

## TURBO 2 ULTRAFAST HIGH VOLTAGE RECTIFIER

**Table 1: Main Product Characteristics**

$I_{F(AV)}$	8 A
$V_{RRM}$	600 V
$I_{RM} (\text{typ})$	5.5 A
$T_j$	175°C
$V_F (\text{typ})$	1.4 V
$t_{rr} (\text{max})$	25 ns

### FEATURES AND BENEFITS

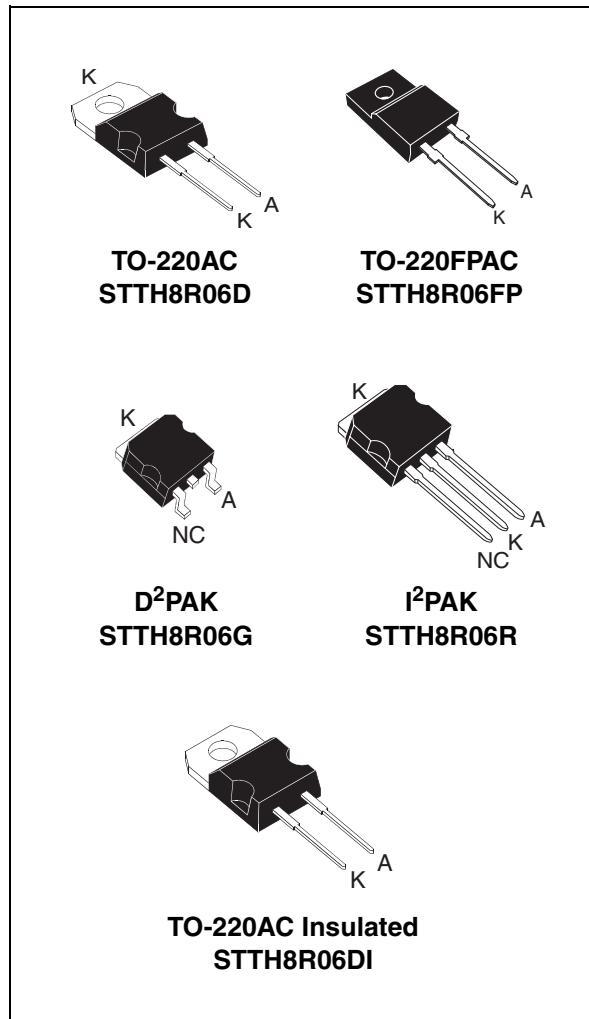
- Ultrafast switching
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses

### DESCRIPTION

The STTH8R06, which is using ST Turbo 2 600V technology, is specially suited as boost diode in continuous mode power factor corrections and hard switching conditions.

**Table 2: Order Codes**

Part Number	Marking
STTH8R06D	STTH8R06D
STTH8R06FP	STTH8R06FP
STTH8R06R	STTH8R06R
STTH8R06G	STTH8R06G
STTH8R06G-TR	STTH8R06G
STTH8R06DI	STTH8R06DI
STTH8R06DIRG	STTH8R06DI



## STTH8R06

**Table 3: Absolute Ratings** (limiting values)

Symbol	Parameter			Value	Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage			600	V
I <sub>F(RMS)</sub>	RMS forward voltage	TO-220AC / TO-220FPAC / D <sup>2</sup> PAK / I <sup>2</sup> PAK			30
		TO-220AC Ins.			24
I <sub>F(AV)</sub>	Average forward current $\delta = 0.5$	TO-220AC / D <sup>2</sup> PAK / I <sup>2</sup> PAK	T <sub>c</sub> = 130°C	8	A
		TO-220FPAC	T <sub>c</sub> = 85°C		
		TO-220AC Ins.	T <sub>c</sub> = 100°C		
I <sub>FSM</sub>	Surge non repetitive forward current			80	A
T <sub>stg</sub>	Storage temperature range			-65 to + 175	°C
T <sub>j</sub>	Maximum operating junction temperature			175	°C

**Table 4: Thermal Resistance**

Symbol	Parameter			Value (max.)	Unit
R <sub>th(j-c)</sub>	Junction to case		TO-220AC / D <sup>2</sup> PAK / I <sup>2</sup> PAK	2.2	°C/W
			TO-220FPAC	4.6	
			TO-220AC Ins.	3.8	

**Table 5: Static Electrical Characteristics**

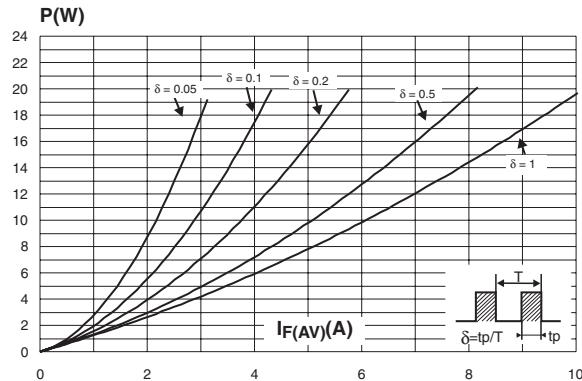
Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I <sub>R</sub>	Reverse leakage current	T <sub>j</sub> = 25°C	V <sub>R</sub> = V <sub>RRM</sub>			30	μA
		T <sub>j</sub> = 125°C			35	400	
V <sub>F</sub>	Forward voltage drop	T <sub>j</sub> = 25°C	I <sub>F</sub> = 8A			2.9	V
		T <sub>j</sub> = 125°C			1.4	1.8	

To evaluate the conduction losses use the following equation:  $P = 1.16 \times I_{F(AV)} + 0.08 I_F^2 (\text{RMS})$

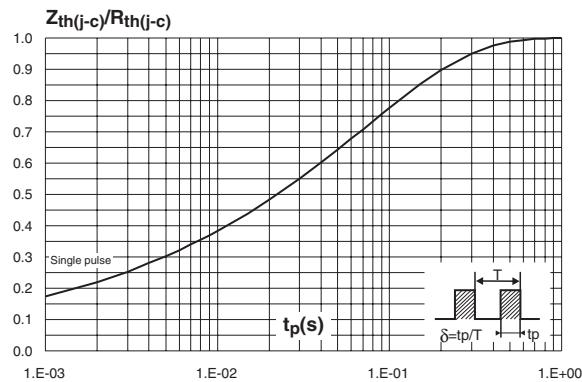
**Table 6: Dynamic Characteristics**

Symbol	Parameter	Test conditions			Min.	Typ	Max.	Unit
t <sub>rr</sub>	Reverse recovery time	T <sub>j</sub> = 25°C	I <sub>F</sub> = 0.5A Irr = 0.25A I <sub>R</sub> = 1A				25	ns
			I <sub>F</sub> = 1A dI <sub>F</sub> /dt = -50 A/μs V <sub>R</sub> = 30V				45	
I <sub>RM</sub>	Reverse recovery current	T <sub>j</sub> = 125°C	I <sub>F</sub> = 8A V <sub>R</sub> = 400V			5.5	7.2	A
			dI <sub>F</sub> /dt = -200 A/μs			0.3		
S factor	Softness factor					150		nC
Qrr	Reverse recovery charges							
t <sub>fr</sub>	Forward recovery time	T <sub>j</sub> = 25°C	I <sub>F</sub> = 8A dI <sub>F</sub> /dt = 64 A/μs				150	ns
V <sub>FP</sub>	Forward recovery voltage		V <sub>FR</sub> = 1.1 x V <sub>Fmax</sub>				5	V

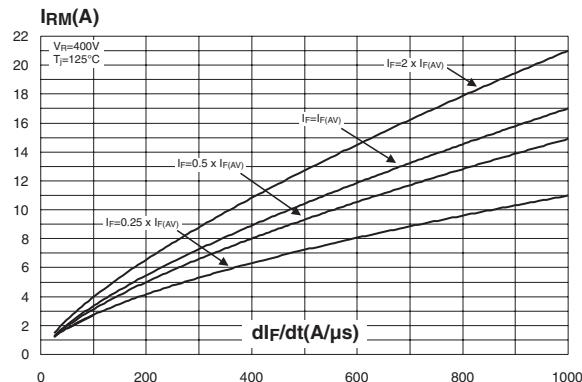
**Figure 1: Conduction losses versus average current**



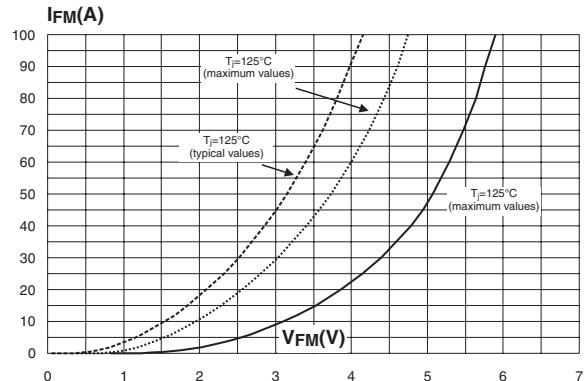
**Figure 3: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC, I<sup>2</sup>PAK, D<sup>2</sup>PAK)**



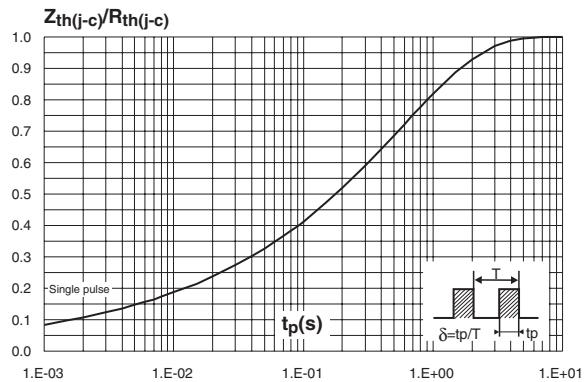
**Figure 5: Peak reverse recovery current versus  $dI_F/dt$  (typical values)**



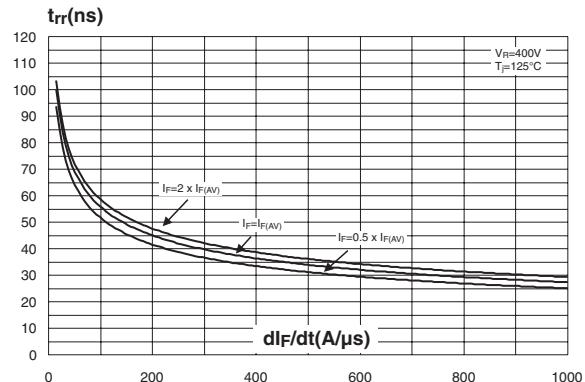
**Figure 2: Forward voltage drop versus forward current**



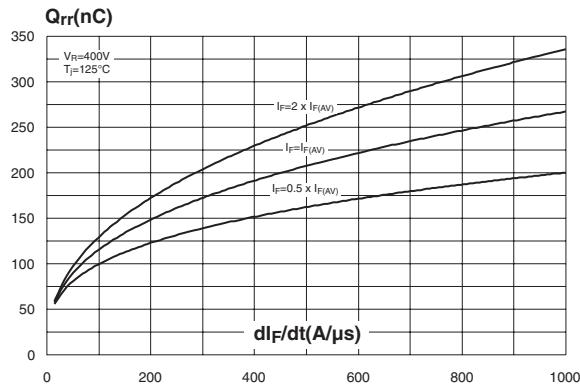
**Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC Insulated)**



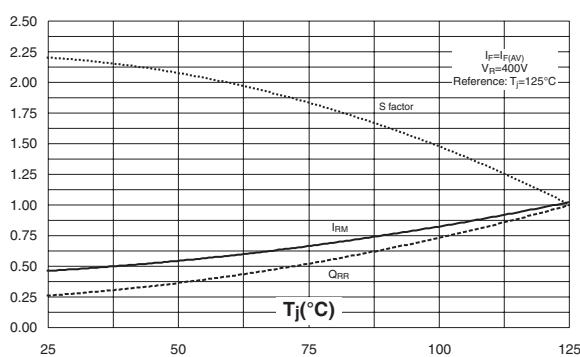
**Figure 6: Reverse recovery time versus  $dI_F/dt$  (typical values)**



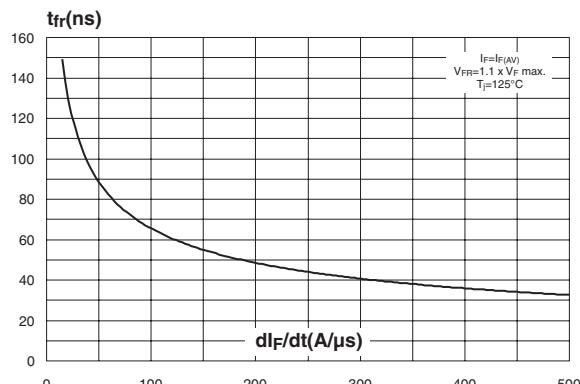
**Figure 7: Reverse recovery charges versus  $dI_F/dt$  (typical values)**



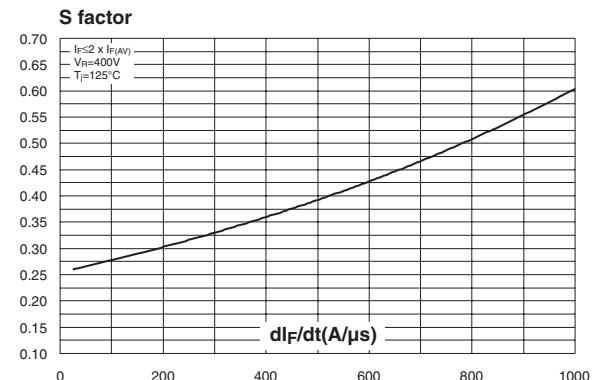
**Figure 9: Relative variations of dynamic parameters versus junction temperature**



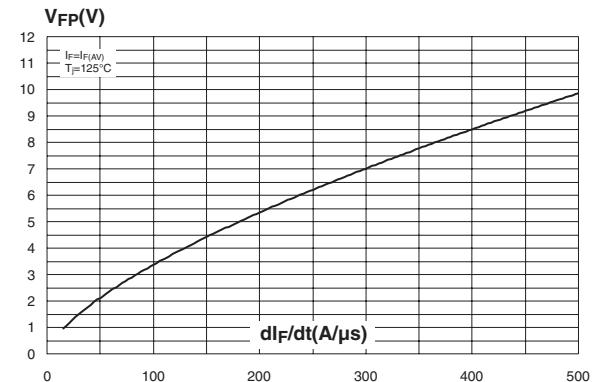
**Figure 11: Forward recovery time versus  $dI_F/dt$  (typical values)**



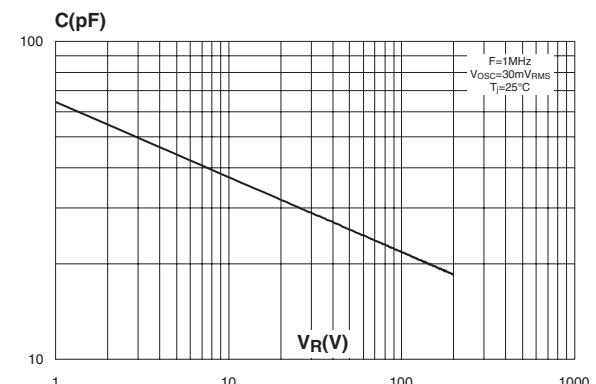
**Figure 8: Softness factor versus  $dI_F/dt$  (typical values)**



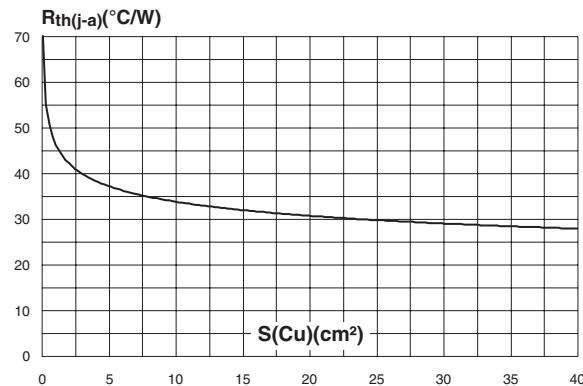
**Figure 10: Transient peak forward voltage versus  $dI_F/dt$  (typical values)**



**Figure 12: Junction capacitance versus reverse voltage applied (typical values)**



**Figure 13: Thermal resistance junction to ambient versus copper surface under tab (epoxy FR4,  $e_{CU}=35\mu m$ ) (D<sup>2</sup>PAK)**



**Figure 14: I<sup>2</sup>PAK Package Mechanical Data**

REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
b	0.70	0.93	0.028	0.037
b1	1.14	1.70	0.044	0.067
b2	1.14	1.70	0.044	0.067
c	0.45	0.60	0.018	0.024
c2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
E	10.0	10.4	0.394	0.409
L	13.1	13.6	0.516	0.535
L1	3.48	3.78	0.137	0.149
L2	1.27	1.40	0.050	0.055

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**Figure 15: D<sup>2</sup>PAK Package Mechanical Data**

The figure contains three technical drawings of the D<sup>2</sup>PAK package. The left drawing shows a top-down view with dimensions L, E, L<sub>2</sub>, L<sub>3</sub>, G, B<sub>2</sub>, and B. The middle drawing shows a side view with dimensions A, C<sub>2</sub>, D, and C. The right drawing provides a detailed view of a corner with dimensions A<sub>1</sub>, A<sub>2</sub>, C, R, M, and V<sub>2</sub>. Below these drawings is a note: \* FLAT ZONE NO LESS THAN 2mm.

REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	0.208
L	15.00	15.85	0.590	0.624
L <sub>2</sub>	1.27	1.40	0.050	0.055
L <sub>3</sub>	1.40	1.75	0.055	0.069
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 typ.	
V <sub>2</sub>	0°	8°	0°	8°

**Figure 16: D<sup>2</sup>PAK Foot Print Dimensions**  
(in millimeters)

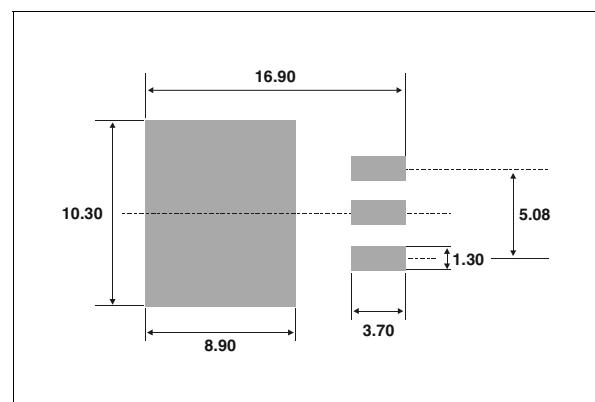
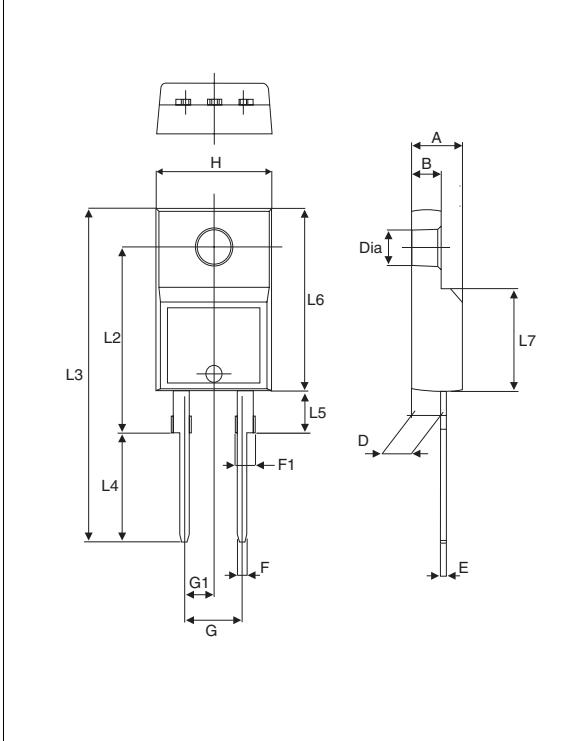
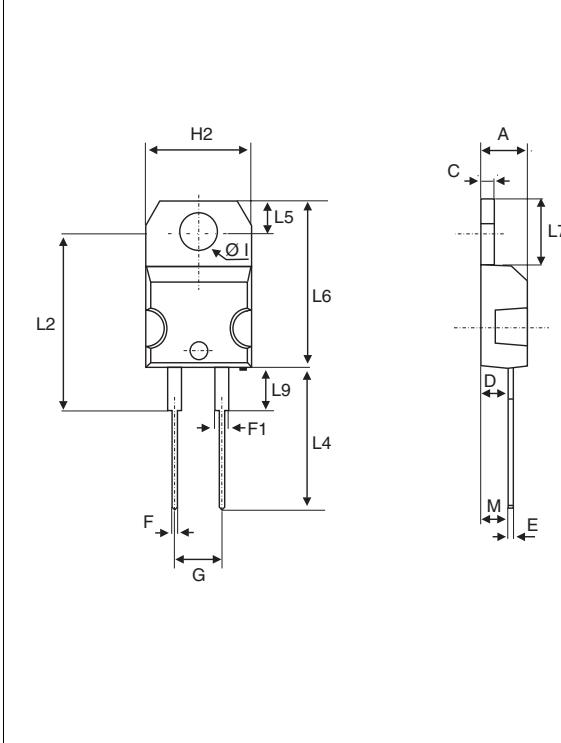


Figure 17: TO-220FPAC Package Mechanical Data



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	2.5	2.7	0.098	0.106
D	2.5	2.75	0.098	0.108
E	0.45	0.70	0.017	0.027
F	0.75	1	0.030	0.039
F1	1.15	1.70	0.045	0.067
F2	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.204
G1	2.40	2.70	0.094	0.106
H	10	10.4	0.393	0.409
L2	16 Typ.		0.63 Typ.	
L3	28.6	30.6	1.126	1.204
L4	9.8	10.6	0.385	0.417
L6	15.9	16.4	0.626	0.645
L7	9.00	9.30	0.354	0.366
Dia.	3	3.20	0.118	0.126

Figure 18: TO-220AC Package Mechanical Data



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
H2	10.00	10.40	0.393	0.409
L2	16.40 typ.		0.645 typ.	
L4	13.00	14.00	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 typ.	
Diam. I	3.75	3.85	0.147	0.151

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Figure 19: TO-220AC Insulated Package Mechanical Data

REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
H2	10.00	10.40	0.393	0.409
L2	16.40 typ.		0.645 typ.	
L4	13.00	14.00	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 typ.	
Diam. I	3.75	3.85	0.147	0.151

Table 7: Ordering Information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH8R06D	STTH8R06D	TO-220AC	1.90 g	50	Tube
STTH8R06G	STTH8R06G	D <sup>2</sup> PAK	1.48 g	50	Tube
STTH8R066G-TR	STTH8R06G	D <sup>2</sup> PAK	1.48 g	1000	Tape & reel
STTH8R06FP	STTH8R06FP	TO-220FPAC	1.70 g	50	Tube
STTH8R06R	STTH8R06R	I <sup>2</sup> PAK	1.5 g	50	Tube
STTH8R06DI	STTH8R06DI	TO-220AC Ins.	1.86 g	250	Box
STTH8R06DIRG	STTH8R06DI	TO-220AC Ins.	1.86 g	50	Tube

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 m.N. (TO-220FPAC) / 0.55 m.N. (TO-220AC)
- Maximum torque value: 1.0 m.N. (TO-220FPAC) / 0.70 m.N. (TO-220AC)

Table 8: Revision History

Date	Revision	Description of Changes
May-2001	1	First issue
January-2002	2	D <sup>2</sup> PAK and I <sup>2</sup> PAK packages added
18-Oct-2004	3	TO-220AC Insulated package added
05-Dec-2004	4	D <sup>2</sup> PAK foot print correction

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