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TPAX706 Series

Supply Voltage Supervisor w/Watchdog Input and Manual Reset

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Features

- Wide Operation Voltage Range of 1V to 5.5V
- Correct Logic Output Guaranteed to V_{CC}=1.0V
- 200ms Reset Pulse Width
- Independent Watchdog Timer-1.6s Timeout
- Power-Supply Transient Immunity
- 80μA (Typ) Supply Current

Applications

- Computers
- Embedded Systems
- Industrial Equipments
- Intelligent Instruments
- Programmable Controls
- Wireless Communications Systems
- Applications Using DSPs, Microcontrollers or Microprocessors

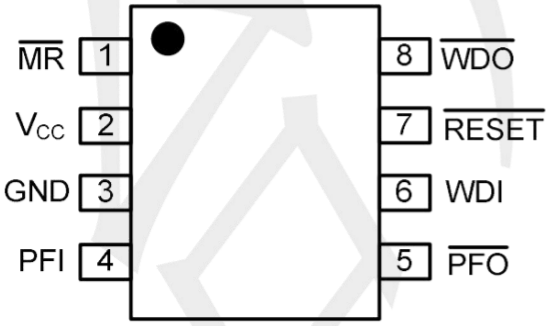
General Description

The series are cost effective system power supply supervisory circuits designed to monitor the power supplies in digital systems.

The provides power-supply monitoring circuitry that generates a reset output during power-up, power-down, and brownout conditions. The reset output remains operational with VCC as low as 1V. Independent watchdog monitoring circuitry is also provided. This is activated if the watchdog input has not been toggled within 1.6 seconds. In addition, there is a 1.25V threshold detector for power-fail warning, low battery detection, or to monitor an additional power supply. An active low debounced manual reset input is also included.

The except an active-high reset is substituted for the watchdog timer. The except $\overline{\text{RESET}}$ is provided instead of RESET. All parts are available in a small outline SOP-8 package.

Pin Definition



SOP-8

Ordering Information

TPAX706RS8

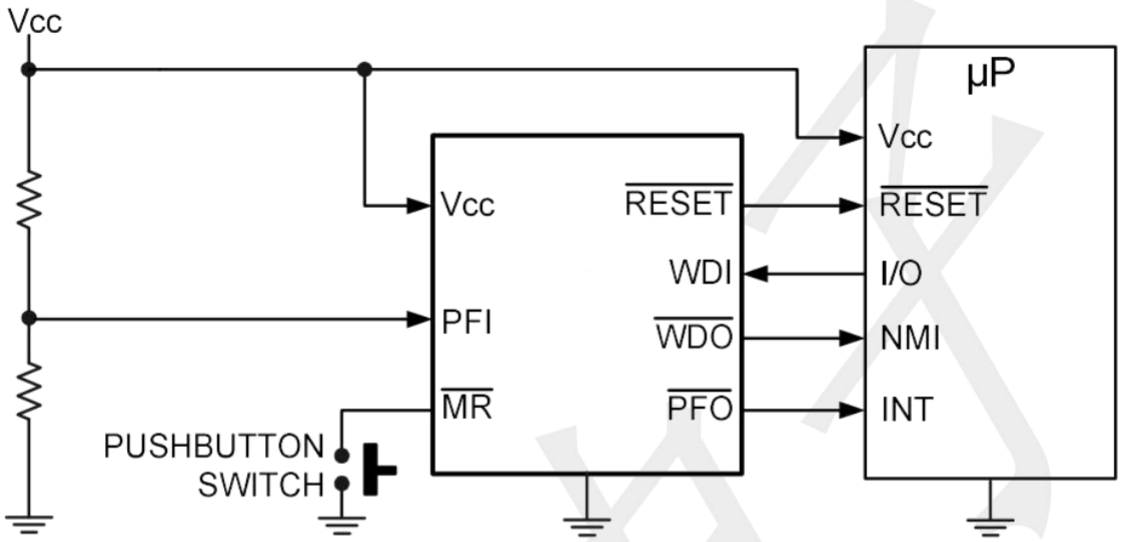
PACKAGE TYPE
S8:SOP-8

RESET VOLTAGE:
L=4.63V
M=4.38V
T=3.08V
S=2.93V
R=2.63V

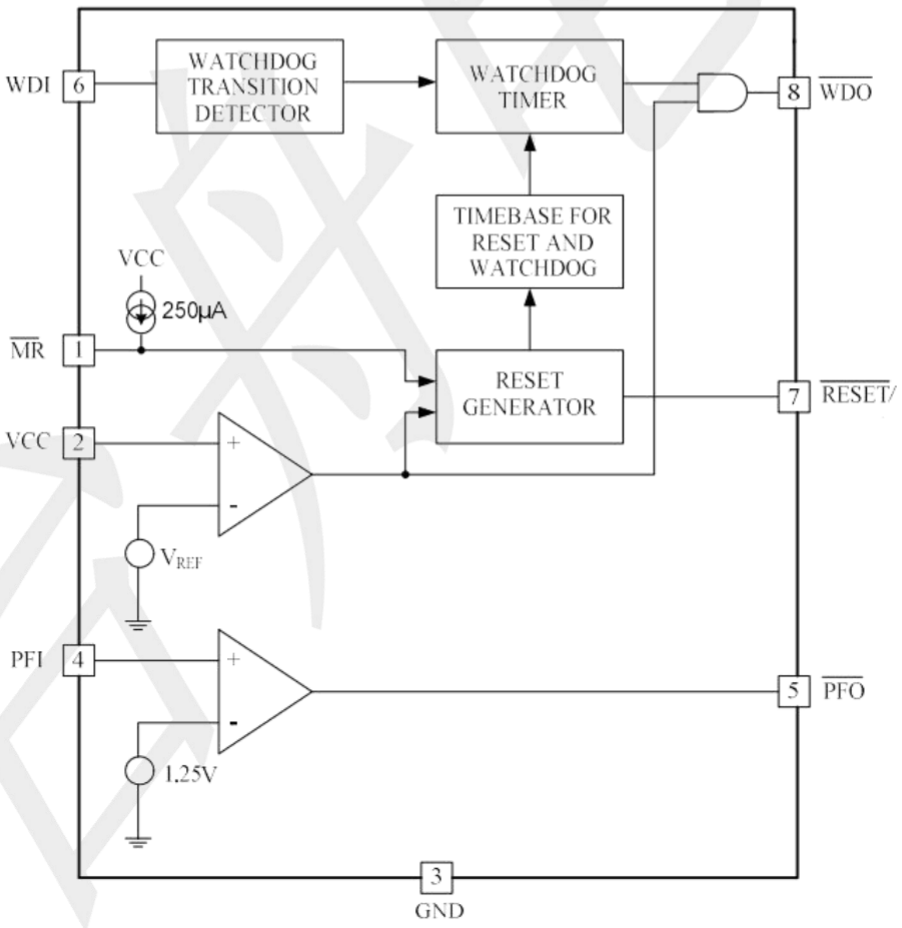
PIN CONFIGURATION

Pin Number	Pin Name	Function
1	$\overline{MR}$	Manual-Reset Input triggers a reset pulse when pulled below 0.8V. This active-low input has an internal 250μA pull-up current. It can be driven from a TTL or CMOS logic line as well as shorted to ground with a switch.
2	V_{CC}	Supply Input.
3	GND	Ground Reference for all signals.
4	PFI	Power-Fail Voltage Monitor Input. When PFI is less than 1.25V, $\overline{PFO}$ goes low. Connect PFI to GND or V_{CC} when not used.
5	$\overline{PFO}$	Power-Fail Output goes low and sinks current when PFI is less than 1.25V; otherwise $\overline{PFO}$ stays high.
6	WDI	Watchdog Input. If WDI remains either high or low for 1.6sec, the internal watchdog timer runs out and the $\overline{WDO}$ goes low. Floating WDI or connecting WDI to a high-impedance three-state buffer disables the watchdog feature. The internal watchdog timer clears whenever reset is asserted, WDI is three-stated, or WDI sees a rising or falling edge.
7	$\overline{RESET}$	Active-Low Reset Output pulses low for 200ms when trigged, and stays low whenever V_{CC} is below the reset threshold. It remains low for 200ms after V_{CC} rises above the reset threshold or $\overline{MR}$ goes from Low to High.
8	$\overline{WDO}$	Watchdog Output pulls low when the internal watchdog timer finishes its 1.6sec count and does not go high again until the watchdog is cleared. $\overline{WDO}$ also goes low during low-line conditions. Whenever V_{CC} is below the reset threshold, $\overline{WDO}$ stays low; however, unlike $\overline{RESET}$, $\overline{WDO}$ does not have a minimum pulse width. As soon as V_{CC} rises above the reset threshold, $\overline{WDO}$ goes high with no delay.

TYPICAL APPLICATIN CIRCUIT



FUNCTIONAL BLOCK DIAGRAM



Absolute Maximum Ratings （Note 1）

Symbol	Parameter	Value	Unit
VCC	Supply Voltage	-0.3 to +6.0	V
ICC	Input Current, VCC	20	mA
IO	Output Current, $\overline{\text{RESET}}$	20	mA
	Rate of Rise, VCC	100	V/μs
PD	Continuous Power Dissipation	471	mW
TJ	Operating Junction Temperature	-40 to +105	°C
TSTG	Storage Temperature Range	-65 to +150	°C
	Lead Temperature (Soldering, 10s)	300	°C

Note1: Stresses beyond those listed under “Absolute maximum Ratings” may cause permanent damage to the device.

Electrical Characteristics

(V_{CC}=full range, T_A=-40°C to +85°C, unless otherwise noted. Typical values are at T_A=+25°C, V_{CC}=5V for L/M versions, V_{CC}=3.3V for T/S versions and V_{CC}=3V for R version). (Note 2)

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CC}	Supply Voltage Range	T_A=0°C to +70°C		1.0	--	5.5	V
		TA=-40°C to +85°C		1.2	--	7	V
I_{CC}	Supply Current	WDI and MR unconnected		--	80	150	μA
V_{TH+}	Reset Threshold	L Version	T_A=+25°C	4.56	4.63	4.70	V
			TA=-40°C to +85°C	4.50	--	4.75	
		M Version	T_A=+25°C	4.31	4.38	4.45	
			TA=-40°C to +85°C	4.25	--	4.50	
		T Version	T_A=+25°C	3.04	3.08	3.11	
			TA=-40°C to +85°C	3.00	--	3.15	
		S Version	T_A=+25°C	2.89	2.93	2.96	
			TA=-40°C to +85°C	2.85	--	3.00	
		R Version	T_A=+25°C	2.59	2.63	2.66	
			TA=-40°C to +85°C	2.55	--	2.70	
	Reset Threshold Hysteresis			--	40	--	mV
tRS	Reset Pulse Width			140	200	280	ms

Electrical Characteristics

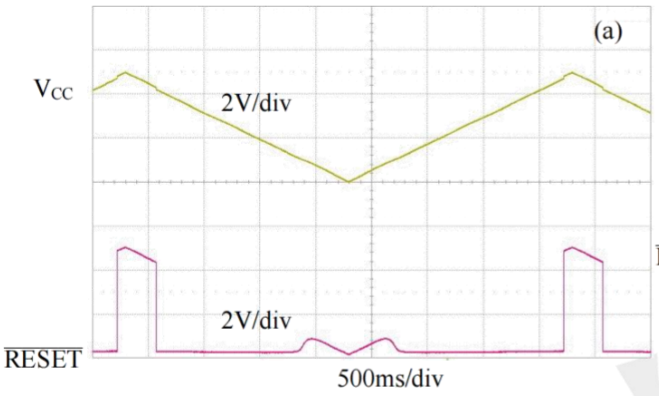
(VCC=full range, TA=-40°C to +85°C, unless otherwise noted. Typical values are at TA=+25°C, VCC=5V for L/M versions, VCC=3.3V for T/S versions and VCC=3V for R version). (Note 2)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OL}	$\overline{RESET}$ Output Voltage Low	I_{SINK}=1.2mA (for R/S/T versions)	--	--	0.3	V
		I_{SINK}=3.2mA (for L/M versions)	--	--	0.4	
		V_{CC}=1.2V, I_{SINK}=100μA	--	--	0.3	
	$\overline{MR}$ Pull-Up Current	$\overline{MR}$=0V	--	--	600	μA
t_{MR}	$\overline{MR}$ Pulse Width		150	--	--	ns
	$\overline{MR}$ Input Threshold, Low		--	--	0.8	V
	$\overline{MR}$ Input Threshold, High		2.0	--	--	V
t_{MD}	$\overline{MR}$ to Reset Out Delay		--	--	250	ns
	PFI Input Threshold	V_{CC}=5V	1.20	1.25	1.30	V
	PFI Input Current		-25	0.01	+25	nA
	$\overline{PFO}$ Output Voltage	I_{SOURCE}=800μA	0.7V_{CC}	--	--	V
		I_{SINK}=3.2mA	--	--	0.4	
Watchdog Function for						
t_{WD}	Watchdog Timeout Period		1.0	1.6	2.25	S
t_{WP}	WDI Pulse Width	V_{IL}=0.4V, V_{IH}=0.8V_{CC}	50	--	--	ns
	WDI Input Threshold Low	V_{CC}=5V	--	--	0.8	V
	WDI Input Threshold High	V_{CC}=5V	3.5	--	--	V
	WDI Input Current	WDI=V_{CC}	--	--	10	μA
		WDI=0V	-10	--	--	
	$\overline{WDO}$ Output Voltage High	I_{SOURCE}=800μA	0.7V_{CC}	--	--	V
	$\overline{WDO}$ Output Voltage Low	I_{SINK}=1.2mA	--	--	0.4	V

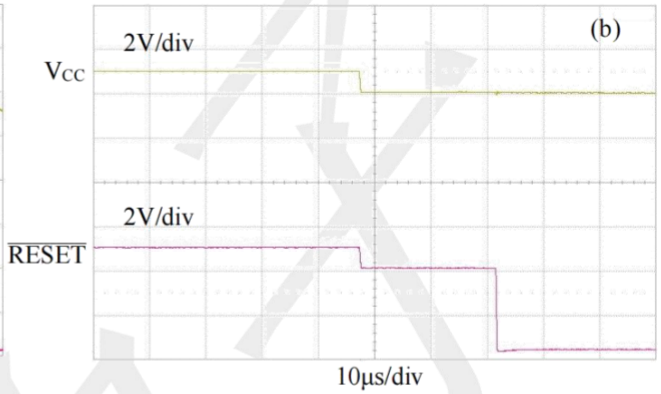
Note 2: Production testing done at TA=+25°C; limits over temperature guaranteed by design only.

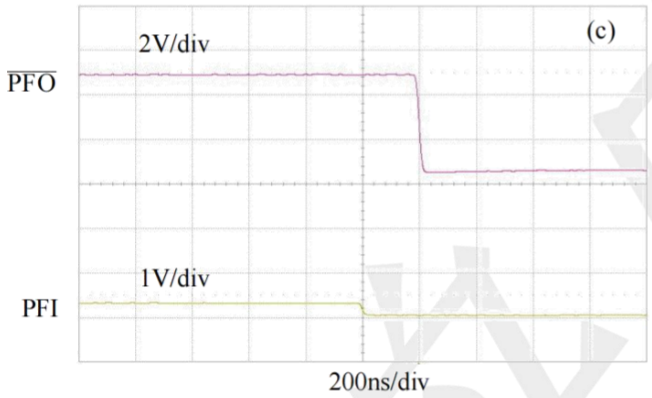
Typical Operating Characteristics

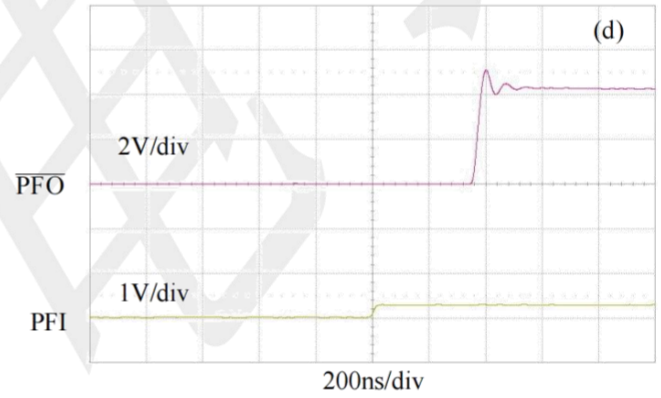
$\overline{\text{RESET}}$ Output Voltage vs. Supply Voltage

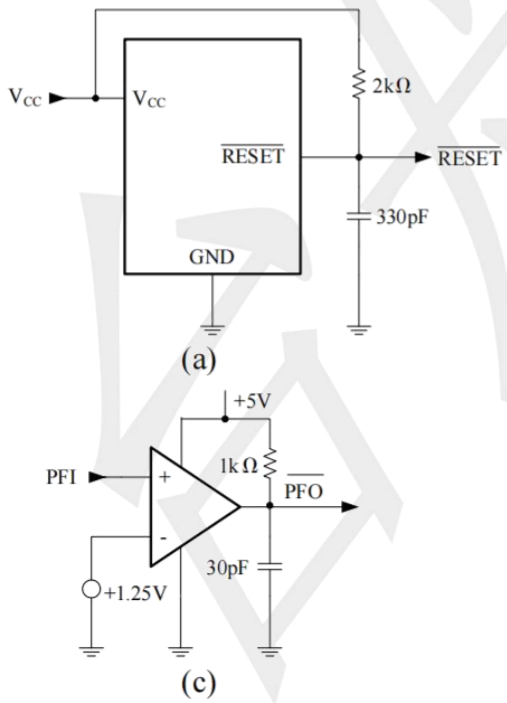


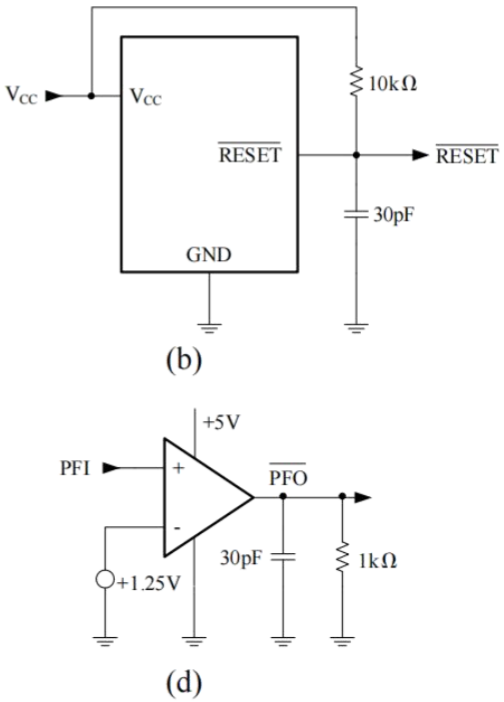
$\overline{\text{RESET}}$ Response Time



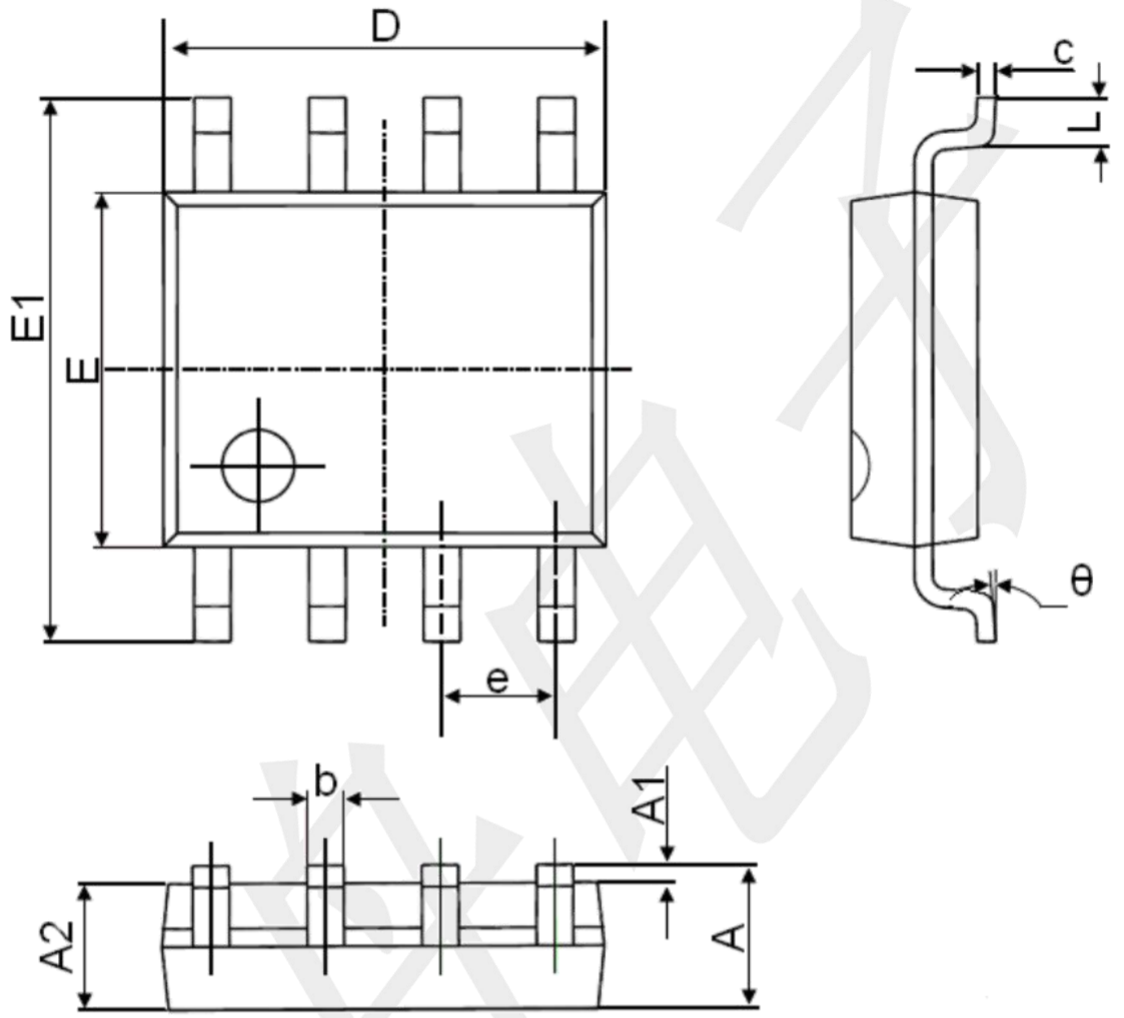








Package Outline Dimensions SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°