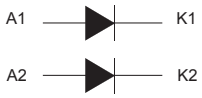
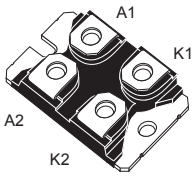
STPS24045

Datasheet

45 V power Schottky rectifier





ISOTOP™

Features

- Very small conduction losses
- Extremely fast switching
- Low thermal resistance
- Insulated package ISOTOP™:
  - Insulated voltage: 2500 V_{RMS} 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	
$I_{F(AV)}$	2 x 120 A
V_{RRM}	45 V
V_F (typ.)	0.52 V
T_j (max.)	150 °C

1 Characteristics

Table 1. Absolute ratings (limiting values, per diode at T_{amb} = 25 °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, δ = 0.5, square wave	T_C = 80 °C	Per diode	120	A
		T_C = 70 °C	Per device	240	
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		1500	A
P_{ARM}	Repetitive peak avalanche power	t_p = 10 µs, T_j = 125 °C		3096	W
T_{stg}	Storage temperature range			-55 to +150	°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	0.65	°C/W
		Total	0.38	
$R_{th(c)}$	Coupling		0.10	

When the diodes 1 and 2 are used simultaneously:

ΔT_j (diode1) = $P_{(diode1)}$ x $R_{th(j-c)\ (per\ diode)}$ + $P_{(diode2)}$ x $R_{th(c)}$

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	$V_R = V_{RRM}$	-		2	mA
		T_j = 125 °C		-		300	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 240 A	-		0.91	V
		T_j = 125 °C		-	0.72	0.87	
		T_j = 125 °C	I_F = 120 A	-	0.52	0.67	

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

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

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

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. Conduction losses versus average forward current (per diode)

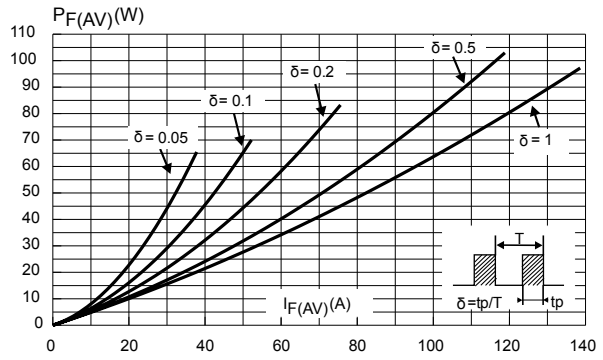


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

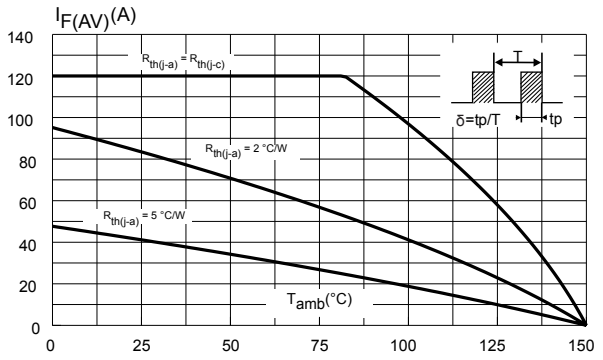


Figure 3. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

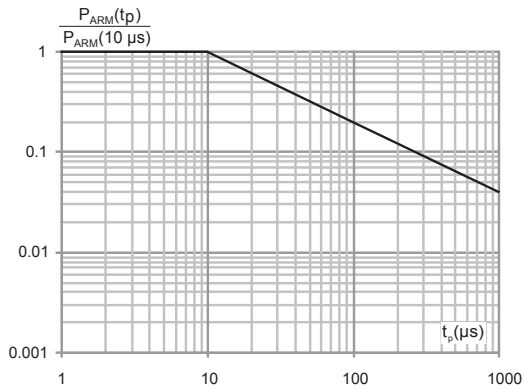


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

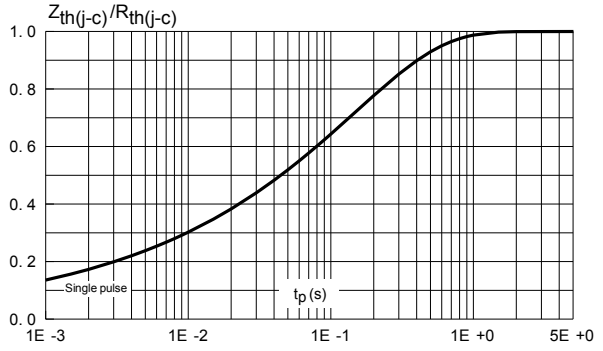


Figure 5. Reverse leakage current versus reverse voltage applied (typical values per diode)

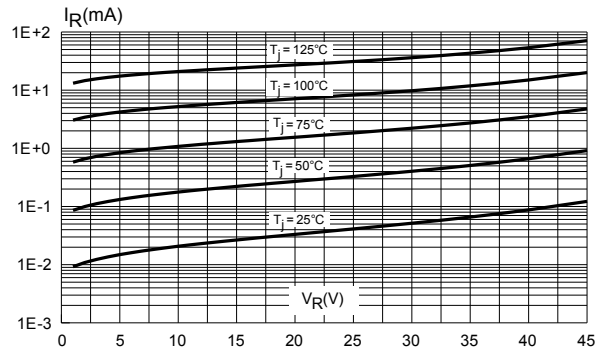


Figure 6. Junction capacitances versus reverse voltage applied (typical values per diode)

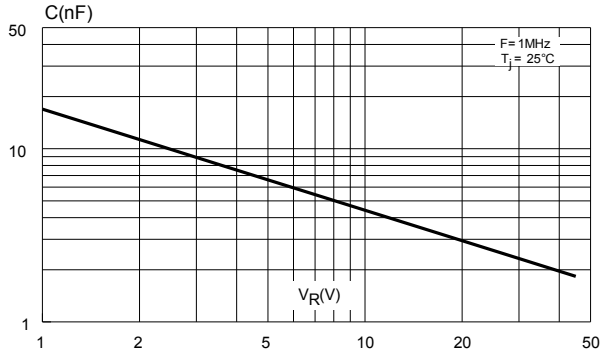
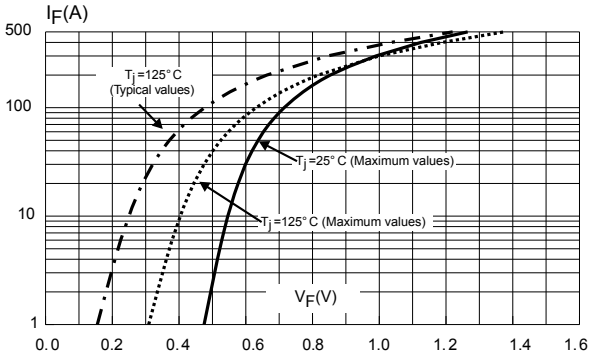


Figure 7. Forward voltage drop versus forward current (per diode)



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. 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

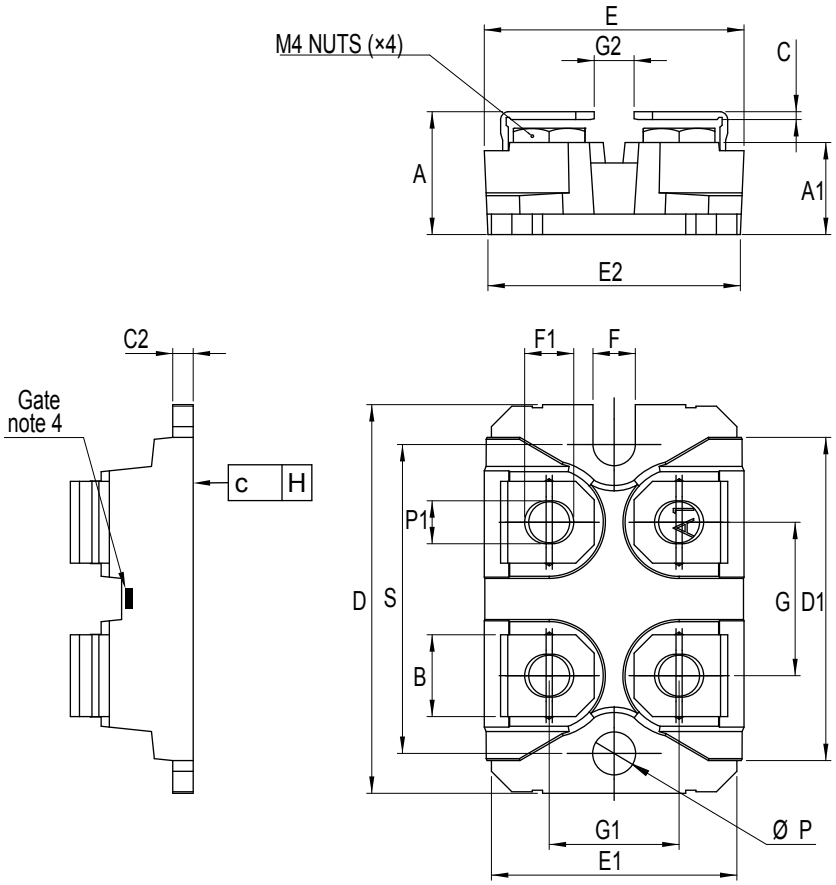


Table 4. **ISOTOP™ package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches[1]	
	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 Table 1. Absolute ratings (limiting values, per diode at T_{amb} = 25 °C, unless otherwise specified) and Table 5. Ordering information. Removed figure 3, figure 4 and figure 5. Minor text changes to improve readability.

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