



# BYT230PIV-400 BYT231PIV-400

## FAST RECOVERY RECTIFIER DIODES

### MAIN PRODUCT CHARACTERISTICS

|               |          |
|---------------|----------|
| $I_{F(AV)}$   | 2 x 30 A |
| $V_{RRM}$     | 400 V    |
| $V_F(max)$    | 1.4 V    |
| $t_{rr}(max)$ | 50 ns    |

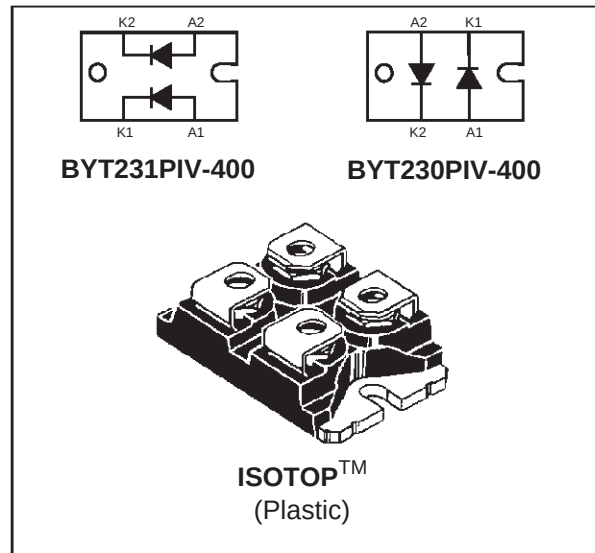
### FEATURES AND BENEFITS

- 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

These 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        |                                      | 400           | V          |
| $I_{FRM}$    | Repetitive peak forward current        | $t_p=5 \mu s \quad F=1kHz$           | 900           | A          |
| $I_{F(RMS)}$ | RMS forward current                    |                                      | 50            | A          |
| $I_{F(AV)}$  | Average forward current                | $T_c = 75^\circ C$<br>$\delta = 0.5$ | 30            | A          |
| $I_{FSM}$    | Surge non repetitive forward current   | $t_p = 10 ms$ Sinusoidal             | 350           | A          |
| $T_{stg}$    | Storage temperature range              |                                      | - 40 to + 150 | $^\circ C$ |
| $T_j$        | Maximum operating junction temperature |                                      | 150           | $^\circ C$ |

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## BYT230PIV-400 / BYT231PIV-400

### THERMAL RESISTANCES

| Symbol        | Parameter        |                    | Value      | Unit |
|---------------|------------------|--------------------|------------|------|
| $R_{th(j-c)}$ | Junction to case | Per diode<br>Total | 1.5<br>0.8 | °C/W |
| $R_{th(c)}$   |                  | 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    | $T_j = 25^\circ\text{C}$  | $I_F = 30\text{ A}$ |      |      | 1.5  | V             |
|            |                         | $T_j = 100^\circ\text{C}$ |                     |      |      | 1.4  |               |
| $I_R^{**}$ | Reverse leakage current | $T_j = 25^\circ\text{C}$  | $V_R = V_{RRM}$     |      |      | 35   | $\mu\text{A}$ |
|            |                         | $T_j = 100^\circ\text{C}$ |                     |      |      | 6    | 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:

$$P = 1.1 \times I_{F(AV)} + 0.0095 I_F^2 (RMS)$$

### RECOVERY CHARACTERISTICS

| Symbol   | Test Conditions          |                                                                             | Min. | Typ. | Max. | Unit |
|----------|--------------------------|-----------------------------------------------------------------------------|------|------|------|------|
| $t_{rr}$ | $T_j = 25^\circ\text{C}$ | $I_F = 1\text{ A}$ $V_R = 30\text{ V}$ $dI_F/dt = -15\text{ A}/\mu\text{s}$ |      |      | 100  | ns   |
|          |                          | $I_F = 0.5\text{ A}$ $I_R = 1\text{ A}$ $I_{rr} = 0.25\text{ A}$            |      |      | 50   |      |

### TURN-OFF SWITCHING CHARACTERISTICS

| 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>$L_p \text{ @ } 0.05\text{ }\mu\text{H}$<br>$T_j = 100^\circ\text{C}$<br>(see fig. 13) |      |      | 75   | ns   |
|                             |                                  | $dI_F/dt = -240\text{ A}/\mu\text{s}$                                                                                                                    |                                                                                                                                          |      | 50   |      |      |
| $I_{RM}$                    | Maximum reverse recovery current | $dI_F/dt = -120\text{ A}/\mu\text{s}$                                                                                                                    |                                                                                                                                          |      |      | 9    | A    |
|                             |                                  | $dI_F/dt = -240\text{ A}/\mu\text{s}$                                                                                                                    |                                                                                                                                          |      | 12   |      |      |
| $C = \frac{V_{RP}}{V_{CC}}$ | Turn-off overvoltage coefficient | $T_j = 100^\circ\text{C}$ $V_{CC} = 60\text{ V}$ $I_F = I_{F(AV)}$<br>$dI_F/dt = -30\text{ A}/\mu\text{s}$ $L_p = 1\text{ }\mu\text{H}$<br>(see fig. 14) |                                                                                                                                          |      | 3.3  |      | /    |

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

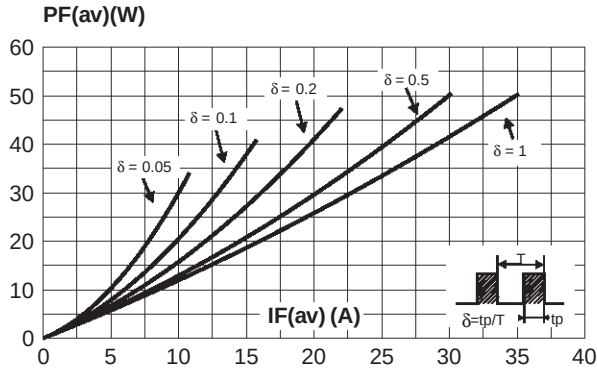


**Fig. 2:** Peak current versus form factor (per diode).

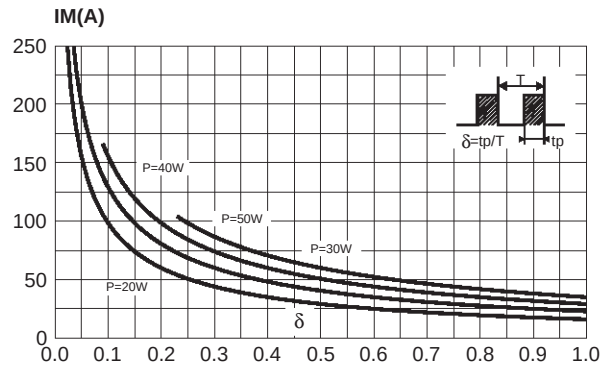


**Fig. 3:** Average forward current versus ambient temperature ( $\delta=0.5$ , per diode).

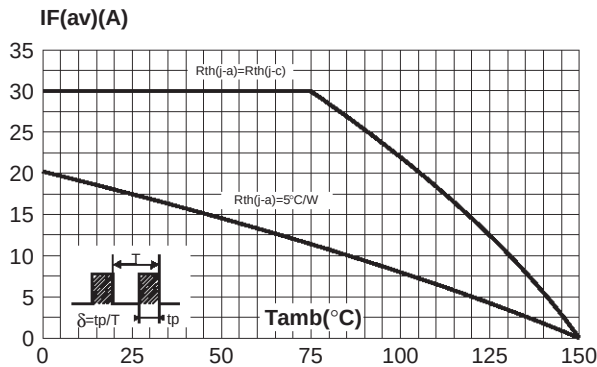


**Fig. 4:** Non repetitive surge peak forward current versus overload duration (per diode).

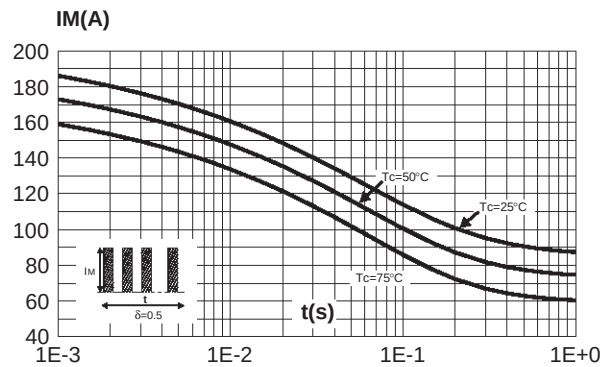


**Fig. 5:** Relative variation of thermal impedance junction to case versus pulse duration (per diode).

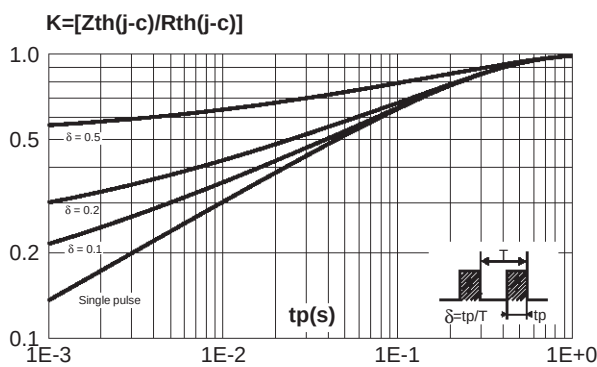


**Fig. 6:** Forward voltage drop versus forward current (maximum values, per diode).

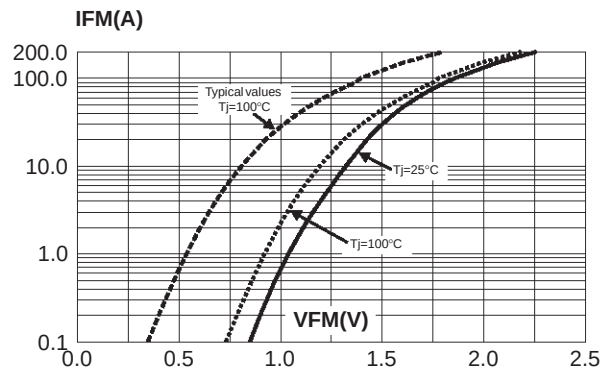


**Fig. 7:** Junction capacitance versus reverse voltage applied (typical values, per diode).

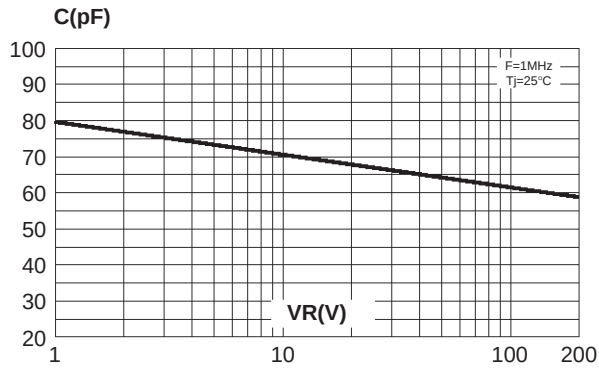


**Fig. 8:** Recovery charges versus  $dI_F/dt$  (per diode).

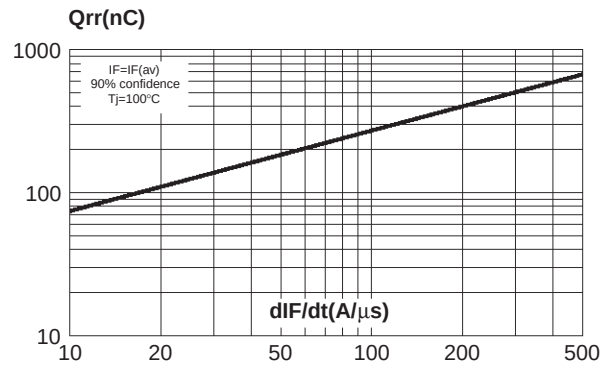


**Fig. 9:** Recovery current versus  $dI_F/dt$  (per diode).

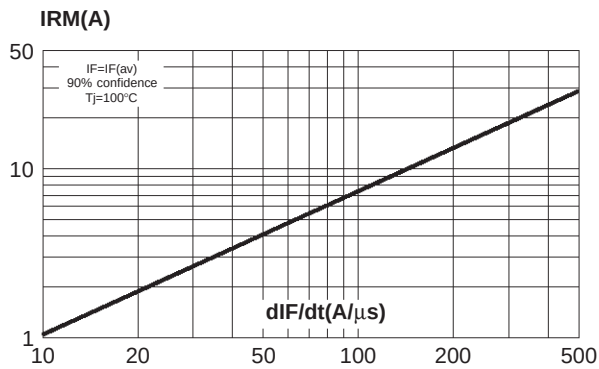


**Fig. 10:** Transient peak forward voltage versus  $dI_F/dt$  (per diode).

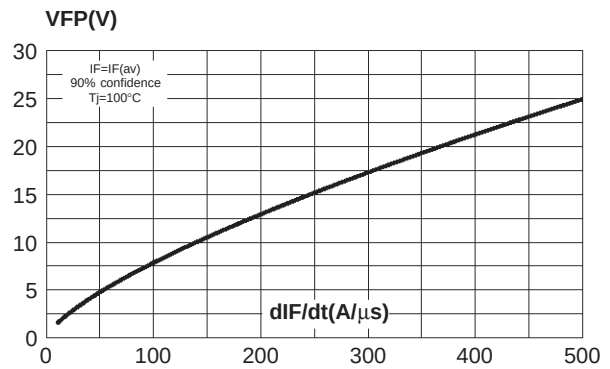


**Fig. 11:** Forward recovery time versus  $dI_F/dt$  (per diode).

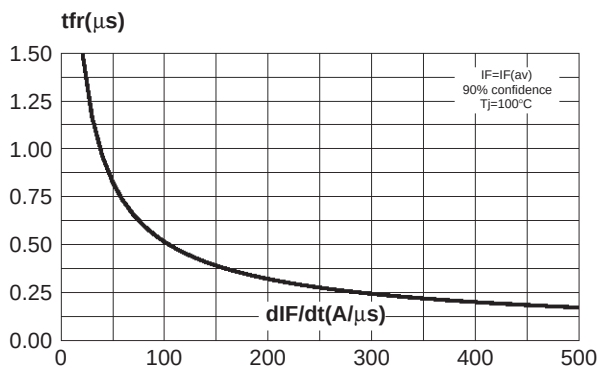


**Fig. 12:** Dynamic parameters versus junction temperature.

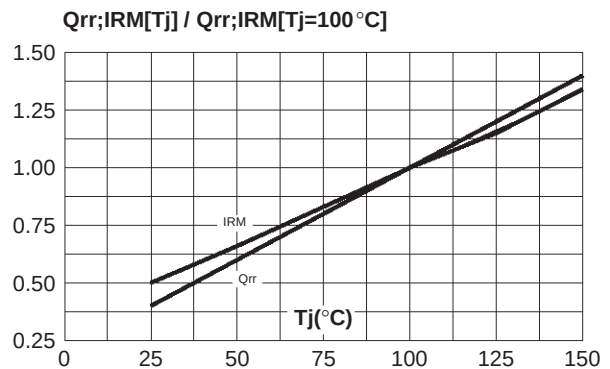


**Fig. 13:** Turn-off switching characteristics (without serie inductance).

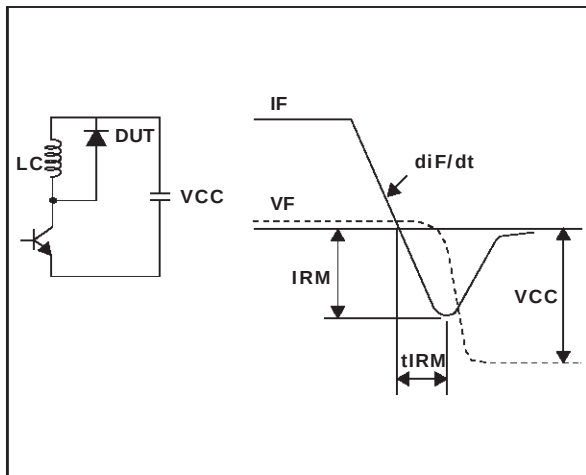
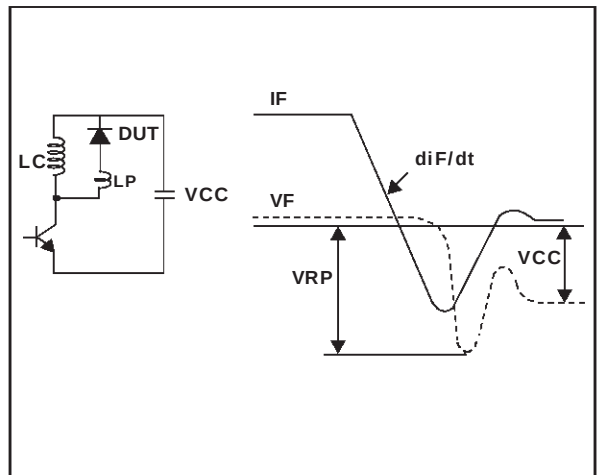


**Fig. 14:** Turn-off switching characteristics (with serie inductance).



**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   | 4.60        | 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-400 | BYT230PIV-400 | ISOTOP  | 28 g. (without screws) | 10       | Tube          |
| BYT231PIV-400 | BYT231PIV-400 | 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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