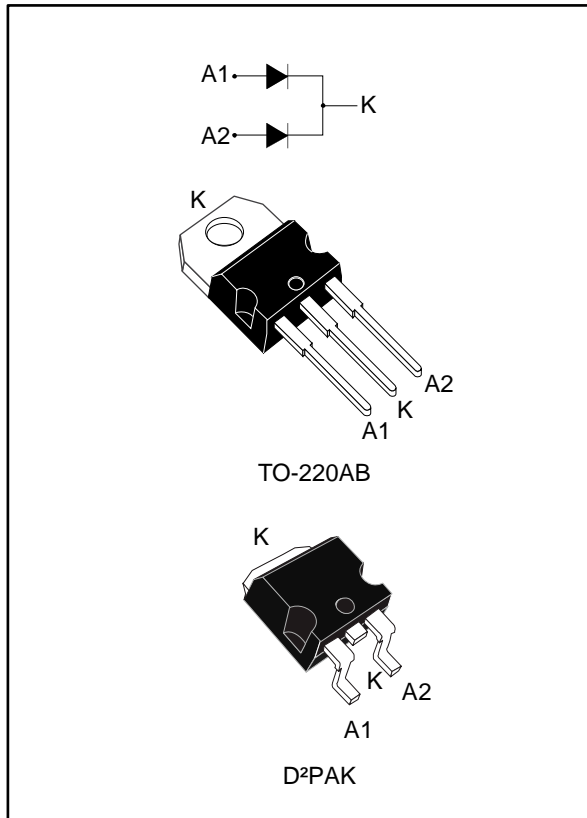


## Automotive Turbo 2 ultrafast high voltage rectifier

Datasheet - production data



### Description

The STTH16L06C-Y is specially suited for use in switching power supplies as rectifier and discontinuous mode PFC boost diode for automotive applications.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	2 x 8 A
$V_{RRM}$	600 V
$T_j$	+175 °C
$V_F$ (typ.)	1.05 V
$t_{rr}$ (max.)	35 ns

### Features

- AEC-Q101 qualified
- Low reverse recovery current
- Reduce switching and conduction losses
- Low thermal resistance
- Ultrafast switching
- PPAP capable
- ECOPACK<sup>®</sup>2 compliant component



# 1 Characteristics

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

Symbol	Parameter		Value	Unit	
V <sub>RRM</sub>	Repetitive peak reverse voltage	T <sub>j</sub> = -40 °C to +175 °C	600	V	
I <sub>F(RMS)</sub>	Forward rms current		30	A	
I <sub>F(AV)</sub>	Average forward current $\delta = 0.5$ , square wave	T <sub>C</sub> = 140 °C	Per diode	8	A
		T <sub>C</sub> = 135 °C	Per device	16	
		T <sub>C</sub> = 130 °C	Per diode	10	
		T <sub>C</sub> = 120 °C	Per device	20	
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal	120	A	
T <sub>stg</sub>	Storage temperature range		-65 to +175	°C	
T <sub>j</sub>	Operating junction temperature range		-40 to +175	°C	

**Table 3: Thermal parameters**

Symbol	Parameter			Max. value	Unit
R <sub>th(j-c)</sub>	Junction to case	TO-220AB, D <sup>2</sup> PAK	Per diode	2.5	°C/W
			Total	1.6	
R <sub>th(c)</sub>	Coupling			0.7	°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 <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25 °C	V <sub>R</sub> = V <sub>RRM</sub>	-		8	μA
		T <sub>j</sub> = 150 °C		-	25	240	
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 8 A	-		1.80	V
		T <sub>j</sub> = 150 °C		-	1.05	1.35	
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 16 A	-		2.08	
		T <sub>j</sub> = 150 °C		-	1.28	1.64	

**Notes:**

(1)Pulse test: t<sub>p</sub> = 5 ms,  $\delta < 2\%$

(2)Pulse test: t<sub>p</sub> = 380 μs,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

$$P = 1.06 \times I_{F(AV)} + 0.036 \times I_{F(RMS)}^2$$

Table 5: Dynamic electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 0.5\text{ A}$ $I_R = 1\text{ A}$ $I_{rr} = 0.25\text{ A}$	-		35	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	$T_j = 125\text{ °C}$	$I_F = 8\text{ A}$ $V_R = 400\text{ V}$ $di_F/dt = 100\text{ A}/\mu\text{s}$	-	4.5	6.5	A
$t_{fr}$	Forward recovery time	$T_j = 25\text{ °C}$	$I_F = 8\text{ A}$ $V_{FR} = 1.1 \times V_{Fmax.}$ $di_F/dt = 100\text{ A}/\mu\text{s}$	-		200	ns
$V_{FP}$	Forward recovery voltage			-	3.5		V

# 1.1 Characteristics (curves)

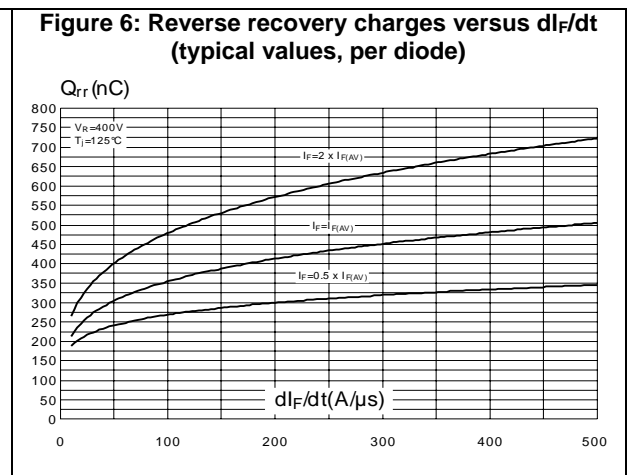
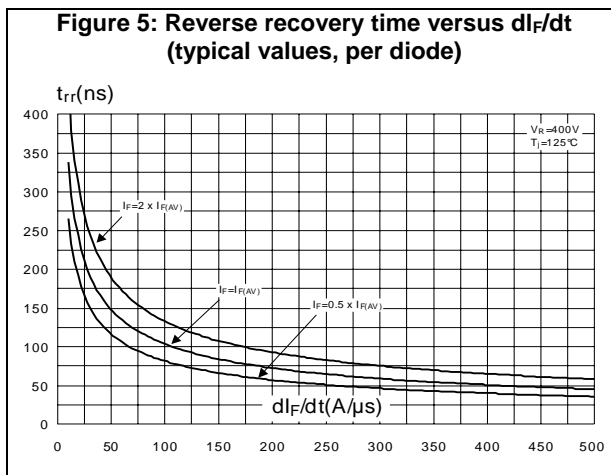
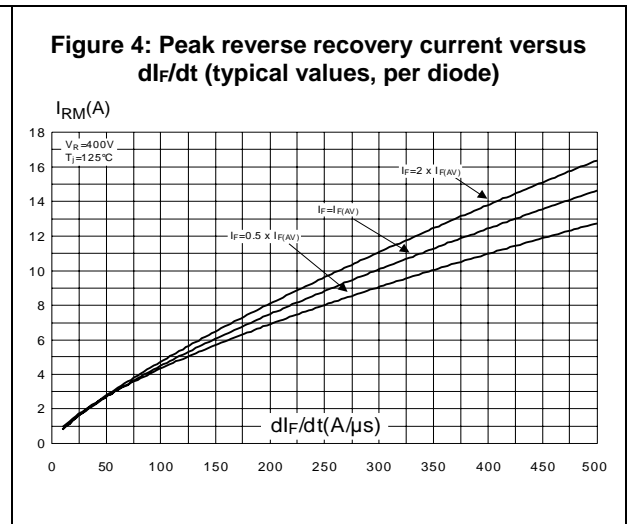
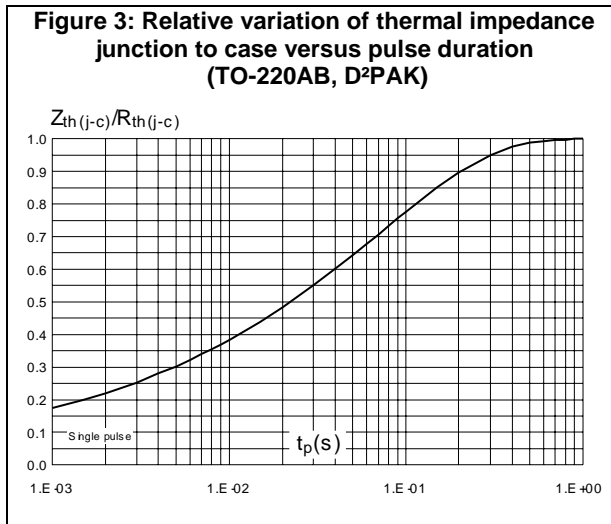
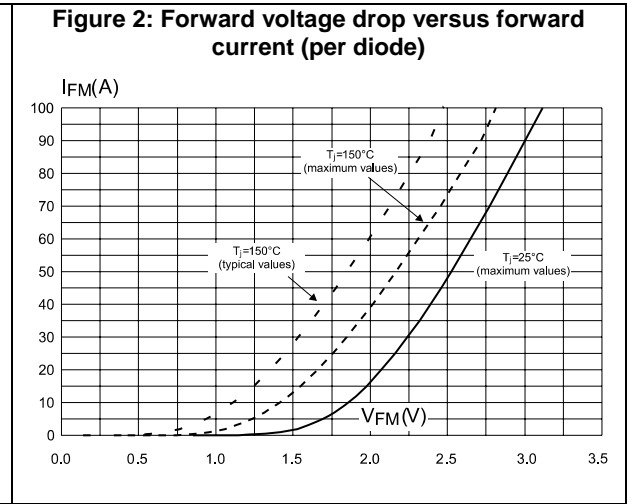
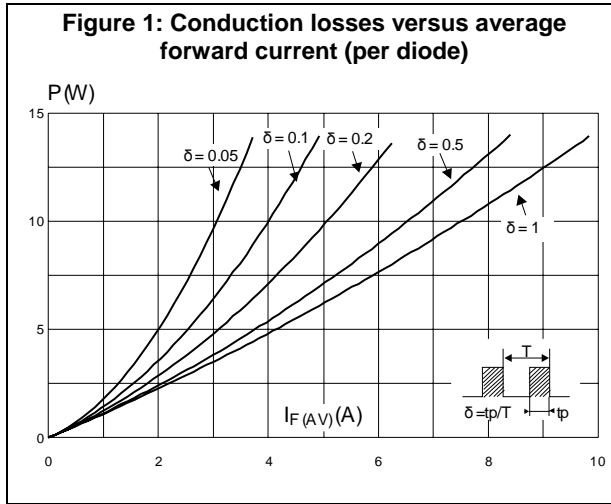


Figure 7: Relative variations of dynamic parameters versus junction temperature

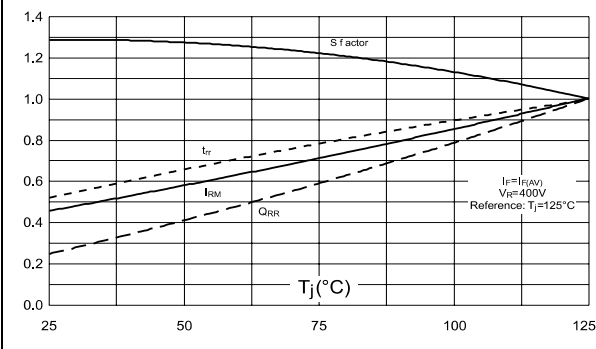


Figure 8: Reverse recovery softness factor versus  $di_F/dt$  (typical values, per diode)

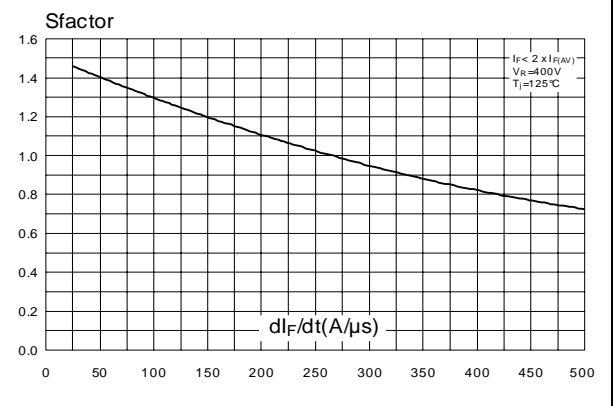


Figure 9: Forward recovery time versus  $di_F/dt$  (typical values, per diode)

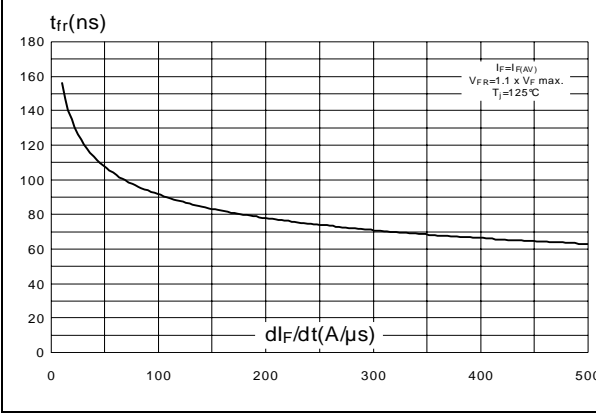


Figure 10: Transient peak forward voltage versus  $di_F/dt$  (typical values, per diode)

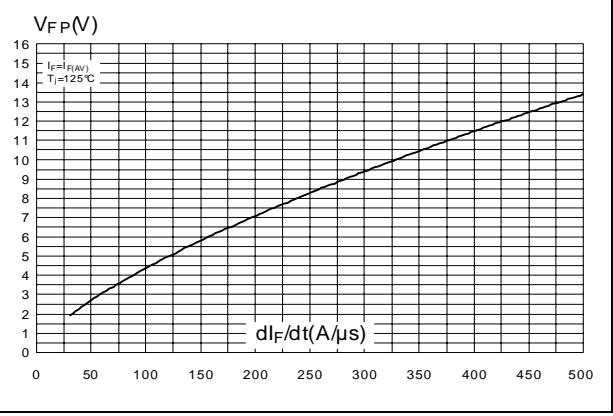


Figure 11: Junction capacitance versus reverse voltage applied (typical values, per diode)

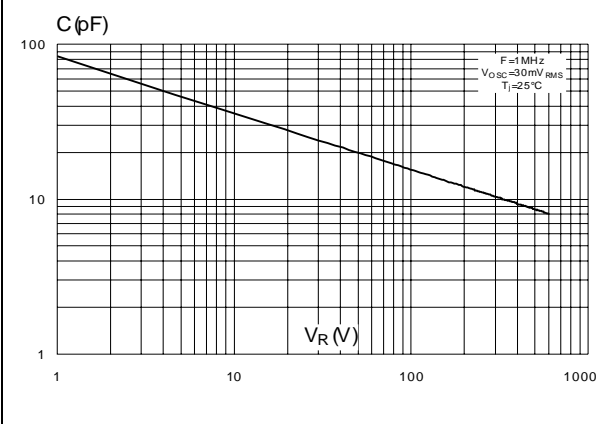
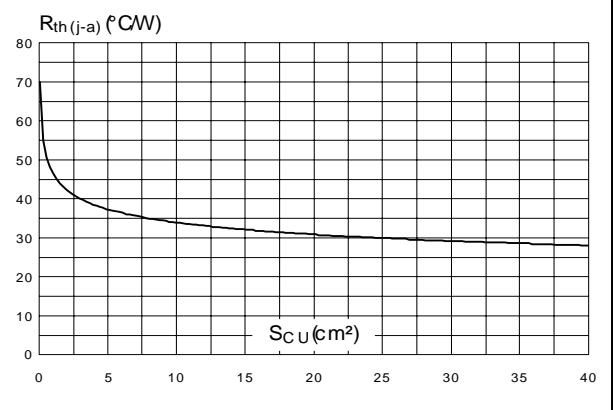


Figure 12: Thermal resistance, junction to ambient, versus copper surface under tab (epoxy FR4, copper thickness = 35 μm)(D2PAK)



## 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](http://www.st.com). ECOPACK® is an ST trademark.

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0
- Recommended torque value: 0.55 N·m (for TO-220AB)
- Maximum torque value: 0.7 N·m (for TO-220AB)

### 2.1 D<sup>2</sup>PAK package information

Figure 13: D<sup>2</sup>PAK package outline

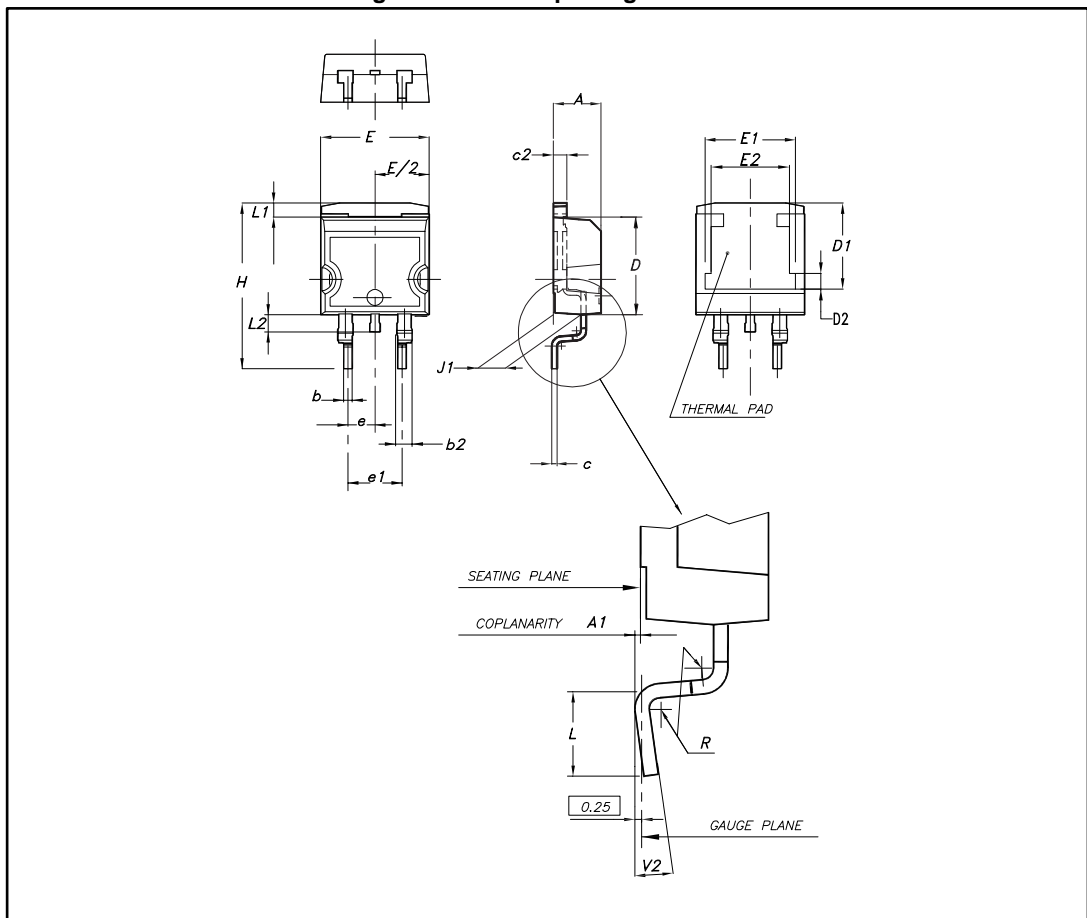
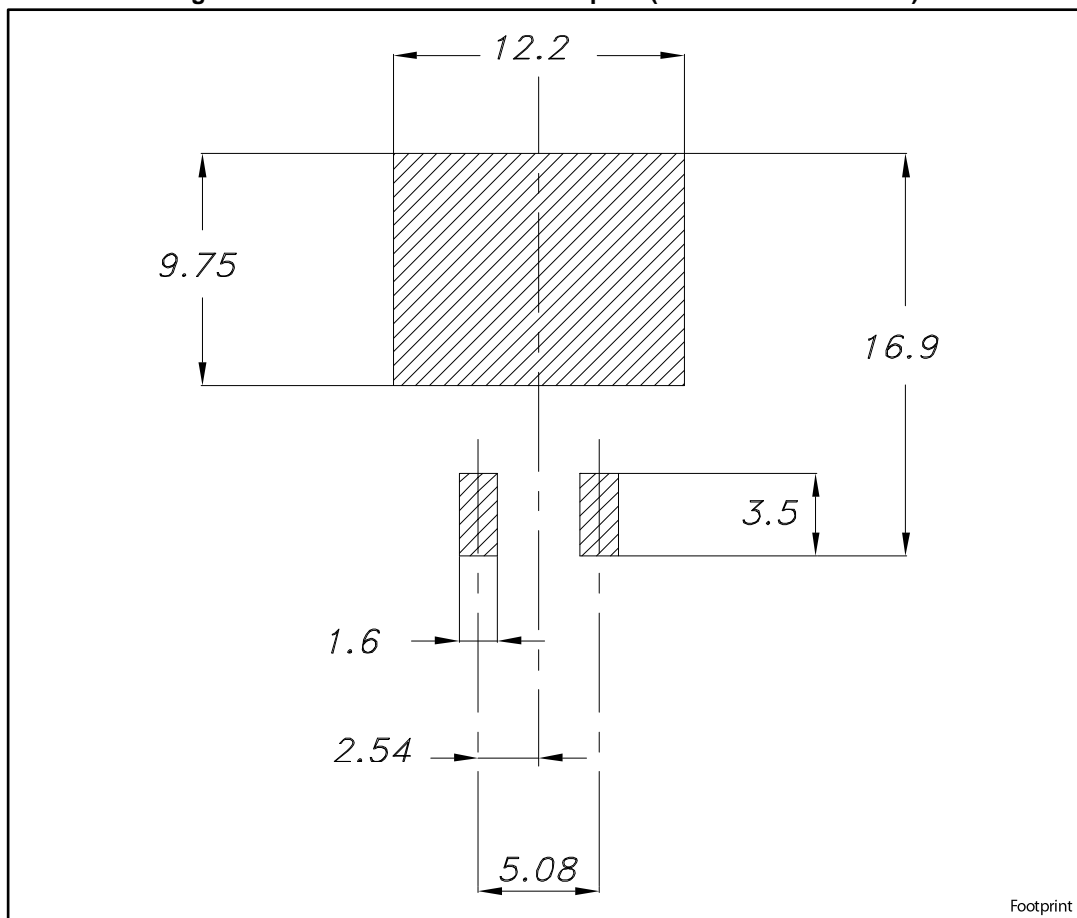


Table 6: D<sup>2</sup>PAK package mechanical data

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 14: D<sup>2</sup>PAK recommended footprint (dimensions are in mm)





## 2.2 TO-220AB package information

Figure 15: TO-220AB package outline

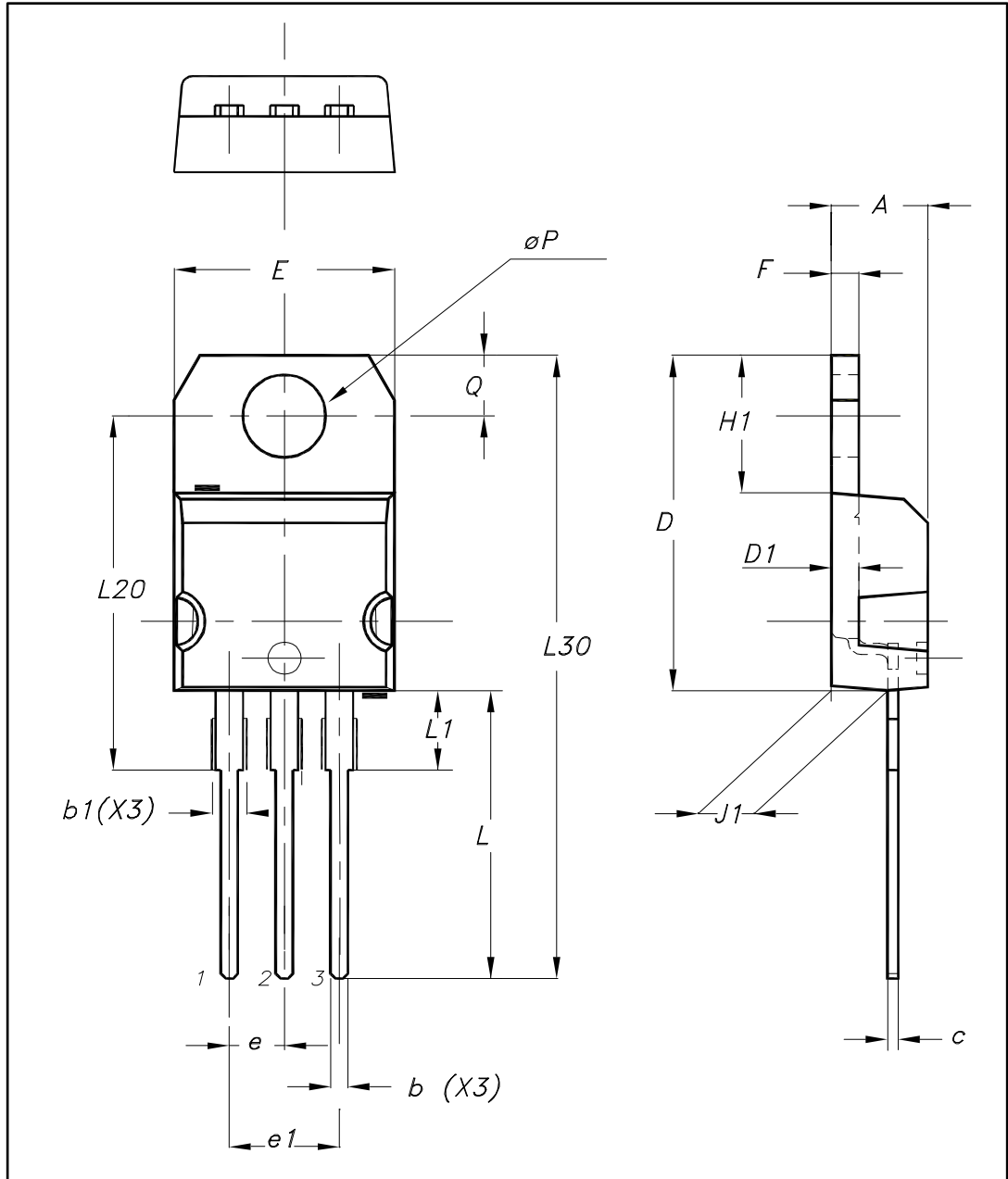


Table 7: TO-220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
b	0.61	0.88	0.240	0.035
b1	1.14	1.70	0.045	0.067
c	0.48	0.70	0.019	0.028
D	15.25	15.75	0.600	0.620
D1	1.27 typ.		0.050 typ.	
E	10.00	10.40	0.394	0.409
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
F	1.23	1.32	0.048	0.052
H1	6.20	6.60	0.244	0.260
J1	2.40	2.72	0.094	0.107
L	13.00	14.00	0.512	0.551
L1	3.50	3.93	0.138	0.155
L20	16.40 typ.		0.646 typ.	
L30	28.90 typ.		1.138 typ.	
θP	3.75	3.85	0.148	0.152
Q	2.65	2.95	0.104	0.116

### 3 Ordering information

Table 8: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH16L06CTY	STTH16L06CTY	TO-220AB	2.23 g	50	Tube
STTH16L06CGY-TR	STTH16L06CGY	D <sup>2</sup> PAK	1.48 g	1000	Tape and reel

### 4 Revision history

Table 9: Document revision history

Date	Revision	Changes
19-Nov-2014	1	Initial release.
12-Dec-2014	2	Removed TO-220FPAB and D <sup>2</sup> PAK package information.
20-Sep-2017	3	Added D <sup>2</sup> PAK package information.

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