

Ultrafast rectifier PDP energy recovery

Datasheet – production data

Features

- Ultrafast recovery allowing high sustain frequency
- Decrease charge evacuation time in the inductance
- Minimize switching-on and total power losses
- Increase luminous efficiency and brightness
- Soft and noise-free recovery
- High surge capability
- High junction temperature

Description

The STTH60P03SW is an ultrafast recovery power rectifier dedicated to energy recovery in PDP application.

The key parameters of the D_{ERC} diode for the energy recovery circuit have been optimized to decrease power losses.

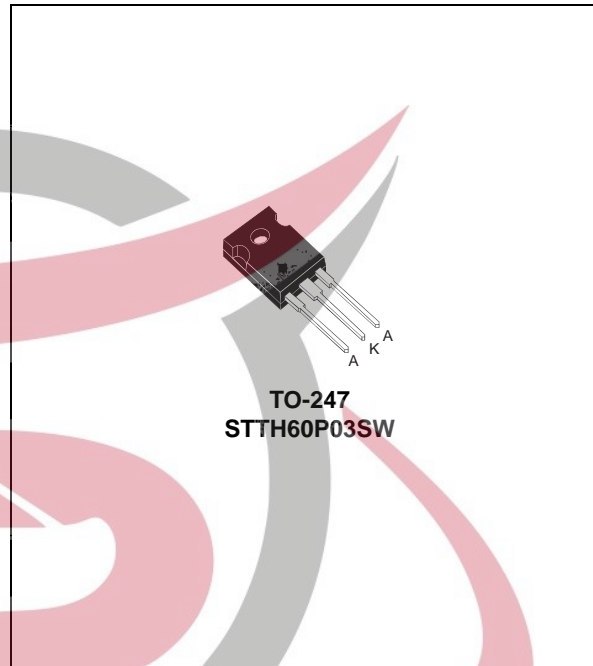


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	60 A
V_{RRM}	300 V
V_{FP} (typ)	2.5 V
I_{RM} (typ)	6 A
T_j	175 °C
V_F (typ)	0.9 V

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1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter	Value	Unit
V _{RRM}	Repetitive peak reverse voltage	300	V
I _{F(RMS)}	Forward rms current	80	A
I _{F(AV)}	Average forward current	60	A
I _{FSM}	Surge non repetitive forward current	t _p = 10 ms Sinusoidal	250 A
I _{FRM}	Repetitive peak forward current	F = 200 kHz, t _p = 500 ns Sinusoidal, T _C = 155 °C	150 A
T _{stg}	Storage temperature range	-65 to +175	°C
T _j	Maximum operating junction temperature	175	°C

Table 3. Thermal parameters

Symbol	Parameter	Value	Unit
R _{th(j-c)}	Junction to case	0.8	°C/W
Z _{th(j-c)}	Transient thermal resistance at 1 μs	0.002	°C/W

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit	
I _R (1)	Reverse leakage current	T _j = 25 °C			100	μA	
		T _j = 125 °C	V _R = 0.7 x V _{RRM}	0.1	1	mA	
V _F (2)	Forward voltage drop	T _j = 25 °C	I _F = 30 A			1.5	V
		T _j = 125 °C		0.9	1.15		

1. Pulse test: t_p = 5 ms, δ < 2%

2. Pulse test: t_p = 380 μs, δ < 2%

To evaluate the conduction losses use the following equation:

$$P = 0.88 \times I_{F(AV)} + 0.009 I_{F(RMS)}^2$$

Table 5. Switching characteristics

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
I _{RM}	Reverse recovery current	T _j = 100 °C I _F = 60 A, V _R = 100 V dI _F /dt = 200 A/μs		6	7.5	A
S _{factor}	Softness factor		0.5	-		
V _{FP}	Peak forward voltage	T _j = 25 °C I _F = 60 A, dI _F /dt = 400 A/μs		2.5	3.5	V

Figure 1. Forward voltage drop versus forward current

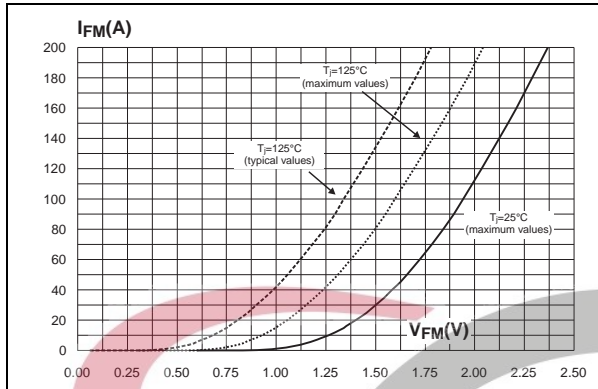


Figure 2. Relative variation of thermal impedance junction to case versus pulse duration

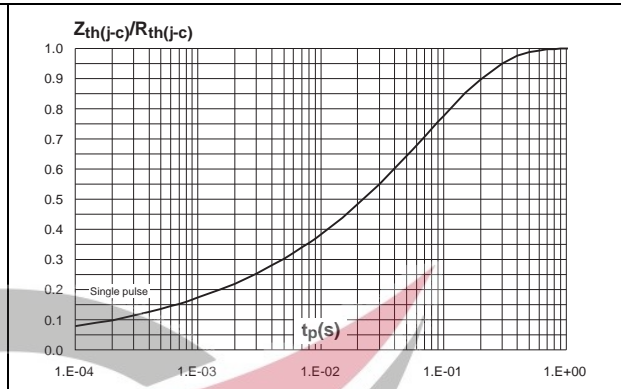


Figure 3. Peak reverse recovery current versus di_F/dt (typical values)

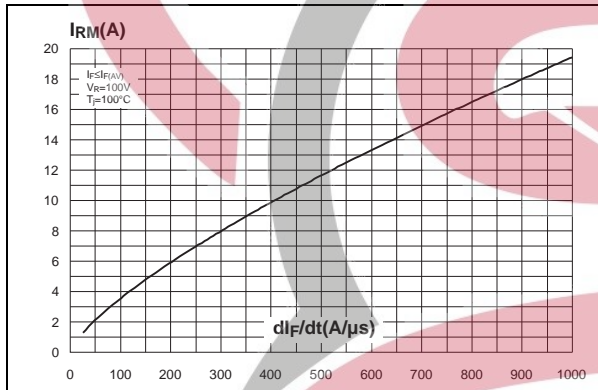


Figure 4. Reverse recovery time versus di_F/dt (typical values)

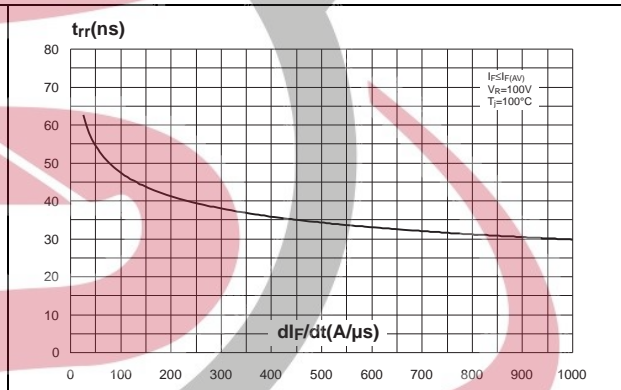


Figure 5. Reverse recovery softness factor versus di_F/dt (typical values)

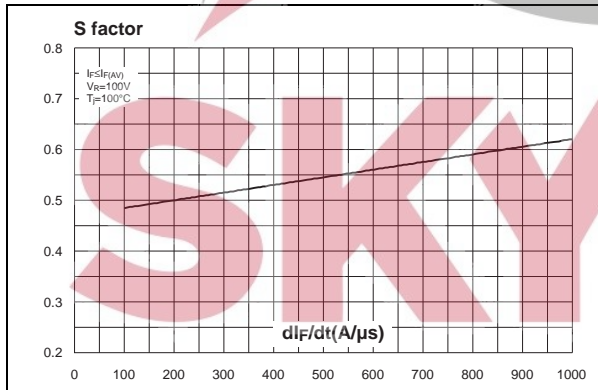


Figure 6. Relative variations of dynamic parameters versus junction temperature

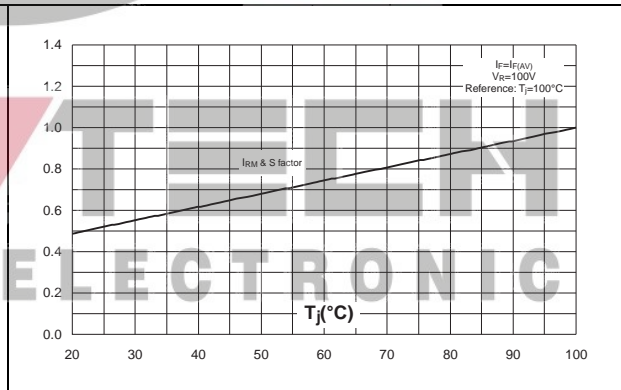


Figure 7. Transient peak forward voltage versus di_F/dt (typical values)

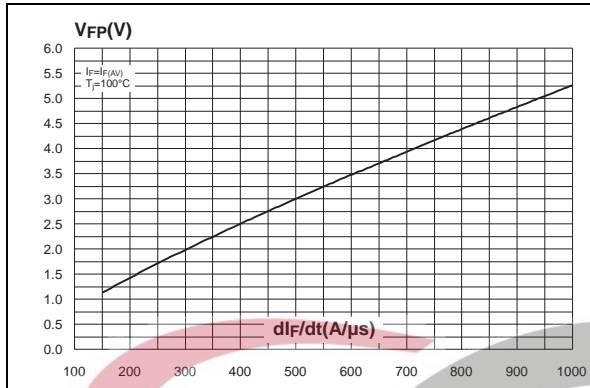


Figure 8. Forward recovery time versus di_F/dt (typical values)

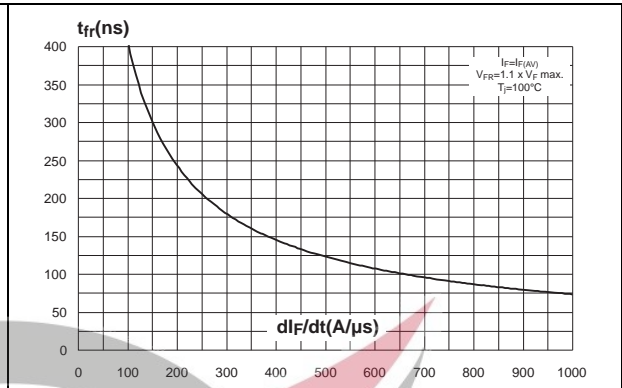
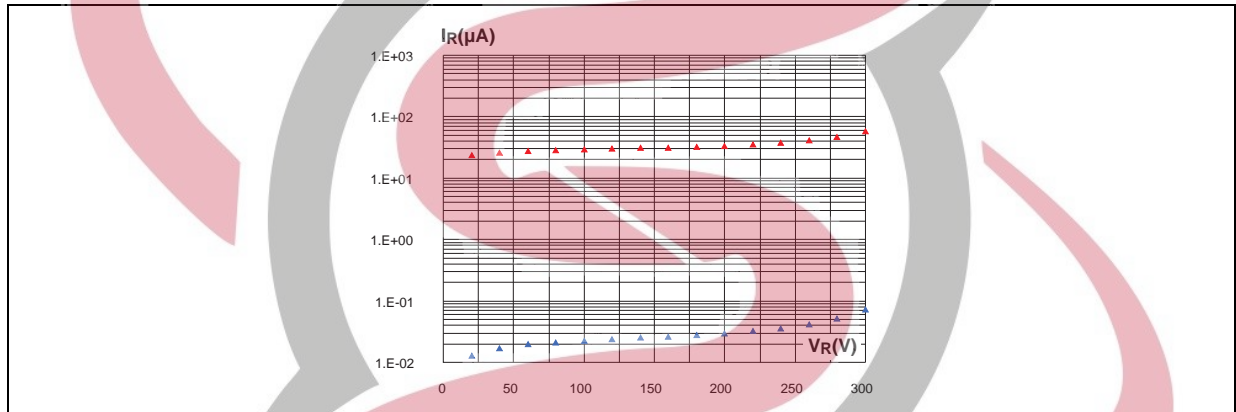


Figure 9. Reverse leakage current versus reverse voltage



2 Application information

Figure 10. Application characteristics

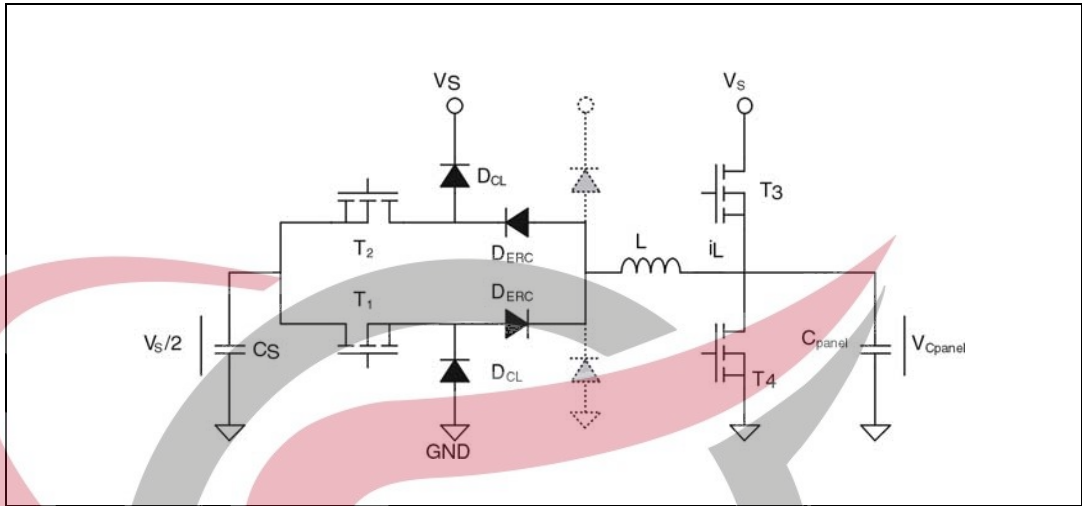
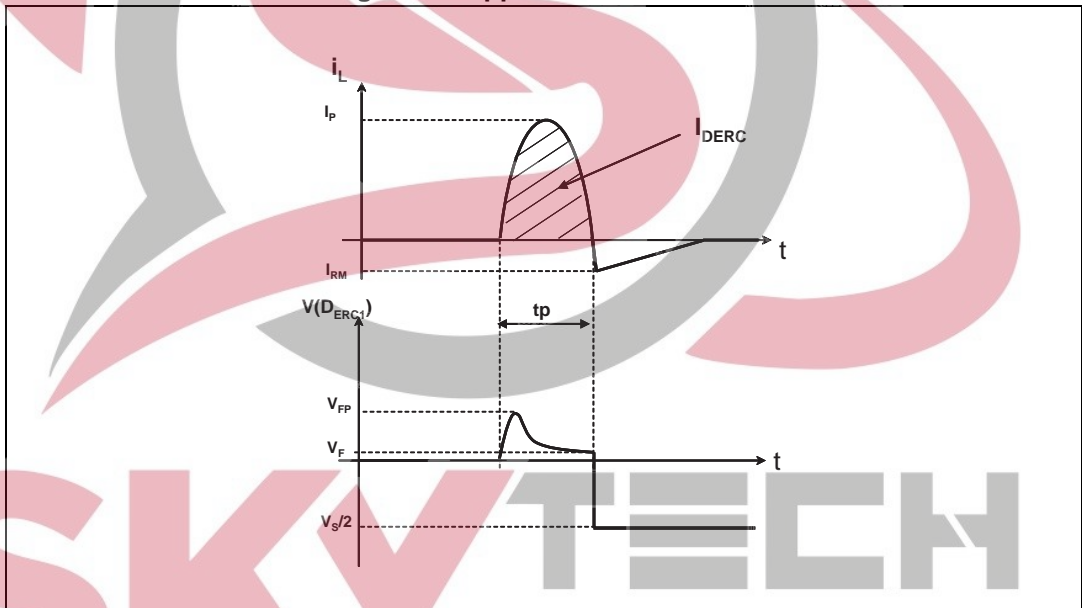


Figure 11. Application waveforms



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3 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.5 N·m
- Maximum torque value: 1.0 N·m

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Figure 12. TO-247 dimension definitions

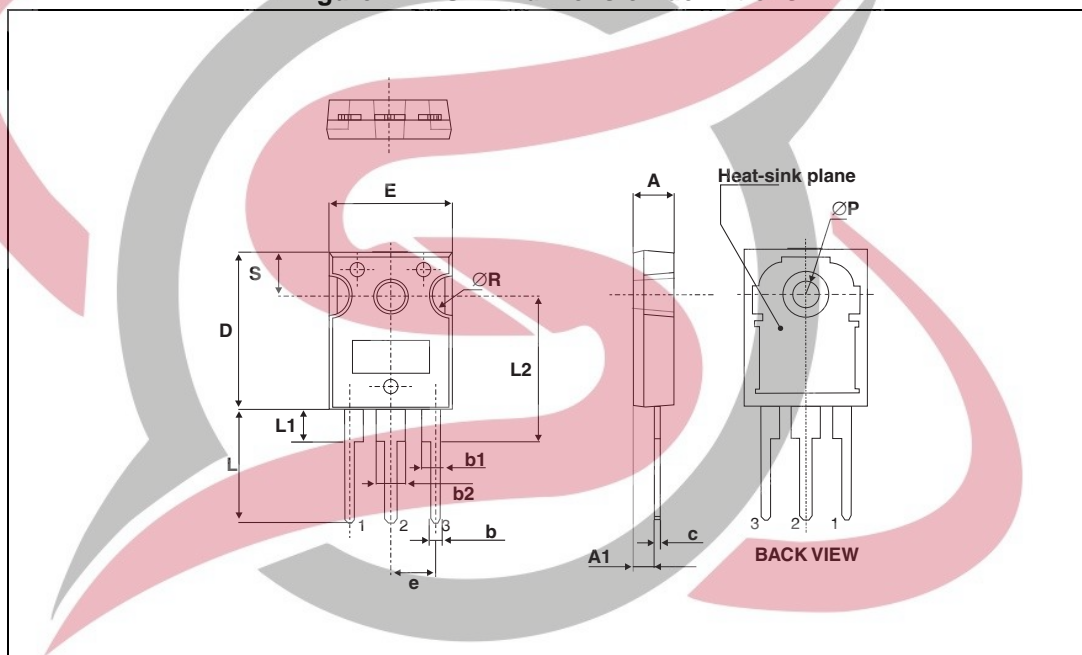


Table 6. TO-247 dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ	Max.
A	4.85		5.15	0.191		0.203
A1	2.20		2.60	0.086		0.102
b	1.00		1.40	0.039		0.055
b1	2.00		2.40	0.078		0.094
b2	3.00		3.40	0.118		0.133
c	0.40		0.80	0.015		0.031
D ⁽¹⁾	19.85		20.15	0.781		0.793
E	15.45		15.75	0.608		0.620
e	5.30	5.45	5.60	0.209	0.215	0.220
L	14.20		14.80	0.559		0.582
L1	3.70		4.30	0.145		0.169
L2	18.50 typ.			0.728 typ.		
∅P ⁽²⁾	3.55		3.65	0.139		0.143
∅R	4.50		5.50	0.177		0.217
S	5.30	5.50	5.70	0.209	0.216	0.224

1. Dimension D plus gate protrusion does not exceed 20.5 mm.
2. Resin thickness around the mounting hole is not less than 0.9 mm.

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4 Ordering information

Table 7. Ordering information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH60P03SW	STTH60P03SW	TO-247	4.46 g	30	Tube

5 Revision history

Table 8. Document revision history

Date	Revision	Changes
04-Nov-2004	1	First issue.
10-Jan-2005	2	Minor layout update. No content change.
04-03-2005	3	Table 7 on page 5: base quantity delivery from 50 to 30.
19-Mar-2013	4	Added ECOPACK statement.



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