

Ultralow forward voltage power Schottky rectifier

Features

- Ultralow forward voltage drop
- High current capability
- High frequency operation
- ECOPACK[®]2 compliant components

Description

The STPS50U100C is a dual power Schottky diode rectifier, suited for high frequency switch mode power supply.

Featuring an ultralow forward voltage drop, this device, packaged in TO-220AB and I²PAK, is intended to be used in notebook, game station and desktop adaptors as well as server SMPS. It has been especially designed to help power supply manufacturers meet the recently introduced worldwide efficiency standards.

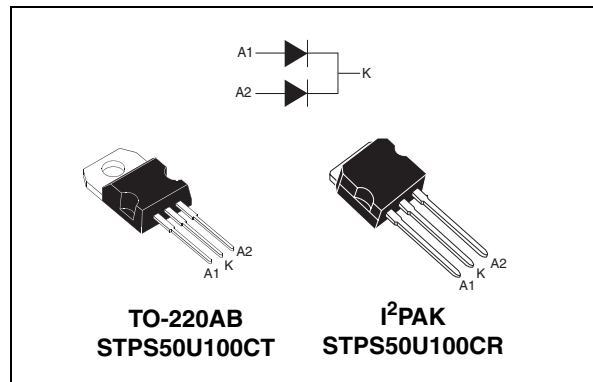


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 25 A
V_{RRM}	100 V
$V_{F(TYP)}$ @ 25 A @ 125 °C	0.64 V
$T_j(max)$	150 °C

1 Characteristics

Table 2. Absolute ratings (limiting values per diode at 25 °C, unless otherwise specified)

Symbol	Parameter		Value	Unit
V _{RRM}	Repetitive peak reverse voltage		100	V
I _{F(RMS)}	Forward rms current		50	A
I _{F(AV)}	Average forward current, δ = 0.5	T _C = 120 °C Per diode	25	A
		T _C = 105 °C Per device	50	
I _{FSM}	Surge non repetitive forward current	t _p = 10 ms, half sine-wave	250	A
T _{stg}	Storage temperature range		-65 to + 150	°C
T _j	Maximum operating junction temperature ⁽¹⁾		150	°C

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

Table 3. Thermal resistance

Symbol	Parameter		Value	Unit
R _{th(j-c)}	Junction to case	Per diode	1.3	°C/W
		Per device	0.9	
R _{th(c)}	Coupling		0.45	°C/W

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

Symbol	Parameter	Tests conditions	Min.	Typ.	Max.	Unit	
I _R	Reverse leakage current	T _j = 25 °C	V _R = 70 V	-	15	-	μA
		T _j = 125 °C		-	10	-	mA
		T _j = 25 °C	V _R = V _{RRM}	-	30	200	μA
		T _j = 125 °C		-	15	40	mA
V _F	Forward voltage drop	T _j = 25 °C	I _F = 5 A	-	0.48	-	V
		T _j = 125 °C		-	0.38	-	
		T _j = 25 °C	I _F = 15 A	-	0.58	-	
		T _j = 125 °C		-	0.54	-	
		T _j = 25 °C	I _F = 25 A	-	0.67	0.73	
		T _j = 125 °C		-	0.64	0.7	

To evaluate the conduction losses use the following equation:

$$P = 0.475 \times I_{F(AV)} + 0.009 I_{F(RMS)}^2$$

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

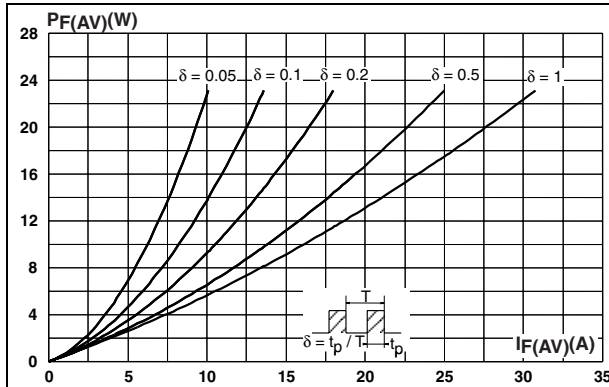


Figure 2. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

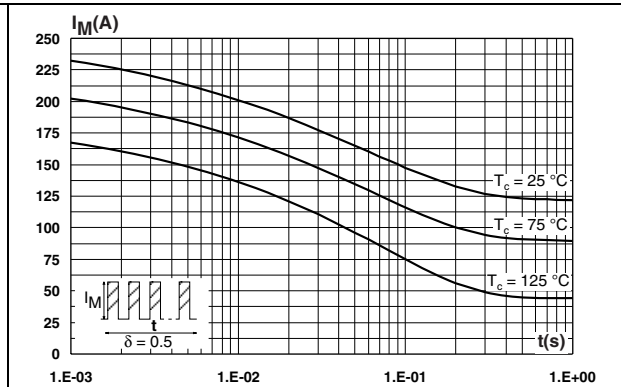


Figure 3. Reverse leakage current versus reverse voltage applied (typical values, per diode)

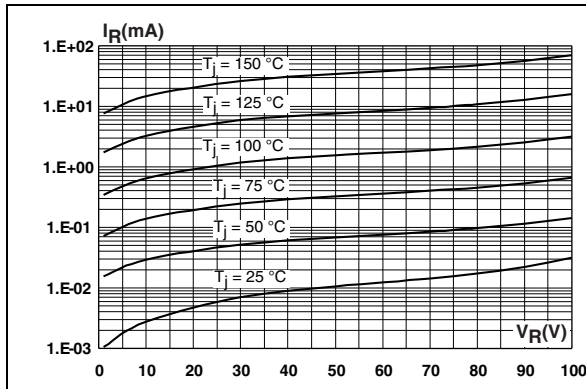


Figure 4. Average forward current versus ambient temperature (delta = 0.5, per diode)

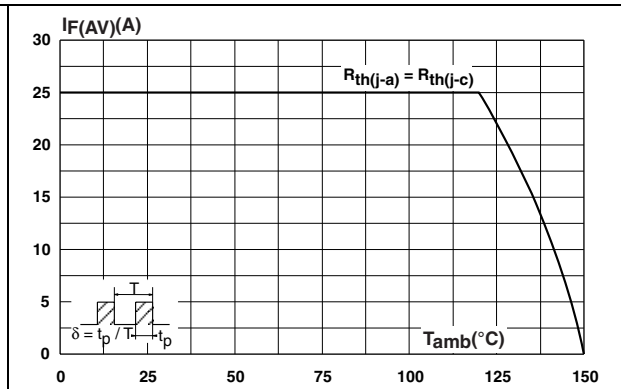


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration

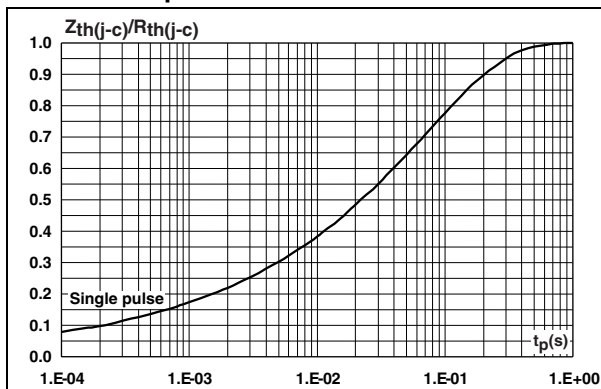


Figure 6. Junction capacitance versus reverse voltage applied (typical values, per diode)

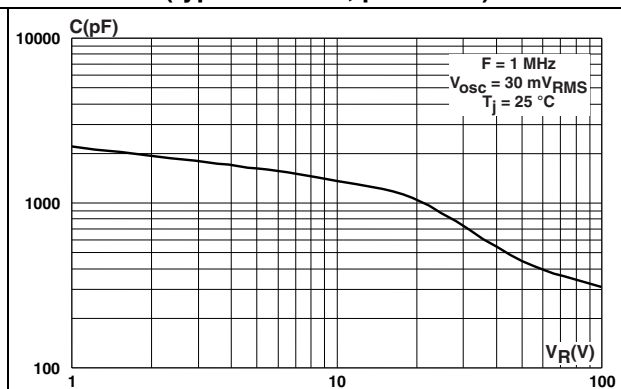
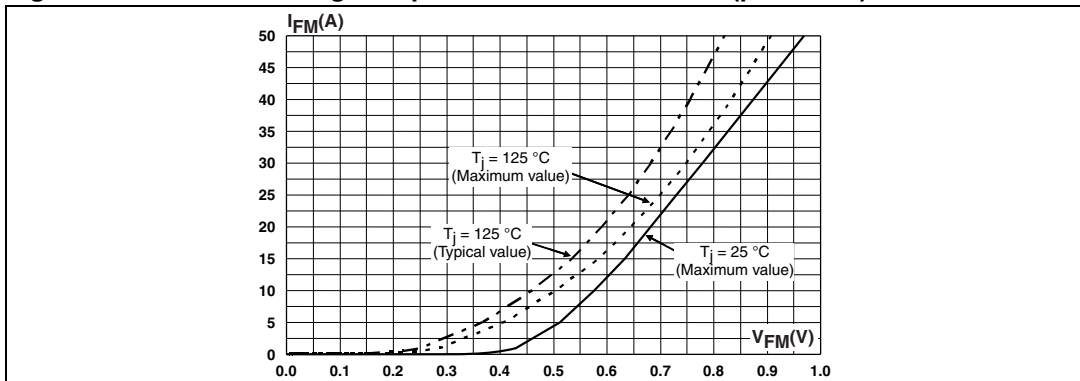


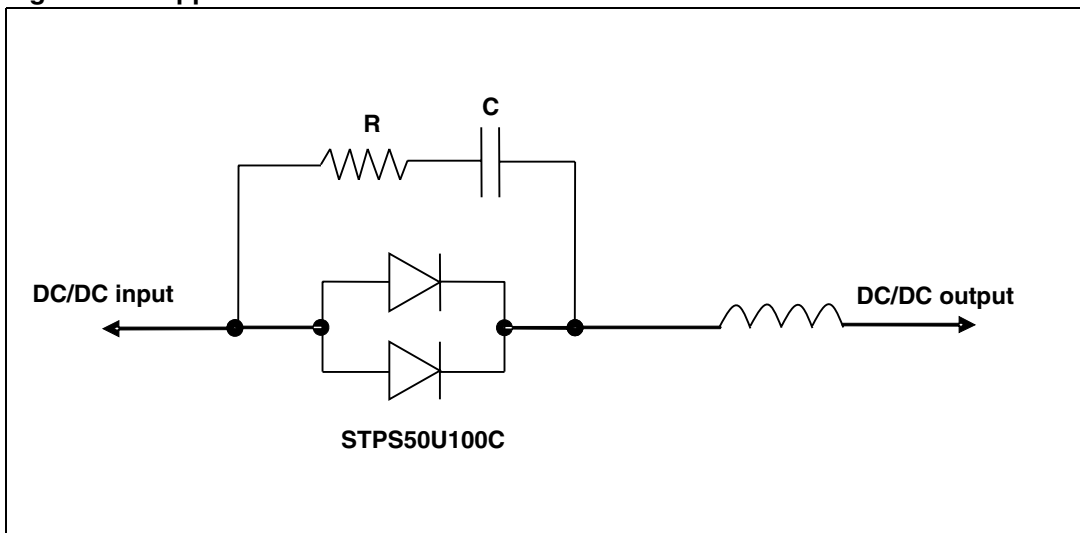
Figure 7. Forward voltage drop versus forward current (per diode)



2 Application information

It is mandatory to ensure a peak reverse voltage below the V_{RRM} absolute rating. Therefore, it is recommended to use a RC clamping snubber circuit in parallel with the STPS50U100C device.

Figure 8. Application schematic



3 Package information

- Epoxy meets UL94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.4 to 0.6 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-220AB dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
F2	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
G1	2.40	2.70	0.094	0.106
H2	10	10.40	0.393	0.409
L2	16.4 typ.		0.645 typ.	
L4	13	14	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 typ.	
Diam.	3.75	3.85	0.147	0.151

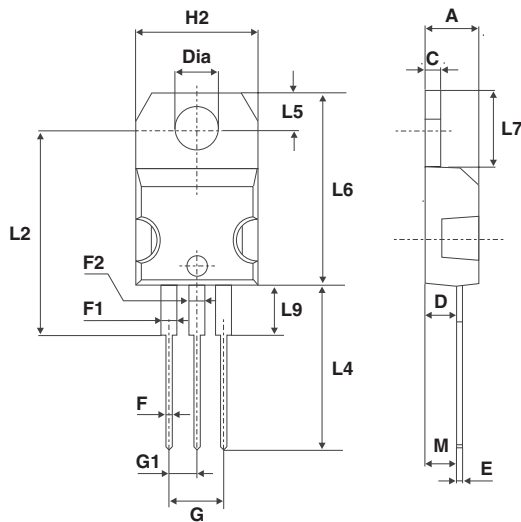


Table 6. I²PAK dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	2.72	0.094	0.107
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.044	0.067
c	0.49	0.70	0.019	0.028
c2	1.23	1.32	0.048	0.052
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
E	10	10.40	0.394	0.409
L	13	14	0.512	0.551
L1	3.50	3.93	0.138	0.155
L2	1.27	1.40	0.050	0.055

4 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS50U100CT	STPS50U100C	TO-220AB	2.23 g	50	Tube
STPS50U100CR	STPS50U100C	I ² PAK	1.49 g	50	Tube

5 Revision history

Table 8. Document revision history

Date	Revision	Changes
17-Nov-2009	1	First release.

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