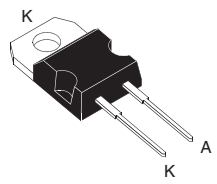
STTH5L06

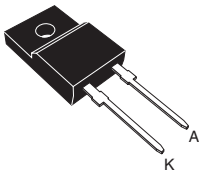
Turbo 2 ultrafast high voltage rectifier

Main product characteristics

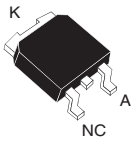
$I_{F(AV)}$	5 A
V_{RRM}	600 V
I_R (max)	125 µA / 150 µA
T_j (max)	175 °C
V_F (max)	1.05 V
t_{rr} (max)	95 ns



TO-220AC
STTH5L06D



TO-220FPAC
STTH5L06FP



DPAK
STTH5L06B

DO-201AD
STTH5L06

Features and benefits

- Ultrafast switching
- Low reverse recovery current
- Reduces switching & conduction losses
- Low thermal resistance

Description

The STTH5L06, which uses ST Turbo 2 600V technology, is specially suited as boost diode in discontinuous or critical mode power factor corrections.

This device, available in TO-220AC, TO-220FPAC DPAK and DO-201AD, is also intended for use as a free wheeling diode in power supplies and other power switching applications

Order codes

Part number	Marking
STTH5L06	STTH5L06
STTH5L06RL	STTH5L06
STTH5L06D	STTH5L06D
STTH5L06B	STTH5L06B
STTH5L06B-TR	STTH5L06B
STTH5L06FP	STTH5L06FP

1 Characteristics

Table 1. Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			600	V
$I_{F(RMS)}$	RMS forward current		TO-220AC, TO-220FPAC, DO-201AD	20	A
			DPAK	10	
$I_{F(AV)}$	Average forward current	TO-220AC, DPAK	T_c = 150 °C δ = 0.5	5	A
		DO-210AD	T_l = 50° C δ = 0.5		
		TO-220FPAC	T_c = 135 °C δ = 0.5		
I_{FRM}	Repetitive peak forward current		t_p = 5 µs, F = 5 kHz square	65	A
I_{FSM}	Surge non repetitive forward current	tp = 10 ms Sinusoidal	TO-220AC, TO-220FPAC	90	A
			DO-201AD	110	
			DPAK	60	
T_{stg}	Storage temperature range			- 65 + 175	°C
T_j	Maximum operating junction temperature			+ 175	°C

Table 2. Thermal parameters

Symbol	Parameter			Maximum	Unit
$R_{th(j-c)}$	Junction to case		TO-220AC, DPAK	3.5	°C/W
			TO-220FPAC	6.0	
$R_{th(j-l)}$	Junction to lead	L = 10 mm	DO-201AD	20	
$R_{th(j-a)}$	Junction to ambient (1)			75	

1. With recommended pad layout (see *Figure 15*)

Table 3. Static electrical characteristics

Symbol	Parameter	Tests conditions			Min.	Typ.	Max.	Unit
I_R	Reverse leakage current	V_R = 600 V	T_j = 25°C				5	µA
			T_j = 150°C	TO-220AC, DPAK, TO-220FPAC		10	125	
				DO-201AD		25	150	
V_F	Forward voltage drop	I_F = 5 A		T_j = 25°C			1.3	V
				T_j = 150°C		0.85	1.05	

To evaluate the maximum conduction losses use the following equation:

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

Table 4. Dynamic electrical characteristics

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

Figure 1. Conduction losses versus average current

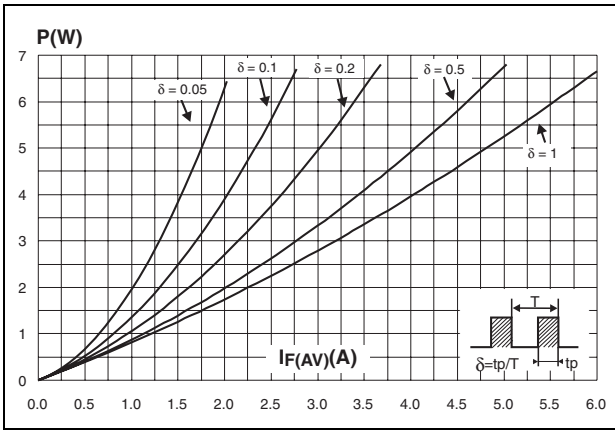


Figure 2. Forward voltage drop versus forward current

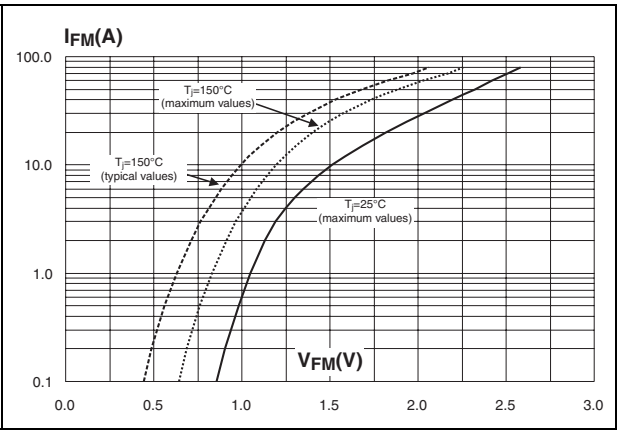


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC, DPAK)

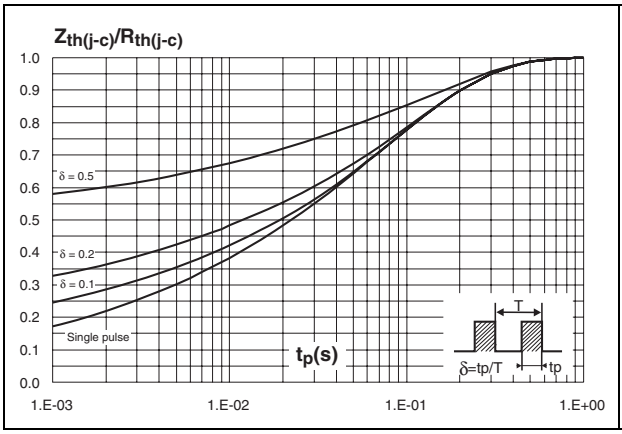


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC)

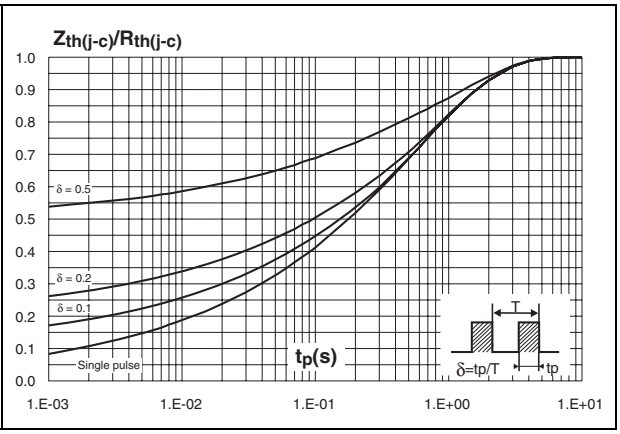


Figure 5. Relative variation of thermal impedance junction ambient versus pulse duration (Epoxy FR4, L_{leads} = 10 mm) (DO-201AD)

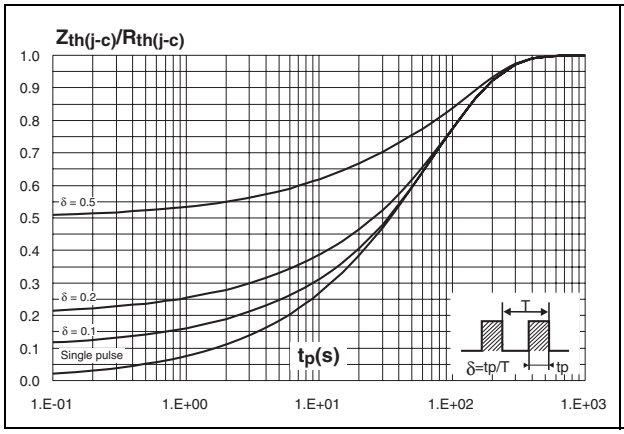


Figure 6. Peak reverse recovery current versus dI_F/dt (90% confidence)

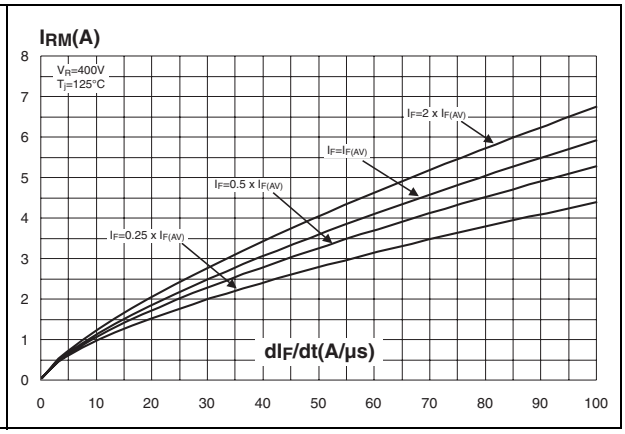


Figure 7. Reverse recovery time versus dI_F/dt (90% confidence)

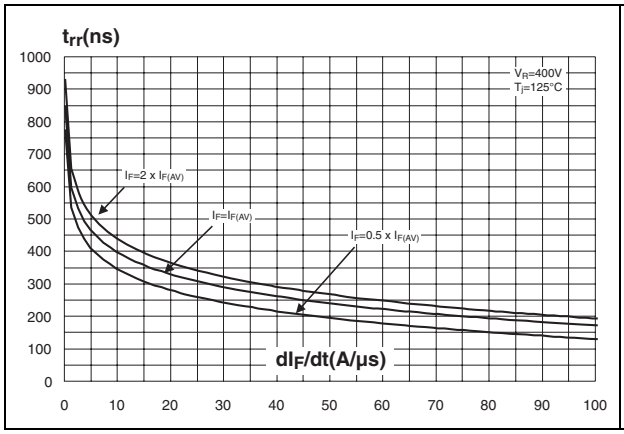


Figure 8. Reverse recovery charges versus dI_F/dt (90% confidence)

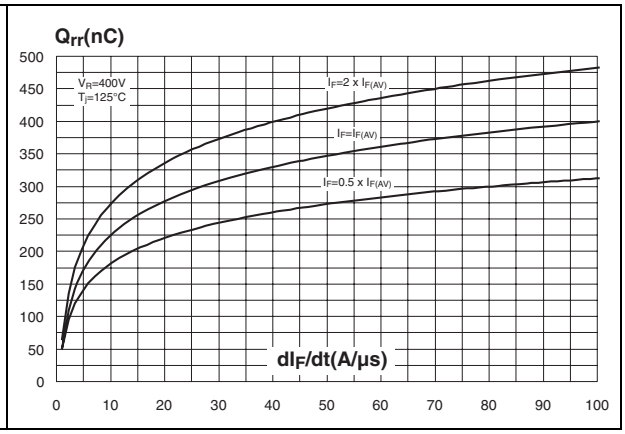


Figure 9. Softness factor versus dI_F/dt (typical values)

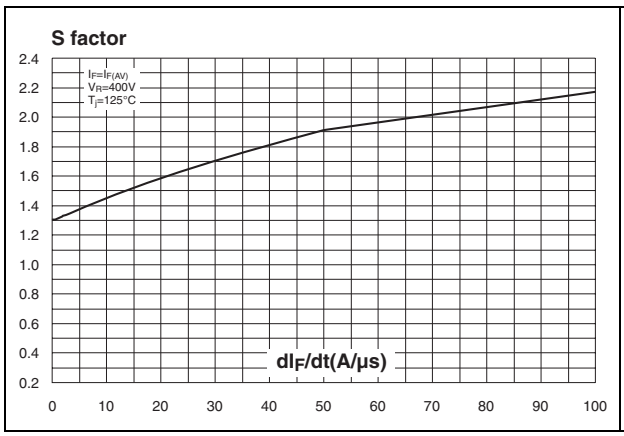


Figure 10. Relative variations of dynamic parameters versus junction temperature

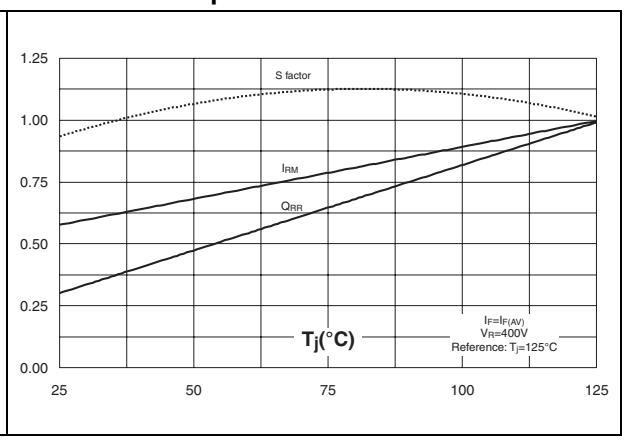


Figure 11. Transient peak forward voltage versus dI_F/dt (90% confidence)

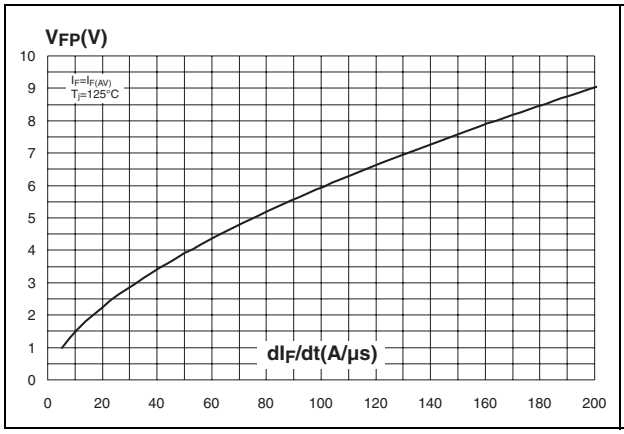


Figure 12. Forward recovery time versus dI_F/dt (90% confidence)

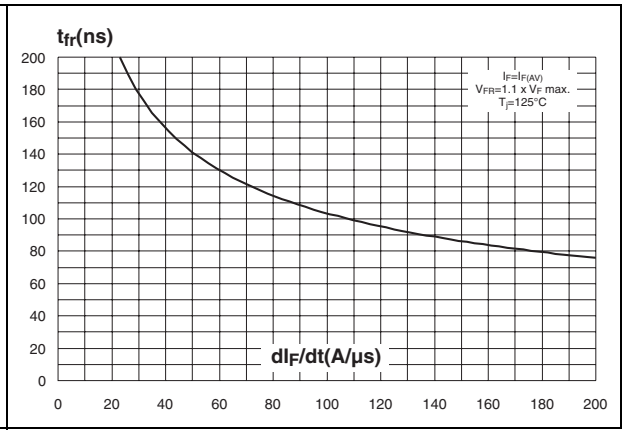


Figure 13. Junction capacitance versus reverse voltage applied (typical values)

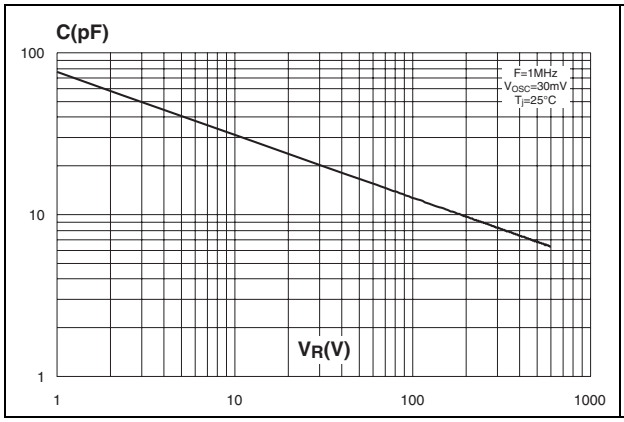


Figure 14. Thermal resistance junction to ambient versus copper surface under tab (epoxy FR4, eCU = 35 µm) (DPAK)

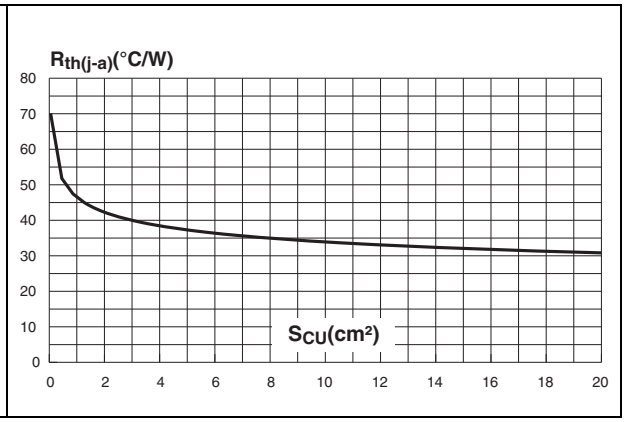
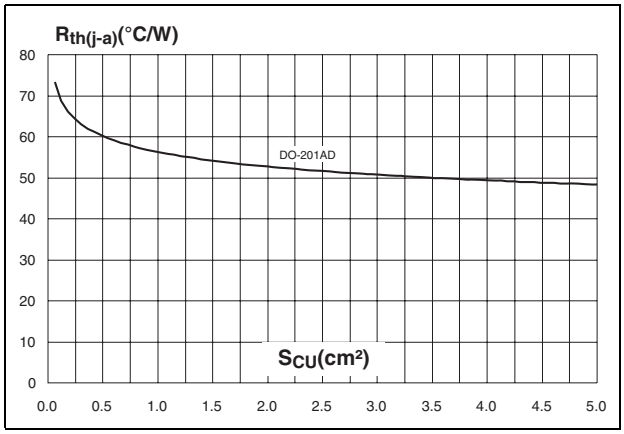


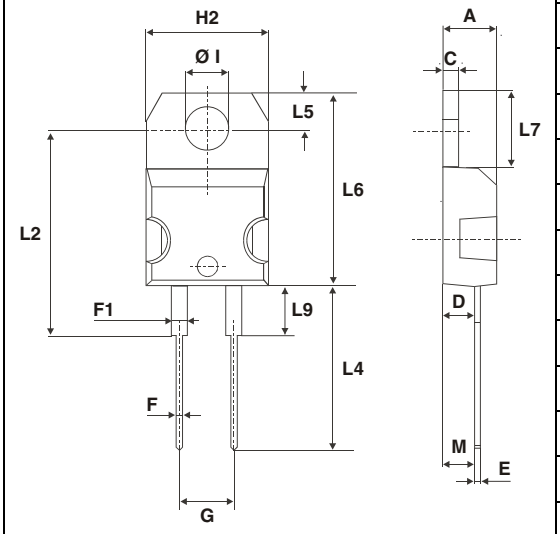
Figure 15. Thermal resistance junction to ambient versus copper surface under each lead (epoxy printed circuit board FR4, copper thickness: 35µm) (DO-201AD)



2 Package information

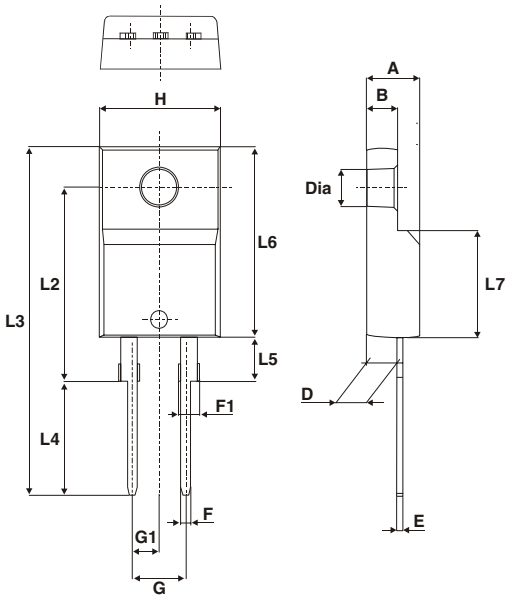
- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 Nm (TO-220FPAC) / 0.55 Nm (TO-220AC)
- Maximum torque value: 1.0 Nm (TO-220FPAC) / 0.70 Nm (TO-220AC)

Table 5. TO-220AC dimensions



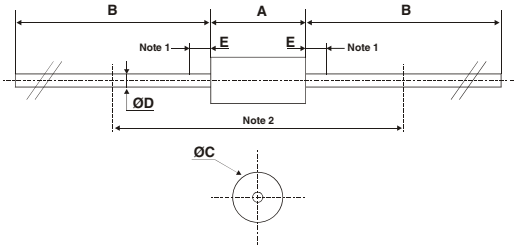
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
H2	10.00	10.40	0.393	0.409
L2	16.40 typ.		0.645 typ.	
L4	13.00	14.00	0.511	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.	
Diam. I	3.75	3.85	0.147	0.151

Table 6. TO-220FPAC dimensions



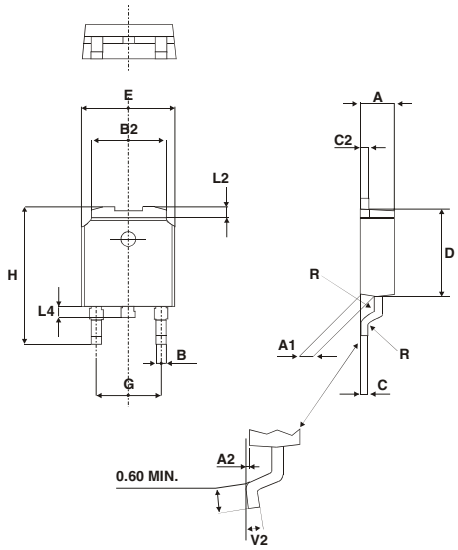
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	2.5	2.7	0.098	0.106
D	2.5	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1	0.030	0.039
F1	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.4	2.7	0.094	0.106
H	10	10.4	0.393	0.409
L2	16 Typ.		0.63 Typ.	
L3	28.6	30.6	1.126	1.205
L4	9.8	10.6	0.386	0.417
L5	2.9	3.6	0.114	0.142
L6	15.9	16.4	0.626	0.646
L7	9.00	9.30	0.354	0.366
Dia.	3.00	3.20	0.118	0.126

Table 7. DO-201AD dimensions



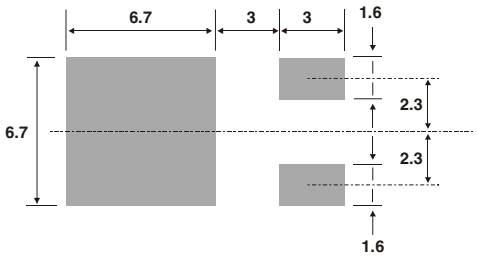
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A		9.50		0.374
B	25.40		1.000	
C		5.30		0.209
D		1.30		0.051
E		1.25		0.049
Notes	1 - The lead diameter ø D is not controlled over zone E 2 - The minimum length which must stay straight between the right angles after bending is 0.59"(15mm)			

Table 8. DPAK dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.20	2.40	0.086	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
B2	5.20	5.40	0.204	0.212
C	0.45	0.60	0.017	0.023
C2	0.48	0.60	0.018	0.023
D	6.00	6.20	0.236	0.244
E	6.40	6.60	0.251	0.259
G	4.40	4.60	0.173	0.181
H	9.35	10.10	0.368	0.397
L2	0.80 typ.		0.031 typ.	
L4	0.60	1.00	0.023	0.039
V2	0°	8°	0°	8°

Figure 16. DPAK footprint (dimensions in mm)



In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

3 Ordering information

Ordering code	Marking	Package	Weight	Base qty	Delivery mode
STTH5L06	STTH5L06	DO-201AD	1.16 G	600	Ammopack
STTH5L06RL	STTH5L06			1900	Tape & reel
STTH5L06D	STTH5L06D	TO-220AC	1.9 g	50	Tube
STTH5L06B	STTH5L06B	DPAK	0.3 g	75	Tube
STTH5L06B-TR	STTH5L06B			2500	Tape & reel
STTH5L06FP	STTH5L06FP	TO-220FPAC	1.7 g	50	Tube

4 Revision history

Date	Revision	Changes
Nov-2001	1A	Last release.
31-Mar-2007	2	Merge with TO-220AC, TO-220FPAC and DPAK version.