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High efficiency ultrafast diode

Features

- Very low conduction losses
- Negligible switching losses
- Low forward and reverse recovery times
- High junction temperature

Description

The STTH2R06 uses ST Turbo 2 600 V planar Pt doping technology. It is specially suited for switching mode base drive and transistor circuits. Packaged in axial, SMA, SMB and SMC, this device is intended for use in high frequency inverters, free wheeling and polarity protection.

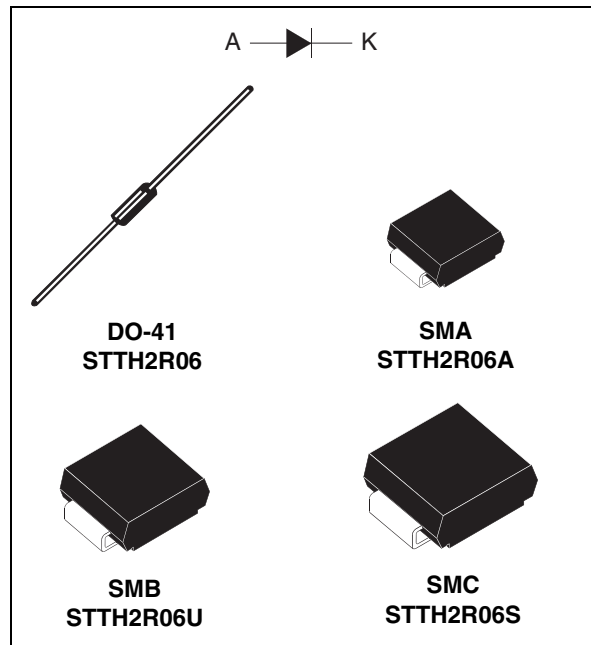


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 A
V_{RRM}	600 V
T_j	175 °C
$V_F(\text{typ})$	1.0 V
$t_{rr}(\text{typ})$	35 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		7	A	
$I_{F(AV)}$	Average forward current $\delta = 0.5$	DO-41	$T_L = 70\text{ }^\circ\text{C}$	2	A
		SMA	$T_L = 85\text{ }^\circ\text{C}$		
		SMB	$T_L = 100\text{ }^\circ\text{C}$		
		SMC	$T_L = 115\text{ }^\circ\text{C}$		
I_{FSM}	Surge non repetitive forward current	DO-41	$t_p = 10\text{ms}$ sinusoidal	40	A
		SMA / SMB / SMC		30	
T_{stg}	Storage temperature range		-65 to + 175	$^\circ\text{C}$	
T_j	Operating junction temperature range		-40 to + 175	$^\circ\text{C}$	

Table 3. Thermal resistance

Symbol	Parameter		Maximum	Unit
$R_{th(j-l)}$	Junction to lead	DO-41 L = 5 mm	35	$^\circ\text{C/W}$
		SMA	30	
		SMB	25	
		SMC	20	

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ }^\circ\text{C}$	$V_R = V_{RRM}$	-	-	2	μA
		$T_j = 150\text{ }^\circ\text{C}$		-	12	85	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 2\text{ A}$	-	-	1.7	V
		$T_j = 150\text{ }^\circ\text{C}$		-	1.0	1.25	

1. Pulse test: $t_p = 5\text{ ms}$, $\delta < 2\%$

2. Pulse test: $t_p = 380\text{ }\mu\text{s}$, $\delta < 2\%$

To evaluate the maximum conduction losses use the following equation:

$$P = 1 \times I_{F(AV)} + 0.125 I_{F(RMS)}^2$$

Table 5. Dynamic electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 0.5\text{ A}, I_{rr} = 0.25\text{ A}, I_R = 1\text{ A}$	-	-	30	ns
			$I_F = 1\text{ A}, dl_F/dt = -50\text{ A}/\mu\text{s}, V_R = 30\text{ V}$	-	35	50	
t_{fr}	Forward recovery time	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 2\text{ A}, dl_F/dt = 100\text{ A}/\mu\text{s}$	-	-	100	ns
V_{FP}	Forward recovery voltage			-	-	10	V

Figure 1. Conduction losses versus average forward current

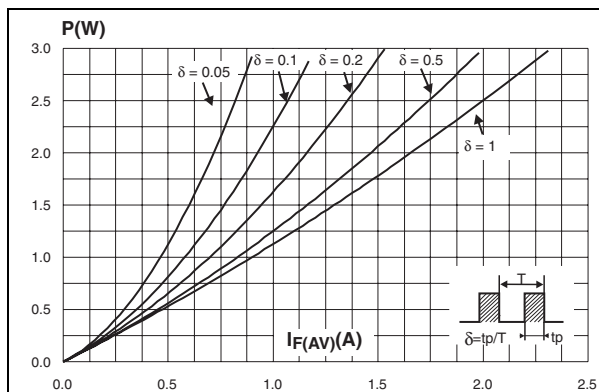


Figure 2. Forward voltage drop versus forward current

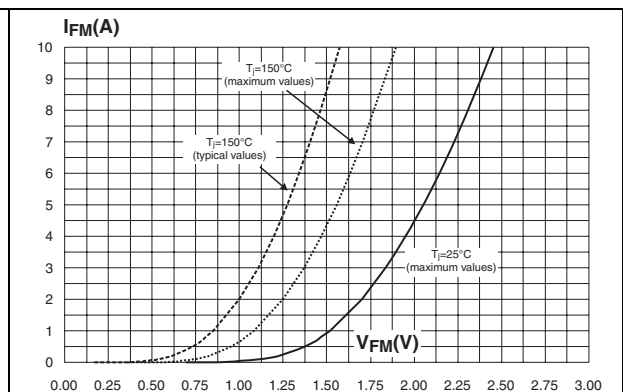


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

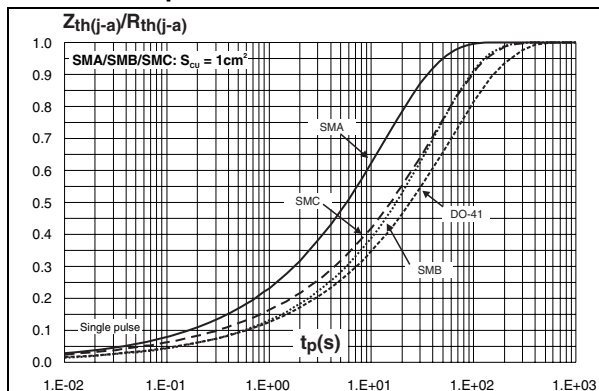


Figure 4. Peak reverse recovery current versus di/dt (typical values)

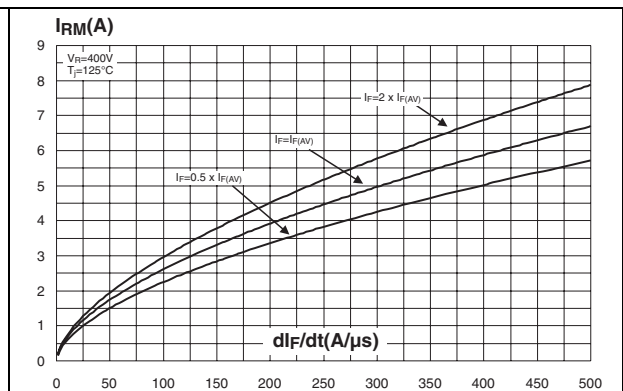


Figure 5. Reverse recovery time versus di_F/dt (typical values)

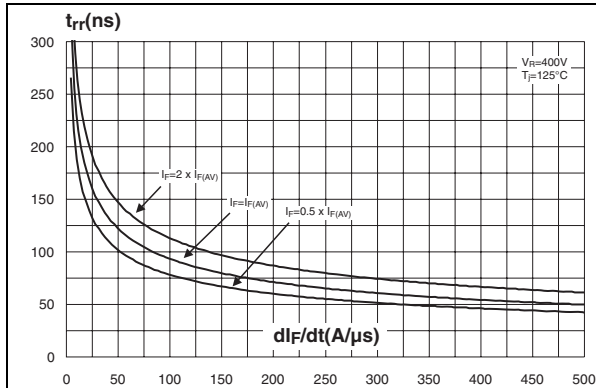


Figure 6. Reverse recovery charges versus di_F/dt (typical values)

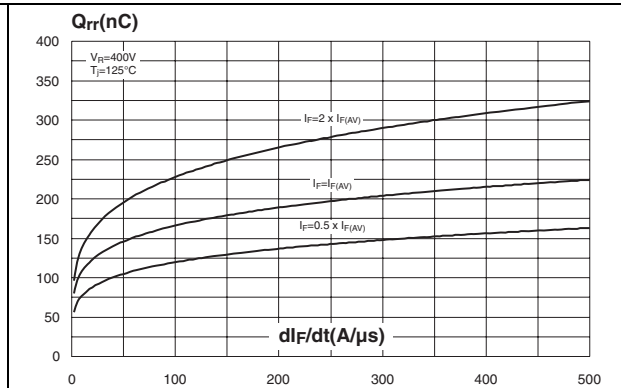


Figure 7. Relative variations of dynamic parameters versus junction temperature

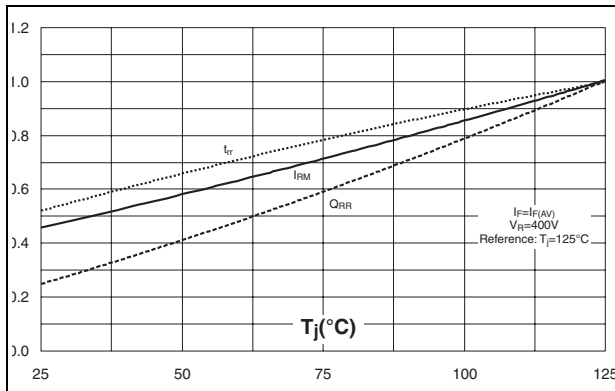


Figure 8. Transient peak forward voltage versus di_F/dt (typical values)

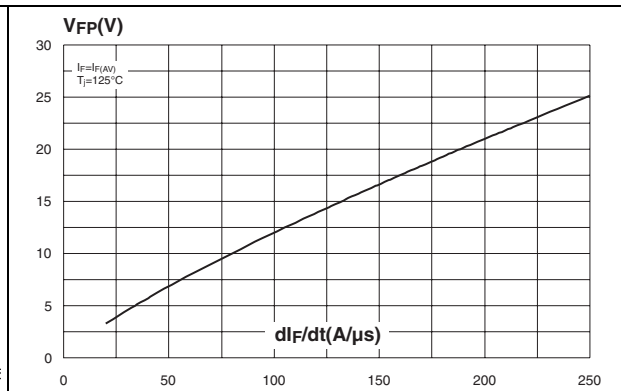


Figure 9. Forward recovery time versus di_F/dt (typical values)

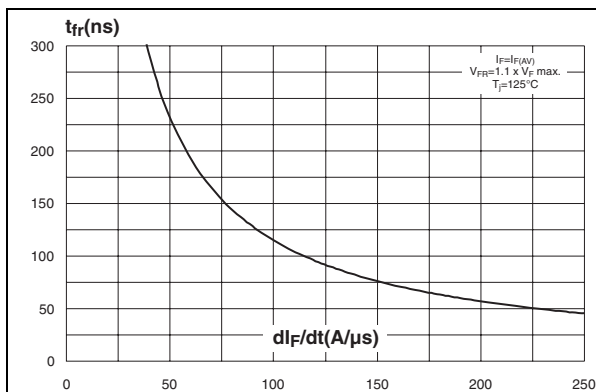


Figure 10. Junction capacitance versus reverse voltage applied (typical values)

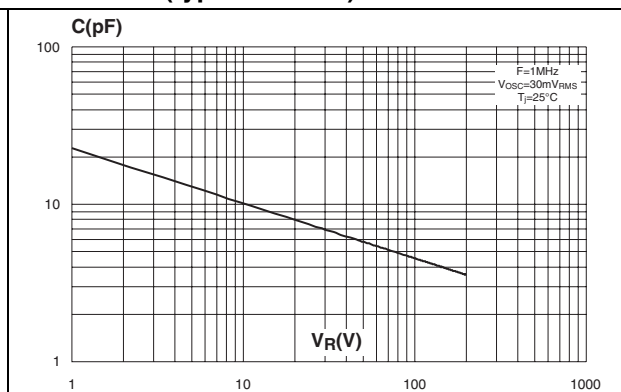


Figure 11. Thermal resistance junction to ambient versus copper surface under each lead

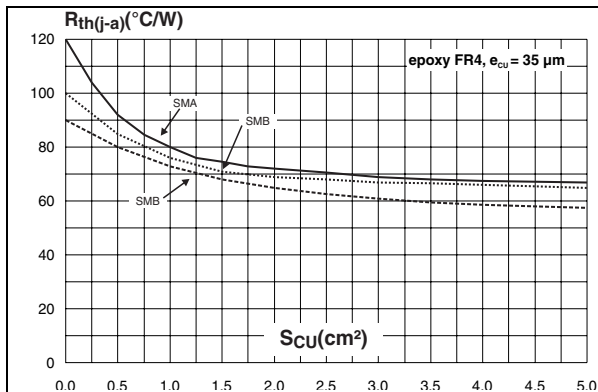
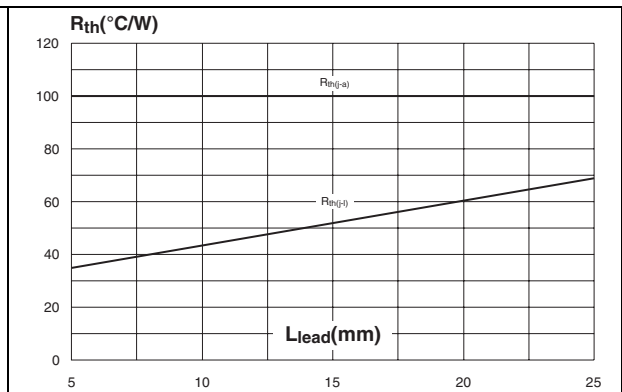


Figure 12. Thermal resistance versus lead length (DO-41)



2 Package information

- Epoxy meets UL 94, V0
- Band indicates cathode
- Bending method (DO-41): see Application note AN1471

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Table 6. 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

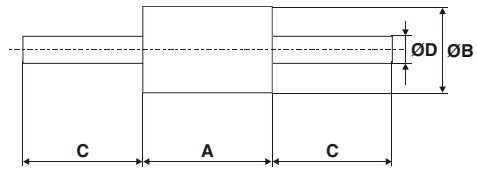


Table 7. SMA dimensions

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

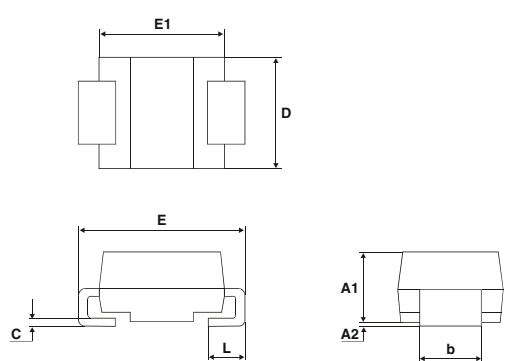


Figure 13. Footprint (dimensions in mm)

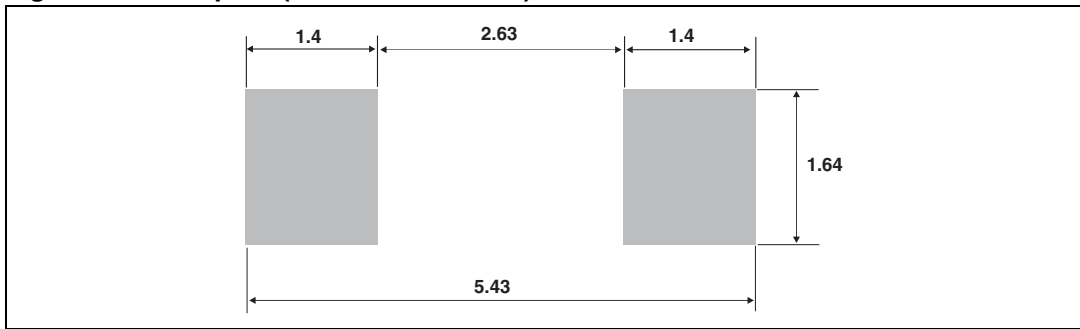


Table 8. SMB dimensions

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
D	3.30	3.95	0.130	0.156
E	5.10	5.60	0.201	0.220
E1	4.05	4.60	0.159	0.181
L	0.75	1.50	0.030	0.059

Figure 14. Footprint (dimensions in mm)

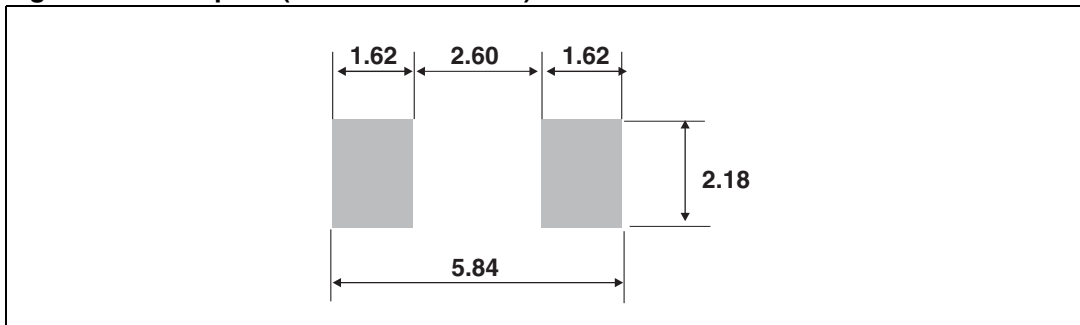
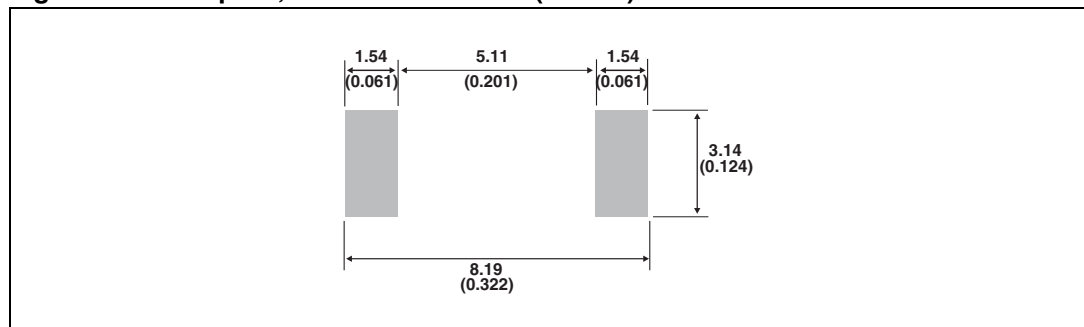


Table 9. SMC dimensions

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⁾	2.90	3.20	0.114	0.126
c ⁽¹⁾	0.15	0.40	0.006	0.016
D	5.55	6.25	0.218	0.246
E	7.75	8.15	0.305	0.321
E1	6.60	7.15	0.260	0.281
E2	4.40	4.70	0.173	0.185
L	0.75	1.50	0.030	0.059

1. Dimensions b and c apply to plated leads

Figure 15. Footprint, dimensions in mm (inches)



3 Ordering information

Table 10. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH2R06	STTH2R06	DO-41	0.34 g	2000	Ammopack
STTH2R06RL	STTH2R06	DO-41	0.34 g	5000	Tape and reel
STTH2R06A	R6A	SMA	0.068 g	5000	Tape and reel
STTH2R06U	R6U	SMB	0.11 g	2500	Tape and reel
STTH2R06S	R62	SMC	0.243 g	2500	Tape and reel

4 Revision history

Table 11. Document revision history

Date	Revision	Changes
07-Sep-2004	1	First issue
1-Jun-2005	2	SMC package addition.
30-Sep-2009	3	Updated Table 6 package dimensions.
04-Dec-2009	4	Updated Table 9 package dimensions.

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