

HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

MAIN PRODUCT CHARACTERISTICS

$I_F(AV)$	2 x 10 A
V_{RRM}	200 V
$T_j(max)$	150 °C
$V_F(max)$	0.85 V
$trr(max)$	25 ns

FEATURES AND BENEFITS

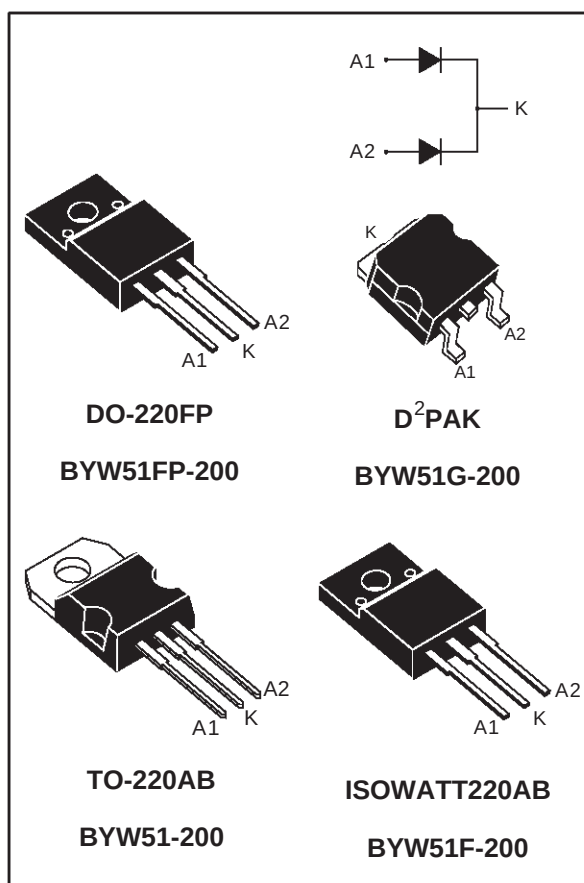
- SUITED FOR SMPS
 - VERY LOW FORWARD LOSSES
 - NEGLIGIBLE SWITCHING LOSSES
 - HIGH SURGE CURRENT CAPABILITY
 - INSULATED PACKAGES (ISOWATT220AB / TO-220FP) :
- Insulation voltage = 2000 V DC
Capacitance = 12 pF

DESCRIPTION

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

Packaged in TO-220AB, ISOWATT220AB, TO-220FP or D²PAK, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.

PRELIMINARY DATASHEET



ABSOLUTE RATINGS (limiting values, per diode)

Symbol	Parameter				Value	Unit
V _{RRM}	Repetitive peak reverse voltage				200	V
I _{F(RMS)}	RMS forward current				20	A
I _{F(AV)}	Average forward current δ = 0.5	TO-220AB/D ² PAK	Tc=120°C	Per diode	10	A
				Per device	20	
		ISOWATT220AB	Tc=95°C	Per diode	10	
				Per device	20	
		TO-220FP	Tc=85°C	Per diode	10	
				Per device	20	
I _{FSM}	Surge non repetitive forward current		tp=10ms sinusoidal		100	A
Tstg	Storage temperature range				- 65 to + 150	°C
Tj	Maximum operating junction temperature				150	°C

THERMAL RESISTANCES

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AB/D ² PAK	Per diode	2.5	°C/W
			Total	1.4	
		ISOWATT220AB	Per diode	5.1	
			Total	4.05	
		TO-220FP	Per diode	5.7	
			Total	4.6	
$R_{th(c)}$	Coupling	TO-220AB/D ² PAK		0.25	°C/W
		ISOWATT220AB		3.0	
		TO-220FP		3.5	

When diodes 1 and 2 are used simultaneously :

$$\Delta T_c (\text{diode 1}) = P(\text{diode 1}) \times R_{th(j-c)} (\text{Per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

STATIC ELECTRICAL CHARACTERISTICS (Per diode)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I_R^*	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$			15	μA
		$T_j = 100^\circ\text{C}$				1	mA
V_F^{**}	Forward voltage drop	$T_j = 125^\circ\text{C}$	$I_F = 8\text{ A}$			0.85	V
		$T_j = 125^\circ\text{C}$	$I_F = 16\text{ A}$			1.05	
		$T_j = 25^\circ\text{C}$	$I_F = 16\text{ A}$			1.15	

Pulse test : * $t_p = 5\text{ ms}$, $\delta < 2\%$

** $t_p = 380\text{ }\mu\text{s}$, $\delta < 2\%$

To evaluate the conduction losses use the following equation :

$$P = 0.65 \times I_{F(AV)} + 0.025 \times I_F^2 (RMS)$$

RECOVERY CHARACTERISTICS

Symbol	Test Conditions			Typ.	Max.	Unit
trr	$T_j = 25^\circ\text{C}$	$I_F = 0.5\text{ A}$ $I_R = 1\text{ A}$	$I_{rr} = 0.25\text{ A}$		25	ns
		$I_F = 1\text{ A}$ $V_R = 30\text{ V}$	$dI_F/dt = -50\text{ A}/\mu\text{s}$		35	
tfr	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$ $V_{FR} = 1.1 \times V_F \text{ max}$	$dI_F/dt = -50\text{ A}/\mu\text{s}$	15		ns
V_{FP}	$T_j = 25^\circ\text{C}$	$I_F = 1\text{ A}$	$dI_F/dt = -50\text{ A}/\mu\text{s}$	2		V

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

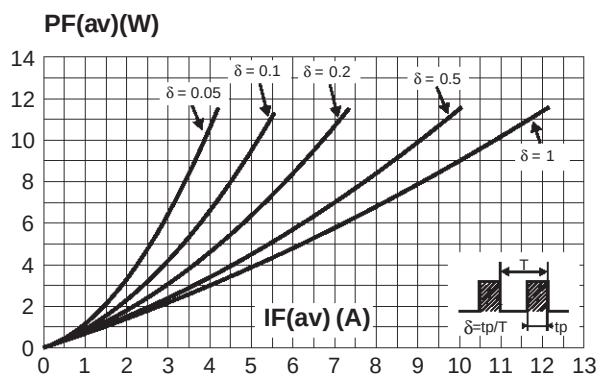


Fig. 2: Peak current versus form factor (per diode).

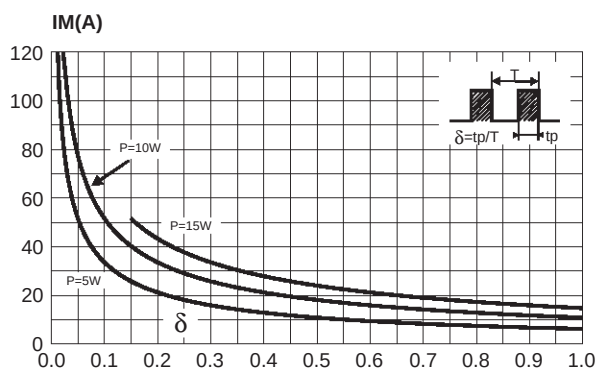


Fig. 3-1: Average forward current versus ambient temperature ($\delta = 0.5$, D²PAK, TO-220AB).

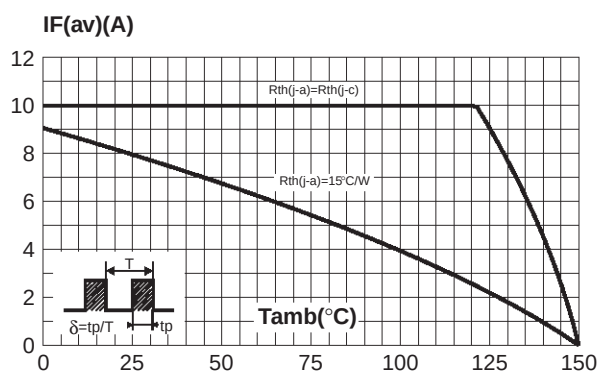


Fig. 3-2: Average forward current versus ambient temperature ($\delta = 0.5$, ISOWATT220AB, TO-220FP).

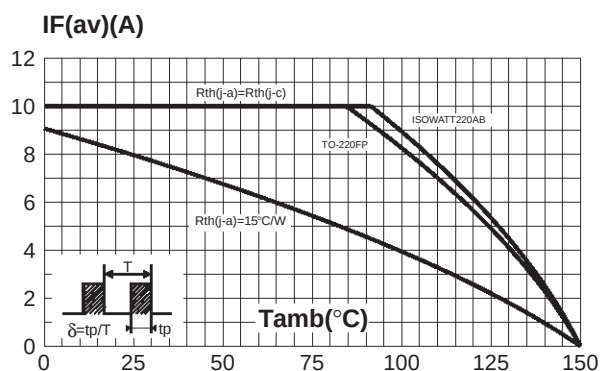


Fig. 4-1: Non repetitive surge peak forward current versus overload duration (D²PAK, TO-220AB).

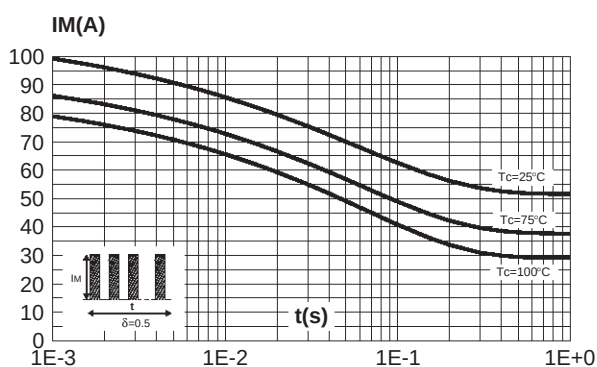


Fig. 4-2: Non repetitive surge peak forward current versus overload duration (ISOWATT220AB).

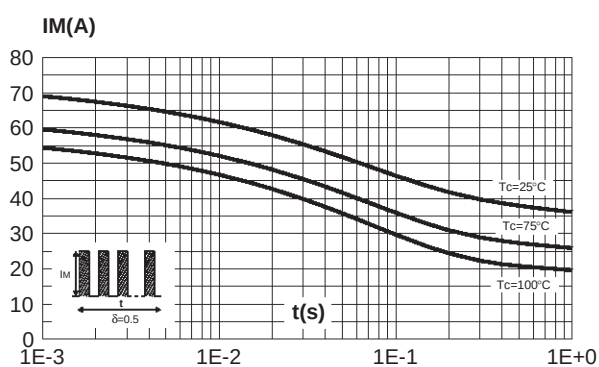


Fig. 4-3: Non repetitive surge peak forward current versus overload duration (TO-220FP).

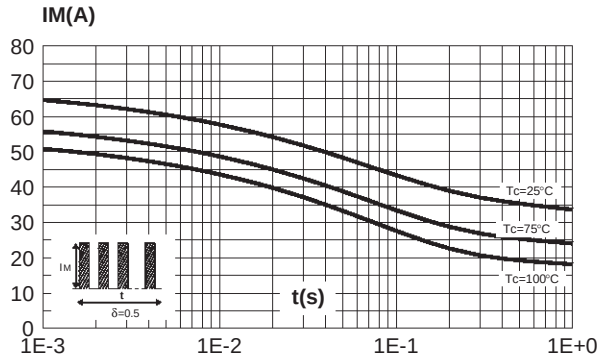


Fig. 5-1: Relative variation of thermal impedance junction to case versus pulse duration (D²PAK, TO-220AB).

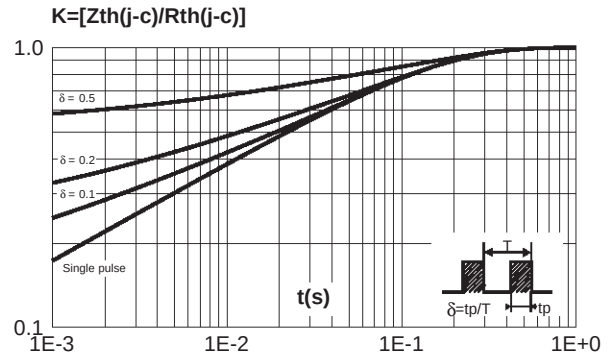


Fig. 5-2: Relative variation of thermal impedance junction to case versus pulse duration (ISOWATT220AB, TO-220FP).

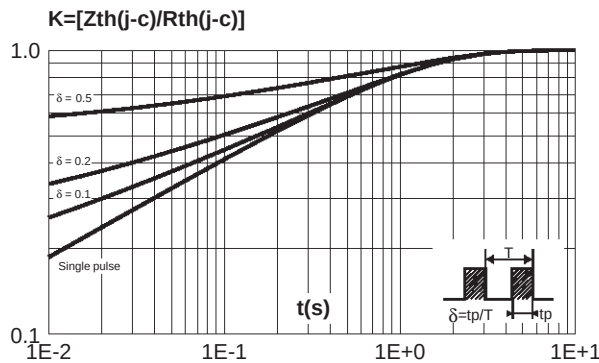


Fig. 6: Forward voltage drop versus forward current (maximum values, per diode).

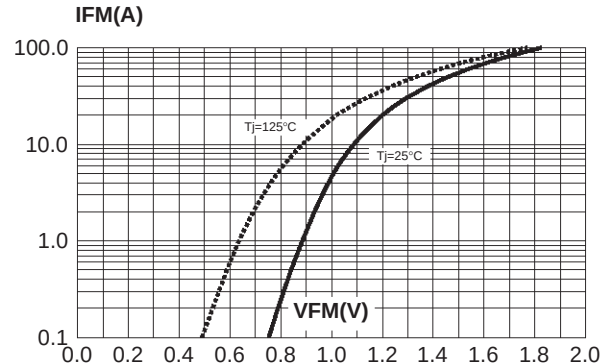


Fig. 7: Junction capacitance versus reverse voltage applied (typical values, per diode).

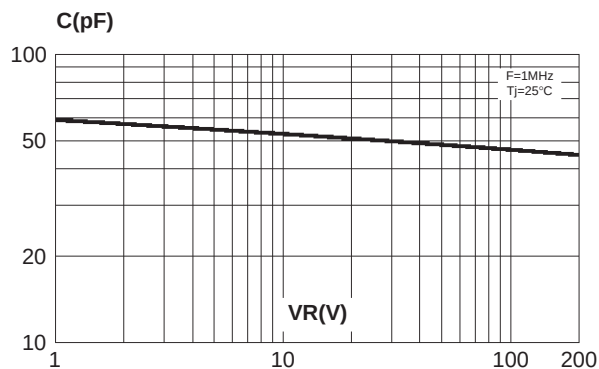


Fig. 8: Reverse recovery charges versus dI_F/dt (per diode).

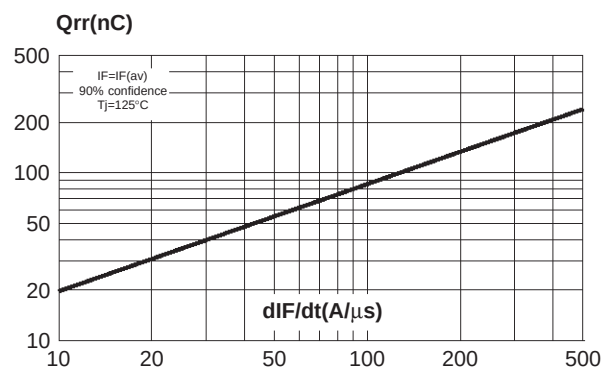


Fig. 9: Peak reverse recovery current versus dI_F/dt (per diode).

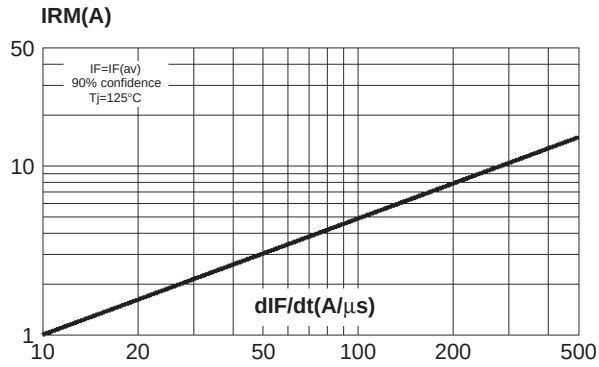


Fig. 10: Dynamic parameters versus junction temperature.

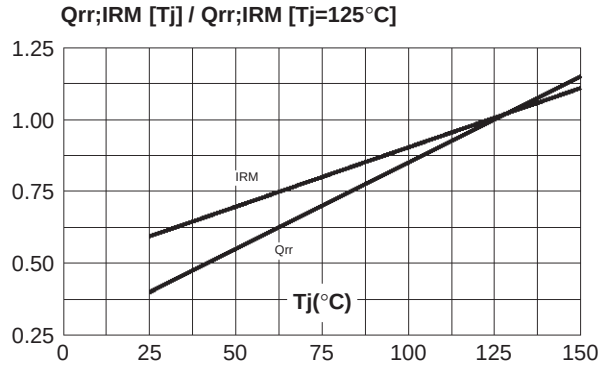
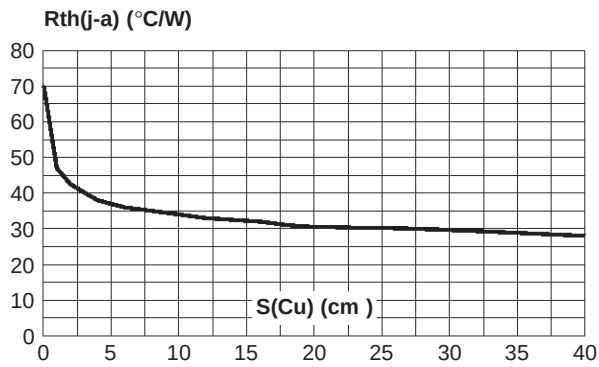
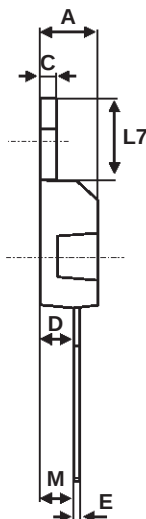
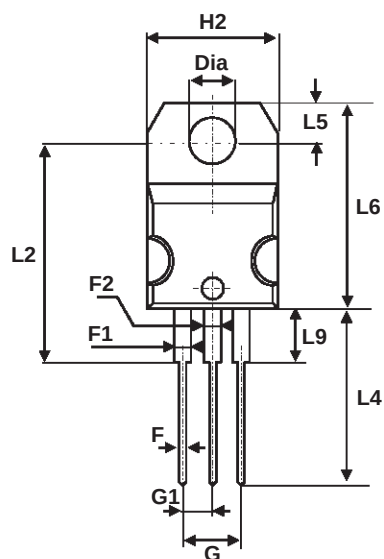


Fig. 11: Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, copper thickness: $35\mu m$) (D^2PAK).

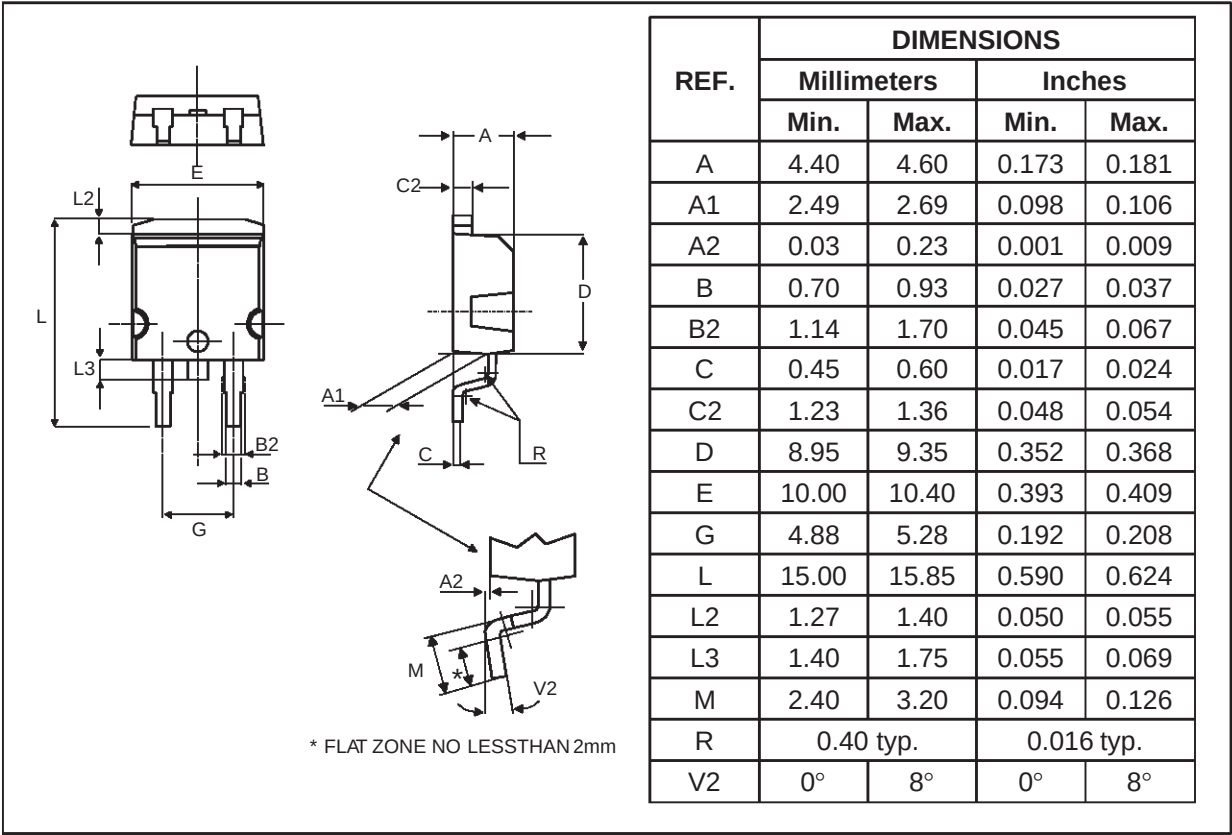


PACKAGE MECHANICAL DATA
TO-220AB (JEDEC compatible)

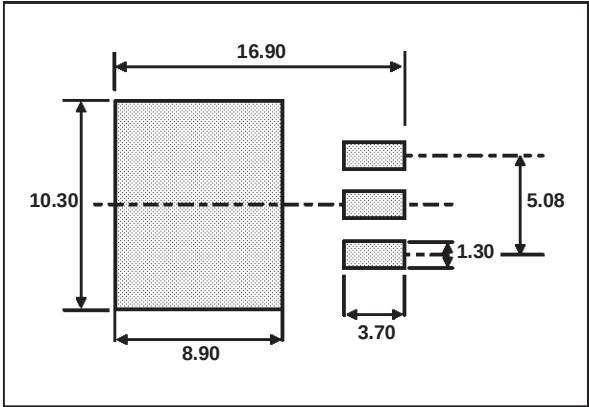


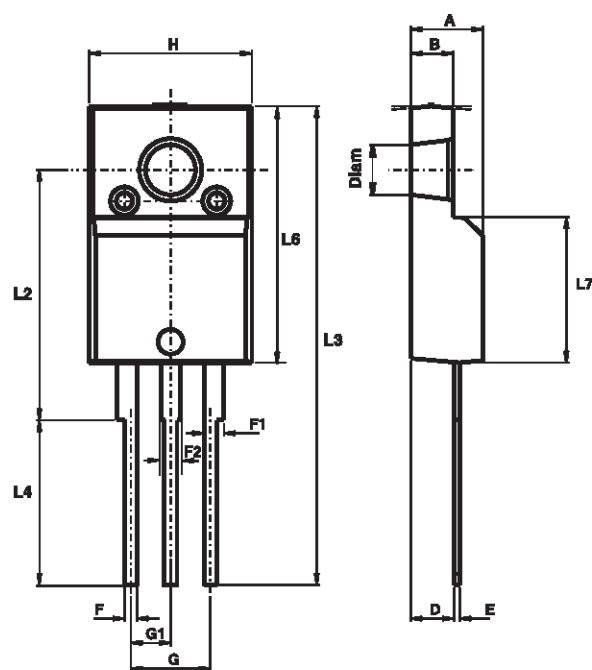
REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
F2	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
G1	2.40	2.70	0.094	0.106
H2	10	10.40	0.393	0.409
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
D²PAK



FOOT PRINT (in millimeters)
D²PAK



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 code	Marking	Package	Weight	Base qty	Delivery mode
BYW51-200	BYW51-200	TO220AB	2.2 g.	50	Tube
BYW51F-200	BYW51F-200	ISOWATT220AB	2.08 g.	50	Tube
BYW51G-200	BYW51G-200	D ² PAK	1.48 g.	50	Tube
BYW51FP-200	BYW51FP-200	TO-220FP	2g	50	Tube

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

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