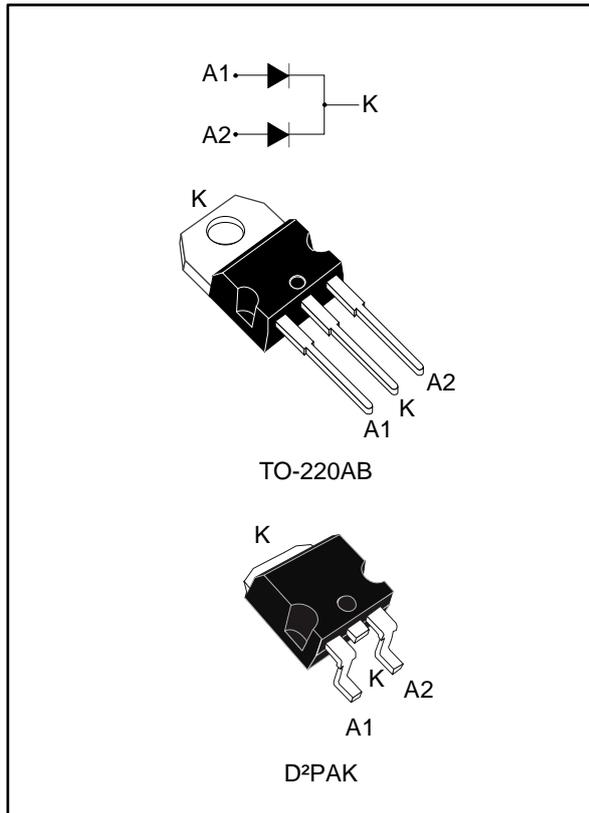


## Automotive Turbo 2 ultrafast high voltage rectifier

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 δ = 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, δ < 2%

(2)Pulse test: t<sub>p</sub> = 380 μs, δ < 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)

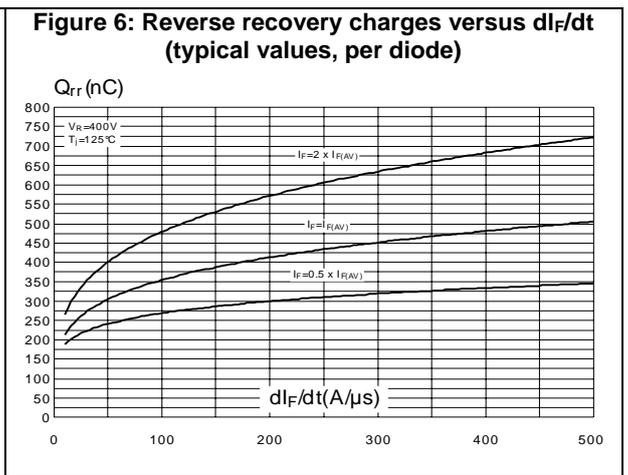
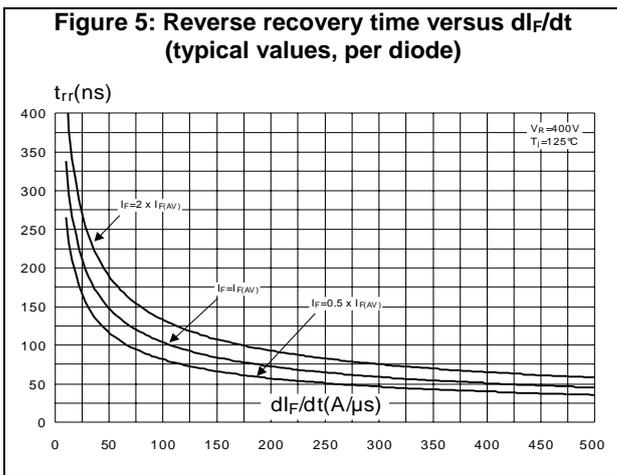
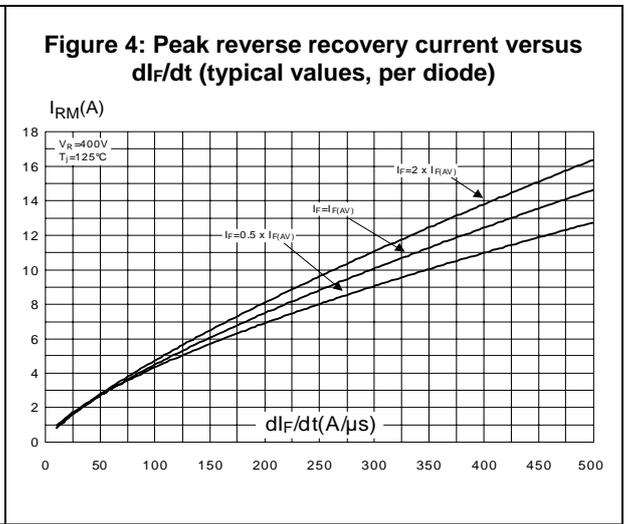
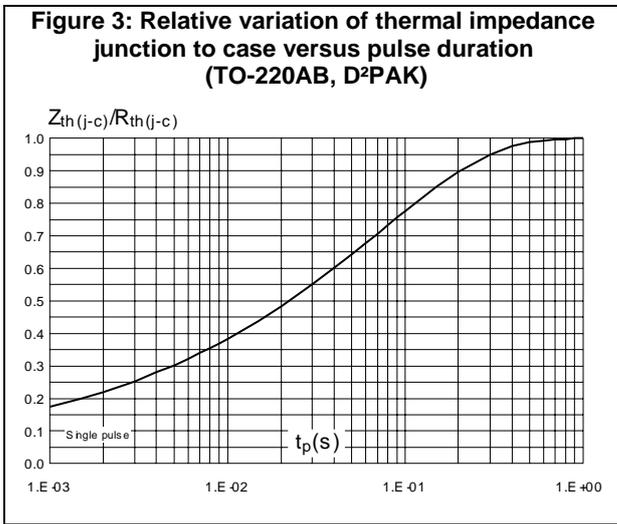
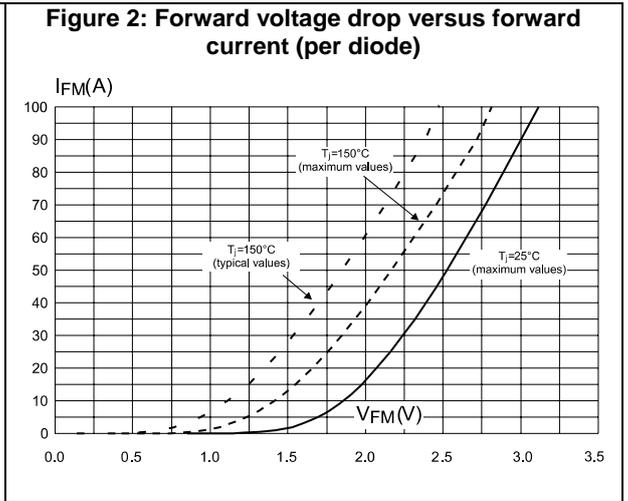
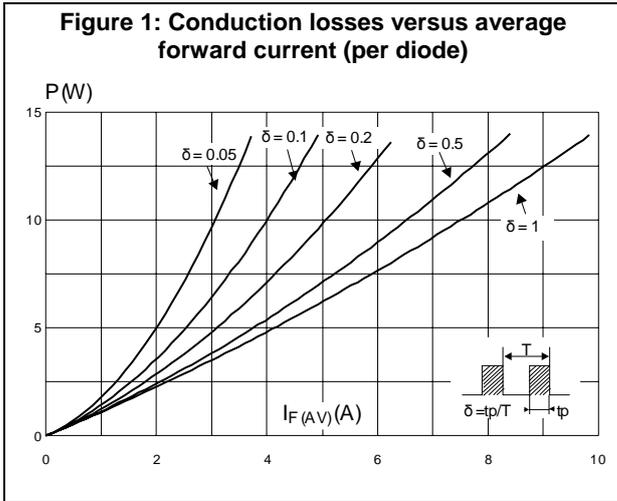


Figure 7: Relative variations of dynamic parameters versus junction temperature

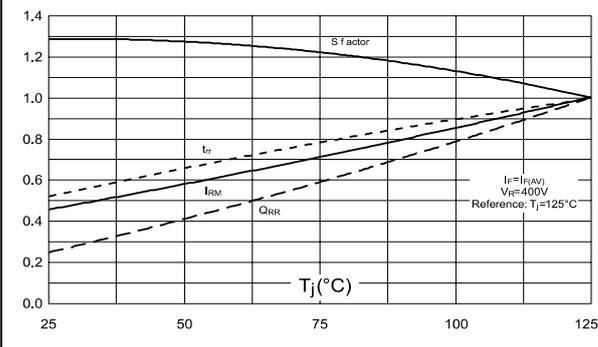


Figure 8: Reverse recovery softness factor versus  $dl_F/dt$  (typical values, per diode)

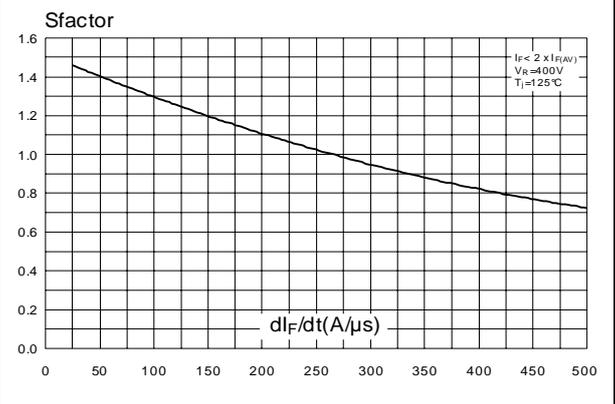


Figure 9: Forward recovery time versus  $dl_F/dt$  (typical values, per diode)

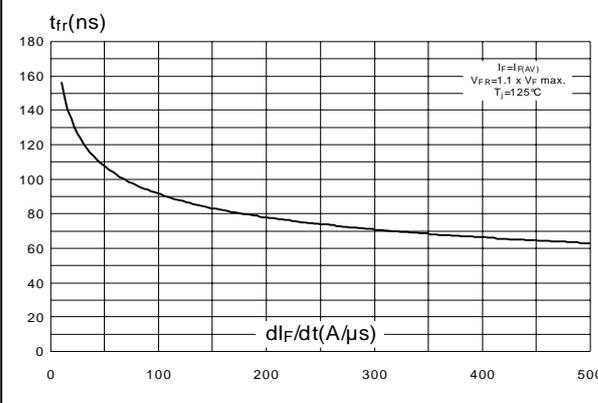


Figure 10: Transient peak forward voltage versus  $dl_F/dt$  (typical values, per diode)

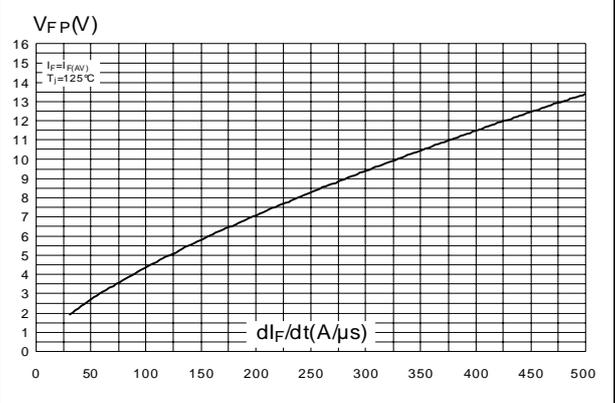


Figure 11: Junction capacitance versus reverse voltage applied (typical values, per diode)

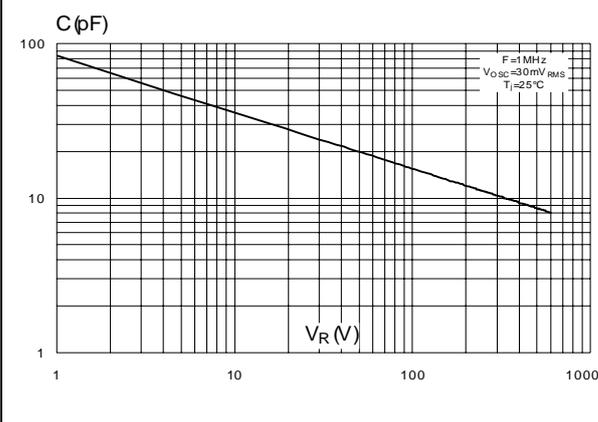
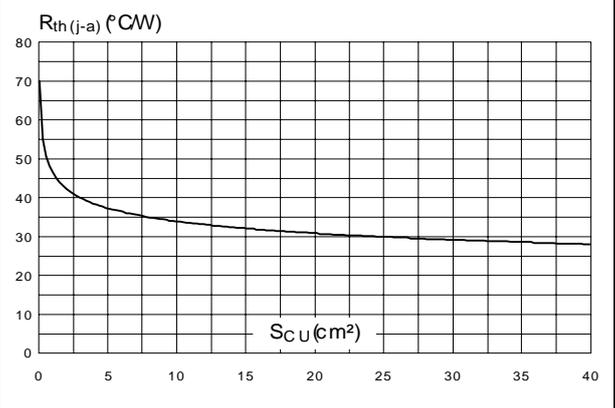


Figure 12: Thermal resistance, junction to ambient, versus copper surface under tab (epoxy FR4, copper thickness = 35  $\mu m$ )(D2PAK)



## 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

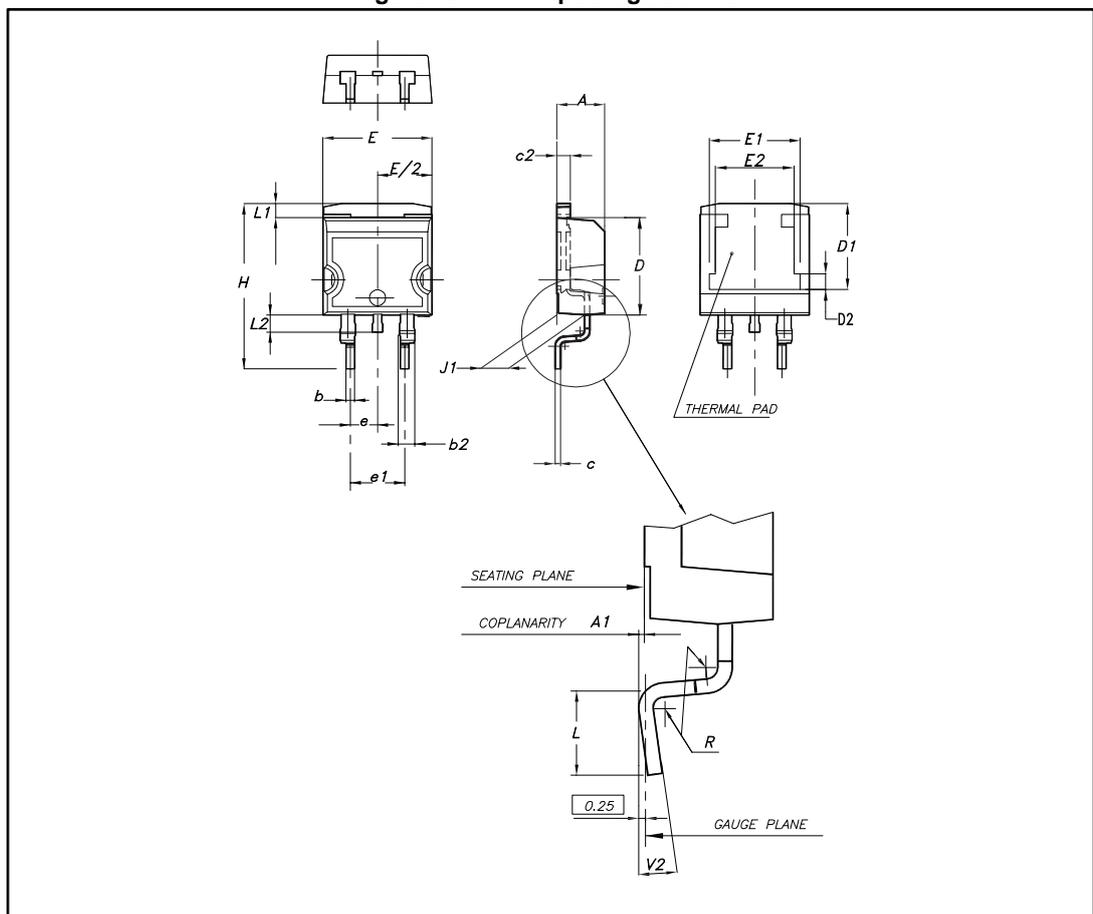
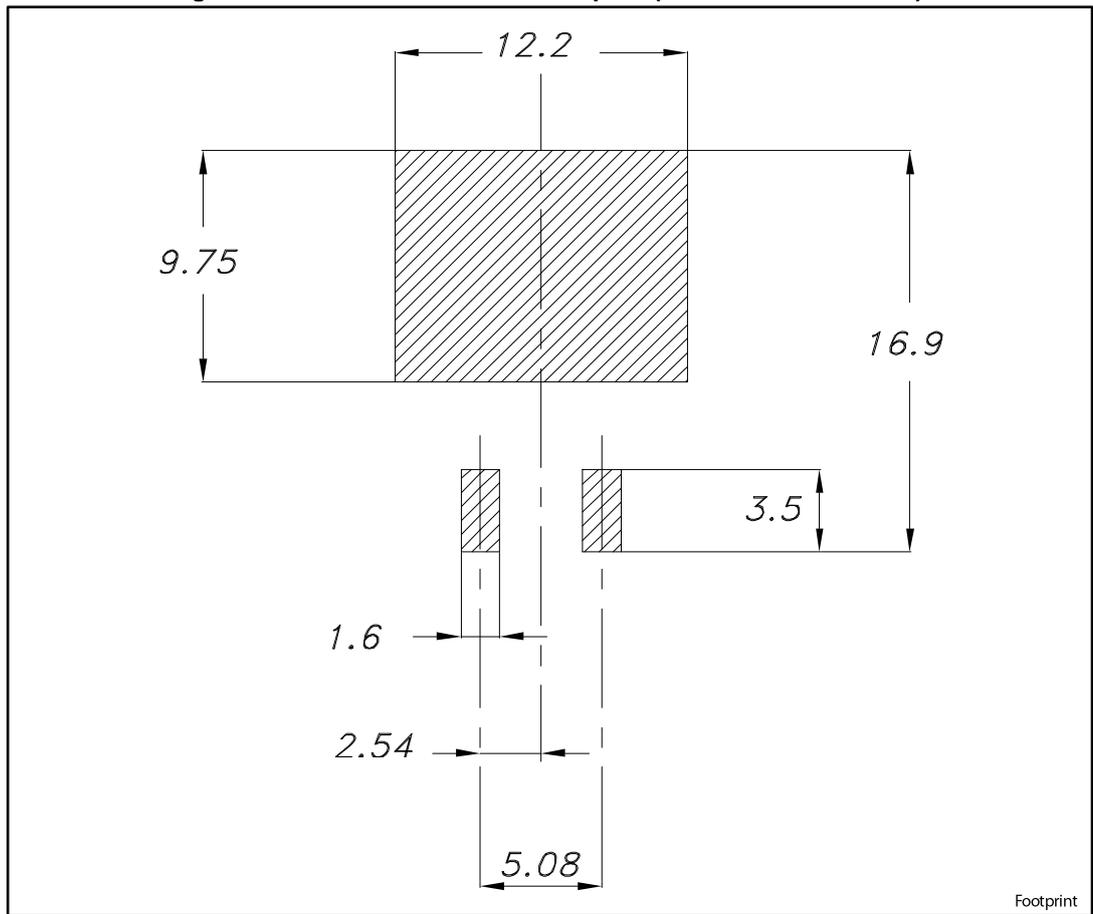


Table 6: D<sup>2</sup>PAK package mechanical data

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)



Footprint

## 2.2 TO-220AB package information

Figure 15: TO-220AB package outline

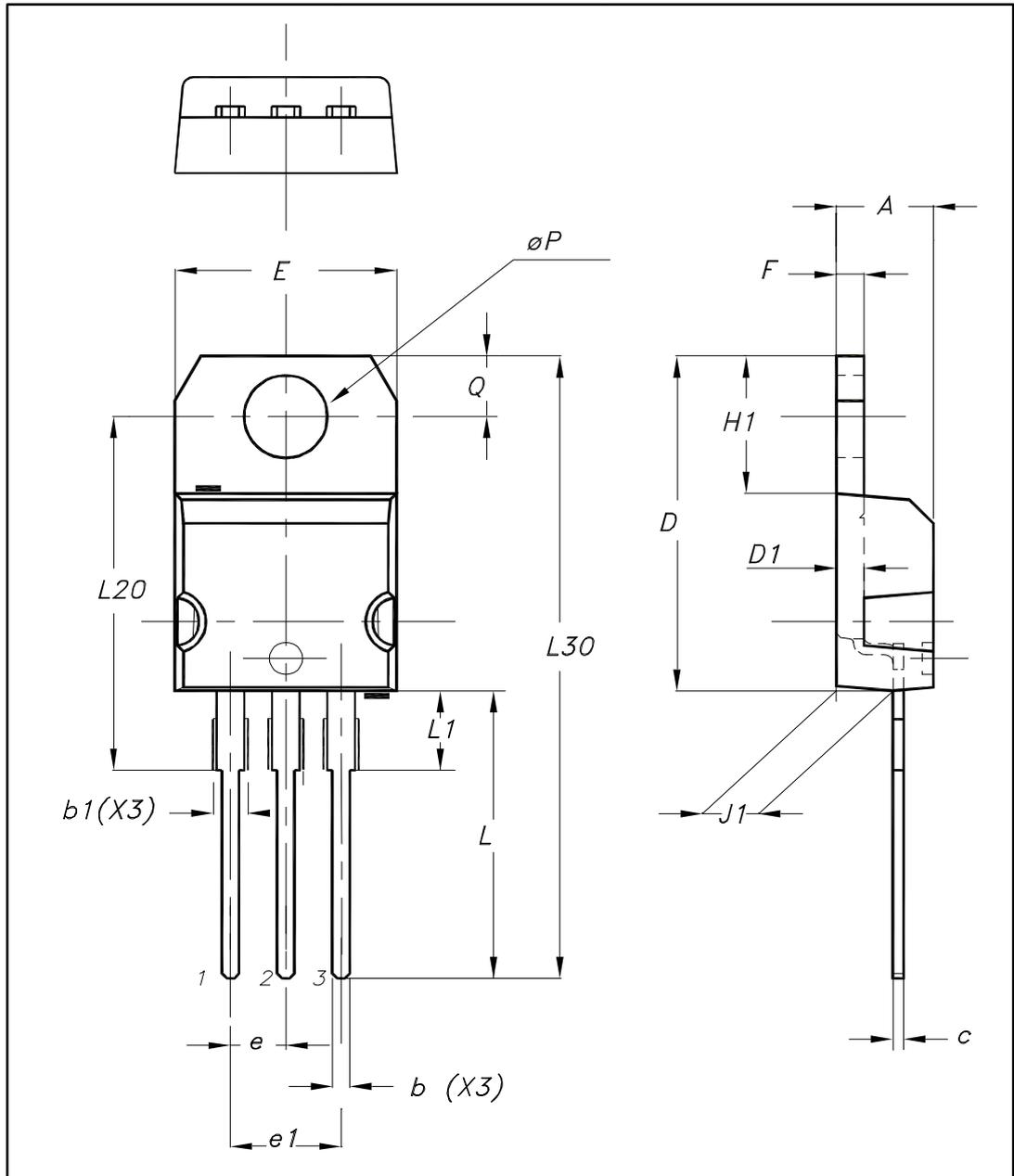


Table 7: TO-220AB package mechanical data

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.

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2017 STMicroelectronics – All rights reserved