SGS-THOMSON MICROELECTRONICS

# BYW51(F)

## HIGH EFFICIENCY FAST RECOVERY RECTIFIER DIODES

### FEATURES

- SUITED FOR SMPS
- VERY LOW FORWARD LOSSES
- NEGLIGIBLE SWITCHING LOSSES
- HIGH SURGE CURRENT CAPABILITY
- HIGH AVALANCHE ENERGY CAPABILITY
- INSULATED VERSION (ISOWATT220AB) :
  Insulating voltage = 2000 V DC
  Capacitance = 12 pF


**TO220AB**
(Plastic)

**BYW51-200**

**isolated**
**ISOWATT220AB**
(Plastic)

**BYW51F-200**

### DESCRIPTION

Dual center tap rectifier suited for switchmode power supply and high frequency DC to DC converters.
Packaged in TO220AB, or ISOWATT220AB this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection applications.

### ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | | | | Value | Unit |
|---|---|---|---|---|---|---|
| $I_{F(RMS)}$ | RMS forward current | | | Per diode | 20 | A |
| $I_{F(AV)}$ | Average forward current $\delta = 0.5$ | TO220AB | Tc=120°C | Per diode | 10 | A |
| | | ISOWATT220AB | Tc=95°C | Per diode | 10 | |
| $I_{FSM}$ | Surge non repetitive forward current | | tp=10ms sinusoidal | Per diode | 100 | A |
| Tstg<br>Tj | Storage and junction temperature range | | | | - 65 to + 150<br>- 65 to + 150 | °C<br>°C |

| Symbol | Parameter | BYW51-(F) | | | | Unit |
|---|---|---|---|---|---|---|
| | | 50 | 100 | 150 | 200 | |
| $V_{RRM}$ | Repetitive peak reverse voltage | 50 | 100 | 150 | 200 | V |

## THERMAL RESISTANCE

| Symbol | Parameter | | | Value | Unit |
|---|---|---|---|---|---|
| Rth (j-c) | Junction to case | TO220AB | Per diode | 2.5 | °C/W |
| | | | Total | 1.4 | |
| | | ISOWATT220AB | Per diode | 5.1 | |
| | | | Total | 4.05 | |
| Rth (c) | Coupling | TO220AB | | 0.25 | °C/W |
| | | ISOWATT220AB | | 3.0 | |

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

## ELECTRICAL CHARACTERISTICS (Per diode)
## STATIC CHARACTERISTICS

| Symbol | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_R$ * | $T_j$ = 25°C | $V_R = V_{RRM}$ | | | 15 | µA |
| | $T_j$ = 100°C | | | | 1 | mA |
| $V_F$ ** | $T_j$ = 125°C | $I_F$ = 8 A | | | 0.85 | V |
| | $T_j$ = 125°C | $I_F$ = 16 A | | | 1.05 | |
| | $T_j$ = 25°C | $I_F$ = 16 A | | | 1.15 | |

Pulse test : * tp = 5 ms, duty cycle < 2 %
** tp = 380 µs, duty cycle < 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 | | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| trr | $T_j$ = 25°C | $I_F$ = 0.5A<br>$I_R$ = 1A | Irr = 0.25A | | | 25 | ns |
| | | $I_F$ = 1A<br>$V_R$ = 30V | $dI_F/dt$ = -50A/µs | | | 35 | |
| tfr | $T_j$ = 25°C | $I_F$ = 1A<br>$V_{FR} = 1.1 \times V_F$ | tr = 10 ns | | 15 | | ns |
| $V_{FP}$ | $T_j$ = 25°C | $I_F$ = 1A | tr = 10 ns | | 2 | | V |

**Fig.1** : Average forward power dissipation versus average forward current.

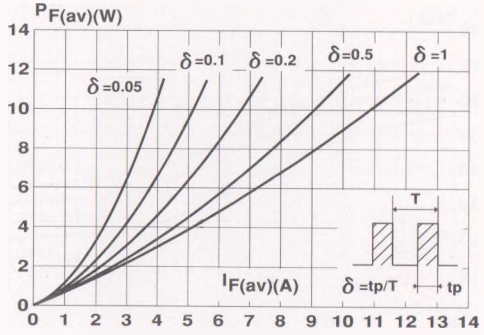


**Fig.2** : Peak current versus form factor.

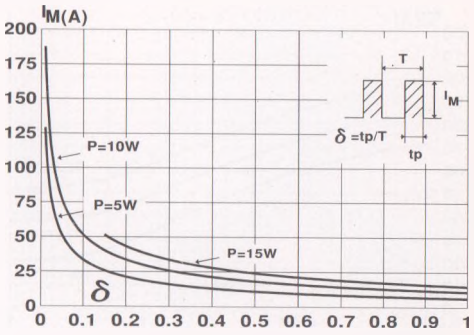


**Fig.3** : Forward voltage drop versus forward current (maximum values).

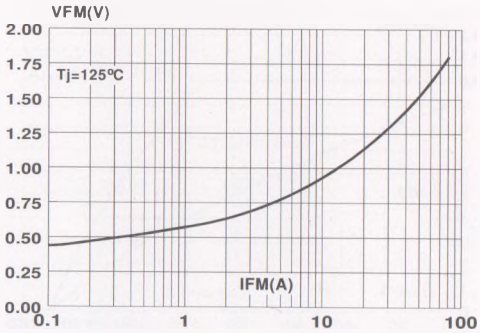


**Fig.4** : Relative variation of thermal impedance junction to case versus pulse duration. (TO220AB)

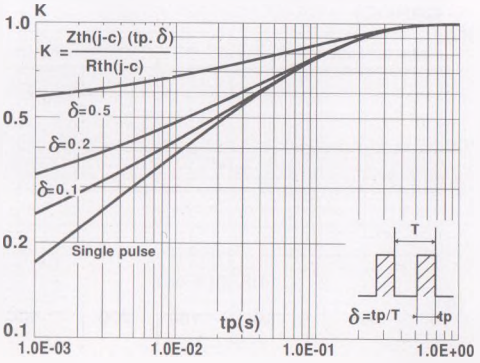


**Fig.5** : Relative variation of thermal impedance junction to case versus pulse duration. (ISOWATT220AB)

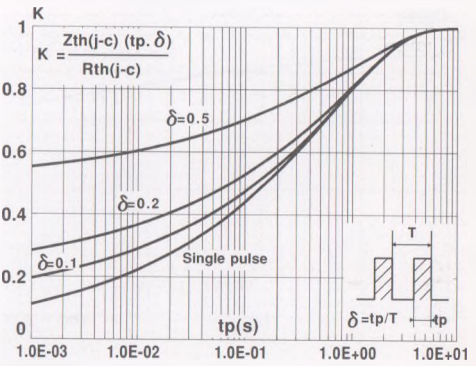

**Fig.6 :** Non repetitive surge peak forward current versus overload duration.
(TO220AB)

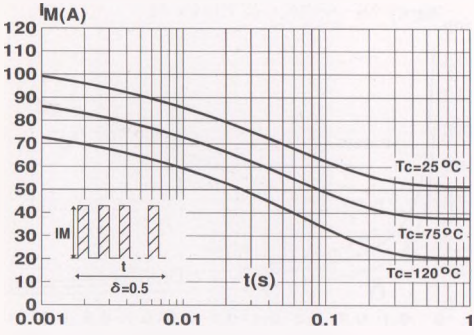


**Fig.7 :** Non repetitive surge peak forward current versus overload duration.
(ISOWATT220AB)

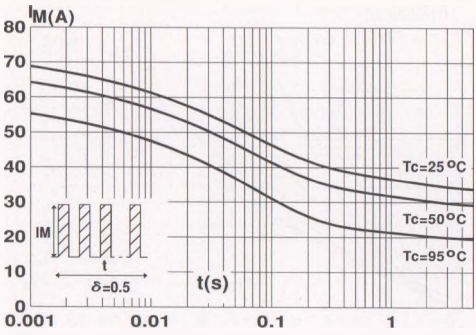


**Fig.8 :** Average current versus ambient temperature.
(duty cycle : 0.5) (TO220AB)

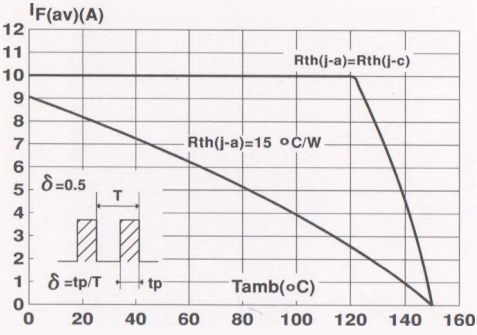


**Fig.9 :** Average current versus ambient temperature.
(duty cycle : 0.5) (ISOWATT220AB)

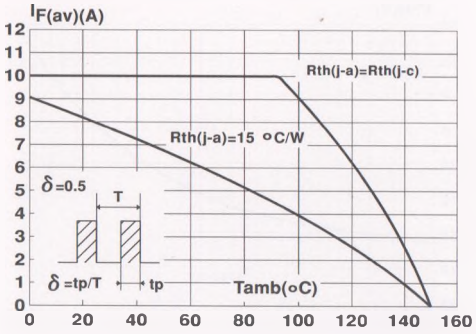


**Fig.10 :** Junction capacitance versus reverse voltage applied (Typical values).

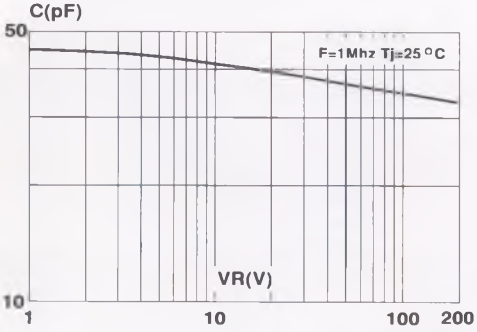


**Fig.11 :** Recovery charges versus $dI_F/dt$.

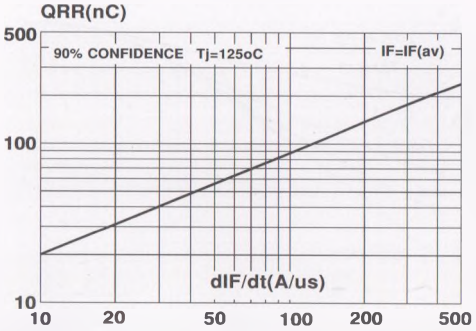

**Fig.12 :** Peak reverse current versus dIF/dt.

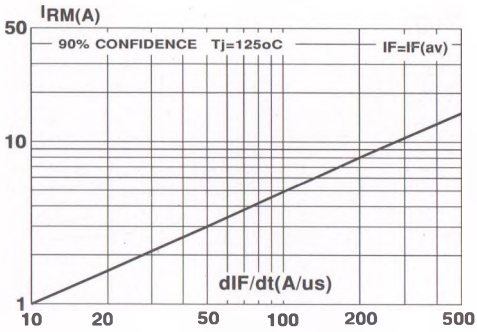


**Fig.13 :** Dynamic parameters versus junction temperature.