STPS41L60C

Power Schottky rectifier

Features

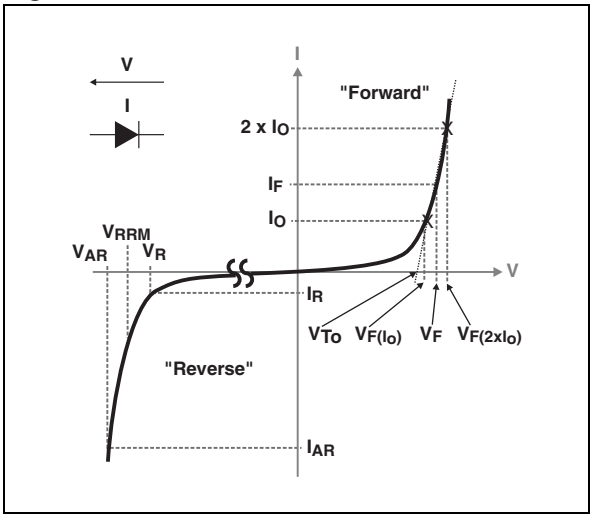
- Low forward voltage drop
- Negligible switching losses
- Low thermal resistance
- Avalanche capability specified

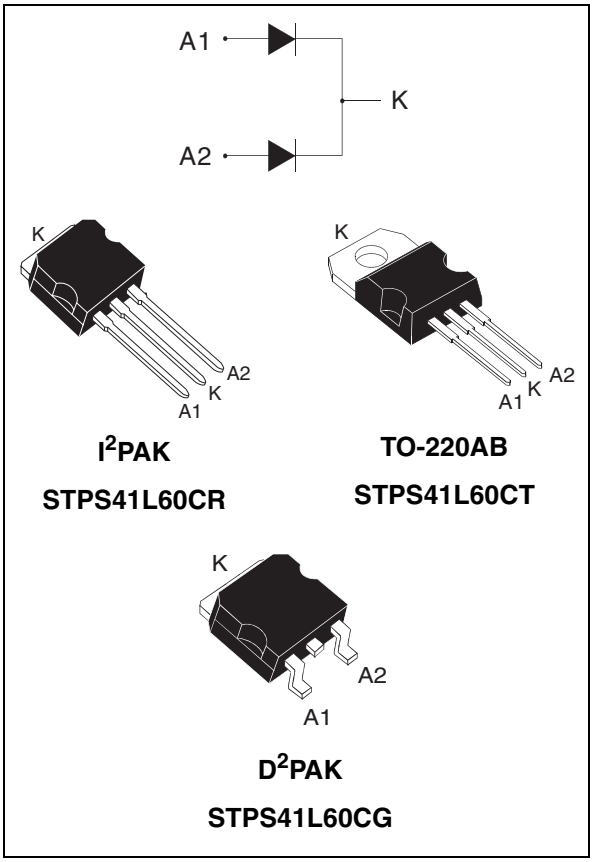
Description

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

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

Figure 1. Electrical characteristics (a)





I^2PAK

STPS41L60CR

TO-220AB

STPS41L60CT

D^2PAK

STPS41L60CG

Table 1. Device summary

$I_{F(AV)}$	2 x 20 A
V_{RRM}	60 V
$T_{j\ (max)}$	150 °C
$V_{F\ (max)}$	0.58 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

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	T_C = 125 °C δ = 0.5	Per diode Per device	20 40	A
I_{FSM}	Surge non repetitive forward current	tp = 10 ms Sinusoidal		220	A
P_{ARM} (1)	Repetitive peak avalanche power	tp = 1 µs T_j = 25 °C		9500	W
V_{ARM} (2)	Maximum repetitive peak avalanche voltage	t_p < 1 µs, T_j < 150 °C, I_{AR} < 35 A		80	V
V_{ASM} (2)	Maximum single pulse peak avalanche voltage	t_p < 1 µs, T_j < 150 °C, I_{AR} < 35 A		80	V
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Maximum operating junction temperature(3)			150	°C

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	Per diode Total	1.5 0.8	° C/W
$R_{th\ (c)}$	Coupling		0.1	

When the diodes 1 and 2 are used simultaneously :
$\Delta Tj(diode\ 1) = P(diode1) \times R_{th(j-c)}(Per\ diode) + P(diode\ 2) \times R_{th(c)}$

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	$V_R = V_{RRM}$			600	µA
		T_j = 125 °C			100	175	mA
V_F (1)	Forward voltage drop	T_j = 25 °C	I_F = 20 A			0.60	V
		T_j = 125 °C	I_F = 20 A		0.50	0.58	
		T_j = 25 °C	I_F = 40A			0.77	
		T_j = 125 °C	I_F = 40A		0.67	0.71	

1. Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:
$P = 0.42 \times I_{F(AV)} + 0.007 \times I_F{}^2{}_{(RMS)}$

Figure 2. Conduction losses versus average current

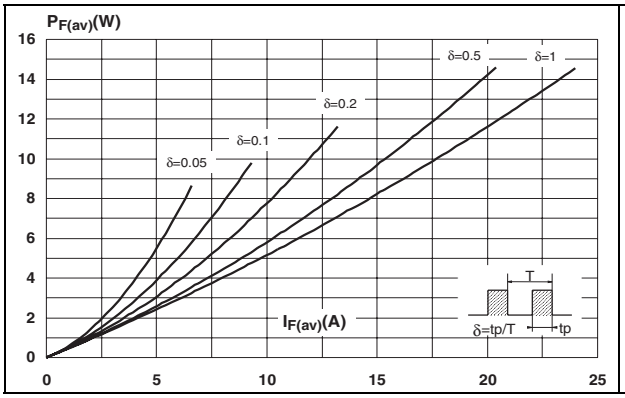


Figure 3. Average forward current versus ambient temperature (δ = 0.5)

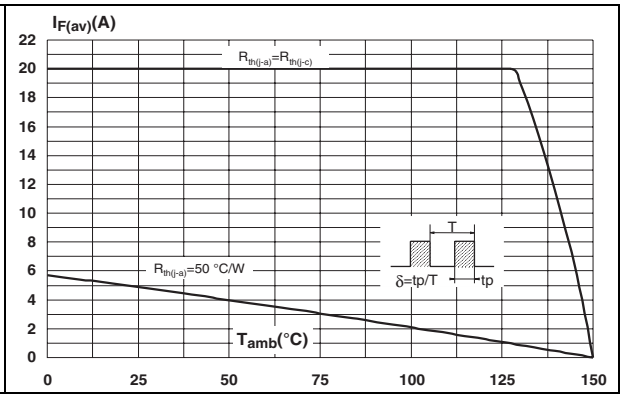


Figure 4. Normalized avalanche power derating versus pulse duration

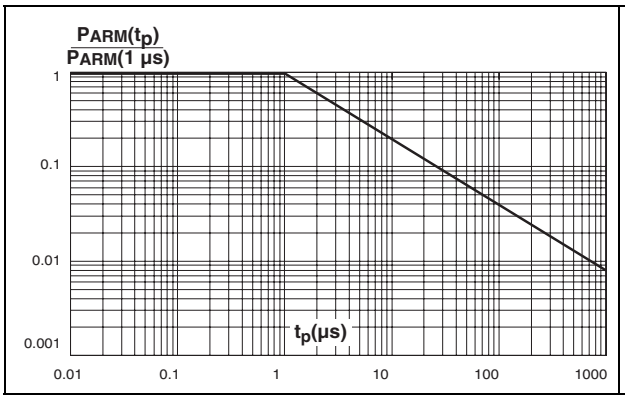


Figure 5. Normalized avalanche power derating versus junction temperature

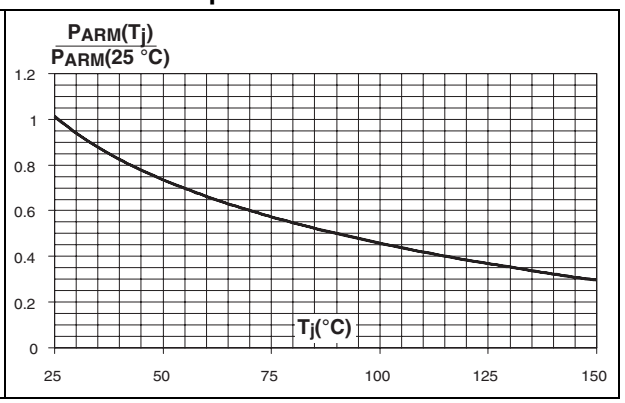


Figure 6. Non repetitive surge peak forward current versus overload duration (maximum values)

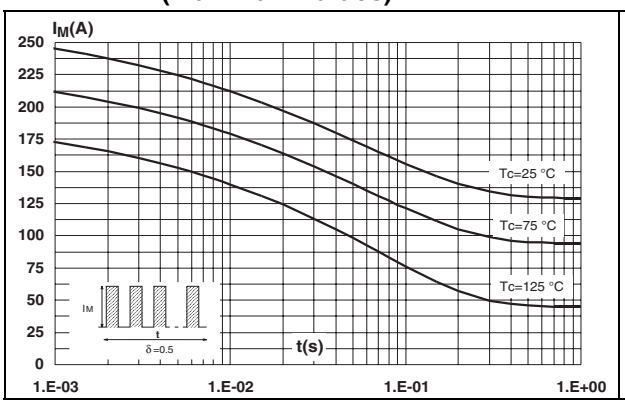


Figure 7. Relative variation of thermal impedance junction to case versus pulse duration

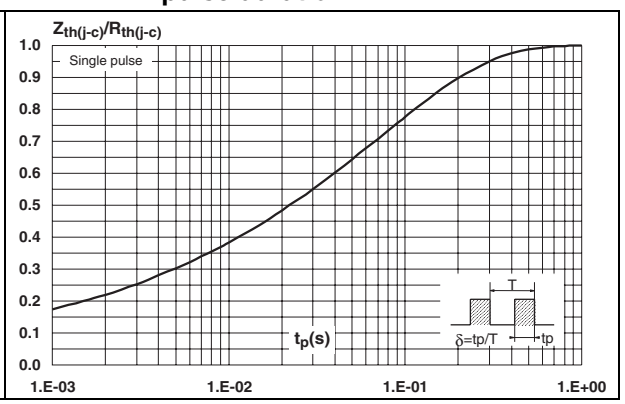


Figure 8. Reverse leakage current versus reverse voltage applied (typical values)

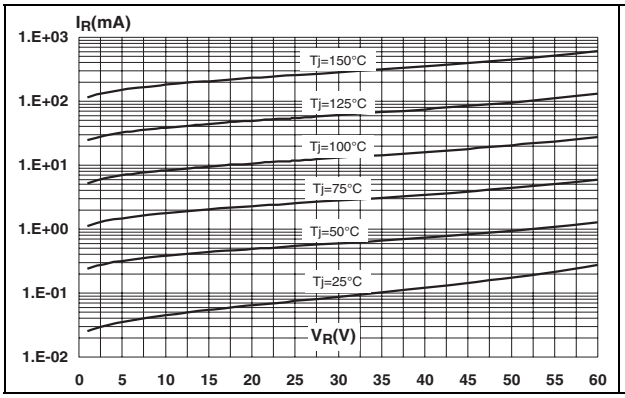


Figure 9. Junction capacitance versus reverse voltage applied (typical values)

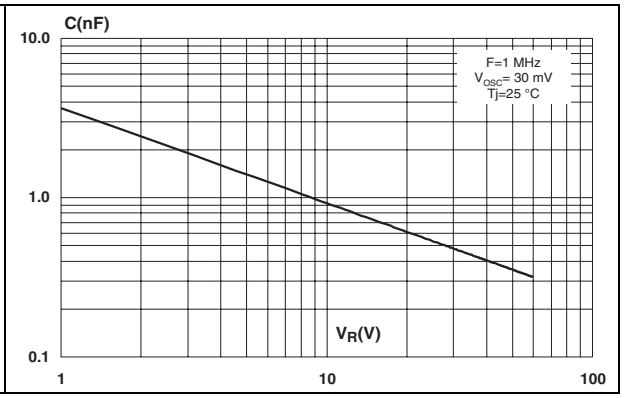


Figure 10. Forward voltage drop versus forward current

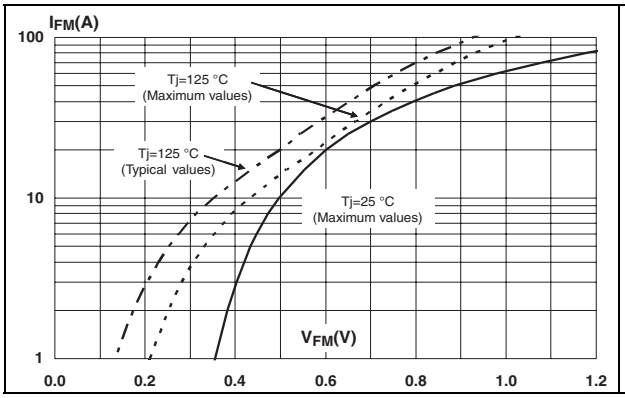


Figure 11. Thermal resistance junction to ambient versus copper surface under tab (STPS41L60CG only)

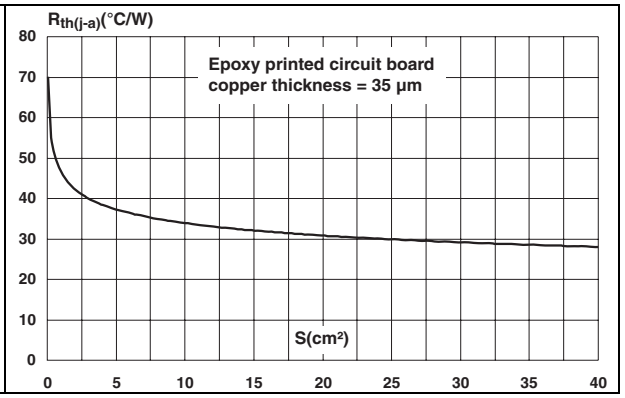
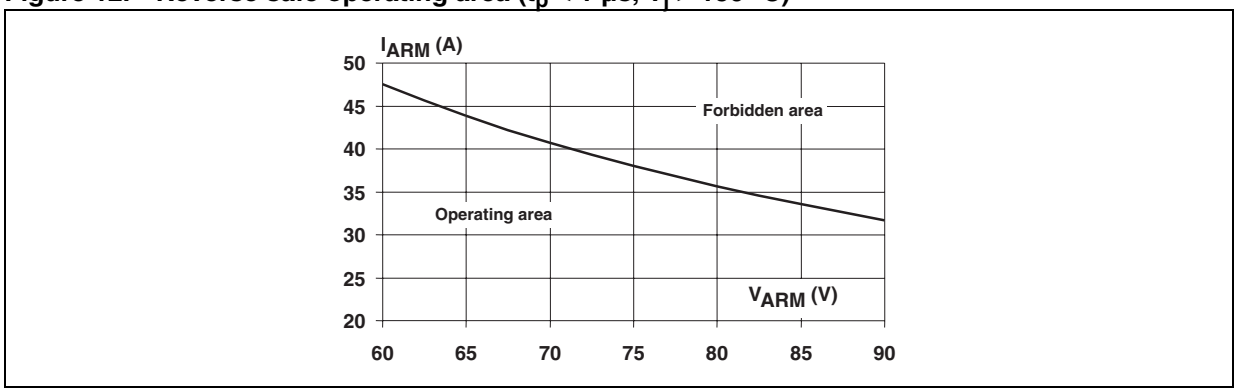


Figure 12. Reverse safe operating area (t_p < 1 µs, T_j > 150 °C)

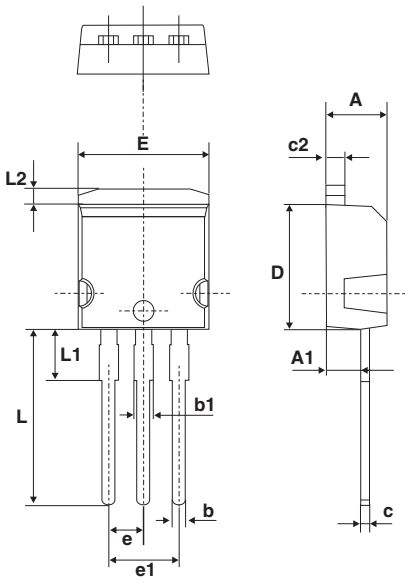


2 Package information

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

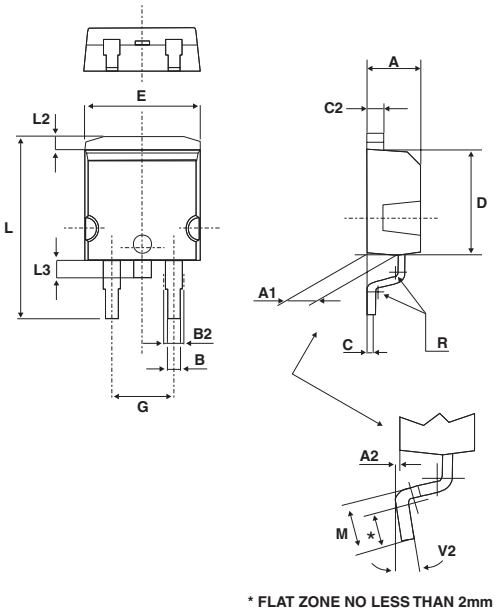
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Figure 13. Package dimensions I²PAK



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
b	0.70	0.93	0.028	0.037
b1	1.14	1.17	0.044	0.046
b2	1.14	1.17	0.044	0.046
c	0.45	0.60	0.018	0.024
c2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
E	10.0	10.4	0.394	0.409
L	13.1	13.6	0.516	0.535
L1	3.48	3.78	0.137	0.149
L2	1.27	1.40	0.050	0.055

Figure 14. Package dimensions D^2PAK



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 15. Footprint

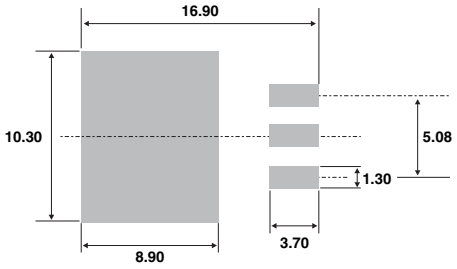
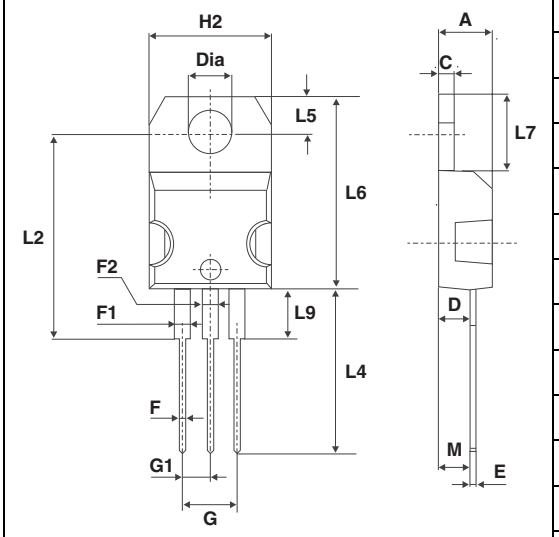


Figure 16. Package dimensions TO-220AB



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

3 Ordering information

Table 5. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS41L60CG	STPS41L60CG	D^2PAK	1.48 g	50	Tube
STPS41L60CG-TR	STPS41L60CG	D^2PAK	1.48 g	1000	Tape and reel
STPS41L60CT	STPS41L60CT	TO-220AB	2.20 g	50	Tube
STPS41L60CR	STPS41L60CR	I^2PAK	1.49 g	50	Tube

4 Revision history

Table 6. Document revision history

Date	Revision	Changes
July 2003	3A	Previous issue
10-Jan-2007	4	Reformated to current standards. Added ECOPACK statement Removed I_{RRM} and dV/dT from the Absolute ratings table on page 1. Updated reverse leakage current values in Table 3 and Figure 7.
28-May-2007	5	Updated figures 1, 2, and 5 to 10.
15-Jul-2011	6	Added electrical diagram on first page. Added parameters V_{ARM} and V_{ASM} to *Table 2*. Added *Figure 12*.

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