STPS30L30C

Low drop power Schottky rectifier

Features

- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Low forward voltage drop
- Low thermal resistance
- Avalanche capability specified

Description

This dual center tap Schottky rectifier is suited for switch mode power supplies and high frequency DC to DC converters.

Packaged in TO-220AB, D^2PAK and I^2PAK, this device is intended for use in low voltage, high frequency inverters, free-wheeling and polarity protection applications.

Table 1. Device summary

$I_{F(AV)}$	2 x 15 A
V_{RRM}	30 V
T_j (max)	150 °C
V_F(typ)	0.37 V

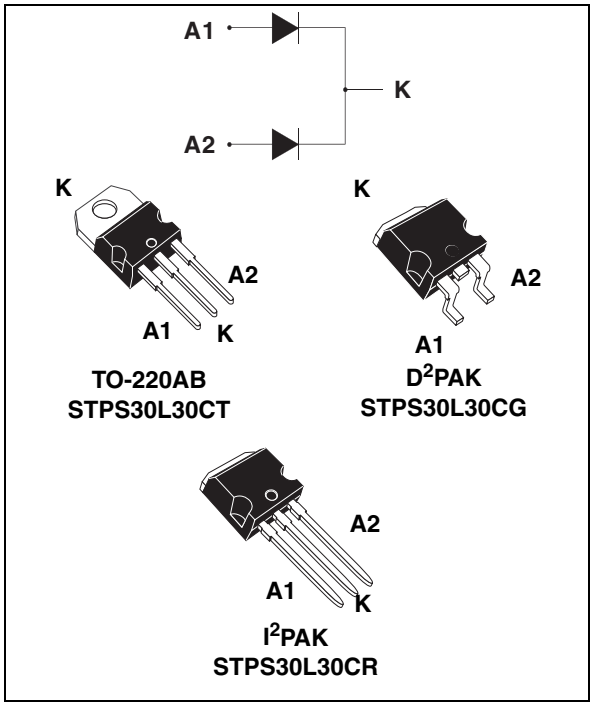
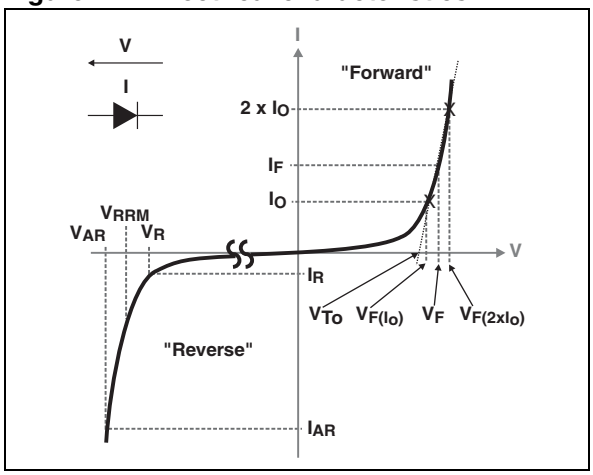


Figure 1. Electrical characteristics (a)



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

1 Characteristics

Table 2. Absolute ratings (limiting values per diode)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			30	V
$I_{F(RMS)}$	Forward rms current			30	A
$I_{F(AV)}$	Average forward current δ = 0.5	T_c = 140 °C,	Per diode Per device	15 30	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal,		220	A
I_{RRM}	Peak repetitive reverse current	t_p = 2 µs square, F= 1 kHz square		1	A
I_{RSM}	Non repetitive peak reverse current	t_p = 100 µs square		3	A
P_{ARM} (1)	Repetitive peak avalanche power	t_p = 1 µs T_j = 25 °C		5300	W
V_{ARM} (2)	Maximum repetitive peak avalanche voltage	t_p < 1 µs T_j < 150 °C I_{AR} < 35 A		45	V
V_{ASM} (2)	Maximum single pulse peak avalanche voltage	t_p < 1 µs T_j < 150 °C I_{AR} < 35 A		45	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 of 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 resistance(1)

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	Per diode Total	1.5 0.8	°C/W
$R_{th(c)}$	Coupling		0.1	

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

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$			1.5	mA
		T_j = 125 °C			170	350	mA
V_F (1)	Forward voltage drop	T_j = 25 °C	I_F = 15 A			0.46	V
		T_j = 125 °C			0.33	0.37	
		T_j = 25 °C	I_F = 30A			0.57	
		T_j = 125 °C			0.43	0.5	

1. Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:

$P = 0.24 \times I_{F(AV)} + 0.009 \times I_F{}^2{}_{(RMS)}$

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

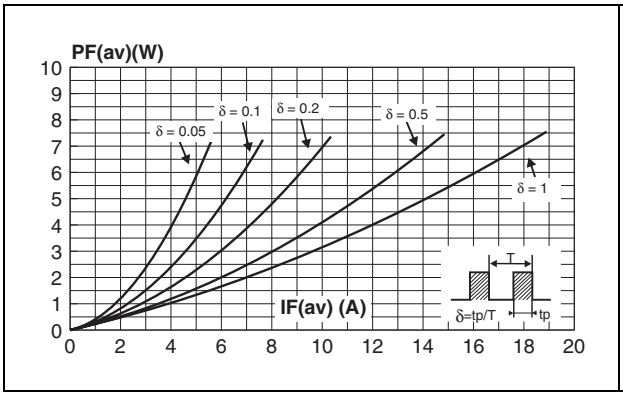


Figure 3. Average forward current per diode versus ambient temperature (δ = 0.5)

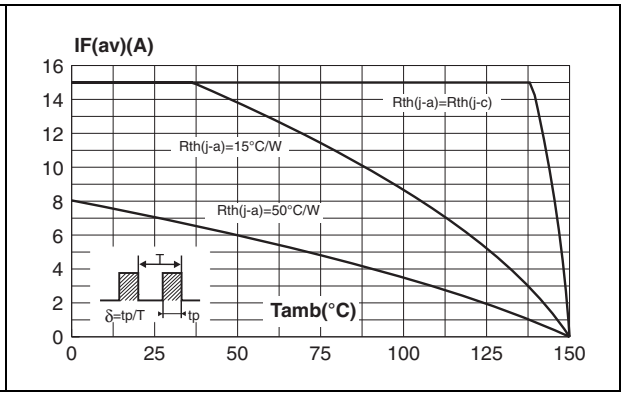


Figure 4. Normalized avalanche power derating versus pulse duration

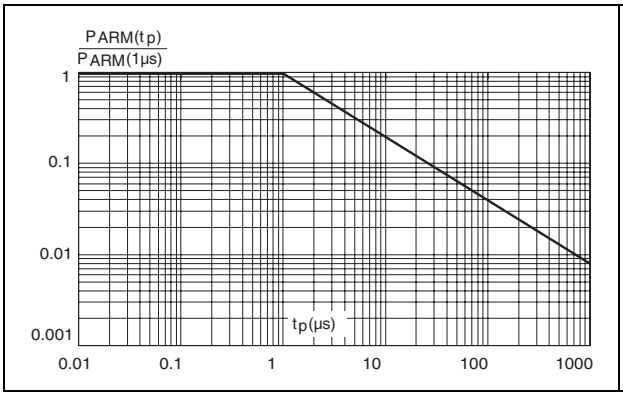


Figure 5. Normalized avalanche power derating versus junction temperature

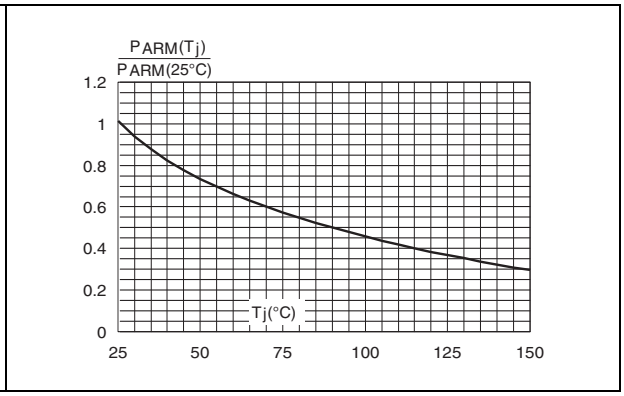


Figure 6. Non repetitive surge peak forward current versus overload duration, (maximum values per diode)

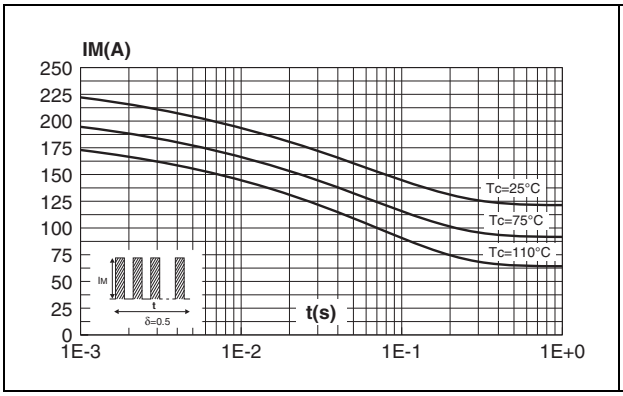


Figure 7. Relative variation of thermal impedance junction to case versus pulse duration

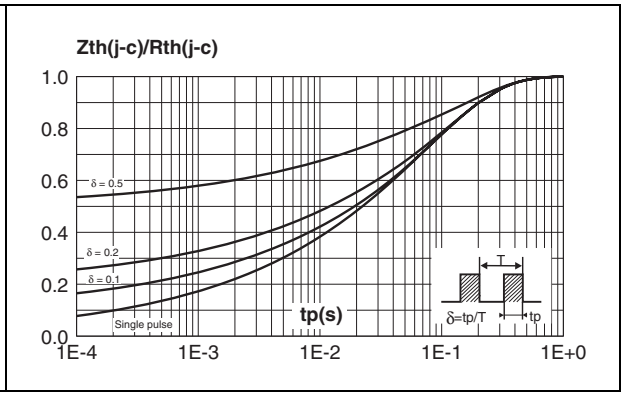


Figure 8. Reverse leakage current versus reverse voltage applied (typical values per diode)

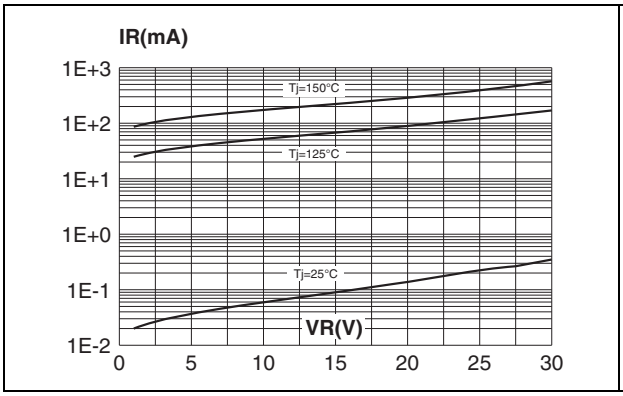


Figure 9. Junction capacitance versus reverse voltage applied (typical values per diode)

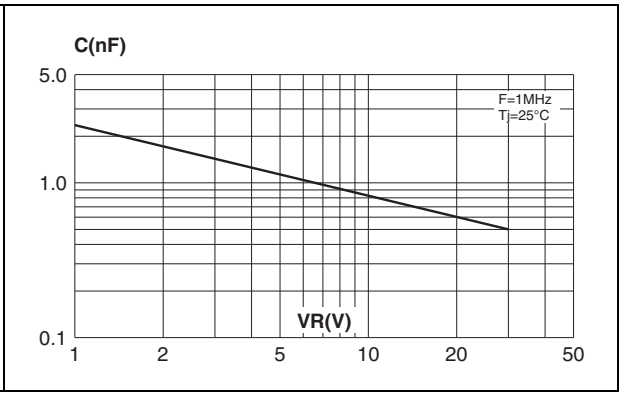


Figure 10. Forward voltage drop versus forward current (maximum values per diode)

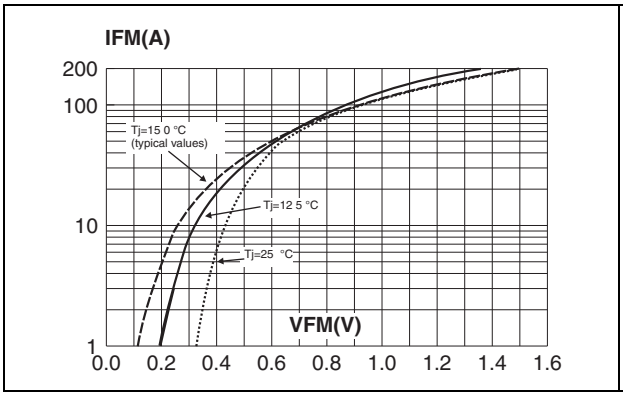


Figure 11. Thermal resistance junction to ambient versus copper surface under tab

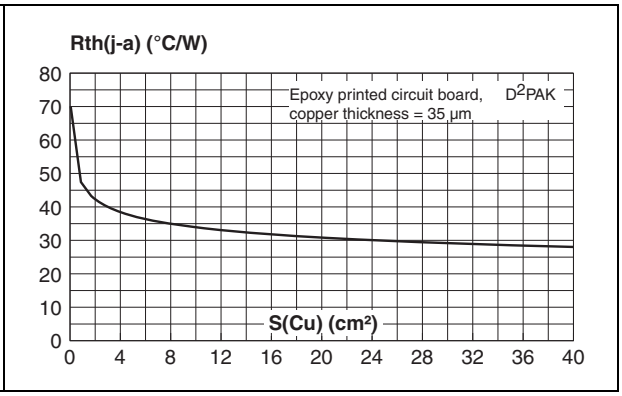
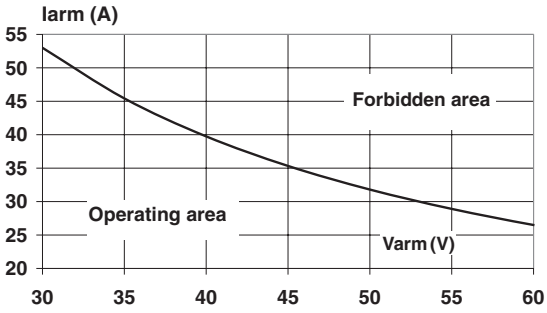


Figure 12. Reverse safe operating area (t_p < 1 µs and T_j < 150 °C)

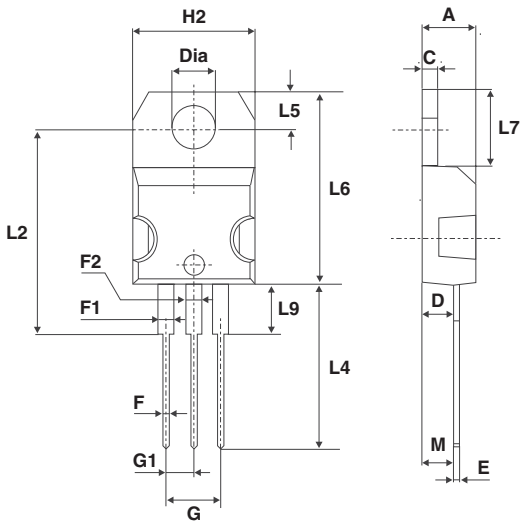


2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.4 to 0.6 N·m

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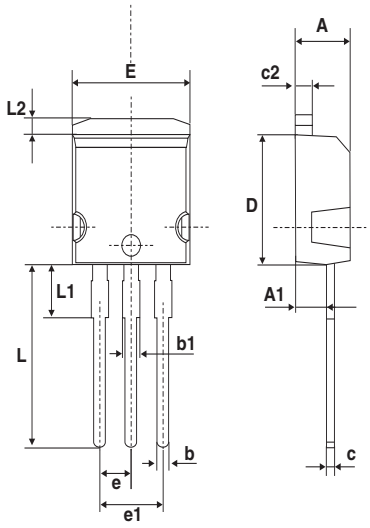
Table 5. TO-220AB dimensions



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	0.066
F2	1.14	1.70	0.044	0.066
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

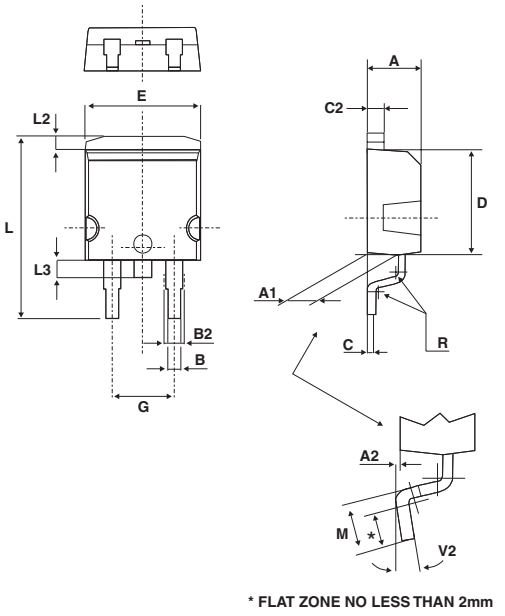
Mounting (soldering) the I^2PAK metal slug (heatsink) with alloy, like a surface mount device, IS NOT PERMITTED. A standard through-hole mounting is mandatory.

Table 6. I^2PAK dimensions



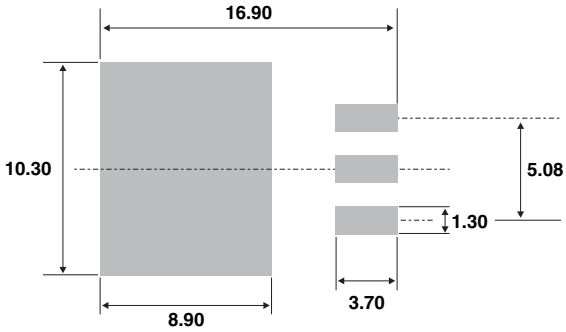
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	2.72	0.094	0.107
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.044	0.067
c	0.49	0.70	0.019	0.028
c2	1.23	1.32	0.048	0.052
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
E	10	10.40	0.394	0.409
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 7. 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. D²PAK footprint (dimensions in mm)



3 Ordering information

Table 8. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS30L30CT	STPS30L30CT	TO-220AB	2.0 g	50	Tube
STPS30L30CG	STPS30L30CR	D^2PAK	1.8 g	50	Tube
STPS30L30CG-TR	STPS30L30CG	D^2PAK	1.8 g	1000	Tape and reel
STPS30L30CG-TR	STPS30L30CG	I^2PAK	1.49 g	50	Tube

4 Revision history

Table 9. Document revision history

Date	Revision	Changes
Jul-2003	5C	Previous issue
29-Apr-2010	6	Added *Figure 1* and *Figure 12*. Added parameters V_{ARM} and V_{ASM} to *Table 2*

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