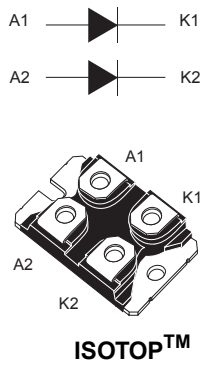


## 45 V power Schottky rectifier



### Features

- Very small conduction losses
- Extremely fast switching
- Low thermal resistance
- Insulated package ISOTOP™:
  - Insulated voltage: 2500 V<sub>RMS</sub> sine
- Avalanche capability
- ECOPACK®2 compliant

### Applications

- Switching diode
- DC/DC converter
- Industrial
- Heavy duty application

### Description

Dual power Schottky rectifier suited for SMPS and high frequency DC to DC converters.

Packaged in ISOTOP™, the **STPS24045** is especially intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.

*Note:* ISOTOP™ is an ST trademark

#### Product status link

[STPS24045](#)

#### Product summary

<b>I<sub>F(AV)</sub></b>	2 x 120 A
<b>V<sub>RRM</sub></b>	45 V
<b>V<sub>F</sub> (typ.)</b>	0.52 V
<b>T<sub>j</sub> (max.)</b>	150 °C

# 1 Characteristics

**Table 1. Absolute ratings (limiting values, per diode at  $T_{amb} = 25\text{ °C}$ , unless otherwise specified)**

Symbol	Parameter	Value	Unit	
$V_{RRM}$	Repetitive peak reverse voltage	45	V	
$I_{F(RMS)}$	Forward rms current	170	A	
$I_{F(AV)}$	Average forward current, $\delta = 0.5$ , square wave	$T_C = 80\text{ °C}$ Per diode	120	A
		$T_C = 70\text{ °C}$ Per device	240	
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms}$ sinusoidal	1500	A
$P_{ARM}$	Repetitive peak avalanche power	$t_p = 10\text{ }\mu\text{s}$ , $T_j = 125\text{ °C}$	3096	W
$T_{stg}$	Storage temperature range	-55 to +150	$^{\circ}\text{C}$	
$T_j$	Maximum operating junction temperature <sup>(1)</sup>	150	$^{\circ}\text{C}$	

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	0.65	$^{\circ}\text{C/W}$
		Total	0.38	
$R_{th(c)}$	Coupling	0.10		

When the diodes 1 and 2 are used simultaneously:

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

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	
$I_R$ <sup>(1)</sup>	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-		2	mA
		$T_j = 125\text{ °C}$		-		300	
$V_F$ <sup>(2)</sup>	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 240\text{ A}$	-		0.91	V
		$T_j = 125\text{ °C}$		-	0.72	0.87	
		$T_j = 125\text{ °C}$	$I_F = 120\text{ A}$	-	0.52	0.67	

1. Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

2. Pulse test:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the maximum conduction losses, use the following equation:

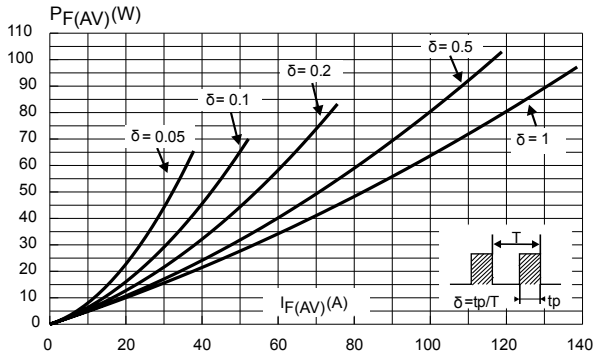
$$P = 0.47 \times I_{F(AV)} + 0.00167 \times I_F^2 (\text{RMS})$$

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

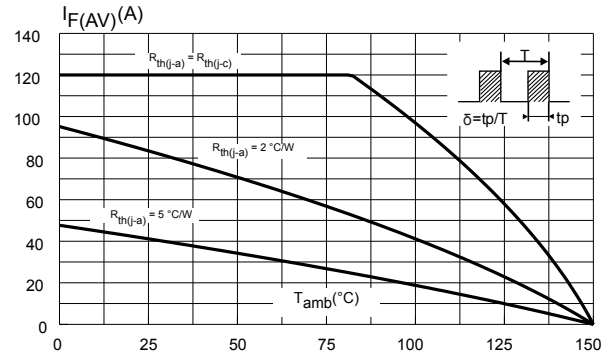
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

### 1.1 Characteristics (curves)

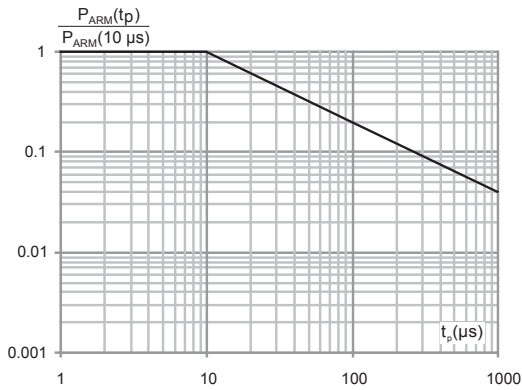
**Figure 1. Conduction losses versus average forward current (per diode)**



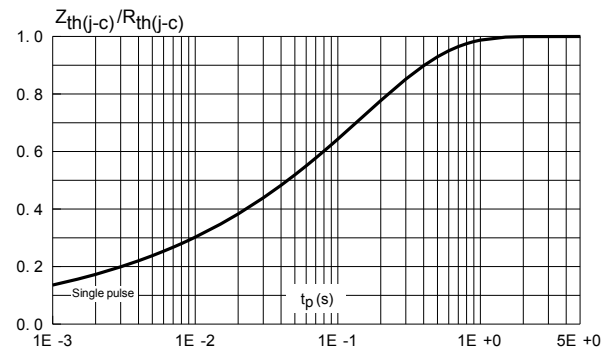
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)**



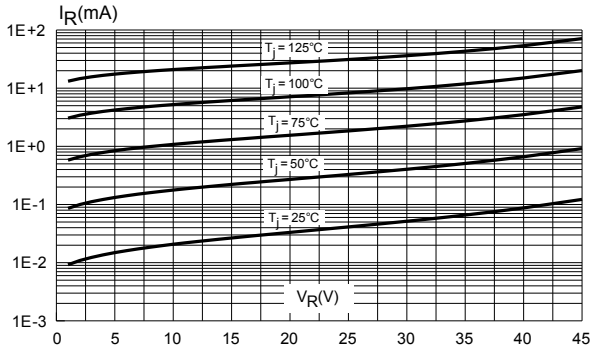
**Figure 3. Normalized avalanche power derating versus pulse duration ( $T_j = 125^\circ\text{C}$ )**



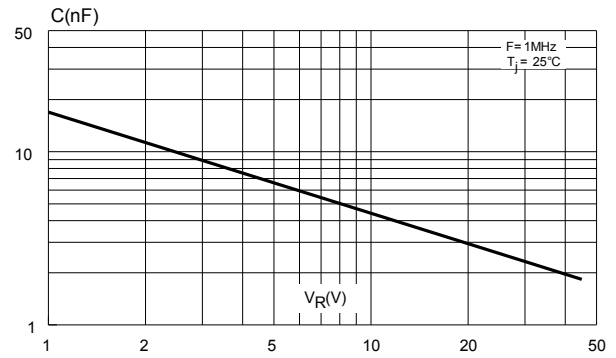
**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**



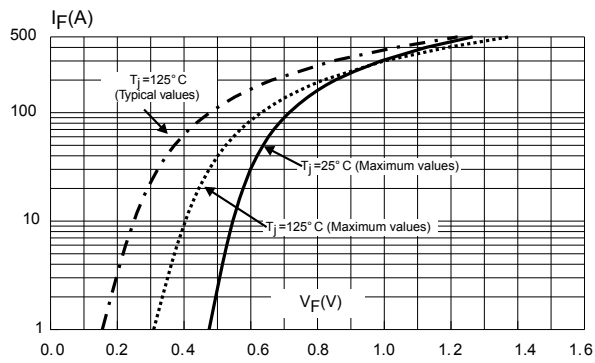
**Figure 5. Reverse leakage current versus reverse voltage applied (typical values per diode)**



**Figure 6. Junction capacitances versus reverse voltage applied (typical values per diode)**



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



## 2 Package information

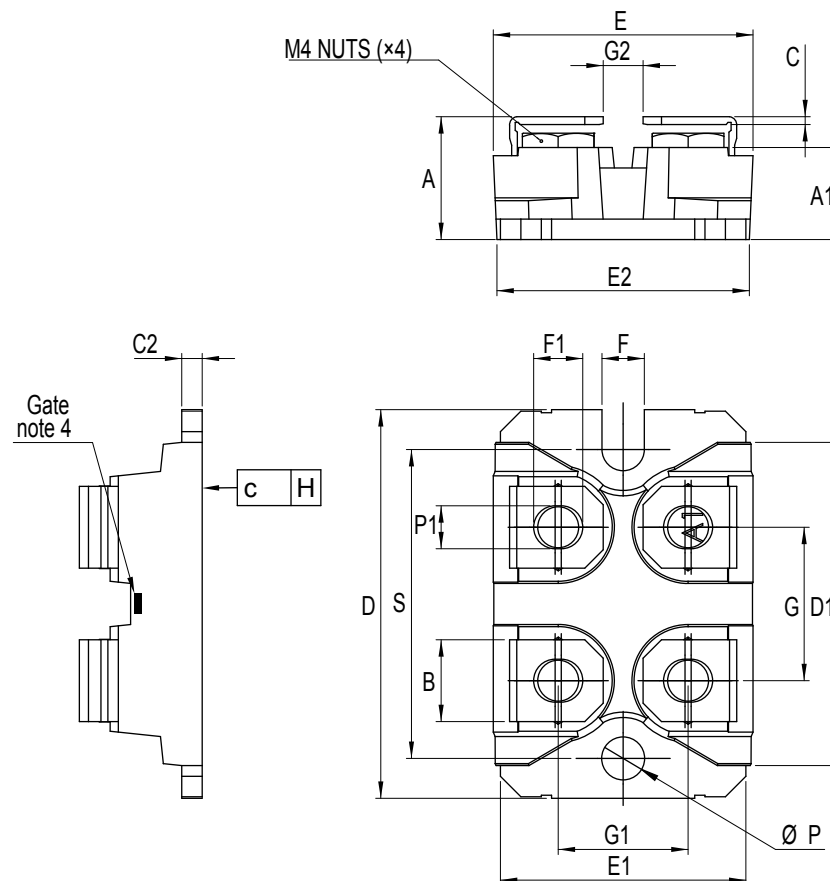
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

### 2.1 ISOTOP™ package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 1.3 N·m
- Maximum torque value: 1.5 N·m

STMicroelectronics strongly recommend the use of the screws delivered with this product. The use of any other screws is entirely at the user's own risk and will invalidate the warranty.

Figure 8. ISOTOP™ package outline



**Table 4. ISOTOP™ package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches <sup>(1)</sup>	
	Min.	Max.	Min.	Max.
A	11.80	12.20	0.460	0.480
A1	8.90	9.10	0.350	0.358
B	7.80	8.20	0.307	0.323
C	0.75	0.85	0.030	0.033
C2	1.95	2.05	0.077	0.081
D	37.80	38.20	1.488	1.504
D1	31.50	31.70	1.240	1.248
E	25.15	25.50	0.990	1.004
E1	23.85	24.15	0.939	0.951
E2	24.80		0.976	
G	14.90	15.10	0.587	0.594
G1	12.60	12.80	0.496	0.504
G2	3.50	4.30	0.138	0.169
F	4.10	4.30	0.161	0.169
F1	4.60	5.00	0.181	0.197
H	-0.05	0.10	-0.002	0.004
Diam P	4.00	4.30	0.157	0.169
P1	4.00	4.40	0.157	0.173
S	30.10	30.30	1.185	1.193

1. Inches given for reference only

### 3 Ordering information

**Table 5. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS24045TV	STPS24045TV	ISOTOP™	27 g without screws	10 with screws	Tube

## Revision history

**Table 6. Document revision history**

Date	Version	Changes
July-2003	3	Previous release.
17-Sep-2018	4	Updated cover page. Updated <a href="#">Table 1. Absolute ratings (limiting values, per diode at <math>T_{amb} = 25\text{ °C}</math>, unless otherwise specified)</a> and <a href="#">Table 5. Ordering information</a> . Removed figure 3, figure 4 and figure 5. Minor text changes to improve readability.



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