

Product Summary

| | |
|-------------------------------|--------|
| V_{RRM} | 1200 V |
| $I_F (T_C=150^\circ\text{C})$ | 20 A |
| Q_C | 106 nC |

Features

- Low leakage current (I_R)
- Zero reverse recovery current
- Temperature independent switching behavior
- Positive temperature coefficient on V_F
- High surge current capacity
- Low capacitive charge

Benefits

- System cost savings due to smaller magnetics
- System efficiency improvement over Si diodes
- Reduction of heat sink requirements
- Enabling higher frequency
- Reduced EMI

Applications

- Switch mode power supplies (SMPS)
- Uninterruptible power supplies
- Server/telecom power supplies
- Power factor correction
- Solar

Package Pin Definitions

- Pin1 and backside - Cathode
- Pin2 - Anode

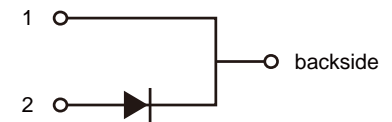
Package Parameters

| Part Number | Marking | Package |
|-------------|-----------|----------|
| B3D20120H | B3D20120H | TO-247-2 |

Package: TO-247-2



Electrical Connection



Maximum Ratings ($T_c=25^\circ\text{C}$ unless otherwise specified)

| Symbol | Parameter | Test conditions | Value | Unit |
|---------------|--------------------------------------|--|---------|----------------------|
| V_{RRM} | Repetitive peak reverse voltage | | 1200 | V |
| V_{RSM} | Non-repetitive peak reverse voltage | | 1200 | V |
| E_{AS} | Single pulse avalanche energy | $T_c=25^\circ\text{C}$, $L=1\text{mH}$, $I_{AS}=22\text{A}$, $V=140\text{V}$ | 242 | mJ |
| I_F | Continuous forward current | $T_c=25^\circ\text{C}$ | 60 | A |
| | | $T_c=135^\circ\text{C}$ | 28 | |
| | | $T_c=150^\circ\text{C}$ | 20 | |
| I_{FSM} | Non-repetitive forward surge current | $T_c=25^\circ\text{C}$, $t_p=10\text{ms}$ Half sine wave | 160 | A |
| I_{FRM} | Repetitive forward surge current | $T_c=25^\circ\text{C}$, $t_p=10\text{ms}$ Half sine wave | 90 | A |
| $\int i^2 dt$ | i^2t value | $T_c=25^\circ\text{C}$, $t_p=10\text{ms}$ | 128 | A^2S |
| P_{tot} | Power dissipation | $T_c=25^\circ\text{C}$ | 259 | W |
| | | $T_c=110^\circ\text{C}$ | 112 | |
| T_j | Operating junction temperature | | -55~175 | $^\circ\text{C}$ |
| T_{stg} | Storage temperature | | -55~175 | $^\circ\text{C}$ |
| | TO-247 mounting torque | M3 Screw | 0.7 | Nm |

Thermal Characteristics

| Symbol | Parameter | Value | | | Unit |
|--------------|--|-------|------|------|------|
| | | Min. | Typ. | Max. | |
| $R_{th(jc)}$ | Thermal resistance from junction to case | | 0.58 | | K/W |

Electrical Characteristics
Static Characteristics

| Symbol | Parameter | Test conditions | Value | | | Unit |
|----------|-----------------------|---|-------|--------------|--------------|---------|
| | | | Min. | Typ. | Max. | |
| V_{DC} | DC blocking voltage | $T_j=25^{\circ}C$ | 1200 | | | V |
| V_F | Diode forward voltage | $I_F=20A$ $T_j=25^{\circ}C$ $I_F=20A$ $T_j=175^{\circ}C$ | | 1.40 2.03 | 1.62 2.52 | V |
| I_R | Reverse current | $V_R=1200V$ $T_j=25^{\circ}C$ $V_R=1200V$ $T_j=175^{\circ}C$ | | 5 20 | 80 150 | μA |

AC Characteristics

| Symbol | Parameter | Test conditions | Value | | | Unit |
|--------|---------------------------|---|-------|-------------------|------|---------|
| | | | Min. | Typ. | Max. | |
| Q_C | Total capacitive charge | $V_R=800V$ $T_j=25^{\circ}C$ $Q_C=\int_0^{V_R} C(V)dV$ | | 106 | | nC |
| C | Total capacitance | $V_R=1V$ $f=1MHz$ $V_R=400V$ $f=1MHz$ $V_R=800V$ $f=1MHz$ | | 1180 100 73 | | pF |
| E_C | Capacitance stored energy | $V_R=800V$ | | 55 | | μJ |

Typical Performance

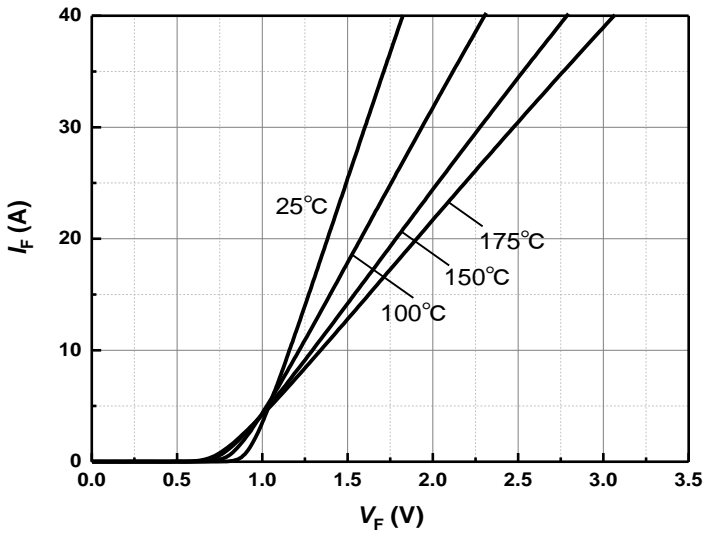


Figure 1 Typical forward characteristics

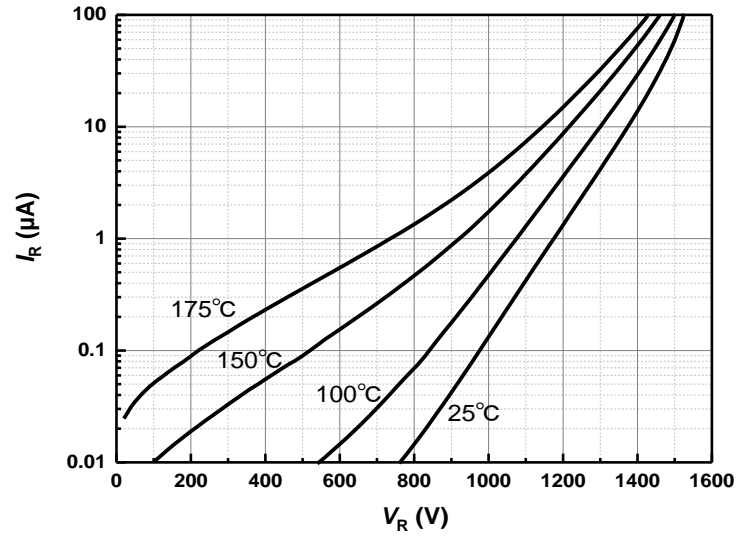


Figure 2 Typical reverse current as function of reverse voltage

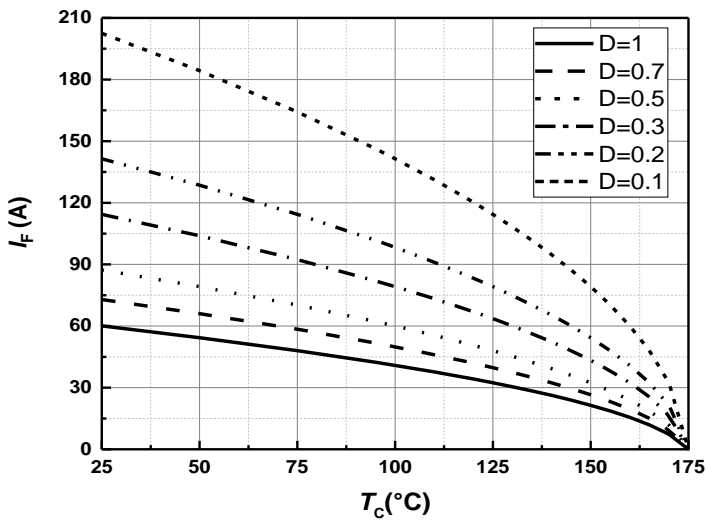


Figure 3 Diode forward current as function of temperature, D=duty cycle

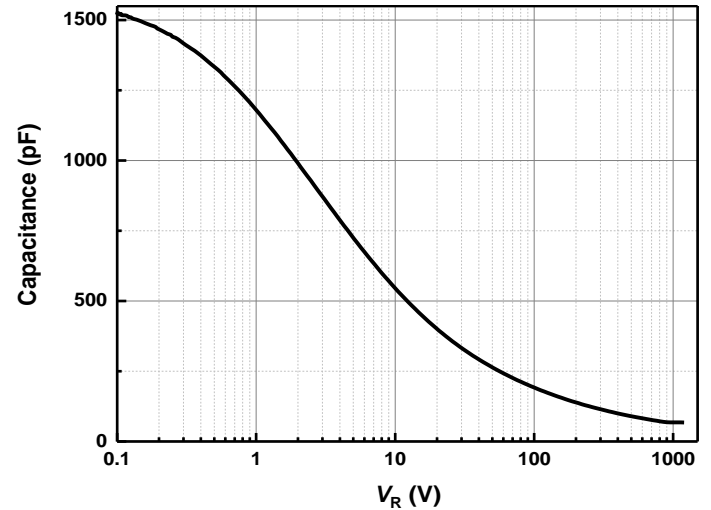


Figure 4 Typical capacitance as function of reverse voltage, $C=f(V_R)$; $T_j=25^{\circ}$ C; $f=1$ MHz

Typical Performance

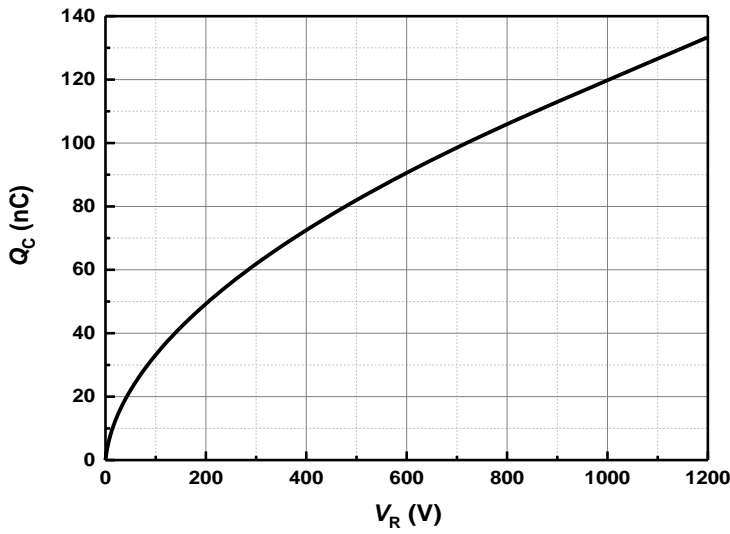


Figure 5 Typical reverse charge as function of reverse voltage

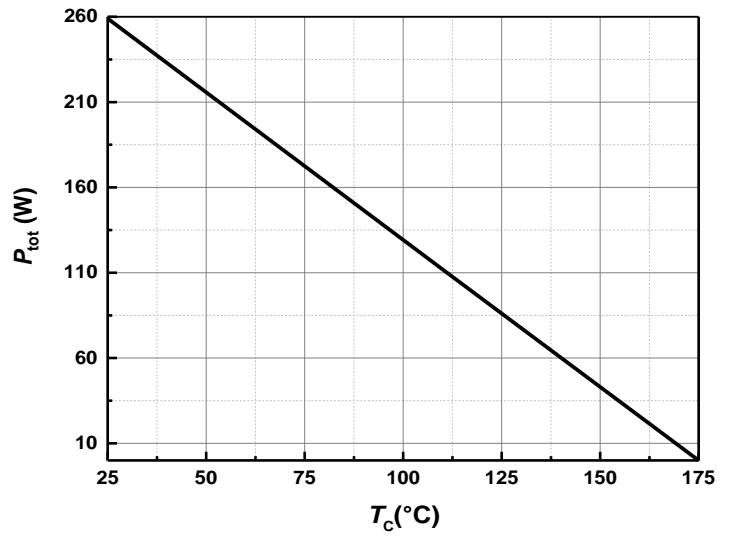


Figure 6 Power dissipation as function of case temperature

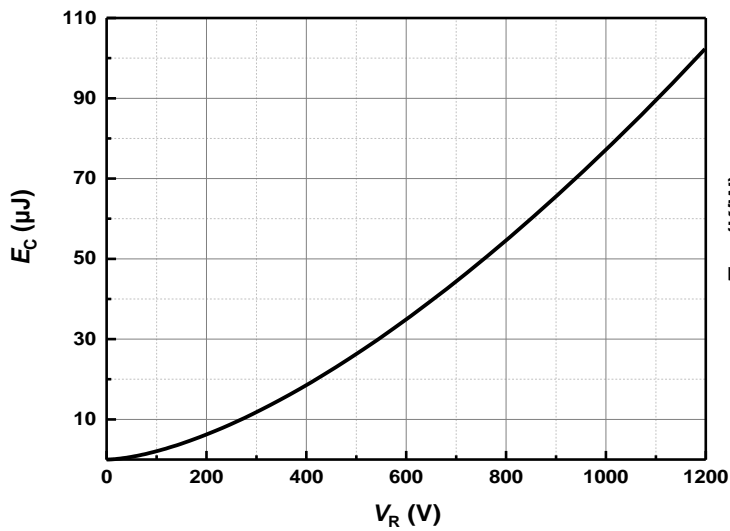


Figure 7 Capacitance stored energy

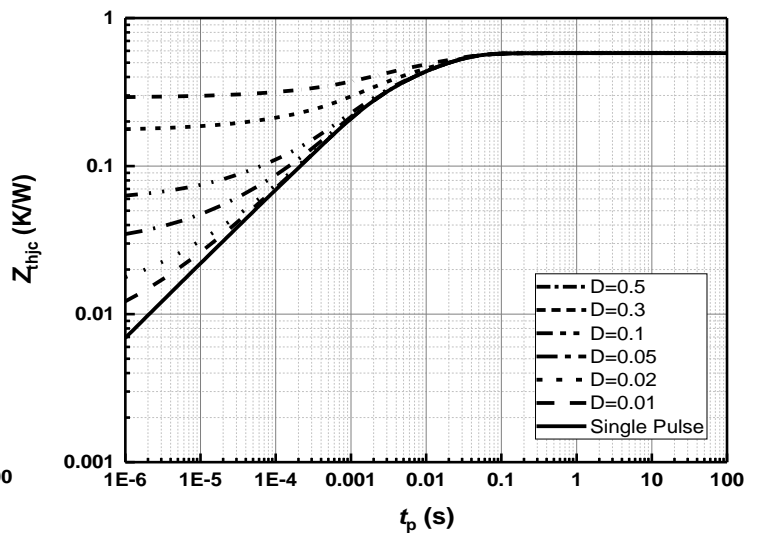
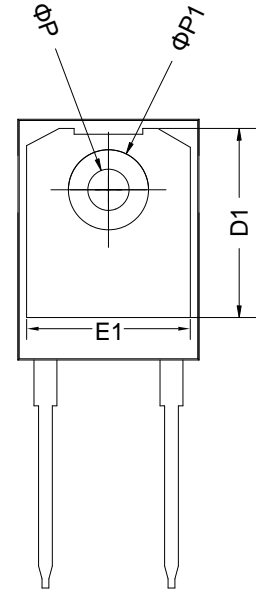
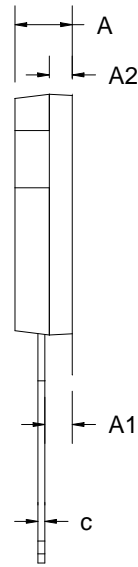
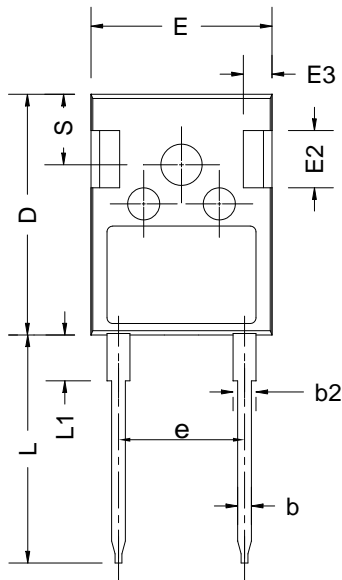
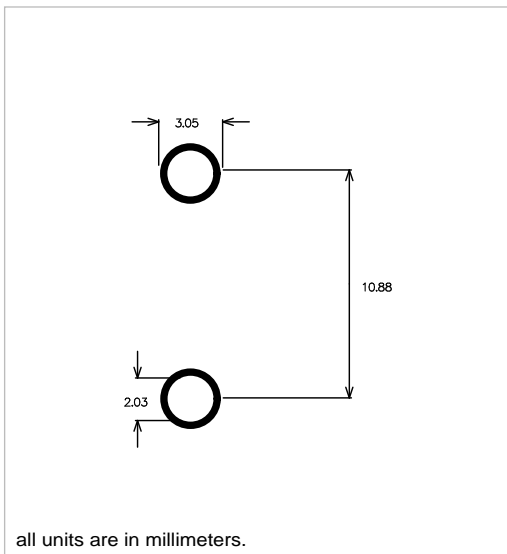


Figure 8 Max. transient thermal impedance, $Z_{thjc} = f(t)$, parameter: $D = t / T$

Package Dimensions



Recommended Solder Pad Layout



| SYMBOL | mm | | |
|--------|-----------|-------|-------|
| | MIN | NOM | MAX |
| A | 4.80 | 5.00 | 5.20 |
| A1 | 2.21 | 2.41 | 2.61 |
| A2 | 1.85 | 2.00 | 2.15 |
| b | 1.11 | 1.21 | 1.36 |
| b2 | 1.91 | 2.01 | 2.21 |
| c | 0.51 | 0.61 | 0.75 |
| D | 20.70 | 21.00 | 21.30 |
| D1 | 16.25 | 16.55 | 16.85 |
| E | 15.50 | 15.80 | 16.10 |
| E1 | 13.00 | 13.30 | 13.60 |
| E2 | 4.40 | - | 5.20 |
| E3 | 1.50 | - | 2.70 |
| e | 10.88 BSC | | |
| L | 19.62 | 19.92 | 20.22 |
| L1 | - | - | 4.30 |
| ϕ P | 3.40 | 3.60 | 3.80 |
| ϕ P1 | - | - | 7.40 |
| S | 6.15 BSC | | |

Revision History

| Document Version | Date of Release | Description of Changes |
|-------------------------|------------------------|-------------------------------|
| Rev. 0.0 | 2023-07-04 | Release of the datasheet. |
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