# Voltage Supervisors (Reset ICs)

# **Quick Reference Guide**



#### **Overview**

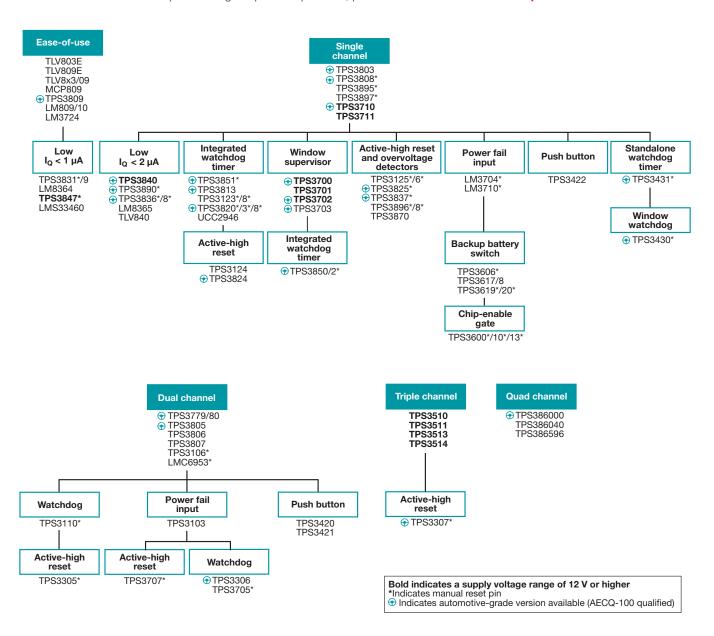
A voltage supervisor is a device that monitors or "supervises" a voltage rail within a system. When that monitored voltage rail falls below or rises above a predetermined threshold voltage, the supervisor will assert a signal to enable, disable, or reset another device. Supervisors are utilized to ensure proper system power on, prevent processor brownout conditions, and wherever a voltage rail, out of specification, could lead to performance issues or system failure.

Voltage supervisors are also known as reset ICs, voltage monitors or voltage detectors. These names all refer to the same device and are interchanged depending on the preference of the manufacturer.

For more information on various specifications of a supervisor, please see the design factor glossary on page 5 in this guide.

To view our basic training series on supervisors, please visit https://training.ti.com/voltage-supervisors-101

To learn more and view our complete voltage supervisor portfolio, please visit us at www.ti.com/supervisors



# Voltage supervisors (reset ICs) selection table

	Number of supervisors	Supervised		V <sub>DD</sub> range	l <sub>DD</sub> (typ)	Time delay	Watchdog timer WDI (sec)	Reset threshold accuracy (%)	Manual reset/enable reset	Active-low reset/output	Active-high reset/output	Reset output topology <sup>1</sup>	Power-fail PFI/PF0	Overvoltage detection	Overcurrent detection	Chip-enabled gating		Automotive grade	
Device		voltages	Package(s)	(V)	(μA)	(ms)	<b>※</b> ≽	22 %	Ž	æ	Æ	22	&	8	8	5	Comments	¥	Price*
Ease-of-	use																		
TLV803E	1	3.0/3.3/5.0	S0T-23-3, SC-70-3	1.7 to 6.0	0.25	200		±0.5		V		OD							0.18
TLV809E	1	3.0/3.3/5.0	S0T-23-3	1.7 to 6.0	0.25	200		±0.5		~		PP							0.20
TLV8x3	1	2.5/3/3.3/5.0	S0T-23-3	1.1 to 6.0	9	200		±2.2		V		OD							0.20
TLV809	1	2.5/3.0/3.3/5.0	S0T-23-3	2.0 to 6.0	9	200		±2.2		V		PP							0.25
MCP809	1	3.0	SOT-23-3	1.0 to 5.5	15	240		±1.5		~		PP							0.19
TLV810	1	2.5/3/3.3/5.0	S0T-23-3	1.1 to 6.0	9	200		±2.2			V	PP							0.20
TPS3809	1	2.5/3.0/3.3/5.0 3.0/3.3/5.0	SOT-23-3 SOT-23-3	1.8 to 6.5 1.0 to 6.0	10 15	200 240		±2.2		V		PP PP						<b>V</b>	0.24
LM809 LM810	1	5.0	S0T-23-3	1.0 to 6.0	15	240		±1.5 ±1.5		~	V	PP							0.23
LM3724	1	2.32, 3.08, 4.63	S0T-23-5	1.0 to 5.5	6	190		±1.5	V	V	V	OD OD							0.23
								-2.5 /											
<u>TPS3831</u>	1	0.9/1.2/1.6/1.8/3.0/3.3/5.0	SON-4	0.6 to 6.5	0.15	200		+1.5	~	~		PP					Nano Iq, Ultra small		0.30
TPS3839	1	0.9/1.2/1.6/1.8/2.5/3.0/ 3.3/5.0	SON-4, SOT-23-3	0.6 to 6.5	0.15	200		-2.5 / +1.5		~		PP					Nano Iq, Ultra small		0.21
TPS3847	1	12	S0T-23-5	4.5 to 18	0.38	20		±2.5	V	V		PP					Wide Vin		0.85
LM8364	1	2.0	S0T-23-5	1.0 to 6.0	0.65	20		±2.5		V		OD					11100 1111		0.24
LMS33460	1	3.0	SC-70-5	1.0 to 7.0	1			±5		V		OD							0.17
Single chan	nel																		
TPS3890	1	Adj./1.2/1.5/1.8/2.0/ 2.5/3.0/3.3	SON-6	1.5 to 5.5	2.1	Prog		0.5	V	V		OD					Ultra small	V	0.55
TPS3895/7	1	Adj.	SON-6	1.7 to 6.5	6	Prog		0.25	V	V		PP/OD					Ultra small		0.60
TPS3896/8	1	Adj.	SON-6	1.7 to 6.5	6	Prog		0.25	V		V	PP/OD					Ultra small		0.60
TPS3836/8	1	1.8/2.5/3.0/3.3	SOT-23-5, SON-6	1.6 to 6.0	0.22	10/200		2.5	V	V		PP/OD					Nano Ig	V	0.85
TPS3837	1	1.8/2.5/3.0/3.3	S0T-23-5	1.6 to 6.0	0.22	10/200		2.4	V		V	PP					Nano Iq	V	0.85
LM8365	1	2.75, 4.5	S0T-23-5	1.0 to 6.0	0.65	Prog		±2.5		V		OD					Low Iq		0.25
TPS3803	1	Adj./1.5	SC-70-5	1.3 to 6.0	3			1.5		V		OD						V	0.25
TPS3808	1	Adj./0.9/1.2/1.5/1.8/2.5/ 3.0/3.3/5.0/EEPROM	S0T-23-6, S0N-6	1.8 to 6.5	2.4	Prog		0.5	~	~		OD						~	0.70
<u>TPS3710</u>	1	Adj.	ThinS0T23-6, WS0N-6	1.8 to 18	5.5			0.25		V		OD					Wide Vin	~	0.59
TPS3711	1	Adj.	ThinS0T23-6	1.8 to 36	7			0.25		V		OD					Wide Vin		0.79
TPS3125	1	1.2/1.5/1.8/3.0	S0T-23-5	0.75 to 3.3	14	180		3.6	V	V	V	PP							0.80
TPS3126	1	1.2/1.5/1.8	S0T-23-5	0.75 to 3.3	14	180		3.5	1	1	V	OD							0.80
TPS3825	1	3.3/5.0	S0T-23-5	1.1 to 5.5	15	200		2.2	1	1	V	PP						V	0.55
TPS3840	1	1.6-4.9 with 0.1V steps	S0T-23-5	1.5 to 10	0.35	Prog		1	V	~	V	PP/OD					Wide Vin	V	0.40
<u>TLV840</u>	1	0.8-5.5 with 0.1V steps	S0T-23-5	0.7 to 6	0.10	Prog		1	V	V	V	PP/OD						V	0.16
TPS3870	1	0.5-1.3 with 50mV steps, 1.5, 1.8, 2.5, 2.8, 2.9, 3.3, 5	SON-6	1.7 to 5.5	4.50	Prog		0.25	~	~		OD		•			Over voltage	~	0.86
Window su	pervis	or																	
TPS3850	1	Adj./1.2/1.8/3.0/3.3/5.0	DFN-10	1.6 to 6.5	10	Prog.	Adj. Window	±0.8		~		OD		~			Window watchdog	V	0.75
TPS3700	2	Adj.	ThinS0T23-6, S0N-6	1.8 to 18	5.5			0.25		~		OD .		V				V	0.70
TPS3701	2	Adj.	ThinS0T23-6, S0N-6	1.8 to 36	7			0.25		~		OD OD		V					0.89
TPS3702	2	1.0/1.2/1.8/3.3/5.0 0.5-1.3 with 50mV steps, 1.5,	ThinS0T23-6	1.8 to 18	7			0.25		<b>V</b>		OD		V				V	0.79
<u>TPS3703</u>	1	1.8, 2.5, 2.8, 2.9, 3.3, 5	SON-6	1.7 to 5.5	4.5	Prog		0.25	~	~		OD		<b>'</b>				~	0.86
Supervisor	+ wa	tchdog timer																	
TPS3851	1	1.8/2.5/3.0/3.3/5.0	DFN-8	1.6 to 6.5	10	200	Adj.	±0.8	V	~		OD						V	0.65
TPS3852	1	3.3	DFN-8	1.6 to 6.5	10	200	Adj. Window	±0.8	~	V		OD .					Window watchdog	V	0.65
TPS3813	1	2.5/3.0/3.3/5.0	SOT-23-6	2.0 to 6.0	9	25	Adj. Window	2.2		~		OD DD					Window watchdog	~	0.90
TPS3123	1	1.2/1.8 1.2/1.5/1.8	S0T-23-5	0.75 to 3.3	14	180	1.4	3.6	~	V		PP PP							0.85
TPS3124 TPS3128	1	1.2/1.5/1.8	SOT-23-5 SOT-23-5	0.75 to 3.3 0.75 to 3.3	14	180 180	1.4	3.6 3.5	.1	V	~	OD OD							0.85
TPS3820/8	1	3.3/5.0	S0T-23-5 S0T-23-5	1.1 to 5.5	15	25/200	0.2/1.6	2.4	V	V		PP/OD						V	0.85
TPS3823	1	2.5/3.0/3.3/5.0	S0T-23-5	1.1 to 5.5	15	200	1.6	2.4	V	V		PP PP						V	0.65
TPS3824	1	2.5/3.0/3.3/5.0	S0T-23-5	1.1 to 5.5	15	200	1.6	2.4		~	V	PP						V	0.65
UCC2/3946	1	Adjustable	TSS0P-8	2.1 to 5.5	12	Prog	Prog	2.2	V	V		PP						V	1.65
Standalone						-5	-5												
TPS3430	N/A	N/A	VSON-10	1.6 to 6.5	10	Prog	Adj. Window	N/A	V	V		OD					Window watchdog	V	0.70
	N/A	N/A	VSON-8	1.8 to 6.5	10	200	Adj.	N/A	V	V		OD						V	0.60

<sup>&</sup>lt;sup>1</sup>PP = push-pull, OD = open drain. \*Suggested resale price in U.S. dollars in quantities of 1,000.

# Voltage supervisors (reset ICs) selection table (continued)

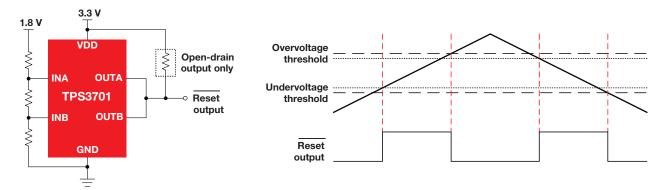
	Number of supervisors	Supervised		V <sub>DD</sub> range	I <sub>DD</sub>	Time delay	Watchdog timer WDI (sec)	Reset threshold accuracy (%)	Manual reset/enable reset	Active-low reset/output	Active-high reset/output	Reset output topology <sup>1</sup>	Power-fail PFI/PFO	Overvoltage detection	Overcurrent detection	Chip-enabled gating		Automotive grade	
Device	N m	voltages	Package(s)	(V)	(typ) (μA)	(ms)	Wate	Rese	Man	Acti	Acti	Resc	Pow	Over	Over	을 를	Comments	Auto	Price*
Multiple channels																			
TPS3779/80	2	Adj.	SON-6, SOT-23-6	1.5 to 6.5	1.8			1		~		PP/OD					Different Hysteresis Options	~	0.50
TPS3805	2	Adj./3.3	SC-70-5	1.3 to 6.0	3			1.5		V		PP						V	0.34
TPS3806	2	Adj./2.0/3.3	S0T-23-6	1.3 to 6.0	3			2		1		OD							0.45
TPS3807	2	3/3.5	SC-70-5	1.8 to 6.5	3.5	20		1		1		OD							0.95
TPS3106	2	Adj./0.9/1.6/3.3	S0T-23-6	0.4 to 3.3	1.2	130		0.75	~	V		OD							0.90
TPS3110	2	Adj./0.9/1.2/1.5/3.3	S0T-23-6	0.4 to 3.3	1.2	130	1.1	0.75	V	V		PP							0.99
TPS3305	2	1.8/2.5/3.3/5.0	S0-8, MS0P-8	2.7 to 6.0	15	200	1.6	2.7	~	~	V	PP							1.00
<u>TPS3307</u>	3	Adj./1.8/2.5/3.3/5.0	S0-8, MS0P-8	2.0 to 6.0	15	200		2.7	V	V	V	PP						~	1.05
TPS3510/1	3	3.3/5.0/12.0	SO-8, DIP-8	4.0 to 15	1 mA	300		9.1		V		OD	~	~			PC power supplies		0.45
TPS3513/4	3	3.3/5.0/12.0	S0-14, DIP-14	4.5 to 15	1 mA	300		9.1		V		OD	~	~	~		PC power supplies		0.70
TPS3860x0	4	Adj. (includes negative rail)	QFN	1.8 to 6.5	9	Prog	0.6	0.25	~	~	V	PP/OD		~				~	0.95
TPS386596	4	Adj./3.0	MSOP-8	1.8 to 6.5	7.5	50		0.25	~	V		OD		~					0.85
Power fai	l in	out																	
TPS3103	2	1.2/1.5/2.0/3.3	S0T-23-6	0.4 to 3.3	1.2	130		0.75	V	V		OD	1						0.90
TPS3705	2	3.0/3.3/5.0	S0-8, MS0P-8	2.0 to 6.0	30	200	1.6	2.1	V	V		PP	~						0.80
TPS3707	2	2.5/3.0/3.3/5.0	S0-8, MS0P-8	2.0 to 6.0	20	200		2.2	V	V	V	PP	V						0.75
TPS3306	2	1.5/1.8/2.0/2.5/3.3/5.0	S0-8, MS0P-8	2.7 to 6.0	15	100	0.8	2.7		1		OD	V					~	1.05
LM3704	2	2.32, 3.08, 3.6	VSSOP-10	1.0 to 5.5	28	28, 200		±2	V	V		PP/OD	V						0.77
LM3710	2	2.32, 3.08, 4.63	VSSOP-10	1.0 to 5.5	28	28, 200	0.0062 to 25.6	±2	~	~		PP/OD	~						1.10
Battery b	ack	up switchover supp	ly supervisors	S															
TPS3600	1	2.0/2.5/3.3/5.0	TSS0P-14	1.6 to 5.5	20	100	0.8	2.3	~	V		PP	V			V			2.15
TPS3606-33	1	3.3	MSOP-10	1.6 to 5.5	20	100	0.8	2	V	V		PP	V						1.45
TPS3613-01	1	Adjustable	MSOP-10	1.6 to 5.5	20	100		1.7	V	V	V	PP				V			1.50
TPS3617/8	1	4.55	MSOP-8	1.6 to 5.5	15	100	0.8	2		V		PP	~				TPS3617 includes battery freshness seal		1.33
TPS3619/20	1	3.3/5.0	MSOP-8	1.6 to 5.5	15	100		2	V	~		PP	~				TPS3619 includes battery freshness seal		1.10

 $<sup>^{1}</sup>PP = push-pull, OD = open drain.$ 

# Benefits and features of voltage supervisors (reset ICs)

### **Window supervisor**

Detect overvoltage fault events in addition to undervoltage fault events to alert a system if a voltage rail deviated from its permissible tolerance.

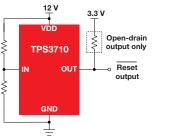


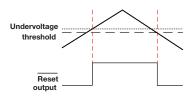
<sup>\*</sup>Suggested resale price in U.S. dollars in quantities of 1,000.

## Benefits and features of voltage supervisors (reset ICs) (continued)

#### Wide input voltage

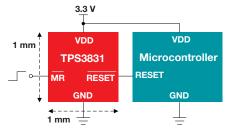
For voltage rails greater than 7 V, TI's family of wide-input supervisors can operate and monitor directly off an input voltage rail of 12 V or more.





### Nano power + small size

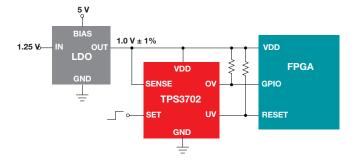
TI's family of nano-power, small-size supervisors help improve system efficiency, increase battery life and address PCB size constraints.





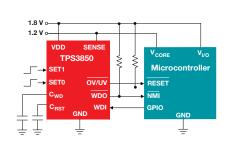
#### **High accuracy**

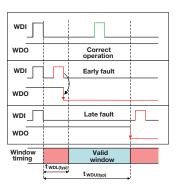
For voltage rails with tight tolerance specifications, such as those found in processors and FPGAs, TI's high-accuracy voltage supervisors (down to 0.9% error tolerance) detect fault events with extreme precision.



#### Integrated watchdog timer

In addition to monitoring voltage rails, many processors or FPGAs also need a watchdog timer to detect and recover from a hardware fault or program error. Using a supervisor with an integrated watchdog timer, one device has the ability to both monitor voltage as well as processor faults.

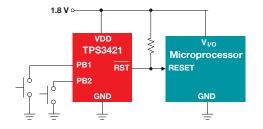


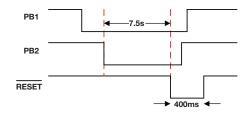


### Benefits and features of voltage supervisors (reset ICs) (continued)

#### **Push-button reset IC**

Being able to reset a system by holding down a button or two is critical to applications where it is not easy to remove the battery. They are also useful when a processor is frozen and a user needs to force the application to reset. In such cases, a push-button reset IC can monitor these user presses and provides a reset after a given time period has been met.





#### **Design factors**

- Reset time delay (T<sub>D</sub>) Refers to the amount of time the reset output takes to de-assert when the monitored voltage has
  returned above the voltage threshold.
- Reset output polarity The reset output can assert high (Active-High) or low (Active-Low) in the event of a fault.
- Reset output topology The reset output comes in two flavors: open-drain (OD) and push-pull (PP). An open-drain (or open-collector) output requires the output be tied to an external voltage via a pull-up resistor. A push-pull (or CMOS) output both sinks and sources current without needing to be tied to an external voltage.
- Package TI's Reset ICs are available in leaded (ex. SOT23-3) and unleaded packages (ex. X2SON). The smallest
  voltage supervisors in TI's portfolio are 1 mm<sup>2</sup>.
- Watchdog timer (WDT) Monitors a periodic pulse from a processor and provides a reset signal to the processor when that pulse has not been received within a designated time period. This increases redundancy in systems that can't afford an undetected processor hang or freeze.
- Supply current (I<sub>DD</sub>) Voltage supervisor current draw. Minimizing the supply current is critical in extending battery life and
  ensuring more efficient system operation.
- Manual reset (MR) / Enable (EN) Allows manual intervention to assert the reset output.
- Voltage threshold accuracy Determines how close the actual threshold voltage is to the target threshold voltage.
- **AEC-Q100 qualification** Many of TI's voltage supervisors are qualified for use in automotive applications. This is indicated by a "-Q1" suffix. Other devices can be qualified upon request.

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