STTH1R06

Turbo 2 ultrafast high voltage rectifier

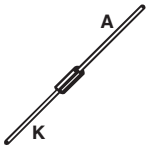
Features

- Ultrafast switching
- Low reverse recovery current
- Low thermal resistance
- Reduces switching and conduction losses

Description

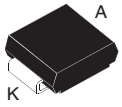
The STTH1R06, which is using ST Turbo 2 600 V technology, is specially suited as boost diode in power factor correction circuitry.

The device is also intended for use as a free wheeling diode in power supplies and other power switching applications.



DO-41
STTH1R06

SMA
STTH1R06A



SMB
STTH1R06U

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	1 A
V_{RRM}	600 V
I_R (max)	75 µA
T_j	175 °C
V_F (typ)	1.0 V
t_{rr} (max)	25 ns

1 Characteristics

Table 2. Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			600	V
$I_{F(RMS)}$	Forward rms current	DO-41		10	A
		SMA / SMB		7	
$I_{F(AV)}$	Average forward current	DO-41	T_c = 100 °C δ = 0.5	1	A
		SMA	T_c = 125 °C δ = 0.5		
		SMB	T_c = 135 °C δ = 0.5		
I_{FSM}	Surge non repetitive forward current	DO-41	t_p = 10ms sinusoidal	25	A
		SMA / SMB		20	
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Maximum operating junction temperature			175	°C

Table 3. Thermal resistance

Symbol	Parameter			Value (max)	Unit
$R_{th(j-l)}$	Junction to lead	L = 10 mm	DO-41	45	°C/W
			SMA	30	
			SMB	25	
$R_{th(j-a)}$	Junction to ambient (1)	L = 10 mm	DO-41	70	°C/W

1. $R_{th(j-a)}$ is measured with a copper area S = Scm2 (see *Figure 14*).

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$			1	µA
		T_j = 150 °C			10	75	
V_F	Forward voltage drop	T_j = 25 °C	I_F = 1A			1.7	V
		T_j = 150 °C			1.0	1.25	

To evaluate the conduction losses use the following equation: $P = 1.03 \times I_{F(AV)} + 0.27\ I_F{}^2{}_{(RMS)}$

Table 5. Dynamic characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 0.5A I_{rr} = 0.25A I_R =1A			25	ns
			I_F = 1A dI_F/dt = -50 A/µs V_R =30V		30	45	
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 1A dI_F/dt = 100 A/µs V_{FR} = 1.1 x V_{Fmax}			100	ns
V_{FP}	Forward recovery voltage	T_j = 25 °C	I_F = 1A dI_F/dt = 100 A/µs V_{FR} = 1.1 x V_{Fmax}			10	V

Figure 1. Conduction losses versus average forward current

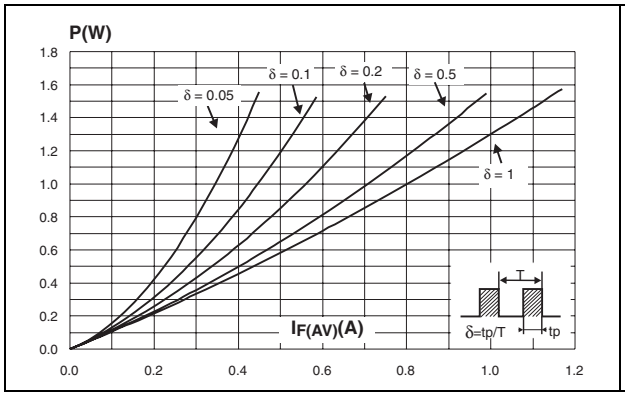


Figure 2. Forward voltage drop vs forward current

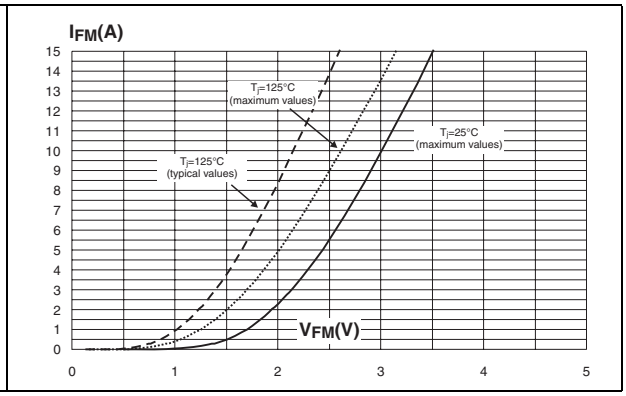


Figure 3. Relative variation of thermal impedance junction to case vs pulse duration (DO-41)

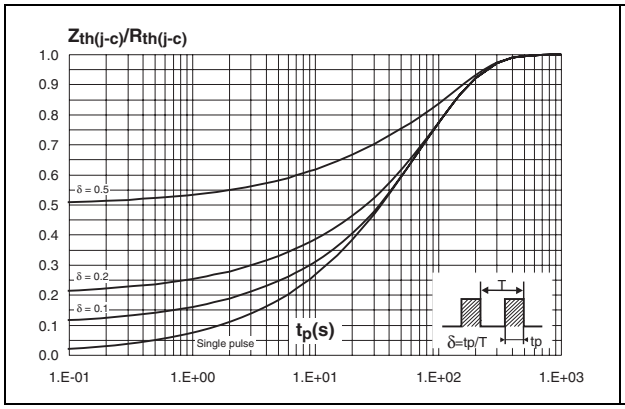


Figure 4. Relative variation of thermal impedance junction to case vs pulse duration (SMA)

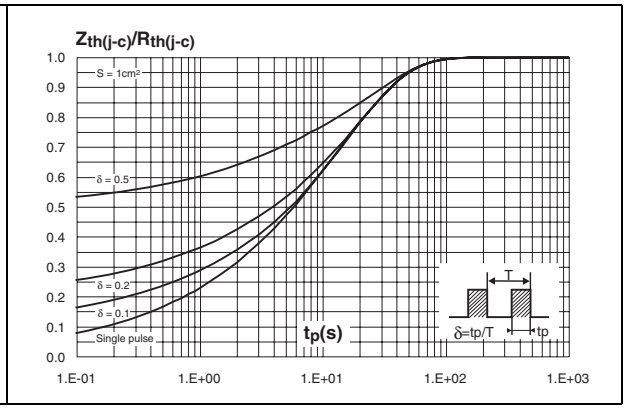


Figure 5. Relative variation of thermal impedance junction to case vs pulse duration (SMB)

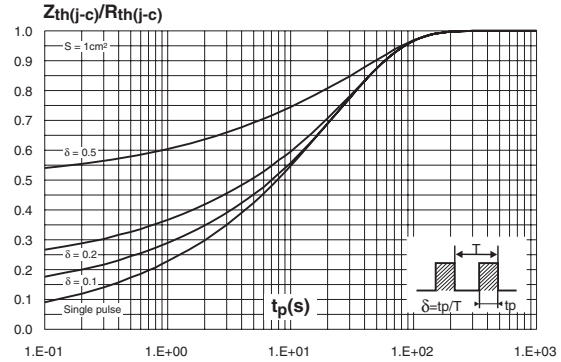


Figure 6. Peak reverse recovery current vs dI_F/dt (typical values)

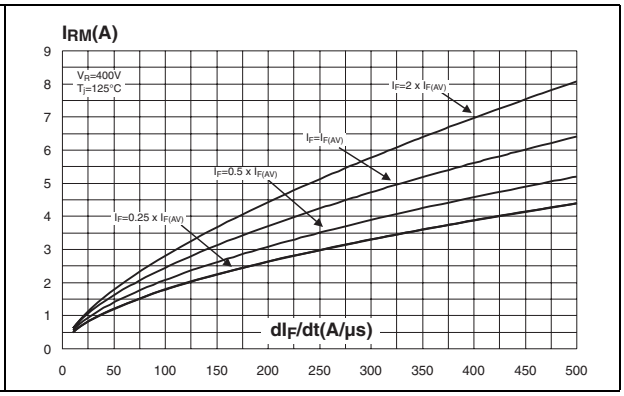


Figure 7. Reverse recovery time versus dI_F/dt (typical values)

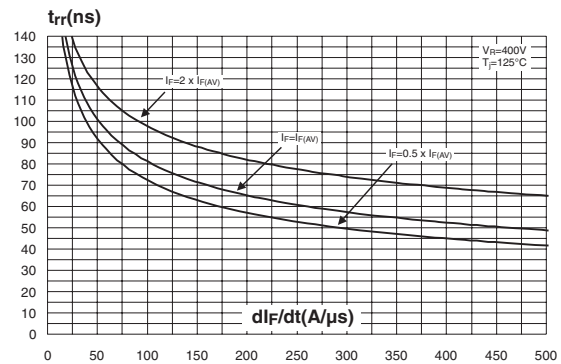


Figure 8. Reverse recovery charges versus dI_F/dt (typical values)

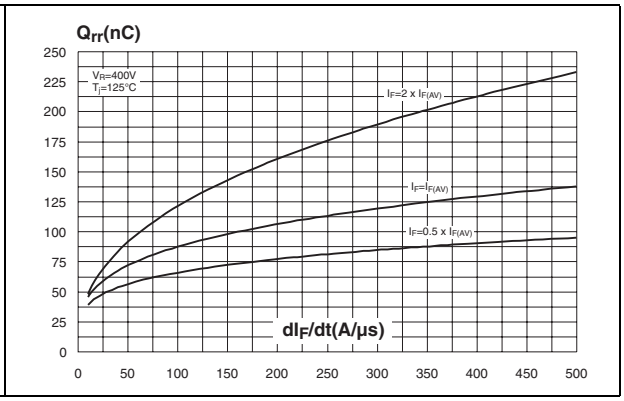


Figure 9. Reverse recovery softness factor vs dI_F/dt (typical values)

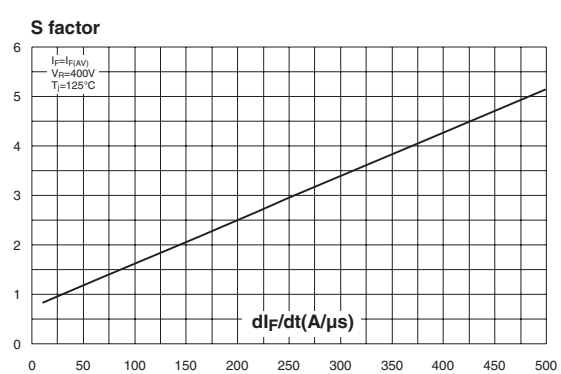


Figure 10. Relative variations of dynamic parameters vs junction temperature

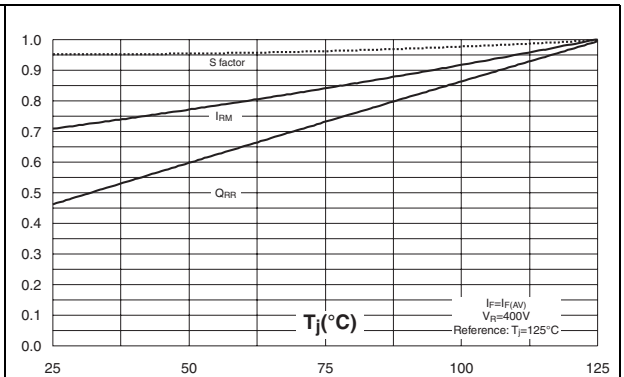


Figure 11. Transient peak forward voltage vs dI_F/dt (typical values)

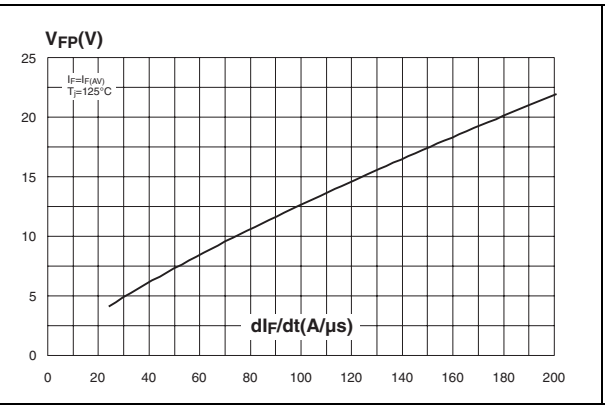


Figure 12. Forward recovery time vs dI_F/dt (typical values)

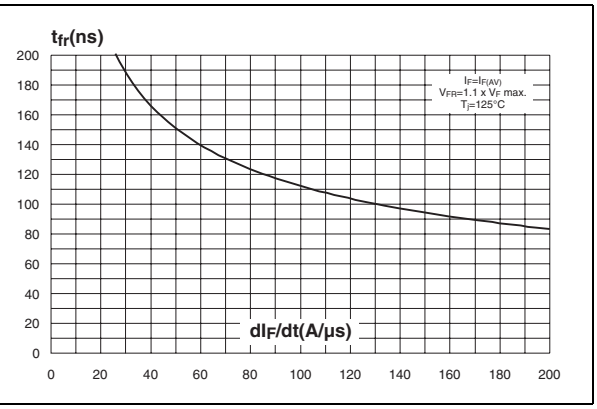


Figure 13. Junction capacitance versus reverse voltage applied (typical values)

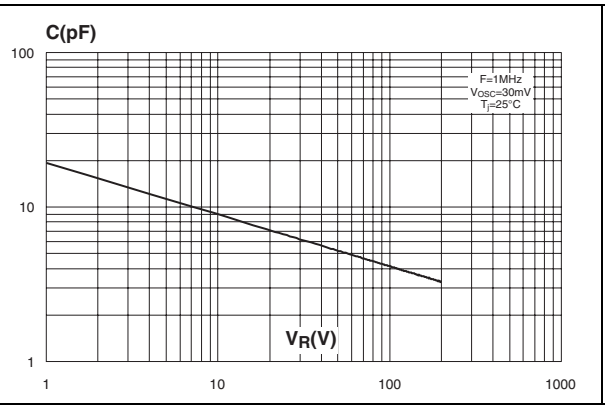


Figure 14. Thermal resistance junction to ambient versus copper surface under each lead

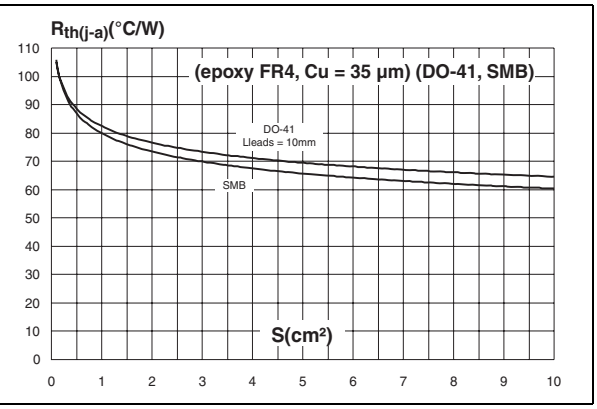
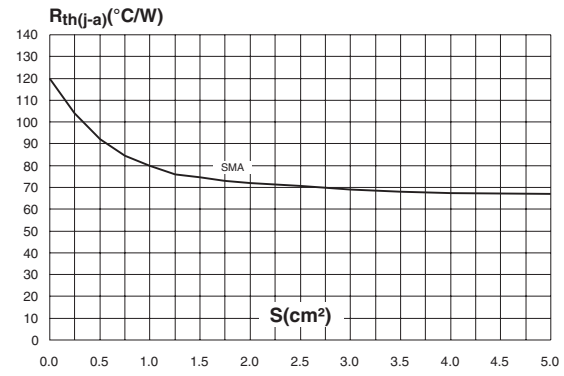


Figure 15. Thermal resistance junction to ambient versus copper surface under each lead (epoxy FR4, Cu = 35 µm) (SMA)

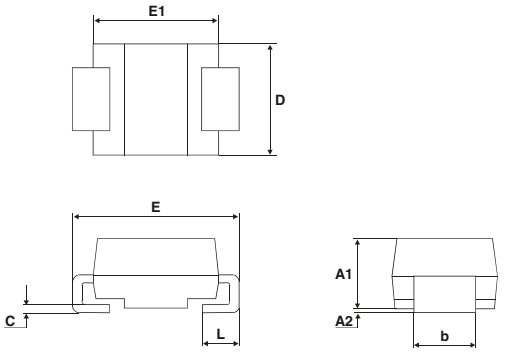


2 Package information

- Epoxy meets UL94, V0
- Lead-free packages

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.

Table 6. SMA dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.094
A2	0.05	0.20	0.002	0.008
b	1.25	1.65	0.049	0.065
c	0.15	0.40	0.006	0.016
D	2.25	2.90	0.089	0.114
E	4.80	5.35	0.189	0.211
E1	3.95	4.60	0.156	0.181
L	0.75	1.50	0.030	0.059

Figure 16. Footprint (dimensions in mm)

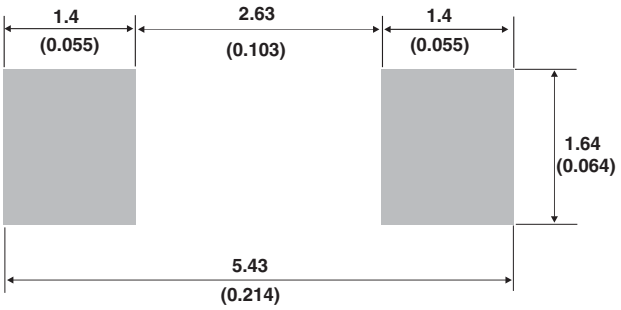
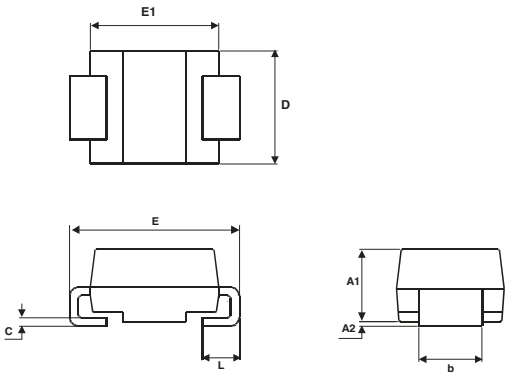


Table 7. SMB dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.096
A2	0.05	0.20	0.002	0.008
b	1.95	2.20	0.077	0.087
c	0.15	0.40	0.006	0.016
E	5.10	5.60	0.201	0.220
E1	4.05	4.60	0.159	0.181
D	3.30	3.95	0.130	0.156
L	0.75	1.50	0.030	0.059

Figure 17. Footprint (dimensions in mm)

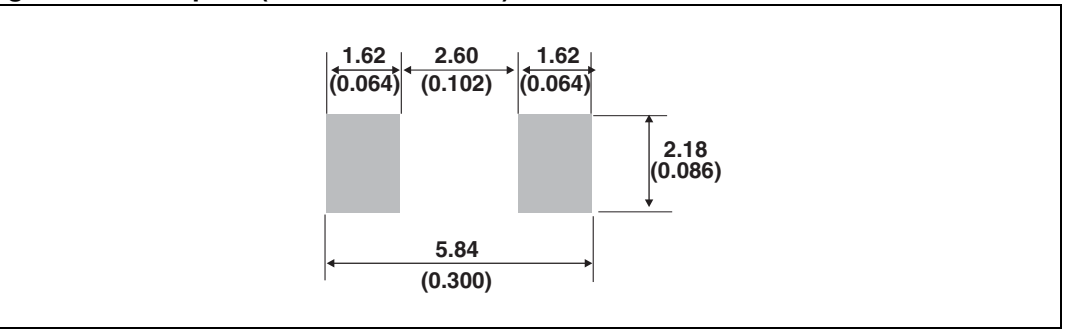
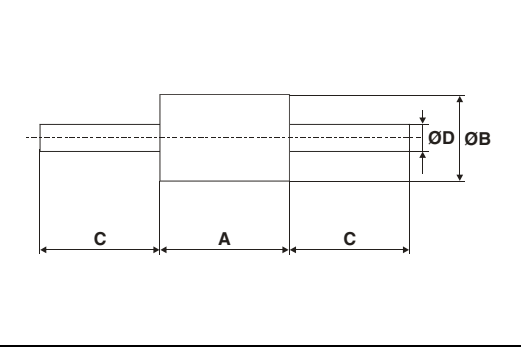


Table 8. DO-41 (plastic) dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.07	5.20	0.160	0.205
B	2.04	2.71	0.080	0.107
C	25.4		1	
D	0.71	0.86	0.028	0.034

3 Ordering information

Table 9. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH1R06	STTH1R06	DO-41	0.34 g	2000	Ammopack
STTH1R06RL	STTH1R06	DO-41	0.34 g	5000	Tape and reel
STTH1R06A	HR6	SMA	0.068 g	5000	Tape and reel
STTH1R06U	BR6	SMB	0.11 g	2500	Tape and reel

4 Revision history

Table 10. Document revision history

Date	Revision	Changes
Apr-2003	1	First issue.
07-Sep-2004	2	DO-41 and SMA packages added.
24-Feb-2005	3	SMA package dimensions update. Reference A1 max. changed from 2.70 mm (0.106 inc.) to 2.03 mm (0.080).
02-Jul-2007	4	Reformatted to current standards. Added cathode bars to cover illustrations. Updated dimensions and footprint illustrations for SMA and SMB packages. Corrected part number in Table 9.
30-Sep-2009	5	Updated table 8 package dimensions.

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