



THE DATASHEET OF BYT230PIV400





BYT230PIV-400 BYT231PIV-400

FAST RECOVERY RECTIFIER DIODES

MAIN PRODUCT CHARACTERISTICS

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

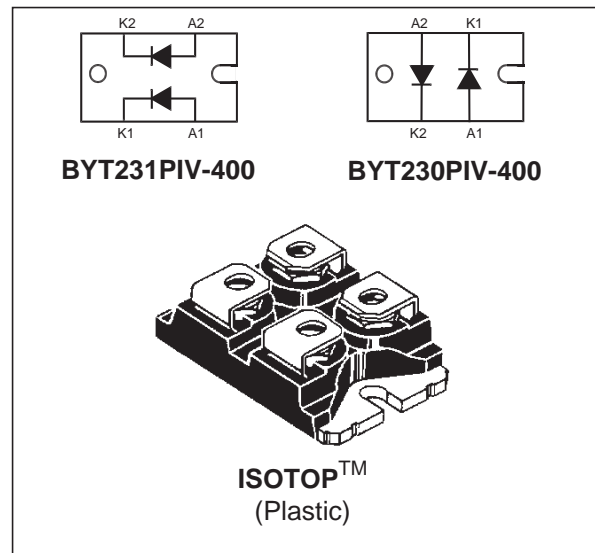
FEATURES AND BENEFITS

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED PACKAGE: ISOTOP
Insulation voltage: 2500 V_{RMS}
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 | $t_p=5\ \mu\text{s}$ $F=1\text{kHz}$ | 900 | A |
| $I_{F(RMS)}$ | RMS forward current | | 50 | A |
| $I_{F(AV)}$ | Average forward current | $T_c = 75^\circ\text{C}$ $\delta = 0.5$ | 30 | A |
| I_{FSM} | Surge non repetitive forward current | $t_p = 10\ \text{ms}$ Sinusoidal | 350 | A |
| T_{stg} | Storage temperature range | | - 40 to + 150 | $^\circ\text{C}$ |
| T_j | Maximum operating junction temperature | | 150 | $^\circ\text{C}$ |

TM: ISOTOP is a registered trademark of STMicroelectronics.

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THERMAL RESISTANCES

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

When the diodes 1 and 2 are used simultaneously :

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

STATIC ELECTRICAL CHARACTERISTICS (per diode)

| Symbol | Parameter | Test Conditions | | Min. | Typ. | Max. | Unit |
|------------|-------------------------|-----------------------------|---------------------|------|------|------|---------------|
| 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 | μA |
| | | $T_j = 100^{\circ}\text{C}$ | | | | 6 | mA |

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

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

To evaluate the conduction losses use the following equation:

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

RECOVERY CHARACTERISTICS

| Symbol | Test Conditions | | Min. | Typ. | Max. | Unit |
|----------|----------------------------|---|------|------|------|------|
| t_{rr} | $T_j = 25^{\circ}\text{C}$ | $I_F = 1\text{ A}$ $V_R = 30\text{ V}$ $dl_F/dt = -15\text{ A}/\mu\text{s}$ | | | 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 | $dl_F/dt = -120\text{ A}/\mu\text{s}$ | $V_{CC} = 200\text{ V}$ $I_F = 30\text{ A}$ $L_p \text{ @ } 0.05\ \mu\text{H}$ $T_j = 100^{\circ}\text{C}$ (see fig. 13) | | | 75 | ns |
| | | $dl_F/dt = -240\text{ A}/\mu\text{s}$ | | | | 50 | |
| I_{RM} | Maximum reverse recovery current | $dl_F/dt = -120\text{ A}/\mu\text{s}$ | $V_{CC} = 200\text{ V}$ $I_F = 30\text{ A}$ $L_p \text{ @ } 0.05\ \mu\text{H}$ $T_j = 100^{\circ}\text{C}$ (see fig. 13) | | | 9 | A |
| | | $dl_F/dt = -240\text{ A}/\mu\text{s}$ | | | | 12 | |
| $C = \frac{V_{RP}}{V_{CC}}$ | Turn-off overvoltage coefficient | $T_j = 100^{\circ}\text{C}$ $V_{CC} = 60\text{ V}$ $I_F = I_{F(AV)}$ $dl_F/dt = -30\text{ A}/\mu\text{s}$ $L_p = 1\ \mu\text{H}$ (see fig. 14) | | | 3.3 | | / |

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

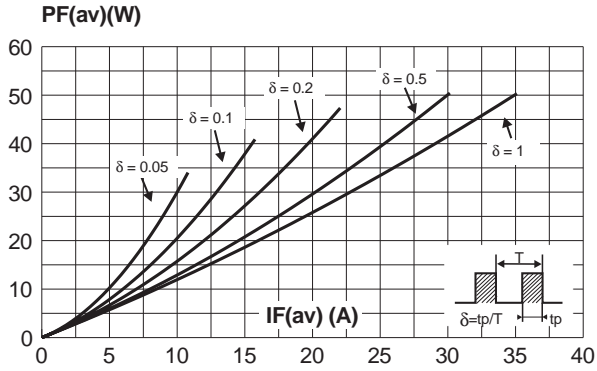


Fig. 2: Peak current versus form factor (per diode).

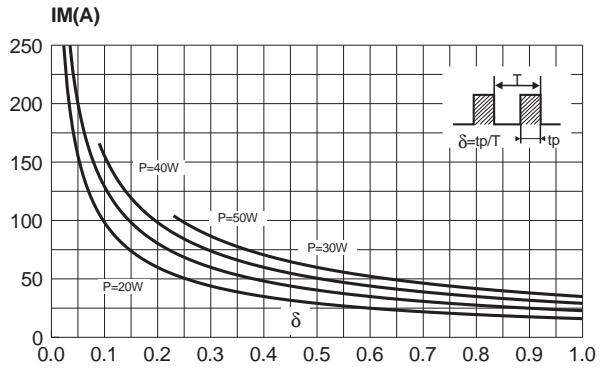


Fig. 3: Average forward current versus ambient temperature ($\delta=0.5$, per diode).

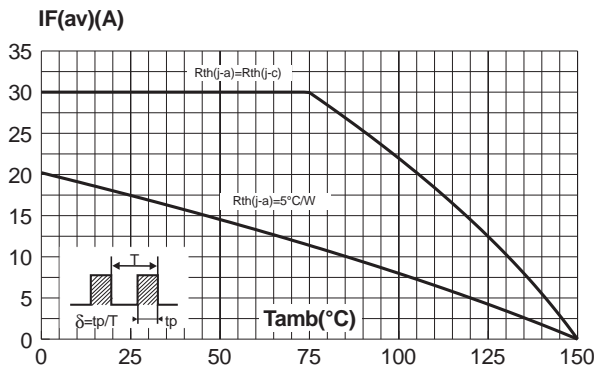


Fig. 4: Non repetitive surge peak forward current versus overload duration (per diode).

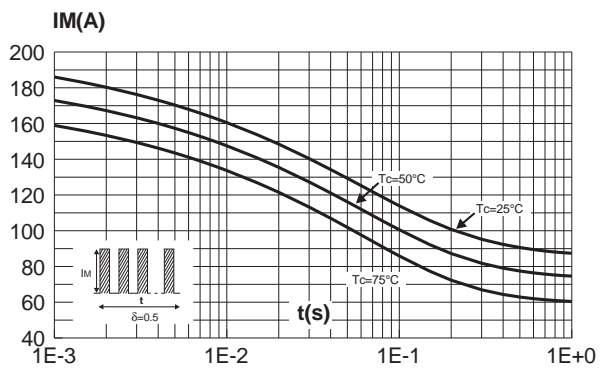


Fig. 5: Relative variation of thermal impedance junction to case versus pulse duration (per diode).

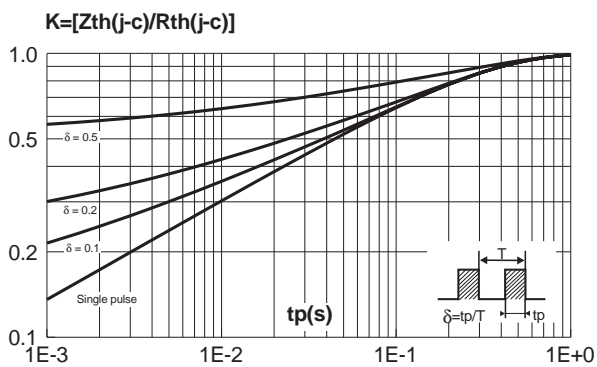


Fig. 6: Forward voltage drop versus forward current (maximum values, per diode).

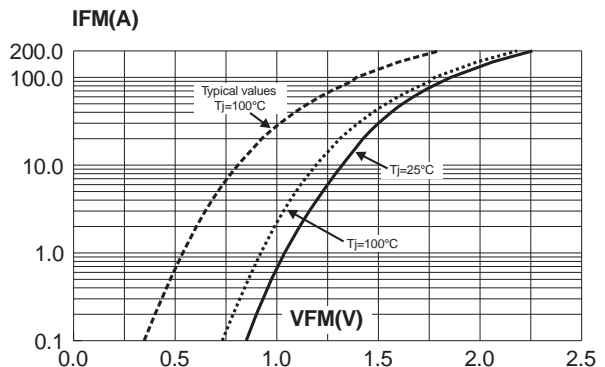


Fig. 7: Junction capacitance versus reverse voltage applied (typical values, per diode).

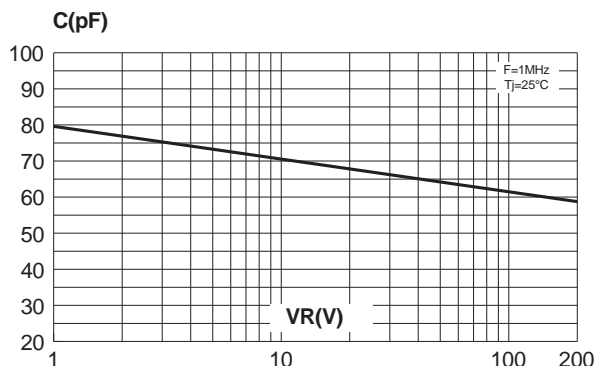


Fig. 8: Recovery charges versus dI_F/dt (per diode).

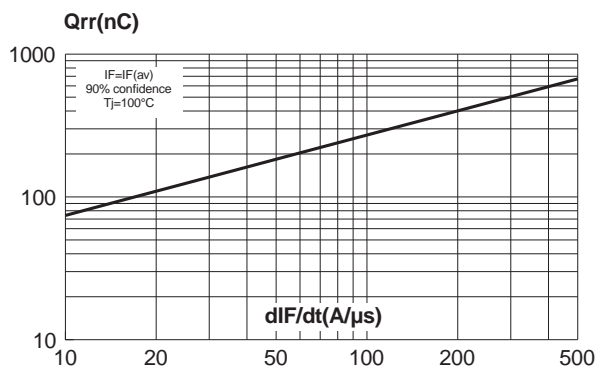


Fig. 9: Recovery current versus dI_F/dt (per diode).

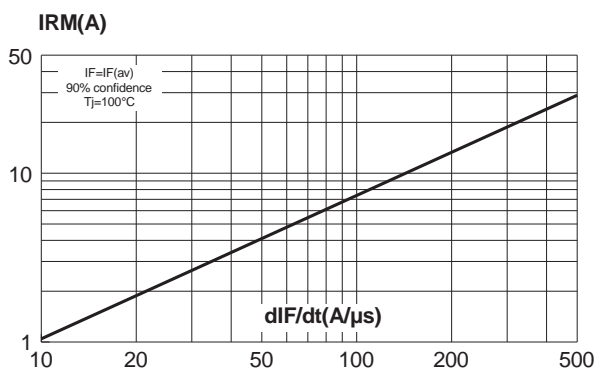


Fig. 10: Transient peak forward voltage versus dI_F/dt (per diode).

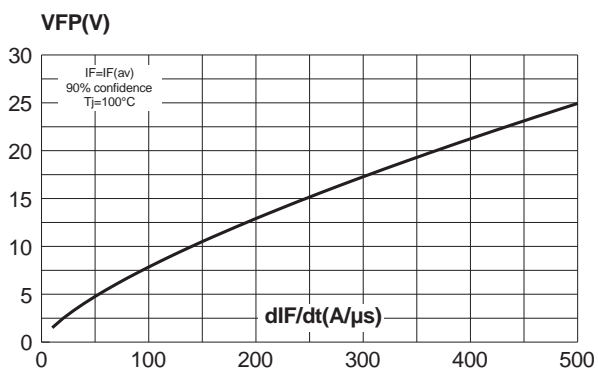


Fig. 11: Forward recovery time versus dI_F/dt (per diode).

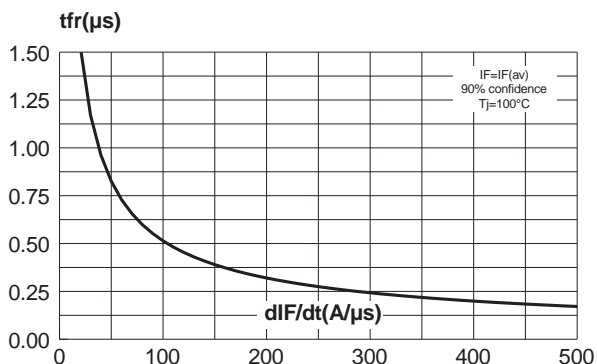


Fig. 12: Dynamic parameters versus junction temperature.

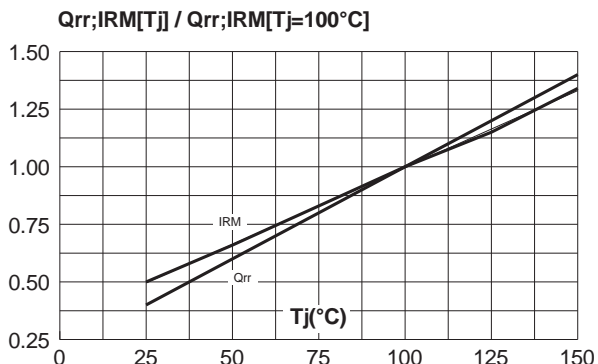


Fig. 13: Turn-off switching characteristics (without serie inductance).

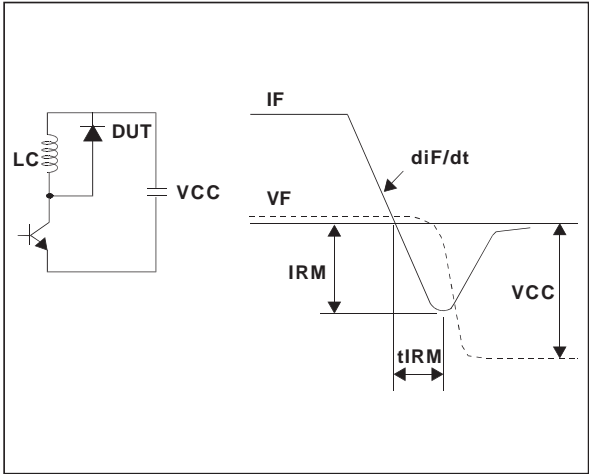
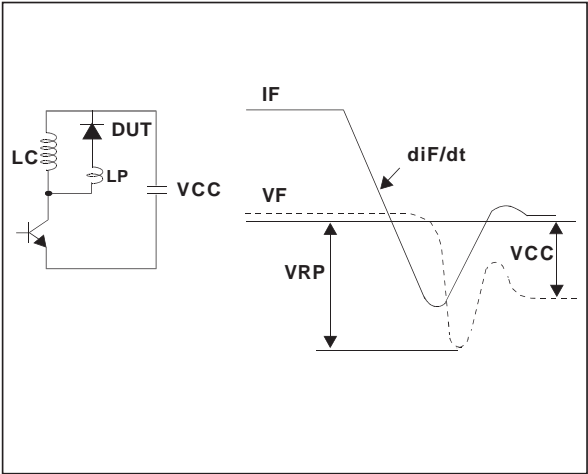
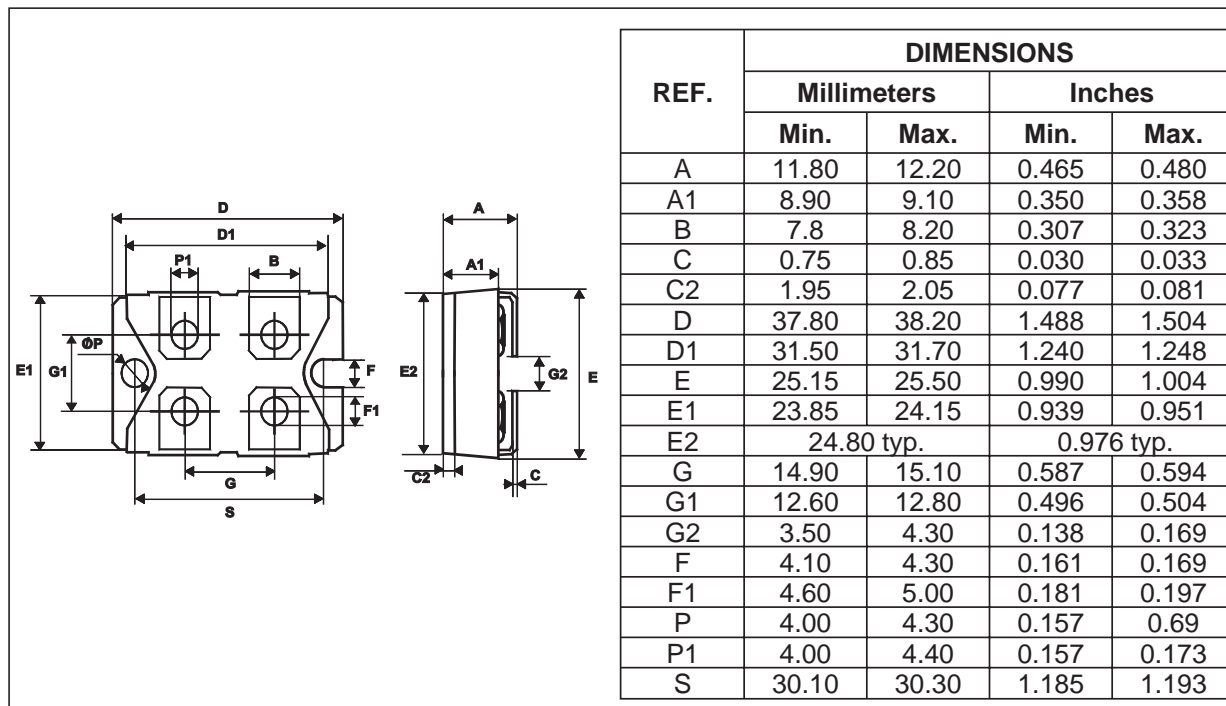


Fig. 14: Turn-off switching characteristics (with serie inductance).



BYT230PIV-400 / BYT231PIV-400

PACKAGE MECHANICAL DATA ISOTOP



| 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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