STPS30L60C

Power Schottky rectifier

Datasheet – production data

Features

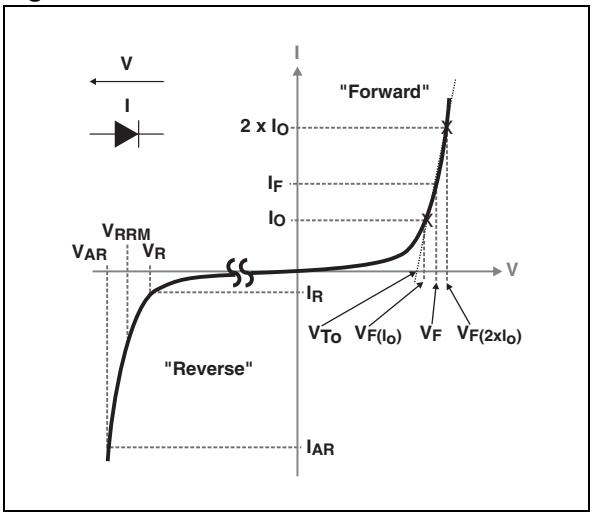
- Low forward voltage drop
- Negligible switching losses
- Low thermal resistance
- Avalanche capability specified

Description

These dual center tap Schottky rectifiers are suited for switched mode power supplies and high frequency DC to DC converters.

Packaged in TO-220FPAB, TO-220AB narrow leads, TO-220AB, D^2PAK, I^2PAK and TO-247, this device is intended for use in high frequency inverters.

Figure 1. Electrical characteristics (a)



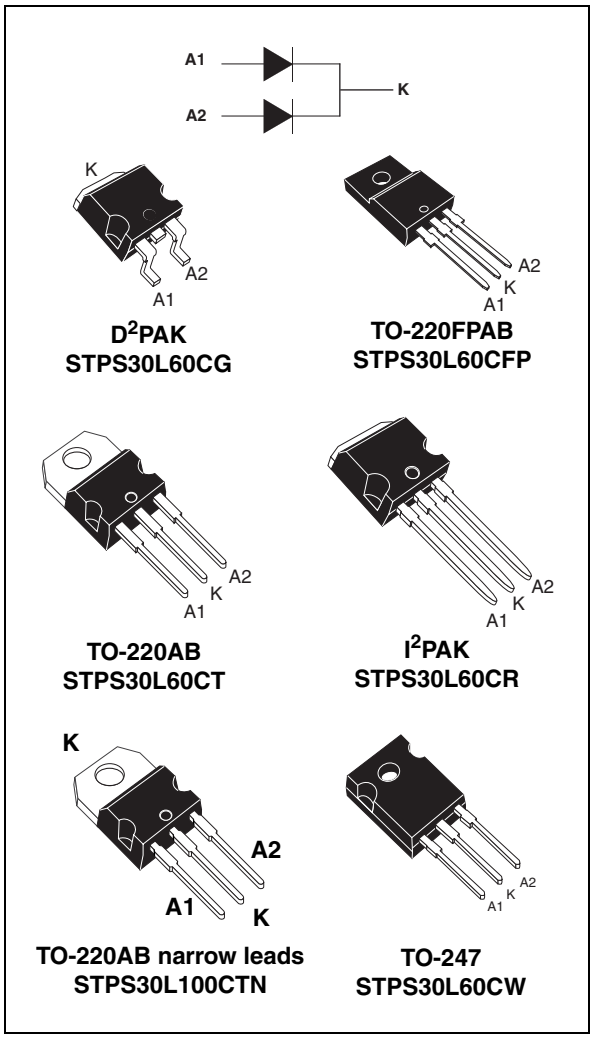


Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 15 A
V_{RRM}	60 V
$T_{j\ (max)}$	150 °C
$V_{F\ (max)}$	0.56 V

a. V_{ARM} and I_{ARM} must respect the reverse safe operating area defined in *Figure 12* V_{AR} and I_{AR} are pulse measurements (t_p < 1 µs). V_R, I_R, V_{RRM} and V_F, are static characteristics

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1 Characteristics

Table 2. Absolute ratings (limiting values, per diode)

Symbol	Parameter				Value	Unit
V_{RRM}	Repetitive peak reverse voltage				60	V
$I_{F(RMS)}$	Forward rms current				30	A
$I_{F(AV)}$	Average forward current	TO-220AB narrow leads, TO-220AB, I^2PAK, D^2PAK, TO-247, $\delta = 0.5$	T_c = 130 °C	Per diode Per device	15 30	A
		TO-220FPAB, $\delta = 0.5$	T_c = 110 °C	Per diode Per device	15 30	
I_{FSM}	Surge non repetitive forward current		t_p = 10 ms, sinusoidal		230	A
I_{RRM}	Repetitive peak reverse current		t_p = 2 µs square, F = 1 kHz		2	A
P_{ARM} (1)	Repetitive peak avalanche power		t_p = 1 µs, T_j = 25 °C		7800	W
V_{ARM} (2)	Maximum repetitive peak avalanche voltage		t_p < 1 µs, T_j < 150 °C, I_{AR} < 29 A		80	V
V_{ASM} (2)	Maximum single pulse peak avalanche voltage		t_p < 1 µs, T_j < 150 °C, I_{AR} < 29 A		80	V
T_{stg}	Storage temperature range				-65 to + 175	°C
T_j	Maximum operating junction temperature(3)				150	°C
dV/dt	Critical rate of rise reverse voltage				10000	V/µs

1. For temperature or pulse time duration deratings, refer to *Figure 4* and *Figure 5*. More details regarding the avalanche energy measurements and diode validation in the avalanche are provided in the application notes AN1768 and AN2025.
2. Refer to *Figure 12*.
3. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistances

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AB narrow leads, TO-220AB, I^2PAK, D^2PAK, TO-247	Per diode	1.5	°C/W
			Total	0.8	
		TO-220FPAB	Per diode	4.7	
			Total	3.95	
$R_{th(c)}$	Coupling	TO-220AB narrow leads, TO-220AB, I^2PAK, D^2PAK, TO-247		0.1	
		TO-220FPAB		3.2	

When the diodes 1 and 2 are used simultaneously:
ΔT_j(diode 1) = P(diode1) x $R_{th(j-c)}$(Per diode) + P(diode2) x $R_{th(c)}$

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Tests conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$			480	µA
		T_j = 125 °C			77	130	mA
V_F (1)	Forward voltage drop	T_j = 25 °C	I_F = 15 A			0.6	V
		T_j = 125 °C	I_F = 15 A		0.5	0.56	
		T_j = 25 °C	I_F = 30 A			0.75	
		T_j = 125 °C	I_F = 30 A		0.65	0.7	

1. Pulse test: tp = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation: $P = 0.42 \times I_{F(AV)} + 0.009 \times I_{F}{}^{2}{}_{(RMS)}$

Figure 2. Average forward power dissipation versus average forward current (per diode)

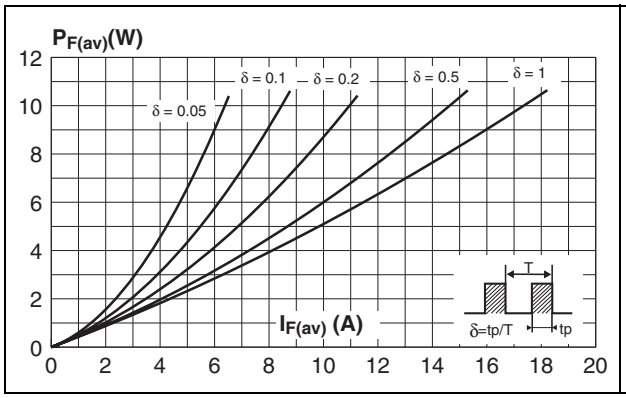


Figure 3. Average forward current versus ambient temperature (δ = 0.5, per diode)

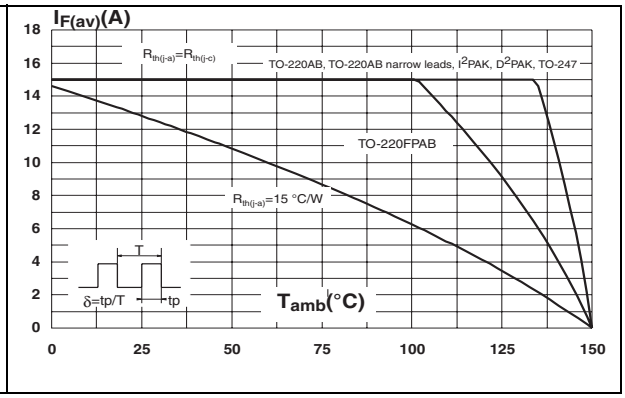


Figure 4. Normalized avalanche power derating versus pulse duration

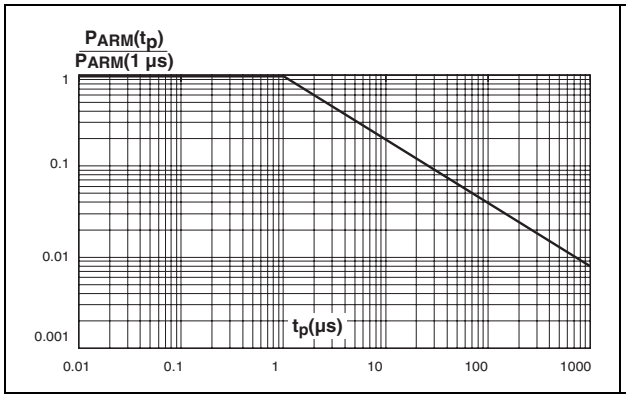


Figure 5. Normalized avalanche power derating versus junction temperature

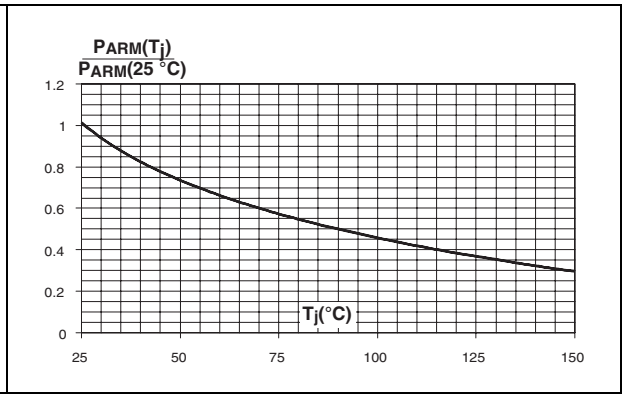


Figure 6. Relative variation of thermal impedance junction to case versus pulse duration

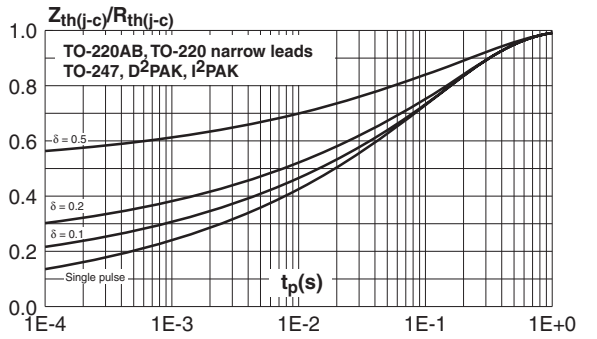


Figure 7. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

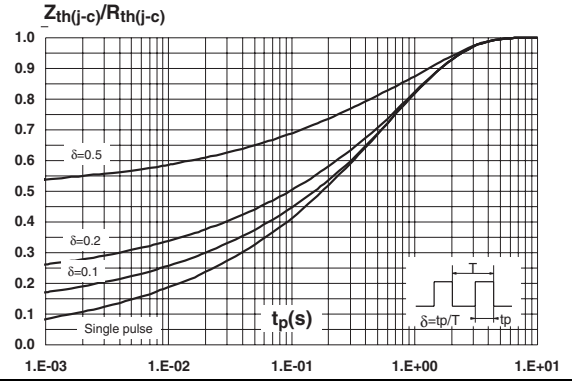


Figure 8. Reverse leakage current versus reverse voltage applied (typical values, per diode)

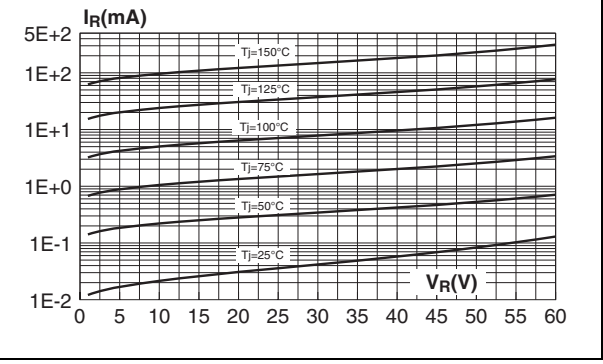


Figure 9. Junction capacitance versus reverse voltage applied (typical values, per diode)

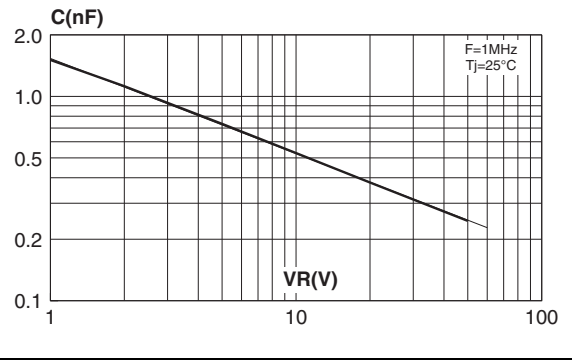


Figure 10. Forward voltage drop versus forward current (maximum values, per diode)

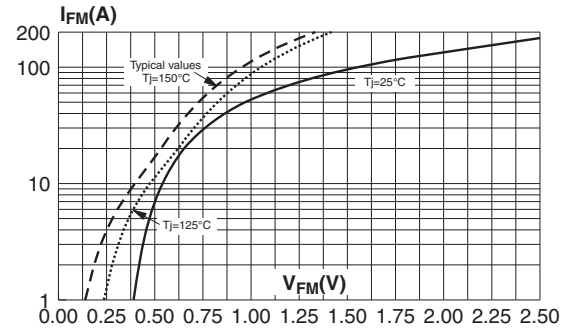


Figure 11. Thermal resistance junction to ambient versus copper surface under tab for D^2PAK

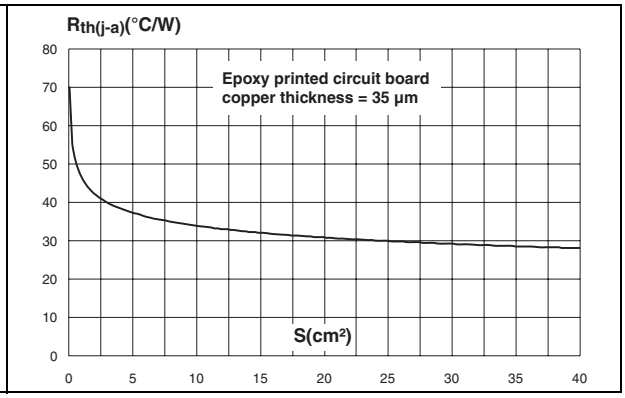
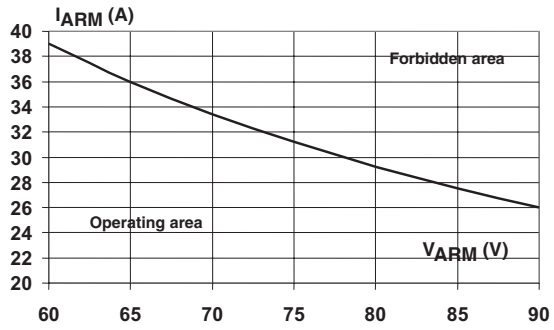


Figure 12. Reverse safe operating area (t_p < 1 µs, T_j < 150 °C)



2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque values: TO-220AB, TO-220AB narrow leads, and TO-220FPAB 0.4 to 0.6 N·m, TO-247 0.55 N·m (1.0 N·m maximum)

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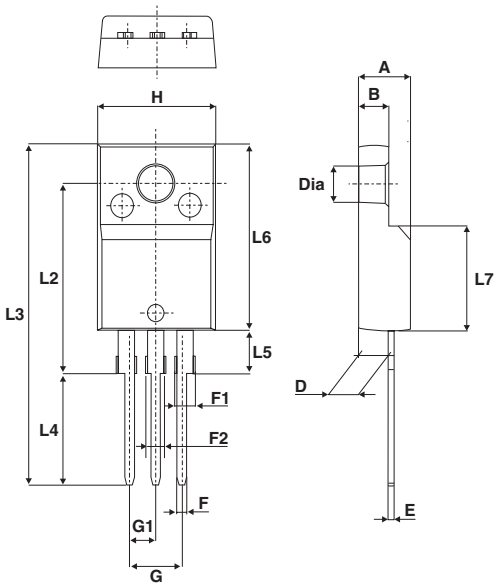
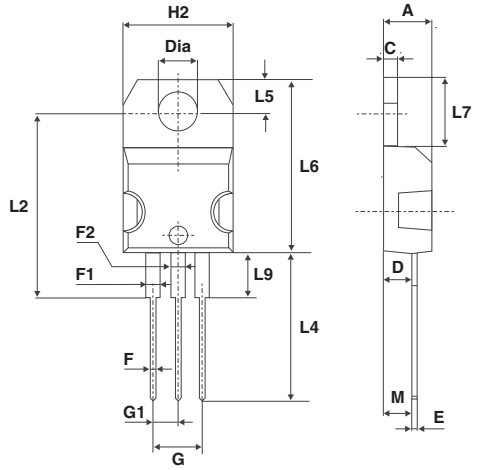
Table 5. TO-220FPAB dimensions



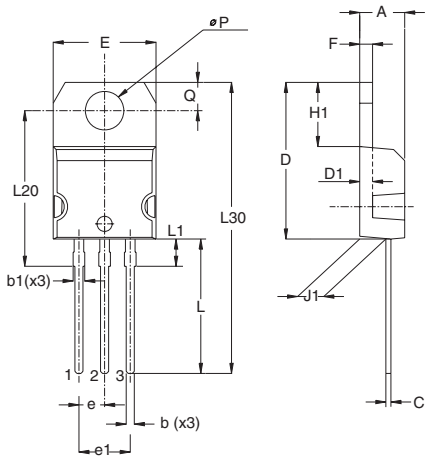
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	2.5	2.7	0.098	0.106
D	2.5	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1	0.030	0.039
F1	1.15	1.70	0.045	0.067
F2	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.4	2.7	0.094	0.106
H	10	10.4	0.393	0.409
L2	16 Typ.		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 6. TO-220AB dimensions



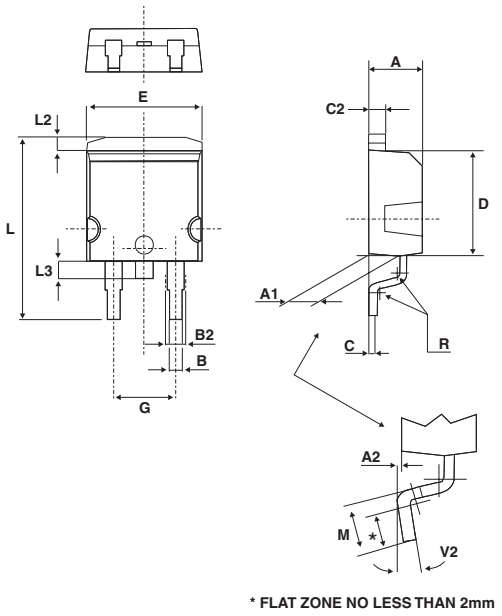
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.067
F2	1.14	1.70	0.044	0.06è
G	4.95	5.15	0.194	0.202
G1	2.40	2.70	0.094	0.106
H2	10	10.40	0.393	0.409
L2	16.4 typ.		0.645 typ.	
L4	13	14	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.	3.75	3.85	0.147	0.151

Table 7. TO-220AB narrow leads dimensions



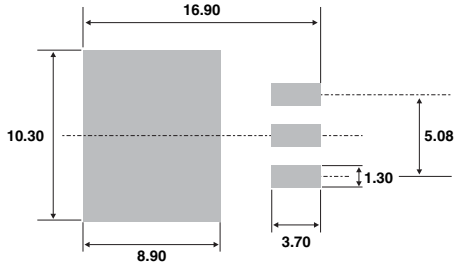
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.17		0.18
b	0.61		0.88	0.024		0.034
b1	0.95		1.20	0.037		0.047
c	0.48		0.70	0.019		0.027
D	15.25		15.75	0.60		0.62
D1	1.27			0.05		
E	10.00		10.40	0.39		0.41
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.19		0.20
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.24		0.26
J1	2.40		2.72	0.095		0.107
L	13.00		14.00	0.51		0.55
L1	2.60		2.90	0.102		0.114
L20	15.40			0.61		
L30	28.90			1.14		
ØP	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116

Table 8. D²PAK dimensions



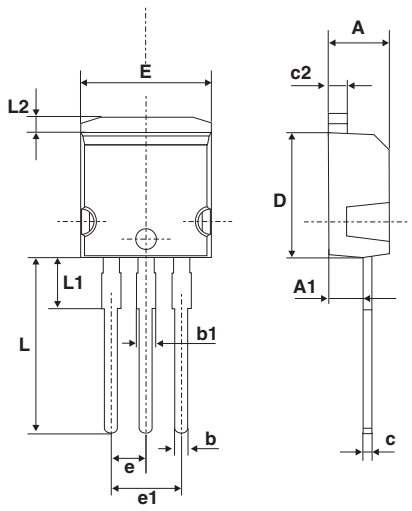
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	0.208
L	15.00	15.85	0.590	0.624
L2	1.27	1.40	0.050	0.055
L3	1.40	1.75	0.055	0.069
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 typ.	
V2	0°	8°	0°	8°

Figure 13. Footprint (dimensions in millimeters)



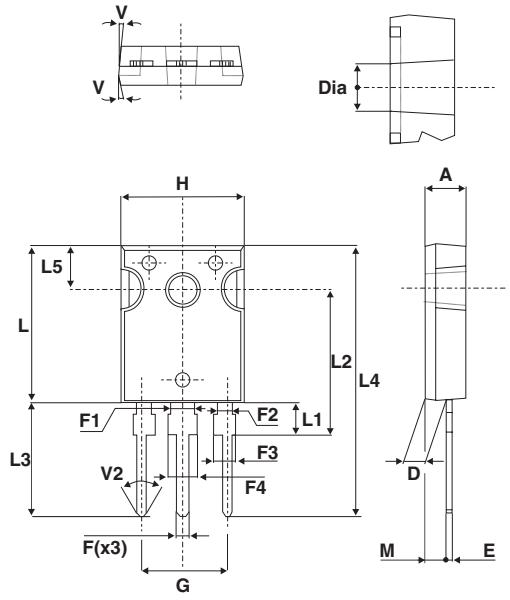
Devices in I²PAK with nickel-plated back frame must NOT be mounted by frame soldering like SMDs. Such devices are intended to be through-hole mounted ONLY and in no circumstances shall ST be held liable for any lack of performance or damage arising out of soldering of nickel-plated back frames.

Table 9. I²PAK dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	2.72	0.094	0.107
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.044	0.067
c	0.49	0.70	0.019	0.028
c2	1.23	1.32	0.048	0.052
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
E	10	10.40	0.394	0.409
L	13	14	0.512	0.551
L1	3.50	3.93	0.138	0.155
L2	1.27	1.40	0.050	0.055

Table 10. TO-247 dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.85		5.15	0.191		0.203
D	2.20		2.60	0.086		0.102
E	0.40		0.80	0.015		0.031
F	1.00		1.40	0.039		0.055
F1		3.00			0.118	
F2		2.00			0.078	
F3	2.00		2.40	0.078		0.094
F4	3.00		3.40	0.118		0.133
G		10.90			0.429	
H	15.45		15.75	0.608		0.620
L	19.85		20.15	0.781		0.793
L1	3.70		4.30	0.145		0.169
L2		18.50			0.728	
L3	14.20		14.80	0.559		0.582
L4		34.60			1.362	
L5		5.50			0.216	
M	2.00		3.00	0.078		0.118
V		5°			5°	
V2		60°			60°	
Dia.	3.55		3.65	0.139		0.143

3 Ordering information

Table 11. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS30L60CW	STPS30L60CW	TO-247	4.4 g	30	Tube
STPS30L60CT	STPS30L60CT	TO-220AB	2.3 g	50	Tube
STPS30L60CG	STPS30L60CG	D^2PAK	1.5 g	50	Tube
STPS30L60CG-TR	STPS30L60CG	D^2PAK	1.5 g	1000	Tape and reel
STPS30L60CR	STPS30L60CR	I^2PAK	1.49 g	50	Tube
STPS30L60CFP	STPS30L60CFP	TO-220FPAB	2.0 g	50	Tube
STPS30L60CTN	STPS30L60CTN	TO-220AB narrow leads	1.9 g	50	Tube

4 Revision history

Table 12. Document revision history

Date	Revision	Description of changes
July-2003	3B	Initial release
16-Oct-2006	4	Reformatted to current standards. Corrected dimensions for I^2PAK in Table 5.
28-Nov-2006	5	Added TO-220FPAB package. Added STPS30L60CG-TR to ordering information.
07-Mar-2007	6	Updated thermal parameters in Table 2.
31-Mar-2007	7	Updated T_C = 110 °C in Table 1.
25-Aug-2008	8	Reformatted to current standards. Updated ECOPACK statement. Updated torque values and dimension illustration for TO-247 in *Section 2*.
07-Feb-2011	9	Added electrical diagram on first page. Added parameters V_{ARM} and V_{ASM} to *Table 2*. Added *Figure 12*. Updated and added warning paragraph above *Table 9*. Updated *Table 11.*
15-Jun-2012	10	Added TO-220AB narrow leads package.

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