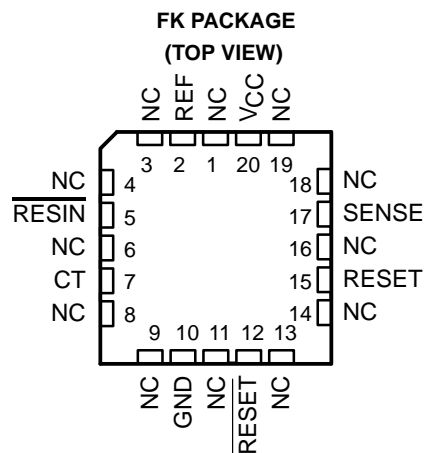
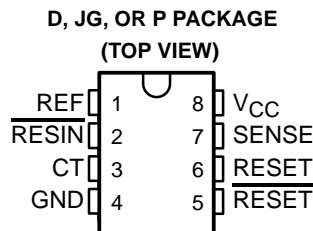


TL7702A, TL7705A, TL7709A, TL7712A, TL7715A TL7702AY, TL7705AY, TL7709AY, TL7712AY, TL7715AY SUPPLY VOLTAGE SUPERVISORS

SLVS028C – APRIL 1983 – REVISED AUGUST 1995

- 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



NC – No internal connection

description

The TL77xxA family of monolithic integrated circuit supply voltage supervisors are specifically designed for use as reset controllers in micro-computer 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, outputs $\overline{\text{RESET}}$ 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 (assuming that SENSE is below V_{IT-}), the outputs remain active until the V_{CC} falls below a maximum of 2 V. After this, the outputs are undefined.

An external capacitor (typically 0.1 μF for the TL77xxAC and TL77xxAI and typically 0.02 μF for the TL77xxAM) must be connected to REF to reduce the influence of fast transients in the supply voltage.

The TL77xxAC series are characterized for operation from 0°C to 70°C. The TL77xxAI series are characterized for operation from –40°C to 85°C. The TL7702AM and TL7705AM are characterized for operation over the full military range of –55°C to 125°C.

AVAILABLE OPTIONS

T _A	PACKAGED DEVICES				CHIP FORM (Y)
	SMALL OUTLINE (D)	CHIP CARRIER (FK)	CERAMIC DIP (JG)	PLASTIC DIP (P)	
0°C to 70°C	TL7702ACD – TL7715ACD			TL7702ACP – TL7715ACP	TL7702ACY – TL7715ACY
–40°C to 85°C	TL7702AID – TL7715AID			TL7702AIP – TL7715AIP	
–55°C to 125°C		TL7702AMFK TL7705AMFK	TL7702AMJG TL7705AMJG		

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.



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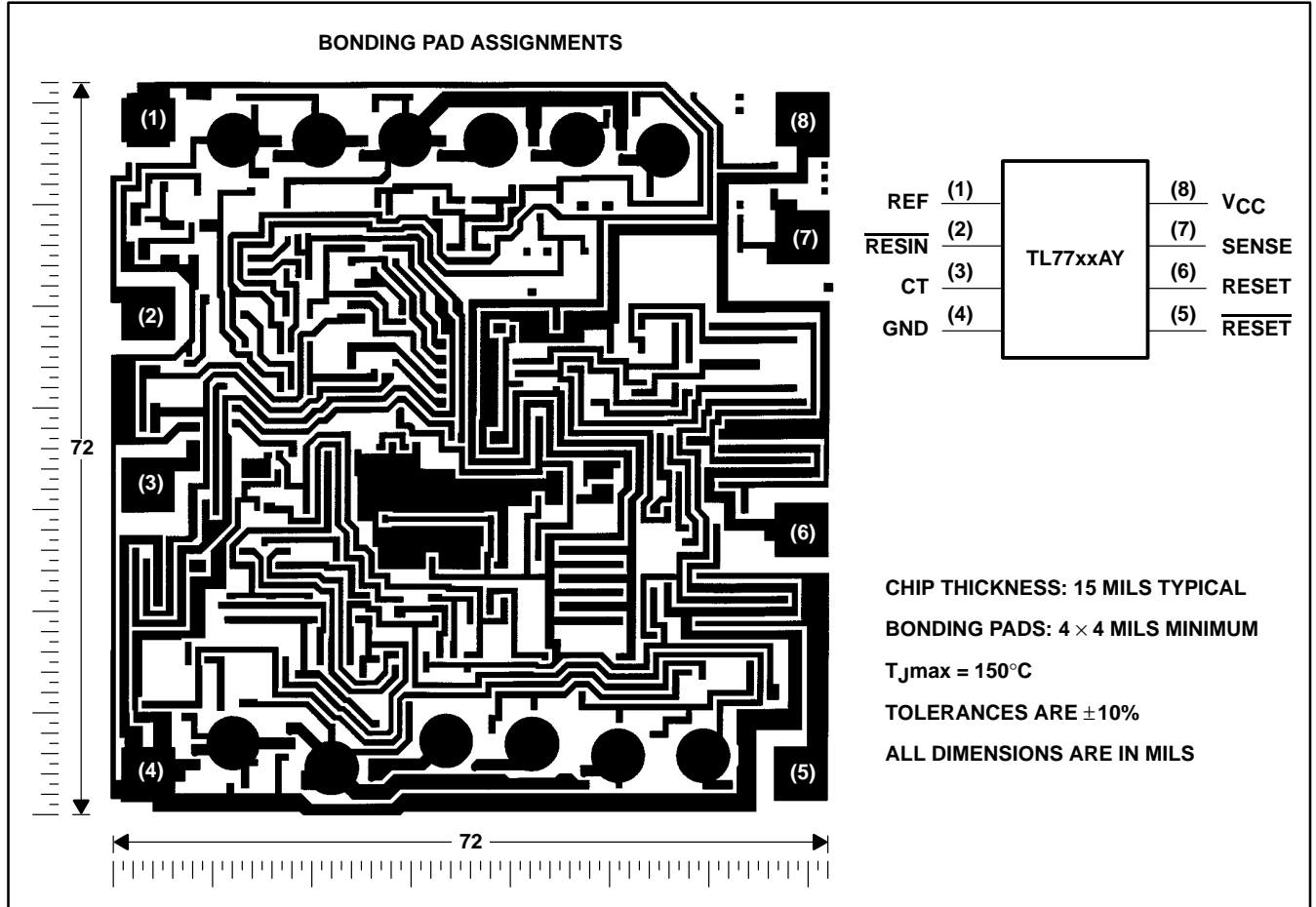
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On products compliant to MIL-STD-883, Class B, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

TL7702A, TL7705A, TL7709A, TL7712A, TL7715A
 TL7702AY, TL7705AY, TL7709AY, TL7712AY, TL7715AY
SUPPLY VOLTAGE SUPERVISORS

SLVS028C – APRIL 1983 – REVISED AUGUST 1995

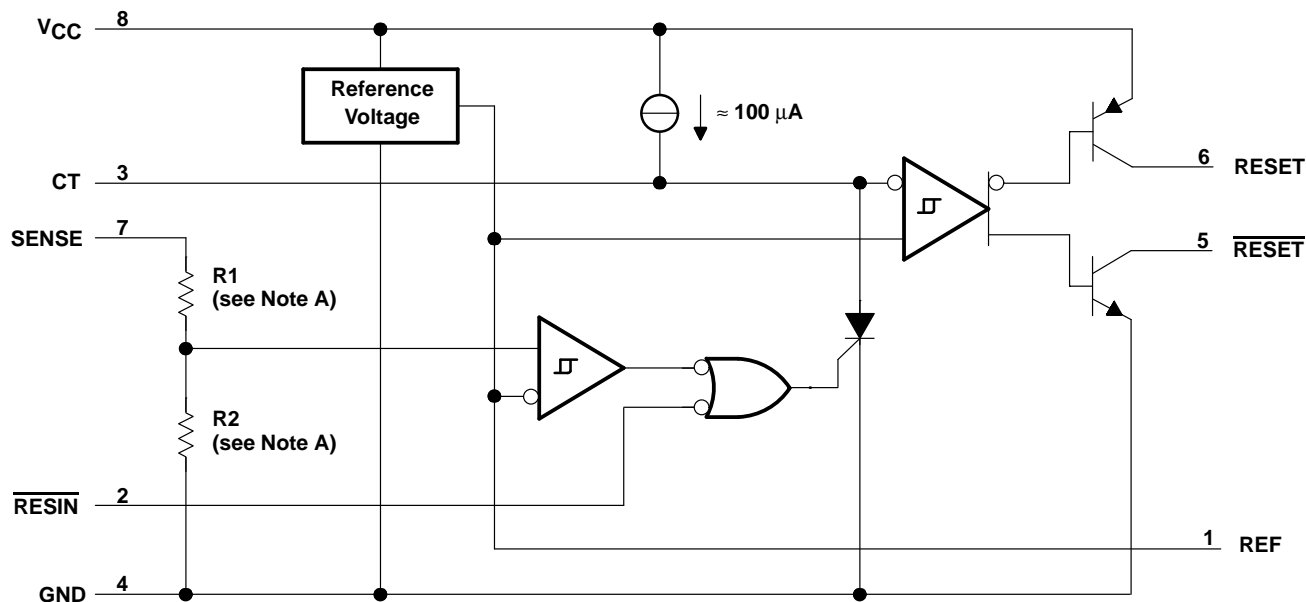
TL77xxAY chip information

This chip, when properly assembled, displays characteristics similar to the TL77xxAC. Thermal compression or ultrasonic bonding may be used on the doped aluminum bonding pads. The chips may be mounted with conductive epoxy or a gold-silicon preform.



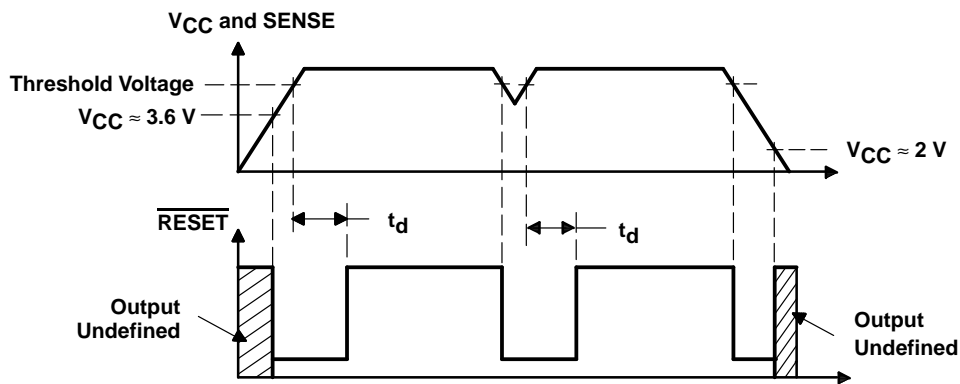
functional block diagram

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 kΩ, R2 = 10 kΩ
 TL7709A: R1 = 19.7 kΩ, R2 = 10 kΩ
 TL7712A: R1 = 32.7 kΩ, R2 = 10 kΩ
 TL7715A: R1 = 43.4 kΩ, R2 = 10 kΩ
 B. Terminal numbers shown are for the D, JG, or P package.
 C. Resistor values shown are nominal.

timing diagram



TL7702A, TL7705A, TL7709A, TL7712A, TL7715A
TL7702AY, TL7705AY, TL7709AY, TL7712AY, TL7715AY
SUPPLY VOLTAGE SUPERVISORS
 SLVS028C – APRIL 1983 – REVISED AUGUST 1995

electrical characteristics over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITIONS†	TL77xxAC, TL77xxAI			UNIT	
			MIN	TYP	MAX		
V_{OH}	High-level output voltage, $\overline{\text{RESET}}$	$I_{OH} = -16 \text{ mA}$	$V_{CC} - 1.5$			V	
V_{OL}	Low-level output voltage, $\overline{\text{RESET}}$	$I_{OL} = 16 \text{ mA}$	0.4			V	
V_{ref}	Reference voltage	$T_A = 25^\circ\text{C}$	2.48	2.53	2.58	V	
V_{IT-}	Negative-going input threshold voltage, SENSE	$T_A = 25^\circ\text{C}$	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 ($V_{IT+} - V_{IT-}$)	$T_A = 25^\circ\text{C}$	TL7702A	10		mV	
			TL7705A	15			
			TL7709A	20			
			TL7712A	35			
			TL7715A	45			
I_I	Input current, $\overline{\text{RESIN}}$	$V_I = 2.4 \text{ V to } V_{CC}$	20			μA	
		$V_I = 0.4 \text{ V}$	-100				
I_I	Input current, SENSE	TL7702A	$V_{ref} < V_I < V_{CC} - 1.5 \text{ V}$		0.5	2	μA
I_{OH}	High-level output current, $\overline{\text{RESET}}$	$V_O = 18 \text{ V}$	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	μs
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 from $\overline{\text{RESIN}}$ to $\overline{\text{RESET}}$	$V_{CC} = 5 \text{ V}$	1			μs
t_r	$\overline{\text{RESET}}$	$V_{CC} = 5 \text{ V}$, See Note 3	0.2			μs
	$\overline{\text{RESET}}$		3.5			
t_f	$\overline{\text{RESET}}$		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 3: The rise and fall times are measured with a 4.7-k Ω load resistor at $\overline{\text{RESET}}$ and $\overline{\text{RESET}}$.

TL7702A, TL7705A, TL7709A, TL7712A, TL7715A
 TL7702AY, TL7705AY, TL7709AY, TL7712AY, TL7715AY
SUPPLY VOLTAGE SUPERVISORS

SLVS028C – APRIL 1983 – REVISED AUGUST 1995

electrical characteristics over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITIONS†	TL7702AM, TL7705AM			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, $\overline{\text{RESET}}$	I _{OL} = 16 mA	0.4			V	
V _{ref}	Reference voltage		2.38	2.53	2.63	V	
V _{IT-}	Negative-going input threshold voltage, SENSE	V _{CC} = 3.6 V to 10 V	TL7702AM	2.38	2.53	2.63	V
			TL7705AM	4.25	4.55	4.7	
V _{hys}	Hysteresis SENSE (V _{IT+} - V _{IT-})	V _{CC} = 3.6 V to 10 V	TL7702AM	10		mV	
			TL7705AM	15			
I _I	Input current, $\overline{\text{RESIN}}$	V _I = 2.4 V to V _{CC}	20			μA	
		V _I = 0.4 V	-100				
I _I	Input current, SENSE	TL7702AM	V _{ref} < V _I < V _{CC} - 1.5 V	0.5	2	μA	
I _{OH}	High-level output current, $\overline{\text{RESET}}$	V _O = 10 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 0.02-μF capacitors connected at REF, CT, and V_{CC} to GND.

switching characteristics over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITIONS‡	TL7702AM, TL7705AM			UNIT
			MIN	TYP	MAX	
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, $\overline{\text{RESIN}}$ to $\overline{\text{RESET}}$	V _{CC} = 5 V	1.5			μs
t _r	RESET	V _{CC} = 5 V, See Note 3	0.2*			μs
	$\overline{\text{RESET}}$		3.5*			
t _f	RESET		3.5*			μs
	$\overline{\text{RESET}}$		0.2*			

* On products compliant to MIL-STD-883, Class B, this parameter is not production tested.

‡ All switching characteristics are measured with 0.02-μF capacitors connected at REF and V_{CC} to GND.

NOTE 3: The rise and fall times are measured with a 4.7-kΩ load resistor at $\overline{\text{RESET}}$ and RESET.



TL7702A, TL7705A, TL7709A, TL7712A, TL7715A
 TL7702AY, TL7705AY, TL7709AY, TL7712AY, TL7715AY
SUPPLY VOLTAGE SUPERVISORS
 SLVS028C – APRIL 1983 – REVISED AUGUST 1995

electrical characteristics over recommended operating conditions, $T_A = 25^\circ\text{C}$ (unless otherwise noted)

PARAMETER		TEST CONDITIONS†	TL77xxAY			UNIT
			MIN	TYP	MAX	
V_{ref}	Reference voltage			2.53		V
$V_{\text{IT-}}$	Negative-going input threshold voltage, SENSE		TL7702A	2.53		V
			TL7705A	4.55		
			TL7709A	7.6		
			TL7712A	10.8		
			TL7715A	13.5		
V_{hys}	Hysteresis, SENSE ($V_{\text{IT+}} - V_{\text{IT-}}$)		TL7702A	10		mV
			TL7705A	15		
			TL7709A	20		
			TL7712A	35		
			TL7715A	45		
I_{I}	Input current, SENSE	TL7702A	$V_{\text{ref}} < V_{\text{I}} < V_{\text{CC}} - 1.5\text{ V}$	0.5		μA
I_{CC}	Supply current		All inputs and outputs open	1.8		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, $T_A = 25^\circ\text{C}$ (unless otherwise noted)

PARAMETER		TEST CONDITIONS‡	TL77xxAY			UNIT
			MIN	TYP	MAX	
	Output pulse duration	$C_{\text{T}} = 0.1\ \mu\text{F}$		1.2		μs

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

PARAMETER MEASUREMENT INFORMATION

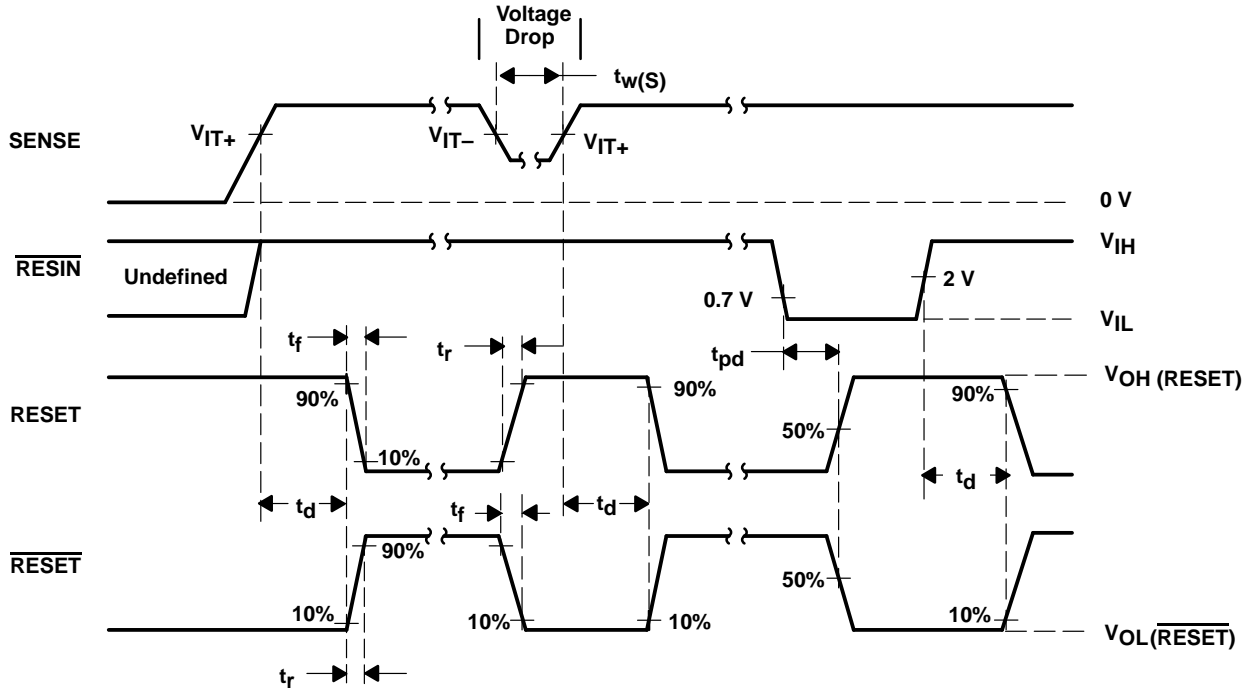


Figure 1. Voltage Waveforms

TYPICAL CHARACTERISTICS†

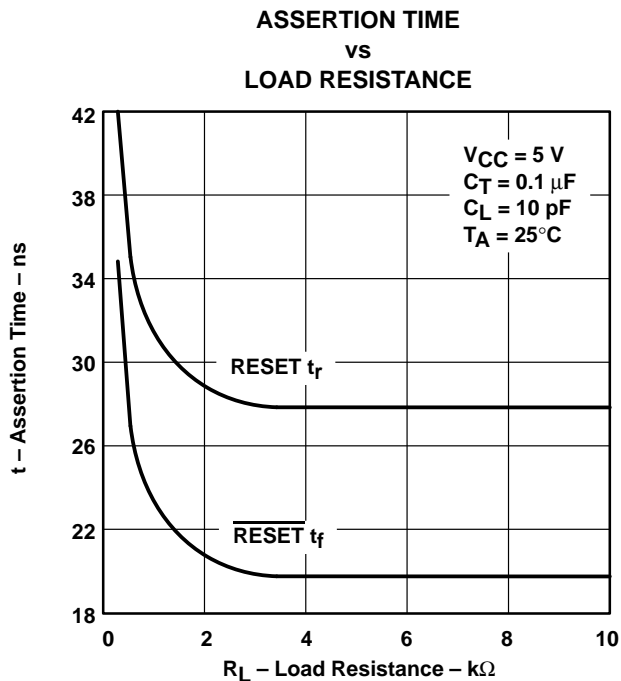


Figure 2

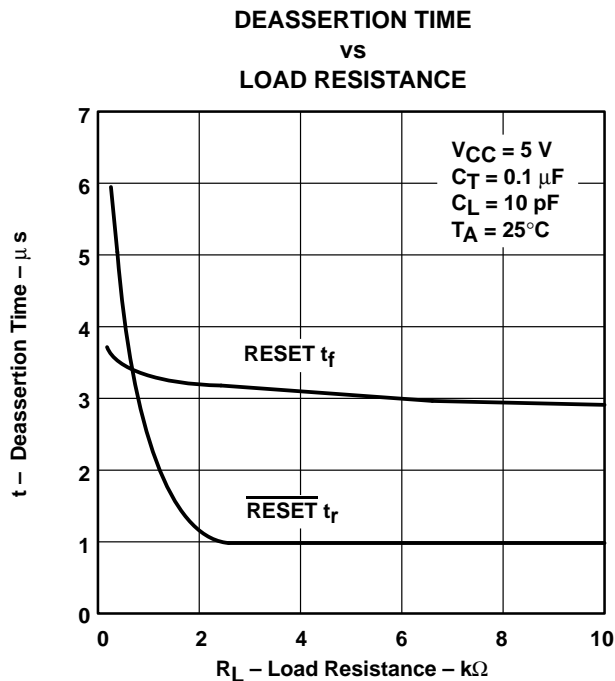


Figure 3

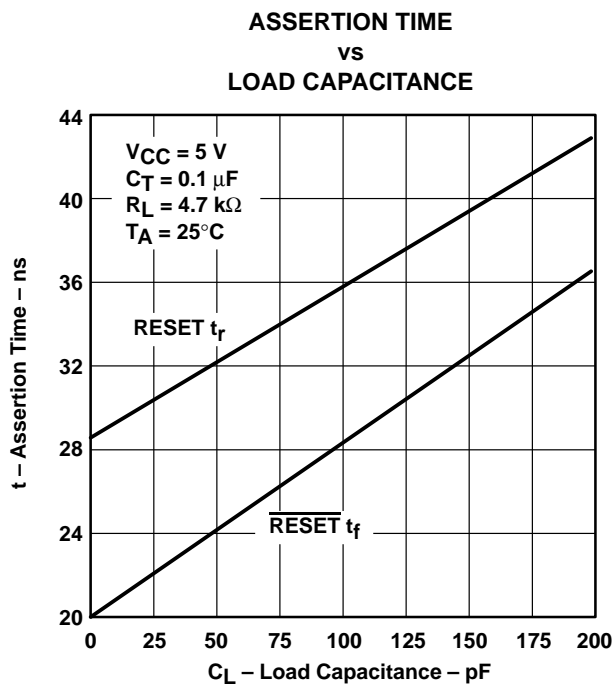


Figure 4

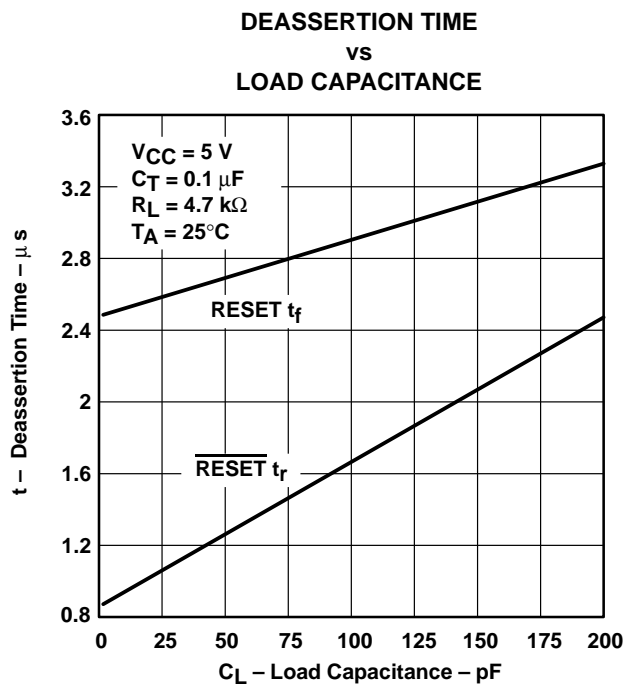


Figure 5

† 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

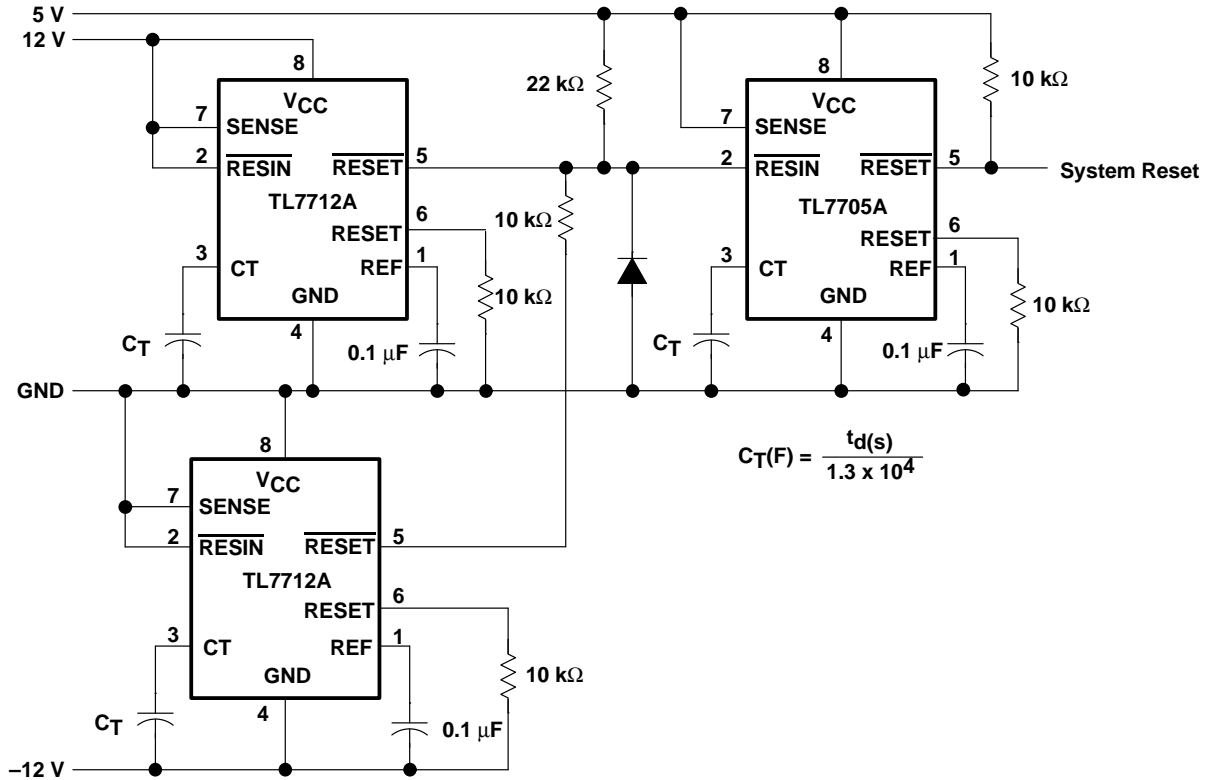


Figure 6. Multiple Power Supply System Reset Generation

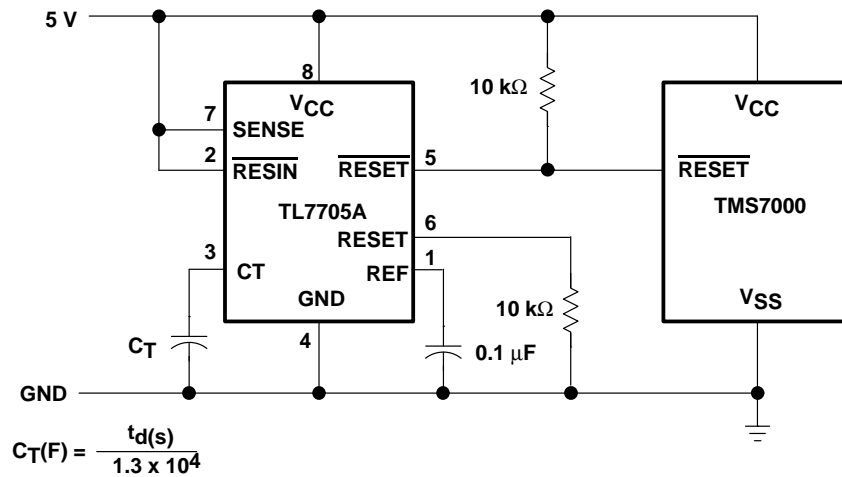


Figure 7. Reset Controller for TMS7000 System

Terminal numbers shown are for the D, JG, and P packages.

APPLICATION INFORMATION

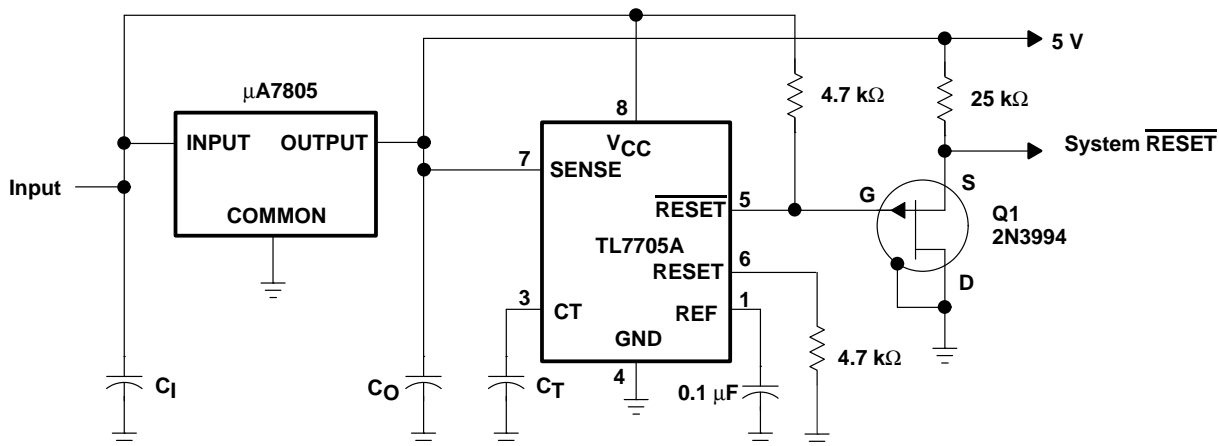


Figure 8. Eliminating Undefined States Using a P-Channel JFET

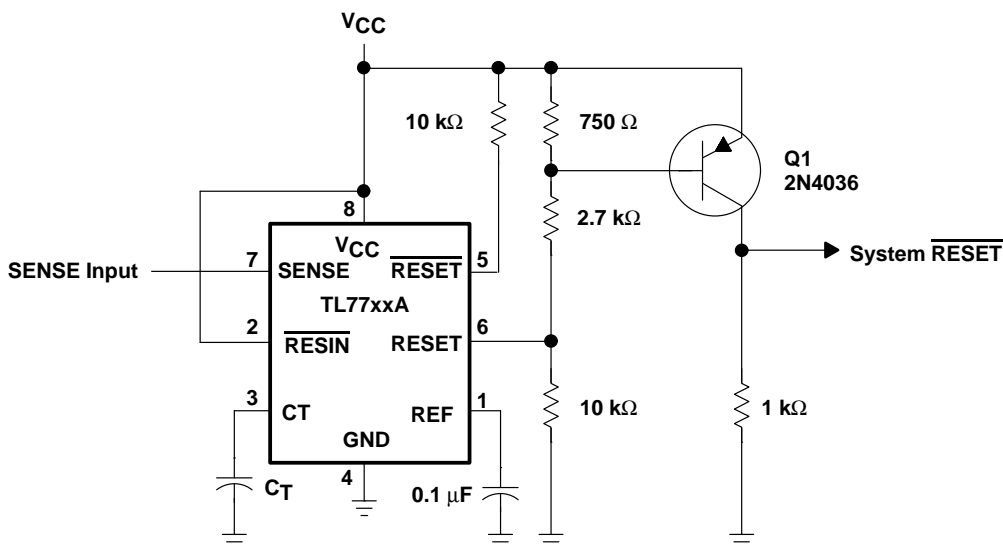


Figure 9. Eliminating Undefined States Using a pnp Transistor

Terminal numbers shown are for the D, JG, and P packages.

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