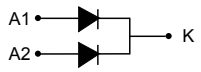
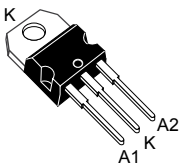
STTH2003

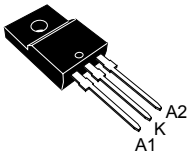
Datasheet

300 V ultrafast rectifier

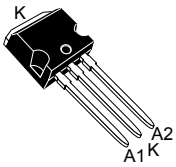




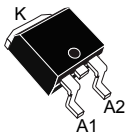
TO-220AB

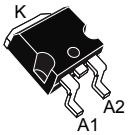


TO-220FPAB



I²PAK





D²PAK

Product status
STTH2003

Product summary	
$I_{F(AV)}$	2 x 10 A
V_{RRM}	300 V
T_j (max.)	175 °C
V_F (typ.)	0.85 V
t_{rr} (max.)	25 ns

Features

- Combines highest recovery and reverse voltage performance
- Ultra-fast, soft and noise-free recovery
- Insulated package: TO-220FPAB
  - Insulating voltage = 2000 V_{RMS} sine
- ECOPACK®2 compliant component for D²PAK on demand

Applications

- Secondary rectification
- Switching diode
- Telecom power supply
- DC/DC converter

Description

The STTH2003 is a dual center tap fast recovery epitaxial diodes suited for switch mode power supply and high frequency DC/DC converters.

Packaged in TO-220AB, TO-220FPAB, I²PAK or D²PAK, this device is especially intended for secondary rectification.

1 Characteristics

Table 1. Absolute ratings (limiting values, per diode, at 25 °C, unless otherwise specified)

Symbol	Parameter				Value	Unit
V_{RRM}	Repetitive peak reverse voltage				300	V
$I_{F(RMS)}$	Forward rms current				30	A
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	TO-220AB, D²PAK, I²PAK	T_C = 140 °C	Per diode	10	A
		TO-220FPAB	T_C = 115 °C			
		All types	Per device		20	
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal			110	A
T_{stg}	Storage temperature range				-65 to +175	°C
T_j	Maximum operating junction temperature				175	°C

Table 2. Thermal resistance parameters

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AB, D²PAK, I²PAK	Per diode	2.5	°C/W
		TO-220FPAB		4.6	
		TO-220AB, D²PAK, I²PAK	Total	1.3	
		TO-220FPAB		4.0	
$R_{th(c)}$	Coupling	TO-220AB, D²PAK, I²PAK		0.1	°C/W
		TO-220FPAB		3.5	

For more information, please refer to the following application note:

- AN5088: Rectifiers thermal management, handling and mounting recommendations

When the diodes 1 and 2 are used simultaneously:

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

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 = 300 V	-		20	µA
		T_j = 125 °C		-	30	300	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 10 A	-		1.25	V
		T_j = 125 °C		-	0.85	1.0	

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:

$P = 0.75 \times I_{F(AV)} + 0.025 \times I_F{}^2{}_{(RMS)}$

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

Table 4. Recovery characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 0.5 A, I_{rr} = 0.25 A, I_R = 1 A	-		25	ns
			I_F = 1 A, V_R = 30 V,dI_F/dt = -50 A/µs	-		35	
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 10 A, V_{FR} = 1.1 x V_{Fmax}, dI_F/dt = 100 A/µs	-		230	ns
V_{FP}	Peak forward voltage	T_j = 25 °C	I_F = 10 A, dI_F/dt = 100 A/µs	-		3.5	V
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 10 A, V_{CC} = 200 V, dI_F/dt = -200 A/µs	-		8	A
S factor	Softness factor			-	0.3		-

1.1 Characteristics (curves)

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

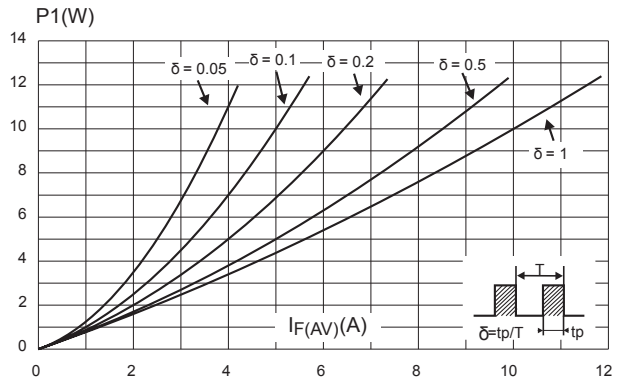


Figure 2. Forward voltage drop versus forward current (maximum values, per diode)

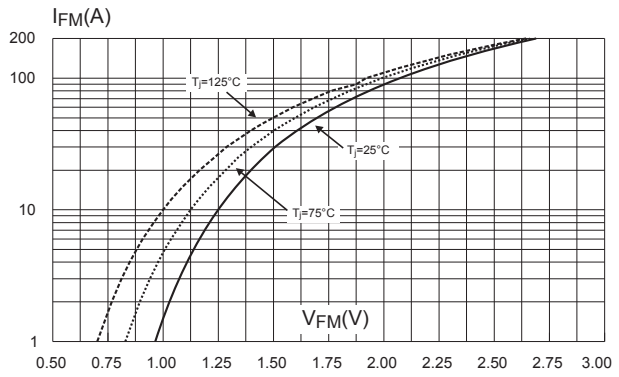


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, D²PAK, I²PAK)

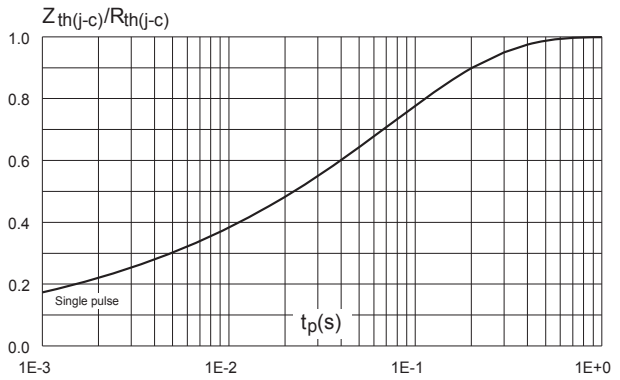
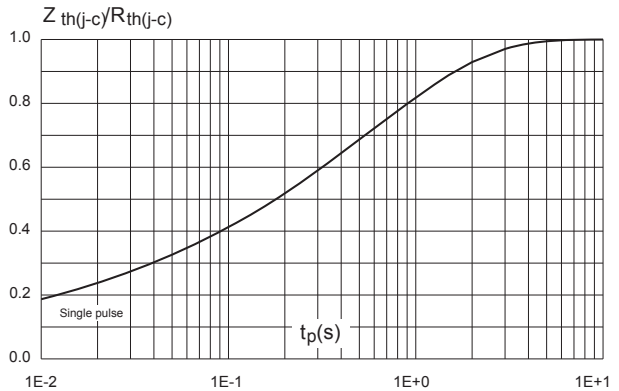


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)



3 Ordering information

Table 9. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH2003CT	STTH2003CT	TO-220AB	1.95 g	50	Tube
STTH2003CG	STTH2003CG	D^2PAK	1.38 g	50	Tube
STTH2003CG-TR	STTH2003CG	D^2PAK	1.38 g	1000	Tape and reel
STTH2003CFP	STTH2003CFP	TO-220FPAB	1.90 g	50	Tube
STTH2003CR	STTH2003CR	I^2PAK	1.50 g	50	Tube