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High voltage power Schottky rectifier

Features

- High junction temperature capability
- Low leakage current
- Good trade off between leakage current and forward voltage drop
- Low thermal resistance
- High frequency operation
- Avalanche specification

Description

Dual center tab Schottky rectifier suited for high frequency switched mode power supply.

Packaged in TO-247, this device is intended for use to enhance the reliability of the application.

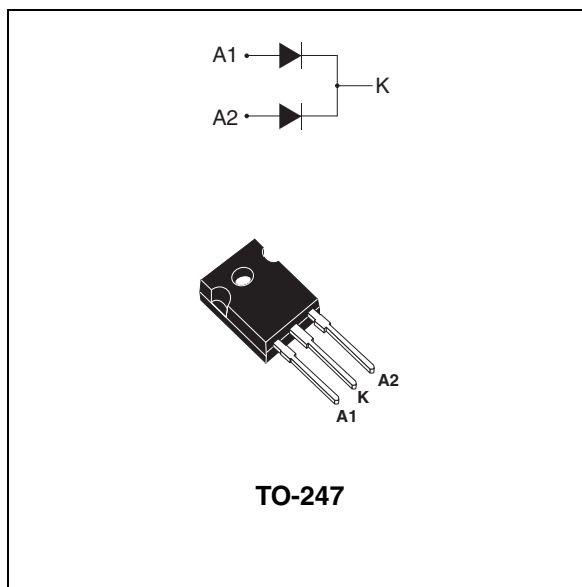


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 30 A
V_{RRM}	170 V
T_j	175 °C
$V_F(max)$	0.67 V

1 Characteristics

Table 2. Absolute ratings (limiting values, per diode)

Symbol	Parameter		Value	Unit
V _{RRM}	Repetitive peak reverse voltage		170	V
I _{F(RMS)}	Forward rms current		80	A
I _{F(AV)}	Average forward current	T _C = 150 °C δ = 0.5	Per diode	30
			Per device	60
I _{FSM}	Surge non repetitive forward current	t _p = 10 ms sinusoidal	500	A
P _{ARM}	Repetitive peak avalanche power	t _p = 1 μs T _j = 25 °C	31800	W
V _{ARM} ⁽¹⁾	Maximum repetitive peak avalanche voltage	t _p = 1 μs, T _j < 150 °C, I _{AR} < 47 A	200	V
V _{ASM} ⁽¹⁾	Maximum single pulse peak avalanche voltage			
T _{stg}	Storage temperature range		-65 to + 175	°C
T _j	Maximum operating junction temperature ⁽²⁾		175	°C
dV/dt	Critical rate of rise reverse voltage		10000	V/μs

1. Refer to [Figure 11](#)

2. $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistance parameters

Symbol	Parameter		Value	Unit
R _{th(j-c)}	Junction to case	Per diode	0.9	°C/W
		Total	0.6	
R _{th(c)}	Coupling		0.3	

When the diodes 1 and 2 are used simultaneously :

$$\Delta T_j(\text{diode 1}) = P(\text{diode1}) \times R_{th(j-c)}(\text{Per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
I _R ⁽¹⁾	Reverse leakage current	T _j = 25 °C	V _R = V _{RRM}			60	μA
		T _j = 125 °C			16	60	mA
V _F ⁽²⁾	Forward voltage drop	T _j = 25 °C	I _F = 30 A			0.84	V
		T _j = 125 °C			0.63	0.67	
		T _j = 25 °C	I _F = 60 A			0.92	
		T _j = 125 °C			0.76	0.80	

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 :

$$P = 0.54 \times I_{F(AV)} + 0.0043 I_{F(RMS)}^2$$

Figure 1. Average forward power dissipation versus average forward current (per diode)

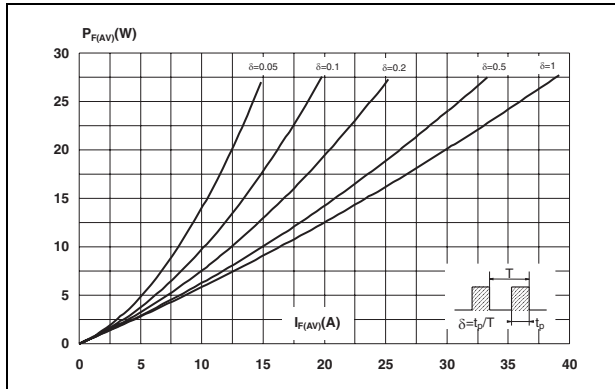


Figure 2. Average forward current versus ambient temperature ($\delta = 0.5$, per diode)

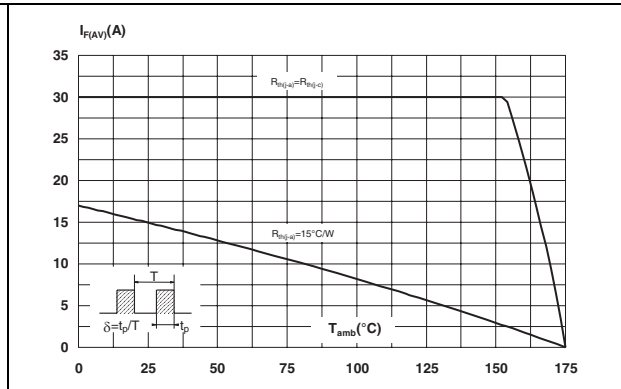


Figure 3. Normalized avalanche power derating versus pulse duration

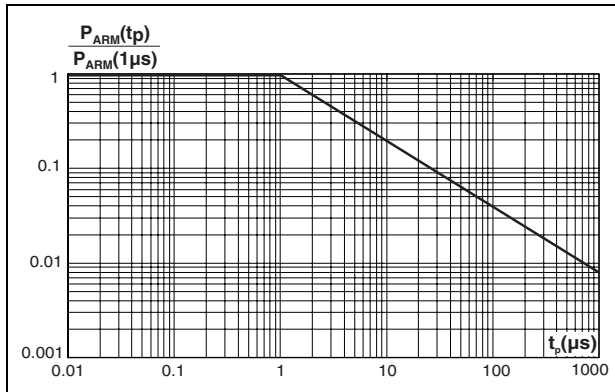


Figure 4. Normalized avalanche power derating versus junction temperature

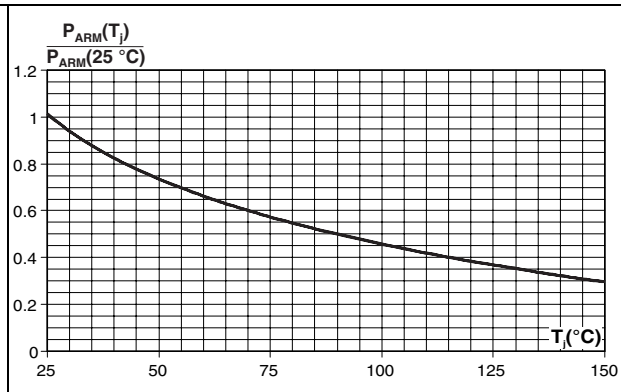


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

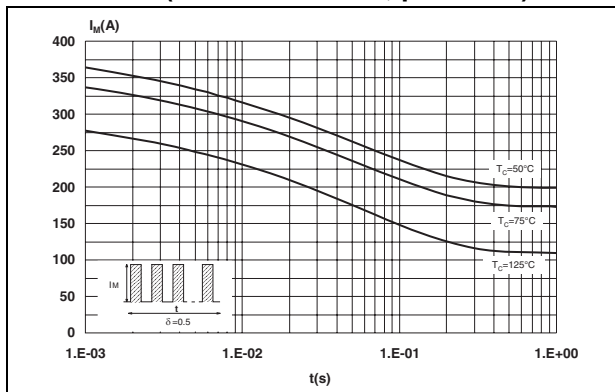


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration (per diode)

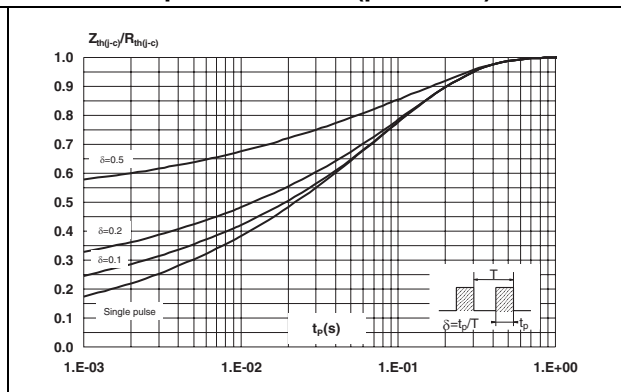


Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)

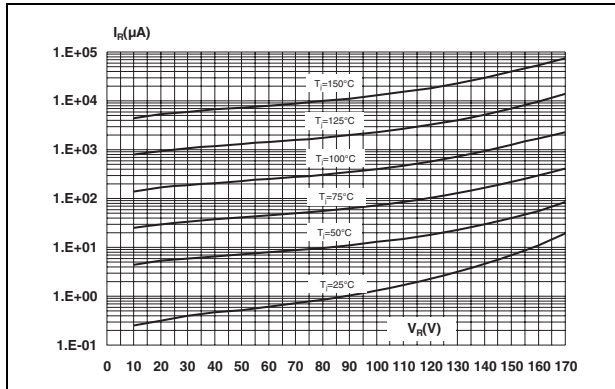


Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)

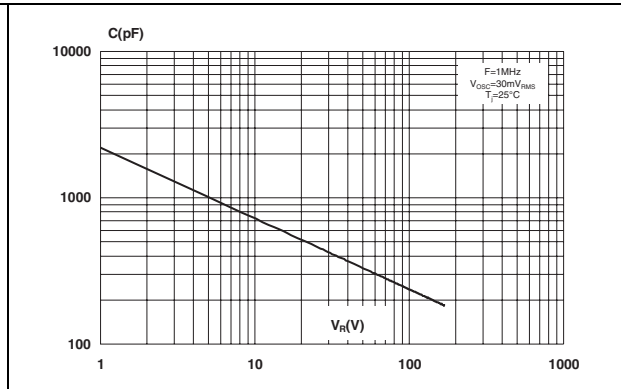


Figure 9. Forward voltage drop versus forward current (per diode, low level)

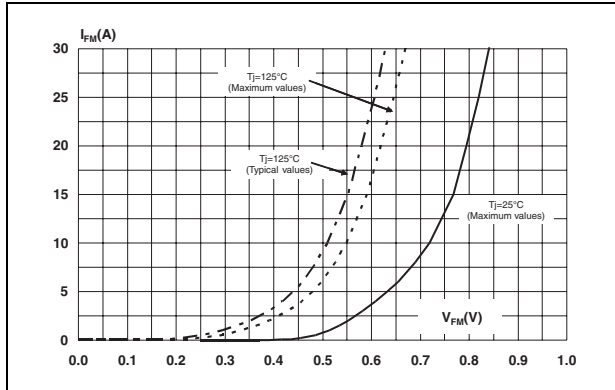


Figure 10. Forward voltage drop versus forward current (per diode, high level)

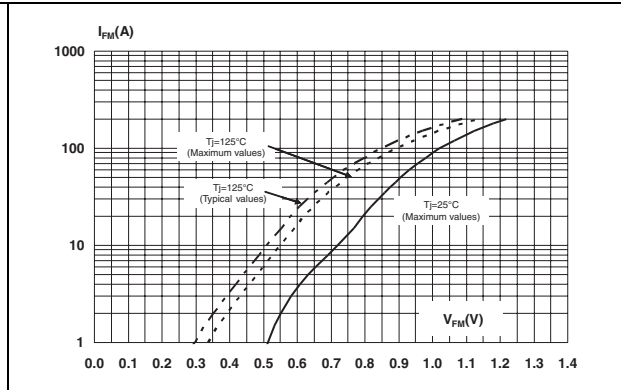
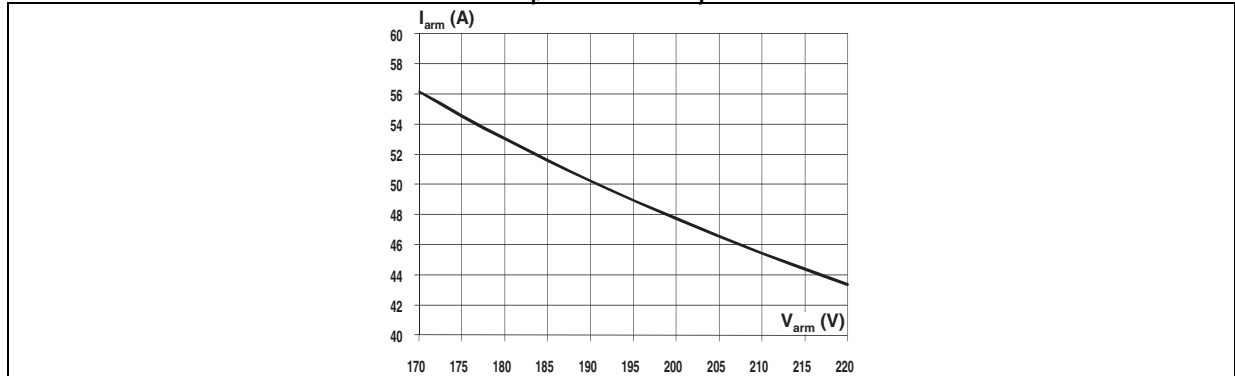


Figure 11. Reverse safe operating area ($t_p < 1\mu\text{s}$ and $T_j < 150^\circ\text{C}$)



2 Package information

- Epoxy meets UL94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 to 1.0 N·m

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 5. TO-247 dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	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	5.45 typ.		0.215 typ.	
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.	
ØP ⁽²⁾	3.55	3.65	0.139	0.143
ØR	4.50	5.50	0.177	0.217
S	5.50 typ.		0.216 typ.	

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

3 Ordering information

Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS61170CW	STPS61170CW	TO-247	4.40 g	30	Tube

4 Revision history

Table 7. Document revision history

Date	Revision	Changes
16-Sep-2005	1	First issue.
01-Dic-2010	2	Updated Table 2 and added Figure 11 .

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