VIPerPlus

Truly innovative AC-DC conversion

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Advanced solutions for switch-mode power supplies

ST's VIPerPlus series of high-voltage converters combine the innovative avalanche-rugged SuperMESH(TM) power MOSFET with state-of-the-art PWM circuitry. The result is truly innovative AC-DC conversion that is efficient, simpler, quicker and - with component count halved - less expensive.

In addition to benefits such as optimized current-mode control and comprehensive built-in protection circuits, the VIPerPlus family represents the easiest solution to comply with the Blue Angel and Energy Star eco norms, with extremely low total power consumption from the mains when the system is in standby mode.

Key benefits

- Ultra-low power-supply consumption: 30 mW standby at 265 V_{AC}
- Easily meets all energy efficiency regulations
- Avalanche-rugged 800 V power section for high robustness and reduced clamp cost
- Jittering feature reduces EMI filter cost and helps meet the EN550022 class B specifications
- High efficiency using quasi-resonant version
- No auxiliary winding costs for very low-power SMPS
- Embedded advanced protection features for high PSU reliability
- Easily compliant with the 2002/95/EC European directive
- Extended pin creepage distance for safe operation in humid environments

Description	Power section: 800 V avalanche rugged						
	$R_{DS(on)}$: 24 ohm			$R_{DS(on)}$: 7 ohm			
	I_{DLIM}: 400 mA			I_{DLIM}: 700 mA			I_{DLIM}: 800 mA
	VIPER15	VIPER16	VIPER17	VIPER25	VIPER26	VIPER27	VIPER28
Fixed-frequency PWM current-mode controller			✓			✓	✓
Quasi-resonant PWM current-mode controller	✓			✓			
Fixed-frequency PWM current-mode controller with embedded error amplifier		✓			✓		
Limiting drain current with adjustable set point	✓	✓	✓	✓	✓	✓	✓
Fixed-frequency 60 kHz (L type) or 115 kHz (H type) with jittering		✓	✓		✓	✓	✓
Advanced standby management	✓	✓	✓	✓	✓	✓	✓
Automatic autorestart after fault	✓	✓	✓	✓	✓	✓	✓
Advanced overload and short circuit management	✓	✓	✓	✓	✓	✓	✓
Accurate overvoltage protection	✓		✓	✓		✓	✓
Open-loop failure detection		✓			✓		
Feed forward compensation	✓			✓			
On-board soft start up	✓	✓	✓	✓	✓	✓	✓
Hysteretic thermal shutdown	✓	✓	✓	✓	✓	✓	✓
Brown-out protection	✓		✓	✓		✓	
Extra power timer for peak power management							✓
Eliminates bias winding supply		✓					
Packages	DIP7 (N type) SO16N (D type)			DIP7 (N type) SO16N (D type)			
Maximum output power with 230 V_{AC} ±10%	up to 10 W			up to 20 W			
Maximum output power with 85 to 265 V_{AC}	up to 6 W			up to 12 W			

Topologies and applications

VIPerPlus converters are suitable for a wide range of applications and switch-mode power supply topologies.

VIPerPlus selection (by SMPS topology)	Power section: 800 V avalanche-rugged						
	$R_{DS(on)}$: 24 ohm			$R_{DS(on)}$: 24 ohm			
	I_{DLIM}: 400 mA			I_{DLIM}: 700 mA			I_{DLIM}: 800 mA
	VIPER15	VIPER16	VIPER17	VIPER25	VIPER26	VIPER27	VIPER28
Buck converter		✓			✓		
Buck-boost converter		✓			✓		
Flyback isolated converter	✓	✓	✓	✓	✓	✓	✓
Flyback primary regulation converter	✓	✓☺	✓	✓	✓☺	✓	✓
Flyback non-isolated converter	✓	✓☺	✓	✓	✓☺	✓	✓

☺ = high-performance topology

Home appliances: washing machines, dishwashers, dryers, ovens, fridges

VIPerPlus function

- Power supplies for microcontrollers and displays

Non-isolated PSU: Viper16, Viper26

Isolated PSU: Viper15, Viper17, ViperV25, Viper27

Main benefits

- Robustness: 800 V avalanche-rugged power section plus embedded failure protection functions
- Cost saving: Easy design for positive and negative voltages with minimized total component count
- Flexibility: Same PCB for PSU from 1 W to 12 W
- Energy saving: 30 mW PSU standby and high efficiency

Smaller home appliances: coffee makers, food processors, microwave ovens

VIPerPlus function

- Replacement of capacitive power supplies

Non-isolated PSU: Viper16, Viper26

Main benefits

- Energy saving: 30 mW PSU standby and high efficiency
- Cost saving: Minimized design for positive or negative voltage without transformer and self supplied.
- In case of fly-back converter, eliminates the auxiliary winding.
- EMI: Easily meets the EN550022 class B specification
- Robustness: 800 V avalanche-rugged power section plus embedded failure protection functions

Consumer electronics: LCD TVs, DVD players/recorders and set-top boxes, home theater

VIPerPlus function
- Auxiliary power supplies

Non-isolated PSU	Viper16	Viper26				
Isolated PSU	Viper15	Viper17	Viper25	Viper27	Viper28	

Main benefits
- Energy saving: 30 mW PSU standby and high efficiency
- Robustness: 800 V avalanche-rugged power section plus embedded failure protection functions, brown-out function or peak power management
- Cost saving: Simple design with minimized total component count
- EMI: Easily meets the EN550022 class B specification
- Flexibility: Same PCB for PSU from 1 W to 12 W

LED driver: architectural lighting, interior decorating lighting, emergency lights

VIPerPlus function
- Power supplies

Non-isolated PSU	Viper16	Viper26				
Isolated PSU	Viper15	Viper17	Viper25	Viper27	Viper28	

Main benefits
- Energy saving: 30 mW PSU standby and high efficiency
- Robustness: 800 V avalanche-rugged power section plus embedded failure protection functions
- Cost saving: Simple design with minimized total component count and high reliability
- Flexibility: Same PCB for PSU from 1 W to 12 W

Computer: desktop PC, server

VIPerPlus function
- Auxiliary power supplies

Non-isolated PSU	Viper26			
Isolated PSU	Viper25	Viper27	Viper28	

Main benefits
- Energy saving: 30 mW PSU standby and high efficiency
- Robustness: 800 V avalanche-rugged power section plus embedded failure protection functions and peak power management
- Cost saving: Simple design with minimized total component count
- EMI: Easily meets the EN550022 class B specification
- Flexibility: Same PCB for PSU from 1 W to 12 W

Adapters, chargers for: mobile/smart phones, cordless appliances, shavers, toys, digital cameras, MP3/ portable audio

VIPerPlus function
- Power supply

Non-isolated PSU	Viper16	Viper26		
Isolated PSU	Viper15	Viper17	Viper25	Viper27

Main benefits
- Energy: 30 mW standby and high efficiency compliant with all relevant standards
- Robustness: 800 V avalanche-rugged power section plus embedded failure protection functions and peak power management
- Cost saving: Simple design with minimized total component count
- Flexibility: Same PCB for PSU from 1 W to 12 W

Product table

Part number	Package	Packaging	$R_{DS(on)}$ max (ohm)	I_{DLIM} (mA)	Breakdown voltage (V)	VDD range (V)	Switching mode	F_{SW} (kHz)
VIPER15LN	DIP-7	Tube	24	400	800	8.5 to 23	Quasi-resonant	variable (limited to 150 kHz)
VIPER15HN	DIP-7	Tube	24	400	800	8.5 to 23	Quasi-resonant	variable (limited to 225 kHz)
VIPER15LD	SO16N	Tube	24	400	800	8.5 to 23	Quasi-resonant	variable (limited to 150 kHz)
VIPER15HD	SO16N	Tube	24	400	800	8.5 to 23	Quasi-resonant	variable (limited to 225 kHz)
VIPER15LDTR	SO16N	Tape and reel	24	400	800	8.5 to 23	Quasi-resonant	variable (limited to 150 kHz)
VIPER15HDTR	SO16N	Tape and reel	24	400	800	8.5 to 23	Quasi-resonant	variable (limited to 225 kHz)
VIPER16LN	DIP-7	Tube	24	400	800	8.5 to 23(1)	Fixed-frequency	60
VIPER16HN	DIP-7	Tube	24	400	800	8.5 to 23(1)	Fixed-frequency	115
VIPER16LD	SO16N	Tube	24	400	800	8.5 to 23(1)	Fixed-frequency	60
VIPER16HD	SO16N	Tube	24	400	800	8.5 to 23(1)	Fixed-frequency	115
VIPER16LDTR	SO16N	Tape and reel	24	400	800	8.5 to 23(1)	Fixed-frequency	60
VIPER16HDTR	SO16N	Tape and reel	24	400	800	8.5 to 23(1)	Fixed-frequency	115
VIPER17LN	DIP-7	Tube	24	400	800	8.5 to 23	Fixed-frequency	60
VIPER17HN	DIP-7	Tube	24	400	800	8.5 to 23	Fixed-frequency	115
VIPER17LD	SO16N	Tube	24	400	800	8.5 to 23	Fixed-frequency	60
VIPER17HD	SO16N	Tube	24	400	800	8.5 to 23	Fixed-frequency	115
VIPER17LDTR	SO16N	Tape and reel	24	400	800	8.5 to 23	Fixed-frequency	60
VIPER17HDTR	SO16N	Tape and reel	24	400	800	8.5 to 23	Fixed-frequency	115
VIPER25LN	DIP-7	Tube	7	700	800	8.5 to 23	Quasi-resonant	variable (limited to 150 kHz)
VIPER25HN	DIP-7	Tube	7	700	800	8.5 to 23	Quasi-resonant	variable (limited to 225 kHz)
VIPER25LD	SO16N	Tube	7	700	800	8.5 to 23	Quasi-resonant	variable (limited to 150 kHz)
VIPER25HD	SO16N	Tube	7	700	800	8.5 to 23	Quasi-resonant	variable (limited to 225 kHz)
VIPER25LDTR	SO16N	Tape and reel	7	700	800	8.5 to 23	Quasi-resonant	variable (limited to 150 kHz)
VIPER25HDTR	SO16N	Tape and reel	7	700	800	8.5 to 23	Quasi-resonant	variable (limited to 225 kHz)
VIPER26LN	DIP-7	Tube	7	700	800	8.5 to 23	Fixed-frequency	60
VIPER26HN	DIP-7	Tube	7	700	800	8.5 to 23	Fixed-frequency	115
VIPER26LD	SO16N	Tube	7	700	800	8.5 to 23	Fixed-frequency	60
VIPER26HD	SO16N	Tube	7	700	800	8.5 to 23	Fixed-frequency	115
VIPER26LDTR	SO16N	Tape and reel	7	700	800	8.5 to 23	Fixed-frequency	60
VIPER26HDTR	SO16N	Tape and reel	7	700	800	8.5 to 23	Fixed-frequency	115
VIPER27LN	DIP-7	Tube	7	700	800	8.5 to 23	Fixed-frequency	60
VIPER27HN	DIP-7	Tube	7	700	800	8.5 to 23	Fixed-frequency	115
VIPER27LD	SO16N	Tube	7	700	800	8.5 to 23	Fixed-frequency	60
VIPER27HD	SO16N	Tube	7	700	800	8.5 to 23	Fixed-frequency	115
VIPER27LDTR	SO16N	Tape and reel	7	700	800	8.5 to 23	Fixed-frequency	60
VIPER27HDTR	SO16N	Tape and reel	7	700	800	8.5 to 23	Fixed-frequency	115
VIPER28LN	DIP-7	Tube	7	800	800	8.5 to 23	Fixed-frequency	60
VIPER28HN	DIP-7	Tube	7	800	800	8.5 to 23	Fixed-frequency	115
VIPER28LD	SO16N	Tube	7	800	800	8.5 to 23	Fixed-frequency	60
VIPER28HD	SO16N	Tube	7	800	800	8.5 to 23	Fixed-frequency	115
VIPER28LDTR	SO16N	Tape and reel	7	800	800	8.5 to 23	Fixed-frequency	60
VIPER28HDTR	SO16N	Tape and reel	7	800	800	8.5 to 23	Fixed-frequency	115

(1) eliminates the bias winding supply

Design support

Part number	Package	F_{sw} (kHz)	Evaluation board order code	Description	Application note	Input voltage (Vac)	Output voltage (V)	Output current (A)
VIPER16HN	DIP-7	115	EVLVIP16H-4WFN	Non isolated fly-back PSU	*	85 to 265	16	0.25
VIPER16HN	DIP-7	115	EVLVIP16H-4WFL	Isolated flyback PSU	*	85 to 265	16	0.25
VIPER16LN	DIP-7	60	EVLVIP16L-4WFN	Non isolated fly-back PSU	*	85 to 265	16	0.25
VIPER16LN	DIP-7	60	EVLVIP16L-4WFL	Isolated flyback PSU	*	85 to 265	16	0.25
VIPER16LN	DIP-7	60	STEVAL-ISA010V1	Non-isolated buck converter	AN2872	85 to 500	12/5	0.15
VIPER17HN	DIP-7	115	EVLVIP17-5WCHG	Battery charger (isolated flyback)	AN2840	85 to 265	5	1
VIPER17HN	DIP-7	115	STEVAL-ILL017V1	LED driver (non-isolated flyback)	AN2811	220 ±10%	7	0.5
VIPER17HN	DIP-7	115	STEVAL-ISA062V1	Isolated flyback PSU	AN2934	85 to 265	5/12	0.5/0.25
VIPER17HN	DIP-7	115	STEVAL-ISA060V1	Isolated flyback PSU	AN2753	85 to 265	12	0.5
VIPER17LN	DIP-7	60	EVALVIPER17L-6W	Isolated flyback PSU	AN2803	85 to 265	12	0.5
VIPER17LN	DIP-7	60	STEVAL-ISA058V1	Isolated flyback PSU (standby 30 mW)	AN2864	85 to 265	5	1
VIPER28HN	DIP-7	115	EVLVIPER28H-10W	Isolated flyback PSU	*	85 to 265	5	2.4
VIPER28LN	DIP-7	60	EVLVIPER28L-10W	Isolated flyback PSU	*	85 to 265	5	2.4

* coming soon

DIP7 and SO16N packages

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