

## Turbo 2 ultrafast high voltage rectifier

### Main product characteristics

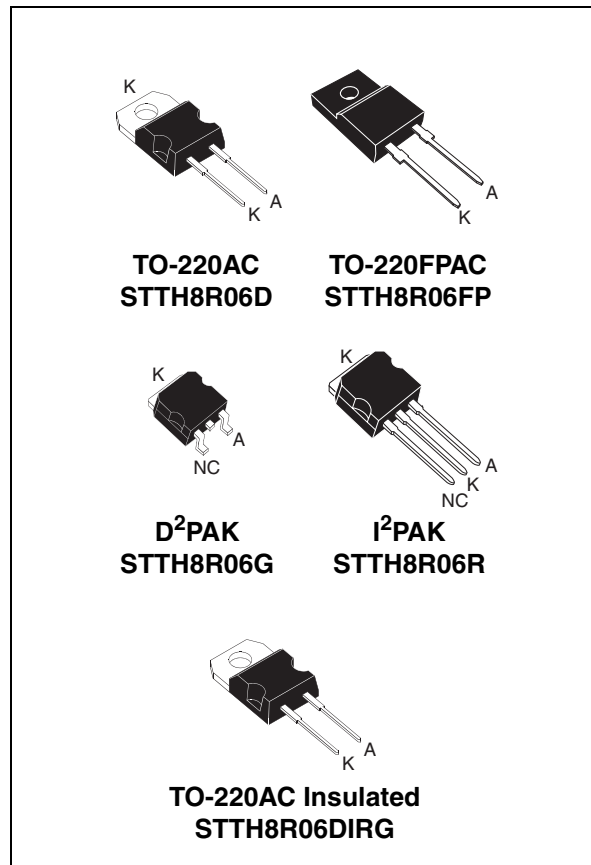
$I_{F(AV)}$	8 A
$V_{RRM}$	600 V
$I_{RM}$ (typ)	5.5 A
$T_j$	175°C
$V_F$ (typ)	1.4 V
$t_{rr}$ (max)	25 ns

### Features and benefits

- Ultrafast switching
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses
- Package insulation voltage:  
TO-220AC Ins: 2500 V<sub>RMS</sub>  
TO-220FPAC: 2000 V<sub>DC</sub>

### 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.



### Order codes

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

# 1 Characteristics

**Table 1. Absolute ratings (limiting values)**

Symbol	Parameter		Value	Unit	
$V_{RRM}$	Repetitive peak reverse voltage		600	V	
$I_{F(RMS)}$	RMS forward voltage	TO-220AC / TO-220FPAC / D <sup>2</sup> PAK / I <sup>2</sup> PAK	30	A	
		TO-220AC Ins.	24		
$I_{F(AV)}$	Average forward current $\delta = 0.5$	TO-220AC / D <sup>2</sup> PAK / I <sup>2</sup> PAK	8	A	
		TO-220FPAC			Tc = 130° C
		TO-220AC Ins.			Tc = 85° C
$I_{FSM}$	Surge non repetitive forward current		tp = 10ms sinusoidal	80	A
$T_{stg}$	Storage temperature range		-65 to + 175	°C	
$T_j$	Maximum operating junction temperature		175	°C	

**Table 2. Thermal resistance**

Symbol	Parameter		Value (max)	Unit
$R_{th(j-c)}$	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 3. Static electrical characteristics**

Symbol	Parameter	Test conditions		Min	Typ	Max	Unit
$I_R$	Reverse leakage current	$T_j = 25^\circ C$	$V_R = V_{RRM}$			30	$\mu A$
		$T_j = 125^\circ C$			35	400	
$V_F$	Forward voltage drop	$T_j = 25^\circ C$	$I_F = 8 A$			2.9	V
		$T_j = 125^\circ C$			1.4	1.8	

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

**Table 4. Dynamic characteristics**

Symbol	Parameter	Test conditions		Min	Typ	Max	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25^\circ C$	$I_F = 0.5 A$ $I_{rr} = 0.25 A$ $I_R = 1 A$			25	ns
			$I_F = 1 A$ $di_F/dt = -50 A/\mu s$ $V_R = 30 V$			45	
$I_{RM}$	Reverse recovery current	$T_j = 125^\circ C$	$I_F = 8 A$ $V_R = 400 V$ $di_F/dt = -200 A/\mu s$		5.5	7.2	A
S factor	Softness factor				0.3		
Qrr	Reverse recovery charges				150		nC
$t_{fr}$	Forward recovery time	$T_j = 25^\circ C$	$I_F = 8 A$ $di_F/dt = 64 A/\mu s$ $V_{FR} = 1.1 \times V_{Fmax}$			150	ns
$V_{FP}$	Forward recovery voltage					5	V

Figure 1. Conduction losses versus average current

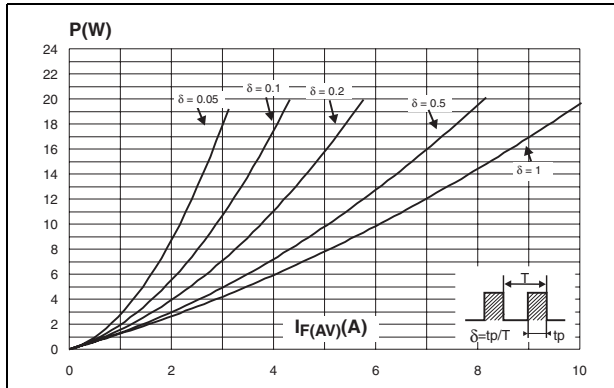


Figure 2. Forward voltage drop versus forward current

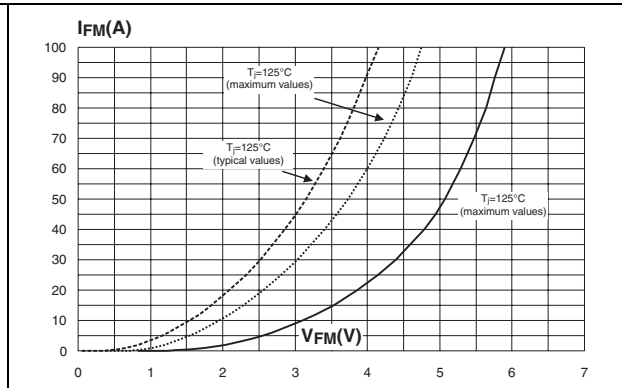


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC, I<sup>2</sup>PAK, D<sup>2</sup>PAK)

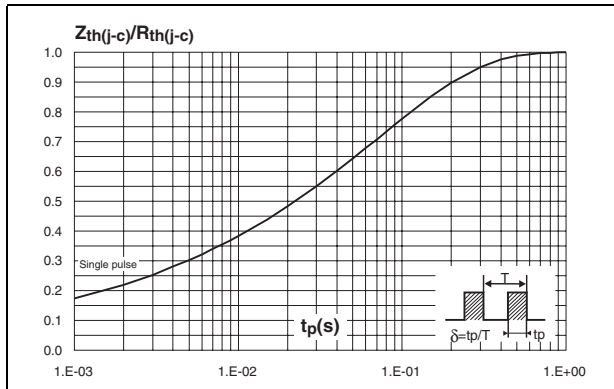


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC Insulated)

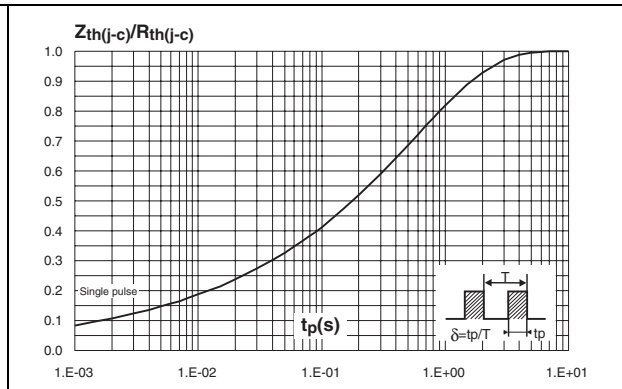


Figure 5. Peak reverse recovery current versus  $di_F/dt$  (typical values)

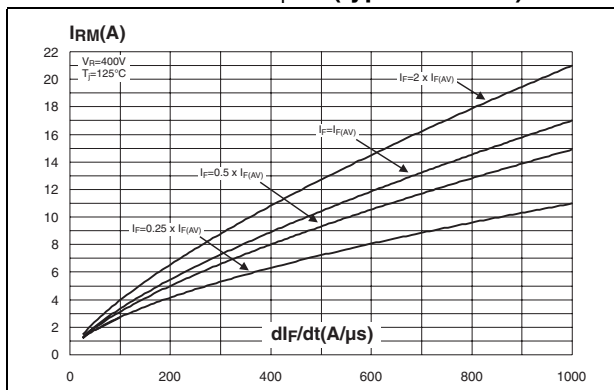
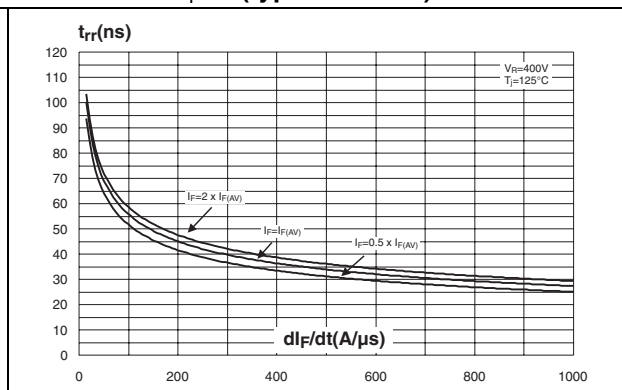
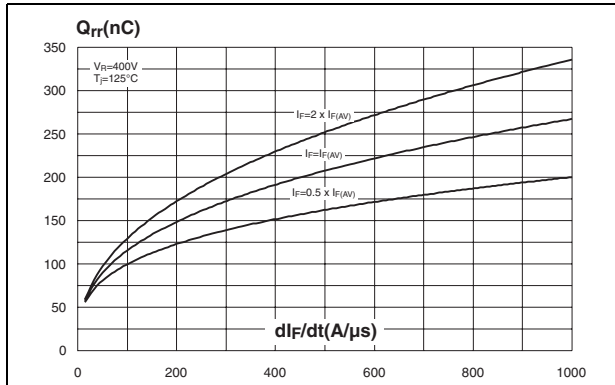


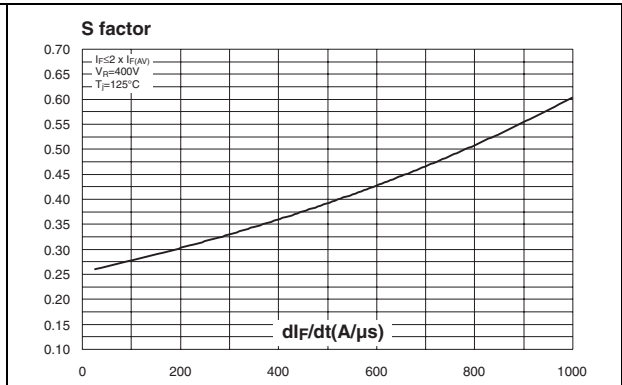
Figure 6. Reverse recovery time versus  $di_F/dt$  (typical values)



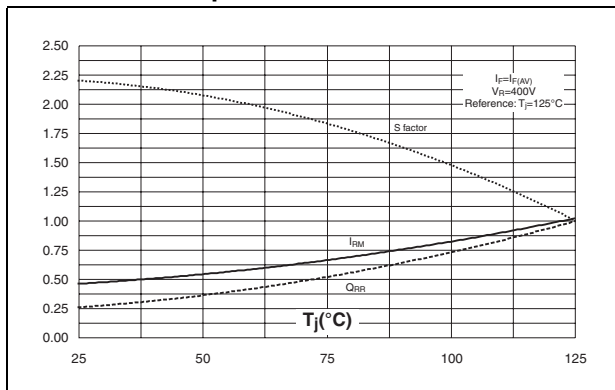
**Figure 7. Reverse recovery charges versus  $di_F/dt$  (typical values)**



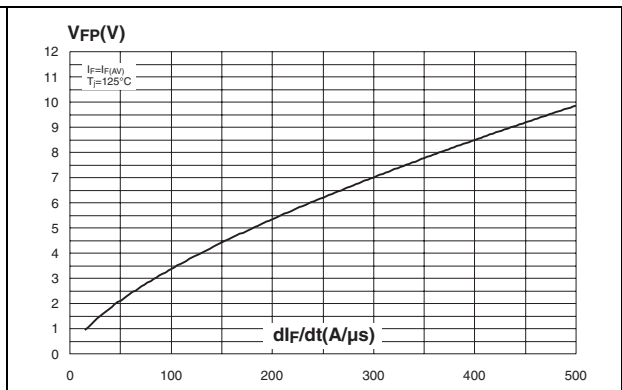
**Figure 8. Softness factor versus  $di_F/dt$  (typical values)**



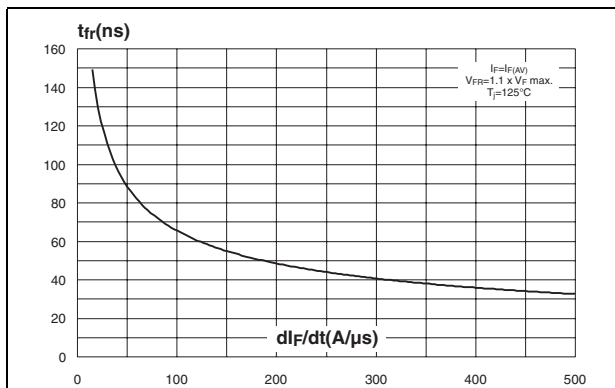
**Figure 9. Relative variations of dynamic parameters versus junction temperature**



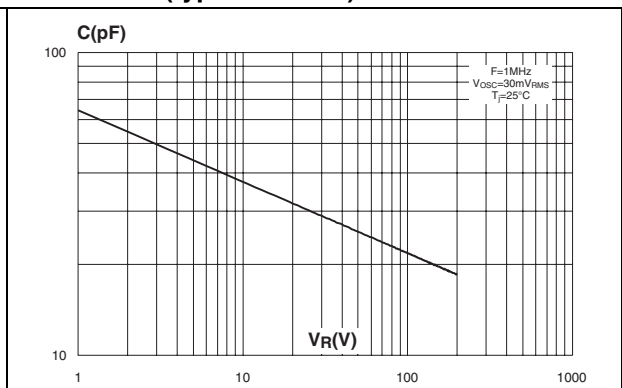
**Figure 10. Transient peak forward voltage versus  $di_F/dt$  (typical values)**



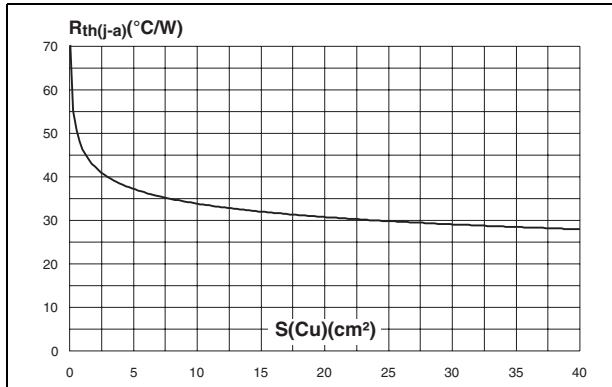
**Figure 11. Forward recovery time versus  $di_F/dt$  (typical values)**



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



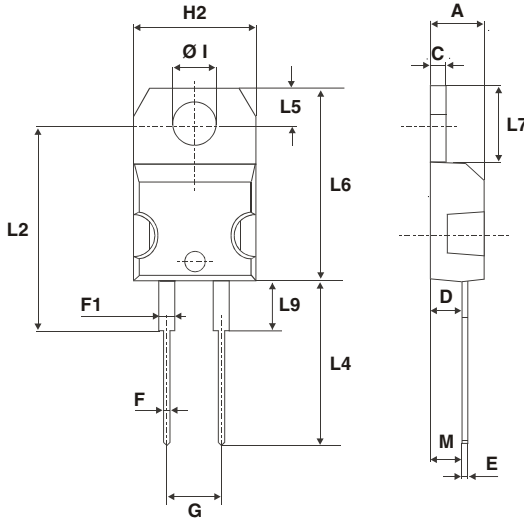
**Figure 13. Thermal resistance junction to ambient versus copper surface under tab (epoxy FR4,  $e_{Cu} = 35 \mu m$ ) (D<sup>2</sup>PAK)**



## 2 Package information

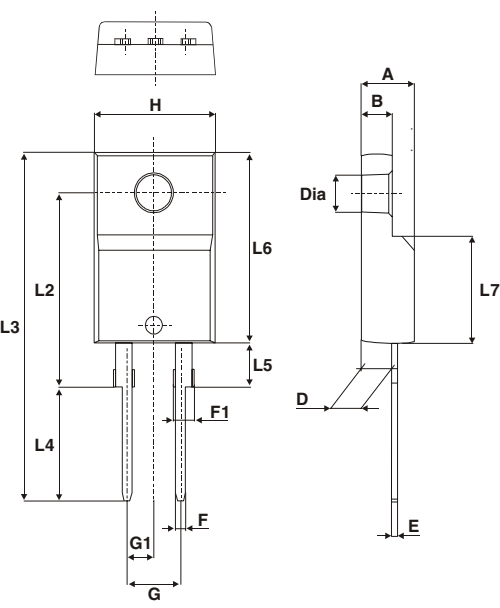
- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 Nm (TO-220FPAC) / 0.55 Nm (TO-220AC)
- Maximum torque value: 1.0 Nm (TO-220FPAC) / 0.70 Nm (TO-220AC)

Table 5. TO-220AC dimensions



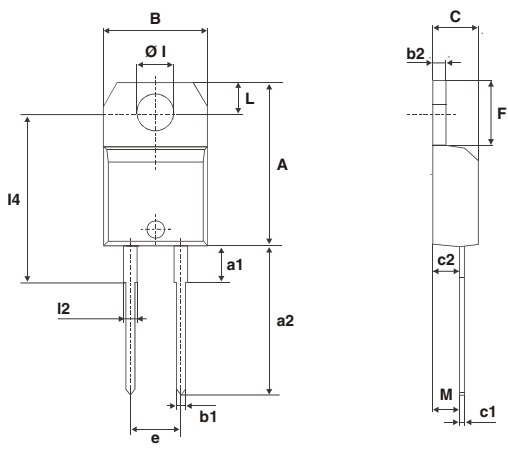
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
H2	10.00	10.40	0.393	0.409
L2	16.40 typ.		0.645 typ.	
L4	13.00	14.00	0.511	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 6. TO-220FPAC Dimensions



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	0.018	0.027
F	0.75	1	0.030	0.039
F1	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.4	2.7	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	1.205
L4	9.8	10.6	0.386	0.417
L5	2.9	3.6	0.114	0.142
L6	15.9	16.4	0.626	0.646
L7	9.00	9.30	0.354	0.366
Dia.	3.00	3.20	0.118	0.126

Table 7. TO-220AC (Nlns. & Ins. 20-up) Dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
B	10.00		10.40	0.393		0.409
b1	0.61		0.88	0.024		0.034
b2	1.23		1.32	0.048		0.051
C	4.40		4.60	0.173		0.181
c1	0.49		0.70	0.019		0.027
c2	2.40		2.72	0.094		0.107
e	4.80		5.40	0.189		0.212
F	6.20		6.60	0.244		0.259
Ø1	3.75		3.85	0.147		0.151
I4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
I2	1.14		1.70	0.044		0.066
M		2.60			0.102	



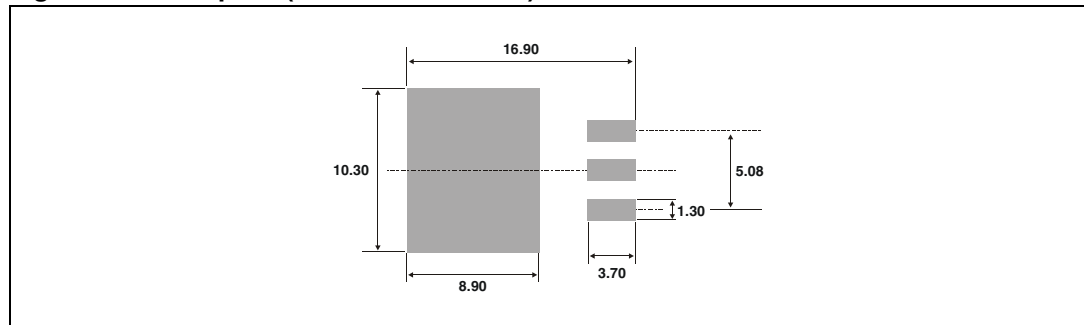
Table 8. I<sup>2</sup>PAK Dimensions

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	2.72	0.094	0.107
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.044	0.067
c	0.49	0.70	0.019	0.028
c2	1.23	1.32	0.048	0.052
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
E	10	10.40	0.394	0.409
L	13	14	0.512	0.551
L1	3.50	3.93	0.138	0.155
L2	1.27	1.40	0.050	0.055

Table 9. D<sup>2</sup>PAK Dimensions

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
L2	1.27	1.40	0.050	0.055
L3	1.40	1.75	0.055	0.069
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 typ.	
V2	0°	8°	0°	8°

Figure 14. Footprint (dimensions in mm)



### 3 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 and reel
STTH8R06FP	STTH8R06FP	TO-220FPAC	1.70 g	50	Tube
STTH8R06R	STTH8R06R	I <sup>2</sup> PAK	1.5 g	50	Tube
STTH8R06DIRG	STTH8R06DI	TO-220AC Ins.	1.86 g	50	Tube

### 4 Revision history

Date	Revision	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
10-Aug-2006	5	Reformatted to current standard. Added package insulation voltage data on page 1. Changed order code STTH8R06DI to STTH8R06DIRG.

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