STPS40SM120C

Power Schottky rectifier

Datasheet — production data

Features

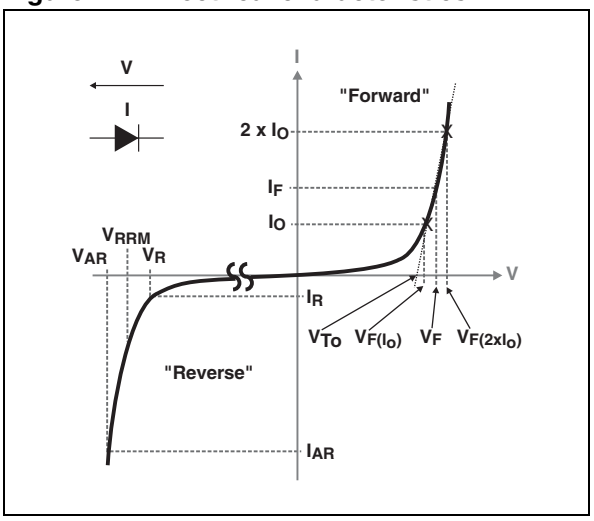
- High current capability
- Avalanche rated
- Low forward voltage drop
- High frequency operation

Description

This Schottky diode is suited for high frequency switch mode power supply.

Packaged in TO-220AB, TO-220AB narrow leads and I^2PAK, this device is intended to be used in notebook, game station and desktop adapters, providing in these applications a good efficiency at both low and high load.

Figure 1. Electrical characteristics[(a)]



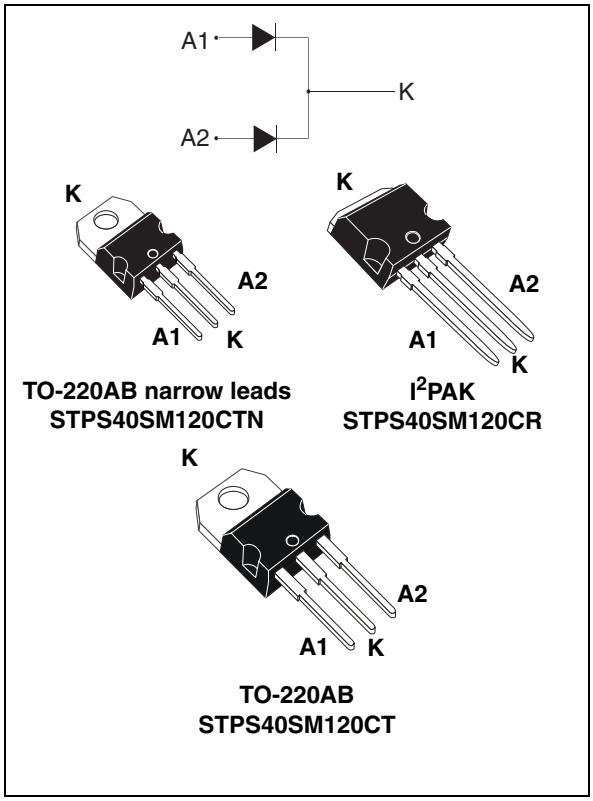


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 20 A
V_{RRM}	120 V
T_j (max)	150 °C
V_F (typ)	0.46 V

1 Characteristics

Table 2. Absolute ratings (limiting values per diode at T_{amb} = 25 °C, unless otherwise specified)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			120	V
$I_{F(RMS)}$	Forward rms current			30	A
$I_{F(AV)}$	Average forward current, δ = 0.5	Per diode	T_c = 125 °C	20	A
		Per device	T_c = 115 °C	40	
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		210	A
P_{ARM}(1)	Repetitive peak avalanche power	T_j = 125 °C, t_p = 10 µs		1150	W
V_{ARM}(2)	Maximum repetitive peak avalanche voltage	t_p < 10 µs, T_j < 125 °C, I_{AR} < 7.7 A		150	V
V_{ASM}(2)	Maximum single-pulse peak avalanche voltage	t_p < 10 µs, T_j < 125 °C, I_{AR} < 7.7 A		150	V
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Maximum operating junction temperature(3)			150	°C

1. For pulse time duration deratings, please refer to *Figure 4*. More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the STMicroelectronics Application notes AN1768, “Admissible avalanche power of schottky diodes” and AN2025, “Converter improvement using Schottky rectifier avalanche specification”.
2. See *Figure 9*
3. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistance

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	1.35	°C/W
		Total	0.93	
$R_{th(c)}$	Coupling		0.50	

When the two diodes 1 and 2 are used simultaneously:

ΔT_j(diode 1) = P(diode 1) x $R_{th(j-c)}$(Per diode) + P(diode 2) x $R_{th(c)}$

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	55	275	µA
		T_j = 125 °C		-	20	50	mA
V_F(2)	Forward voltage drop	T_j = 125 °C	I_F = 5 A	-	0.46	0.51	V
		T_j = 125 °C	I_F = 10 A	-	0.55	0.60	
		T_j = 25 °C	I_F = 20 A	-		0.83	
		T_j = 125 °C		-	0.63	0.69	

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

To evaluate the conduction losses use the following equation:

$$P = 0.52 \times I_{F(AV)} + 0.0085 \times I_F^2{}_{(RMS)}$$

Figure 2. Average forward power dissipation versus average forward current (per diode)

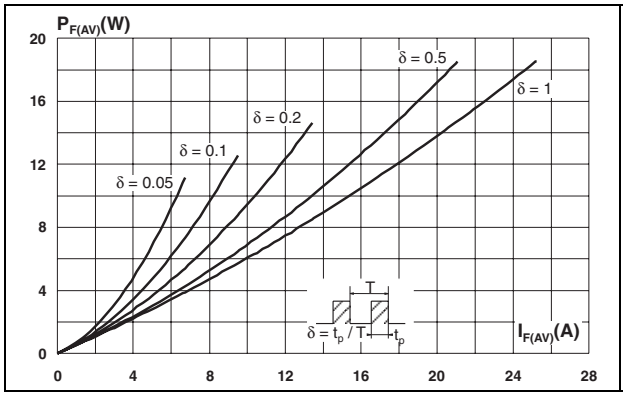


Figure 3. Average forward current versus ambient temperature (δ = 0.5, per diode)

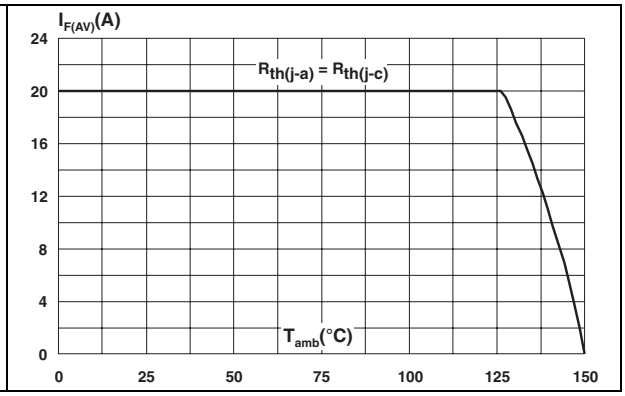


Figure 4. Normalized avalanche power derating versus pulse duration

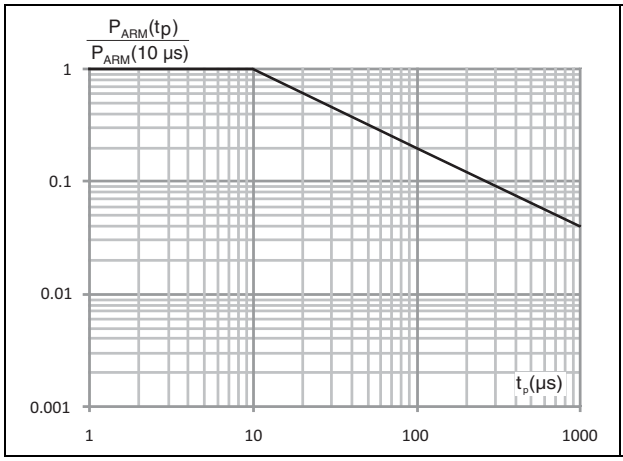
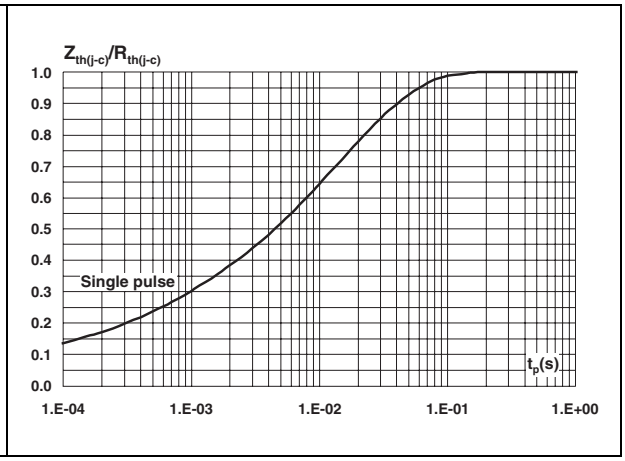


Figure 5. Relative variation of thermal impedance junction to case versus pulse duration



3 Ordering information

Table 8. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS40SM120CTN	PS40SM120CTN	TO-220AB narrow leads	1.9 g	50	Tube
STPS40SM120CT	PS40SM120CT	TO-220AB	1.9 g	50	Tube
STPS40SM120CR	PS40SM120CR	I^2PAK	1.49 g	50	Tube