

# Voltage supervisors (reset ICs)

## Quick reference guide



### Overview

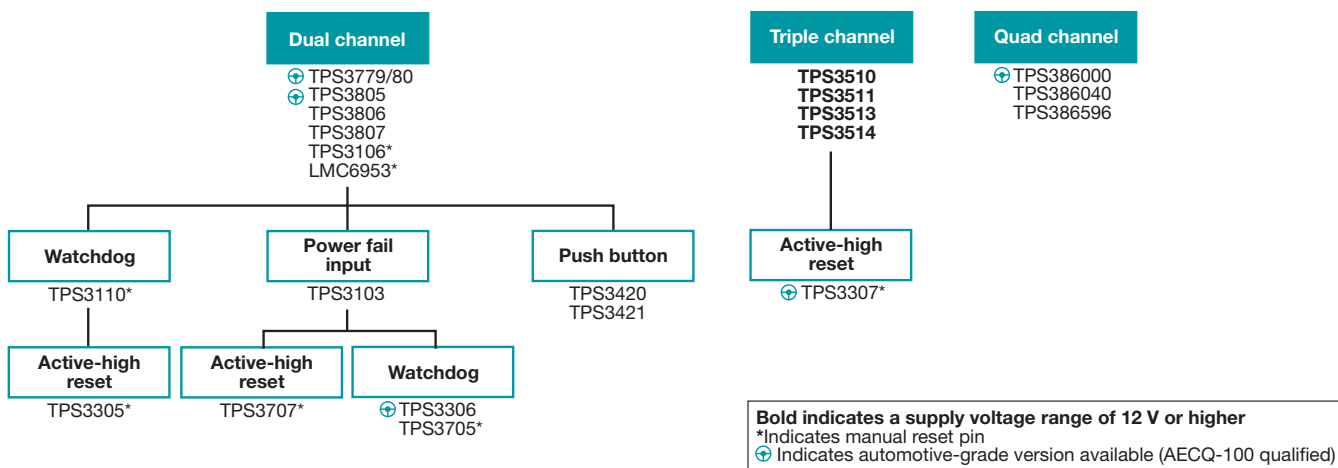
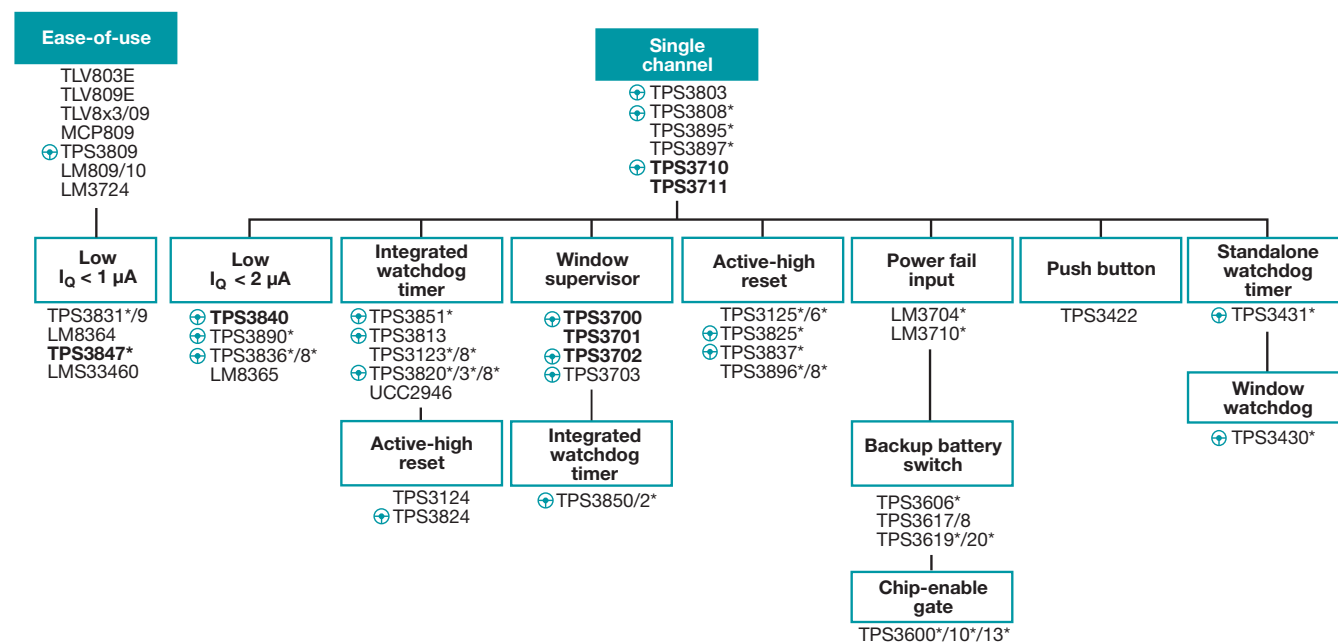
A voltage supervisor is a device that monitors or “supervises” a voltage rail within a system. When that monitored voltage rail falls below or rises above a predetermined threshold voltage, the supervisor will assert a signal to enable, disable, or reset another device. Supervisors are utilized to ensure 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](http://www.ti.com/supervisors)



## Voltage supervisors (reset ICs) selection table

Device	Number of supervisors	Supervised voltages	Package(s)	V <sub>DD</sub> range (V)	I <sub>DD</sub> (typ) (µA)	Time delay (ms)	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 PF/PFO	Overvoltage detection	Overcurrent detection	Chip-enabled gating	Comments	Automotive grade	Price*
<b>Ease-of-use</b>																			
<a href="#">TLV803E</a>	1	3.0/3.3/5.0	SOT-23-3, SC-70-3	1.7 to 6.0	0.25	200		1	✓			OD							0.18
<a href="#">TLV809E</a>	1	3.0/3.3/5.0	SOT-23-3	1.7 to 6.0	0.25	200		1	✓			PP							0.20
<a href="#">TLV8x3</a>	1	2.5/3/3.3/5.0	SOT-23-3	1.1 to 6.0	9	200		±2.2	✓			OD							0.20
<a href="#">TLV809</a>	1	2.5/3.0/3.3/5.0	SOT-23-3	2.0 to 6.0	9	200		±2.2	✓			PP							0.25
<a href="#">MCP809</a>	1	3.0	SOT-23-3	1.0 to 5.5	15	240		±1.5	✓			PP							0.19
<a href="#">TLV810</a>	1	2.5/3/3.3/5.0	SOT-23-3	1.1 to 6.0	9	200		±2.2		✓		PP							0.20
<a href="#">TPS3809</a>	1	2.5/3.0/3.3/5.0	SOT-23-3	1.8 to 6.5	10	200		±2.2	✓			PP						✓	0.24
<a href="#">LM809</a>	1	3.0/3.3/5.0	SOT-23-3	1.0 to 6.0	15	240		±1.5	✓			PP							0.23
<a href="#">LM810</a>	1	5.0	SOT-23-3	1.0 to 6.0	15	240		±1.5		✓		PP							0.23
<a href="#">LM3724</a>	1	2.32, 3.08, 4.63	SOT-23-5	1.0 to 5.5	6	190		±2.5	✓	✓		OD							0.75
<a href="#">TPS3831</a>	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		-2.5/ +1.5	✓	✓		PP					Nano Iq, Ultra small		0.30
<a href="#">TPS3839</a>	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
<a href="#">TPS3847</a>	1	12	SOT-23-5	4.5 to 18	0.38	20		±2.5	✓	✓		PP					Wide Vin		0.85
<a href="#">LM8364</a>	1	2.0	SOT-23-5	1.0 to 6.0	0.65			±2.5	✓			OD							0.24
<a href="#">LMS33460</a>	1	3.0	SC-70-5	1.0 to 7.0	1			±5	✓			OD							0.17
<b>Single channel</b>																			
<a href="#">TPS3890</a>	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	✓	✓		OD					Ultra small	✓	0.55
<a href="#">TPS3895/7</a>	1	Adj.	SON-6	1.7 to 6.5	6	Prog		0.25	✓	✓		PP/OD					Ultra small		0.60
<a href="#">TPS3896/8</a>	1	Adj.	SON-6	1.7 to 6.5	6	Prog		0.25	✓	✓	✓	PP/OD					Ultra small		0.60
<a href="#">TPS3836/8</a>	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	✓	✓		PP/OD					Nano Iq	✓	0.85
<a href="#">TPS3837</a>	1	1.8/2.5/3.0/3.3	SOT-23-5	1.6 to 6.0	0.22	10/200		2.4	✓		✓	PP					Nano Iq	✓	0.85
<a href="#">LM8365</a>	1	2.75, 4.5	SOT-23-5	1.0 to 6.0	0.65	Prog		±2.5	✓			OD					Low Iq		0.25
<a href="#">TPS3803</a>	1	Adj./1.5	SC-70-5	1.3 to 6.0	3			1.5		✓		OD						✓	0.25
<a href="#">TPS3808</a>	1	Adj./0.9/1.2/1.5/1.8/2.5/ 3.0/3.3/5.0/EEPROM	SOT-23-6, SON-6	1.8 to 6.5	2.4	Prog		0.5	✓	✓		OD						✓	0.70
<a href="#">TPS3710</a>	1	Adj.	ThinSOT23-6, WSON-6	1.8 to 18	5.5			0.25		✓		OD					Wide Vin	✓	0.59
<a href="#">TPS3711</a>	1	Adj.	ThinSOT23-6	1.8 to 36	7			0.25		✓		OD					Wide Vin		0.79
<a href="#">TPS3125</a>	1	1.2/1.5/1.8/3.0	SOT-23-5	0.75 to 3.3	14	180		3.6	✓	✓	✓	PP							0.80
<a href="#">TPS3126</a>	1	1.2/1.5/1.8	SOT-23-5	0.75 to 3.3	14	180		3.5	✓	✓	✓	OD							0.80
<a href="#">TPS3825</a>	1	3.3/5.0	SOT-23-5	1.1 to 5.5	15	200		2.2	✓	✓	✓	PP						✓	0.55
<a href="#">TPS3840</a>	1	1.6-4.9 with 0.1V steps	SOT-23-5	1.5 to 10	0.35	Prog		1	✓	✓	✓	PP/OD					Wide Vin	✓	0.40
<b>Window supervisor</b>																			
<a href="#">TPS3850</a>	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	✓	0.75
<a href="#">TPS3700</a>	2	Adj.	ThinSOT23-6, SON-6	1.8 to 18	5.5			0.25		✓		OD		✓				✓	0.70
<a href="#">TPS3701</a>	2	Adj.	ThinSOT23-6, SON-6	1.8 to 36	7			0.25		✓		OD		✓					0.89
<a href="#">TPS3702</a>	2	1.0/1.2/1.8/3.3/5.0	ThinSOT23-6	1.8 to 18	7			0.25		✓		OD		✓				✓	0.79
<a href="#">TPS3703</a>	1	0.5-1.3 with 50-mV steps, 1.5, 1.8, 2.5, 2.8, 2.9, 3.3, 5	SON-6	1.7 to 5.5	6	Prog		0.25	✓	✓		OD		✓				✓	0.86
<b>Supervisor + watchdog timer</b>																			
<a href="#">TPS3851</a>	1	1.8/2.5/3.0/3.3/5.0	DFN-8	1.6 to 6.5	10	Prog	Adj.	±0.8	✓	✓		OD						✓	0.65
<a href="#">TPS3852</a>	1	3.3	DFN-8	1.6 to 6.5	10	Prog	Adj. Window	±0.8	✓	✓		OD					Window watchdog	✓	0.65
<a href="#">TPS3813</a>	1	2.5/3.0/3.3/5.0	SOT-23-6	2.0 to 6.0	9	25	Adj. Window	2.2	✓	✓		OD					Window watchdog	✓	0.90
<a href="#">TPS3123</a>	1	1.2/1.8	SOT-23-5	0.75 to 3.3	14	180	1.4	3.6	✓	✓		PP							0.85
<a href="#">TPS3124</a>	1	1.2/1.5/1.8	SOT-23-5	0.75 to 3.3	14	180	1.4	3.6		✓	✓	PP							0.85
<a href="#">TPS3128</a>	1	1.2/1.5/1.8	SOT-23-5	0.75 to 3.3	14	180	1.4	3.5	✓	✓		OD							0.85
<a href="#">TPS3820/8</a>	1	3.3/5.0	SOT-23-5	1.1 to 5.5	15	25/200	0.2/1.6	2.4	✓	✓		PP/OD						✓	0.65
<a href="#">TPS3823</a>	1	2.5/3.0/3.3/5.0	SOT-23-5	1.1 to 5.5	15	200	1.6	2.4	✓	✓		PP						✓	0.65
<a href="#">TPS3824</a>	1	2.5/3.0/3.3/5.0	SOT-23-5	1.1 to 5.5	15	200	1.6	2.2	✓	✓	✓	PP						✓	0.65
<a href="#">UCC2/3946</a>	1	Adjustable	TSSOP-8	2.1 to 5.5	12	Prog	Prog	2	✓	✓		PP						✓	1.65
<b>Standalone watchdog timer</b>																			
<a href="#">TPS3430</a>	N/A	N/A	VSON-10	1.6 to 6.5	10	Prog	Adj. Window	N/A	✓	✓		OD					Window watchdog	✓	0.70
<a href="#">TPS3431</a>	N/A	N/A	VSON-8	1.8 to 6.5	10	200	Adj.	N/A	✓	✓		OD						✓	0.60

<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)

Device	Number of supervisors	Supervised voltages	Package(s)	V <sub>DD</sub> range (V)	I <sub>DD</sub> (typ) (µA)	Time delay (ms)	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	Comments	Automotive grade	Price*
<b>Multiple channels</b>																			
<a href="#">TPS3779/80</a>	2	Adj.	SON-6, SOT-23-6	1.5 to 6.5	1.8			1	✓			PP/OD					Different Hysteresis Options	✓	0.50
<a href="#">TPS3805</a>	2	Adj./3.3	SC-70-5	1.3 to 6.0	3			1.5	✓			PP						✓	0.34
<a href="#">TPS3806</a>	2	Adj./2.0/3.3	SOT-23-6	1.3 to 6.0	3			2	✓			OD							0.45
<a href="#">TPS3807</a>	2	3/3.5	SC-70-5	1.8 to 6.5	3.5	20		1	✓			OD							0.95
<a href="#">TPS3106</a>	2	Adj./0.9/1.6/3.3	SOT-23-6	0.4 to 3.3	1.2	130		0.75	✓			OD							0.90
<a href="#">TPS3110</a>	2	Adj./0.9/1.2/1.5/3.3	SOT-23-6	0.4 to 3.3	1.2	130	1.1	0.75	✓	✓		PP							0.99
<a href="#">TPS3305</a>	2	1.8/2.5/3.3/5.0	SO-8, MSOP-8	2.7 to 6.0	15	200	1.6	2.7	✓	✓	✓	PP							1.00
<a href="#">TPS3307</a>	3	Adj./1.8/2.5/3.3/5.0	SO-8, MSOP-8	2.0 to 6.0	15	200		2.7	✓	✓	✓	PP						✓	1.05
<a href="#">TPS3510/1</a>	3	3.3/5.0/12.0	SO-8, DIP-8	4.0 to 15	1 mA	300		9.1		✓		OD	✓	✓			PC power supplies		0.45
<a href="#">TPS3513/4</a>	3	3.3/5.0/12.0	SO-14, DIP-14	4.5 to 15	1 mA	300		9.1		✓		OD	✓	✓	✓		PC power supplies		0.70
<a href="#">TPS3860x0</a>	4	Adj. (includes negative rail)	QFN	1.8 to 6.5	9	Prog	0.6	0.25	✓	✓	✓	PP/OD		✓				✓	1.95
<a href="#">TPS386596</a>	4	Adj./3.0	MSOP-8	1.8 to 6.5	7.5	Prog		0.25	✓	✓		OD		✓					1.25
<b>Power fail input</b>																			
<a href="#">TPS3103</a>	2	1.2/1.5/2.0/3.3	SOT-23-6	0.4 to 3.3	1.2	130		0.75	✓	✓		OD	✓						0.90
<a href="#">TPS3705</a>	2	3.0/3.3/5.0	SO-8, MSOP-8	2.0 to 6.0	30	200	1.6	2.1	✓	✓		PP	✓						0.80
<a href="#">TPS3707</a>	2	2.5/3.0/3.3/5.0	SO-8, MSOP-8	2.0 to 6.0	20	200		2.2	✓	✓	✓	PP	✓						0.75
<a href="#">TPS3306</a>	2	1.5/1.8/2.0/2.5/3.3/5.0	SO-8, MSOP-8	2.7 to 6.0	15	100	0.8	2.7	✓	✓		OD	✓					✓	1.05
<a href="#">LM3704</a>	2	2.32, 3.08, 3.6	VSSOP-10	1.0 to 5.5	28	28, 200		±2	✓	✓		PP/OD	✓						0.77
<a href="#">LM3710</a>	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
<b>Battery backup switchover supply supervisors</b>																			
<a href="#">TPS3600</a>	1	2.0/2.5/3.3/5.0	TSSOP-14	1.6 to 5.5	20	100	0.8	2.3	✓	✓		PP	✓			✓			2.15
<a href="#">TPS3606-33</a>	1	3.3	MSOP-10	1.6 to 5.5	20	100	0.8	2	✓	✓		PP	✓						1.45
<a href="#">TPS3613-01</a>	1	Adjustable	MSOP-10	1.6 to 5.5	20	100		1.7	✓	✓	✓	PP							1.50
<a href="#">TPS3617/8</a>	1	4.55	MSOP-8	1.6 to 5.5	15	100	0.8	2		✓		PP	✓				TPS3617 includes battery freshness seal		1.33
<a href="#">TPS3619/20</a>	1	3.3/5.0	MSOP-8	1.6 to 5.5	15	100		2	✓	✓		PP	✓				TPS3619 includes battery freshness seal		1.10

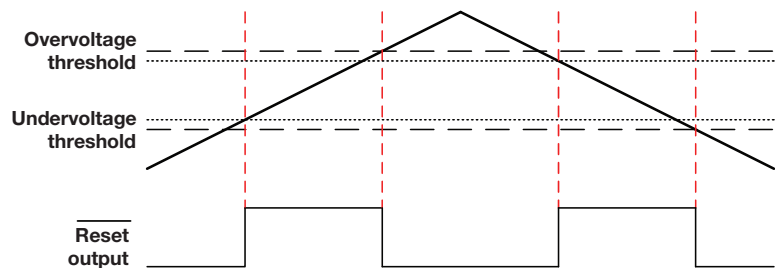
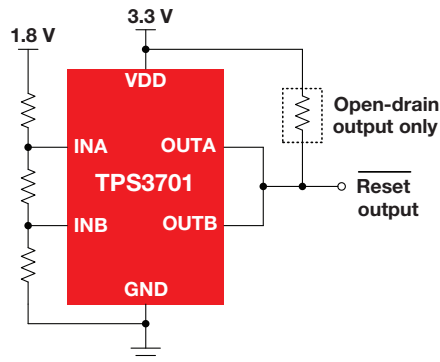
<sup>1</sup>PP = push-pull, OD = open drain.

\*Suggested resale price in U.S. dollars in quantities of 1,000.

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

### Window supervisor

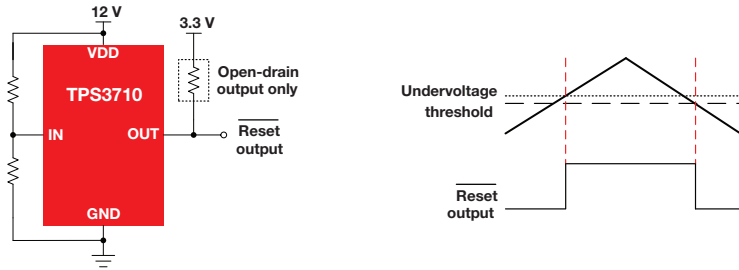
Detect overvoltage fault events in addition to undervoltage fault events to alert a system if a voltage rail deviated from its permissible tolerance.



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

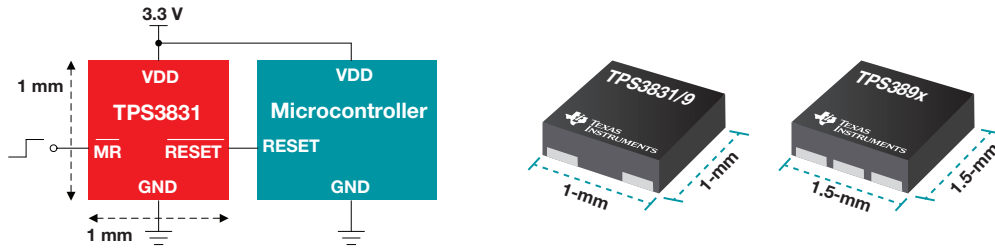
### Wide input voltage

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.



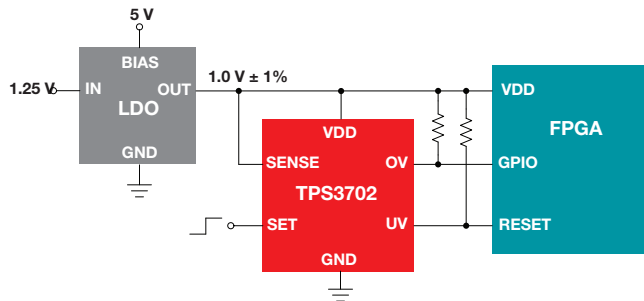
### Nano power + small size

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



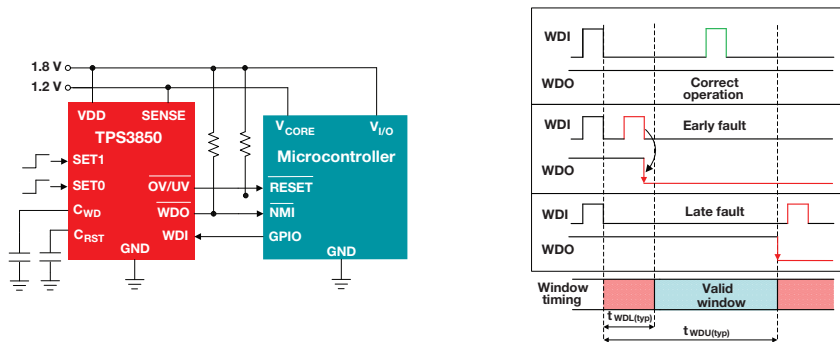
### High accuracy

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

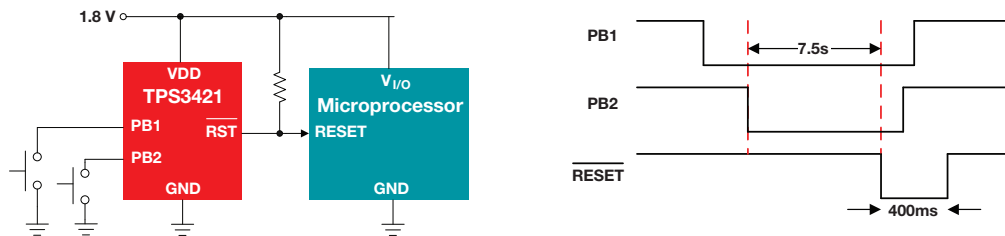
In addition to monitoring voltage rails, many processors or FPGAs also need a watchdog timer to detect and recover from a hardware fault or program error. Using a supervisor with an integrated watchdog timer, one device has the ability to both monitor voltage as well as processor faults.



## 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 ( $T_D$ )** — 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 unlead 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 ( $I_{DD}$ )** — 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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