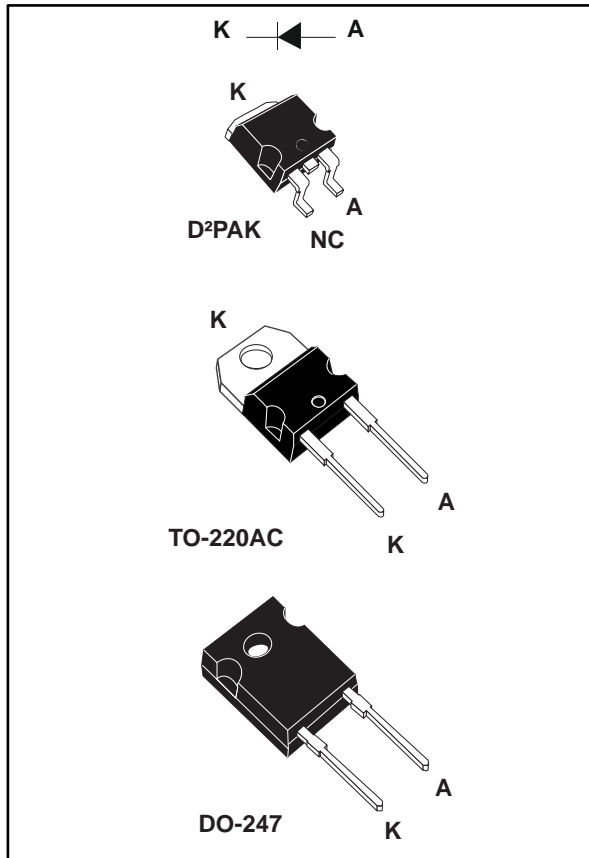


Turbo 2 ultrafast high voltage rectifier

Datasheet - production data



Description

The STTH30RQ06 has been developed to be used in application requiring a high-voltage secondary rectification for LLC Full Bridge topology.

It is also suited for use in switching power supplies, industrial applications, as rectification, freewheeling and clamping diode.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	30 A
V_{RRM}	600 V
V_F (max.)	1.45 V
t_{rr} (max.)	30 ns
T_j (max.)	+175 °C

Features

- High junction temperature capability
- Ultrafast with soft recovery behavior
- Low reverse current
- Low thermal resistance
- Reduce switching and conduction losses

1 Characteristics

Table 2: Absolute ratings (limiting values, at 25 °C, unless otherwise specified)

Symbol	Parameter		Value	Unit	
V_{RRM}	Repetitive peak reverse voltage		600	V	
$I_{F(RMS)}$	Forward rms current		50	A	
$I_{F(AV)}$	Average forward current $\delta = 0.5$, square wave	$T_C = 125\text{ °C}$	30	A	
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ ms}$ sinusoidal	D ² PAK	180	A
			TO-220AC DO-247	200	
T_{stg}	Storage temperature range		-65 to +175	°C	
T_j	Maximum operating junction temperature		175	°C	

Table 3: Thermal parameters

Symbol	Parameter	Max. value	Unit
$R_{th(j-c)}$	Junction to case	0.7	°C/W

Table 4: Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-		40	μA
		$T_j = 150\text{ °C}$		-	80	800	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 15\text{ A}$	-		2.45	V
		$T_j = 150\text{ °C}$		-	1.15	1.45	
		$T_j = 25\text{ °C}$	$I_F = 30\text{ A}$	-		2.95	
		$T_j = 150\text{ °C}$		-	1.45	1.85	

Notes:

(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 conduction losses, use the following equation:

$$P = 1.05 \times I_{F(AV)} + 0.026 \times I_{F(RMS)}^2$$

Table 5: Dynamic electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 0.5\text{ A}$ $I_R = 1\text{ A}$ $I_{rr} = 0.25\text{ A}$	-		30	ns
			$I_F = 1\text{ A}$ $V_R = 30\text{ V}$ $di_F/dt = -50\text{ A}/\mu\text{s}$	-	40	55	
I_{RM}	Reverse recovery current	$T_j = 125\text{ °C}$	$I_F = 30\text{ A}$ $V_R = 400\text{ V}$ $di_F/dt = -200\text{ A}/\mu\text{s}$	-	8	11	A
Q_{RR}	Reverse recovery charge			-	485		nC
t_{rr}	Reverse recovery time			-	95		ns

1.1 Characteristics (curves)

Figure 1: Average forward power dissipation versus average forward current (square waveform)

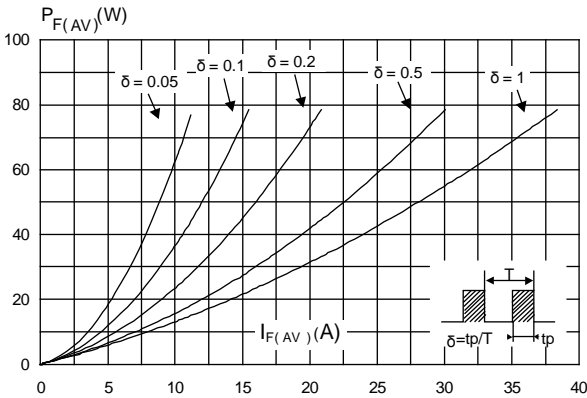


Figure 2: Average forward power dissipation versus average forward current (sinusoidal waveform)

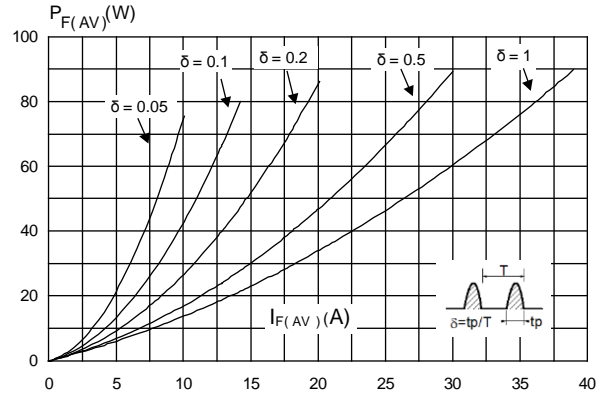


Figure 3: Forward voltage drop versus forward current (typical values)

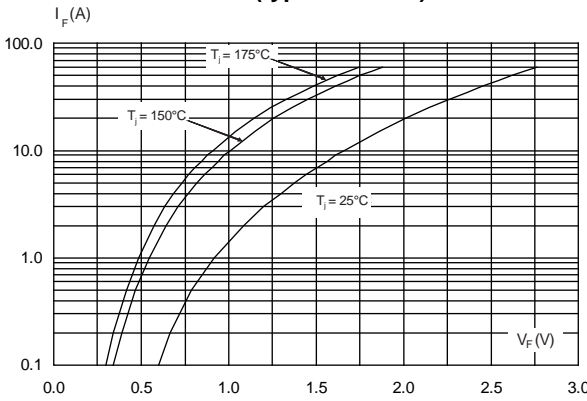


Figure 4: Forward voltage drop versus forward current (maximum values)

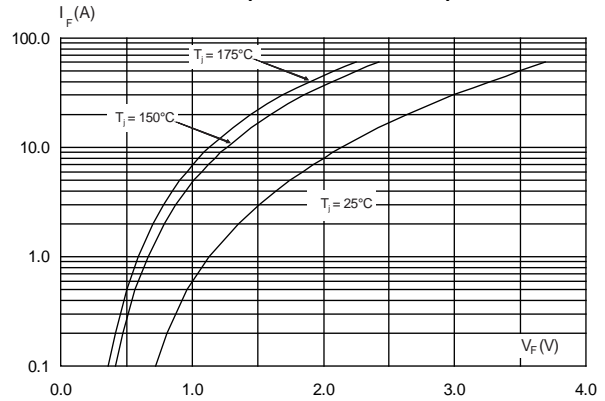


Figure 5: Relative variation of thermal impedance junction to case versus pulse duration

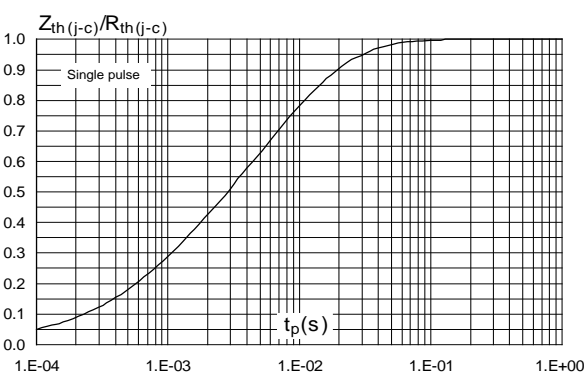


Figure 6: Peak reverse recovery current versus di_F/dt (typical values)

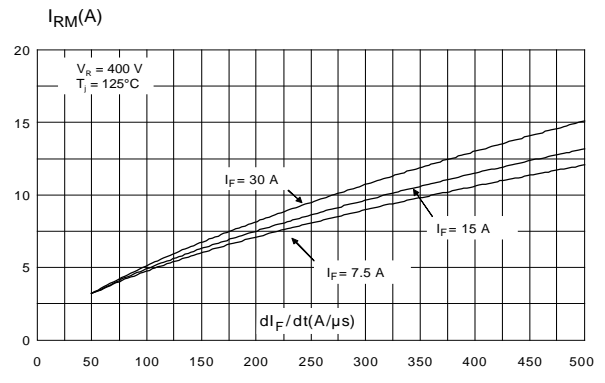


Figure 7: Reverse recovery time versus di_F/dt (typical values)

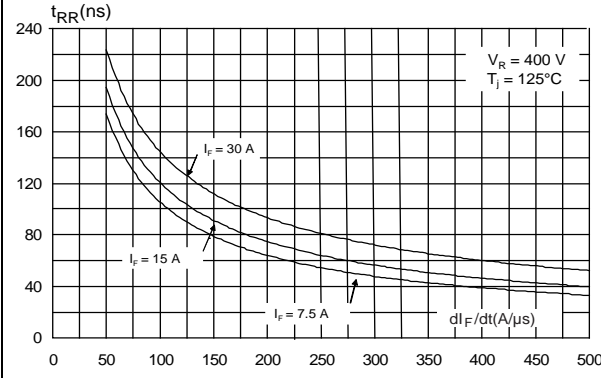


Figure 8: Reverse recovery charges versus di_F/dt (typical values)

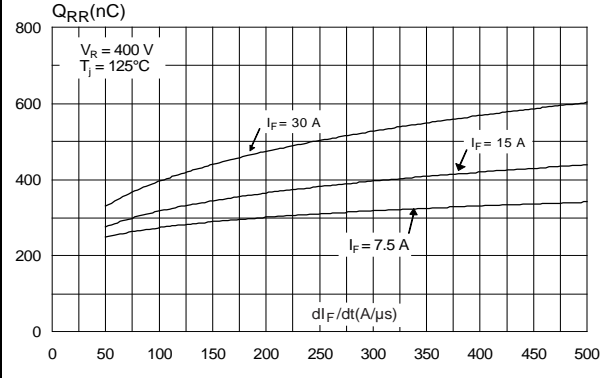


Figure 9: Reverse recovery softness factor versus di_F/dt (typical values)

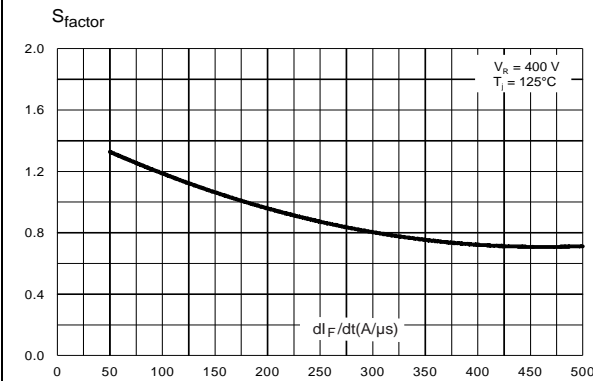


Figure 10: Relative variations of dynamic parameters versus junction temperature

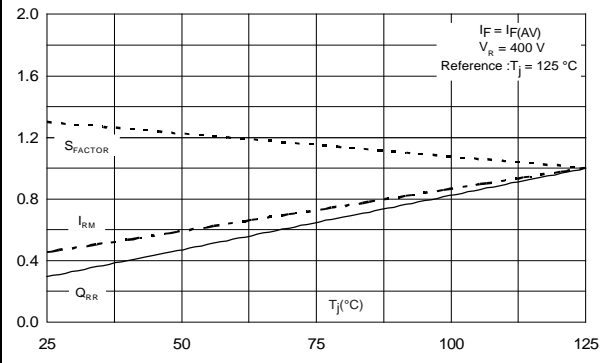


Figure 11: Junction capacitance versus reverse voltage applied (typical values)

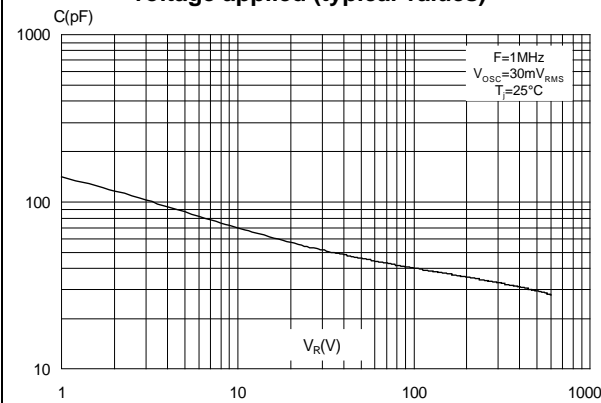


Figure 12: Thermal resistance junction to ambient versus copper surface under tab

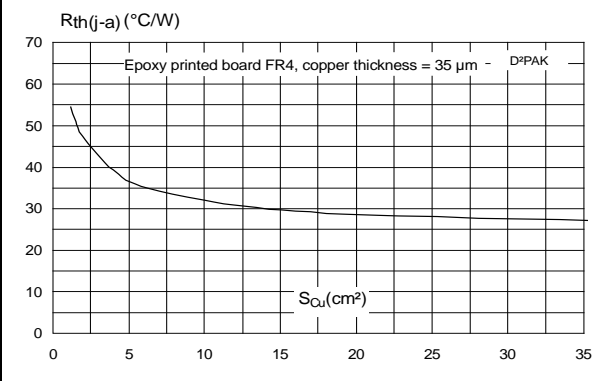


Figure 13: Relative variation of non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

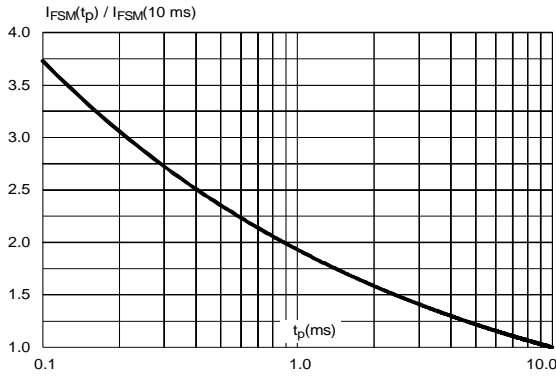
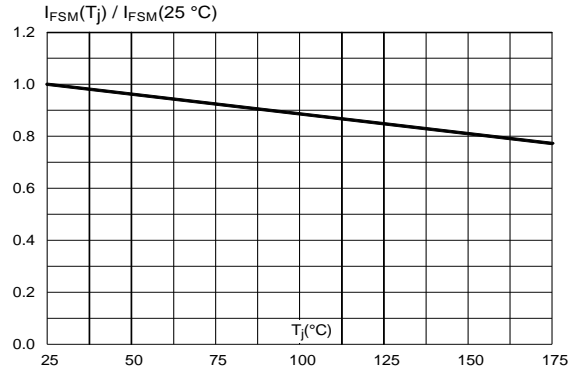


Figure 14: Relative variation of non-repetitive peak surge forward current versus initial junction temperature (sinusoidal waveform)



2 Package information

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.

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m (TO-220AC)
- Recommended torque value: 0.8 N·m (DO-247)
- Maximum torque value: 0.7 N·m (TO-220AC)
- Maximum torque value: 1.0 N·m (DO-247)

2.1 DO-247 package information

Figure 15: DO-247 package outline

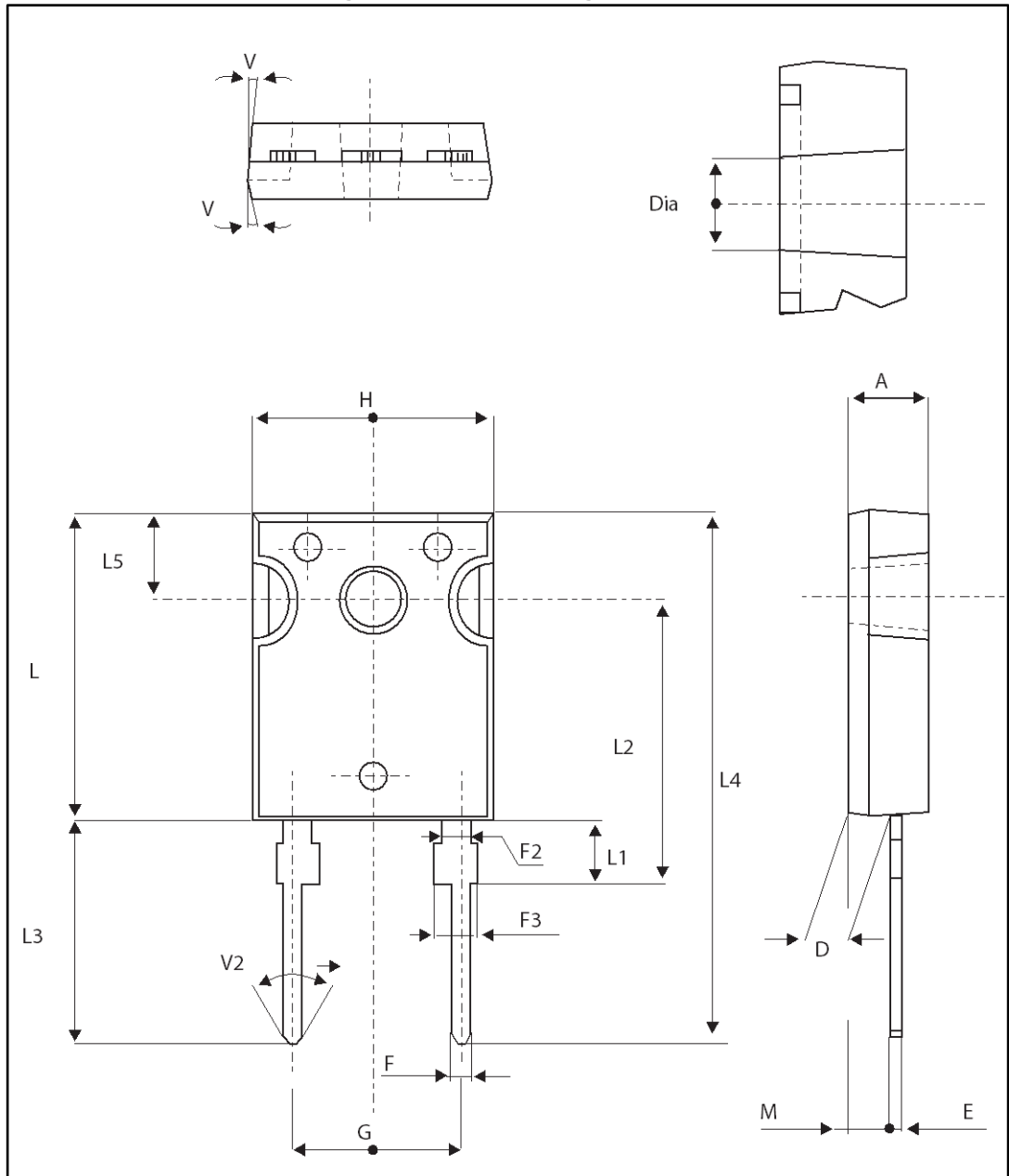


Table 6: DO-247 package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.85	5.15	0.191	0.203
D	2.20	2.60	0.086	0.102
E	0.40	0.80	0.015	0.031
F	1.00	1.40	0.039	0.055
F2	2.00 typ.		0.078 typ.	
F3	2.00	2.40	0.078	0.094
G	10.90 typ.		0.429 typ.	
H	15.45	15.75	0.608	0.620
L	19.85	20.15	0.781	0.793
L1	3.70	4.30	0.145	0.169
L2	18.50 typ.		0.728 typ.	
L3	14.20	14.80	0.559	0.582
L4	34.60 typ.		1.362 typ.	
L5	5.50 typ.		0.216 typ.	
M	2.00	3.00	0.078	0.118
V	5°		5°	
V2	60°		60°	
Dia.	3.55	3.65	0.139	0.143

2.2 D²PAK package information

Figure 16: D²PAK package outline

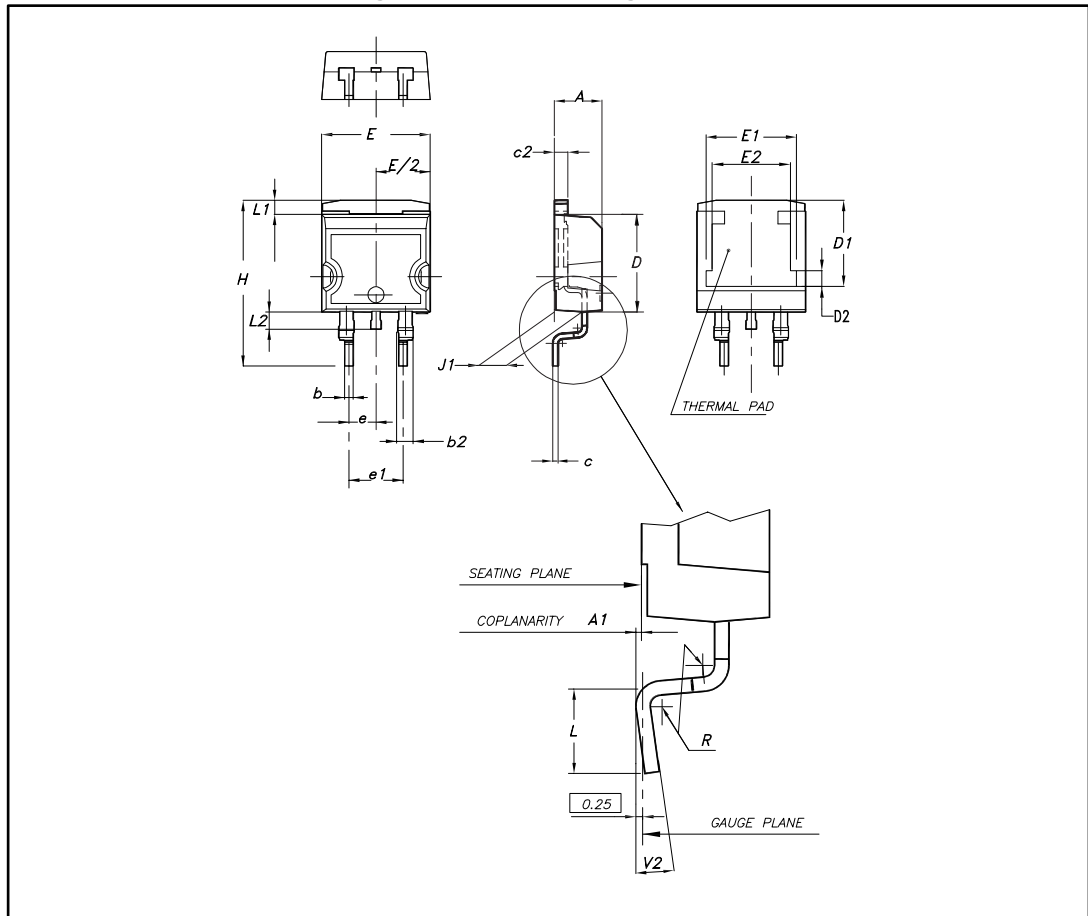
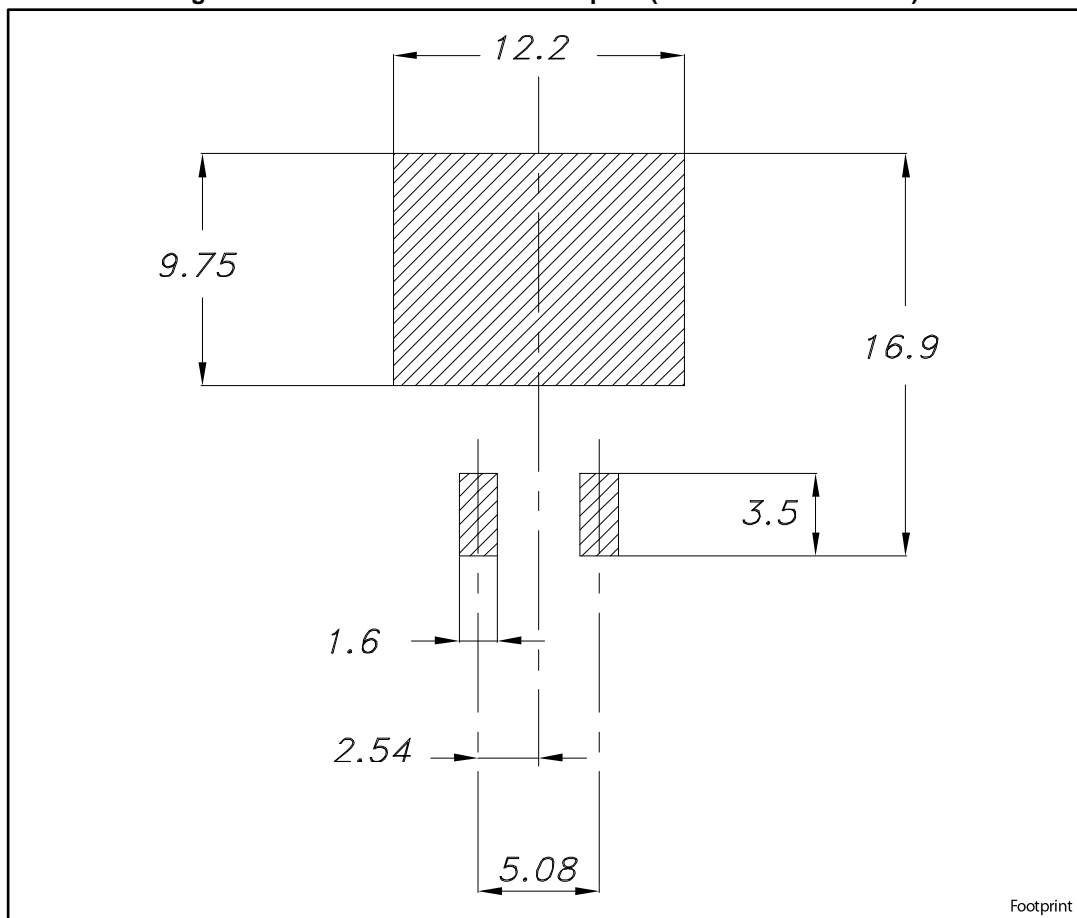


Table 7: D²PAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
A1	0.03		0.23	0.001		0.009
b	0.70		0.93	0.028		0.037
b2	1.14		1.70	0.045		0.067
c	0.45		0.60	0.018		0.024
c2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1	7.50	7.75	8.00	0.295	0.305	0.315
D2	1.10	1.30	1.50	0.043	0.051	0.060
E	10		10.40	0.394		0.409
E1	8.50	8.70	8.90	0.335	0.343	0.346
E2	6.85	7.05	7.25	0.266	0.278	0.282
e		2.54			0.100	
e1	4.88		5.28	0.190		0.205
H	15		15.85	0.591		0.624
J1	2.49		2.69	0.097		0.106
L	2.29		2.79	0.090		0.110
L1	1.27		1.40	0.049		0.055
L2	1.30		1.75	0.050		0.069
R		0.4			0.015	
V2	0°		8°	0°		8°

Figure 17: D²PAK recommended footprint (dimensions are in mm)



2.3 TO-220AC package information

Figure 18: TO-220AC package outline

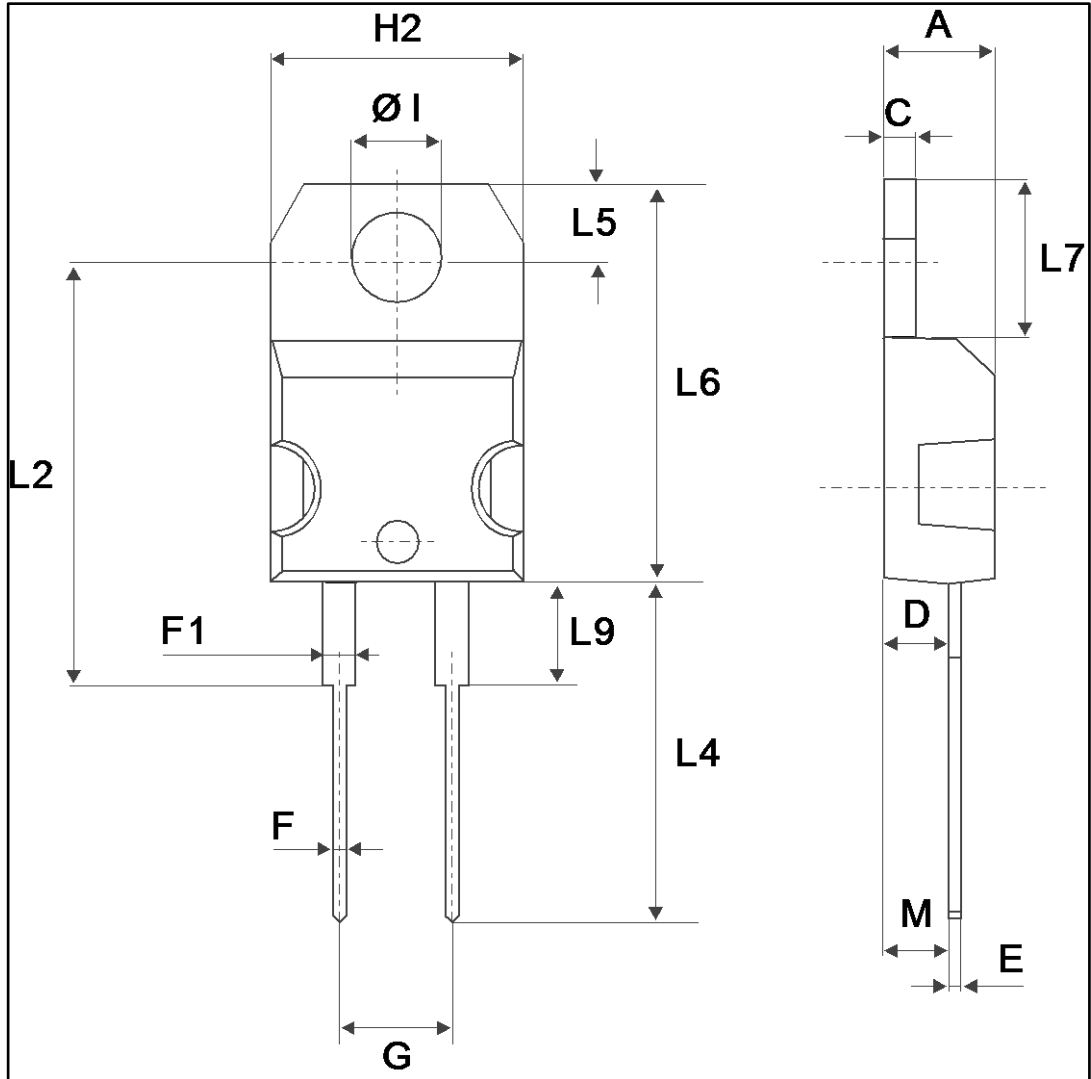


Table 8: TO-220AC package mechanical data

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.	
ØI	3.75	3.85	0.147	0.151

3 Ordering information

Table 9: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH30RQ06G-TR	STTH30RQ06G	D ² PAK	1.38 g	1000	Tape and reel
STTH30RQ06D	STTH30RQ06D	TO-220AC	1.86 g	50	Tube
STTH30RQ06W	STTH30RQ06W	DO-247	4.40 g	30	Tube

4 Revision history

Table 10: Document revision history

Date	Revision	Changes
12-Jun-2017	1	Initial release.

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