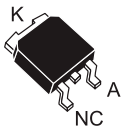
STPS5H100-Y

Datasheet

Automotive 100 V - 5 A power Schottky rectifier



DPAK

Features

- AEC-Q101 qualified
- PPAP capable
- Negligible switching losses
- High junction temperature capability
- Low leakage current
- Good trade-off between leakage current and forward voltage drop
- Avalanche specification
- V_{RRM} guaranteed from -40 °C to +175 °C
- ECOPACK compliant

Applications

- DC/DC converter
- LED lighting
- Sound system
- ECU

Product status
STPS5H100-Y

Product summary	
Symbol	**Value**
$I_{F(AV)}$	5 A
V_{RRM}	100 V
T_j range	-40 °C to +175 °C
V_F (max.)	0.61 V

Description

This high voltage Schottky barrier rectifier is designed for high frequency miniature switched mode power supplies and on board DC to DC converters for automotive applications.

The STPS5H100-Y is housed in a DPAK package.

It is ideally suited for LED lighting and car radio applications, as well as ECU (engine control unit) in automotive environment.

1 Characteristics

Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage, T_j = -40 °C to +175 °C		100	V
$I_{F(RMS)}$	Forward rms current		10	A
$I_{F(AV)}$	Average forward current	T_c = 165 °C, δ = 0.5	5	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	75	A
P_{ARM}	Repetitive peak avalanche power	t_p = 10 µs, T_j = 125 °C	518	W
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Operating junction temperature range(1)		-40 to +175	°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 parameters

Symbol	Parameter	Max. value	Unit
$R_{th(j-c)}$	Junction to case	2.5	°C/W

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

- AN5088: Rectifiers thermal management, handling and mounting recommendations

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		3.5	µA
		T_j = 125 °C		-	1.3	4.5	mA
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 5 A	-		0.73	V
		T_j = 125 °C		-	0.57	0.61	
		T_j = 25 °C	I_F = 10 A	-		0.85	
		T_j = 125 °C		-	0.66	0.71	

1. *Pulse test: tp = 5 ms, δ < 2%*
2. *Pulse test: t_p = 380 µs, δ < 2%*

To evaluate the conduction losses, use the following equation:

$P = 0.51 \times I_{F(AV)} + 0.02 \times I_F{}^2{}_{(RMS)}$

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

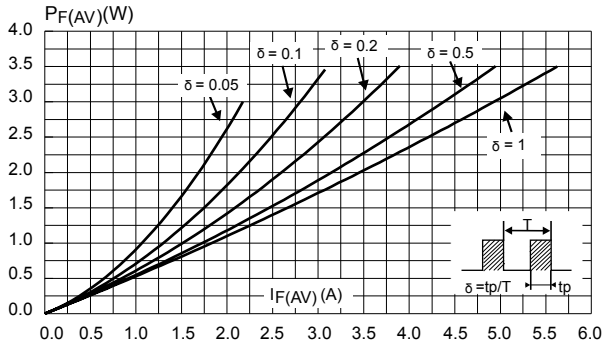


Figure 2. Average forward current versus ambient temperature (δ = 0.5)

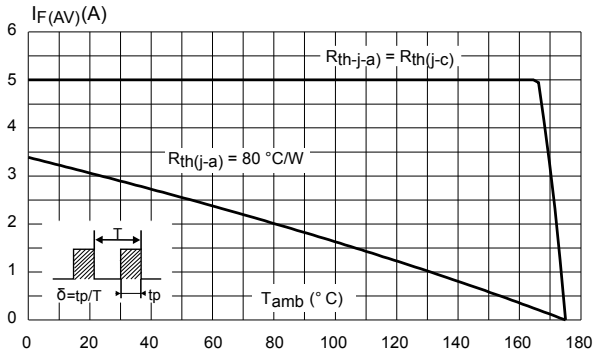


Figure 3. Normalized avalanche power derating versus junction temperature (T_j = 125 °C)

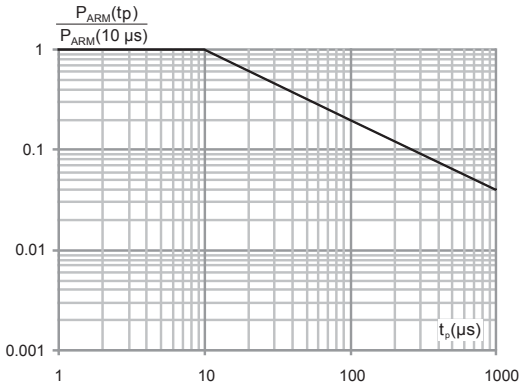


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

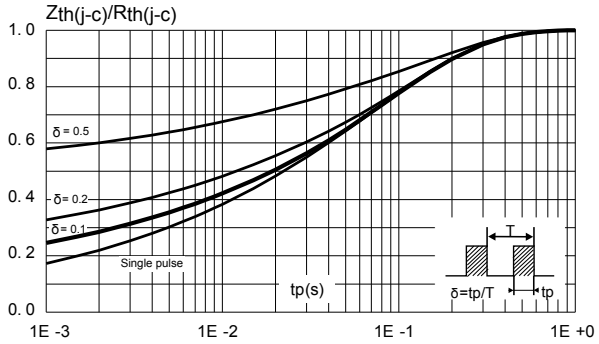


Figure 5. Reverse leakage current versus reverse voltage applied (typical values)

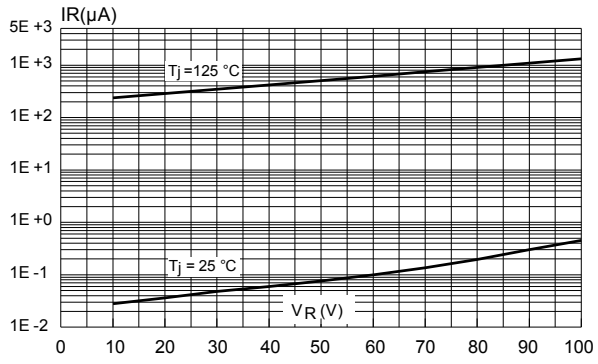


Figure 6. Junction capacitance versus reverse voltage applied (typical values)

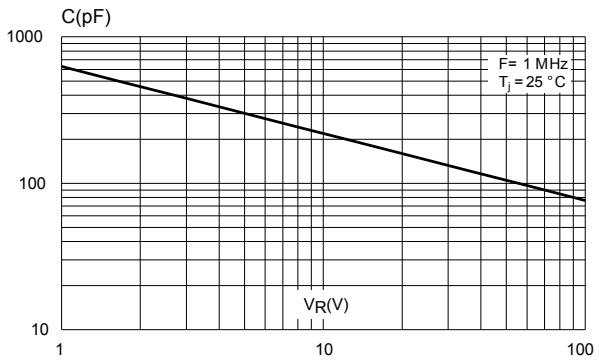


Figure 7. Forward voltage drop versus forward current (maximum values)

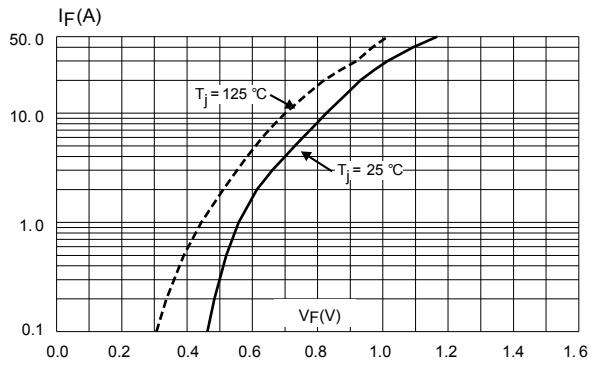
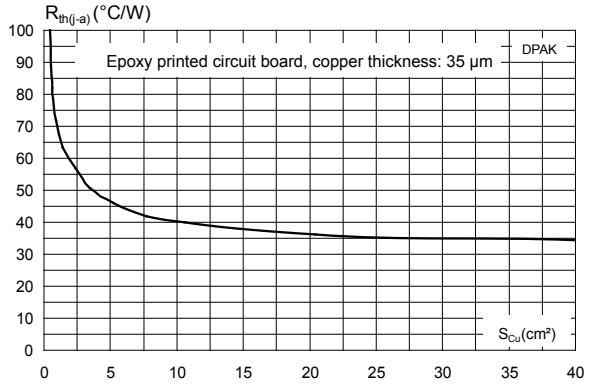


Figure 8. Thermal resistance junction to ambient versus copper surface under tab



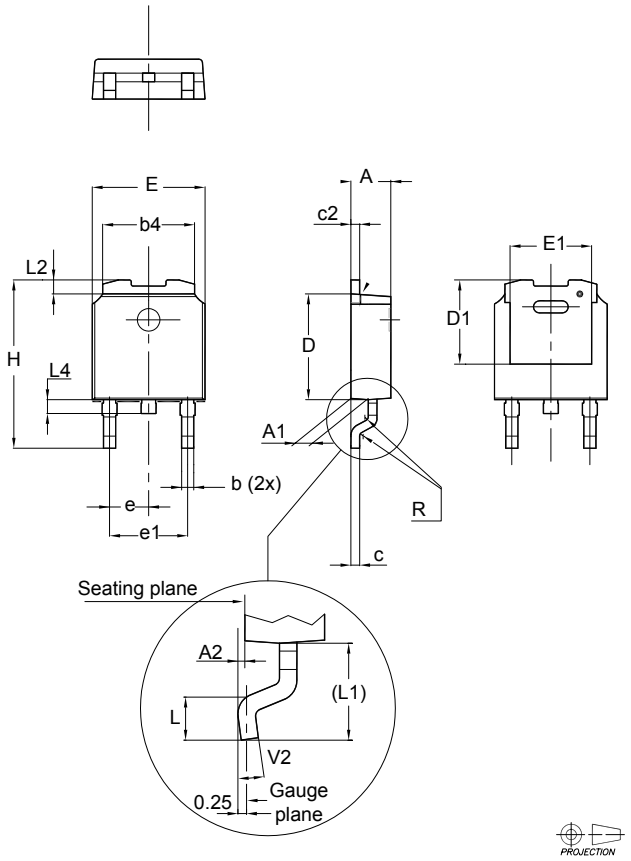
2 Package information

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 DPAK package information

- Epoxy meets UL94, V0

Figure 9. DPAK package outline



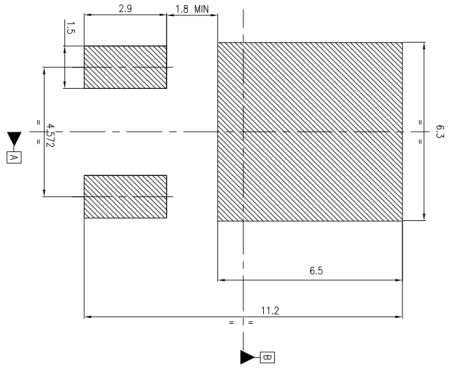
Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 4. DPAK mechanical data

Dim.	Dimensions					
	Millimeters			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
b	0.64		0.90	0.025		0.035
b4	5.20		5.40	0.205		0.213
c	0.45		0.60	0.018		0.024
c2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
D1	4.95	5.10	5.25	0.195	0.201	0.207
E	6.40		6.60	0.252		0.260
E1	4.60	4.70	4.80	0.181	0.185	0.189
e	2.159	2.286	2.413	0.085	0.090	0.095
e1	4.445	4.572	4.699	0.175	0.180	0.185
H	9.35		10.10	0.368		0.398
L	1.00		1.50	0.039		0.059
(L1)	2.60	2.80	3.00	0.102	0.110	0.118
L2	0.65	0.80	0.95	0.026	0.031	0.037
L4	0.60		1.00	0.024		0.039
R		0.20			0.008	
V2	0°		8°	0°		8°

1. *Inches dimensions given for reference only*

Figure 10. DPAK recommended footprint (dimensions are in mm)



Note: For package and tape orientation, reel and inner box dimensions and tape outline please check TN1173

3 Ordering information

Table 5. **Ordering information**

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS5H100BY-TR	STPS5 H100Y	DPAK	0.30 g	2500	Tape and reel

Revision history

Table 6. **Document revision history**

Date	Version	Changes
07-Nov-2011	1	Initial release.
06-Apr-2018	2	Removed figure 4 and figure 5. Updated Section Features and Section Description. Updated Figure 3. Normalized avalanche power derating versus junction temperature (T_j = 125 °C) and Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified). Minor text changes to improve readability.
10-Jan-2024	3	Added ST Power logo and Section Applications. Updated Section 3: Ordering information and minor text changes.