# B2D20065TF

## 650V ▲ 2x10A ▲ SiC SCHOTTKY DIODE

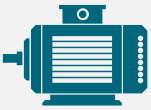
**SILICON CARBIDE SiC SCHOTTKY DIODE** ▲ THT type
Common cathode circuit configuration
Easy paralleling due to positive $V_F$ temperature coefficient
Temperature independent switching
Ultra-low forward voltage and high surge current
**TO3PF-3L package ▲ Electrical insulated mounting tab**

## SPECIFICATION

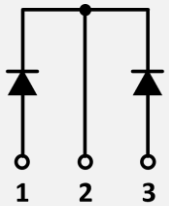
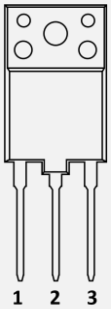
| Item ($T_C$ = 25°C, unless otherwise noted) | | Characteristics |
|---|---|---|
| Operating Temperature Range | $T_J$ | -55°C to +175°C |
| Storage Temperature Range | $T_S$ | -55°C to +175°C |
| Repetitive Peak Reverse Voltage | $V_{RRM}$ | 650V |
| Continuous Forward Current at $T_C$ = 140°C Note 1 | $I_F$ | 10A |
| Continuous Forward Current at $T_C$ = 140°C Note 2 | $I_F$ | 20A |
| Total Capacitive Charge ($T_J$ = 25°C) Note 2 | $Q_C$ | 60nC |
| Diode Forward Voltage ($T_J$ = 175°C, $I_F$ = 10A) Note 1 | $V_F$ | 1.62V |
| Power Dissipation Note 1 | $P_{TOT}$ | 77W |

**Notes**
**1:** **Per leg**
**2:** **Per device**

## APPLICATIONS

| EV Charging | Industrial Inverters | Motors & Drives | Power Factor Correction | Renewable Energy | SMPS | UPS |
|---|---|---|---|---|---|---|
|  |  |  |   |  |  |  |

## PIN DESCRIPTION

| Circuit Diagram | Outline ▪ Front View | Pin No. | Description |
|---|---|---|---|
|   |   | 1<br>2<br>3 | Anode Diode 1<br>Common Cathode<br>Anode Diode 2 |

## ABSOLUT MAXIMUM RATINGS ▲ $T_C$ = 25°C, unless otherwise noted

| Item | Condition | Symbol | | Unit |
|---|---|---|---|---|
| Repetitive Peak Reverse Voltage | | $V_{RRM}$ | 650 | V |
| Non-Repetitive Peak Reverse Voltage | | $V_{RSM}$ | 650 | V |
| Continuous Forward Current | $T_C$ = 25°C | $I_F$ | 25 Note 1 / 50 Note 2 | A |
| Continuous Forward Current | $T_C$ = 140°C | $I_F$ | 10 Note 1 / 20 Note 2 | A |
| Non-Repetitive Forward Surge Current | $T_C$ = 25°C, $t_p$ = 10ms, Half Sine Wave | $I_{FSM}$ | 70 Note 1 | A |
| $I^2t$ Value | $T_C$ = 25°C, $t_p$ = 10ms | $\int i^2dt$ | 24 Note 1 | $A^2s$ |
| Power Dissipation | $T_C$ = 25°C | $P_{TOT}$ | 77 Note 1 | W |
| Power Dissipation | $T_C$ = 110°C | $P_{TOT}$ | 33 Note 1 | W |
| Operating Junction Temperature | | $T_J$ | -55 to +175 | °C |
| Storage Temperature Range | | $T_{STG}$ | -55 to +175 | °C |
| TO-3PF Mounting Torque | M3 Screw | | 0.6 | Nm |

**Notes**
**1: Per leg**
**2: Per device**

## ELECTRICAL CHARACTERISTICS ▲ PER LEG

| Item | Condition | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| DC Blocking Voltage | $T_J$ = 25°C | $V_{DC}$ | 650 | | | V |
| Diode Forward Voltage | $I_F$ = 10A, $T_J$ = 25°C | $V_F$ | | 1.30 | 1.50 | V |
| Diode Forward Voltage | $I_F$ = 10A, $T_J$ = 175°C | $V_F$ | | 1.62 | 2.06 | V |
| Reverse Current | $V_R$ = 650V, $T_J$ = 25°C | $I_R$ | | 1 | 70 | µA |
| Reverse Current | $V_R$ = 650V, $T_J$ = 175°C | $I_R$ | | 20 | 200 | µA |

| Item | Condition | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Dynamic Characteristics** | | | | | | |
| Total Capacitive Charge | $V_R$ = 400V, $T_J$ = 25°C $Q_C = \int_0^{V_R} C\,(V)dV$ | $Q_C$ | | 30 | | nC |
| Total Capacitance | $V_R$ = 1V, f = 1MHz, $T_J$ = 25°C | C | | 470 | | pF |
| Total Capacitance | $V_R$ = 300V, f = 1MHz, $T_J$ = 25°C | C | | 54 | | pF |
| Total Capacitance | $V_R$ = 600V, f = 1MHz, $T_J$ = 25°C | C | | 53 | | pF |
| Capacitance Stored Energy | $V_R$ = 400V, $T_J$ = 25°C | $E_C$ | | 7 | | µJ |

## THERMAL RESISTANCE PERFORMANCE

| Item | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Thermal Resistance, Junction to Case, per Leg | $R_{\theta,JC}$ | | 1.929 | | K/W |
| Thermal Resistance, Junction to Case, per Device | $R_{\theta,JC}$ | | 0.965 | | K/W |

## REFERENCE DATA ▲ TYPICAL PERFORMANCE PER LEG

**Fig. 1 ▪ Typical Forward Characteristics $I_F$ vs. $V_F$**

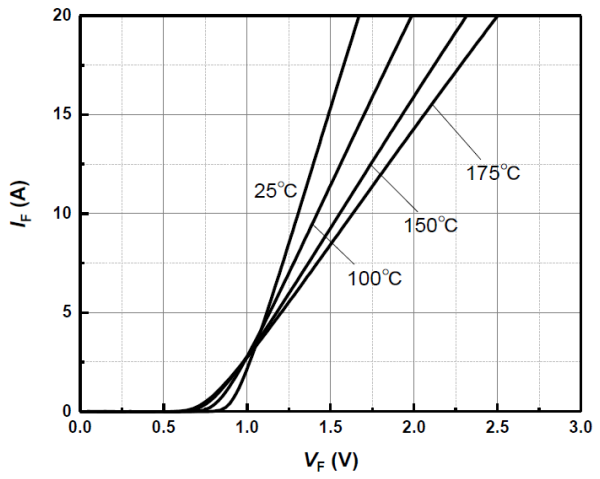



**Fig. 2 ▪ Typical Reverse Current $I_R$ as function of Reverse Voltage $V_R$**

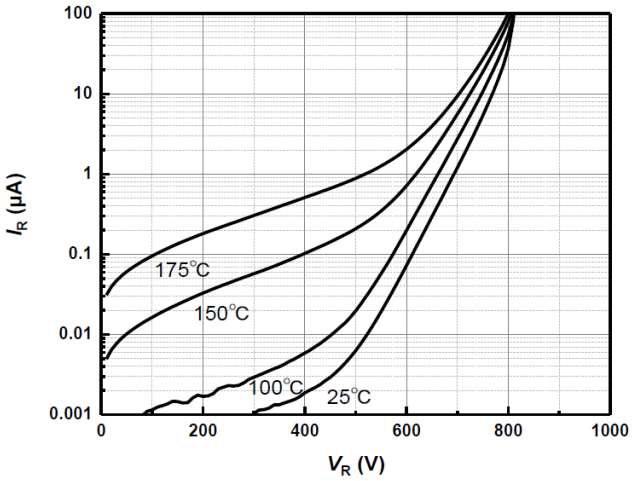



**Fig. 3 ▪ Diode Forward Current $I_F$ as function of Case Temperature $T_C$ (D = Duty Cycle)**

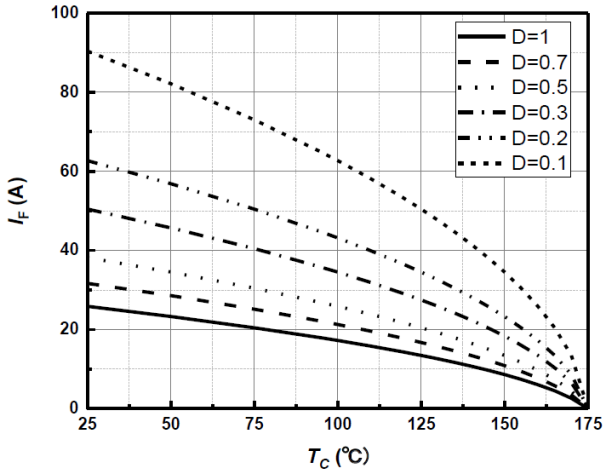



**Fig. 4 ▪ Typical Capacitance C as function of Reverse Voltage $V_R$, C =f($V_R$), $T_J$ = 25°C, f = 1MHz**

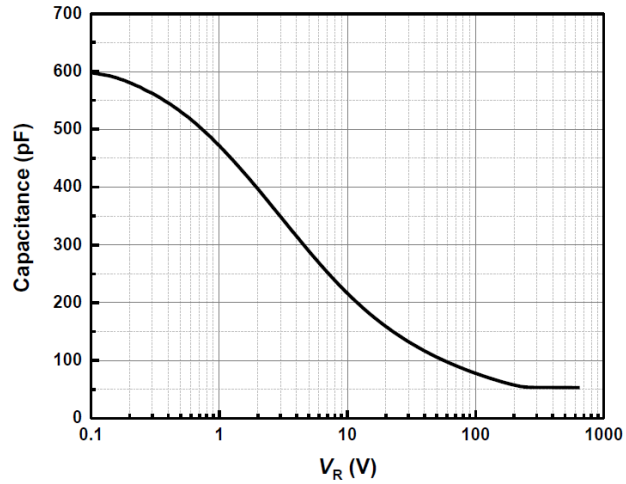



**Fig. 5 ▪ Typical Reverse Charge $Q_C$ as function of Reverse Voltage $V_R$**

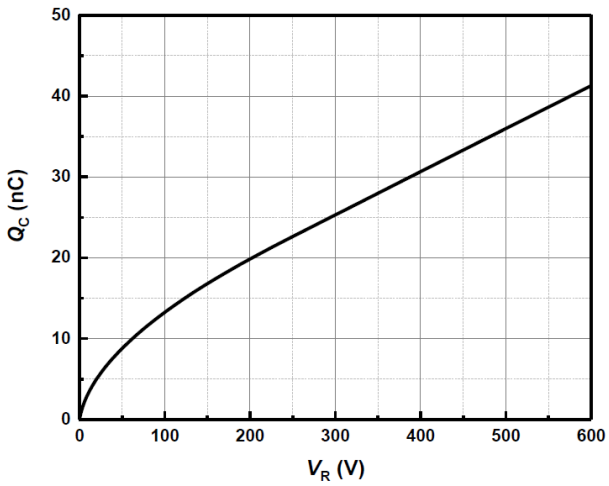
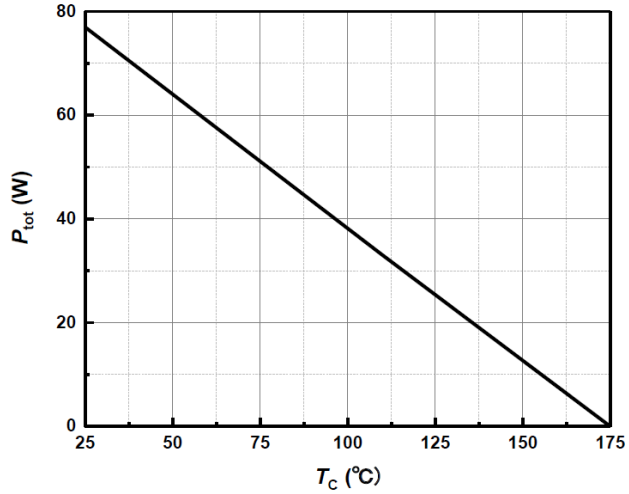



**Fig. 6 ▪ Power Dissipation $P_{TOT}$ as function of Case Temperature $T_C$**



## REFERENCE DATA ▲ TYPICAL PERFORMANCE PER LEG

**Fig. 7 ▪ Capacitance Stored Energy**

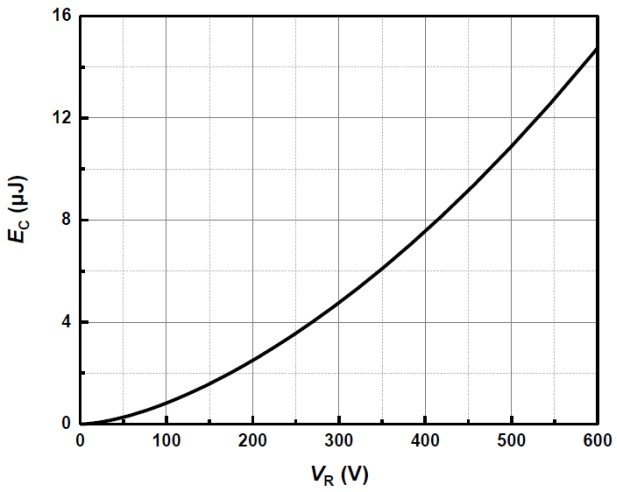
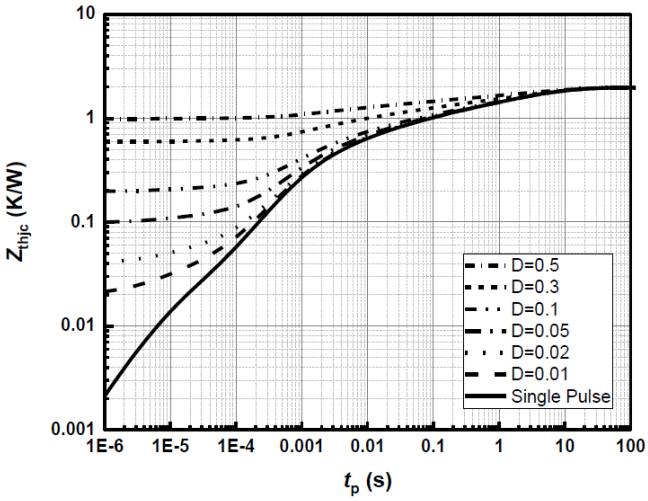
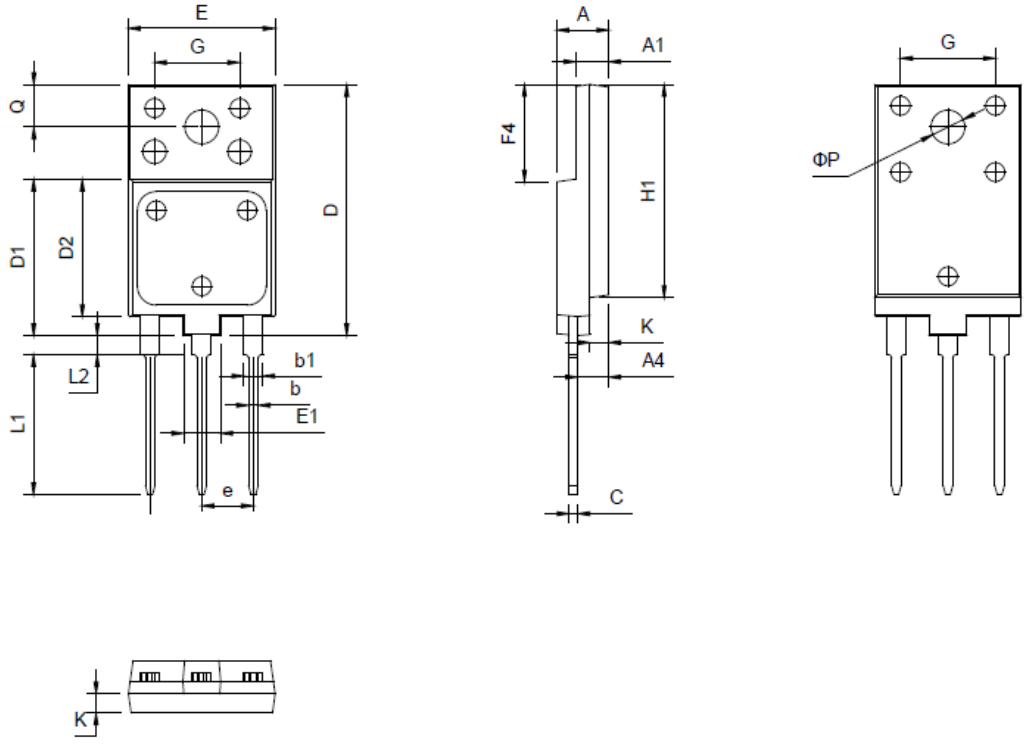



**Fig. 8 ▪ Maximum Transient Thermal Impedance, $Z_{thjc}$ = f(t), Parameter: D = t/T**



## PACKAGE OUTLINE




| Sym | Millimeters (Min.) | Millimeters (Typ.) | Millimeters (Max.) |
|---|---|---|---|
| A | 5.30 | 5.50 | 5.70 |
| A1 | 2.80 | 3.00 | 3.20 |
| b | 0.66 | 0.86 | 0.95 |
| b1 | 1.80 | 2.00 | 2.20 |
| A4 | 3.10 | 3.30 | 3.50 |
| C | 0.80 | 0.90 | 1.00 |
| D | 26.30 | 26.50 | 26.70 |
| D1 | 16.30 | 16.50 | 16.70 |
| D2 | 14.40 | 14.50 | 14.70 |
| P | 3.40 | 3.60 | 3.80 |
| E | 15.30 | 15.50 | 15.70 |

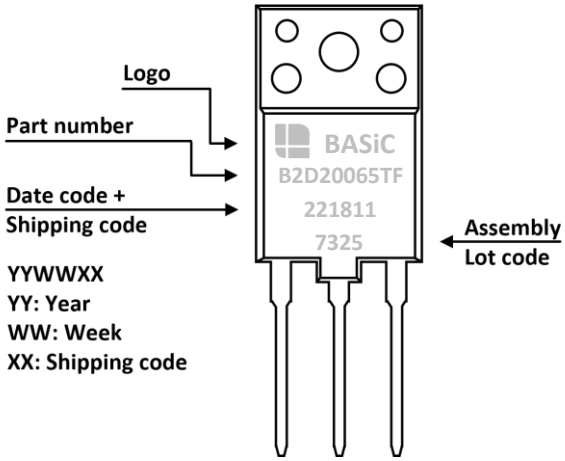
| Sym | Millimeters (Min.) | Millimeters (Typ.) | Millimeters (Max.) |
|---|---|---|---|
| E1 | 3.80 | 4.00 | 4.20 |
| e | 5.15 | 5.45 | 5.75 |
| G | 9.70 | 9.90 | 10.10 |
| Q | 4.35 | 4.50 | 4.65 |
| L1 | 14.60 | 14.80 | 15.00 |
| L2 | 2.30 | 2.50 | 2.70 |
| K | 1.80 | 2.00 | 2.20 |
| F4 | 9.80 | 10.00 | 10.20 |
| H1 | 22.80 | 23.00 | 23.20 |
| K | 1.80 | 2.00 | 2.20 |

**TO3PF-3L package ▲ Epoxy meets UL94-V0**

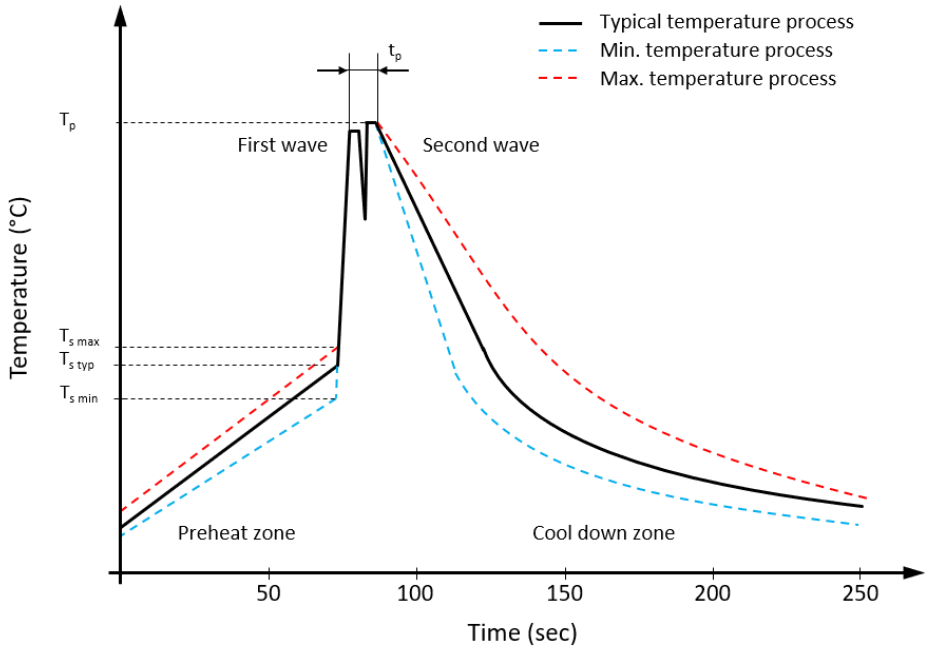
## ORDERING INFORMATION

| Part Number | Package | Packing | Tube Qty. | Inner Box Qty. | Outer Box Qty. |
|---|---|---|---|---|---|
| B2D20065TF | TO3PF-3L | Tube | 30pcs | 300pcs | 3,000pcs |

## PART MARKING




## RECOMMENDED WAVE SOLDERING PROFILE ▲ THT PACKAGE




### Classification wave soldering profile ▲ Refer to EN 61760-1: 2006

| Profile Features | | Value ▲ Sn-Pb Assembly | Value ▲ Pb-free Assembly |
|---|---|---|---|
| Preheat temperature min. | $T_{s\,min}$ | 100 °C | 100 °C |
| Preheat temperature typical | $T_{s\,typ}$ | 120 °C | 120 °C |
| Preheat temperature max. | $T_{s\,max}$ | 130 °C | 130 °C |
| Preheat time $t_s$ from $T_{s\,min}$ to $T_{s\,max}$ | $t_s$ | 70 seconds | 70 seconds |
| Peak temperature | $T_p$ | 235 °C to 260 °C | 245 °C to 260 °C |
| Time of actual peak temperature | $t_p$ | Max. 10 seconds<br>Max. 5 second each wave | Max. 10 seconds<br>Max. 5 second each wave |
| Ramp-down date min. | | ~ 2 °C/second | ~ 2 °C/second |
| Ramp-down rate typical | | ~ 3.5 °C/second | ~ 3.5 °C/second |
| Ramp-down rate max. | | ~ 5 °C/second | ~ 5 °C/second |
| Time 25°C to 25°C | | 4 minutes | 4 minutes |

## REVISION TABLE

| Revision | Date | Status | Notes |
|---|---|---|---|
| 001 | 30/09/2022 | Initial release | Initial publication |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

## DISCLAIMER

Except for the written expressed warranties, MGT does not implicitly, by assumption or whatever else, warrant, under-take, promise any other warranty or guaranty for any MGT product.

All information and technical specifications made available by MGT are for guidance only and we reserve the right to change or modify them without prior notice. Unless expressly stated in writing by MGT, we reject any guarantees, obligations, or warranties.

All MGT products with the technical specifications described are suitable for use in certain applications. Operating, production, storage and environmental conditions can have a massive influence on the parameters mentioned in the data sheets, which cause the performance to vary over time.

It is subject to the user's duty of care to design and validate his products in such a way that appropriate measures are taken, such as protective circuits or redundant systems to ensure the safety standards required in the application.

MGT components are not designed or rated for use in life support, rescue, safety critical, military, or aerospace applications where failure or malfunction could result in property or environmental damage, serious injury or death. In the aforementioned cases, please contact us before using MGT products.

In principle, we reserve all rights and MGT's general terms and conditions apply. You can find them on our website www.mgt.co.com.