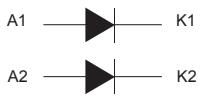
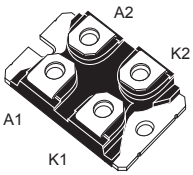
STPS200170TV1Y

Datasheet

Automotive 170 V, 2 x 100 A, high voltage power Schottky rectifier





ISOTOP

Features

- AEC-Q101 qualified
- PPAP capable
- Operating T_j from -40 °C to +175 °C
- Negligible switching losses
- Low leakage current
- Avalanche rated
- Good trade-off between leakage current and forward voltage drop
- Insulated package ISOTOP comply with UL1557 insulation:
  - Insulated voltage: 2500 V_{RMS} sine
- ECOPACK2 compliant component

Applications

- DC/DC converter, especially in hybrid or electrical vehicles
- Secondary rectification
- LLC topologies
- Phase shift topologies

Product status link
STPS200170TV1Y

Product summary	
Symbol	**Value**
$I_{F(AV)}$	2 x 100 A
V_{RRM}	170 V
T_j (max.)	175 °C
V_F (typ.)	0.63 V

Description

This high voltage Schottky rectifier is suitable for high frequency switch mode power supplies.

Packaged in ISOTOP, the STPS200170TV1Y is intended for use in secondary rectification applications and more precisely in DC/DC converters in hybrid and electrical vehicles.

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 (T_j = -40 °C to +175 °C)		170	V
$I_{F(RMS)}$	Forward rms current		200	A
$I_{F(AV)}$	Average forward current, δ = 0.5, square wave	T_C = 140 °C, per diode	100	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	700	A
P_{ARM}	Repetitive peak avalanche power	t_p = 10 µs, T_j = 125 °C	7200	W
T_{stg}	Storage temperature range		-55 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 resistance parameters

Symbol	Parameter		Max. value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	0.4	°C/W
		Total	0.2	

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	$V_R = V_{RRM}$	-		200	µA
		T_j = 125 °C		-	30	100	mA
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 100 A	-		0.85	V
		T_j = 150 °C		-	0.63	0.68	
		T_j = 25 °C	I_F = 200 A	-		1.01	
		T_j = 150 °C		-	0.78	0.86	

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:

$P = 0.5 \times I_{F(AV)} + 0.0018 \times I_F{}^2{}_{(RMS)}$

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 in a power diode

1.1 Characteristics (curves)

Figure 1. Average forward current versus case temperature (δ = 0.5, per diode)

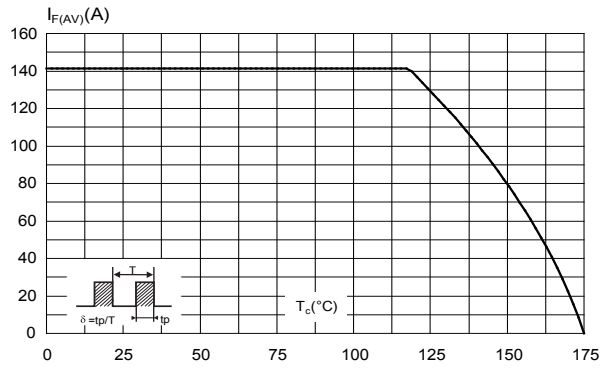


Figure 2. Relative variation of thermal impedance junction to case versus pulse duration

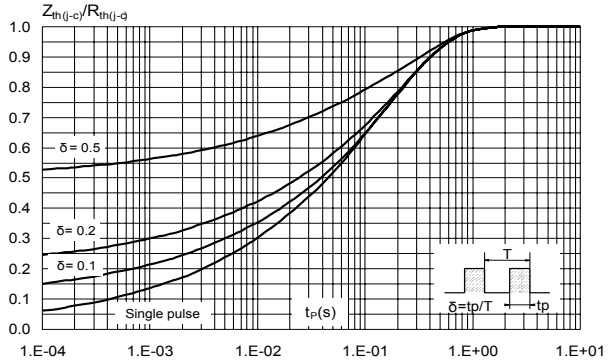


Figure 3. Reverse leakage current versus reverse voltage applied (typical values per diode)

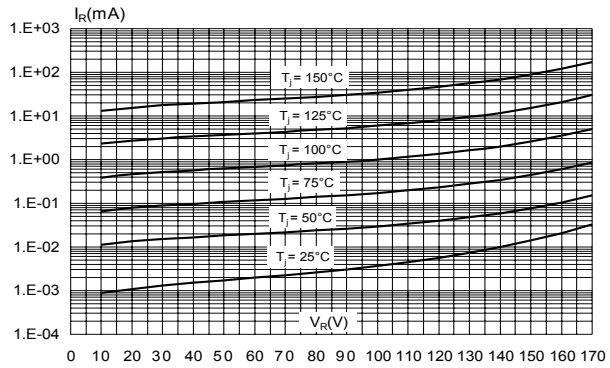


Figure 4. Junction capacitances versus reverse voltage applied (typical values per diode)

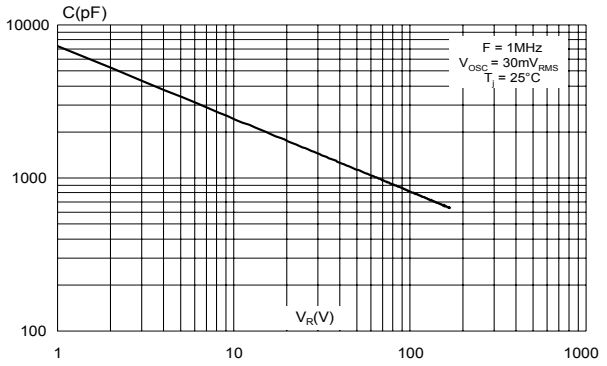


Figure 5. Forward voltage drop versus forward current (typical values, per diode)

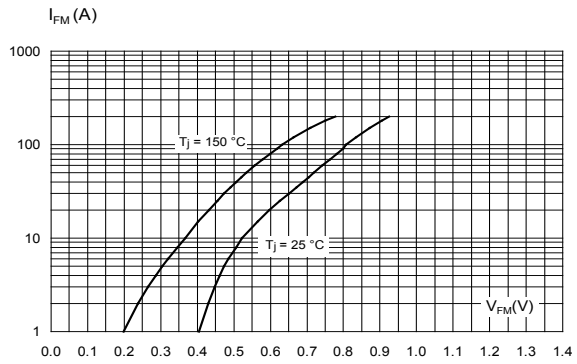
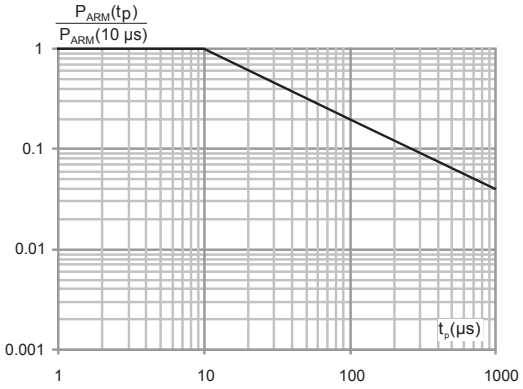


Figure 6. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)



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 7. ISOTOP package outline

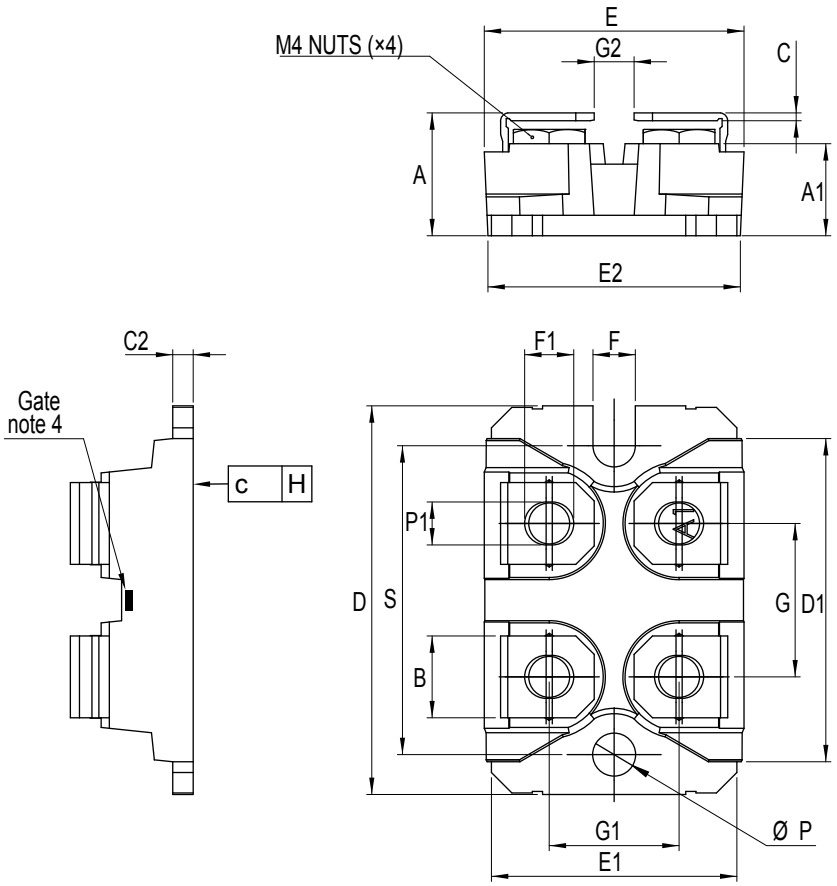


Table 4. ISOTOP package mechanical data

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 Mounting information

3.1 Mounting on heatsink

Figure 8. **Screws distance**

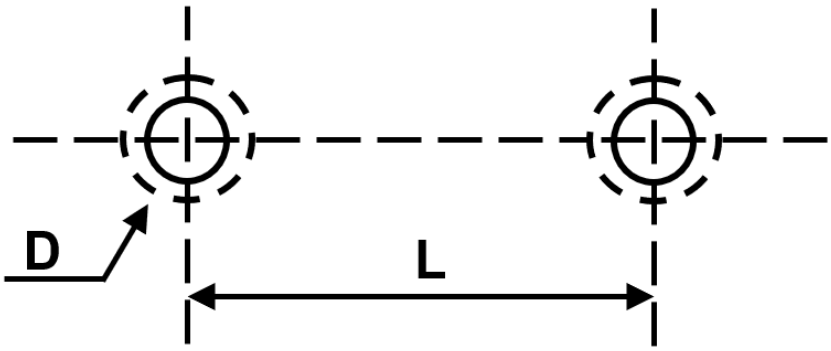


Table 5. **Heatsink specification**

Parameter	Value
Flatness (max concavity or convexity between fixing holes)	≤ 20 µm (0.78 mils
Surface finish	± 1.2 µm (±0.05 mils)
Fixing holes	D = M4 L = 30 + 3 mm (1.181 +0.012 inch)

Table 6. **Mounting specification**

Parameter	Value
Fixing screw	M4 + lock washer
Torque	1.3 ±0.2 N·m (7.6 ±1.2 LBS·inch)
Fixing holes	≤ 0.05 °CW

Table 7. **Connectors**

Parameter	Value
Screws	See figure 9
Torque	1.3 ±0.2 N·m (7.6 ±1.2 LBS·inch)
Pull test (fast on pins)	≤ 80 N
Twist test	N/A
Contact area (screw version)	45 mm^2
Lead inductance	≤ 5 nH

Figure 9. **Mounting section**

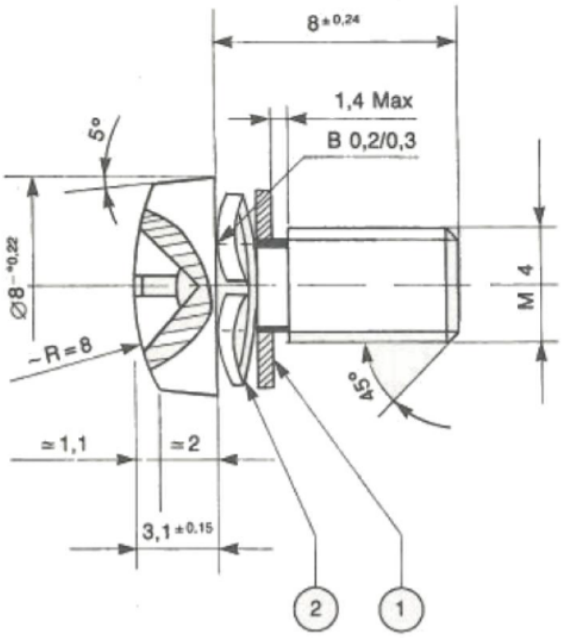
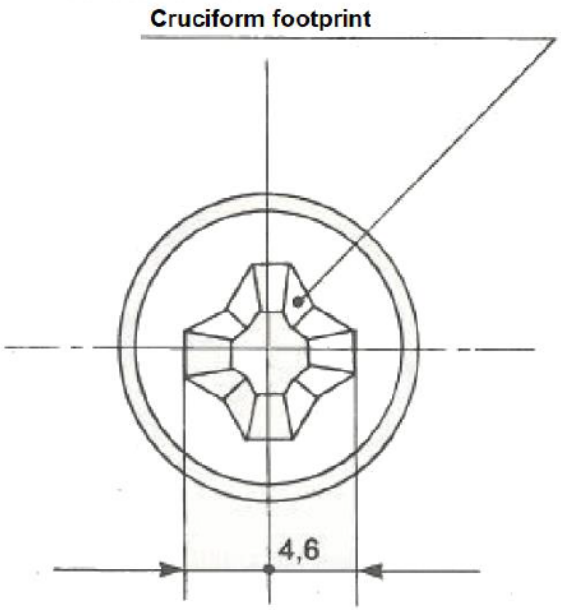


Figure 10. **Cross form**



For more information, please refer to the following technical note related to the mouting :

- TN1331: Assembly recommendations for STMicroelectronics ISOTOP package

4 Ordering information

Table 8. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS200170TV1Y	STPS 200170TV1Y	ISOTOP	27 g without screws	10 with screws	Tube

Revision history

Table 9. Document revision history

Date	Version	Changes
02-Mar-2010	1	First issue.
07-Oct-2011	2	Added torque values in Section 2.
12-Nov-2015	3	Updated features in cover page. Text added in Section 2.
16-Apr-2018	4	Removed figures 3 and 10. Updated Section Features, Section Description and Table 1. Absolute ratings (limiting values, per diode at T_{amb} = 25 °C, unless otherwise specified).
23-Nov-2020	5	Updated Features, Table 1. Absolute ratings (limiting values, per diode at T_{amb} = 25 °C, unless otherwise specified) and Table 2. Thermal resistance parameters. Removed conduction losses curves. Added Section 3 Mounting information. Minor text change.

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STPS200170TV1Y