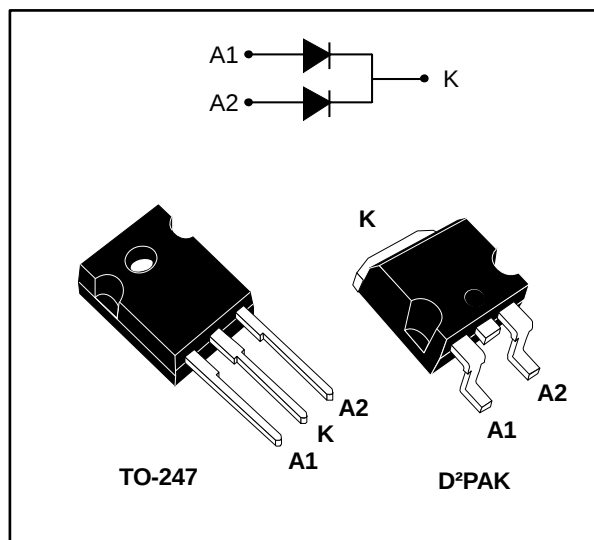


Turbo 2 ultratfast high voltage rectifier

Datasheet - production data



Description

This device uses ST Turbo 2 600 V technology, and is particularly suited as boost diode in discontinuous or critical mode power factor corrections.

It is also intended for use as a freewheeling diode in power supplies and other power switching applications.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	up to 2 x 20 A
V_{RRM}	600 V
V_F (typ.)	0.95 V
t_{rr} (max.)	55 ns

Features

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduce switching and conduction losses
- ECOPACK®2 compliant component for D²PAK on demand

1 Characteristics

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

Symbol	Parameter			Value	Unit
V _{RRM}	Repetitive peak reverse voltage			600	V
I _{F(RMS)}	Forward rms current			30	A
I _{F(AV)}	Average forward current $\delta = 0.5$, square wave	T _C = 140 °C	Per diode	15	A
		T _C = 125 °C	Per device	30	
		T _C = 120 °C	Per diode	20	
		T _C = 110 °C	Per device	40	
I _{FSM}	Surge non repetitive forward current	t _p = 10 ms sinusoidal		130	A
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	Per diode	1.7	°C/W
		Total	1.15	
R _{th(c)}	Coupling		0.6	°C/W

When the diodes 1 and 2 are used simultaneously:

$$\Delta T_j (\text{diode1}) = P_{(\text{diode1})} \times R_{th(j-c)} (\text{per diode}) + P_{(\text{diode2})} \times R_{th(c)}$$

Table 4: Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I _R ⁽¹⁾	Reverse leakage current	T _j = 25 °C	V _R = V _{RRM}	-		15	μA
		T _j = 150 °C		-	40	400	
V _F ⁽²⁾	Forward voltage drop	T _j = 25 °C	I _F = 15 A	-		1.55	V
		T _j = 150 °C		-	0.95	1.2	
		T _j = 25 °C	I _F = 30 A			1.76	
		T _j = 150 °C			1.15	1.45	

Notes:

⁽¹⁾Pulse test: t_p = 5 ms, $\delta < 2\%$

⁽²⁾Pulse test: t_p = 380 μs, $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

$$P = 0.94 \times I_{F(AV)} + 0.017 \times I_{F(RMS)}^2$$

Table 5: Dynamic electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 0.5\text{ A}$ $I_R = 1\text{ A}$ $I_{rr} = 0.25\text{ A}$	-		55	ns
			$I_F = 1\text{ A}$ $V_R = 30\text{ V}$ $di_F/dt = 50\text{ A/}\mu\text{s}$	-	60	85	
I_{RM}	Reverse recovery current	$T_j = 125\text{ °C}$	$I_F = 15\text{ A}$ $V_R = 400\text{ V}$ $di_F/dt = 100\text{ A/}\mu\text{s}$	-	8.5	12	A
t_{fr}	Forward recovery time	$T_j = 25\text{ °C}$	$I_F = 15\text{ A}$	-		300	ns
V_{FP}	Forward recovery voltage		$V_{FR} = 1.1 \times V_{Fmax.}$ $di_F/dt = 100\text{ A/}\mu\text{s}$	-	3.0		V

1.1 Characteristics (curves)

Figure 1: Conduction losses versus average forward current (per diode)

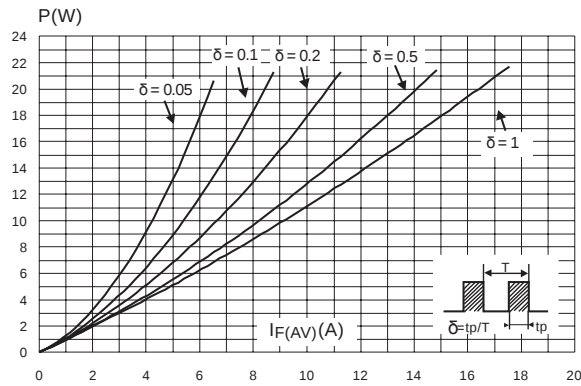


Figure 2: Forward voltage drop versus forward current (per diode)

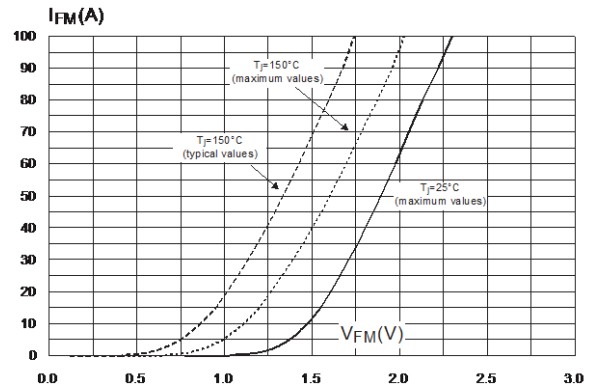


Figure 3: Relative variation of thermal impedance junction to case versus pulse duration

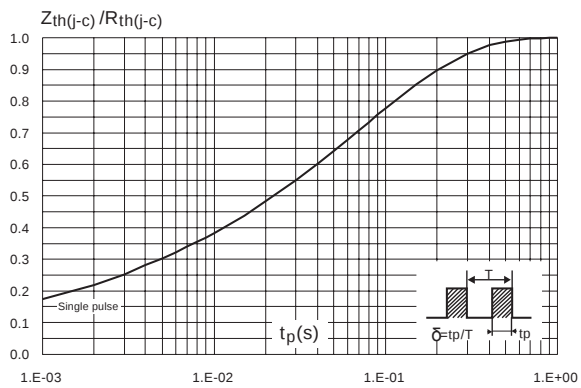


Figure 4: Peak reverse recovery current versus di_F/dt (typical values, per diode)

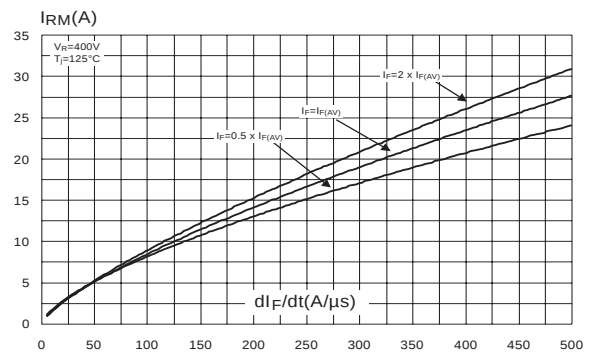


Figure 5: Reverse recovery time versus di_F/dt (typical values, per diode)

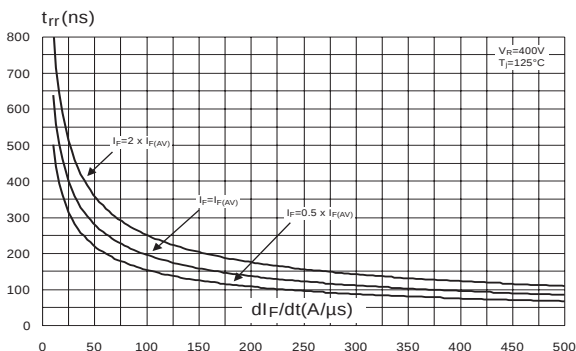


Figure 6: Reverse recovery charges versus di_F/dt (typical values, per diode)

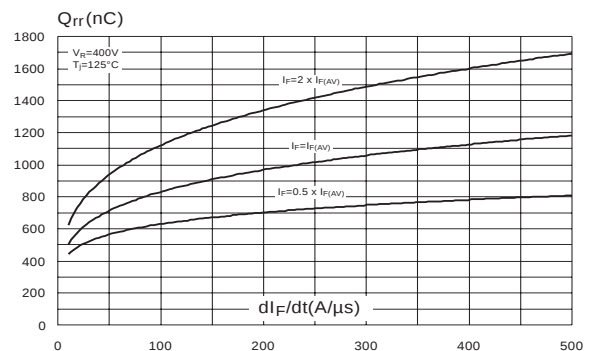


Figure 7: Reverse recovery softness factor versus di_F/dt (typical values, per diode)

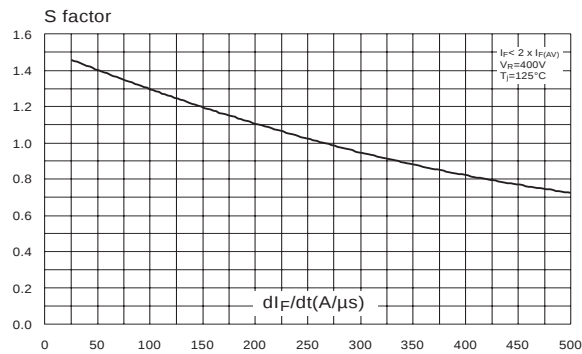


Figure 8: Relative variation of dynamic parameters versus junction temperature

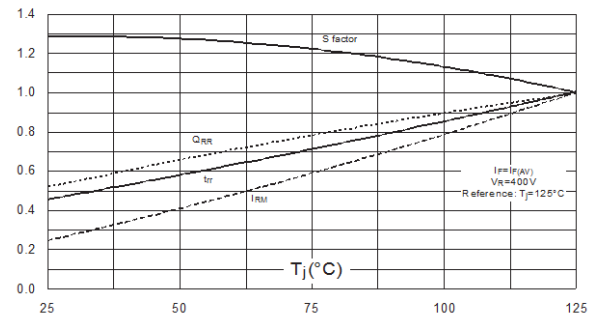


Figure 9: Transient peak forward voltage versus di_F/dt (typical values, per diode)

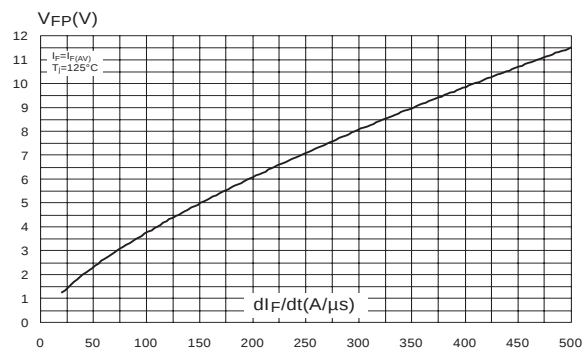


Figure 10: Forward recovery time versus di_F/dt (typical values, per diode)

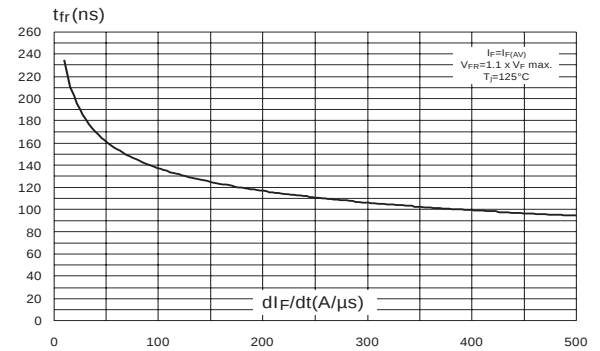


Figure 11: Junction capacitance versus reverse voltage applied (typical values, per diode)

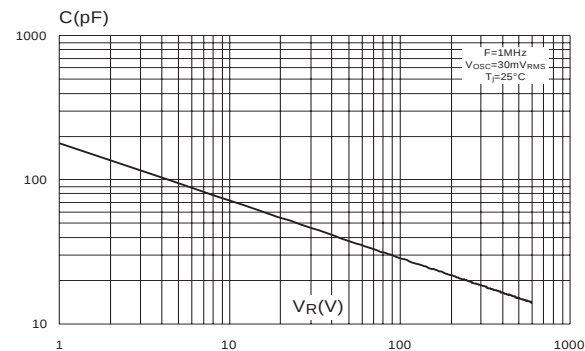
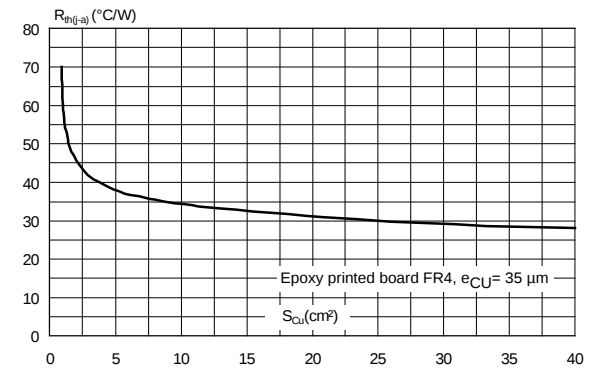


Figure 12: Thermal resistance, junction to ambient, versus copper surface under tab (D²PAK)

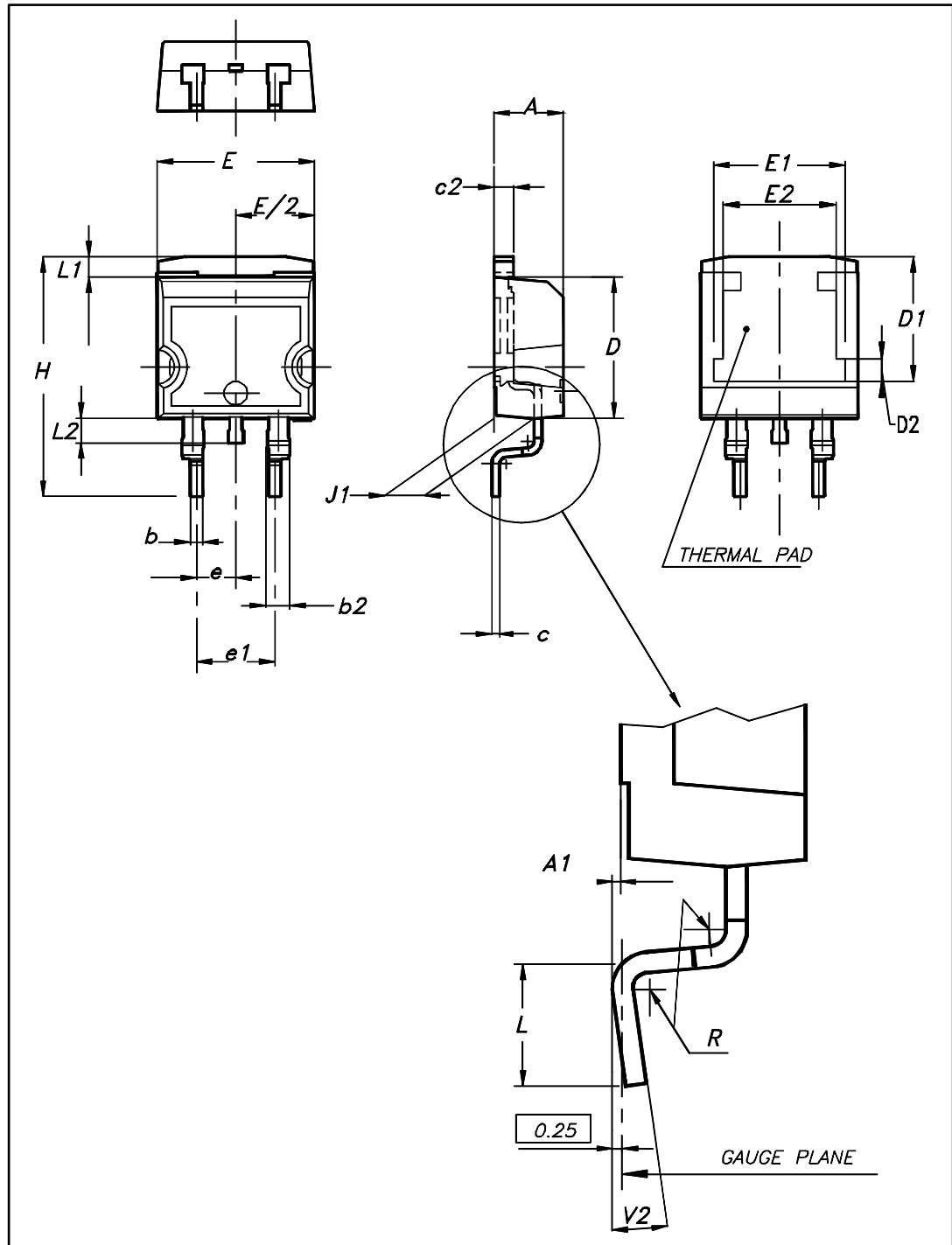


2 Package information

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.

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0
- Recommended torque value: 0.8 N·m
- Maximum torque value: 1.0 N·m

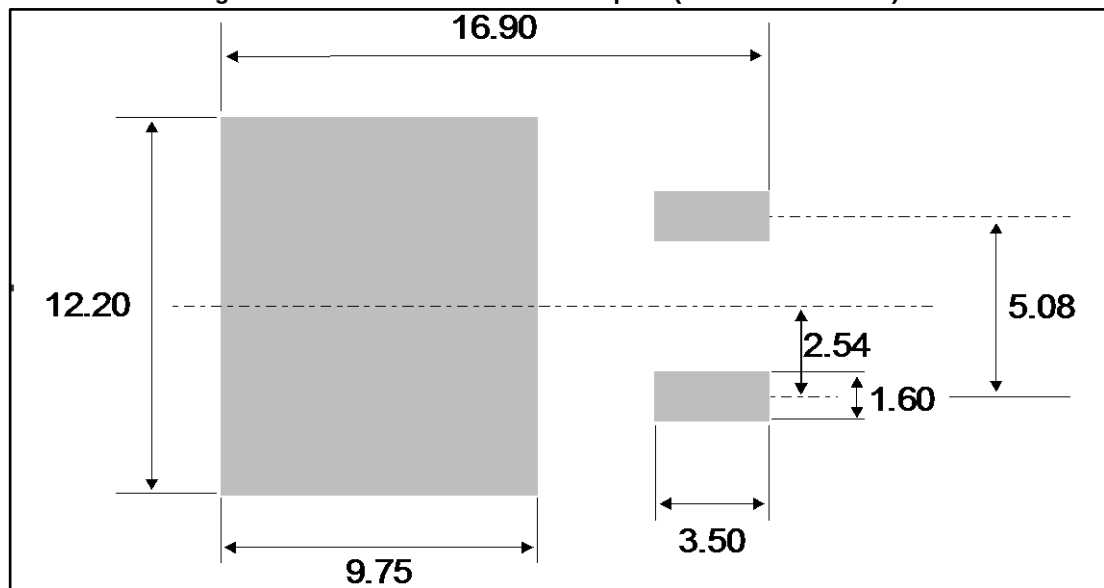
2.1 D²PAK package information

Figure 13: D²PAK package outline

This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6: D²PAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.36	4.60	0.172	0.181
A1	0.00	0.25	0.000	0.010
b	0.70	0.93	0.028	0.037
b2	1.14	1.70	0.045	0.067
c	0.38	0.69	0.015	0.027
c2	1.19	1.36	0.047	0.053
D	8.60	9.35	0.339	0.368
D1	6.90	8.00	0.272	0.311
D2	1.10	1.50	0.043	0.060
E	10.00	10.55	0.394	0.415
E1	8.10	8.90	0.319	0.346
E2	6.85	7.25	0.266	0.282
e	2.54 typ.		0.100	
e1	4.88	5.28	0.190	0.205
H	15.00	15.85	0.591	0.624
J1	2.49	2.90	0.097	0.112
L	1.90	2.79	0.075	0.110
L1	1.27	1.65	0.049	0.065
L2	1.30	1.78	0.050	0.070
R	0.4 typ.		0.015	
V2	0°	8°	0°	8°

Figure 14: D²PAK recommended footprint (dimensions in mm)

2.2 TO-247 package information

Figure 15: TO-247 package outline

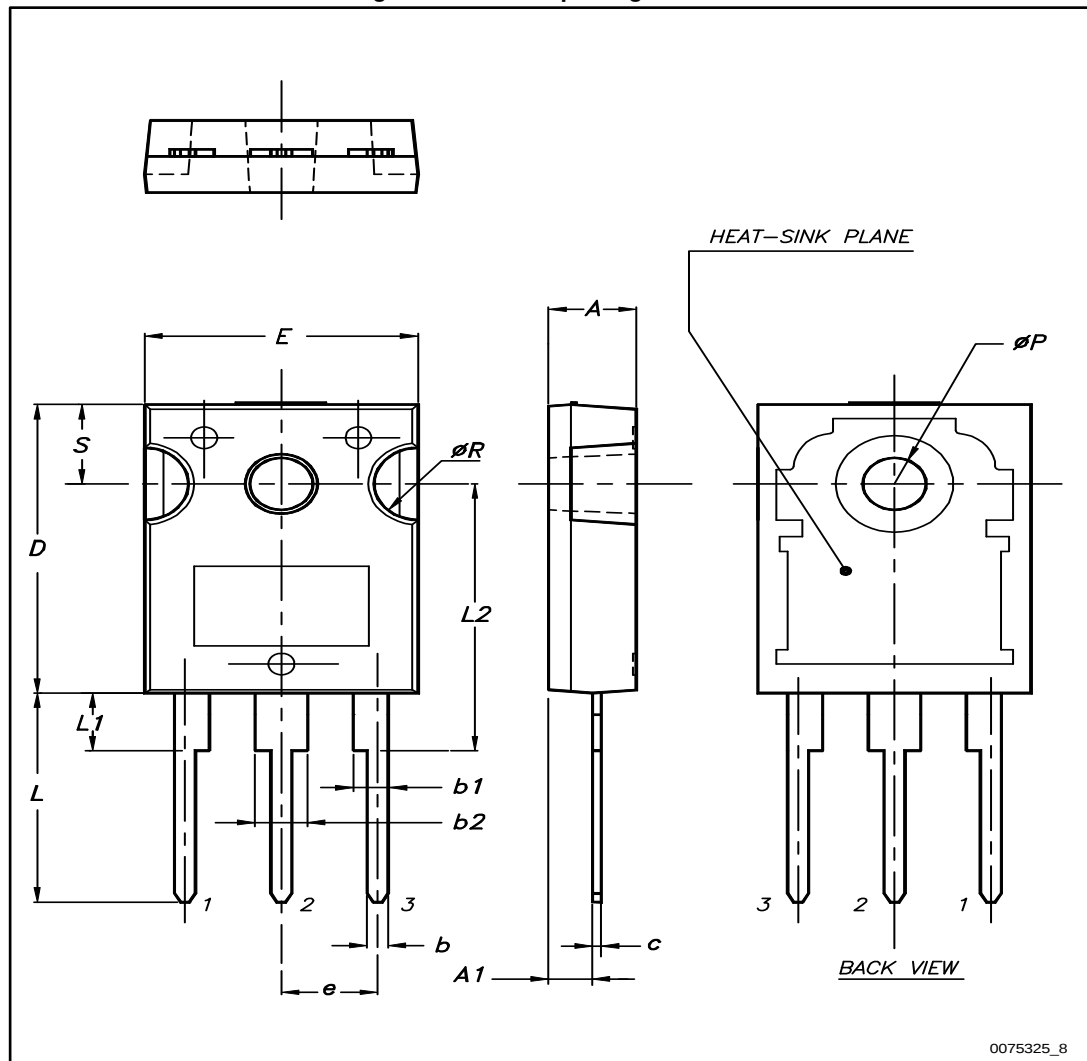


Table 7: TO-247 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.85		5.15	0.191		0.203
A1	2.20		2.60	0.086		0.102
b	1.00		1.40	0.039		0.055
b1	2.00		2.40	0.078		0.094
b2	3.00		3.40	0.118		0.133
c	0.40		0.80	0.015		0.031
D ⁽¹⁾	19.85		20.15	0.781		0.793
E	15.45		15.75	0.608		0.620
e	5.30	5.45	5.60	0.209	0.215	0.220
L	14.20		14.80	0.559		0.582
L1	3.70		4.30	0.145		0.169
L2		18.50			0.728	
ØP ⁽²⁾	3.55		3.65	0.139		0.143
ØR	4.50		5.50	0.177		0.217
S	5.30	5.50	5.70	0.209	0.216	0.224

Notes:

⁽¹⁾Dimension D plus gate protusion does not exceed 20.5 mm

⁽²⁾Resin thickness around the mounting hole is not less than 0.9 mm.

3 Ordering information

Table 8: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH30L06CG-TR	STTH30L06CG	D ² PAK	1.48 g	1000	Tape and reel
STTH30L06CW	STTH30L06CW	TO-247	4.46 g	50	Tube

4 Revision history

Table 9: Document revision history

Date	Revision	Changes
07-Sep-2004	1	Initial release.
14-Dec-2016	2	Removed TO-220AB package information.

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