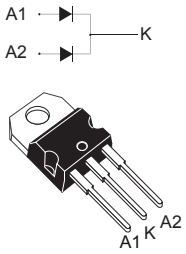
STPS40SM100C

Datasheet

100 V, 40 A power Schottky rectifier



TO-220AB

Features

- Low forward voltage drop
- Good trade-off between leakage current and forward voltage drop
- High frequency operation
- Avalanche capability specified
- ECOPACK®2 compliant

Applications

- Switching diode
- SMPS
- DC/DC converter
- LED lighting
- Adapter for notebook and game station

Description

The STPS40SM100C is suited for high frequency switch mode power supply.

Packaged in TO-220AB, the STPS40SM100C is optimized for use in notebook and game station adaptors, providing in these applications a good efficiency at both low and high load.

Product status link
STPS40SM100C

Product summary	
Symbol	**Value**
$I_{F(AV)}$	2 x 20 A
V_{RRM}	100 V
T_j (max.)	150 °C
V_F (typ.)	0.605 V

1 Characteristics

Table 1. 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			60	A
$I_{F(AV)}$	Average forward current, δ = 0.5 square wave	T_C = 130 °C	Per diode	20	A
		T_C = 125 °C	Per device	40	
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		350	A
P_{ARM}	Repetitive peak avalanche power	t_p = 10 µs , T_j = 125 °C		1295	W
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Maximum operating junction temperature(1)			150	°C

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

Table 2. Thermal resistance parameters

Symbol	Parameter		Max. value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	1.3	°C/W
		Total	0.7	
$R_{th(c)}$	Coupling		0.1	

When the diodes 1 and 2 are used simultaneously:

$\Delta T_{j\ (diode1)} = P_{(diode1)} \times R_{th(j-c)}$ (per diode) + $P_{(diode2)} \times R_{th(c)}$

For more information, please refer to the following application note :

- AN5088 : Rectifiers thermal management, handling and mounting recommendations

Table 3. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	V_R = 70 V	-	7		µA
		T_j = 125 °C		-	7		mA
		T_j = 25 °C	V_R = 100 V	-	13	45	µA
		T_j = 125 °C		-	13	45	mA
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 5 A	-	520		mV
		T_j = 125 °C		-	435		
		T_j = 25 °C	I_F = 10 A	-	620	700	
		T_j = 125 °C		-	520	580	
		T_j = 25 °C	I_F = 20 A	-	740	810	
		T_j = 125 °C		-	605	665	

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: $P = 0.580 \times I_{F(AV)} + 0.0043 \times I_{F}{}^{2}{}_{(RMS)}$

For more information, please refer to the following application notes related to the power losses :

- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

1.1 Characteristics (curves)

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

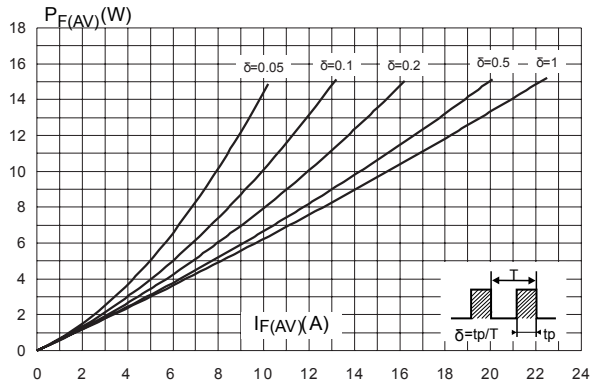


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

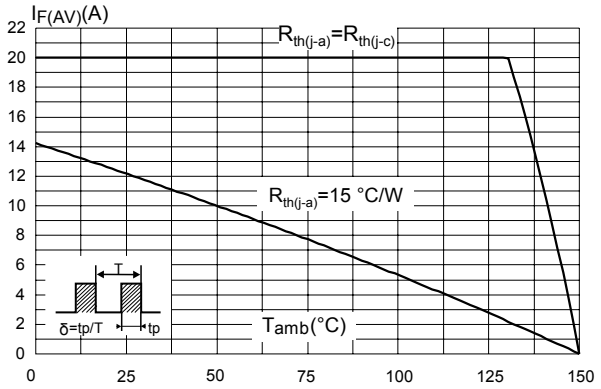


Figure 3. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

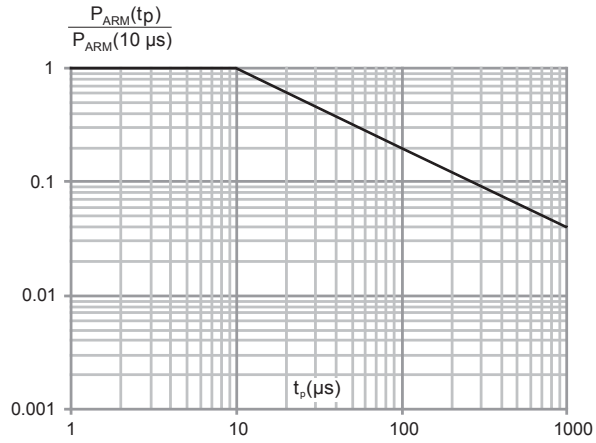


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

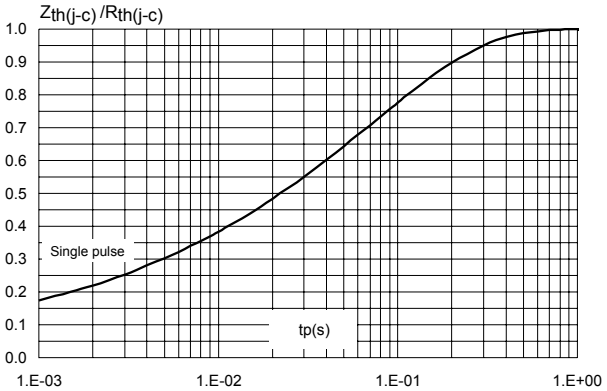


Figure 5. Reverse leakage current versus reverse voltage applied (typical values, per diode)

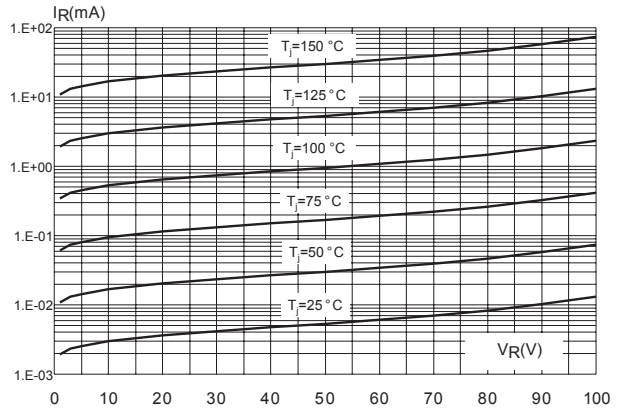


Figure 6. Junction capacitance versus reverse voltage applied (typical values, per diode)

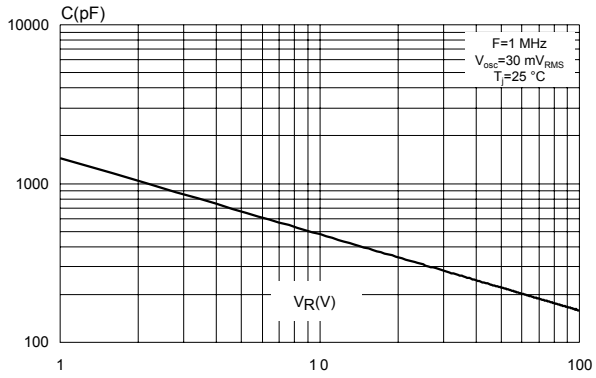
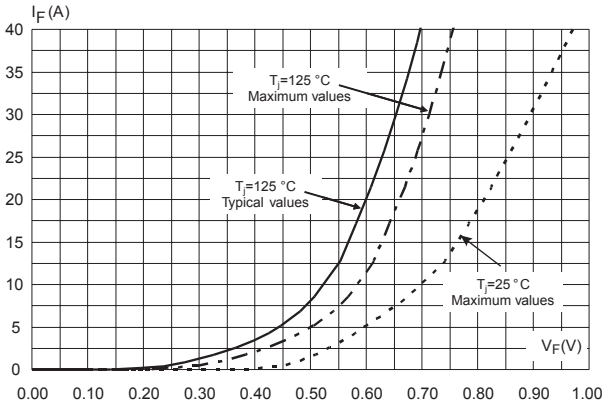


Figure 7. Forward voltage drop versus forward current (per diode)



2 Package information

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.

2.1 TO-220AB package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.70 N·m

Figure 8. TO-220AB package outline

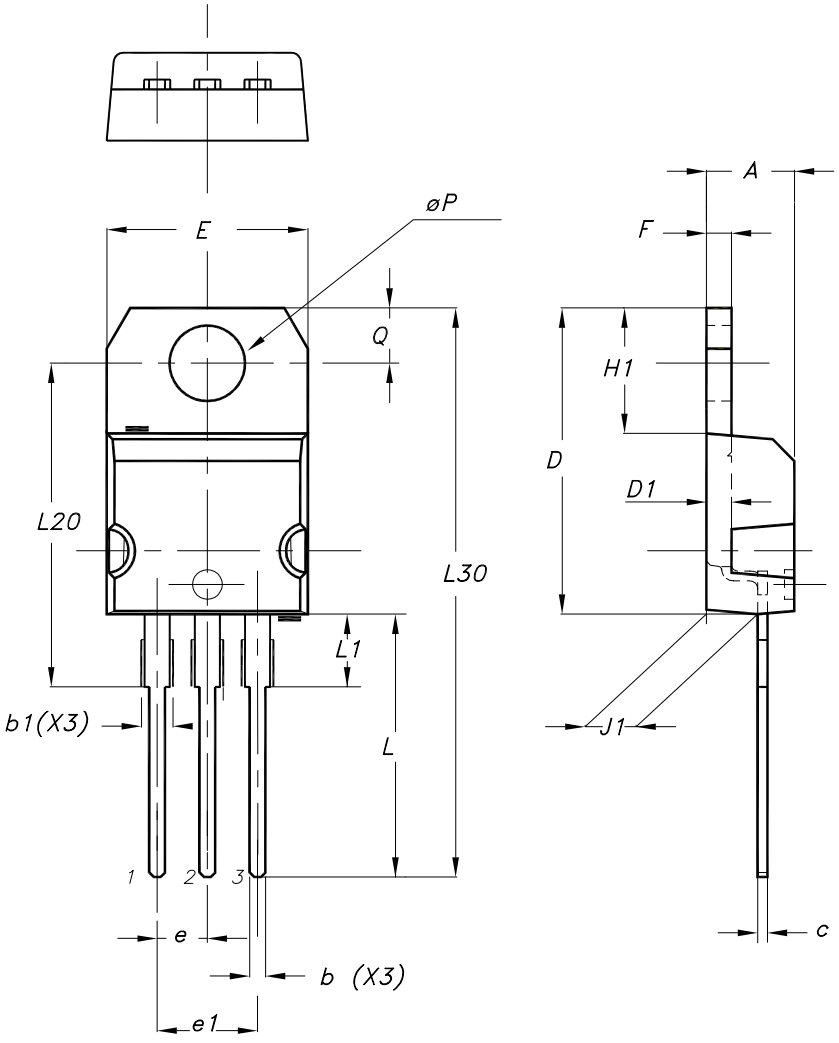


Table 4. TO-220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
b	0.61	0.88	0.240	0.035
b1	1.14	1.55	0.045	0.061
c	0.48	0.70	0.019	0.028
D	15.25	15.75	0.600	0.620
D1	1.27 typ.		0.050 typ.	
E	10.00	10.40	0.394	0.409
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
F	1.23	1.32	0.048	0.052
H1	6.20	6.60	0.244	0.260
J1	2.40	2.72	0.094	0.107
L	13.00	14.00	0.512	0.551
L1	3.50	3.93	0.138	0.155
L20	16.40 typ.		0.646 typ.	
L30	28.90 typ.		1.138 typ.	
θP	3.75	3.85	0.148	0.152
Q	2.65	2.95	0.104	0.116

3 Ordering information

Table 5. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS40SM100CT	PS40SM100CT	TO-220AB	1.95 g	50	Tube

Revision history

Table 6. Document revision history

Date	Version	Changes
25-Mar-2009	1	First issue.
15-Apr-2010	2	Updated package graphics for TO-220AB on front page and in Table 5
27-Jun-2018	3	Updated Table 1. Absolute Ratings (limiting values, per diode, at 25 °C, unless otherwise specified) and Figure 3. Normalized avalanche power derating versus pulse duration (T_j = 125 °C). Removed I^2PAK and D^2PAK package information.
22-Feb-2019	4	Updated Table 1.

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STPS40SM100CT