



Working Together for a Greener Society

Future of Power Electronics and the Earth



Off-Line PWM Controllers with Integrated Power MOSFET

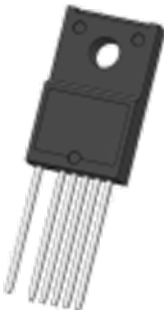
STR3W400MXD Series



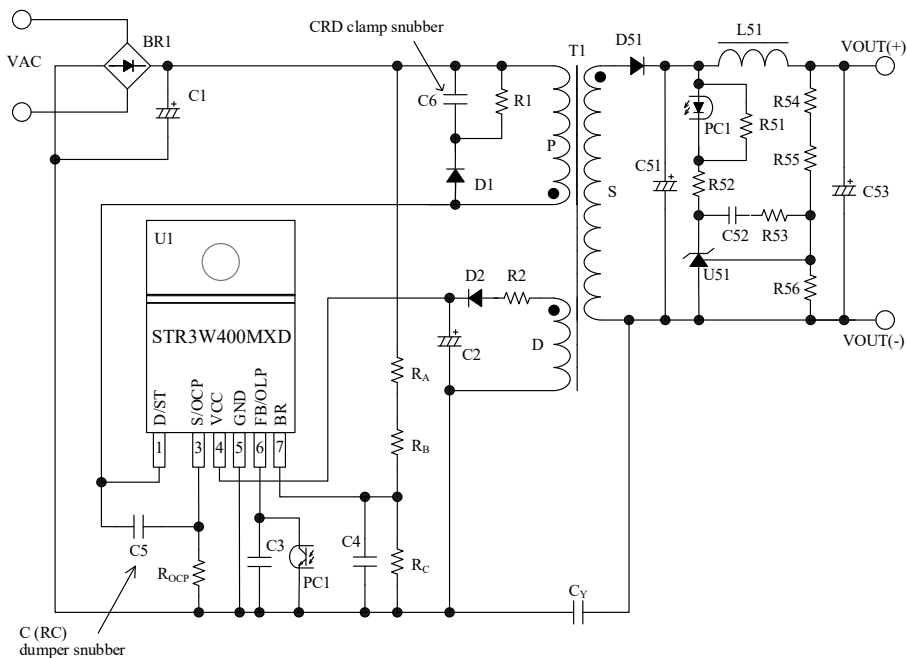
The STR3W400MXD series are PWM off-line converter ICs with built-in power MOSFETs.

■ Package

TO220F-6L



■ Typical Application



■ Specifications

Parameter	STR3W400MXD
Green Mode	✓
Step Drive	✓
Standby Power at No Load	30 mW
Soft Start	7 steps
OCP Precision	±5%
OVP Precision	±7%
Brown-in Precision	±4.5%

■ Pin Functions

Pin No.	Pin Name	Description
1	D/ST	Power MOSFET drain; startup current input
3	S/OCP	Power MOSFET source; OCP signal input
4	VCC	Logic power supply input; OVP signal input
5	GND	Ground
6	FB/OLP	Constant voltage control signal input; OLP signal input
7	BR	AC input high-voltage protection

High Efficiency in All Load Ranges

- **Green mode control:** Lowers oscillation frequency at light load to reduce loss.
- **Step drive control:** Allows secondary rectifier diodes to have V_{RM} lower than conventional. → Lower V_F
- Input power at no load: <30 mW

Protection Functions

- OCP: Pulse-by-pulse
- OLP: Auto-restart
- OVP/TSD: Auto-restart
- AC Input High-voltage Protection (HVP) : Auto-restart
- Brown-in and Brown-out Function : Auto-restart

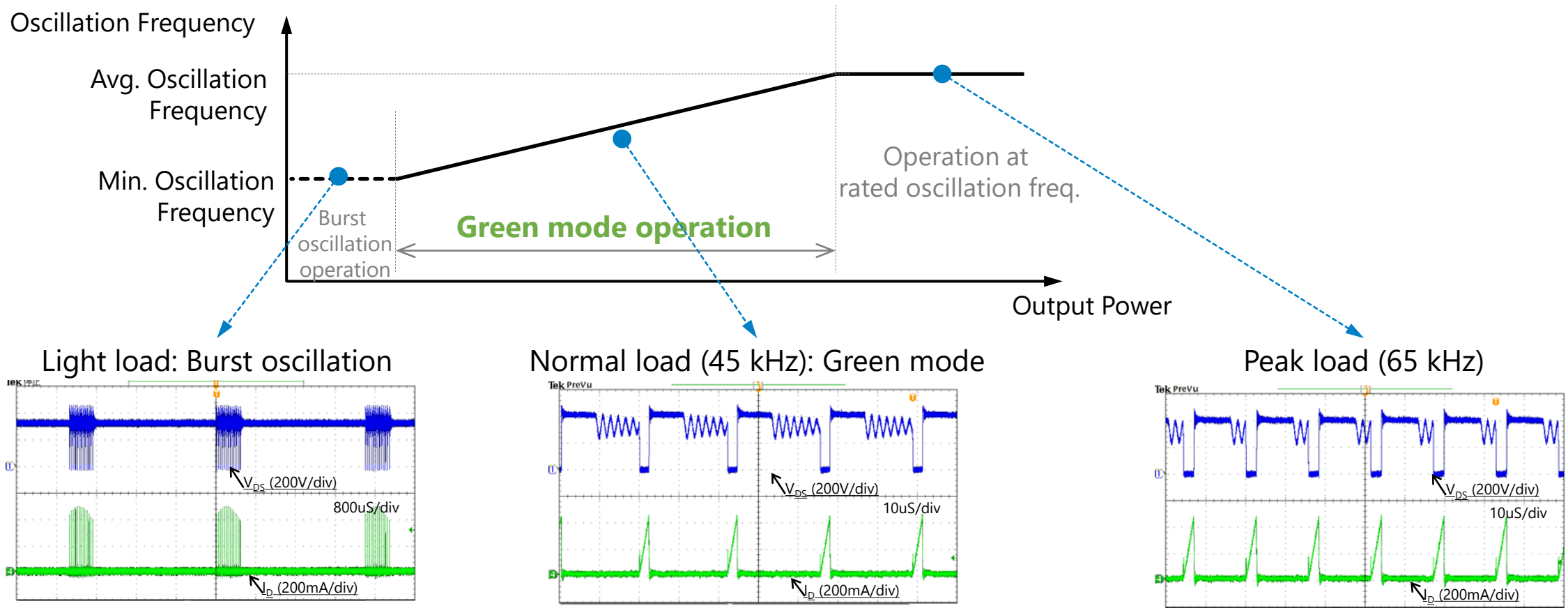
Applications

- White Goods
- Office Automation Equipment
- Industrial Equipment
- Other SMPS

Green Mode Control

The STR3W400MXD series has the green mode control that optimizes an oscillation frequency according to loads. This function decreases the oscillation frequency to a load-appropriate level for reducing switching losses in a power MOSFET.

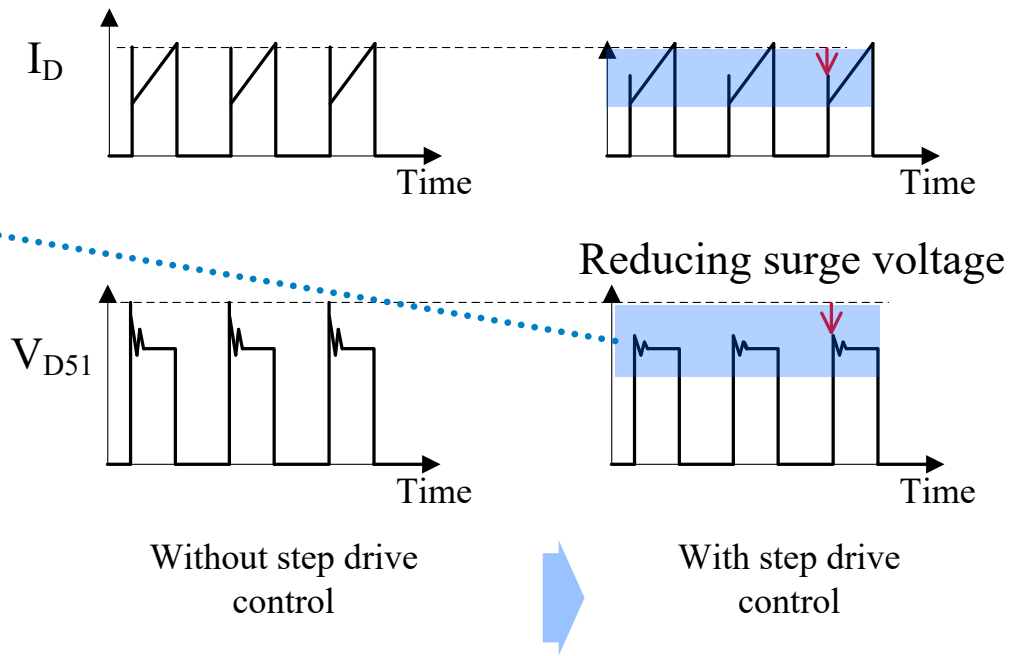
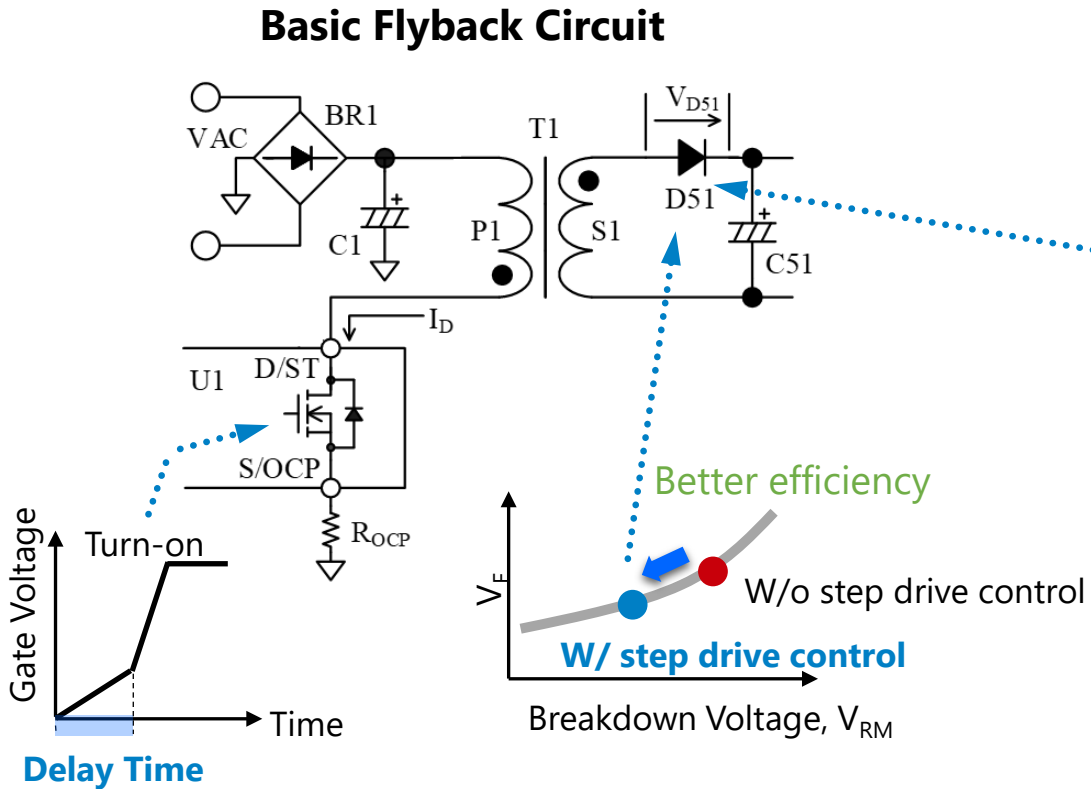
The STR3W400MXD series will be **best suited for applications in which efficiencies at light to medium loads are regulated** such as by the ErP Directive.



Step Drive Control

The STR3W400MXD series has the step drive control that decreases losses in a secondary rectifier diode. The function suppresses the startup surge voltage caused by a secondary rectifier diode during power MOSFET turn-on.

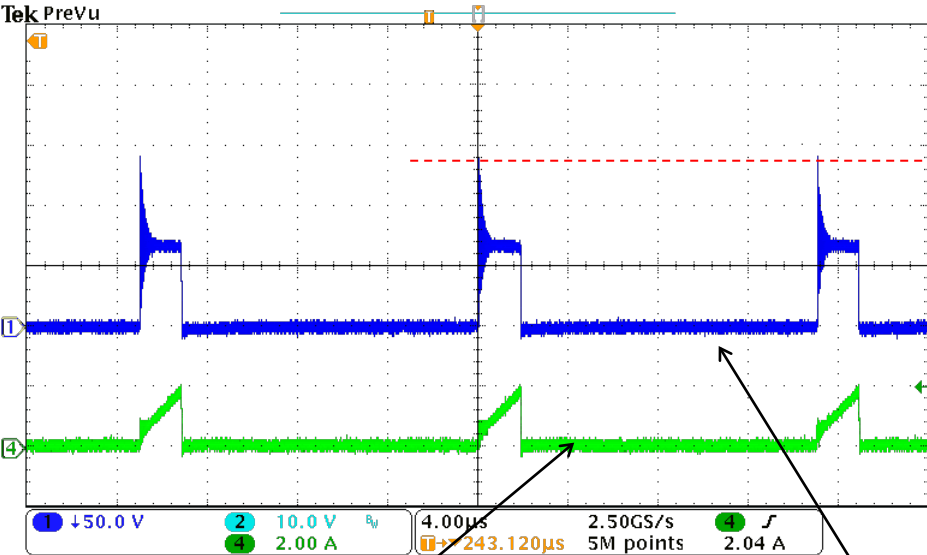
This allows your application to use a secondary rectifier diode with V_{RM} settable to a lower level, leading to a lower V_F loss. Our new STR3W400MXD series brings more efficiency to power supplies.



Waveforms of I_D and V_{D51}

■ Waveform Comparison: Secondary Rectifier Diode

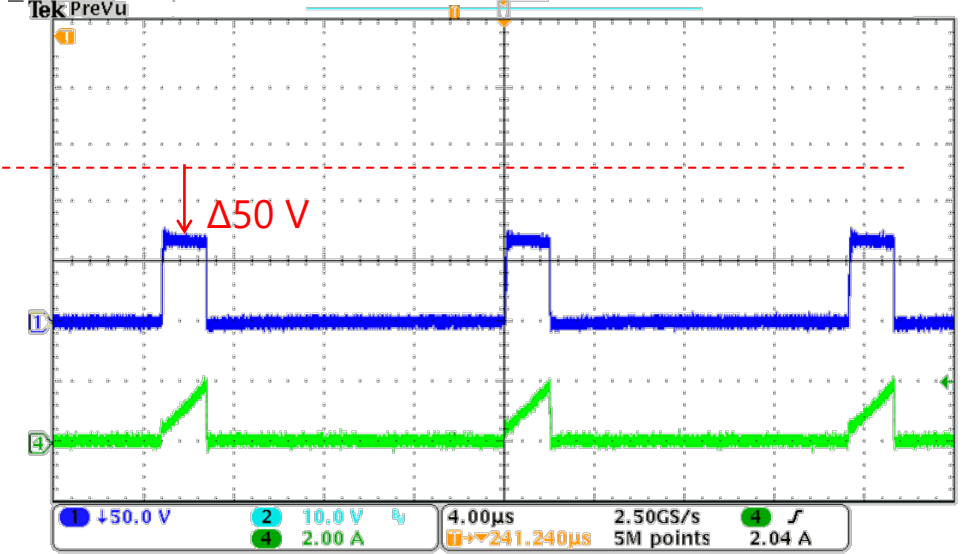
Without Step Drive Control
(Conventional)



Drain Current

Secondary Rectifier Diode
Reverse Voltage, V_R

With Step Drive Control
(Latest)



In general, diodes with low rated V_{RM} only have low V_F .
But our step drive function decreases V_R on a diode to enable
your application to use a diode with low rated V_{RM} .
➔ **Higher power supply efficiency** is achievable by lowering V_F

The STR3W400MXD series has the functions to protect AC input overvoltage/undervoltage conditions and is thus suitable for regions with unstable input voltages.

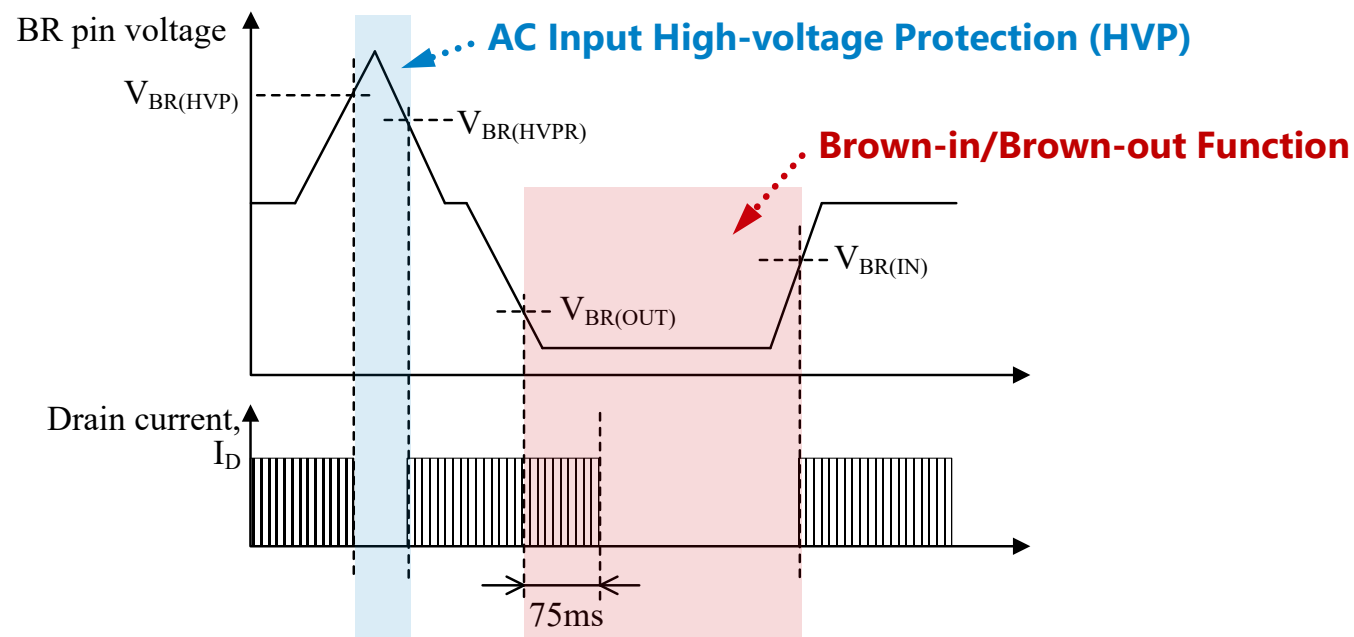
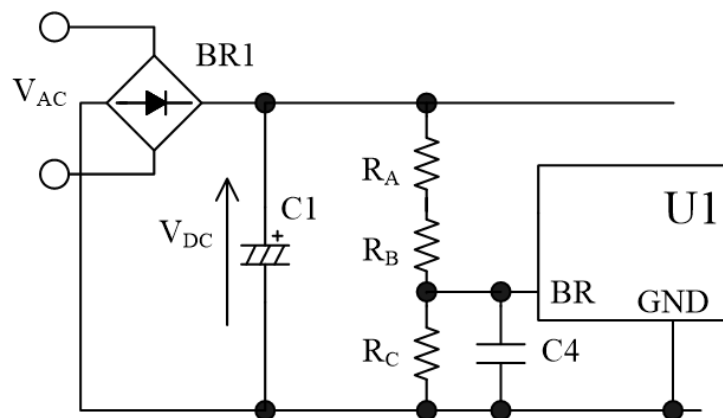
The AC input high-voltage protection (HVP) stops oscillation operation when an AC input voltage is excessive.

→ **Prevents overvoltage damage** to power MOSFETs

The brown-in/brown-out function stops oscillation operation when a supply input voltage is insufficient.

→ **Prevents excessive input current and overheating** when an input voltage decreases abnormally

DC-line Detection



Part Number	Functions				f _{osc}	MOSFET		P _{OUT} (Open Frame)	
	GM ⁽²⁾	SD ⁽³⁾	HVP ⁽⁴⁾	BR ⁽⁵⁾		V _{DSS}	R _{DS(ON)} (Max.)	230 VAC	Universal
STR3W422MXD ⁽¹⁾	✓	✓	✓	✓	65 kHz	700 V	2.8 Ω	60 W	40 W
STR3W424MXD							1.4 Ω	110 W	70 W
STR3W426MXD ⁽¹⁾							1.0 Ω	130 W	80 W

(1) Under Development

(2) GM: Green Mode

(3) SD: Step Drive

(4) HVP: AC Input High-voltage Protection

(5) BR: Brown-in/Brown-out

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