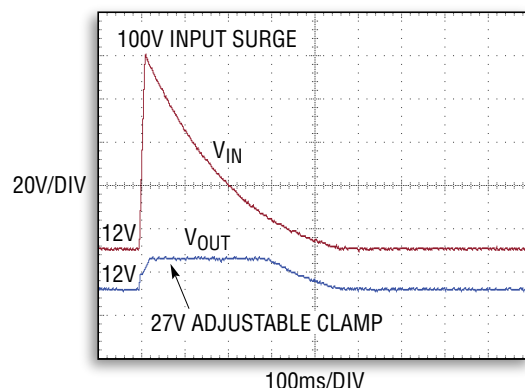
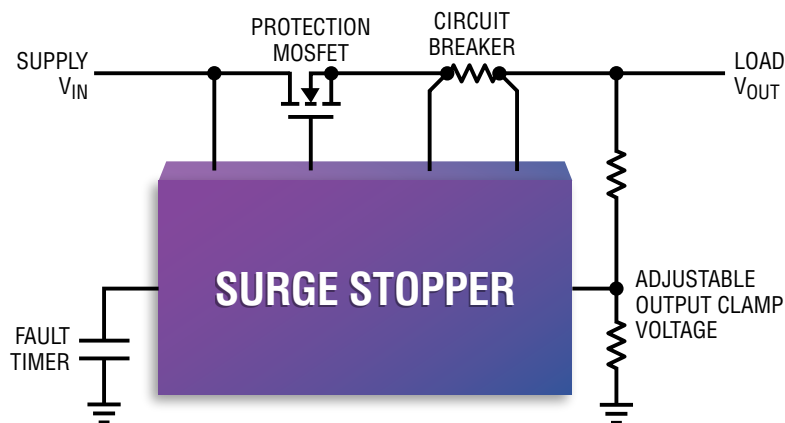


SURGE STOPPERS



Compact, Precise Overvoltage and Overcurrent Protection

Automotive, industrial, and aviation electronics need to survive and operate through power supply surges endemic to their environment. Traditional overvoltage (OV) and overcurrent (OC) protection relies on capacitors, transient voltage suppressors (TVS), fuses, diodes, and inductors, but these discrete solutions are bulky, inaccurate, and blow the fuse during a sustained fault. Our surge stopper family replaces these passive components with a controller and series protection MOSFET, enabling a compact and precise solution.

- ▶ Shields Load Electronics from High Voltage Surges
- ▶ Allows Uninterrupted System Operation through Surges
- ▶ Protects Supply from Overload and Short-Circuit
- ▶ Disconnects Load from Supply for Sustained Faults
- ▶ Adjustable Clamp Voltage Eases Design Changes and Reuse
- ▶ Tight Accuracy Minimizes Overdesign and Reduces Cost
- ▶ Low Profile, Surface Mount Solution Enables Compact Form Factor
- ▶ Automotive and Military-Plastic Temperature Grades

No More Bulky Components!

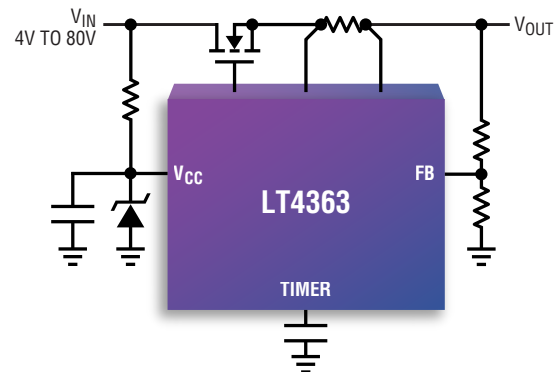


Linear Surge Stoppers

During normal operation, a linear surge stopper fully turns on the MOSFET to provide a low resistance path for the load current. When the input supply voltage surges, the output is linearly regulated to a safe voltage set by a resistive divider, enabling ride-through operation. A capacitive fault timer protects the MOSFET by limiting the time spent in the high dissipation regulation state.

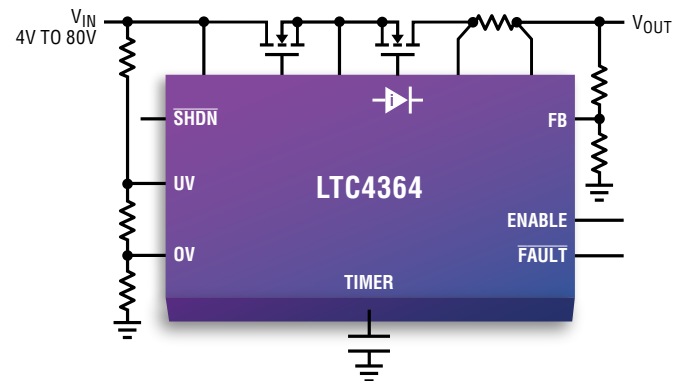
Surge Stopper with Circuit Breaker

- ▶ Resistor-Adjustable 2% Accurate Clamp Voltage
- ▶ Input Surge: Linear Regulator for Adjustable Time
- ▶ –60V Reverse Input Protection
- ▶ Foldback Current-Limited Circuit Breaker with Adjustable Delay
- ▶ Fault Timer Accelerated by MOSFET Voltage Drop



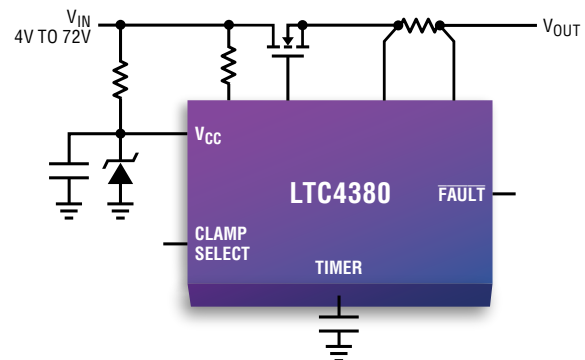
Surge Stopper with Ideal Diode

- ▶ LT4363 Functions Plus Ideal Diode Control
- ▶ Ideal Diode for Output Holdup and Reverse Protection
- ▶ Resistor-Adjustable 2.4% Accurate Clamp Voltage
- ▶ –40V Reverse-Input, –20V Reverse-Output Protection



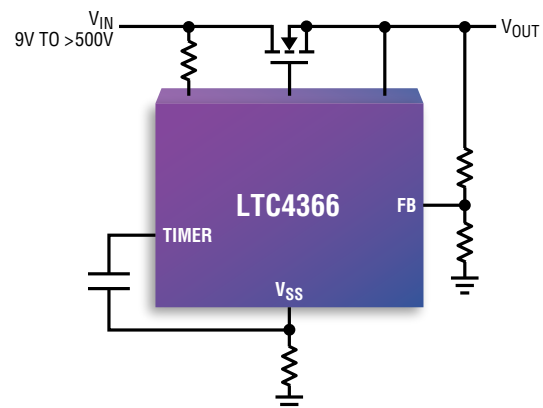
8μA Quiescent Current Surge Stopper

- ▶ Low 8μA Operating I_Q , 6μA in Shutdown
- ▶ Pin-Selectable Gate Clamp for 12V and 24V/28V Systems
- ▶ Input Surge: Clamps MOSFET Gate for Adjustable Time
- ▶ –60V Reverse Input Protection
- ▶ Current-Limited Circuit Breaker with Adjustable Delay
- ▶ Fault Timer Accelerated by MOSFET Power



Floating Surge Stopper

- ▶ Rugged Floating Topology for >500V Operation
- ▶ Resistor-Adjustable 3% Accurate Clamp Voltage
- ▶ Input Surge: Linear Regulator for Adjustable Time

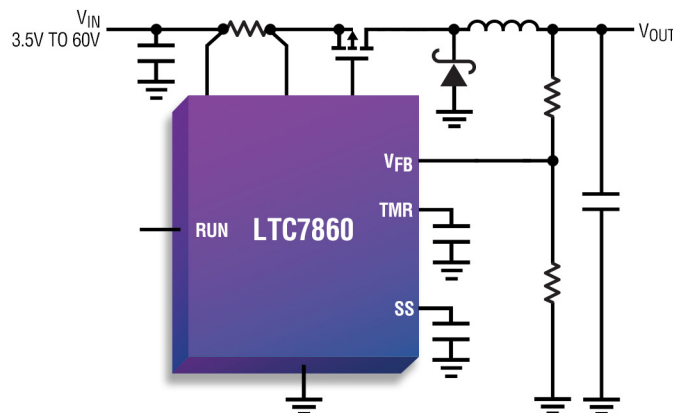


Switching Surge Stopper

During normal operation, a switching surge stopper turns on an external MOSFET continuously to pass the input voltage through to the output with minimum conduction loss. When an input voltage surge occurs, it starts switching the external MOSFET to operate as a high efficiency switching DC/DC regulator to protect critical downstream components by limiting the output voltage and current.

High Efficiency Switching Surge Stopper

- ▶ High Efficiency for High Power (>5A) Surges
- ▶ Normal Operation: 100% Duty Cycle with MOSFET On
- ▶ Input Surge: Switching Regulator with Adjustable Timer
- ▶ Resistor Adjustable 1.1% Accurate Clamp Voltage
- ▶ Adjustable Current Limit
- ▶ Inherent LC Filter Improves Input EMI



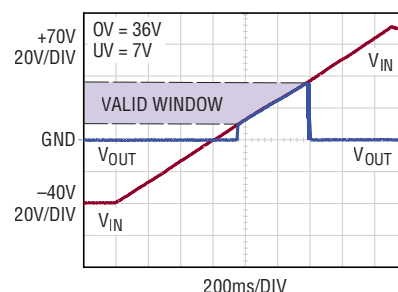
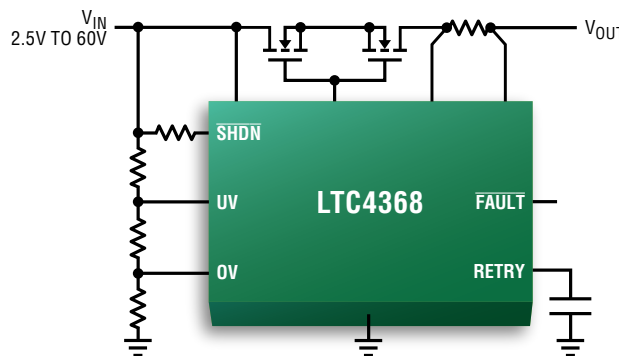
Protection Controllers

Protection controllers disconnect immediately during overvoltage and provide a compact solution for power entry protection in battery-powered portable equipment.

Undervoltage (UV), Overvoltage (OV), Overcurrent (OC), and Reverse Input (RI) Protection Controllers

- ▶ Block Voltages Outside UV-OV Window
- ▶ -40V Reverse Input Protection
- ▶ Adjustable 1.5% Accurate UV, OV Thresholds
- ▶ Low Quiescent and Shutdown Currents
- ▶ Compact Solution Footprint

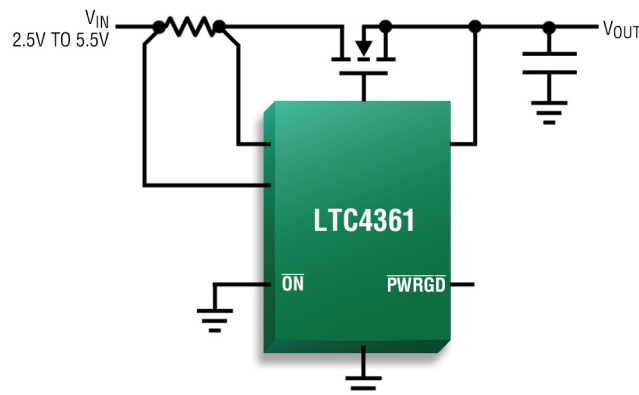
Device	V _{IN}	UV	OV	RI	OC	Forward Current Trip	Reverse Current Trip
LTC4365	2.5V to 34V	•	•	•			
LTC4367	2.5V to 60V	•	•	•			
LTC4368	2.5V to 60V	•	•	•	•	50mV	-50mV/-3mV



Overvoltage and Overcurrent Protection Controllers

- ▶ 2.5V to 5.5V Operation
- ▶ Fixed 5.8V ±2% Overvoltage Turn-Off Threshold
- ▶ <1μs Fast Overvoltage Turn-Off
- ▶ Reverse Input Protection FET Driver Output
- ▶ Compact Solution Footprint

Device	V _{IN(MAX)}	OV	OC	MOSFET
LTC4360	80V	•		External N-Ch
LTC4361	80V	•	•	External N-Ch
LTC4362	28V	•	•	Internal 1.5A



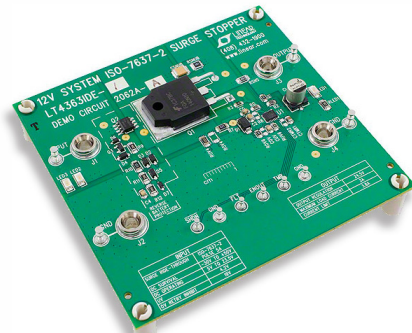
Solutions for Automotive and Military Surge Standards

Analog Devices provides evaluation boards demonstrating surge stopper circuits for automotive and military surge standards such as ISO-7637-2 and MIL-STD-1275D. Each board has been tested by an independent lab with the complete test report available online.

DC2062 for 12V, 3.8A ISO-7637-2 Application

- ▶ Features LT4363 Surge Stopper
- ▶ Rides through 100V, 500ms Load Dump Pulse
- ▶ Latchoff and Auto-Retry Options

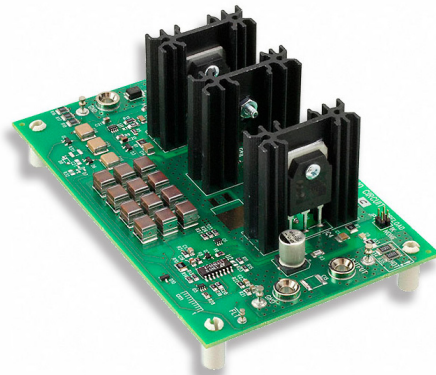
Parameter	Min	Typ	Max	Units
Input Supply Operating Range	5	12	23.5	V
Input Supply 500ms Surge	100			V
Output Regulation Voltage	23.5	25	25.4	V
Current Limit	3	3.8	4.6	A



DC2150 for 28V, 5A MIL-STD-1275D Application

- ▶ Features LTC4366 and LT4363 Surge Stoppers
- ▶ Rides through 100V, 500ms Surge
- ▶ Four Assembly Options, Full-Featured Option Available

Parameter	Min	Typ	Max	Units
Input Supply Operating Range	8	28	40	V
Input Supply 500ms Surge	100			V
Output Regulation Voltage	41	43.6	46	V
Current Limit	4.4	5	5.6	A



Overvoltage Protection Selection Guide

Device	OVP Type*	OCP	Operating V_{IN}	Stops V_{IN}	Reverse Input	I_O (μ A)	I_{SHDN} (μ A)	MOSFET	OVP Accuracy	Fault Timer	Blocks I_{REV}	Temp Grades	Demo Board	Package (mm x mm)
Surge Stoppers														
LT4356	1	•†	4V to 80V	>100V	-60V	1210	7	N-Ch	2%	•		C, I, H, MP	DC1018	4x3 DFN-12, MSOP-10, SO-16
LT4363	1	•	4V to 80V	>100V	-60V	970	7	N-Ch	2%	•		C, I, H, MP	DC1935	4x3 DFN-12, MSOP-12, SO-16
LTC4364	1	•	4V to 80V	>100V	-40V	483	10	N-Ch	2.4%	•	•	C, I, H	DC2027	4x3 DFN-14, MSOP-16, SO-16
LTC4366	1		9V to >500V	>500V	External	159	5	N-Ch	3%	•		C, I, H, MP	DC1850	3x2 DFN-8, TSOT-8
LTC4380	2	•	4V to 72V	>100V	-60V	8	6	N-Ch	~10%	•		C, I, H	DC2178	3x3 DFN-10, MSOP-10
LTC7860	3	•	3.5V to 60V	>100V	External	770	7	P-Ch	1.1%	•		E, I, H, MP	DC2239	MSOPE-12
Protection Controllers														
LTC4365	4		2.5V to 34V	>100V	-40V	125	10	N-Ch	1.5%			C, I, H	DC1555	3x2 DFN-8, TSOT-8
LTC4367	4		2.5V to 60V	>100V	-40V	70	5	N-Ch	1.5%			C, I, H	DC2417	3x3 DFN-8, MSOP-8
LTC4368	4	•	2.5V to 60V	>100V	-40V	80	5	N-Ch	1.5%		•	C, I, H	DC2418	3x3 DFN-10, MSOP-10
LTC4360	4		2.5V to 5.5V	80V	External	230	1.5	N-Ch	2%			C, I	DC1505	SC70-8
LTC4361	4	•	2.5V to 5.5V	80V	External	230	1.5	N-Ch	2%			C, I, H	DC1506	2x2 DFN-8, TSOT-8
LTC4362	4	•	2.5V to 5.5V	28V	External	220	1.5	1.5A	2%			C, I	DC1575	2x3 DFN-8

OCP = Overcurrent Protection, * Overvoltage Protection Type: 1 = Linear regulation of output; 2 = Clamps MOSFET gate voltage; 3 = Switching regulation of output; 4 = Disconnects output from input; † Overcurrent protection only below 100V

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