



# BYT230PIV-1000 BYT231PIV-1000

## FAST RECOVERY RECTIFIER DIODES

### MAIN PRODUCT CHARACTERISTICS

|               |          |
|---------------|----------|
| $I_F(AV)$     | 2 x 30 A |
| $V_{RRM}$     | 1000 V   |
| $V_F(max)$    | 1.8 V    |
| $t_{rr}(max)$ | 80 ns    |

### FEATURES AND BENEFITS

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED PACKAGE: ISOTOP  
Insulation voltage: 2500 V<sub>RMS</sub>  
Capacitance = 45 pF  
Inductance < 5 nH

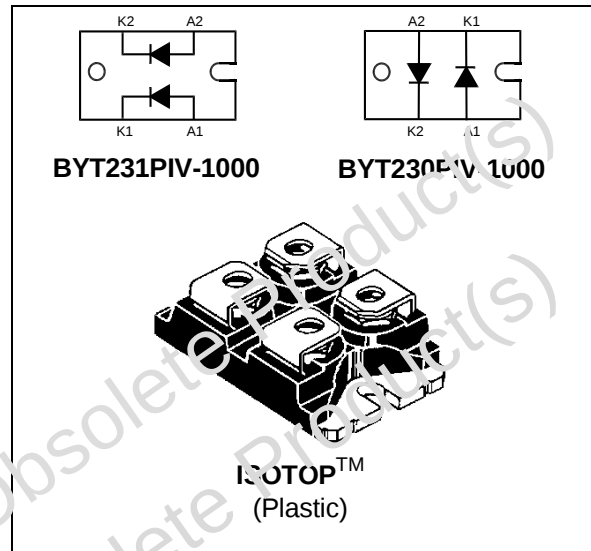
### DESCRIPTION

Dual high voltage rectifier devices are suited for free-wheeling function in converters and motor control circuits.

Packaged in ISOTOP, they are intended for use in Switch Mode Power Supplies.

### ABSOLUTE RATINGS (limiting values, per diode)

| Symbol       | Parameter                              |                                      | Value         | Unit       |
|--------------|----------------------------------------|--------------------------------------|---------------|------------|
| $V_{RRM}$    | Repetitive peak reverse voltage        |                                      | 1000          | V          |
| $I_{FRM}$    | Repetitive peak forward current        | $t_p=5 \mu s \quad F=1kHz$           | 700           | A          |
| $I_{F(RMS)}$ | RMS forward current                    |                                      | 50            | A          |
| $I_F(AV)$    | Average forward current                | $T_c = 55^\circ C$<br>$\delta = 0.5$ | 30            | A          |
| $I_{FSM}$    | Surge non repetitive forward current   | $t_p = 10 ms$ Sinusoidal             | 200           | A          |
| $T_{stg}$    | Storage temperature range              |                                      | - 40 to + 150 | $^\circ C$ |
| $T_j$        | Maximum operating junction temperature |                                      | 150           | $^\circ C$ |



TM: ISOTOP is a registered trademark of STMicroelectronics.

## BYT230PIV-1000 / BYT231PIV-1000

### THERMAL RESISTANCES

| Symbol        | Parameter        |           | Value | Unit |
|---------------|------------------|-----------|-------|------|
| $R_{th(j-c)}$ | Junction to case | Per diode | 1.5   | °C/W |
|               |                  | Total     | 0.8   |      |
| $R_{th(c)}$   |                  | Coupling  | 0.1   |      |

When the diodes 1 and 2 are used simultaneously :

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

### STATIC ELECTRICAL CHARACTERISTICS (per diode)

| Symbol     | Parameter               | Test Conditions           |                     | Min. | Typ. | Max. | Unit          |
|------------|-------------------------|---------------------------|---------------------|------|------|------|---------------|
| $V_F^*$    | Forward voltage drop    | $T_j = 25^\circ\text{C}$  | $I_F = 30\text{ A}$ |      |      | 1.9  | V             |
|            |                         | $T_j = 100^\circ\text{C}$ |                     |      |      | 1.8  |               |
| $I_R^{**}$ | Reverse leakage current | $T_j = 25^\circ\text{C}$  | $V_R = V_{RRM}$     |      |      | 100  | $\mu\text{A}$ |
|            |                         | $T_j = 100^\circ\text{C}$ |                     |      |      | 5    | mA            |

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

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

To evaluate the conduction losses use the following equation:

$$P = 1.47 \times I_{F(AV)} + 0.010 I_F^2(RMS)$$

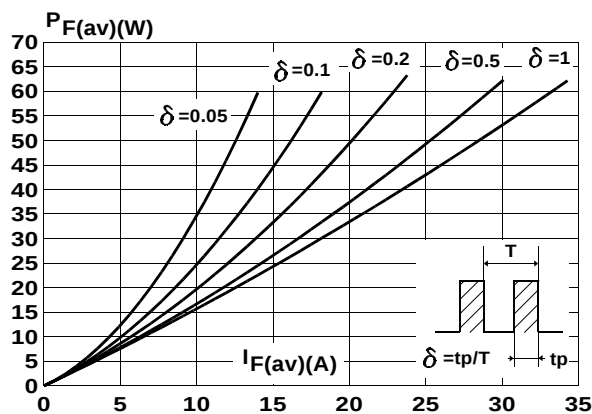
### RECOVERY CHARACTERISTICS (per diode)

| Symbol   | Test Conditions          |                                                                             | Min. | Typ. | Max. | Unit |
|----------|--------------------------|-----------------------------------------------------------------------------|------|------|------|------|
| $t_{rr}$ | $T_j = 25^\circ\text{C}$ | $I_F = 1\text{ A}$ $V_R = 30\text{ V}$ $di_F/dt = -15\text{ A}/\mu\text{s}$ |      |      | 165  | ns   |
|          |                          | $I_F = 0.5\text{ A}$ $I_R = 1\text{ A}$ $I_{rr} = 0.25\text{ A}$            |      |      | 80   |      |

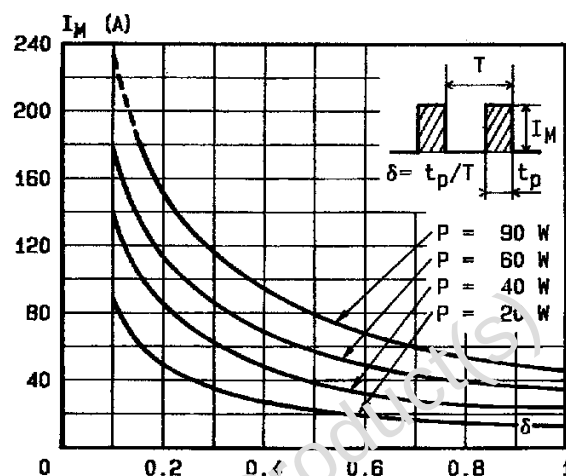
### TURN-OFF SWITCHING CHARACTERISTICS (per diode)

| Symbol                      | Parameter                        | Test Conditions                                                                                                                                 |                                                                                                                                    | Min. | Typ. | Max. | Unit |
|-----------------------------|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|
| $t_{IRM}$                   | Maximum reverse recovery time    | $di_F/dt = -120\text{ A}/\mu\text{s}$                                                                                                           | $V_{CC} = 200\text{ V}$<br>$I_F = 30\text{ A}$<br>$L_p \leq 0.05\text{ }\mu\text{H}$<br>$T_J = 100^\circ\text{C}$<br>(see fig. 11) |      |      | 200  | ns   |
|                             |                                  | $di_F/dt = -240\text{ A}/\mu\text{s}$                                                                                                           |                                                                                                                                    |      | 120  |      |      |
| $I_{F, RM}$                 | Maximum reverse recovery current | $di_F/dt = -120\text{ A}/\mu\text{s}$                                                                                                           |                                                                                                                                    |      |      | 19.5 | A    |
|                             |                                  | $di_F/dt = -240\text{ A}/\mu\text{s}$                                                                                                           |                                                                                                                                    |      | 22   |      |      |
| $C = \frac{V_{RP}}{V_{CC}}$ | Turn-off overvoltage coefficient | $T_J = 100^\circ\text{C}$ $V_{CC} = 200\text{V}$ $I_F = I_{F(AV)}$<br>$di_F/dt = -30\text{A}/\mu\text{s}$ $L_p = 5\mu\text{H}$<br>(see fig. 12) |                                                                                                                                    |      |      | 4.5  | /    |

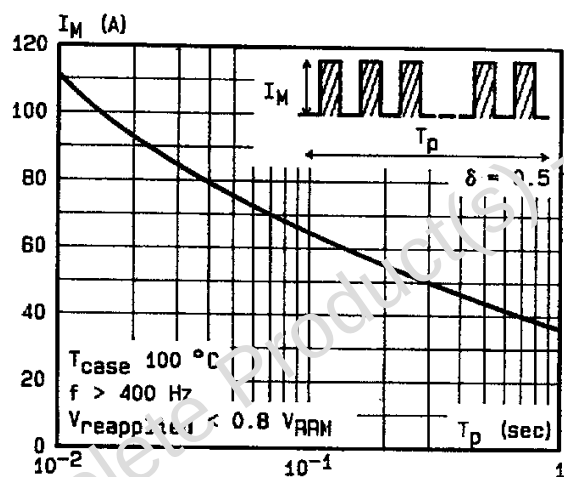
**Fig. 1:** Low frequency power losses versus average current.



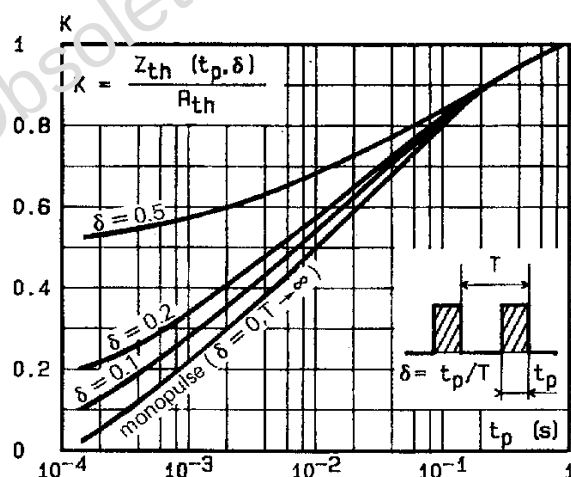
**Fig. 2:** Peak current versus form factor.



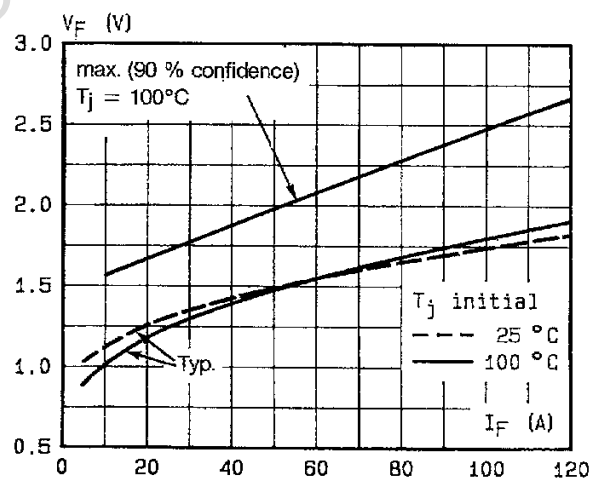
**Fig. 3:** Non repetitive peak surge current versus overload duration.



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



**Fig. 5:** Voltage drop versus forward current.



**Fig. 6:** Recovery charge versus  $di_F/dt$ .

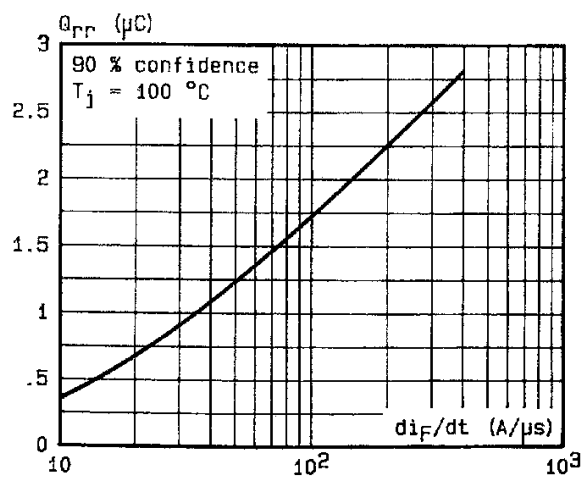


Fig. 7: Recovery time versus  $di_F/dt$ .

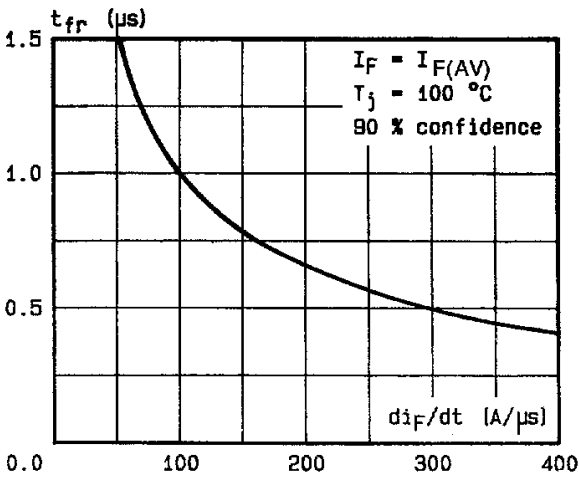


Fig. 9: Peak forward voltage versus  $di_F/dt$ .

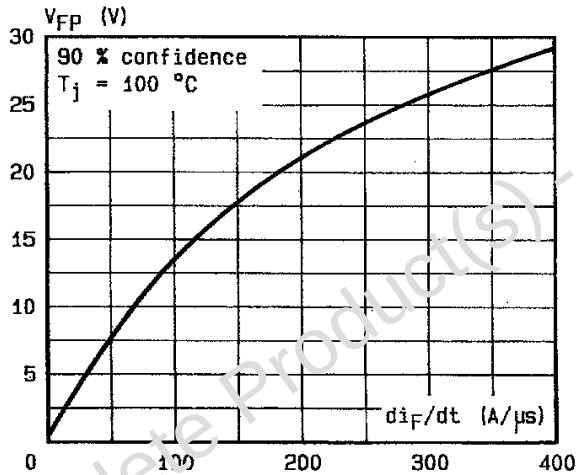


Fig. 11: Turn-off switching characteristics (without series inductance).

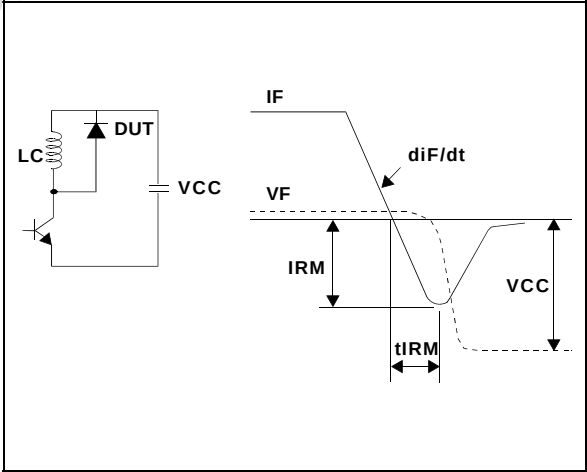


Fig. 8: Peak reverse current versus  $di_F/dt$ .

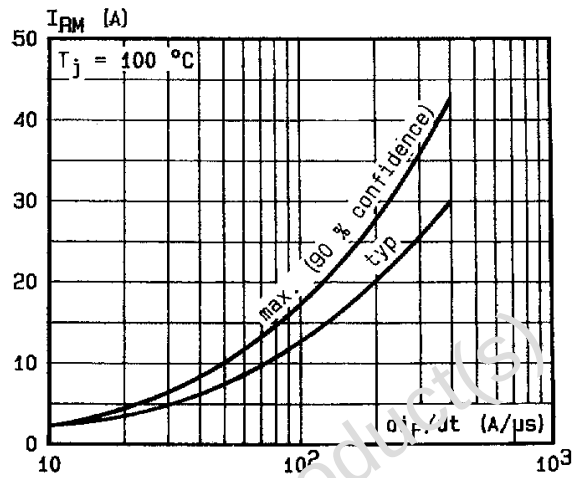


Fig. 10: Dynamic parameters versus junction temperature.

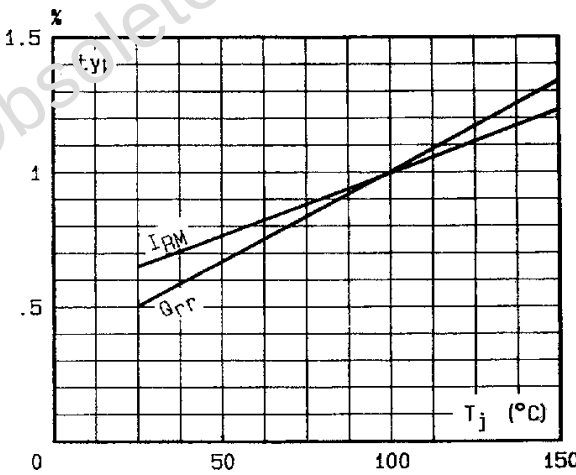
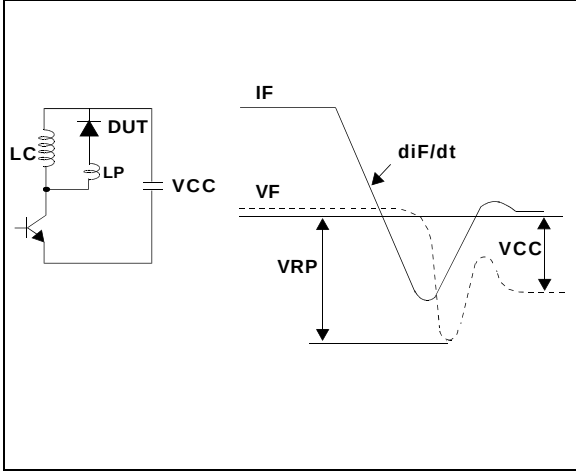


Fig. 12: Turn-off switching characteristics (with series inductance).



**PACKAGE MECHANICAL DATA**  
**ISOTOP**

| REF. | DIMENSIONS  |       |            |       |
|------|-------------|-------|------------|-------|
|      | Millimeters |       | Inches     |       |
|      | Min.        | Max.  | Min.       | Max.  |
| A    | 11.80       | 12.20 | 0.465      | 0.480 |
| A1   | 8.90        | 9.10  | 0.350      | 0.358 |
| B    | 7.8         | 8.20  | 0.307      | 0.323 |
| C    | 0.75        | 0.85  | 0.030      | 0.033 |
| C2   | 1.95        | 2.05  | 0.077      | 0.081 |
| D    | 37.80       | 38.20 | 1.488      | 1.504 |
| D1   | 31.50       | 31.70 | 1.240      | 1.248 |
| E    | 25.15       | 25.50 | 0.990      | 1.004 |
| E1   | 23.85       | 24.15 | 0.939      | 0.951 |
| E2   | 24.80 typ.  |       | 0.976 typ. |       |
| G    | 14.90       | 15.10 | 0.587      | 0.594 |
| G1   | 12.60       | 12.80 | 0.496      | 0.504 |
| G2   | 3.50        | 4.30  | 0.138      | 0.169 |
| F    | 4.10        | 4.30  | 0.161      | 0.169 |
| F1   | 4.00        | 5.00  | 0.181      | 0.197 |
| P    | 4.00        | 4.30  | 0.157      | 0.69  |
| P1   | 4.00        | 4.40  | 0.157      | 0.173 |
| S    | 30.10       | 30.30 | 1.185      | 1.193 |

| Ordering type  | Marking        | Package | Weight                 | Base qty | Delivery mode |
|----------------|----------------|---------|------------------------|----------|---------------|
| BYT230PIV-1000 | BYT230PIV-1000 | ISOTOP  | 28 g. (without screws) | 10       | Tube          |
| BYT231PIV-1000 | BYT231PIV-1000 | ISOTOP  | 28 g. (without screws) | 10       | Tube          |

- Cooling method: by conduction (C)
- Recommended torque value : 1.3 N.m (MAX 1.5 N.m) for the 6 x M4 screws. (2 x M4 screws recommended for mounting the package on the heatsink and the 4 screws given with the screw version). The screws supplied with the package are adapted for mounting on a board (or other types of terminals) with a thickness of 0.6 mm min and 2.2 mm max.
- Epoxy meets UL94,V0

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