

$V_{RRM}$  = 650 V  
 $I_F(T_c=95^{\circ}C)$  = 10 A  
 $Q_C$  = 31 nC

#### Features:

- Extremely low reverse current
- No reverse recovery current
- Temperature independent switching
- Positive temperature coefficient on  $V_F$
- Excellent surge current capability
- Low Capacitive charge

#### Benefits

- Essentially No switching losses
- System efficiency improvement over Si Diodes
- Increased power density
- Enabling higher switching frequency
- Reduction of Heat Sink Requirements
- System Cost savings due to smaller magnetics
- Reduced EMI

#### Applications

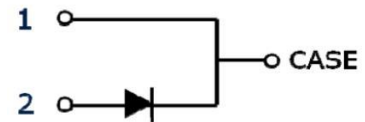
- Switch Mode Power Supplies (SMPS)
- Uninterruptable power supplies
- Motor Drivers
- Power Factor Correction

#### Pacakge Pin definitions

- Pin1-Cathode
- Pin2-Anode

#### Package Parameters

| Part Number | Marking    | Package    |
|-------------|------------|------------|
| B1D10065KF  | B1D10065KF | TO-220F-2L |



**Maximum ratings**

| Symbol        | Parameter                            | Test conditions                                                                   | Value           | Unit                 |
|---------------|--------------------------------------|-----------------------------------------------------------------------------------|-----------------|----------------------|
| $V_{RRM}$     | Repetitive Peak Reverse Voltage      |                                                                                   | 650             | V                    |
| $V_{RSM}$     | Surge Peak Reverse Voltage           |                                                                                   | 650             | V                    |
| $I_F$         | Continuous Forward Current           | $T_c=25^{\circ}\text{C}$<br>$T_c=95^{\circ}\text{C}$<br>$T_c=150^{\circ}\text{C}$ | 24<br>10<br>4.5 | A                    |
| $I_{FSM}$     | Non-Repetitive Forward Surge Current | $T_c=25^{\circ}\text{C}$ , $t_p=10\text{ms}$ , sine halfwave                      | 70              | A                    |
| $\int i^2 dt$ | $i^2t$ Value                         | $T_c=25^{\circ}\text{C}$ , $t_p=10\text{ms}$                                      | 24.5            | $\text{A}^2\text{S}$ |
| $P_{tot}$     | Power Dissipation                    | $T_c=25^{\circ}\text{C}$<br>$T_c=110^{\circ}\text{C}$                             | 33<br>14        | W                    |
| $T_j$         | Operating temperature                |                                                                                   | -55~175         | $^{\circ}\text{C}$   |
| $T_{stg}$     | Storage temperature                  |                                                                                   | -55~135         | $^{\circ}\text{C}$   |

**Thermal Characteristics**

| Symbol       | Parameter                                   | Value |       |      | Unit |
|--------------|---------------------------------------------|-------|-------|------|------|
|              |                                             | Min.  | Typ.  | Max. |      |
| $R_{th(jc)}$ | Thermal resistance from junction to case    |       | 4.44  |      | K/W  |
| $R_{th(ja)}$ | Thermal resistance from junction to ambient |       | 55.85 |      | K/W  |

**Electrical Characteristics**
**Static Characteristics (T<sub>j</sub>=25°C unless otherwise specified)**

| Symbol          | Parameter             | Test conditions                                                                         | Value |             |      | Unit |
|-----------------|-----------------------|-----------------------------------------------------------------------------------------|-------|-------------|------|------|
|                 |                       |                                                                                         | Min.  | Typ.        | Max. |      |
| V <sub>DC</sub> | DC blocking voltage   | T <sub>j</sub> =25°C                                                                    | 650   |             |      | V    |
| V <sub>F</sub>  | Diode forward voltage | I <sub>F</sub> =10A T <sub>j</sub> =25°C<br>I <sub>F</sub> =10A T <sub>j</sub> =175°C   |       | 1.48<br>1.7 |      | V    |
| I <sub>R</sub>  | Reverse current       | V <sub>R</sub> =650V T <sub>j</sub> =25°C<br>V <sub>R</sub> =650V T <sub>j</sub> =175°C |       | 0.07<br>3.5 |      | μA   |

**Dynamic Characteristics (T<sub>j</sub>=25°C unless otherwise specified)**

| Symbol         | Parameter               | Test conditions                                                                         | Value |                     |      | Unit |
|----------------|-------------------------|-----------------------------------------------------------------------------------------|-------|---------------------|------|------|
|                |                         |                                                                                         | Min.  | Typ.                | Max. |      |
| Q <sub>C</sub> | Total capacitive charge | V <sub>R</sub> =400V T <sub>j</sub> =25°C<br>$Q_C = \int_0^{V_R} C(V)dV$                |       | 31                  |      | nC   |
| C              | Total Capacitance       | V <sub>R</sub> =1V f=1MHz<br>V <sub>R</sub> =300V f=1MHz<br>V <sub>R</sub> =500V f=1MHz |       | 450<br>54.7<br>52.3 |      | pF   |

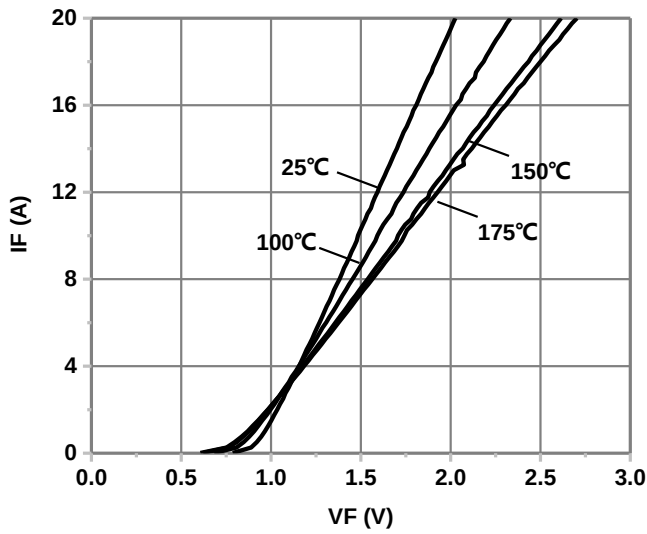


Figure 1. Typical forward characteristics

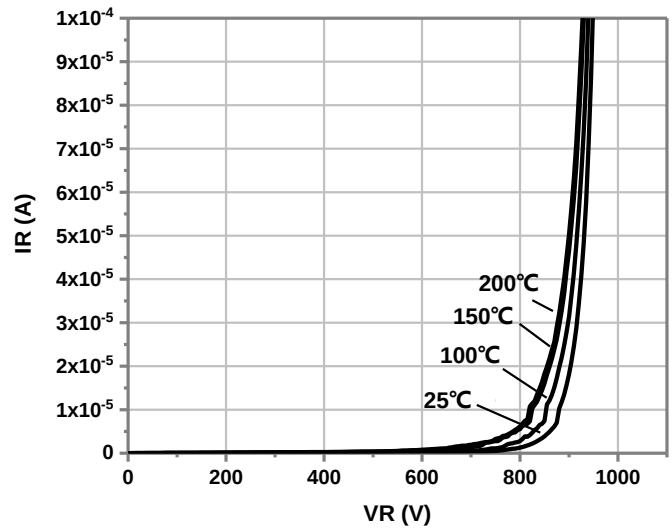


Figure 2. Typical reverse current as function of reverse voltage

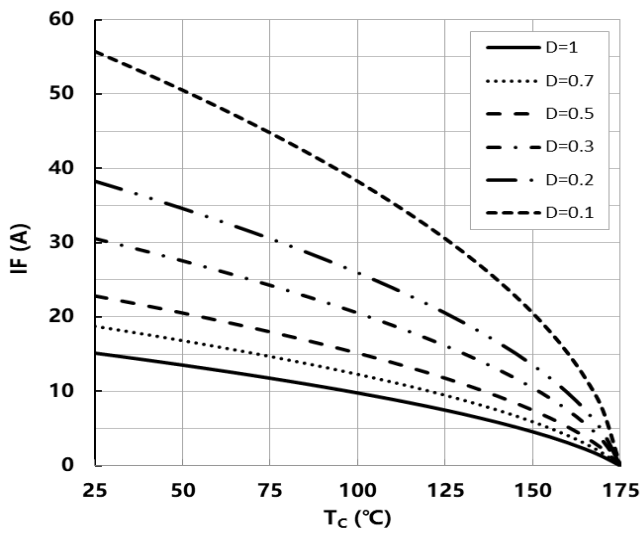


Figure 3. Diode forward current as function of temperature,  $D$ =duty cycle

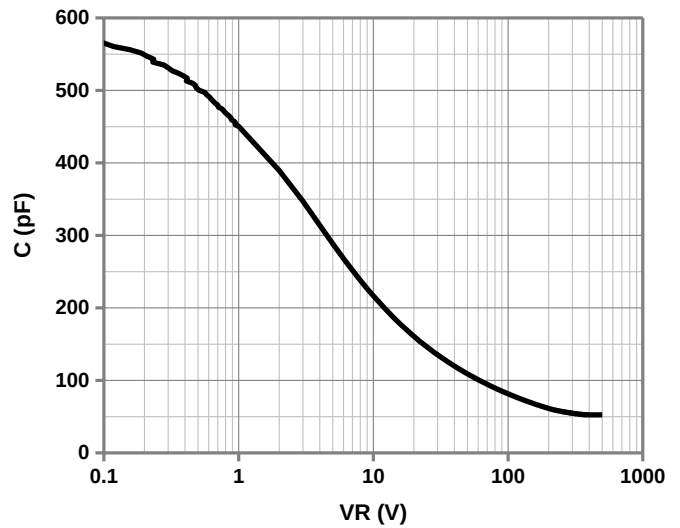


Figure 4. Typical capacitance as function of reverse voltage,  $C=f(V_R)$ ;  $T_j=25^\circ\text{C}$ ;  $f=1\text{ MHz}$

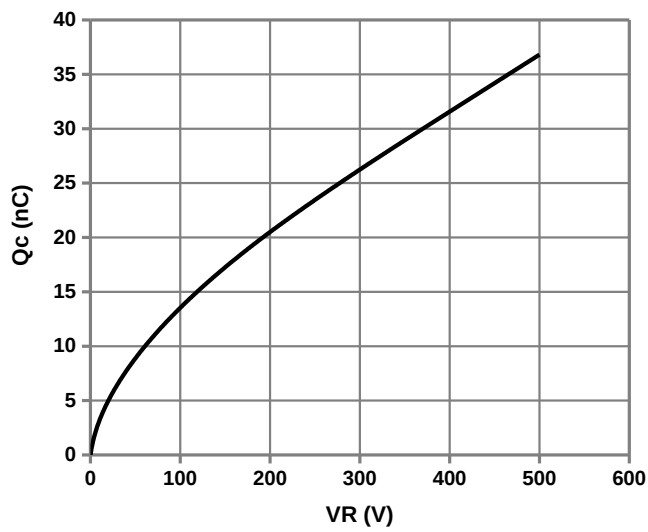


Figure 5. Typical reverse charge as function of reverse voltage

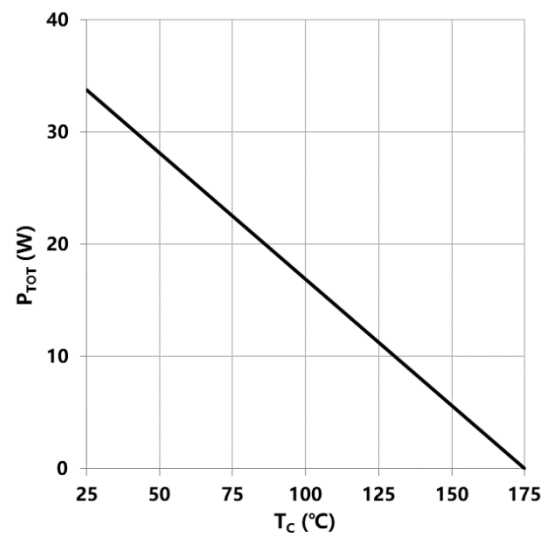


Figure 6. Power dissipation as function of case temperature

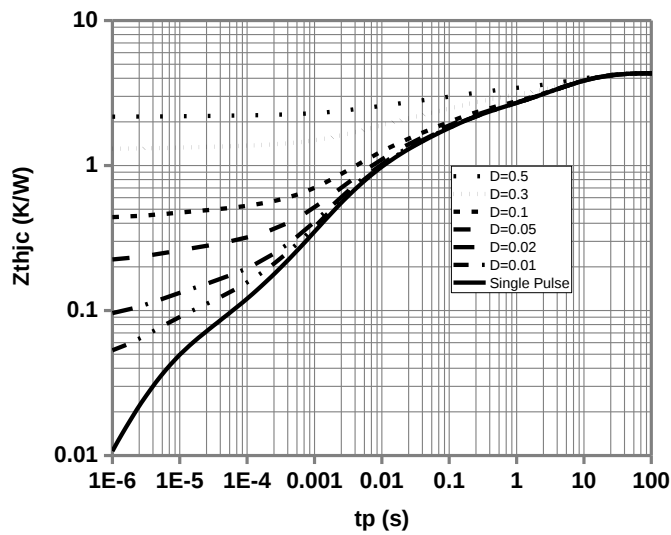
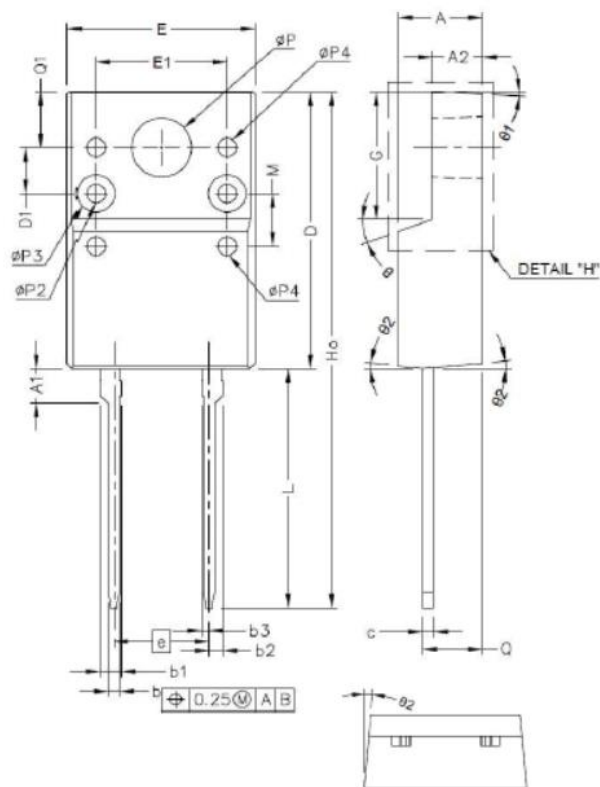


Figure 7. Max. transient thermal impedance,  
 $Z_{th,jc}=f(t)$ , parameter:  $D=t/T$

## Package Dimensions



| SYMBOL    | MIN (mm) | MAX (mm) |
|-----------|----------|----------|
| A         | 4.30     | 4.93     |
| A1        | 1.80     | 3.90     |
| A2        | 2.34     | 2.90     |
| b         | 0.40     | 0.91     |
| b1        | 1.00     | 1.40     |
| b2        | 0.56     | 0.93     |
| b3        | 0.24     | 0.55     |
| C         | 0.40     | 0.80     |
| D         | 14.70    | 16.07    |
| D1        | 2.50 TYP |          |
| D2        | 2.66 TYP |          |
| e         | 4.83     | 5.33     |
| E         | 9.70     | 10.36    |
| E1        | 7.00 TYP |          |
| G         | 6.50     | 7.10     |
| Ho        | 28 TYP   |          |
| L         | 12.10    | 13.50    |
| L1        |          | 0.50     |
| M         | 2.86 TYP |          |
| $\phi P$  | 2.98     | 3.40     |
| Q         | 3.10     | 3.30     |
| Q1        | 2.70     | 3.50     |
| $\theta$  | 20° TYP  |          |
| $\theta1$ | 3° TYP   |          |
| $\theta2$ | 5° TYP   |          |

**Revision History:****2019-05-15****Premilinary Version**

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