

Automotive Turbo 2 ultrafast high voltage rectifier

Datasheet – production data

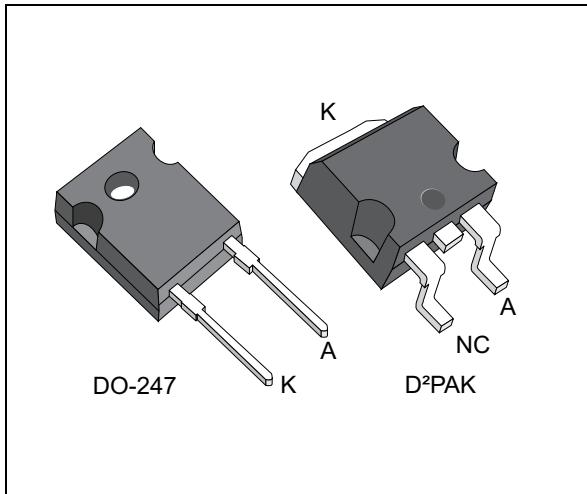


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	30 A
V_{RRM}	600 V
t_{rr} (typ)	39 ns
T_j	-40 to +175 °C
V_F (typ)	1.75 V

Features

- Aluminum ribbon bonding
- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces switching and conduction losses
- ECOPACK®2 compliant component (DO-247)
- AEC-Q101 qualified

Description

The STTH30ST06-Y, which uses ST Turbo 2, 600 V technology, is packaged in DO-247 and D²PAK with aluminum ribbon to ensure a high robustness. It especially suited for use in switching power supplies and automotive applications, industrial applications, as rectification and boost diode for circuits working in continuous conduction mode.

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
V_{RRM}	Repetitive peak reverse voltage, $T_j = -40^\circ\text{C}$		560	V
$I_{F(\text{RMS})}$	Forward rms current		64	A
$I_{F(\text{AV})}$	Average forward current, $\delta = 0.5$	$T_c = 65^\circ\text{C}$	30	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10 \text{ ms sinusoidal}$	160	A
T_{stg}	Storage temperature range		-65 to + 175	°C
T_j	Maximum operating junction temperature		-40 to + 175	°C

Table 3. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{\text{th(j-c)}}$	Junction to case (DO-247, D ² PAK)	1.25	°C / W

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_R ⁽¹⁾	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			50	μA
		$T_j = 125^\circ\text{C}$			50	500	
V_F ⁽²⁾	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 30 \text{ A}$			3.6	V
		$T_j = 125^\circ\text{C}$			1.75	2.2	

1. Pulse test: $t_p = 5 \text{ ms}$, $\delta < 2\%$
2. Pulse test: $t_p = 380 \mu\text{s}$, $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 1.45 \times I_{F(\text{AV})} + 0.025 I_{F(\text{RMS})}^2$$

Table 5. Dynamic electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I _{RM}	Reverse recovery current	T _j = 125 °C	I _F = 30 A, V _R = 400 V dI _F /dt = -100 A/μs		4	5.5	A
S _{factor}	Softness factor				0.3		
t _{rr}	Reverse recovery time	T _j = 25 °C	I _F = 1 A, V _R = 30 V dI _F /dt = -50 A/μs		39	50	ns
			I _F = 0.5 A, I _{rr} = 0.25 A I _R = 1 A			30	
t _{fr}	Forward recovery time		I _F = 30 A, V _{FR} = 4 V dI _F /dt = 300 A/μs			200	
V _{FP}	Forward recovery voltage				7		V

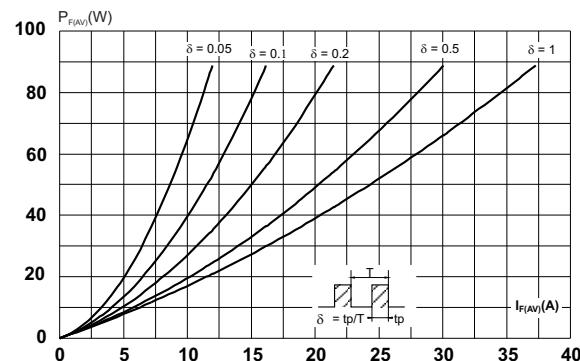
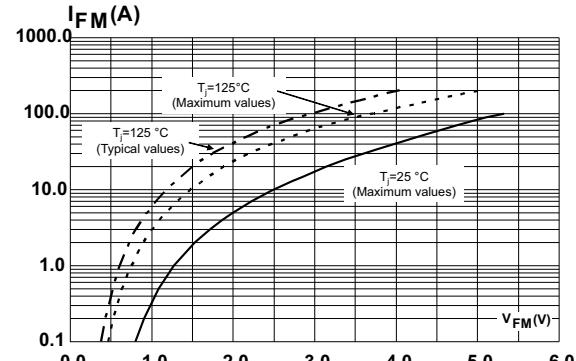
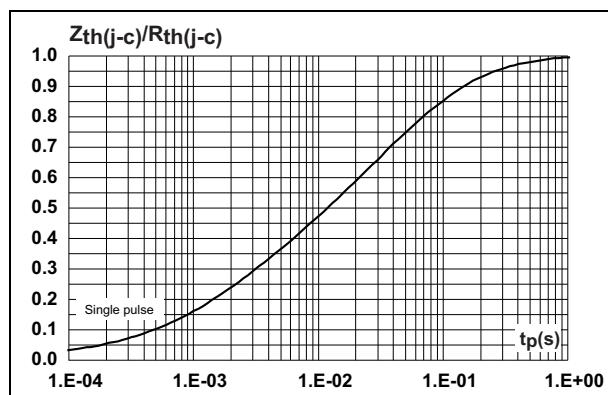
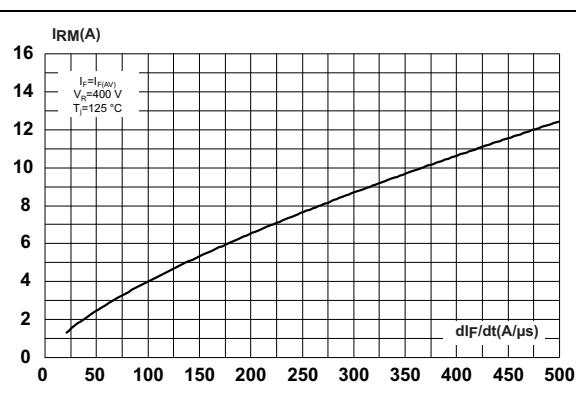
Figure 1. Average forward power dissipation versus average forward current**Figure 2. Forward voltage drop versus forward current****Figure 3. Relative variation of thermal impedance junction to case versus pulse duration****Figure 4. Peak reverse recovery current versus dI_F/dt (typical values)**

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

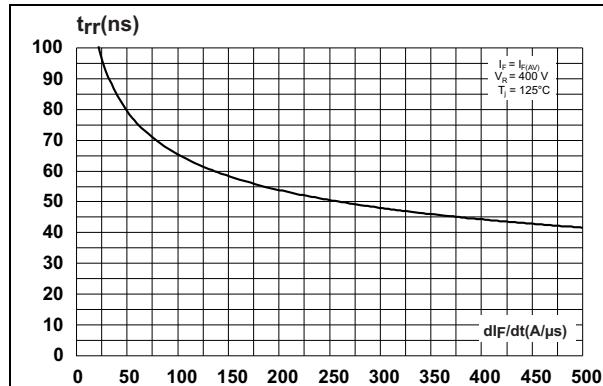


Figure 6. Reverse recovery charges versus dI_F/dt (typical values)

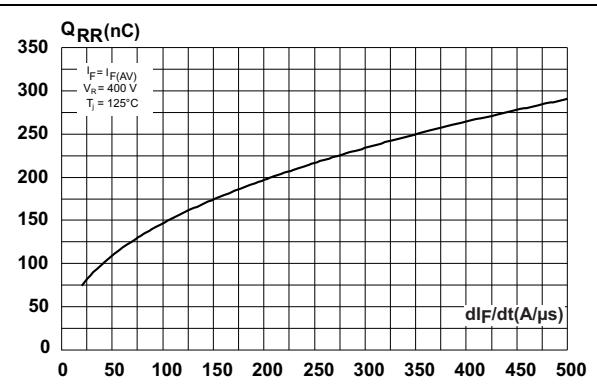


Figure 7. Reverse recovery softness factor versus dI_F/dt (typical values)

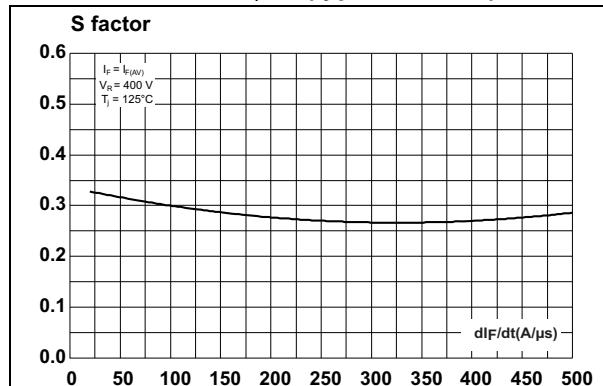


Figure 8. Relative variation of dynamic parameters versus junction temperature

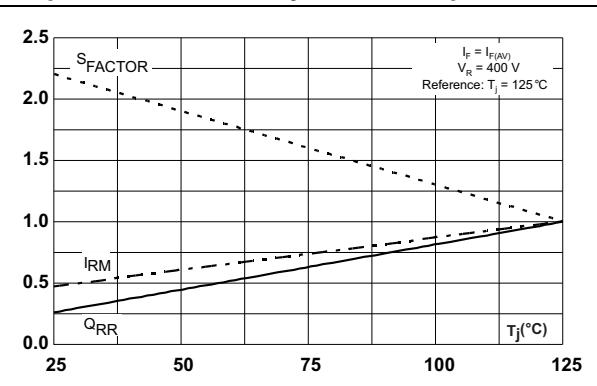


Figure 9. Transient peak forward voltage versus dI_F/dt (typical values)

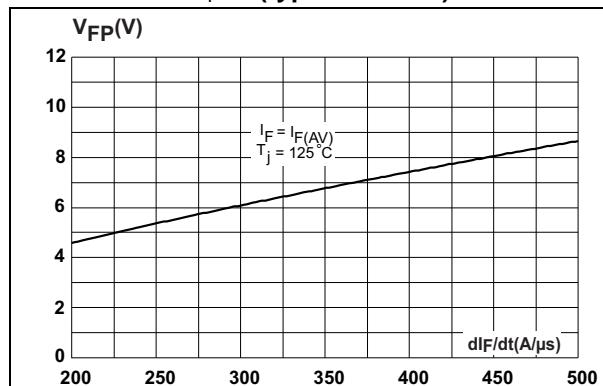


Figure 10. Forward recovery time versus dI_F/dt (typical values)

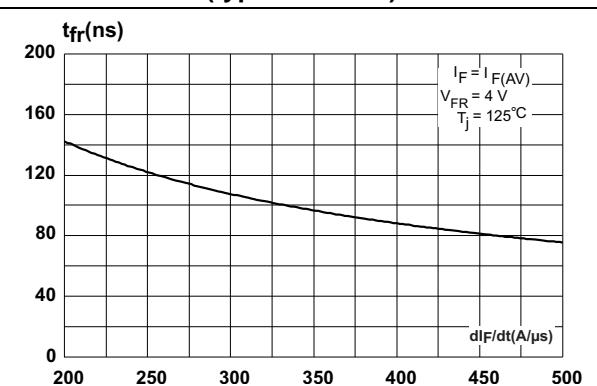


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

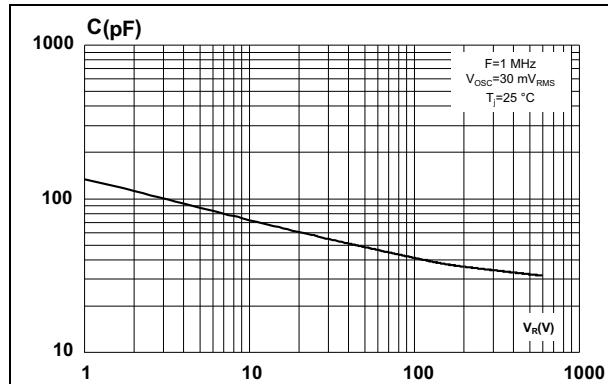
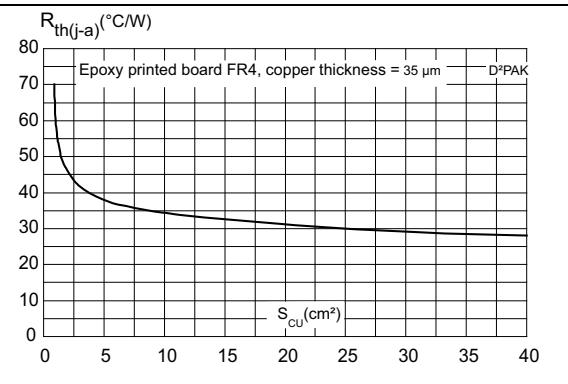


Figure 12. Junction capacitance versus reverse voltage applied (typical values)



2 Package information

- Epoxy meets UL94, V0
- Lead-free package
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m (1.0 N·m maximum)

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Figure 13. D²PAK dimension definitions

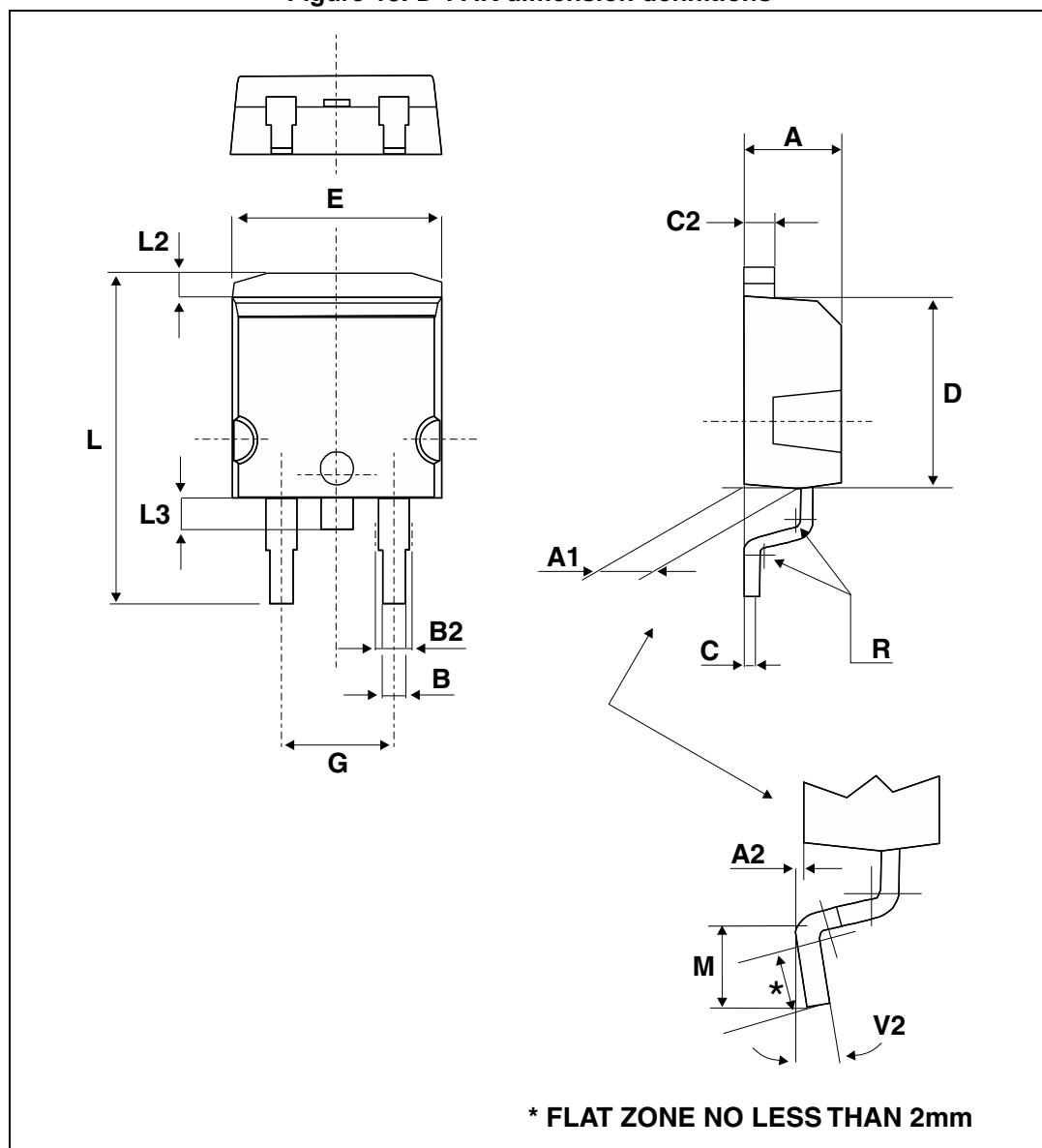


Table 6. D²PAK dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	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	16	5.28	0.192	0.63	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°

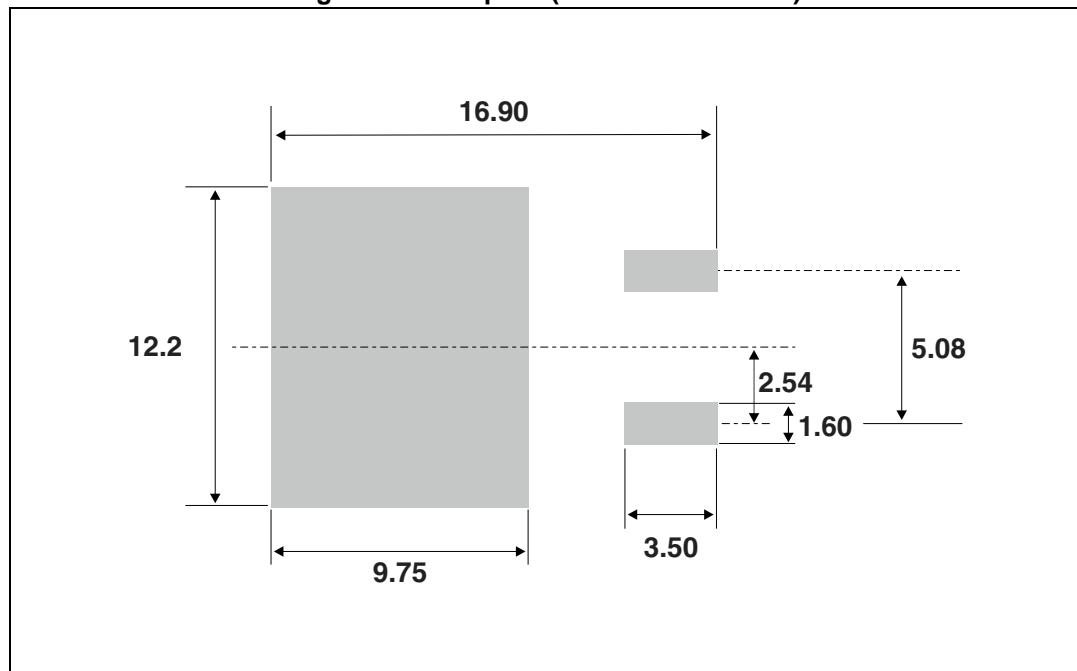
Figure 14. Footprint (dimensions in mm)

Figure 15. DO-247 dimension definitions

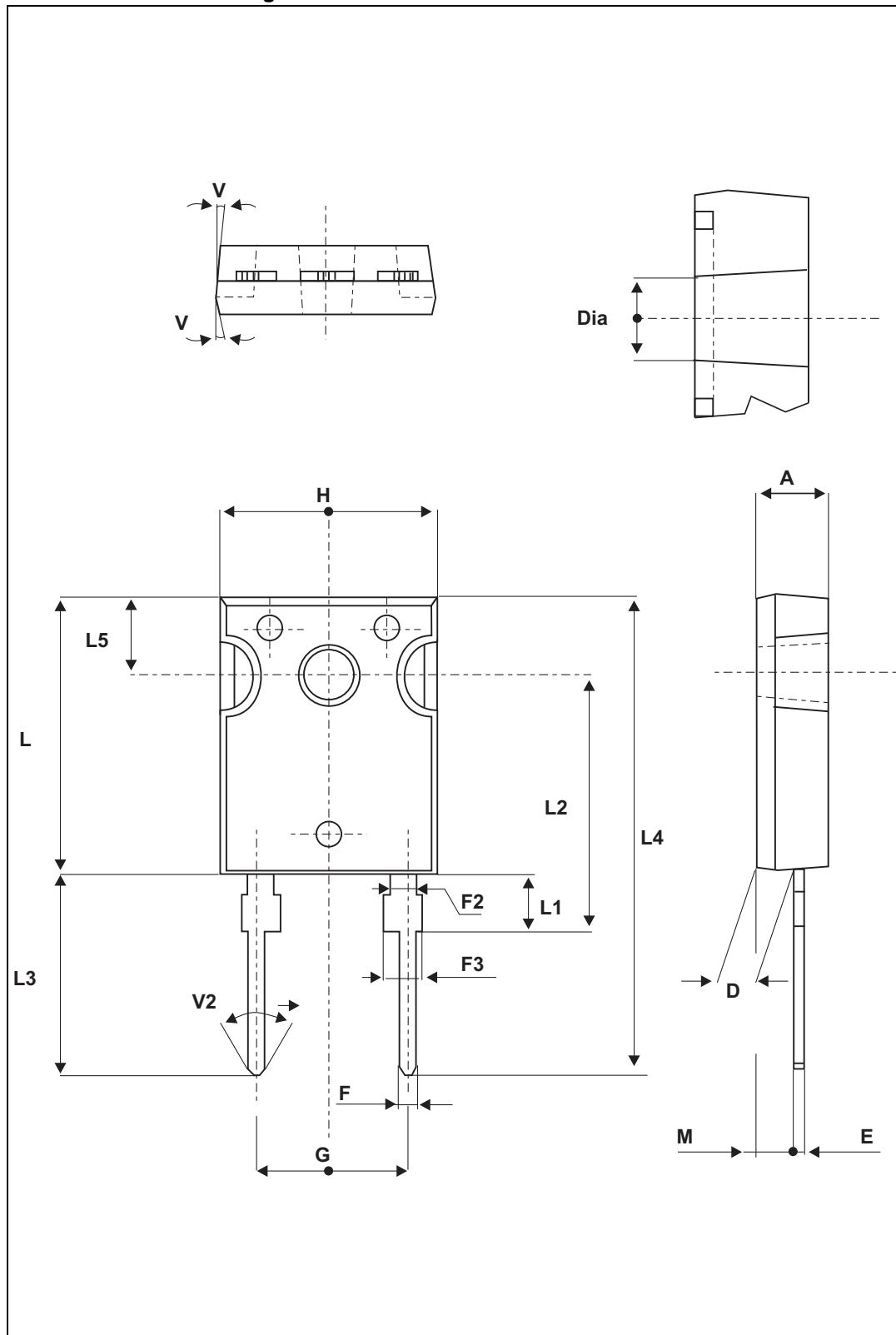


Table 7. DO-247 dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	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			0.078	
F3	2.00		2.40	0.078		0.094
G		10.90			0.429	
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			0.728	
L3	14.20		14.80	0.559		0.582
L4		34.60			1.362	
L5		5.50			0.216	
M	2.00		3.00	0.078		0.118
V		5°			5°	
V2		60°			60°	
Dia.	3.55		3.65	0.139		0.143

3 Ordering information

Table 8. Ordering information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH30ST06WY	STTH30ST06WY	DO-247	4.40 g	30	Tube
STTH30ST06GY-TR	STTH30ST06GY	D ² PAK	1.48 g	1000	Tape and reel

4 Revision history

Table 9. Document revision history

Date	Revision	Changes
14-Jan-2015	1	First issue.

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