



# BYT60P-400 BYT260PIV-400 / BYT261PIV-400

## FAST RECOVERY RECTIFIER DIODES

### MAIN PRODUCT CHARACTERISTICS

|                |          |
|----------------|----------|
| $I_{F(AV)}$    | 2 x 60 A |
| $V_{RRM}$      | 400 V    |
| $V_F$ (max)    | 1.4 V    |
| $t_{rr}$ (max) | 50 ns    |

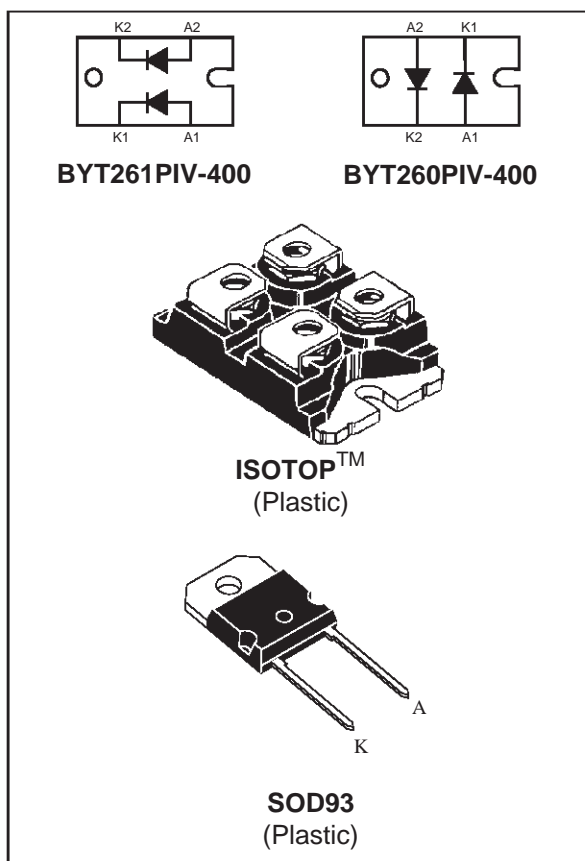
### FEATURES AND BENEFITS

- 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 or SOD93, 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                                  | $t_p=5 \mu s$ $F=1kHz$    | 1000          | A          |
| $I_{F(RMS)}$ | RMS forward current  | ISOTOP                    | 140           | A          |
|              |  | SOD93                     | 100           |            |
| $I_{F(AV)}$  | Average forward current $\delta = 0.5$                           | $T_c = 70^\circ C$ ISOTOP | 60            | A          |
|              |  | $T_c = 80^\circ C$ SOD93  |               |            |
| $I_{FSM}$    | Surge non repetitive forward current<br>$t_p = 10 ms$ Sinusoidal | ISOTOP                    | 600           | A          |
|              |  | SOD93                     | 550           |            |
| $T_{stg}$    | 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.

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### THERMAL RESISTANCES

| Symbol        | Parameter        |        | Value     | Unit |      |
|---------------|------------------|--------|-----------|------|------|
| $R_{th(j-c)}$ | Junction to case | ISOTOP | Per diode | 0.8  | °C/W |
|               |                  |        | Total     | 0.45 |      |
|               |                  | SOD93  | Total     | 0.7  |      |
| $R_{th(c)}$   |                  |        | Coupling  | 0.1  | °C/W |

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    | $T_j = 25^\circ\text{C}$  | $I_F = 60\text{ A}$ |      |      | 1.5  | V             |
|            |                         | $T_j = 100^\circ\text{C}$ |                     |      |      | 1.4  |               |
| $I_R^{**}$ | Reverse leakage current | $T_j = 25^\circ\text{C}$  | $V_R = V_{RRM}$     |      |      | 60   | $\mu\text{A}$ |
|            |                         | $T_j = 100^\circ\text{C}$ |                     |      |      | 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:

$$P = 1.1 \times I_{F(AV)} + 0.0045 I_F^2(\text{RMS})$$

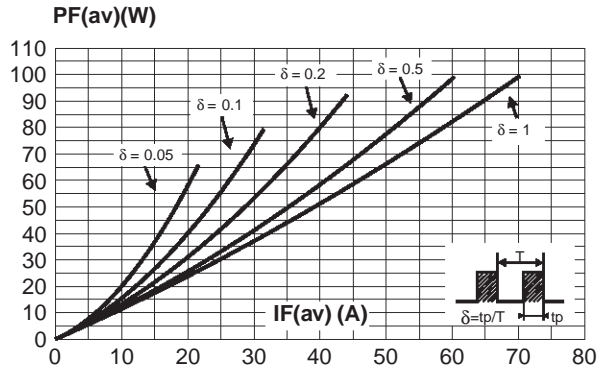
### RECOVERY CHARACTERISTICS (per diode)

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

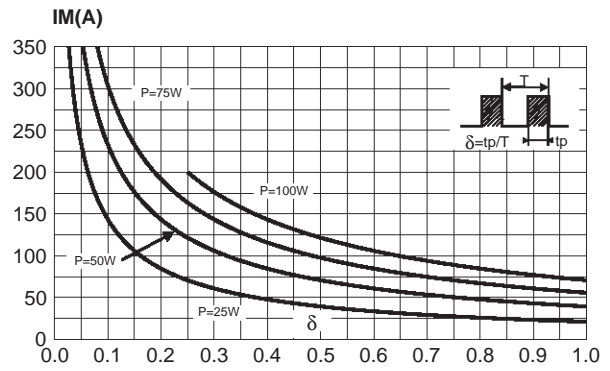
### TURN-OFF SWITCHING CHARACTERISTICS

| Symbol                      | Parameter                        | Test Conditions   |  | Min. | Typ. | Max. | Unit |
|-----------------------------|----------------------------------|---|--|------|------|------|------|
| $t_{IRM}$                   | Maximum reverse recovery time    | $di_F/dt = -240\ \text{A}/\mu\text{s}$  | $V_{CC} = 200\text{ V}$<br>$I_F = 60\text{ A}$<br>$L_p \text{ @ } 0.05\ \mu\text{H}$<br>$T_j = 100^\circ\text{C}$<br>(see fig. 13) |      |      | 75   | ns   |
|                             |                                  | $di_F/dt = -480\ \text{A}/\mu\text{s}$  |  |      |      | 50   |      |
| $I_{RM}$                    | Maximum reverse recovery current | $di_F/dt = -240\ \text{A}/\mu\text{s}$  | $V_{CC} = 200\text{ V}$<br>$I_F = 60\text{ A}$<br>$L_p \text{ @ } 0.05\ \mu\text{H}$<br>$T_j = 100^\circ\text{C}$<br>(see fig. 13) |      |      | 18   | A    |
|                             |                                  | $di_F/dt = -480\ \text{A}/\mu\text{s}$  |  |      |      | 24   |      |
| $C = \frac{V_{RP}}{V_{CC}}$ | Turn-off overvoltage coefficient | $T_j = 100^\circ\text{C}$ $V_{CC} = 120\text{ V}$ $I_F = I_{F(AV)}$<br>$di_F/dt = -60\text{ A}/\mu\text{s}$ $L_p = 0.8\ \mu\text{H}$<br>(see fig. 14) |  |      | 3.3  | 4    | /    |

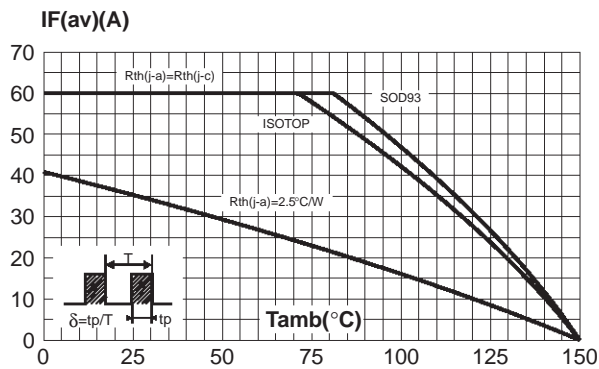
**Fig. 1:** Average forward power dissipation versus average forward current (per diode, for ISOTOP).



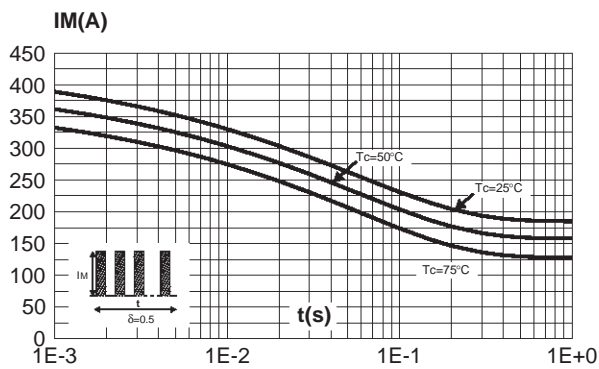
**Fig. 2:** Peak current versus form factor (per diode, for ISOTOP).



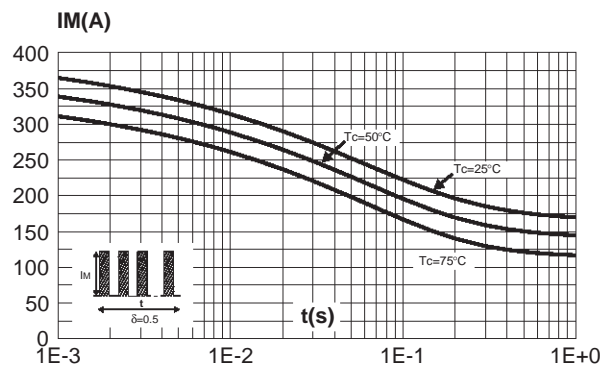
**Fig. 3:** Average forward current versus ambient temperature ( $\delta=0.5$ , per diode for ISOTOP).



**Fig. 4-1:** Non repetitive surge peak forward current versus overload duration (SOD93).

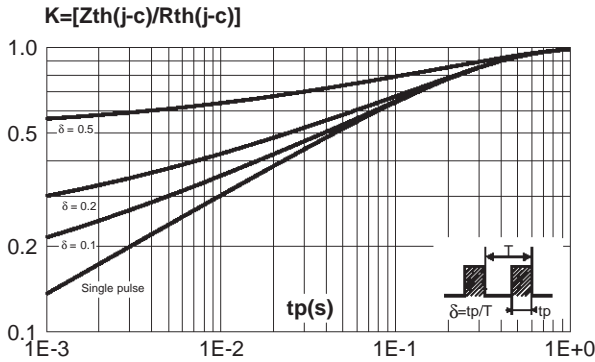


**Fig. 4-2:** Non repetitive surge peak forward current versus overload duration (per diode, for ISOTOP).

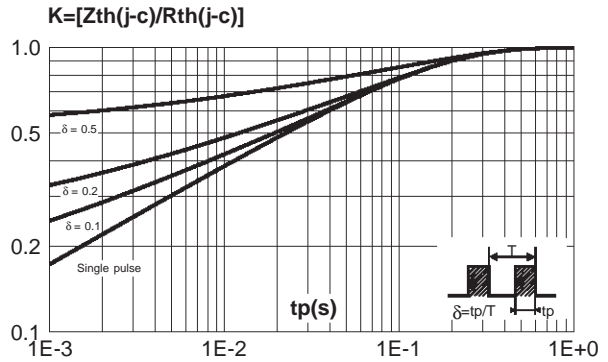


**BYT60P-400 / BYT260PIV-400 / BYT261PIV-400**

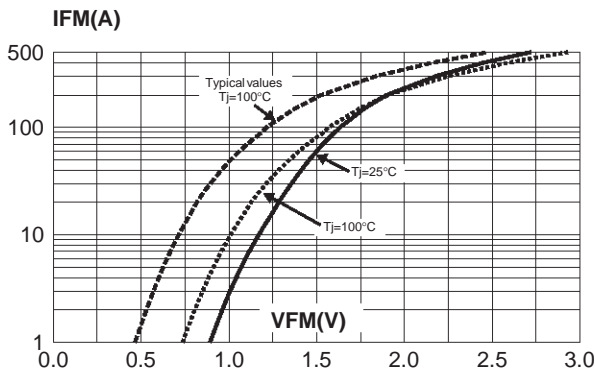
**Fig. 5-1:** Relative variation of thermal impedance junction to case versus pulse duration (per diode for ISOTOP).



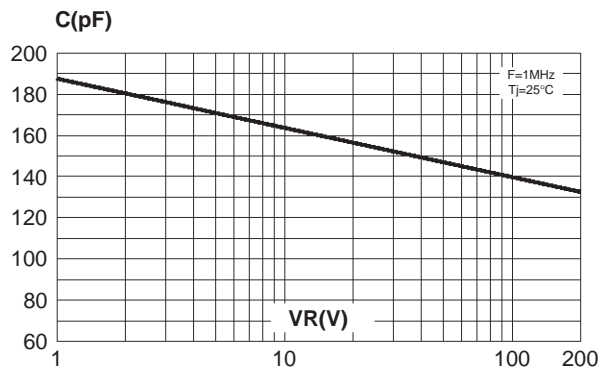
**Fig. 5-2:** Relative variation of thermal impedance junction to case versus pulse duration (SOD93).



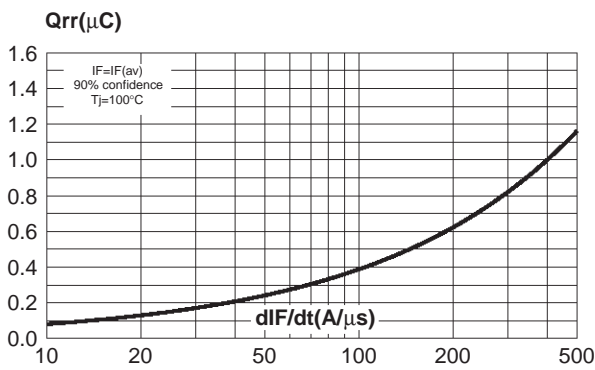
**Fig. 6:** Forward voltage drop versus forward current (maximum values, per diode for ISOTOP).



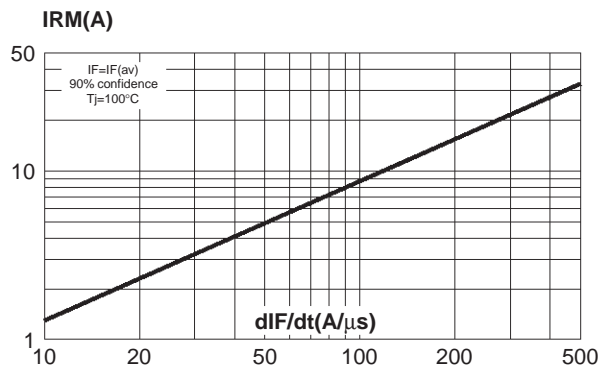
**Fig. 7:** Junction capacitance versus reverse voltage applied (typical values, per diode for ISOTOP).



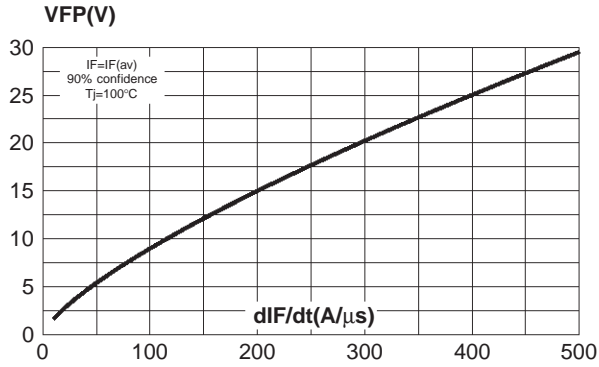
**Fig. 8:** Recovery charges versus  $dI_F/dt$  (per diode for ISOTOP).



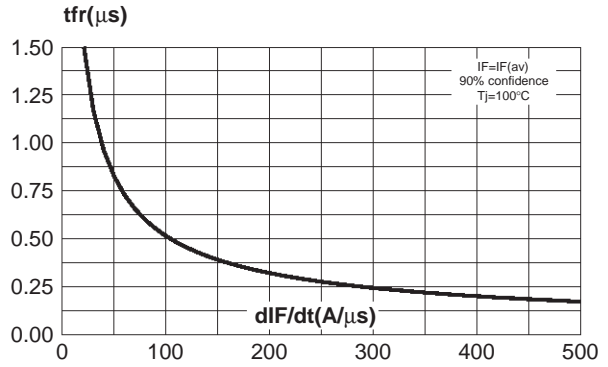
**Fig. 9:** Recovery current versus  $dI_F/dt$  (per diode for ISOTOP).



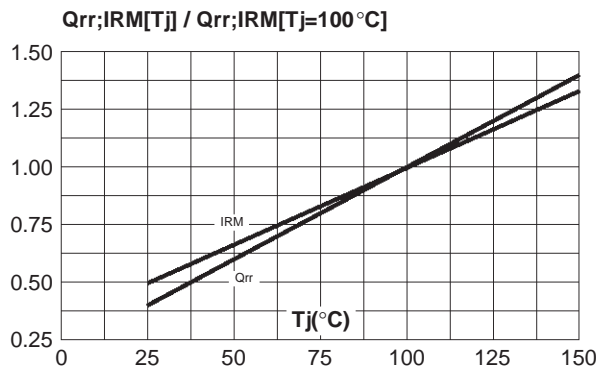
**Fig. 10:** Transient peak forward voltage versus  $di_F/dt$  (per diode for ISOTOP).



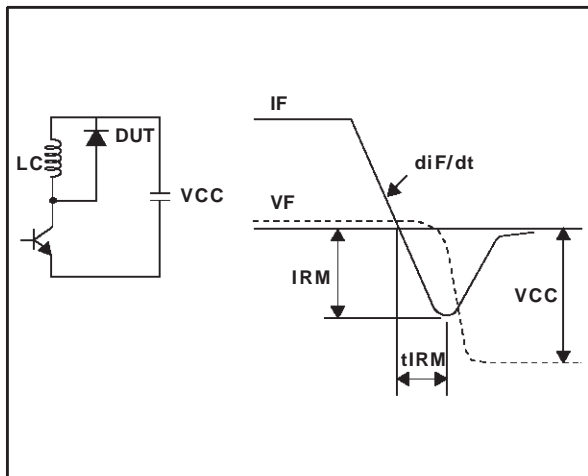
**Fig. 11:** Forward recovery time versus  $di_F/dt$  (per diode for ISOTOP).



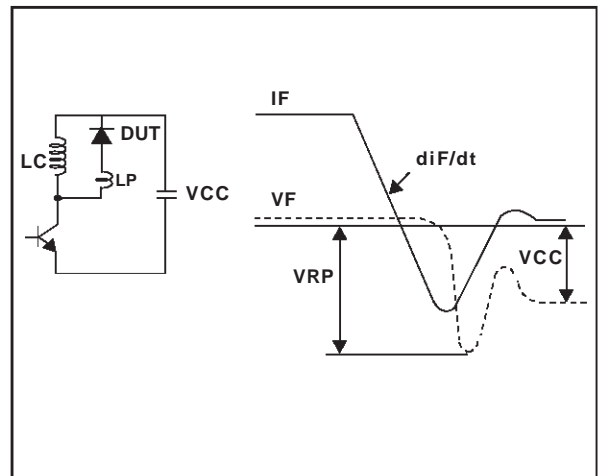
**Fig. 12:** Dynamic parameters versus junction temperature.



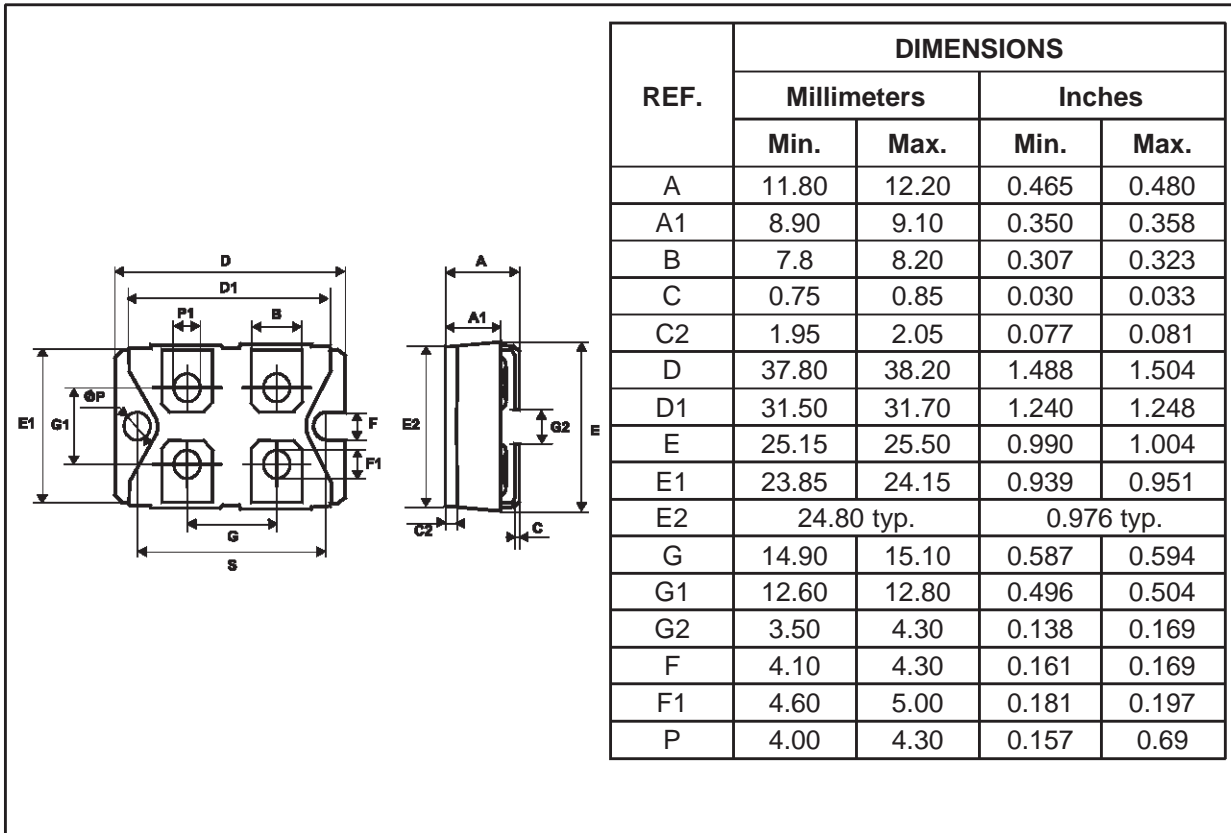
**Fig. 13:** Turn-off switching characteristics (without serie inductance).



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



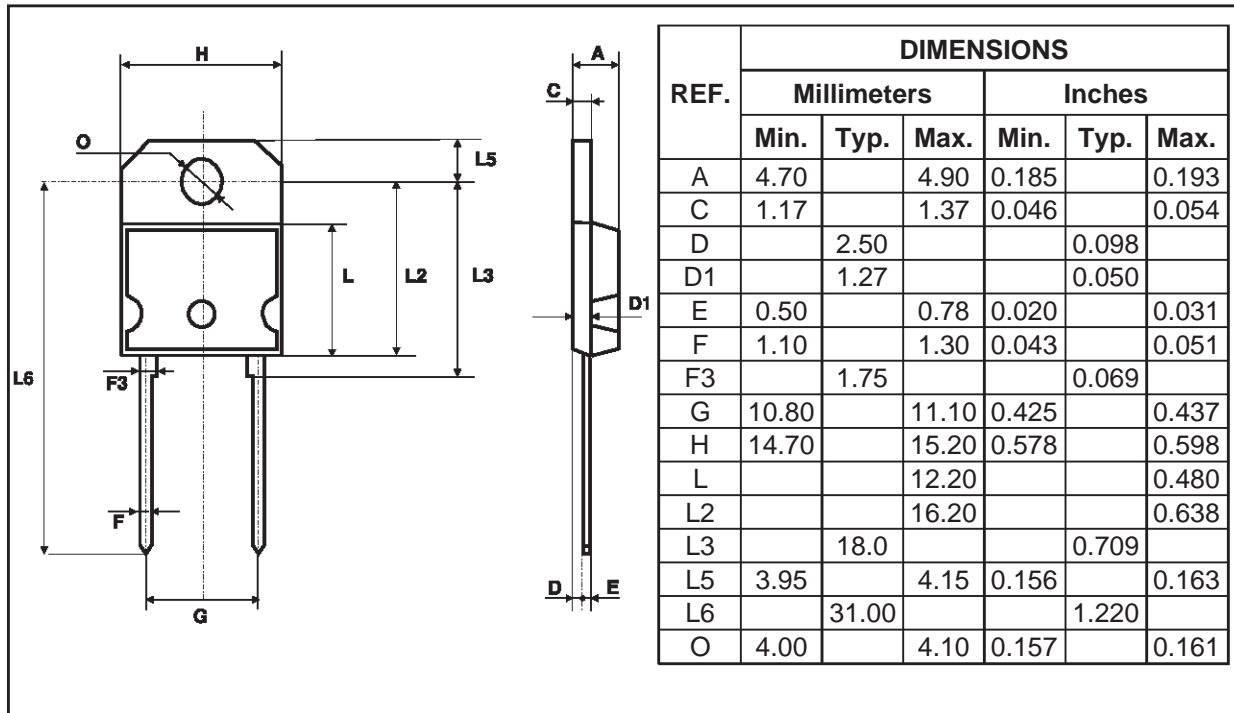
PACKAGE MECHANICAL DATA  
ISOTOP



| 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  |

**PACKAGE MECHANICAL DATA**

SOD93 Plastic



| Ordering type | Marking       | Package | Weight                 | Base qty | Delivery mode |
|---------------|---------------|---------|------------------------|----------|---------------|
| BYT60P-400    | BYT60P-400    | SOD93   | 3.79 g.                | 30       | Tube          |
| BYT260PIV-400 | BYT260PIV-400 | ISOTOP  | 28 g. (without screws) | 10       | Tube          |
| BYT261PIV-400 | BYT261PIV-400 | ISOTOP  | 28 g. (without screws) | 10       | Tube          |

- Cooling method: by conduction (C)
- Recommended torque value (ISOTOP): 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.
- Recommended torque value (SOD93): 0.8 N.m.
- Maximum torque value (SOD93): 1.0 N.m.
- Epoxy meets UL94,V0

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