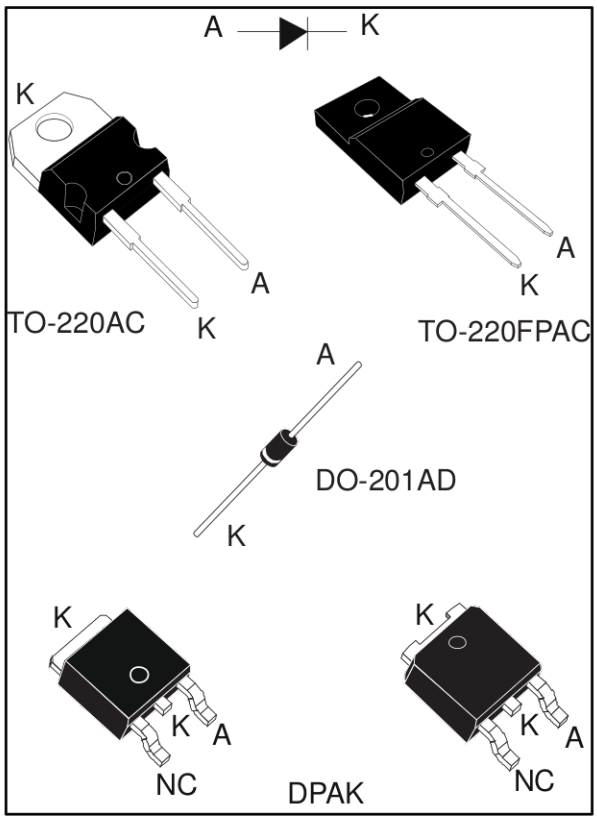
STTH5L06

Turbo 2 ultrafast high voltage rectifier

Datasheet - production data



Description

The device is developed using ST's Turbo 2 600 V technology. It is well-suited as a boost diode, especially for use in continuous mode power factor corrections and hard switching conditions.

This device is also intended for use as a free wheeling diode in power supplies and other power switching applications.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	5 A
V_{RRM}	600 V
I_R (max)	125 µA / 150 µA
T_j (max)	175 °C
V_F (typ)	0.85 V
t_{rr} (typ)	65 ns

Features

- Ultrafast switching
- Low reverse recovery current
- Reduces switching losses
- Low thermal resistance
- Insulated package: TO-220FPAC
  - Insulation voltage: 2000 V_{RMS} sine
- ECOPACK®2 compliant component for DPAK on demand

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		TO-220AC TO-220FPAC DO-201AD	20	A
			DPAK	10	
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	TO-220AC, DPAK	T_C = 150 °C	5	A
		DO-201AD	T_l = 50 °C		
		TO-220FPAC	T_C = 135 °C		
I_{FRM}	Repetitive peak forward current	t_P = 5 µs, F = 5 kHz square		65	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	TO-220AC TO-220FPAC	90	A
			DO-201AD	110	
			DPAK	60	
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Maximum operating junction temperature			175	°C

Table 3: Thermal parameter

Symbol	Parameter		Max. value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AC / DPAK	3.5	°C/W
		TO-220FPAC	6	
$R_{th(j-l)}$	Junction to lead	L = 10 mm, DO-201AD	20	°C/W
$R_{th(j-a)}$	Junction to ambient		75	

Table 4: Static electrical characteristics

Symbol	Parameter	Test conditions			Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	V_R = 600 V		-		5	µA
		T_j = 150 °C	V_R = 600 V	TO-220AC TO-220FPAC DPAK	-	10	125	
				DO-201AD	-	25	150	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 5 A		-		1.30	V
		T_j = 150 °C			-	0.85	1.05	

Notes:

(1)Pulse test: t_p = 5 ms, δ < 2%

(2)Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses, use the following equation:

$P = 0.89 \times I_{F(AV)} + 0.033 \times I_{F^2(RMS)}$

Table 5: Dynamic electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	T_j= 25 °C	I_F = 1 A V_R = 30 V dI_F/dt = -50 A/µs	-	65	95	ns
t_{fr}	Forward recovery time	T_j= 25 °C	I_F = 5 A V_{FR} = 1.1 x $V_F$max dI_F/dt = 100 A/µs	-		150	ns
V_{FP}	Forward recovery voltage		I_F = 5 A dI_F/dt = 100 A/µs	-		7	V

1.1 Characteristics (curves)

Figure 1: Conduction losses versus average current

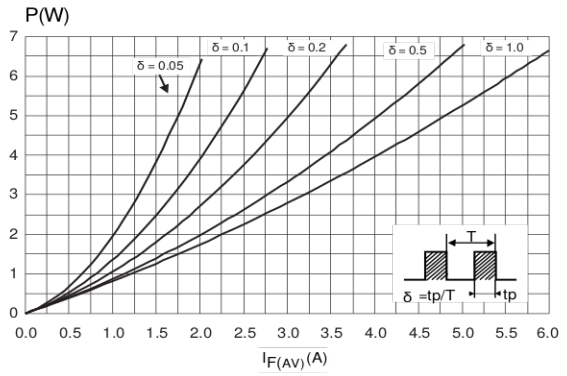


Figure 2: Forward voltage drop versus forward current

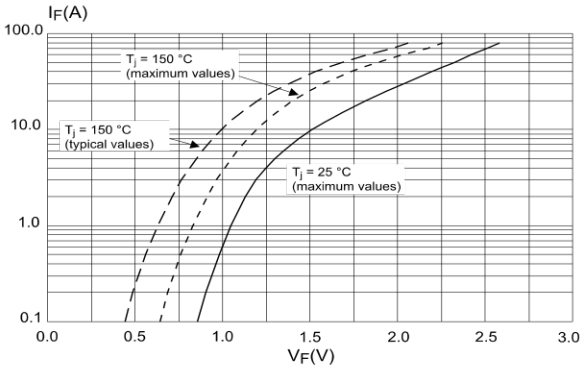


Figure 3: Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC, DPAK)

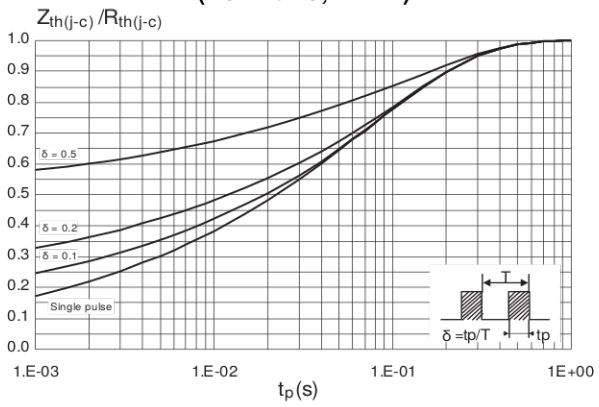


Figure 4: Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC)

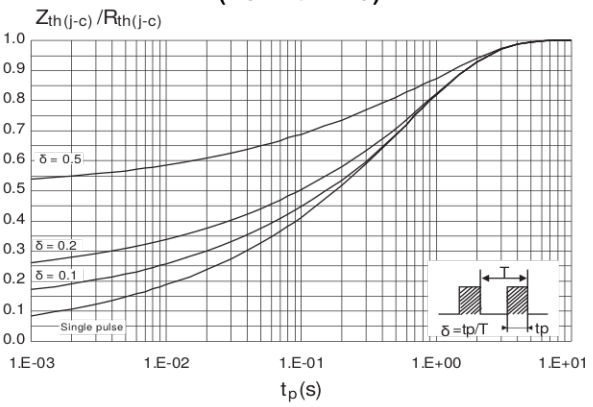


Figure 5: Relative variation of thermal impedance junction to ambient versus pulse duration (DO-201AD)

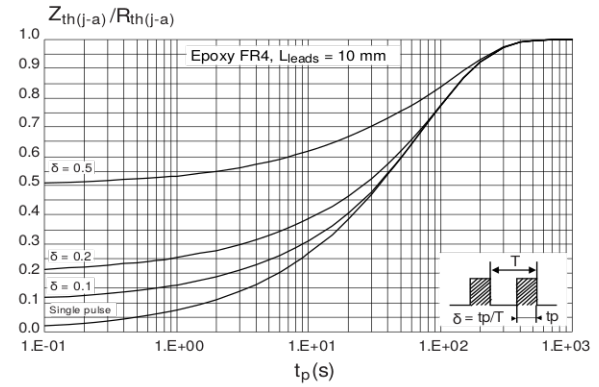


Figure 6: Peak reverse recovery current versus dI_F/dt (typical values)

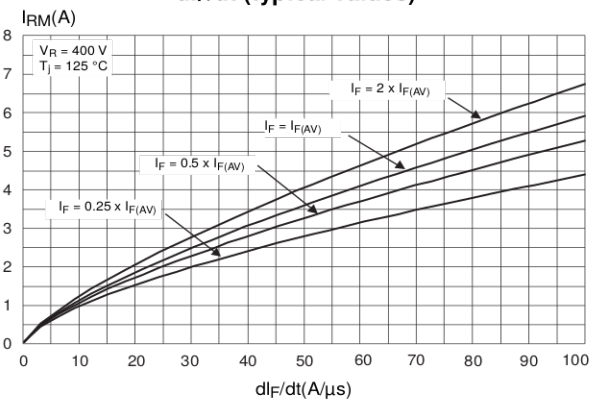


Figure 7: Reverse recovery time versus dI_F/dt (typical values)

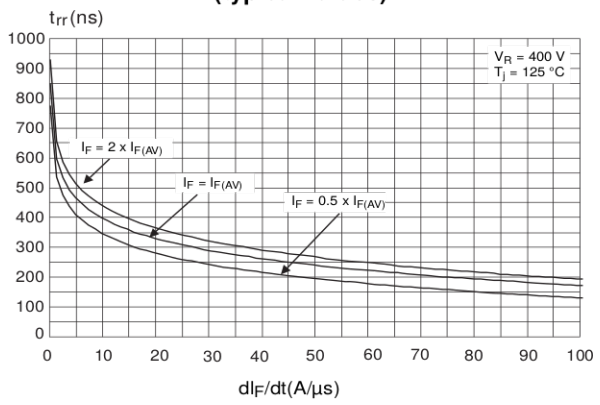


Figure 8: Reverse recovery charges versus dI_F/dt (typical values)

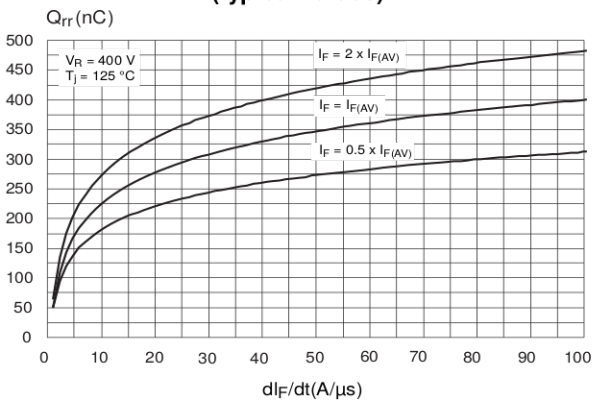


Figure 9: Softness factor versus dI_F/dt (typical values)

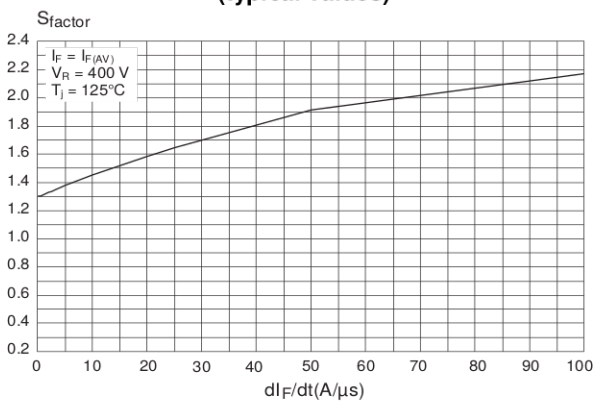


Figure 10: Relative variations of dynamic parameters versus junction temperature

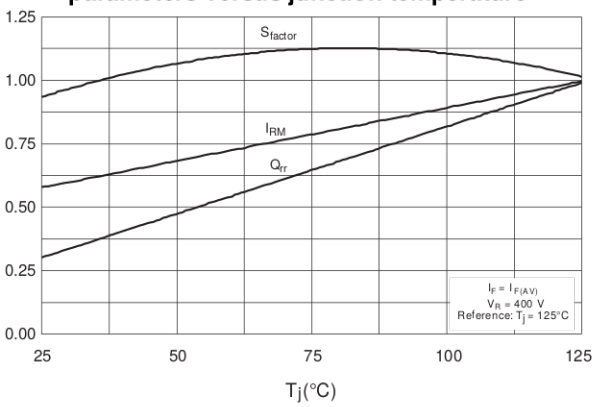


Figure 11: Transient peak forward voltage versus dIF/dt (typical values)

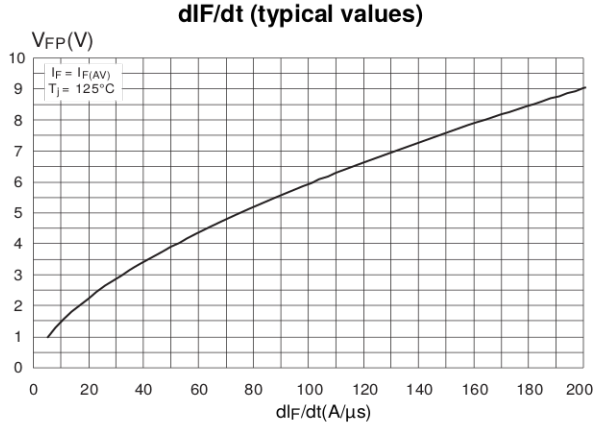


Figure 12: Forward recovery time versus dI_F/dt (typical values)

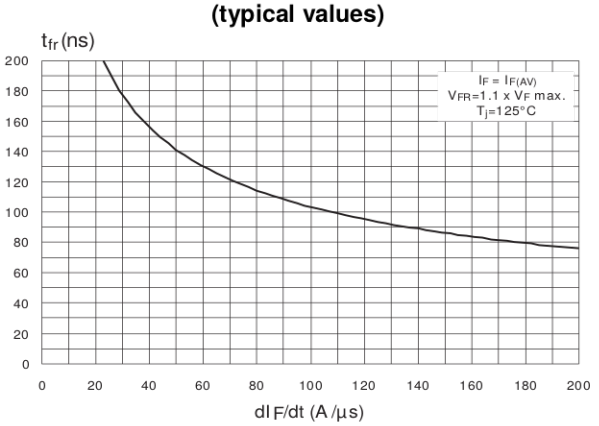


Figure 13: Junction capacitance versus reverse voltage applied (typical values)

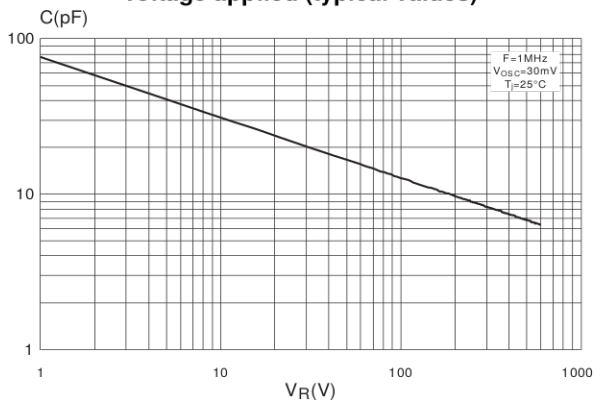


Figure 14: Thermal resistance junction to ambient versus copper surface under tab

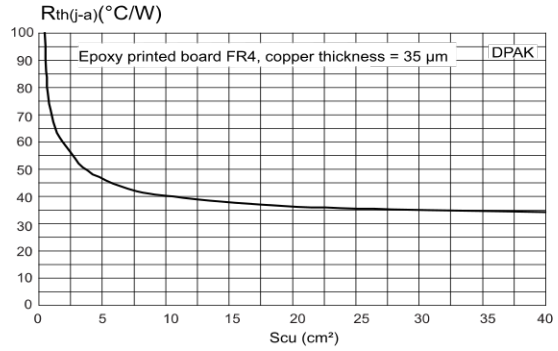
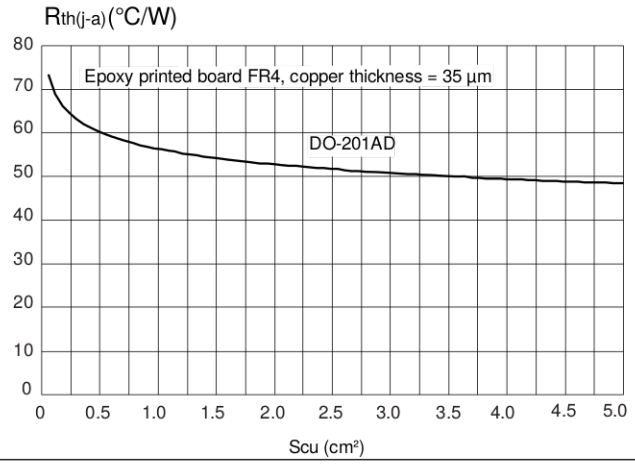


Figure 15: Thermal resistance junction to ambient versus copper surface under each lead



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: 0.55 N·m (for TO-220FPAC / TO-220AC)
- Maximum torque value: 0.7 N·m (for TO-220FPAC / TO-220AC)

2.1 TO-220AC package information

Figure 16: TO-220AC package outline

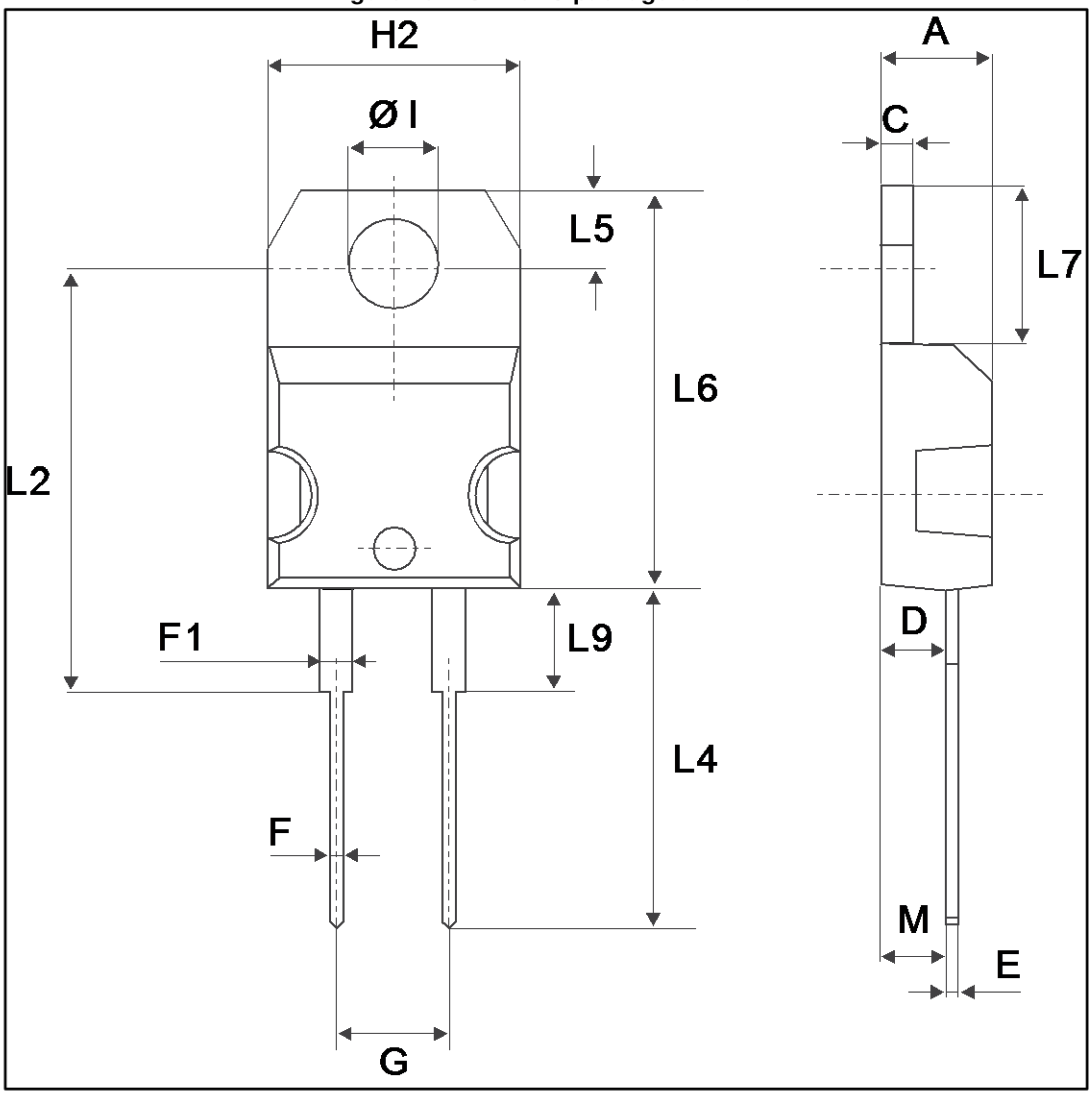


Table 6: TO-220AC package mechanical data

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

2.2 TO-220FPAC package information

Figure 17: TO-220FPAC package outline

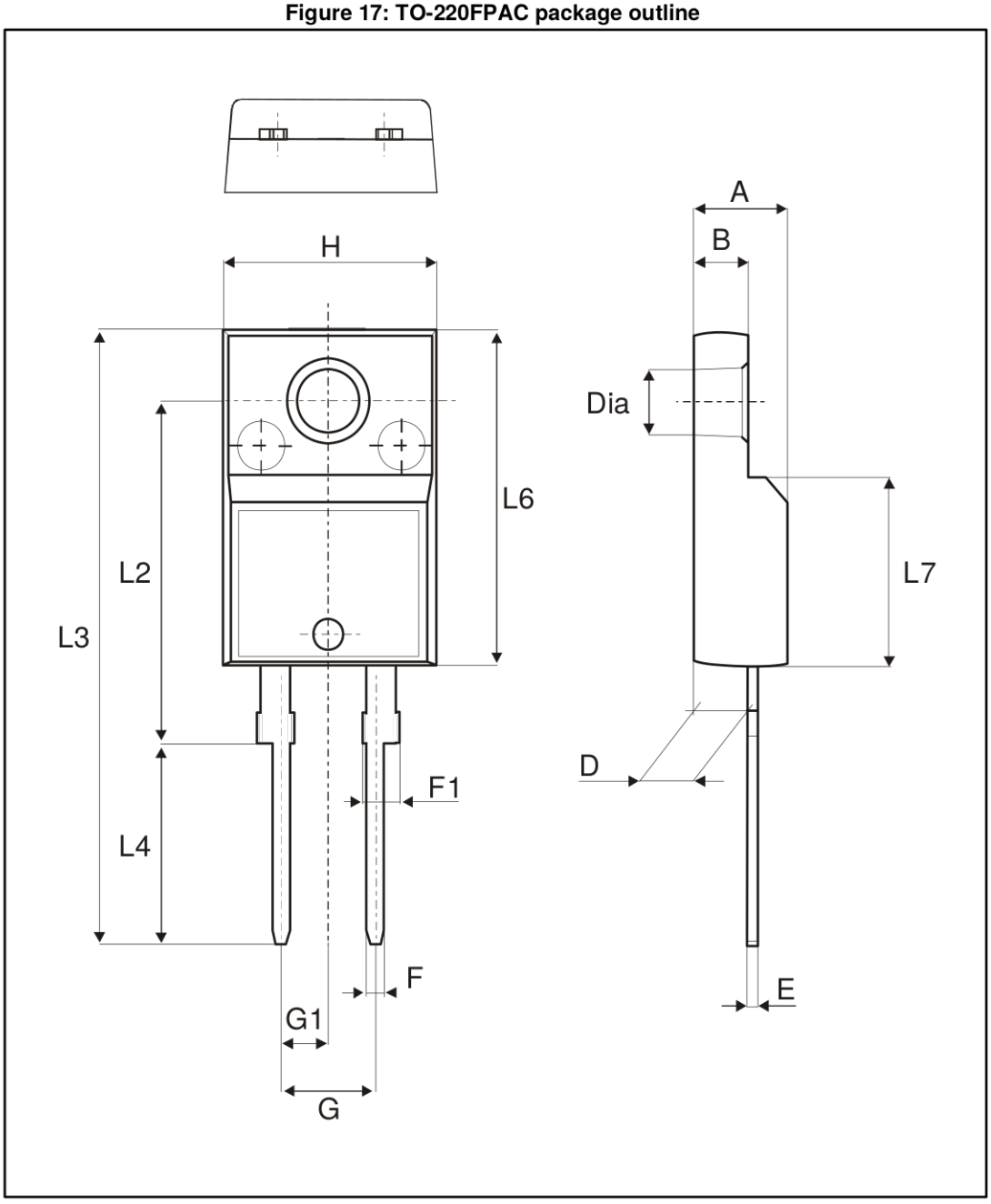


Table 7: TO-220FPAC package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
B	2.50	2.70	0.098	0.106
D	2.50	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1.00	0.030	0.039
F1	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.40	2.70	0.094	0.106
H	10.00	10.40	0.393	0.409
L2	16.00 typ.		0.630 typ.	
L3	28.60	30.60	0.126	1.205
L4	9.80	10.60	0.386	0.417
L6	15.90	16.40	0.626	0.646
L7	9.00	9.30	0.354	0.366
Dia.	3.00	3.20	0.118	0.126

2.3 DO-201AD package information

Figure 18: DO-201AD package outline

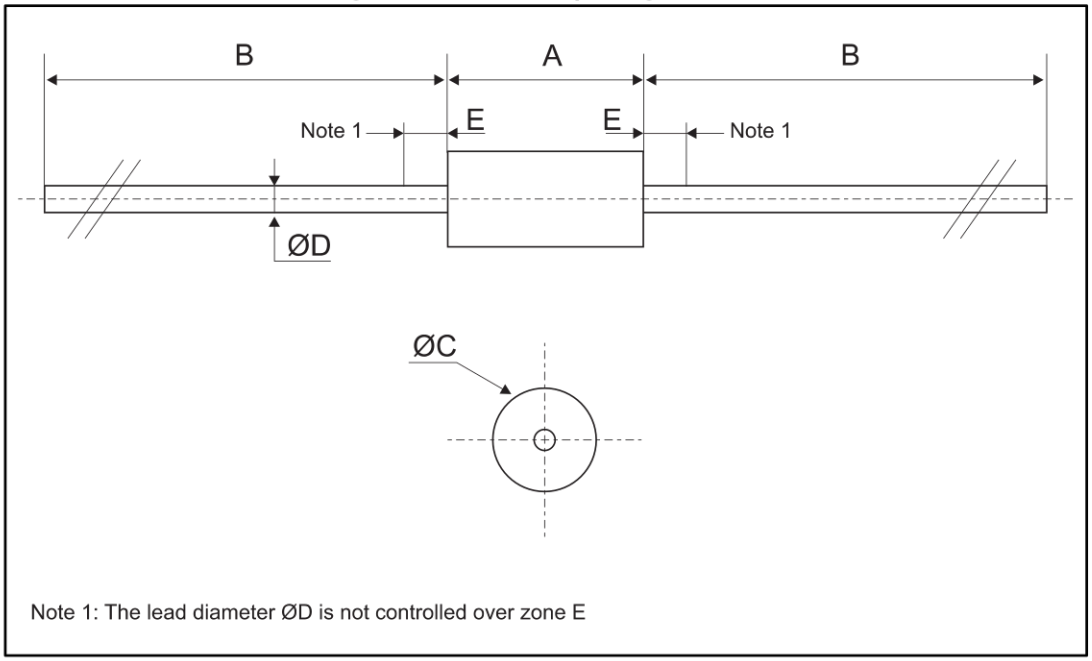
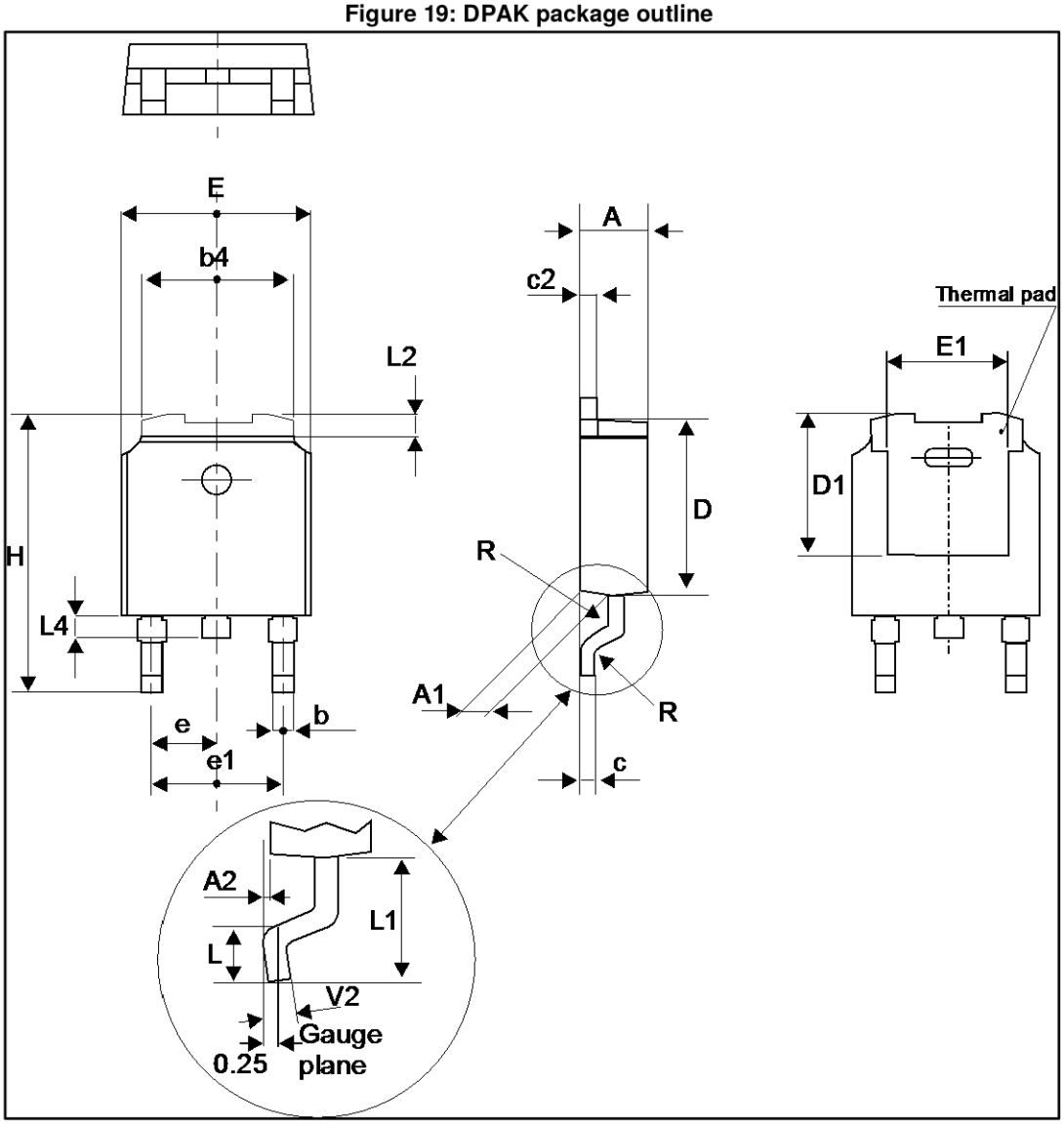


Table 8: DO-201AD package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A		9.50		0.374
B	25.40		1.000	
ØC		5.30		0.209
ØD		1.30		0.051
E		1.25		0.049

2.4 DPAK package information

Figure 19: DPAK package outline

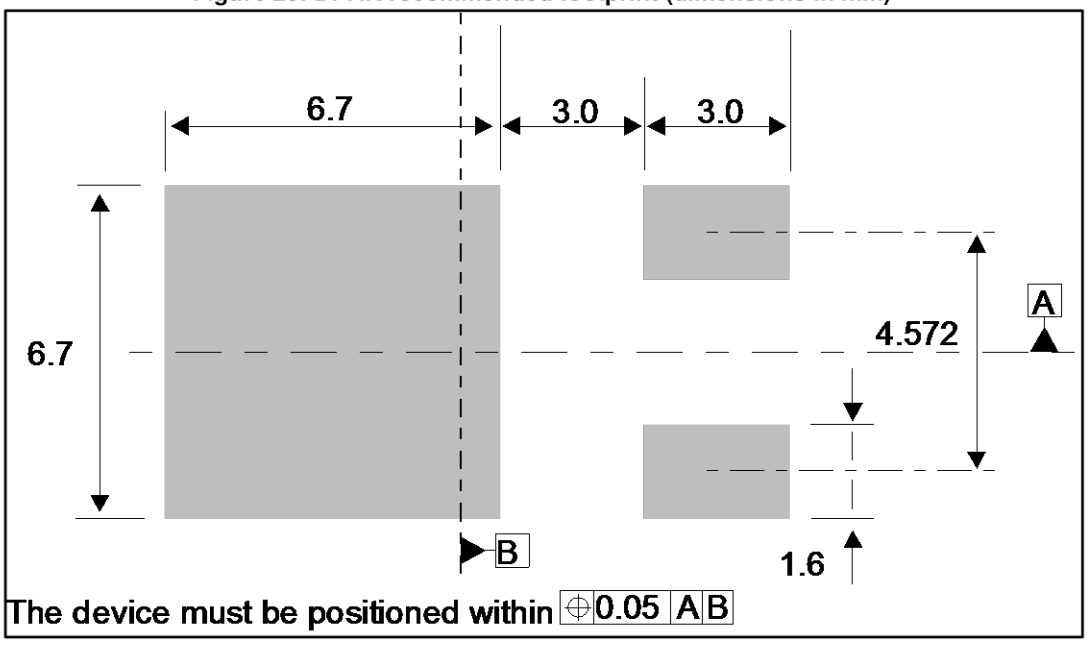


This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 9: DPAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.18	2.40	0.085	0.094
A1	0.90	1.10	0.035	0.043
A2	0.03	0.23	0.001	0.009
b	0.64	0.90	0.025	0.035
b4	4.95	5.46	0.194	0.215
c	0.46	0.61	0.018	0.024
c2	0.46	0.60	0.018	0.023
D	5.97	6.22	0.235	0.244
D1	4.95	5.60	0.194	0.220
E	6.35	6.73	0.250	0.265
E1	4.32	5.50	0.170	0.216
e	2.286 typ.		0.090 typ.	
e1	4.40	4.70	0.173	0.185
H	9.35	10.40	0.368	0.409
L	1.0	1.78	0.039	0.070
L2		1.27		0.050
L4	0.60	1.02	0.023	0.040
V2	-8°	+8°	-8°	+8°

Figure 20: DPAK recommended footprint (dimensions in mm)



3 Ordering information

Table 10: Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH5L06	STTH5L06	DO-201AD	1.12 g	600	Ammopack
STTH5L06RL	STTH5L06			1900	Tape and reel
STTH5L06D	STTH5L06D	TO-220AC	1.9 g	50	Tube
STTH5L06B-TR	STTH5 L06B	DPAK	0.32 g	2500	Tape and reel
STTH5L06FP	STTH5L06FP	TO-220FPAC	1.9 g	50	Tube

4 Revision history

Table 11: Document revision history

Date	Revision	Changes
16-Nov-2001	1	First issue.
31-Mar-2007	2	Merged with TO-220AC, TO-220FPAC and DPAK version.
26-Nov-2014	3	Updated DPAK and reformatted to current standard.
05-Dec-2014	4	Updated Features.
17-May-2017	5	Updated DPAK package information and reformatted to current standard.

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