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System Reset (with battery back-up)
Monolithic IC PST620, 621

Outline

These ICs are part of the regular series of back-up ICs, and use capacitors (super capacitor, large capacity chemical capacitor) as back-up power supply. They control 1-chip microcomputer high-speed, low-speed, and stand-by modes (MNI control).
These ICs also are capable of controlling data save in EPROM and other nonvolatile memories during power outage.

Features

1. Low current consumption
2. Capacitors (super capacitor, large capacity chemical capacitor) are used for back-up power supply, lowering system cost
3. Stable 1-chip microcomputer crystal oscillator rise time maintained with the built-in pulse shaver.
4. In addition to power outage detection for main power supply (+5V), there are built-in pins to detect AC power supply and +5V power supply primary side
5. Reset signal output by back-up power supply (super capacitor, large capacity chemical capacitor) detection

Package

DIP-8B (PST620DDB, PST621DDB)
SOP-8C (PST620DFT, PST621DFT)

Applications

1. VCR
2. Audio equipment
3. Communications equipment
4. Rice cookers, etc.

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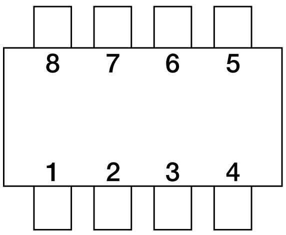
Pin Assignment



Pin Description

PST620

Pin No.	Pin name	Function
1	V_{AC}	Has +2.0V detection voltage to detect AC power supply and stable power supply primary side, for quick power outage detection.
2	V_{CC1}	+5V main power supply
3	V_{CC2}	Back-up power supply (back-up capacitor connected)
4	TC	Pulse width setting pin for pulse shaver (capacitor and resistor connected)
5	$\overline{RE}$	Reset output
6	PS_{CONT}	Pulse shaver ON/OFF switching High : OFF Low : ON
7	CE	Chip enable signal output
8	GND	GND

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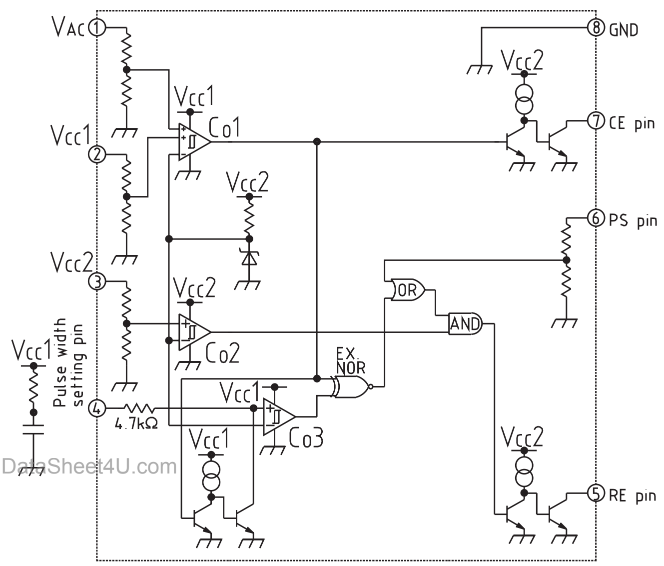
PST621

Pin No.	Pin name	Function
1	VAC	Has +2.0V detection voltage to detect AC power supply and stable power supply primary side, for quick power outage detection.
2	Vcc1	+5V main power supply
3	Vcc2	Back-up power supply (back-up capacitor connected)
4	Tc	Pulse width setting pin for pulse shaver (capacitor and resistor connected)
5	$\overline{RE}$	Reset output
6	MODE	Switches 1-chip microcomputer mode with pulse shaver output signal
7	CE	Chip enable signal output (power outage detection signal)
8	GND	GND

Block Diagram

PST620



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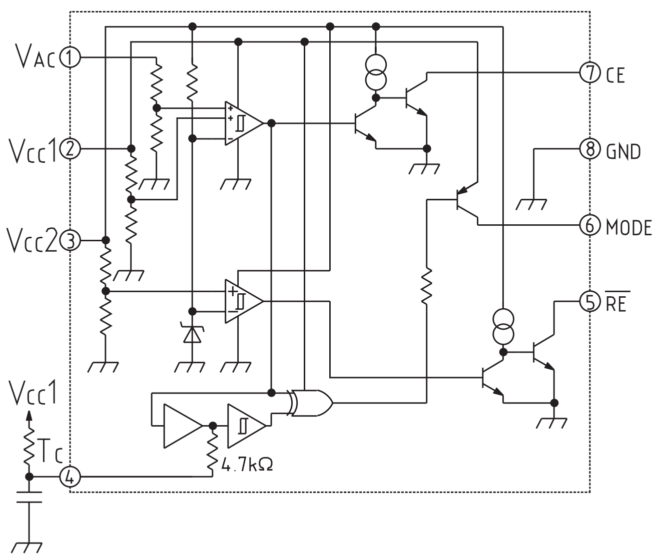
PST621



Absolute Maximum Ratings (Ta=25℃)

Item	Symbol	Rating
Storage temperature	TSTG	-40~+125℃
Operating temperature	TOPR	-20~+70℃
Power supply voltage	Vcc max.	-0.3~+10V
TC input input voltage	Vc max.	Vcc1+0.3V
Allowable loss	Pd	450mW

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Electrical Characteristics (Ta=25°C)

Item		Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Detection voltage 1		V_{S1}	R_{L1}=47kΩ CE output, V_{CC1}=L→H ∗1	4.00	4.20	4.40	V
Detection voltage 2	PST620	V_{S2}	R_{L2}=47kΩ, RE output V_{CC2}=H→L ∗1	2.00	2.15	2.30	
	PST621			2.90	3.10	3.30	
Detection voltage 3		V_{S3}	R_{L1}=47kΩ, CE output, V_{AC}=H→L ∗1	1.85	2.00	2.15	
Hysteresis voltage 1		ΔV_{S1}	R_{L1}=47kΩ, CE output, V_{CC1}=L→H→L	75	150	300	mV
Hysteresis voltage 2		ΔV_{S2}	R_{L2}=47kΩ, CE output, V_{CC2}=L→H→L	25	50	100	
Hysteresis voltage 3		ΔV_{S3}	R_{L1}=47kΩCE output, V_{AC}=L→H→L	45	90	180	
Detection voltage temperature coefficient 1		$V_S/\Delta T$	R_{L1}=47kΩ, CE output		±0.01		%/℃
Detection voltage temperature coefficient 2		$V_S/\Delta T$	R_{L2}=47kΩ, RE output		±0.02		
Detection voltage temperature coefficient 3		$V_S/\Delta T$	R_{L1}=47kΩ, CE output		±0.01		
Low-level output voltage 1		V_{OL1}	V_{CC1}=V_{S1} min.–0.05V, R_{L1}=47kΩ CE output		0.1	0.2	V
Low-level output voltage 2		V_{OL2}	V_{CC2}=V_{S2} min.–0.05V, R_{L2}=47kzΩ RE output		0.1	0.4	
Low-level output voltage 3		V_{OL3}	V_{CC1}=0V, V_{CC2}=V_{S2} typ./0.85 R_{L1}=47kΩ, CE output		0.2	0.4	
Operation limit voltage 1		V_{OP1}	R_{L1}=47kΩ, V_{OL1} ≦ 0.4V CE output		0.8	1.0	V
Operation limit voltage 2		V_{OP2}	R_{L2}=47kΩ, V_{OL2} ≦ 0.4V RE output		0.8	1.0	
Consumption current 1		I_{CC1}	V_{CC1}=V_{CC2}=V_{S1}/0.85		5.0	8.5	μA
		I_{CC2}	R_{L1}=R_{L2}=∞		2.0	3.5	
Consumption current 2		I_{CC1}	V_{CC1}=V_{CC2}=V_{S1} min.–0.05V		8.0	14.5	
		I_{CC2}	R_{L1}=R_{L2}=∞		2.0	3.5	
Consumption current 3		I_{CC1}	V_{CC1}=V_{CC2}=V_{S2} min.–0.05V		8.0	14.5	
		I_{CC2}	R_{L1}=R_{L2}=∞		4.0	7.0	
Consumption current 4		I_{CC2}	V_{CC1}=0V R_{L1}=R_{L2}=∞, V_{CC2}=V_{S1T} typ./0.85		2.0	3.5	μA
Consumption current 5		I_{CC2}	V_{CC1}=0V R_{L1}=R_{L2}=∞ V_{CC2}=V_{S2} min.–0.05V		4.0	7.0	
Output current while on 1		I_{OL1}	V_{CC1}=V_{S1} min.–0.05V, R_{L1}=0 CE output	2			mA
Output current while on 2		I_{OL2}	V_{CC2}=V_{S2} min.–0.05V, R_{L2}=0 RE output	2			
Transport delay time 1		T_{PLH1}	V_{CC1}=V_{S1} typ.±0.4V, R_{L2}=47kΩ CE output		10		μS
Transport delay time 2		T_{PLH2}	V_{CC2}=V_{S2} typ.±0.4V, R_{L2}=47kΩ RE output		50		
Transport delay time 3		T_{PLH3}	V_{CC1}=V_{S1} typ.±0.4V, R_{L2}=47kΩ CE output		40		
Transport delay time 4		T_{PLH4}	V_{CC2}=V_{S2} typ.±0.4V, R_{L2}=47kΩ RE output		80		
AC pin input resistance		R_{ACIN}		0.5	1.0		MΩ
One-shot pulse width		T_{pd}	Cd=0.47μF Rd=100k, V_{CC1}=V_{S1} typ.±0.4V	6	14	21	mS
One-shot output voltage		V_{TOL}	V_{CC1}=V_{S1} typ./0.85, R_{L1}=47kΩ RE output, ∗1		0.1	0.4	V
TC pin threshold voltage		V_{CTH}	R_{L1}=47kΩ, V_C=L→H		2.0		V
TC input input current		I_{CIN}	V_{CC1}=V_{S1} typ./0.85, VC=5.0V			1	μA
PS pin input H level voltage		V_{PSH}		2.0			V
PS pin input L level voltage		V_{PSL}				0.6	V
PS pin input H level current		I_{PSH}	V_{PSH}=2.0V			10	μA

Note 1 : ∗1 Connect TC pin to GND.
Note 2 : Except where noted otherwise, VAC=5V, Vc=OPEN.

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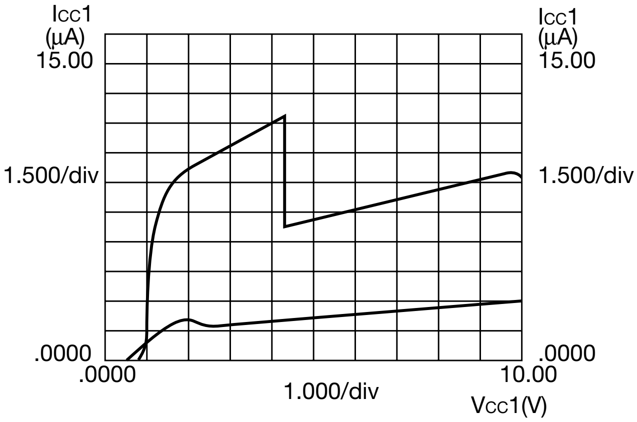
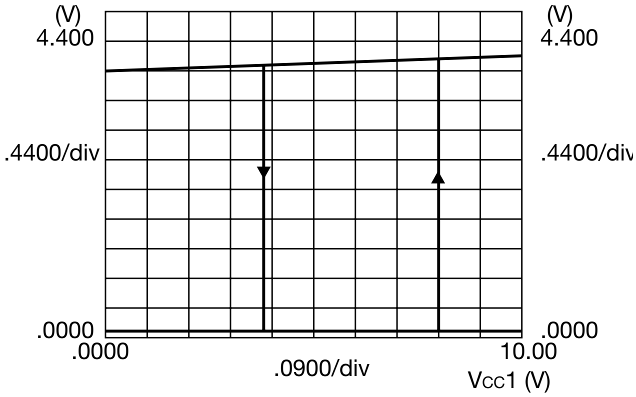
Characteristics (PST620, 621 series. However, VS2 in PST620 series only.)

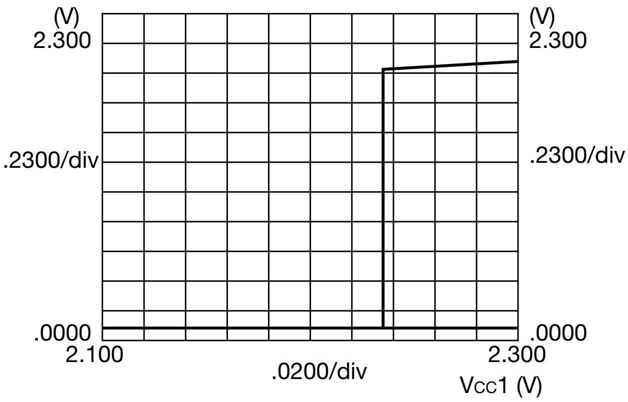
Current consumption



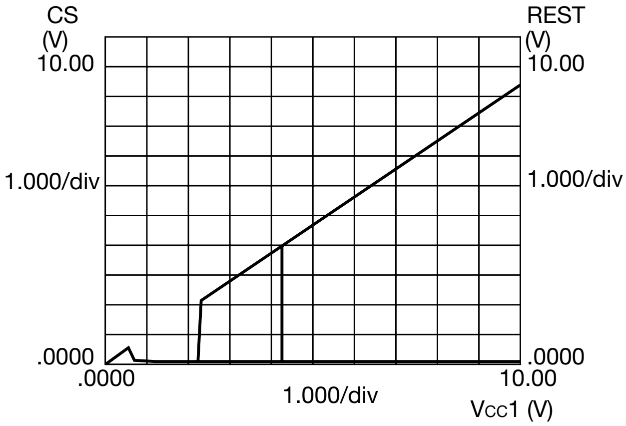
Vs1



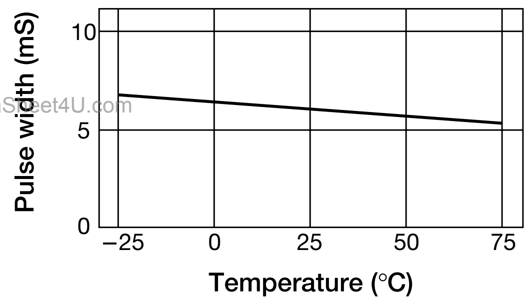
Vs2



VOL



1 shot pulse width-Temperature



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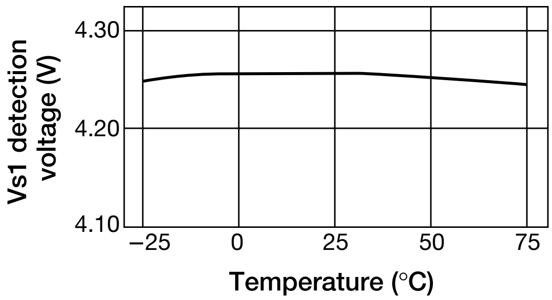
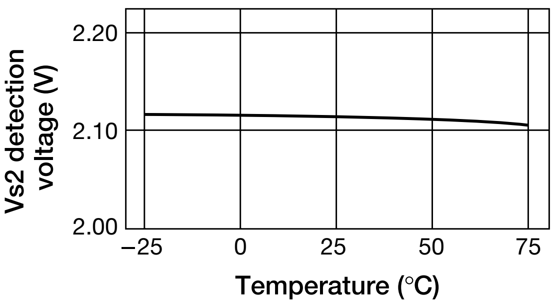
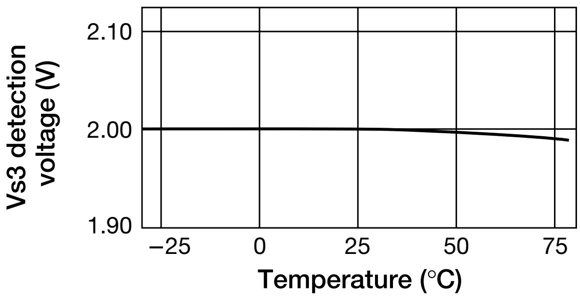
Vs1 detection voltage-Temperature



Vs2 detection voltage-Temperature



Vs3 detection voltage-Temperature



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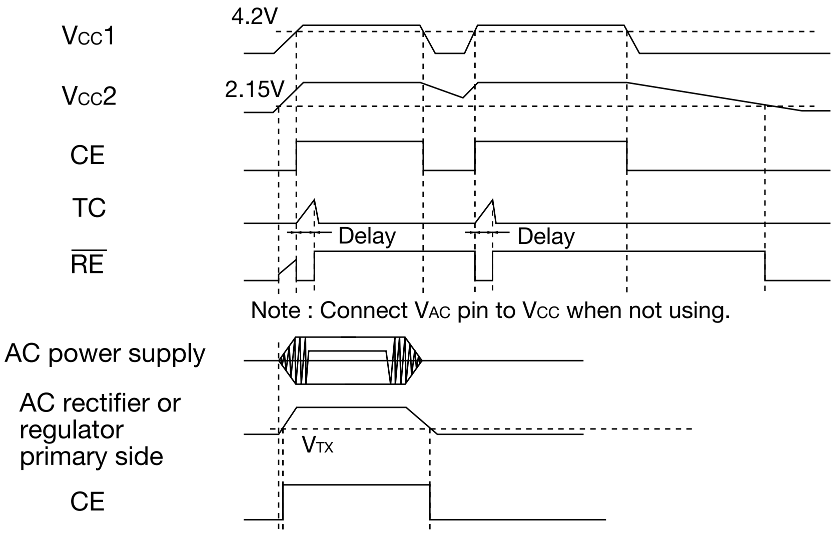
Timing Chart

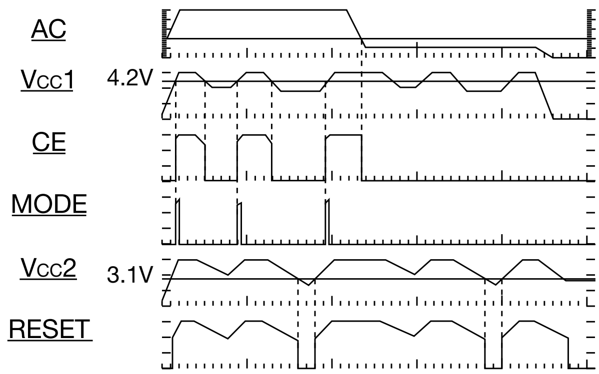
PST620



Note 1: VTH is set at 2.0V and hysteresis voltage at 90mV.
1. Use a resistor to divide the detected voltage so that it equals V_{TH} when monitoring regulator primary side power supply.
2. When monitoring AC voltage rectified as in the application circuit, set so that it equals V_{TH} by lowering the constant and dividing with a resistor. Refer to application circuit diagram.

Note 2: VAC input and VS1 are OR, so either signal makes CE low when power outage is detected.

PST621



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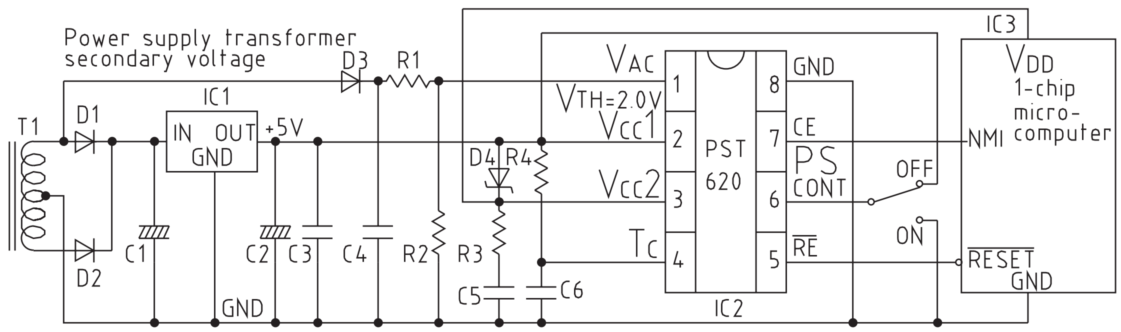
Application Circuits

V_{AC} input : Power supply transformer secondary voltage detection



D1,D2,D3 : Rectification diodes
D4 : Super capacitor charging, reverse current prevention shot key barrier diode
C1,C2 : Power supply capacitors
C3 : Bypass capacitor
C4 : Rectification capacitor
C5 : Super capacitor
C6 : 1-shot pulse width setting capacitor

R1,R2 : VAC voltage stabilizing resistors
R3 : Controls current flow to super capacitor
R4 : 1-shot pulse setting resistor
T1 : Power supply transformer
IC1 : 3 pin regulator
IC2 : PST620
IC3 : 1-chip microcomputer

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1. Connection
   1. +5V power supply to Vcc1 (Pin 2).
   2. Connect back-up capacitor to Vcc2 (Pin 3).
   3. Connect a diode between Vcc1 (Pin 2) and Vcc2 (Pin 3).
   4. Connect pulse width setting resistor and capacitor to PC (Pin 4) when using pulse shaver.
   5. RE output (Pin 5) is reset signal output and is output when Vcc is less than 2.15V.
   6. When using pulse shaver, PSCONT (Pin 6) is high level.
   7. CE output (Pin 7) is for chip enable signal and goes low when power outage is detected.
2. Theory of Operation
   1. When +5V power is supplied normally, it is charged to the back-up capacitor via a diode.
   2. The back-up capacitor starts back-up if +5V power supply voltage drops for some reason and Vcc1 goes below 4.2V, and at the same time the $\overline{CE}$ signal switches the 1-chip microcomputer to standby mode, so that it operates on low current consumption.
   3. When +5V power supply recovers and goes over 4.2V, an RE output signal of a certain width is output, and this signal resets the 1-chip microcomputer. At the same time normal mode starts and the time until crystal oscillator output stabilizes is reset.
   4. If +5V power supply does not recover, and back-up capacitor voltage goes below 2.15V, reset is carried out by the RE output signal to prevent the microcomputer from running wild.
3. Setting AC power supply power outage detection
   1. Theory of operation for detecting AC voltage
      AC voltage is rectified and smoothed by the capacitor. This voltage is divided and set at VAC input detection voltage, +2V. At this time the smoothing capacitor and dividing resistor time constants are used to set AC voltage missing waveform.
   2. VAC voltage setting (R1, R2)
      Set resistor ratio at the midpoint between R1 and R2 so that the voltage to be detected is +2V.
      Impressed AC voltage
      There is are no limitations on AC voltage as it is divided by R1 and R2 and applied to PST620.
   3. Setting time constants to detect AC voltage (C4, R1+R2)
      For impressed AC voltage of 5Vrms, and C4 and R1+R2 time constant of 60mS, set so that AC voltage detects power outage when approximately 2 waveforms are missed. The time constants can be set to detect missing AC waveforms.

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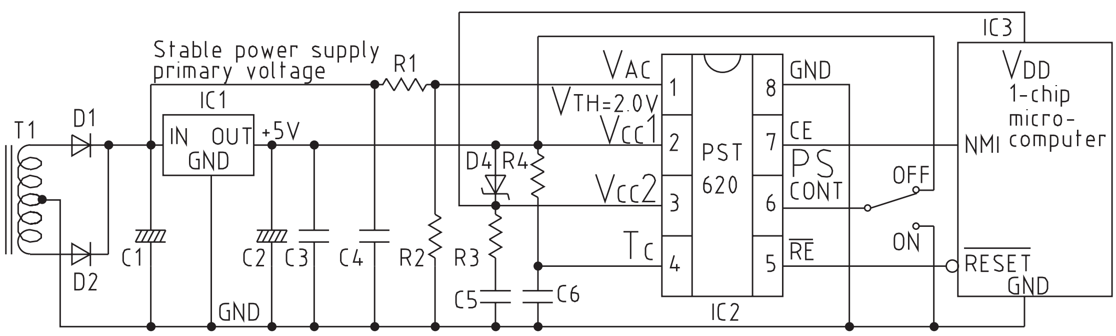
Application Circuits

VAC input : Stable power supply primary voltage detection



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