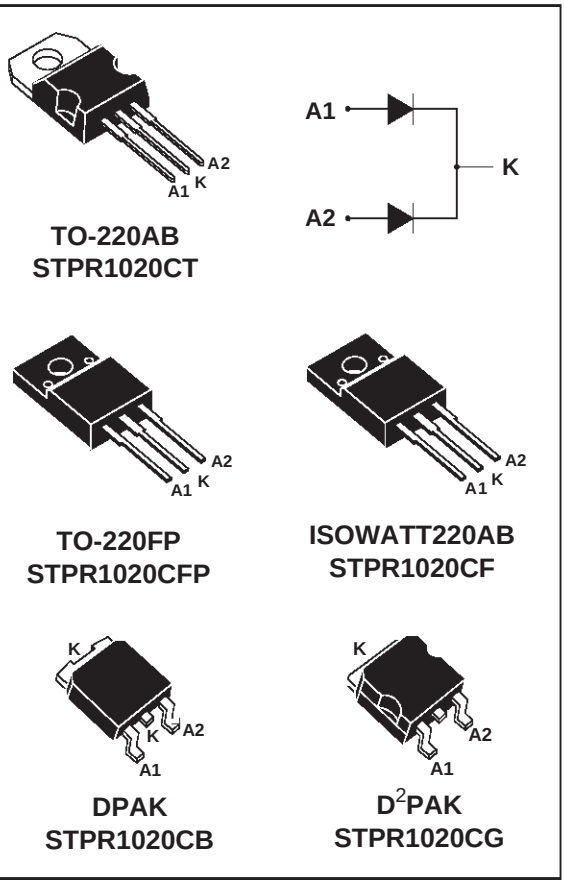
STPR1020CB/CG/CT/CF/CFP

ULTRA-FAST RECOVERY RECTIFIER DIODES

PRELIMINARY DATASHEET

MAIN PRODUCTS CHARACTERISTICS

$I_{F(AV)}$	2 x 5 A
V_{RRM}	200 V
Tj (max)	150°C
V_F (max)	0.99 V
trr (max)	30 ns



FEATURES

- SUITED FOR SMPS
- LOW LOSSES
- LOW FORWARD AND REVERSE RECOVERY TIME
- HIGH SURGE CURRENT CAPABILITY
- INSULATED PACKAGES: ISOWATT220AB / TO-220FP
  Insulation Voltage = 2000V DC
  Capacitance = 12 pF

DESCRIPTION

Dual center tap rectifier suited for Switched Mode Power Supplies and high frequency DC to DC converters.

Packaged in DPAK, D^2PAK, TO-220AB, TO-220FP or ISOWATT220AB, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.

ABSOLUTE MAXIMUM (limiting values, per diode)

Symbol	Parameter				Value	Unit
V_{RRM}	Repetitive peak reverse voltage				200	V
$I_{F(RMS)}$	RMS forward current	D^2PAK / TO-220AB / ISOWATT220AB / TO-220FP			10	A
		DPAK			7	A
$I_{F(AV)}$	Average forward current $\delta = 0.5$	D^2PAK / DPAK TO-220AB	Tc=125°C	Per diode	5	A
		ISOWATT220AB	Tc=115°C	Per device	10	
		TO-220FP	Tc=110°C	Per device	10	
I_{FSM}	Surge non repetitive forward current		tp=10ms sinusoidal		50	A
T_{stg}	Storage temperature range				- 65 to + 150	°C

THERMAL RESISTANCES

Symbol	Parameter			Value	Unit
$R_{th\ (j-c)}$	Junction to case	TO-220AB / D^2PAK / DPAK	Per diode	4.0	°C/W
			Total	2.4	
		ISOWATT220AB	Per diode	6.0	
			Total	4.0	
		TO-220FP	Per diode	6.5	
			Total	5	
$R_{th\ (c)}$	Coupling	TO-220AB / D^2PAK / DPAK		0.7	
		ISOWATT220AB		2.0	
		TO-220FP		3.5	

When diodes 1 and 2 are used simultaneously :
Δ Tj(diode 1) = P(diode 1) x Rth(j-c) (Per diode) + P(diode 2) x Rth(c)

STATIC ELECTRICAL CHARACTERISTICS (per diode)

Symbol	Parameters	Test conditions		Min.	Typ.	Max.	Unit
I_R *	Reverse leakage current	T_j = 25°C	$V_R = V_{RRM}$			50	µA
		T_j = 100°C				0.6	mA
V_F **	Forward voltage drop	T_j = 125°C	I_F = 5 A		0.8	0.99	V
		T_j = 125°C	I_F = 10 A		0.95	1.20	
		T_j = 25°C	I_F = 10 A			1.25	

Pulse test : * tp = 5 ms, δ < 2 %
** tp = 380 µs, δ < 2 %

To evaluate the conduction losses use the following equation :
$P = 0.78 \times I_{F(AV)} + 0.042 \times I_F{}^2{}_{(RMS)}$

RECOVERY CHARACTERISTICS

Symbol	Test conditions			Min.	Typ.	Max.	Unit
trr	T_j = 25°C	I_F = 0.5A I_R = 1A	Irr = 0.25A			30	ns
tfr	T_j = 25°C	I_F = 1A $V_{FR} = 1.1 \times V_F$ max	dI_F/dt = 50 A/µs		20		ns
V_{FP}	T_j = 25°C	I_F = 1A	dI_F/dt = 50 A/µs		3		V

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

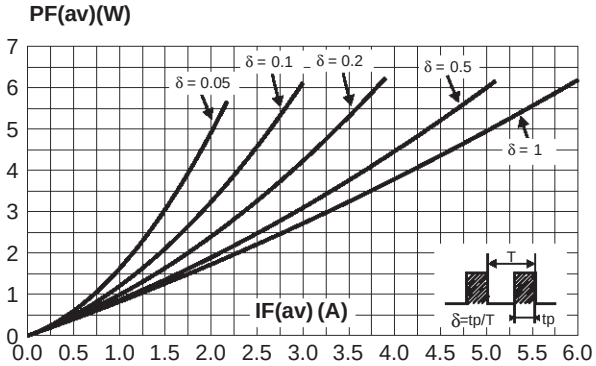


Fig. 2: Peak current versus form factor (per diode).

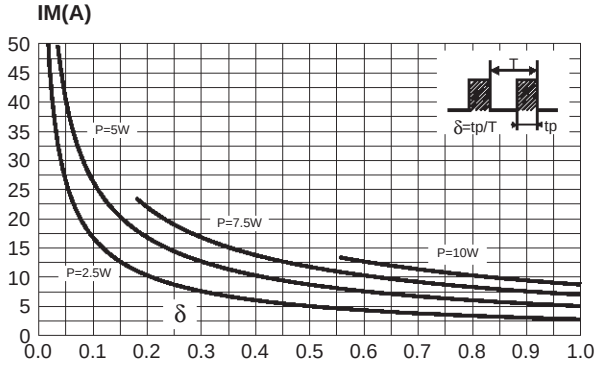


Fig. 3-1: Average forward current versus ambient temperature ($\delta = 0.5$, TO-220AB, DPAK, D^2PAK).

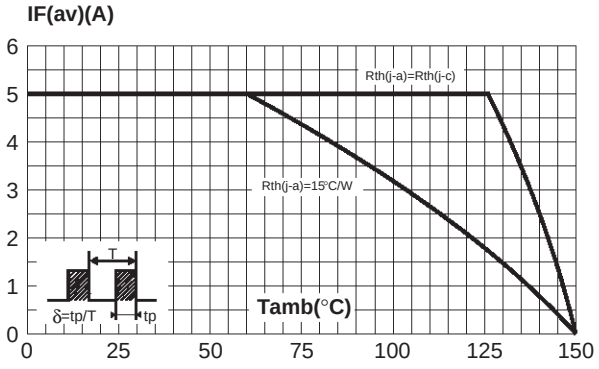


Fig. 3-2: Average forward current versus ambient temperature ($\delta = 0.5$, ISOWATT220AB, TO-220FP).

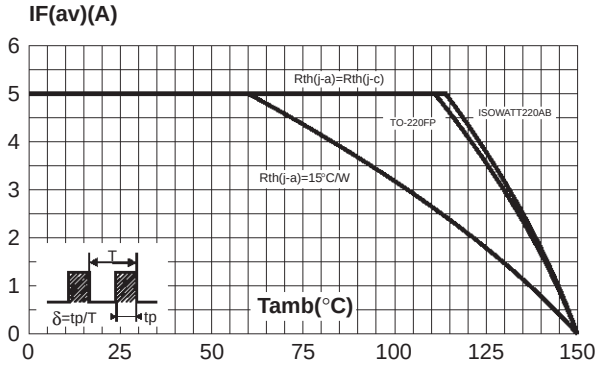


Fig. 4-1: Non repetitive surge peak forward current versus overload duration (TO-220AB, DPAK, D^2PAK).

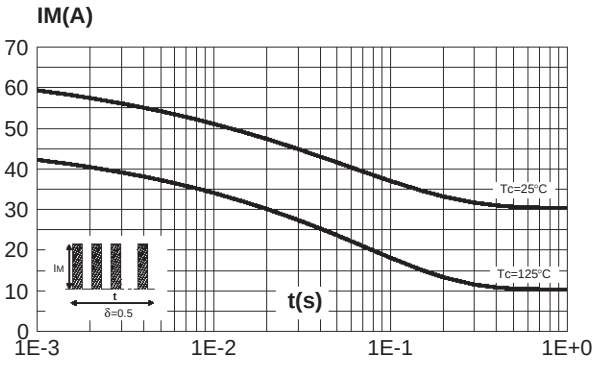


Fig. 4-2: Non repetitive surge peak forward current versus overload duration (ISOWATT220AB).

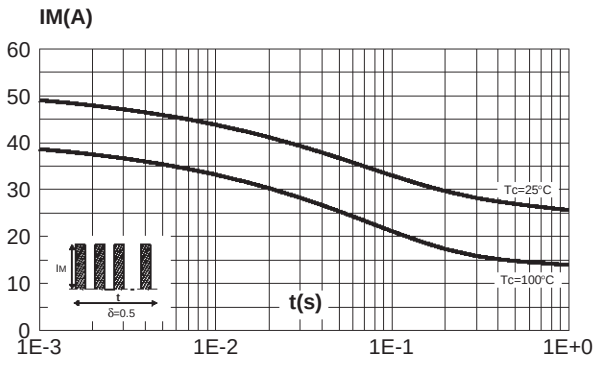


Fig. 4-3: Non repetitive surge peak forward current versus overload duration (TO-220FP).

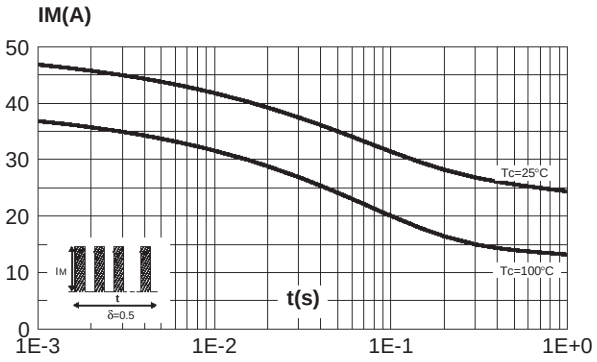


Fig. 5-1: Relative variation of thermal impedance junction to case versus pulse duration (D^2PAK, DPAK, TO-220AB).

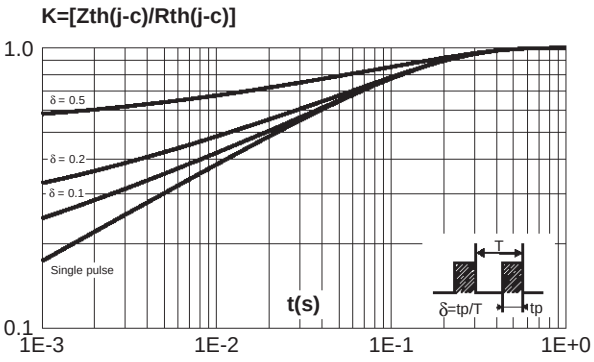


Fig. 5-2: Relative variation of thermal impedance junction to case versus pulse duration (ISOWATT220AB, TO-220FP).

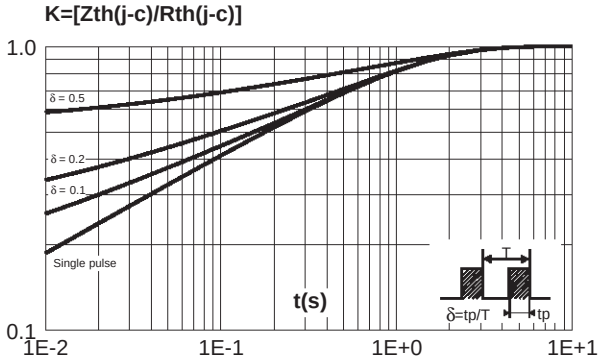


Fig. 6: Forward voltage drop versus forward current (maximum values, per diode).

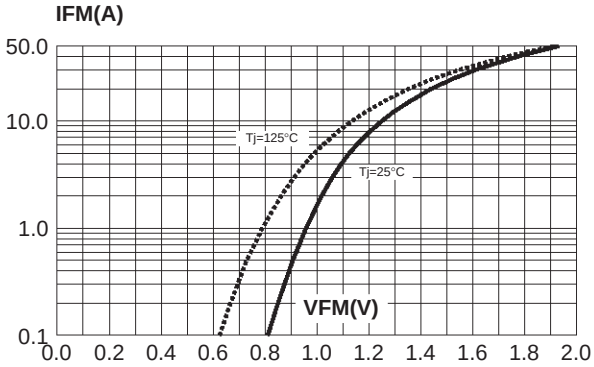


Fig. 7: Junction capacitance versus reverse voltage applied (typical values, per diode).

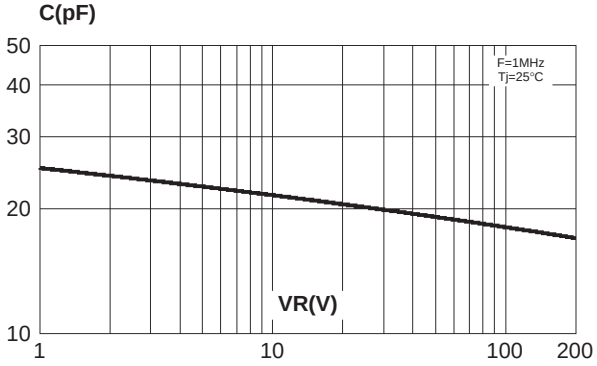


Fig. 8: Reverse recovery charges versus dIF/dt (per diode).

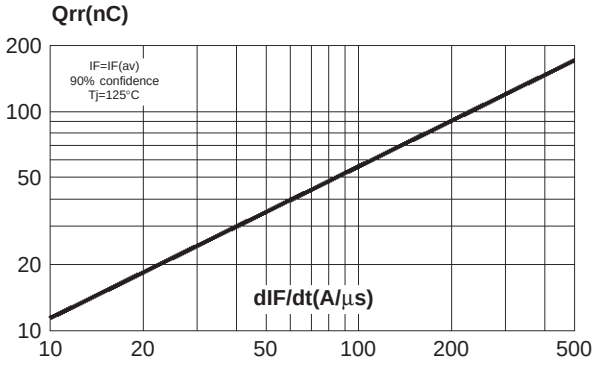


Fig. 9: Peak reverse recovery current versus dIF/dt (per diode).

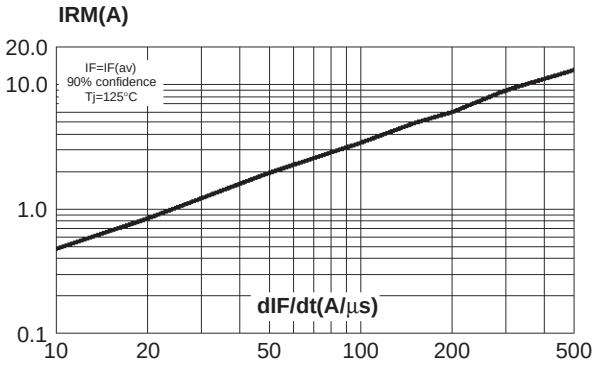


Fig. 10: Dynamic parameters versus junction temperature (per diode).

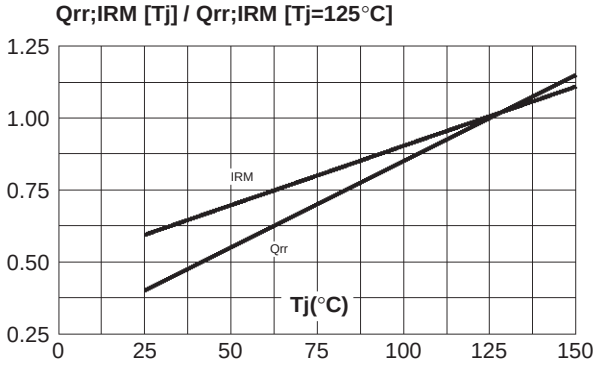
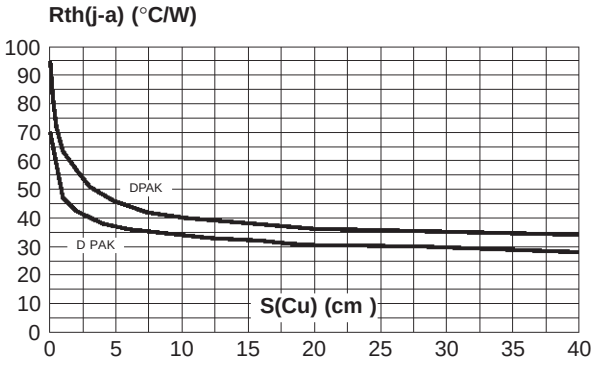
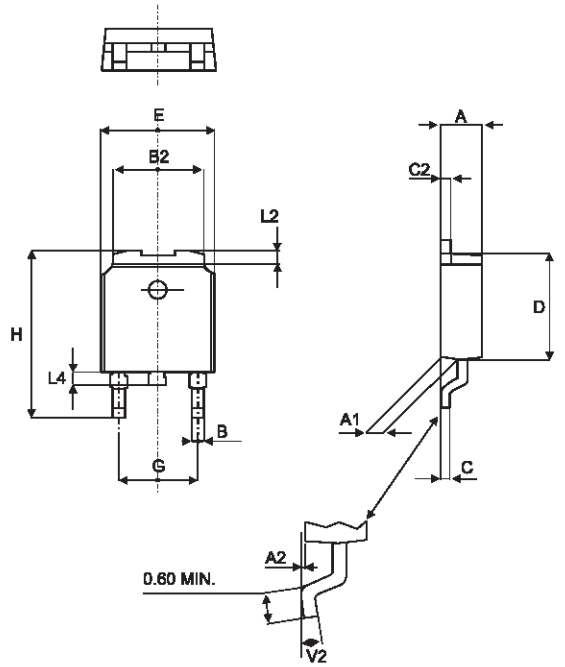


Fig. 11: Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, copper thickness: 35µm).



PACKAGE MECHANICAL DATA

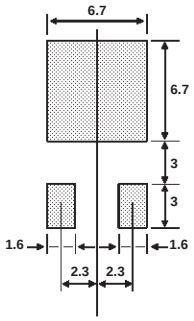
DPAK



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°

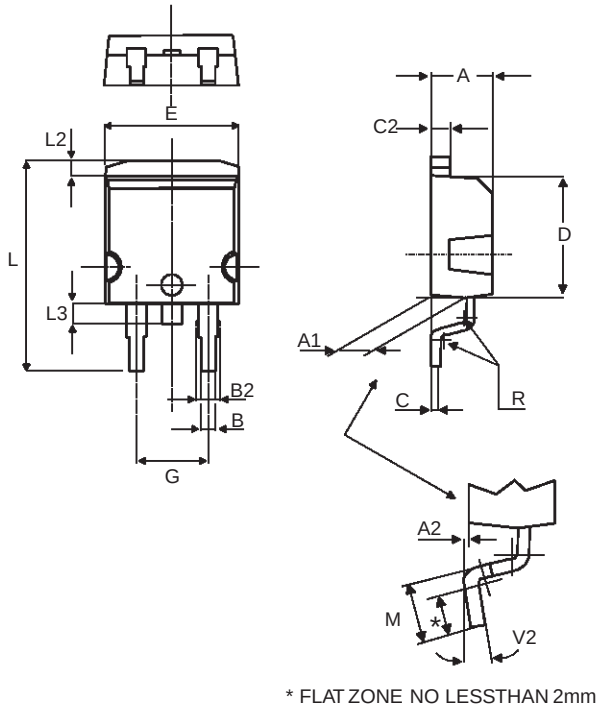
FOOT PRINT (in milliteters)

DPAK



PACKAGE MECHANICAL DATA

D^2PAK

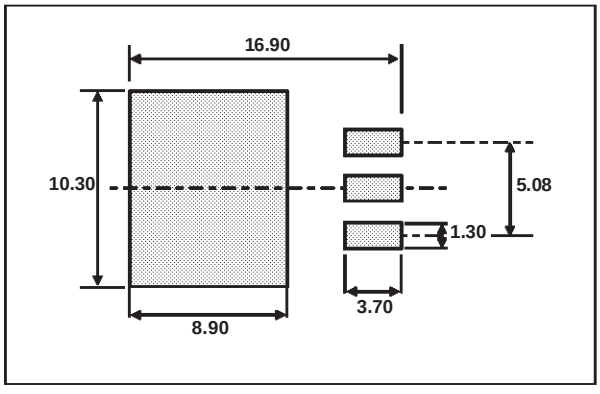


* FLAT ZONE NO LESSTHAN 2mm

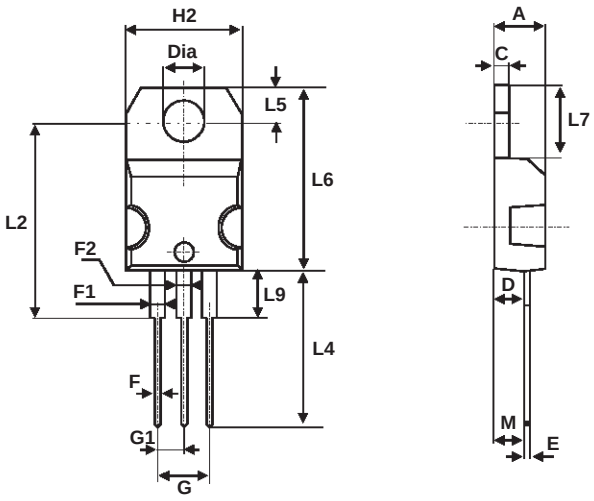
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	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°

FOOT PRINT (in milliteters)

D^2PAK



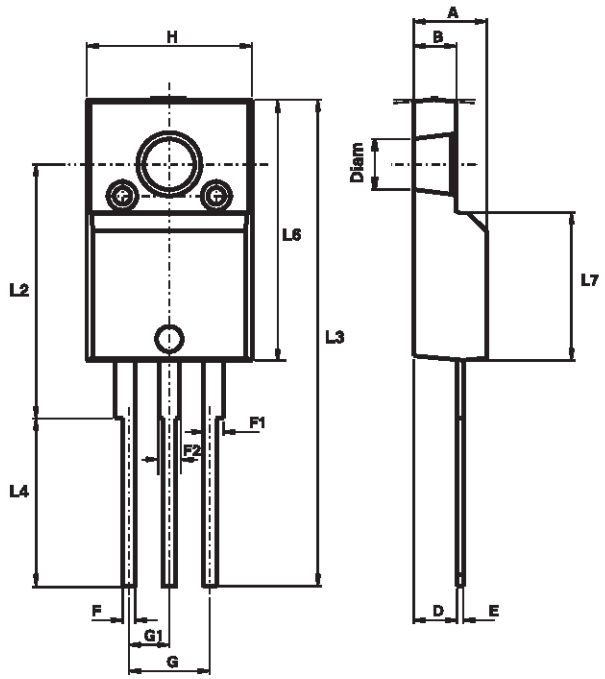
PACKAGE MECHANICAL DATA
TO-220AB (JEDEC compatible)



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

PACKAGE MECHANICAL DATA

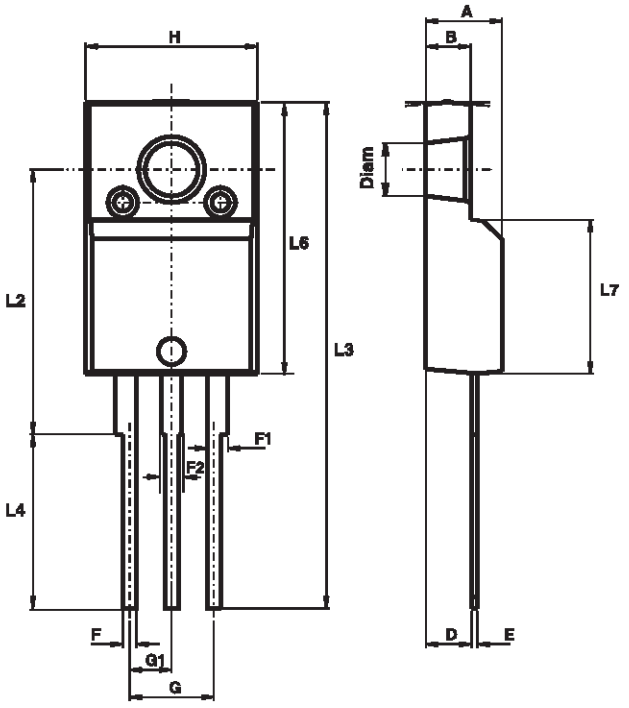
TO-220FP



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.9	0.173	0.193
B	2.5	2.9	0.098	0.114
D	2.45	2.75	0.096	0.108
E	0.40	0.70	0.015	0.027
F	0.60	1	0.023	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	0.204
G1	2.40	2.70	0.094	0.106
H	10	10.7	0.393	0.421
L2	16 Typ.		0.63 Typ.	
L3	28.6	30.6	1.126	1.204
L4	9.8	10.7	0.385	0.421
L6	15.8	16.4	0.622	0.645
L7	9.00	9.90	0.354	0.389
Dia.	2.90	3.50	0.114	0.137

PACKAGE MECHANICAL DATA

ISOWATT220AB (JEDEC compatible)



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
B	2.50	2.70	0.098	0.106
D	2.50	2.75	0.098	0.108
E	0.40	0.70	0.016	0.028
F	0.75	1.00	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	2.40	2.70	0.094	0.106
H	10.00	10.40	0.394	0.409
L2	16.00 typ.		0.630 typ.	
L3	28.60	30.60	1.125	1.205
L4	9.80	10.60	0.386	0.417
L6	15.90	16.40	0.626	0.646
L7	9.00	9.30	0.354	0.366
Diam	3.00	3.20	0.118	0.126

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STPR1020CB	STPR1020CB	DPAK	0.3g	75	Tube
STPR1020CB-TR	STPR1020CB	DPAK	0.3g	2500	Tape & reel
STPR1020CT	STPR1020CT	TO-220AB	2.23g	50	Tube
STPR1020CF	STPR1020CF	ISOWATT220AB	2.2g	50	Tube
STPR1020CG	STPR1020CG	D^2PAK	1.48g	50	Tube
STPR1020CFP	STPR1020CFP	TO-220FP	2.0g	50	Tube

- Cooling method : by conduction (C)
- Recommended torque value (ISOWATT220AB, TO-220FP): 0.55 N.m.
- Maximum torque value (ISOWATT220AB, TO-220FP): 0.70 N.m.
- Recommended torque value (TO-220AB): 0.8 N.m
- Maximum torque value (TO-220AB): 1.0 N.m.
- Epoxy meets UL94,V0