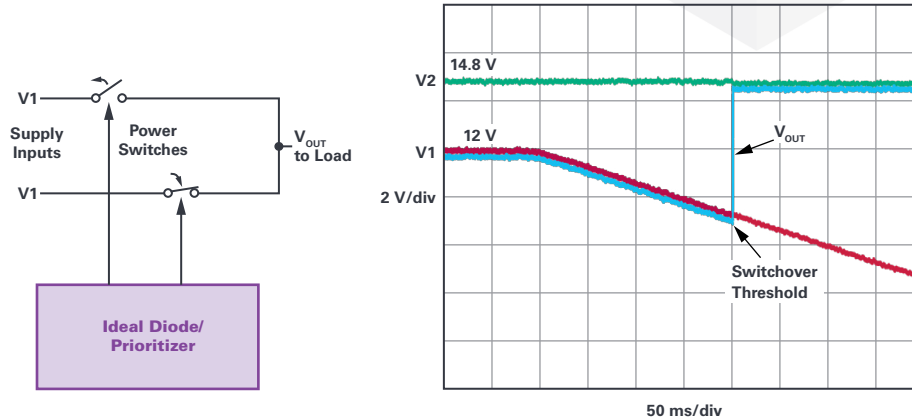


# Ideal Diodes and Prioritizers



Output Switchover to V2 on V1 Undervoltage

## Active ORing

## Backup Switchover

## Supply Holdup

Ideal diodes and prioritizers simplify dynamic supply selection and switchover in high availability electronics employing sources such as wall adapters, USB ports, batteries, and redundant supplies. They reduce solution footprint by integrating the needed amplifiers, comparators, charge pumps, and control logic into a single device. Supplies are multiplexed either by highest voltage or by highest priority with MOSFETs acting as power switches, minimizing voltage and power loss between the supply and the load.

### Benefits

- ▶ Seamless and oscillation-free switchover between supplies
- ▶ Supply selection based on voltage or priority
- ▶ Supplies protected from reverse and cross conduction currents
- ▶ Load protected from reversed supply input
- ▶ Low quiescent current extends battery run and standby time
- ▶ MOSFET power switch: internal or external, N-channel or P-channel, single or back-to-back
- ▶ Broad and growing portfolio covering wide voltage/current range and functions

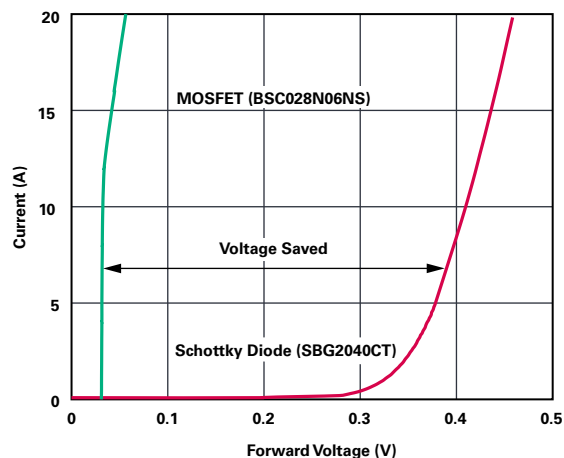
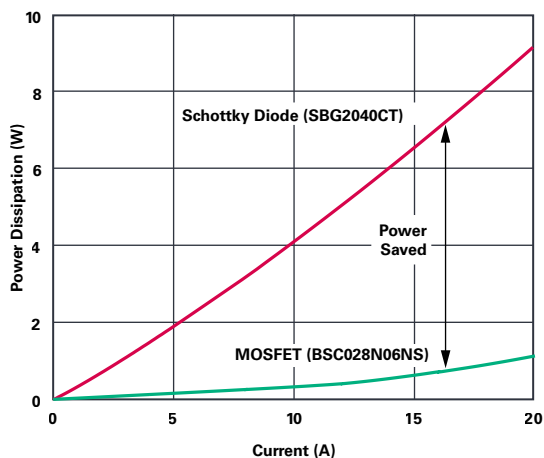
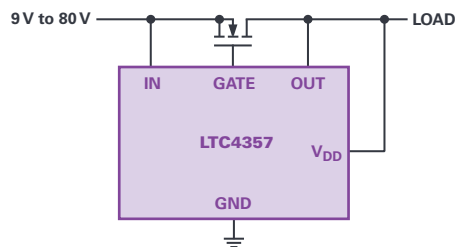
### MOSFET Power Switch Configurations ( $V_{IN}$ to $V_{OUT}$ )

Type	Single	Back to Back
N-Channel		
P-Channel		

Comparison	Ideal Diode	Prioritizer
Supply Selection	Highest voltage	Highest priority (if supply voltage is in valid range)
Typical Application	Redundant supply (similar voltage) ORing	Battery operated systems with various supply voltages
MOSFET Operating State	Forward voltage drop regulated below 50 mV	Fully on, forward voltage drop is $I_{LOAD} \times R_{ON}$
Load Sharing	Yes, droop sharing when supply voltages are close	None, only one supply path is on at a time
Similar Uses	Ideal diodes that block forward current with back-to-back MOSFETs can prioritize	Prioritizer in redundant supply application favors one supply over the rest

## Ideal Diode Controller

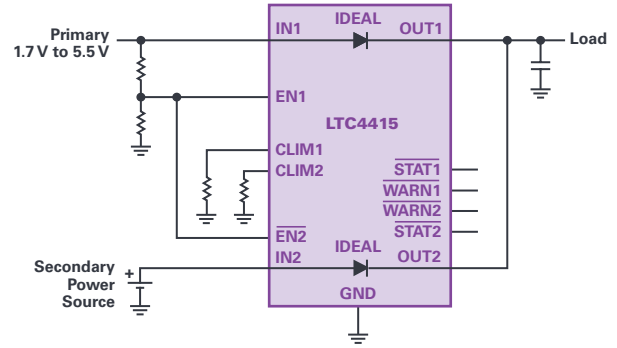
- ▶ Connects highest voltage supply to output
- ▶ Low forward turn-on voltage (<50 mV)
- ▶ Controls external N-channel or P-channel MOSFETs
- ▶ Linear regulation of MOSFET forward voltage drop
- ▶ Conserves voltage and power over Schottky diodes
- ▶ Minimizes or eliminates heat sinks
- ▶ Works as high-side load switch with back-to-back MOSFETs
- ▶ Blocks reversed inputs from load



Device	Supplies	$V_{IN}$ (V)	FET Type	$I_D$	High-Side Switch	Features	Package (mm × mm)
LTC4352	1	0 to 18	N-channel	1.5 mA	•	0.5 $\mu$ s fast turn-on	3 × 3, 12-lead DFN, 12-lead MSOP
LTC4412	1	2.5 to 36	P-channel	18 $\mu$ A	•	Blocks $-14 V_{IN}$	6-lead TSOT-23
LTC4414	1	3 to 36	P-channel	36 $\mu$ A	•	Drives large PFETs, blocks $-14 V_{IN}$	8-lead MSOP
LT8672	1	3 to 42	N-channel	20 $\mu$ A		Rectifies 100 kHz, blocks $-40 V_{IN}$	10-lead MSOP
LTC4359	1	4 to 80	N-channel	150 $\mu$ A	•	Blocks $-40 V_{IN}$	2 × 3, 6-lead DFN, 8-lead MSOP, 8-lead SO
LTC4357	1	9 to 80	N-channel	930 $\mu$ A		Separate bias input	2 × 3, 6-lead DFN, 8-lead MSOP
LTC4371	2	$-4.5$ to $> -100$	N-channel	300 $\mu$ A		Floating topology for negative supplies	3 × 3, 10-lead DFN, 10-lead MSOP
LTC4353	2	0 to 18	N-channel	1.6 mA		1 $\mu$ s fast turn-on	4 × 3, 16-lead DFN, 16-lead MSOP
LTC4370	2	0 to 18	N-channel	2.3 mA		Load sharing	4 × 3, 16-lead DFN, 16-lead MSOP
LTC4416	2	3.6 to 36	P-channel	70 $\mu$ A	•	Dual LTC4414	10-lead MSOP
LTC4355	2	9 to 80	N-channel	2.6 mA		$V_{IN}$ , fuse, MOSFET monitors	4 × 3, 14-lead DFN, 16-lead MSOP, 16-lead SO
LTC4372/ LTC4373	1	2.5 to 80	N-channel	5 $\mu$ A	•	Blocks $-28 V_{IN}$	3 × 3, 8-lead DFN, 8-lead MSOP

## Ideal Diode

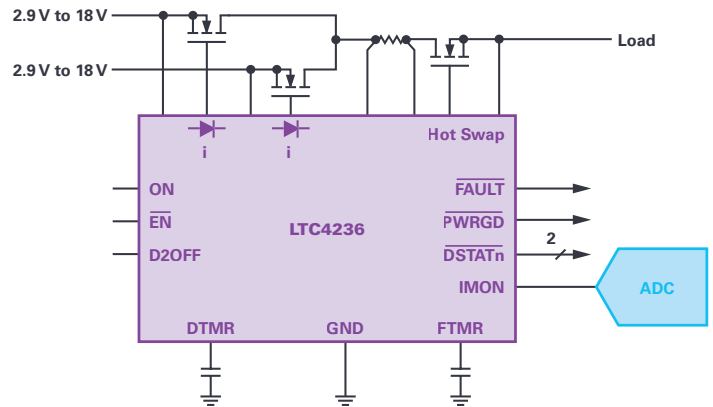
- ▶ Internal power MOSFET for compact solution footprint
- ▶ Load currents up to 7 A
- ▶ Low reverse leakage current (<1  $\mu\text{A}$  at 25°C, <10  $\mu\text{A}$  at 125°C)



Device	Supplies	$V_{IN}$ (V)	Max $I_{LOAD}$ (A)	$R_{ON}$ (m $\Omega$ )	$I_Q$ ( $\mu\text{A}$ )	High-Side Switch	Features	Package (mm $\times$ mm)
LTC4411	1	2.6 to 5.5	1.8	140	40	•	Current limit	5-lead TSOT-23
LTC4376	1	4 to 40	7	15	150	•	Blocks $-40 V_{IN}$	5 $\times$ 4, 16-lead DFN
LTC4358	1	9 to 26.5	5	20	780		Separate bias supply input	4 $\times$ 3, 14-lead DFN, 16-lead TSSOP EP
LTC4415	2	1.7 to 5.5	4	50	44	•	Current monitor and limit (adjustable)	5 $\times$ 3, 16-lead DFN, 16-lead MSOP EP
LTC4413	2	2.5 to 5.5	1.8	140	25	•	Current limit	3 $\times$ 3, 10-lead DFN

## Ideal Diode and Hot Swap Controller

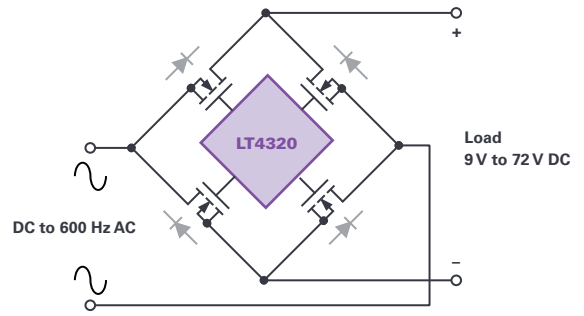
- ▶ Ideal diode (ID) for redundant supply active ORing, reverse current blocking, and supply holdup
- ▶ Hot swap (HS) for inrush current control, overcurrent and under/overvoltage protection (UV/OV)
- ▶ Fast 0.5  $\mu\text{s}$  ideal diode turn-on and turn-off time
- ▶ Current-limited circuit breaker with adjustable delay
- ▶ Current monitoring (CM), power good, circuit breaker fault, and diode status (DS) outputs



Device	Configuration	$V_{IN}$ (V)	$I_Q$	OV	Output		Features	Package (mm $\times$ mm)
					CM	DS		
LTC4229	HS + ID	2.9 to 18	2.5 mA	•		•	Prioritizer, adjustable debounce delay	4 $\times$ 5, 24-lead QFN, 24-lead SSOP
LTC4364	HS + ID	4 to 80	483 $\mu\text{A}$	•			Surge stopper	4 $\times$ 3, 14-lead DFN, 16-lead MSOP, 16-lead SO
LTC4227	HS + dual ID	2.9 to 18	3.3 mA				100 ms/1.6 ms debounce options	4 $\times$ 5, 20-lead QFN, 16-lead SSOP
LTC4236	HS + dual ID	2.9 to 18	3.6 mA		•	•	Prioritizer, adjustable debounce delay	4 $\times$ 5, 28-lead QFN
LTC4235	HS + dual ID	9 to 14	3.6 mA		•		Preset 12 V power good threshold	4 $\times$ 5, 20-lead QFN
LTC4228	Dual (HS + ID)	2.9 to 18	3 mA			•	Complete dual ID for microTCA systems	4 $\times$ 5, 28-lead QFN, 28-lead SSOP

## Ideal Diode Bridge Controller

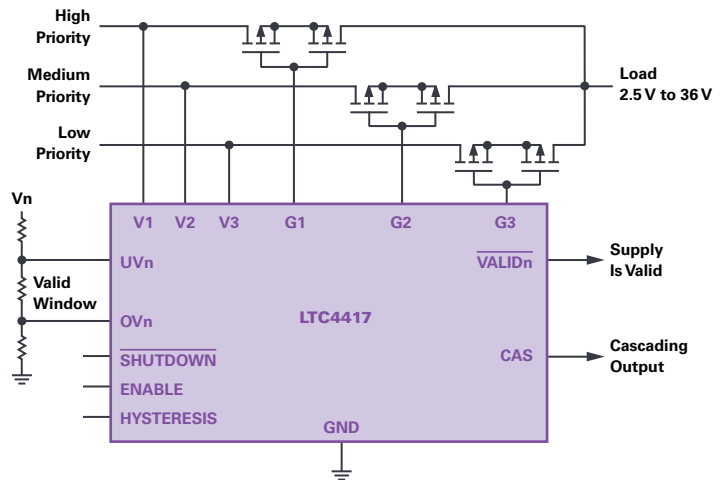
- ▶ Full-wave ac rectification or dc polarity correction
- ▶ Replaces diodes in full-wave bridge rectifier with N-channel MOSFETs
- ▶ Maximizes power efficiency and available voltage
- ▶ Minimizes heat to ease thermal design
- ▶ LT4321 for power over Ethernet (PoE) powered device (PD) applications



Device	Supplies	Operating DC Voltage (V)	Input Frequency Range	I <sub>Q</sub> (mA)	Features	Package (mm × mm)
LT4320	1	9 to 72	DC to 600 Hz	1.3	3-phase ac with 3× LT4320	3 × 3, 8-lead DFN, 12-lead MSOP EP, 8-lead PDIP
LT4321	2	20 to 80	DC only	0.5	For PoE PD, IEEE 802.3 compliant	4 × 4, 16-lead QFN

## Prioritizer

- ▶ Connects highest priority valid supply to load
- ▶ Priority defined by pin assignment
- ▶ Valid window set by precise undervoltage and overvoltage thresholds
- ▶ Low quiescent current, shutdown mode, and freshness seal extends battery run and standby time
- ▶ Protects load from reversed input
- ▶ Cascadable to extend number of supply inputs



Device	Supplies	V <sub>IN</sub> (V)	Max I <sub>LOAD</sub>	Reverse Input Protection (V)	I <sub>Q</sub> (μA)	Cascadable	Features	Package (mm × mm)
LTC4419	2	1.8 to 18	0.5 A	-15	3.6		Freshness seal	3 × 3, 10-lead DFN, 12-lead MSOP EP
LTC4420	2	1.8 to 18	0.5 A	-15	3.6		LTC4419 and backup disconnect	3 × 3, 12-lead DFN, 12-lead MSOP EP
LTC4418	2	2.5 to 40	Ext PFET	-42	26	•	Adjustable validation time	4 × 4, 20-lead QFN
LTC4421	2	0 to 36	Ext NFET	-42	600	•	Per supply current limiting	5 × 6, 36-lead QFN, 36-lead SSOP
LTC4417	3	2.5 to 36	Ext PFET	-42	28	•	256 ms validation time	4 × 4, 24-lead QFN, 24-lead SSOP

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