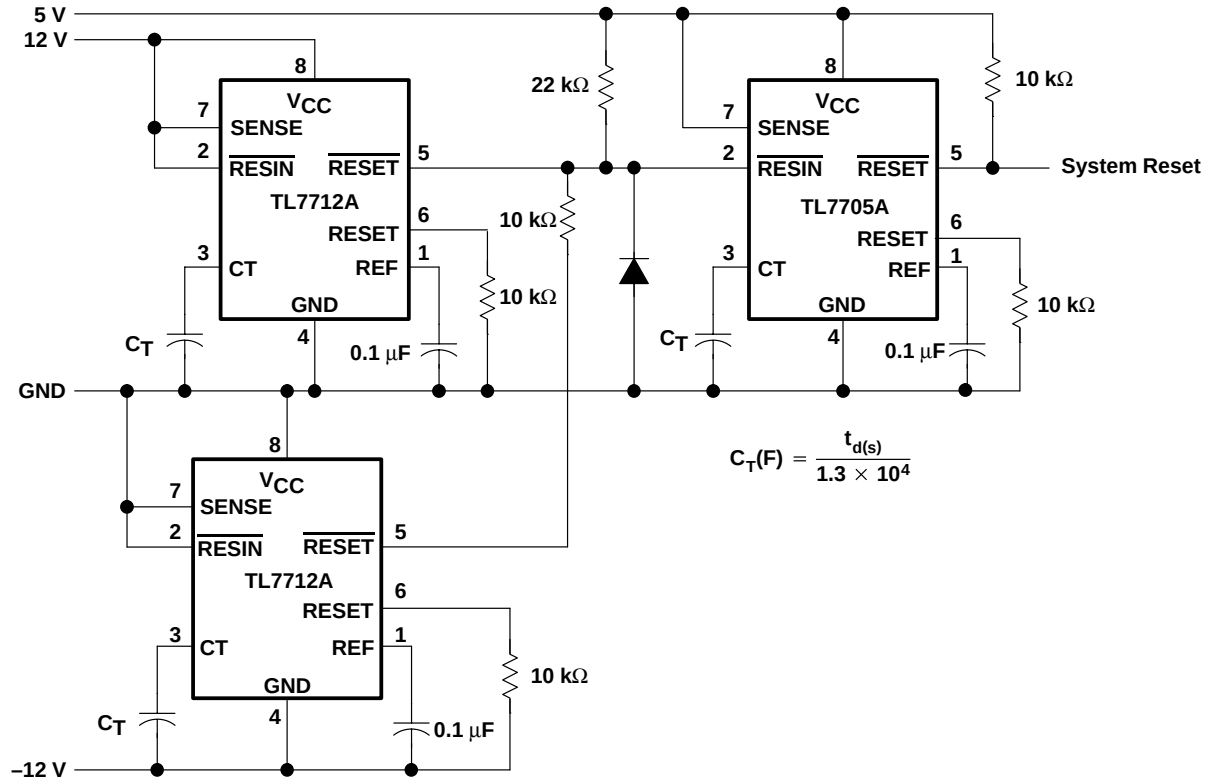


Figure 6. Multiple Power-Supply System Reset Generation

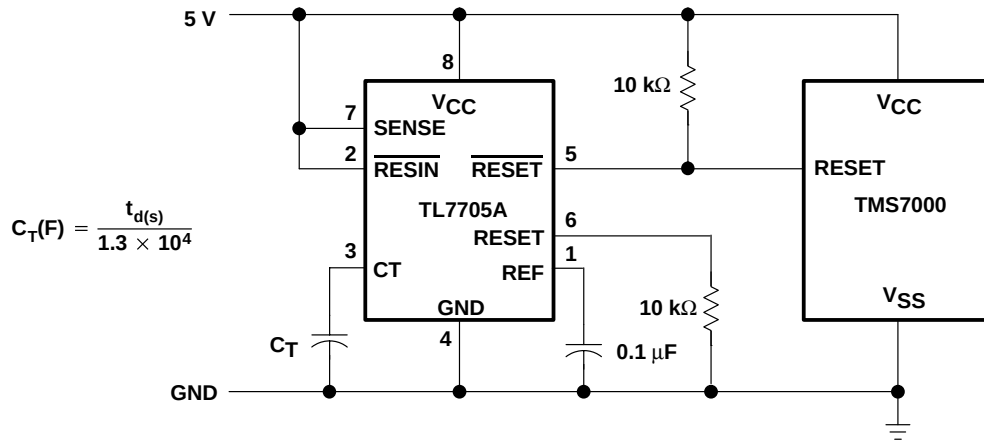


Figure 7. Reset Controller for TMS7000 System

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

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APPLICATION INFORMATION

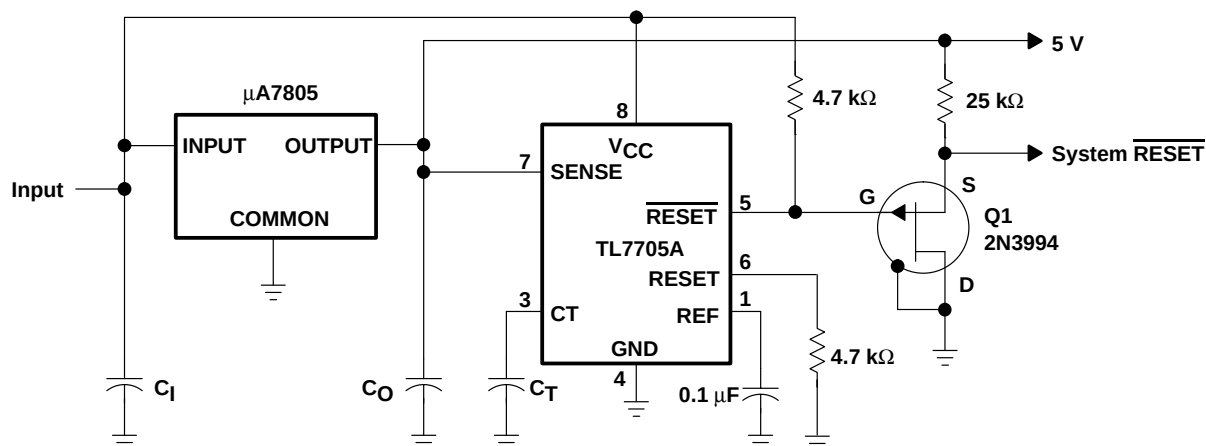


Figure 8. Eliminating Undefined States Using a P-Channel JFET

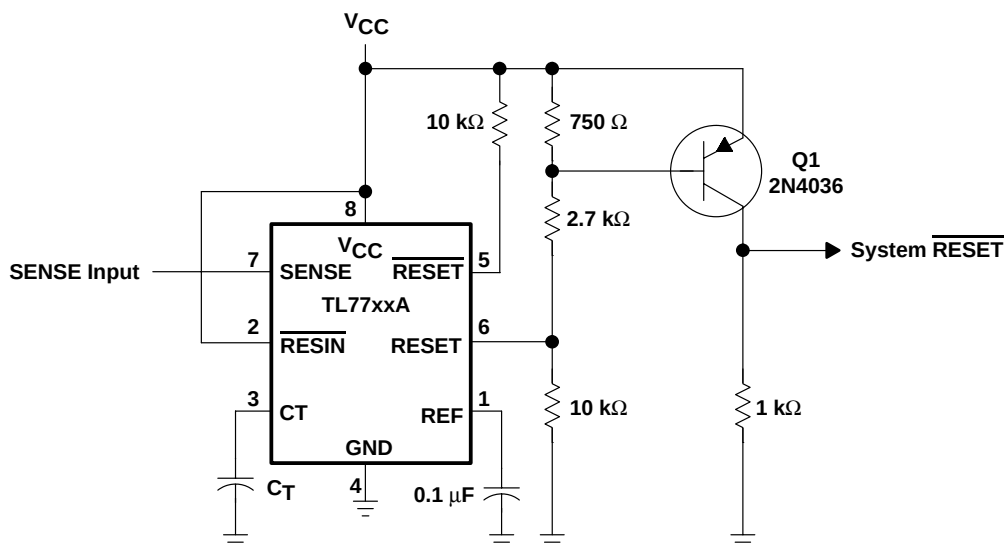


Figure 9. Eliminating Undefined States Using a pnp Transistor

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