



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 |

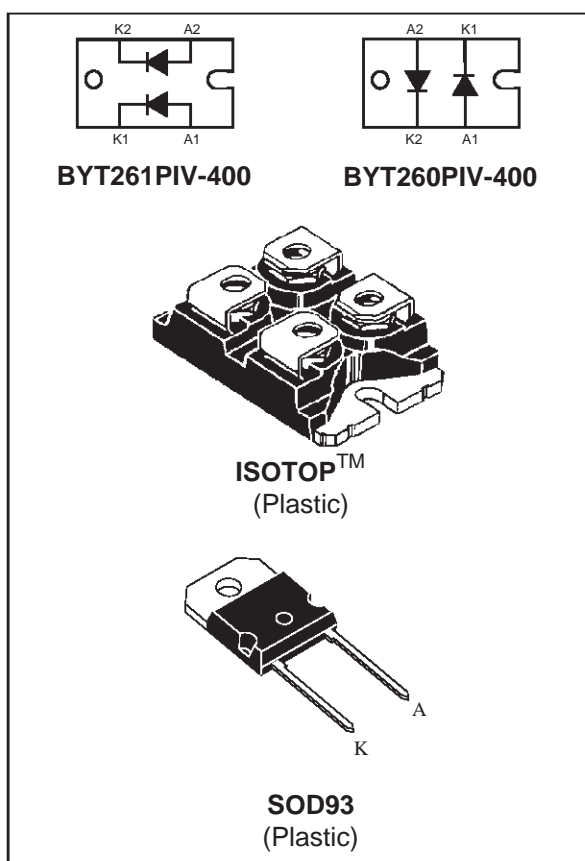
FEATURES AND BENEFITS

- VERY LOW REVERSE RECOVERY TIME
- VERY LOW SWITCHING LOSSES
- LOW NOISE TURN-OFF SWITCHING
- INSULATED PACKAGE: ISOTOP
Insulation voltage: 2500 V_{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 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 $t_p = 10 ms$ 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 | 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:

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

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 | $di_F/dt = -240\ \text{A}/\mu\text{s}$ | $V_{CC} = 200\text{ V}$ $I_F = 60\text{ A}$ $L_p \text{ @ } 0.05\ \mu\text{H}$ $T_j = 100^\circ\text{C}$ (see fig. 13) | | | 75 | ns |
| | | $di_F/dt = -480\ \text{A}/\mu\text{s}$ | | | | 50 | |
| I_{RM} | Maximum reverse recovery current | $di_F/dt = -240\ \text{A}/\mu\text{s}$ | $V_{CC} = 200\text{ V}$ $I_F = 60\text{ A}$ $L_p \text{ @ } 0.05\ \mu\text{H}$ $T_j = 100^\circ\text{C}$ (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 | $T_j = 100^\circ\text{C}$ $V_{CC} = 120\text{ V}$ $I_F = I_{F(AV)}$ $di_F/dt = -60\text{ A}/\mu\text{s}$ $L_p = 0.8\ \mu\text{H}$ (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).

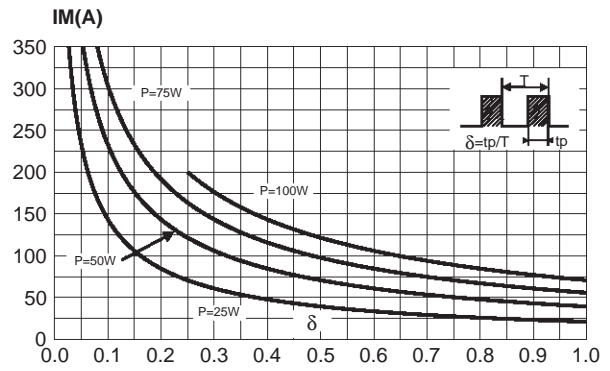
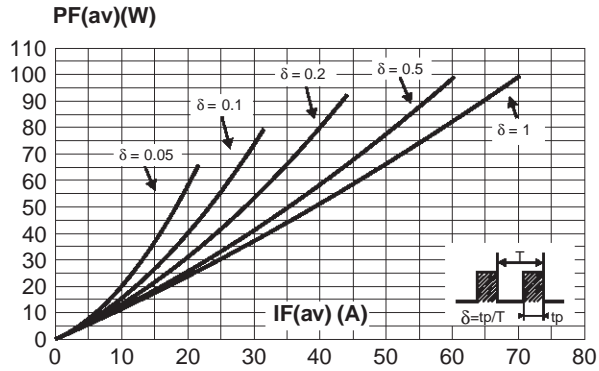


Fig. 3: Average forward current versus ambient temperature ($\delta=0.5$, per diode for ISOTOP).

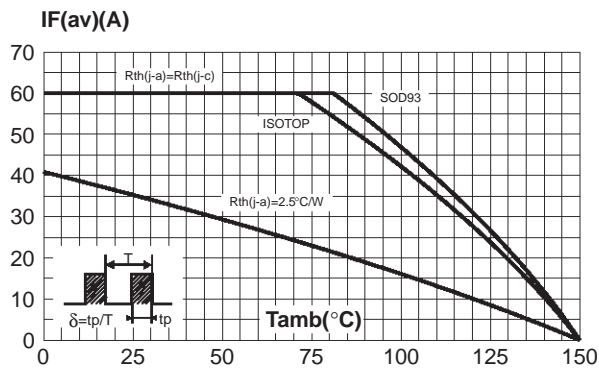
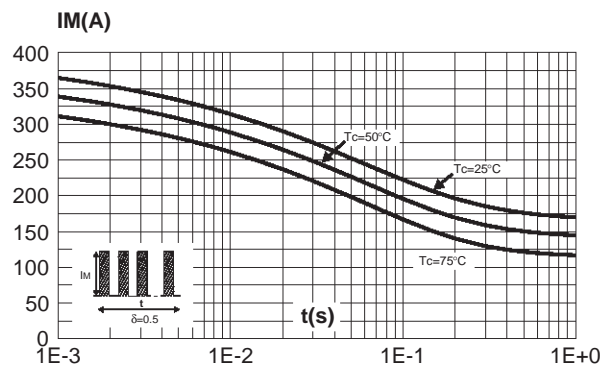
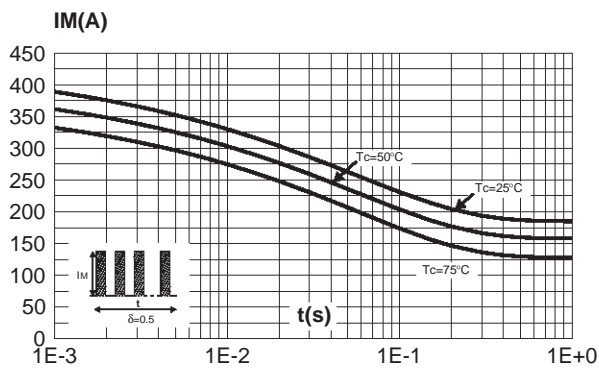


Fig. 4-1: Non repetitive surge peak forward current versus overload duration (SOD93).

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



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

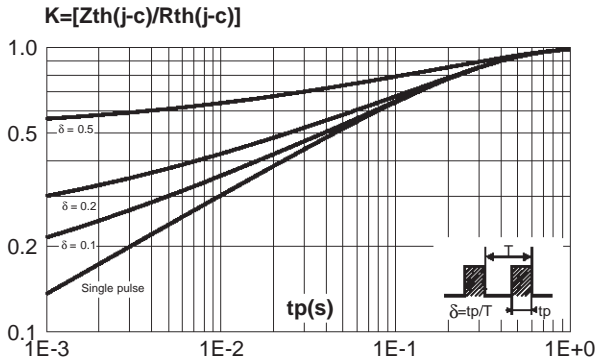


Fig. 5-2: Relative variation of thermal impedance junction to case versus pulse duration (SOD93).

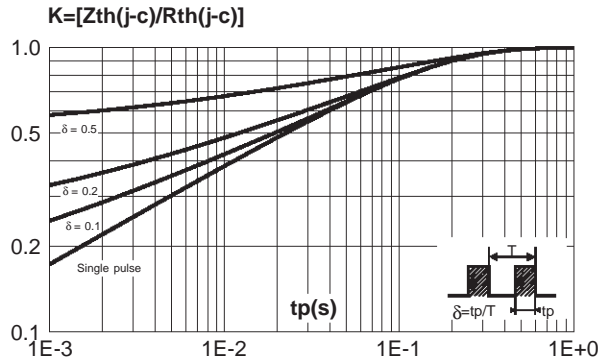


Fig. 6: Forward voltage drop versus forward current (maximum values, per diode for ISOTOP).

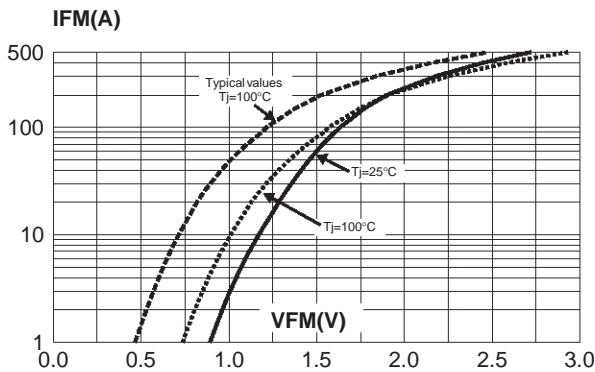


Fig. 7: Junction capacitance versus reverse voltage applied (typical values, per diode for ISOTOP).

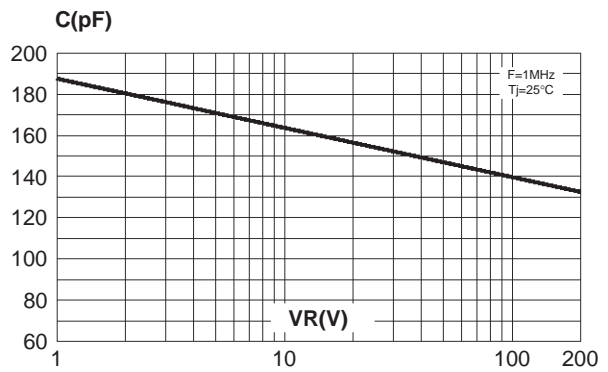


Fig. 8: Recovery charges versus dI_F/dt (per diode for ISOTOP).

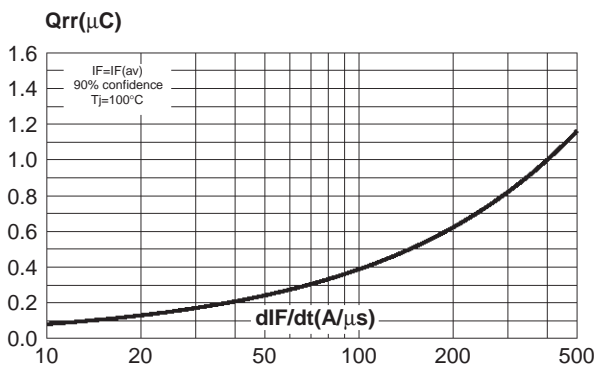


Fig. 9: Recovery current versus dI_F/dt (per diode for ISOTOP).

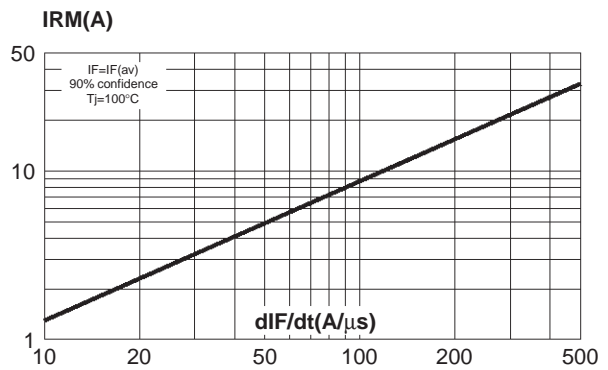


Fig. 10: Transient peak forward voltage versus di_F/dt (per diode for ISOTOP).

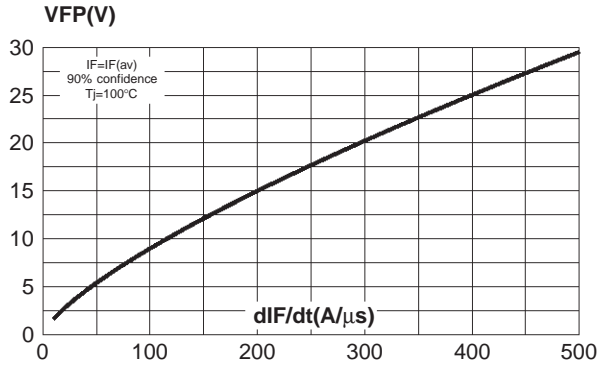


Fig. 11: Forward recovery time versus di_F/dt (per diode for ISOTOP).

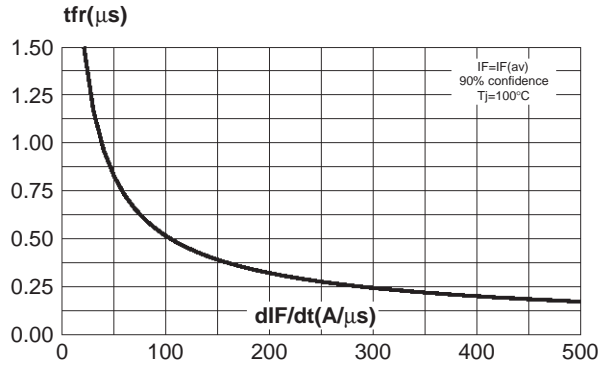


Fig. 12: Dynamic parameters versus junction temperature.

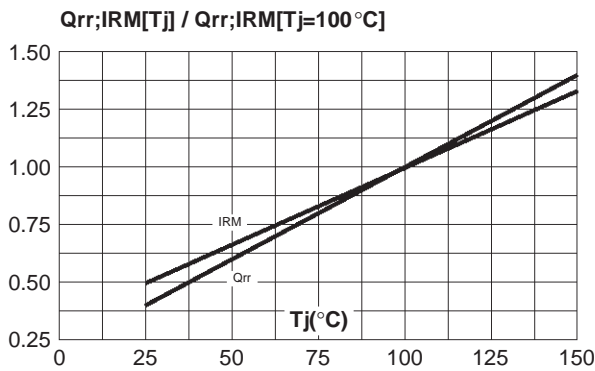


Fig. 13: Turn-off switching characteristics (without serie inductance).

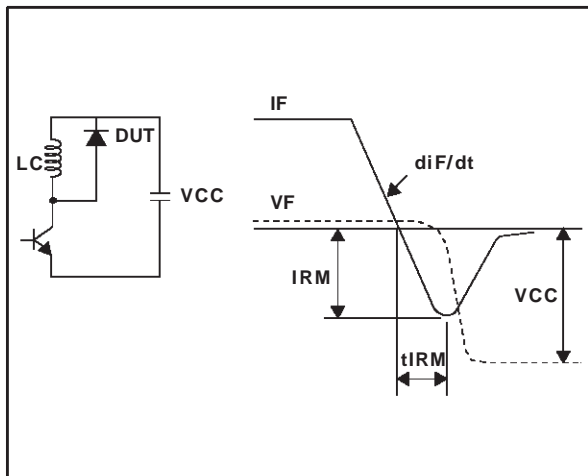
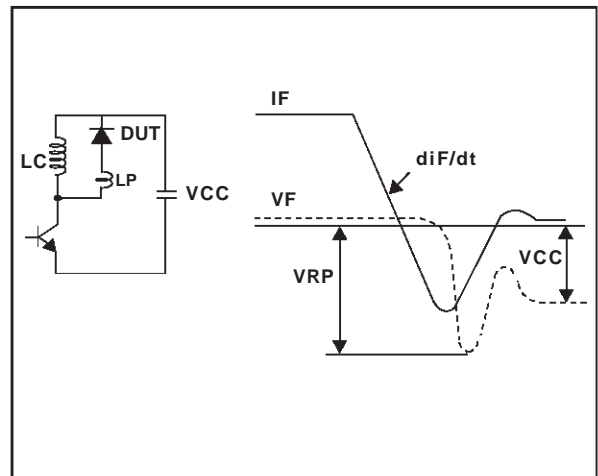
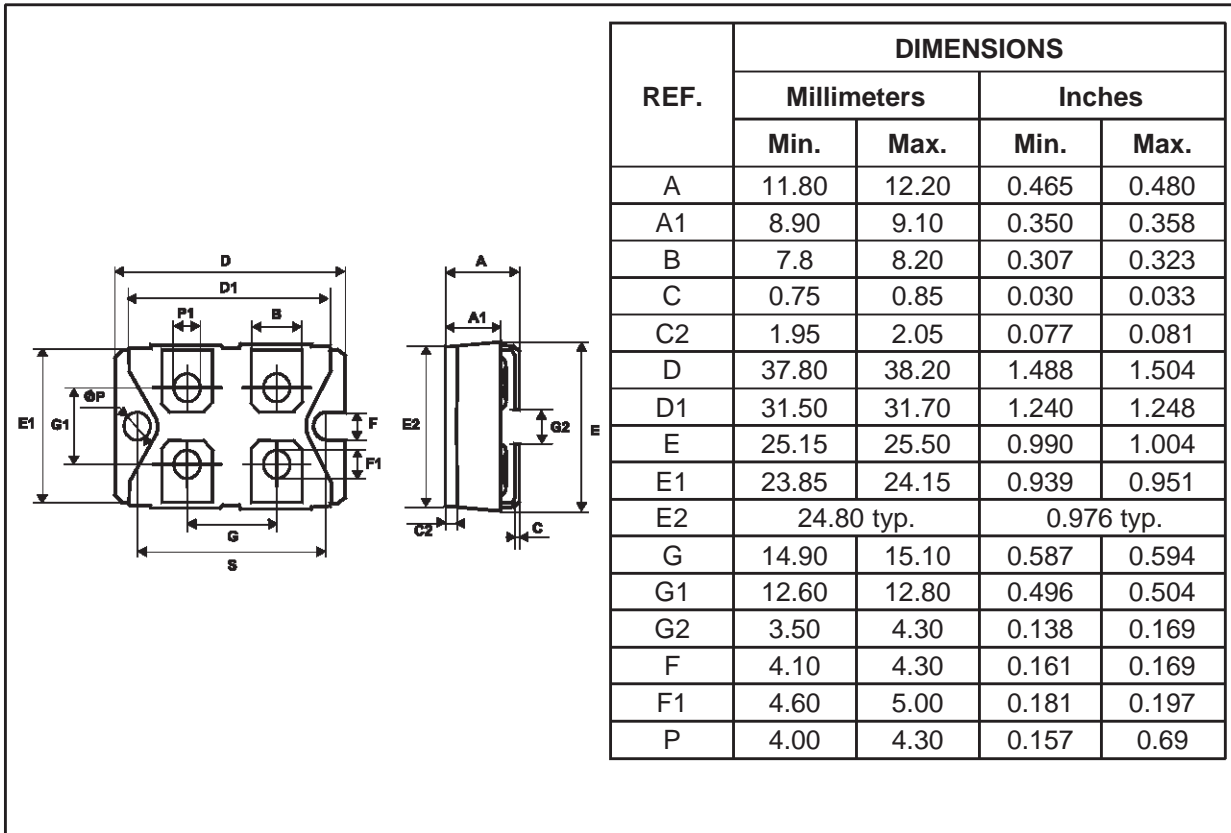


Fig. 14: Turn-off switching characteristics (with serie inductance).



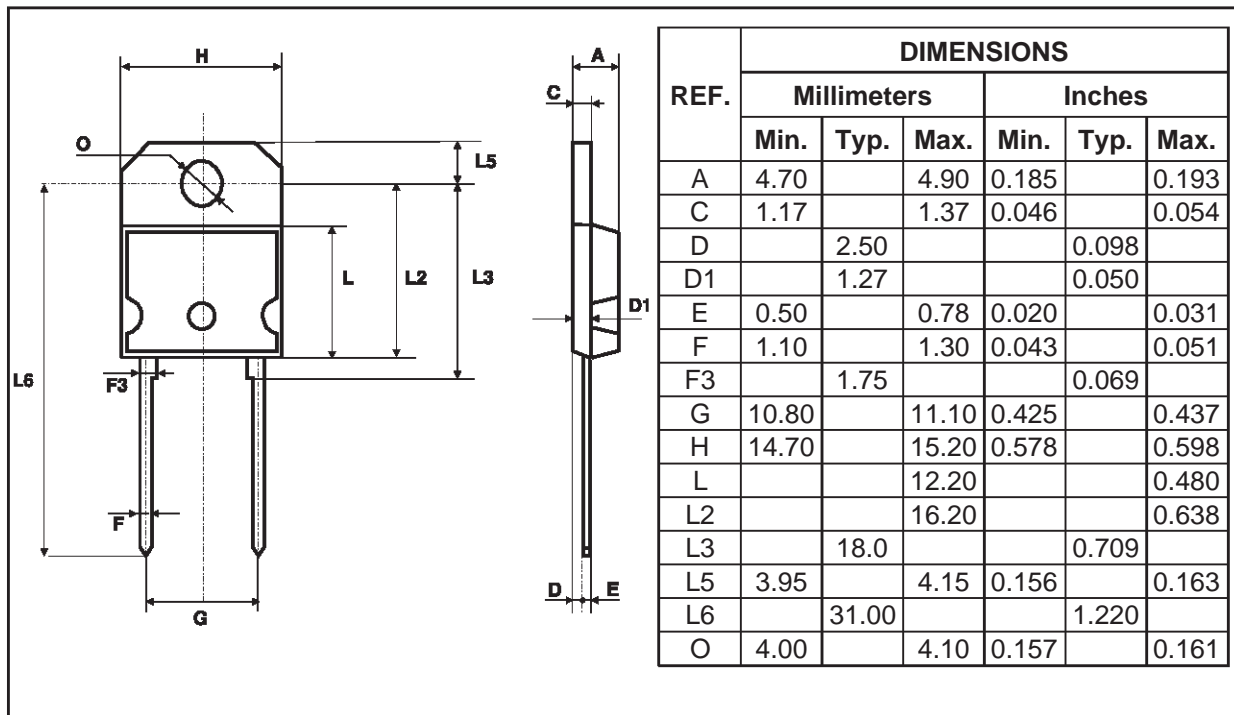
PACKAGE MECHANICAL DATA
ISOTOP



| 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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