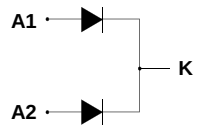
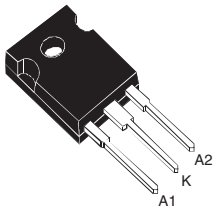
STPS4045C-Y

Automotive power Schottky rectifiers

Datasheet - production data





TO-247
STPS4045CWY

Features

- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Low thermal resistance
- Avalanche capability specified
- AEC-Q101 qualified

Description

This dual center tap Schottky rectifier is suited for switch mode power supply and high frequency DC to DC converters.

Packaged in TO-247 this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection for automotive applications.

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 20 A
V_{RRM}	45 V
$T_{j\ (max)}$	175 °C
$V_{F\ (max)}$	0.63 V

1 Characteristics

Table 2. Absolute ratings (limiting values, per diode)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			45	V
$I_{F(RMS)}$	Forward rms current			30	A
$I_{F(AV)}$	Average forward current	T_c = 150 °C, δ = 0.5	Per diode	20	A
		T_c = 145 °C, δ = 0.5	Per device	40	
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		220	A
I_{RRM}	Repetitive peak reverse current	t_p = 2 µs square F=1 kHz		1	A
I_{RSM}	Non repetitive peak reverse current	t_p = 100 µs square		3	A
P_{ARM}	Repetitive peak avalanche power	t_p = 1 µs T_j = 25 °C		6000	W
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Operating junction temperature(1)			-40 to + 175	°C
dV/dt	Critical rate of rise reverse voltage			10000	V/µs

1. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistances

Symbol	Parameter		Value	Unit
$R_{th\ (j-c)}$	Junction to case	Per diode Total	1.5 0.8	°C/W
$R_{th\ (c)}$	Coupling		0.1	

When the diodes 1 and 2 are used simultaneously:

ΔT_j(diode 1) = P(diode1) x $R_{th(j-c)}$(Per diode) + P(diode2) x $R_{th(c)}$

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Tests 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		-	11	40	mA
V_F (1)	Forward voltage drop	T_j = 25 °C	I_F = 20 A	-	-	0.76	V
		T_j = 125 °C		-	0.56	0.63	
		T_j = 25 °C	I_F = 40 A	-	-	0.94	
		T_j = 125 °C		-	0.7	0.83	

1. Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:

$P = 0.43x\ I_{F(AV)} + 0.01x\ I_F{}^2{}_{(RMS)}$

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

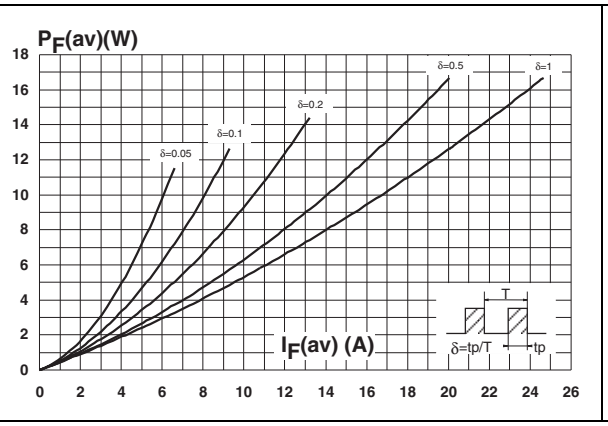


Figure 2. Average forward current versus ambient temperature (δ = 0.5 per diode)

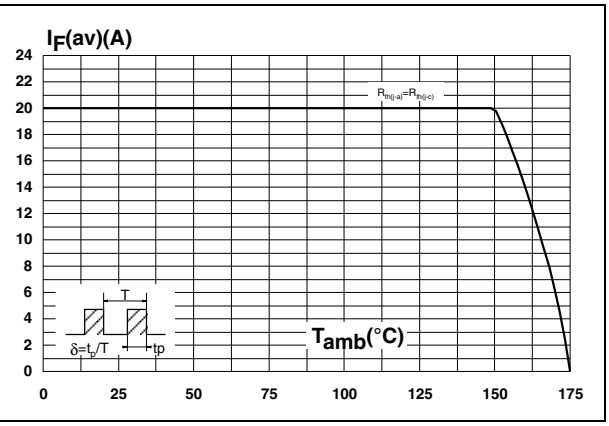


Figure 3. Normalized avalanche power derating versus pulse duration

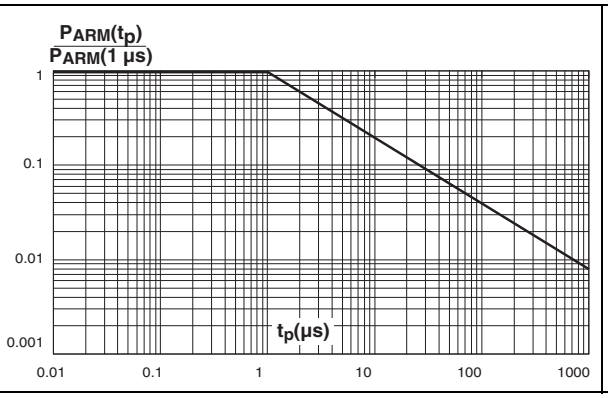


Figure 4. Normalized avalanche power derating versus junction temperature

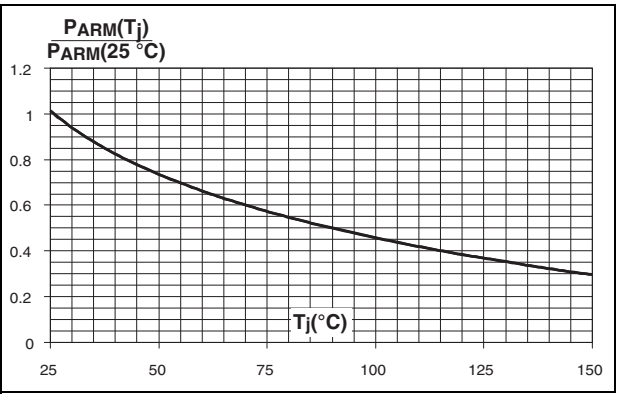


Figure 5. Non repetitive surge peak forward current versus overload duration (maximum values, per diode)

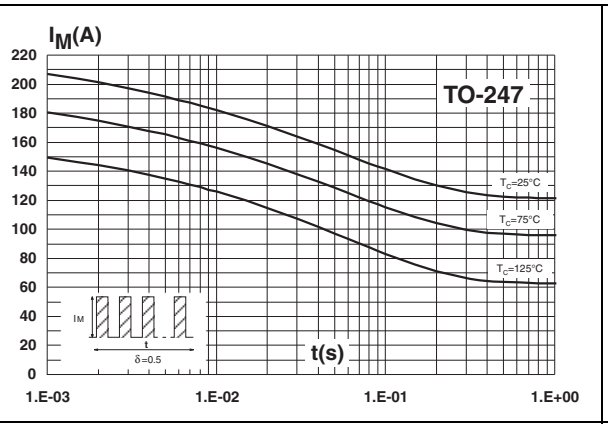


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration

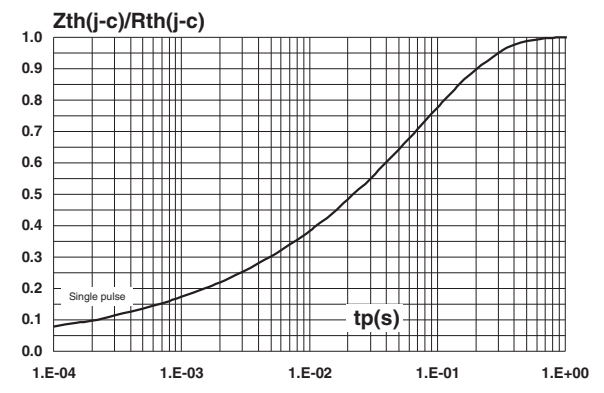


Figure 7. Reverse leakage current versus reverse voltage applied (typical values, per diode)

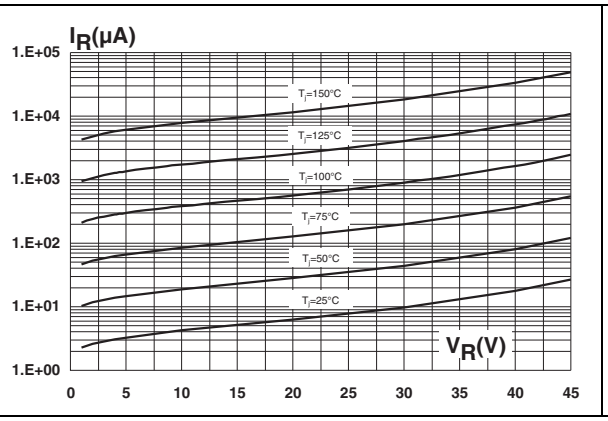


Figure 8. Junction capacitance versus reverse voltage applied (typical values, per diode)

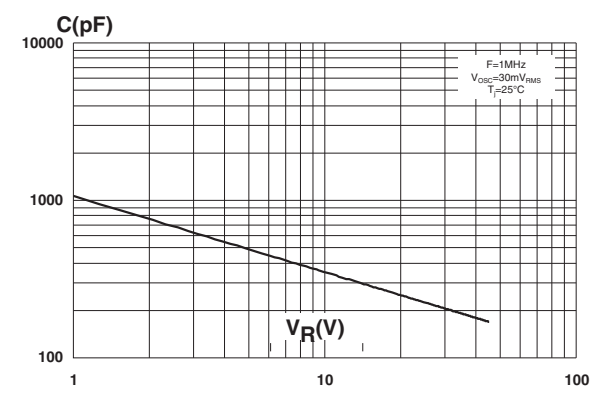
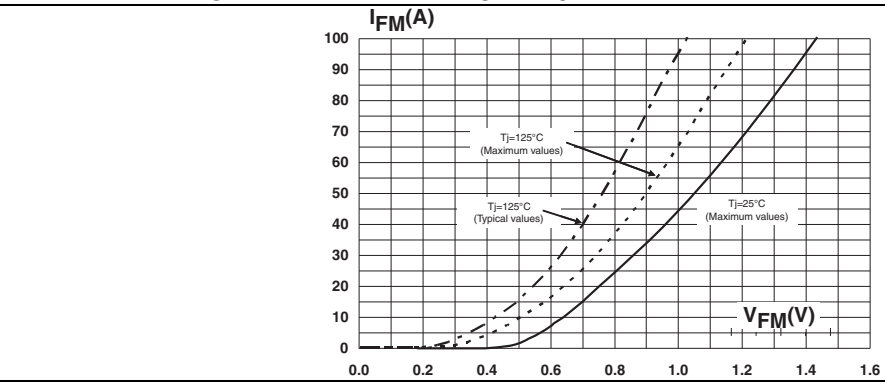


Figure 9. Forward voltage drop versus forward current (per diode)



2 Package information

- Epoxy meets UL94,V0
- Cooling method: by conduction (C)
- Recommended torque values: 0.9 to 1.2 N·m

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Figure 10. TO-247 dimension definitions

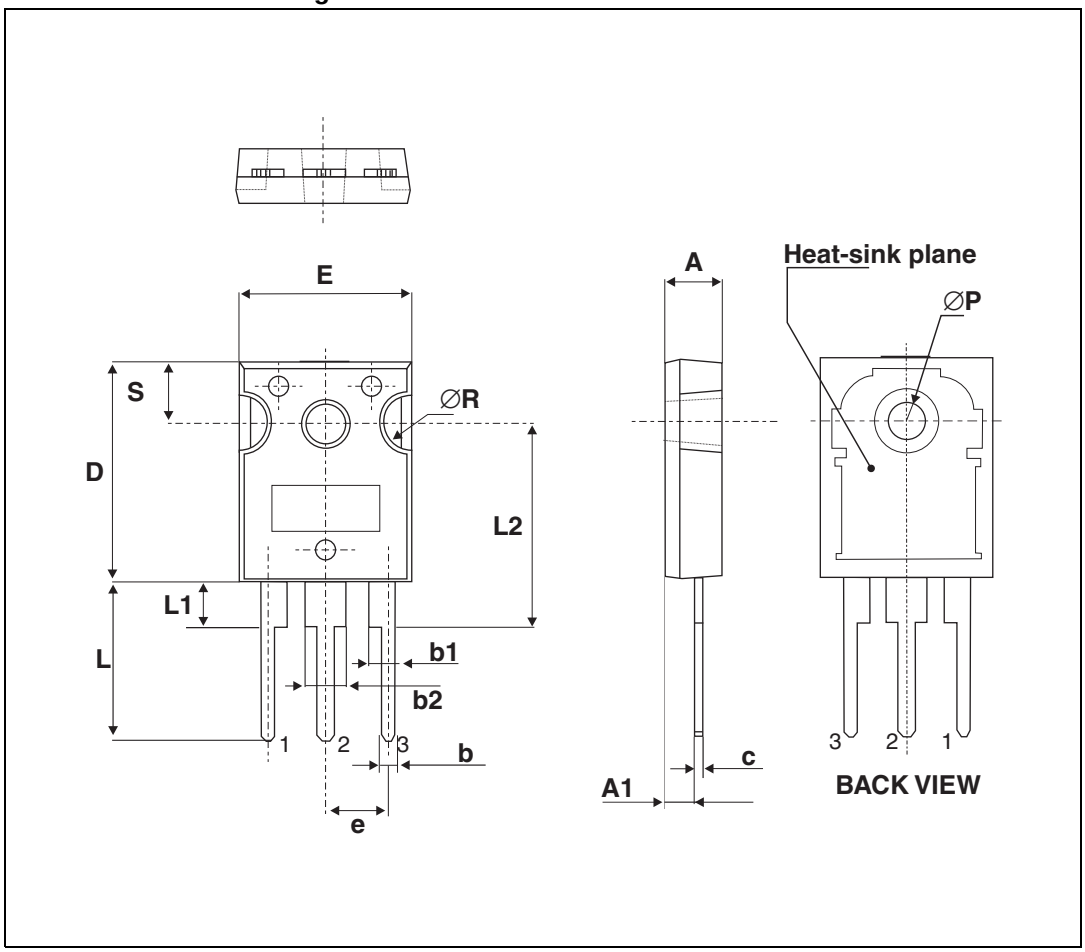

Table 5. TO-247 dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ	Max.
A	4.85		5.15	0.191		0.203
A1	2.20		2.60	0.086		0.102
b	1.00		1.40	0.039		0.055
b1	2.00		2.40	0.078		0.094
b2	3.00		3.40	0.118		0.133
c	0.40		0.80	0.015		0.031
D(1)	19.85		20.15	0.781		0.793
E	15.45		15.75	0.608		0.620
e	5.30	5.45	5.60	0.209	0.215	0.220
L	14.20		14.80	0.559		0.582
L1	3.70		4.30	0.145		0.169
L2	18.50 typ.			0.728 typ.		
∅P(2)	3.55		3.65	0.139		0.143
∅R	4.50		5.50	0.177		0.217
S	5.30	5.50	5.70	0.209	0.216	0.224

1. Dimension D plus gate protrusion does not exceed 20.5 mm
2. Resin thickness around the mounting hole is not less than 0.9 mm

3 Ordering information

Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS4045CWY	STPS4045CWY	TO-247	4.46 g	30	Tube

4 Revision history

Table 7. Document revision history

Date	Revision	Changes
17-Dec-2013	1	First issue.

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