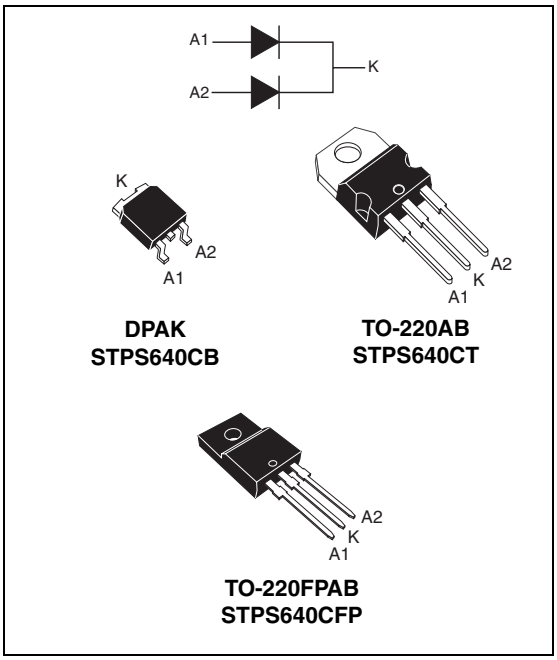
STPS640C

Power Schottky rectifier

Main product characteristics

$I_{F(AV)}$	2 x 3 A
V_{RRM}	40 V
T_j (max)	150° C
V_F(max)	0.57 V



DPAK
STPS640CB

TO-220AB
STPS640CT

TO-220FPAB
STPS640CFP

Features and benefits

- Very small conduction losses
- Negligible switching losses
- Extremely fast switching
- Low forward drop voltage
- Low capacitance
- Low thermal resistance
- Insulated package: TO-220FPAB
  Insulating voltage = 2000 V DC
  Capacitance = 12 pF
- Avalanche capability specified

Description

Dual Schottky rectifier suited to Switch Mode Power Supplies and other Power Converters.

This device is intended for use in low and medium voltage operation, and particulary, in high frequency circuitries where low switching losses are required (free wheeling and polarity protection).

1 Characteristics

Table 1. Absolute ratings (limiting values, per diode)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			40	V
$I_{F(RMS)}$	RMS forward voltage	TO-220AB /TO-220FPAB		10	A
		DPAK		6	
$I_{F(AV)}$	Average forward current δ = 0.5	TO-220AB	T_c = 135° C	3	A
		TO-220FPAB	T_c = 130° C		
		DPAK	T_c = 120° C		
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms Sinusoidal		75	A
I_{RRM}	Repetitive peak reverse current	t_p = 2 µs square F = 1 kHz		1	A
P_{ARM}	Repetitive peak avalanche power	t_p = 1 µs T_j = 25° C		1300	W
T_{stg}	Storage temperature range			-65 to + 150	° C
T_j	Maximum operating junction temperature			150	° C
dV/dt	Critical rate of rise of reverse voltage			10000	V/µs

Table 2. Thermal resistances

Symbol	Parameter			Value	Unit
$R_{th\ (j-c)}$	Junction to case	TO-220AB / DPAK	Per diode Total	5.5 3	°C/W
		TO-220FPAB	Per diode Total	5.5 5.2	
$R_{th(c)}$	Coupling	TO-220AB		0.5	°C/W
		TO-220FPAB		3	

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

Table 3. Static electrical characteristics (per diode)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25° C	$V_R = V_{RRM}$			100	µA
		T_j = 125° C			2	10	mA
V_F(1)	Forward voltage drop	T_j = 25° C	I_F = 3 A			0.63	V
		T_j = 25° C	I_F = 6 A			0.84	
		T_j = 125° C	I_F = 3 A		0.5	0.57	
		T_j = 125° C	I_F = 6 A		0.67	0.72	

1. Pulse test: tp = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:
$P = 0.42 \times I_{F(AV)} + 0.050\ I_F{}^2{}_{(RMS)}$

Figure 1. Average forward power dissipation versus average forward current (per diode)

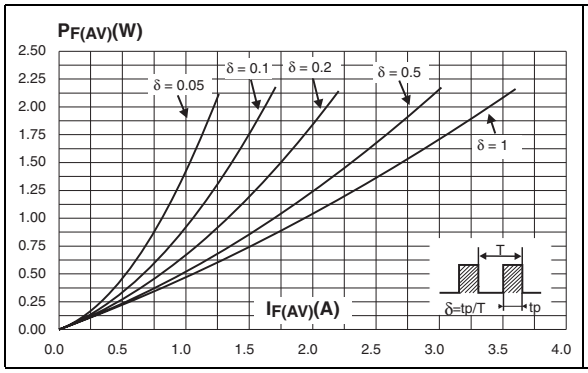


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

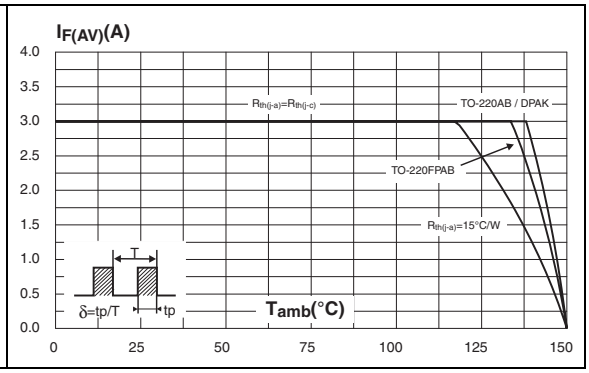


Figure 3. Normalized avalanche power derating versus pulse duration

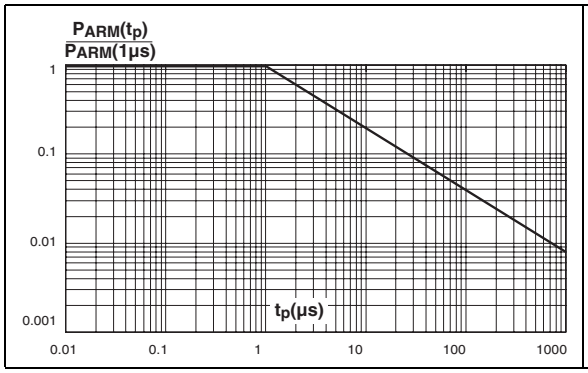


Figure 4. Normalized avalanche power derating versus junction temperature

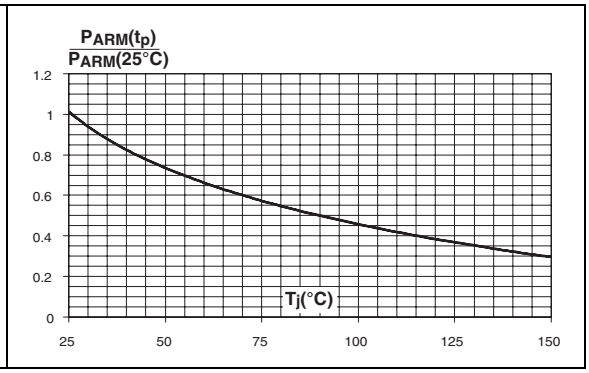


Figure 5. Non repetitive surge peak forward current versus overload duration. (Maximum values, per diode) (TO-220AB / DPAK)

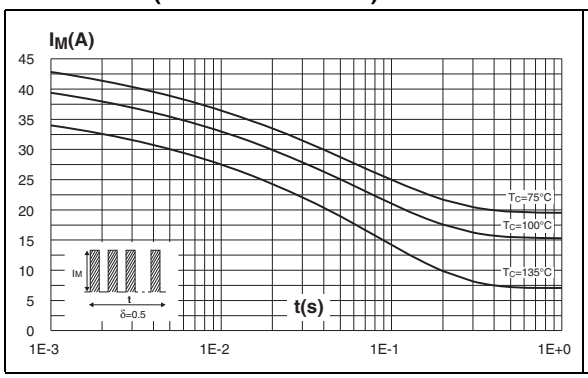


Figure 6. Non repetitive surge peak forward current versus overload duration. (Maximum values, per diode) (TO-220FPAB)

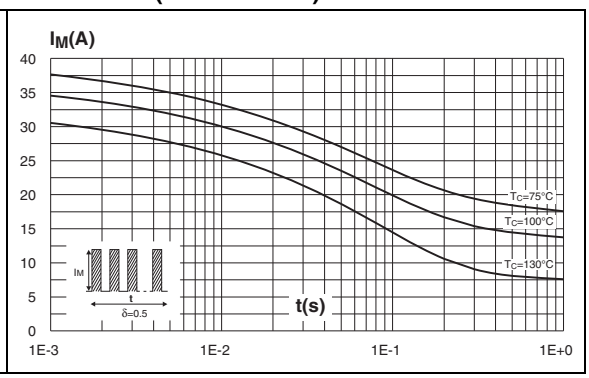


Figure 7. Relative variation of thermal transient impedance junction to case versus pulse duration (TO-220AB/DPAK)

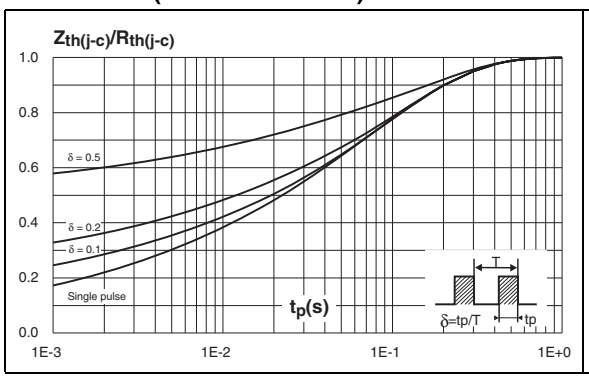


Figure 8. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAB)

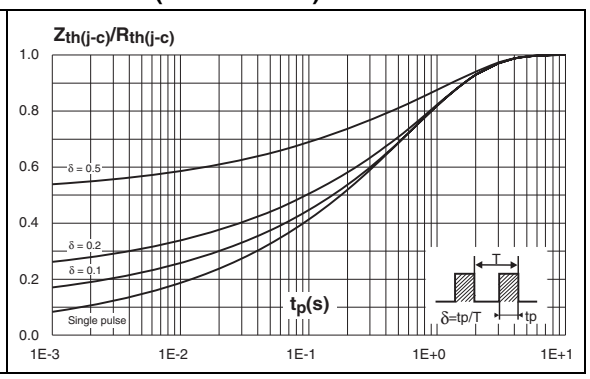


Figure 9. Reverse leakage current versus reverse voltage applied (typical values, per diode)

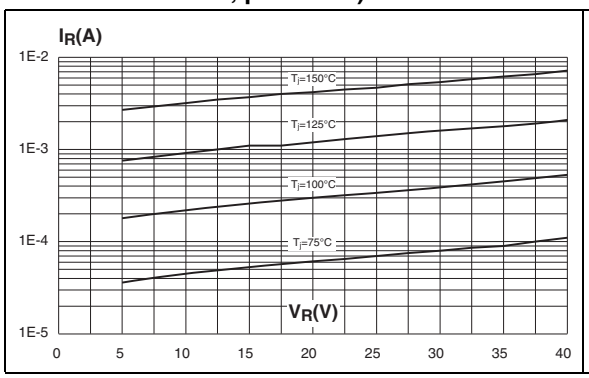


Figure 10. Junction capacitance versus reverse voltage applied (typical values, per diode)

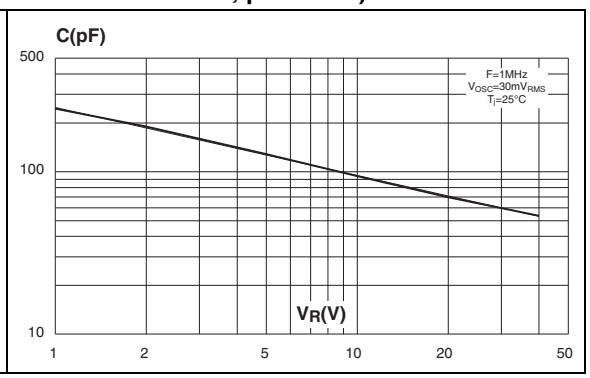


Figure 11. Forward voltage drop versus forward current (maximum values, per diode)

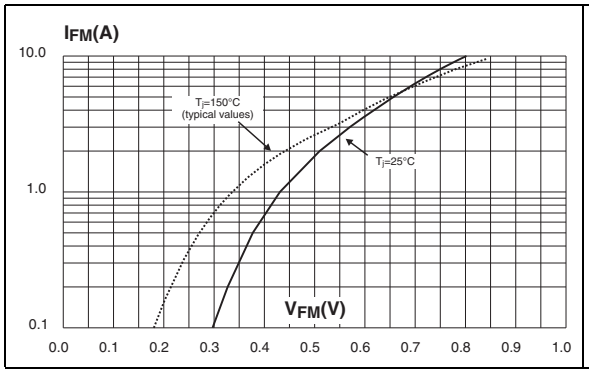
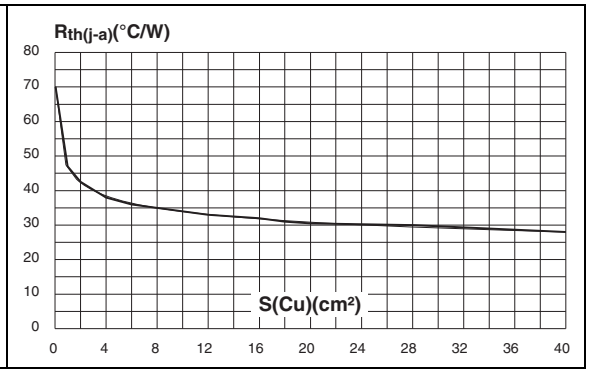


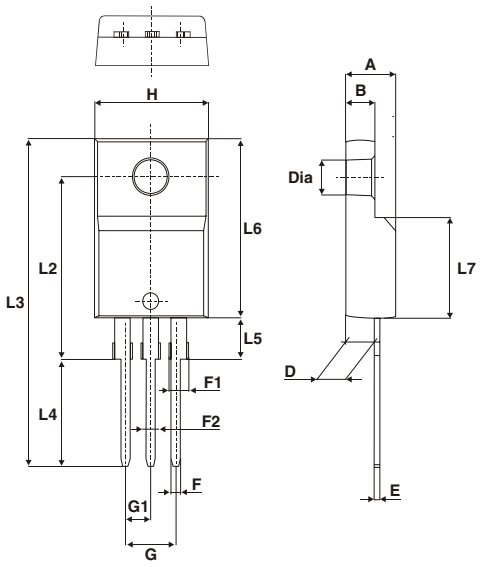
Figure 12. Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, copper thickness: 35 µm)



2 Package information

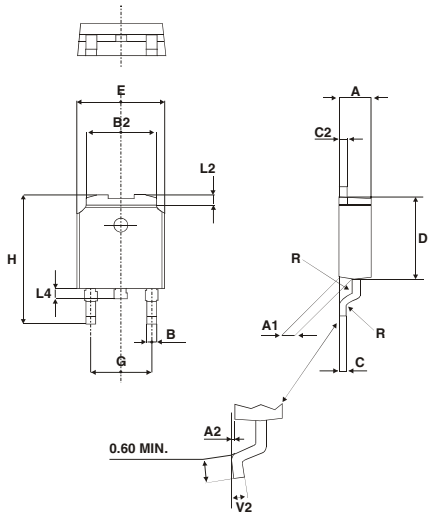
- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 Nm
- Maximum torque value: 0.70 Nm

Table 4. 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 5. 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 13. Footprint (dimensions in millimeters)

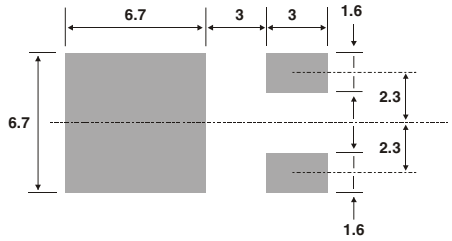
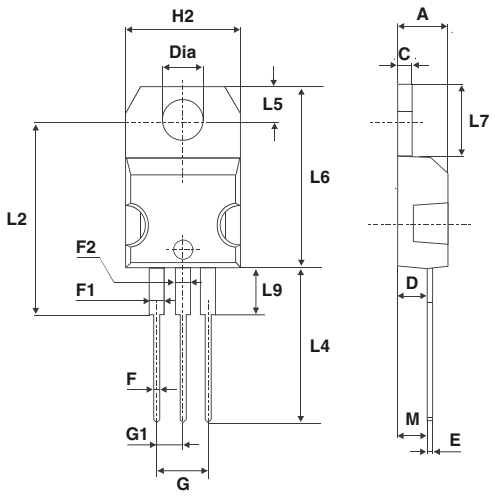


Table 6. TO-220AB dimensions



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	0.066
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

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 type	Marking	Package	Weight	Base qty	Delivery mode
STPS640CT	STPS640CT	TO-220AB	2.20 g	50	Tube
STPS640CB	S640C	DPAK	0.30 g	75	Tube
STPS640CB-TR	S640C	DPAK	0.30 g	2500	Tape and reel
STPS640CFP	STPS640CFP	TO-220FPAB	2.08 g	50	Tube

4 Revision history

Date	Revision	Description of Changes
Aug-2003	6B	Last release.
22-Mar-2007	7	Removed ISOWATT package.

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