

### Product Summary

|                               |         |
|-------------------------------|---------|
| $V_{RRM}$                     | 650V    |
| $I_F (T_C=155^\circ\text{C})$ | 30 A**  |
| $Q_C$                         | 90 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)
- Uninterruptible power supplies
- Motor drivers
- Power factor correction

### Package Pin Definitions

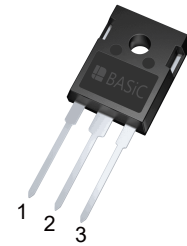
- Pin1 - Anode
- Pin2 and backside - Cathode
- Pin3 - Anode

### Package Parameters

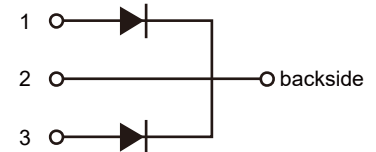
| Part Number | Marking     | Package  |
|-------------|-------------|----------|
| B2D30065HC1 | B2D30065HC1 | TO-247-3 |

\* Per Leg, \*\* Per Device

### Package: TO-247-3



### 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      |  | 650       | V                |
| $V_{RSM}$     | Non-repetitive peak reverse voltage  |  | 650       | V                |
| $I_F$         | Continuous forward current           | $T_c=25^\circ\text{C}$                                       | 53*/106** | A                |
|               |                                      | $T_c=125^\circ\text{C}$                                      | 28*/56**  |                  |
|               |                                      | $T_c=155^\circ\text{C}$                                      | 15*/30**  |                  |
| $I_{FSM}$     | Non-repetitive forward surge current | $T_c=25^\circ\text{C}$ , $t_p=10\text{ms}$<br>Half sine wave | 103*      | A                |
| $\int i^2 dt$ | $i^2t$ value                         | $T_c=25^\circ\text{C}$ , $t_p=10\text{ms}$                   | 53*       | A <sup>2</sup> S |
| $P_{tot}$     | Power dissipation                    | $T_c=25^\circ\text{C}$                                       | 217*      | W                |
|               |                                      | $T_c=110^\circ\text{C}$                                      | 94*       |                  |
| $T_j$         | 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               |

\* Per Leg, \*\* Per Device

**Thermal Characteristics**

| Symbol       | Parameter                                | Value |                 |      | Unit |
|--------------|--|-------|-----------------|------|------|
|              |  | Min.  | Typ.            | Max. |      |
| $R_{th(jc)}$ | Thermal resistance from junction to case |       | 0.69*<br>0.35** |      | K/W  |

\* Per Leg, \*\* Per Device

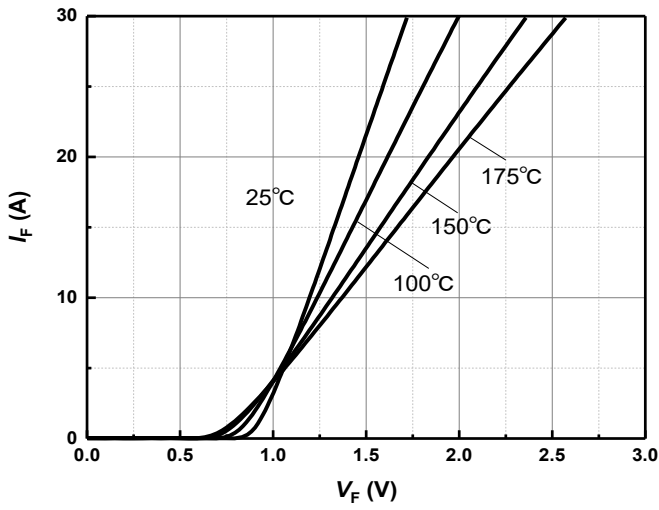
**Electrical Characteristics (Per Leg)**  
**Static Characteristics**

| Symbol   | Parameter             | Test conditions   | Value |              |            | Unit    |
|----------|-----------------------|---|-------|--------------|------------|---------|
|          |                       |   | Min.  | Typ.         | Max.       |         |
| $V_{DC}$ | DC blocking voltage   | $T_J=25^{\circ}C$   | 650   |              |            | V       |
| $V_F$    | Diode forward voltage | $I_F=15A$ $T_J=25^{\circ}C$<br>$I_F=15A$ $T_J=175^{\circ}C$   |       | 1.32<br>1.68 | 1.6<br>2.4 | V       |
| $I_R$    | Reverse current       | $V_R=650V$ $T_J=25^{\circ}C$<br>$V_R=650V$ $T_J=175^{\circ}C$ |       | 1<br>15      | 110<br>150 | $\mu A$ |

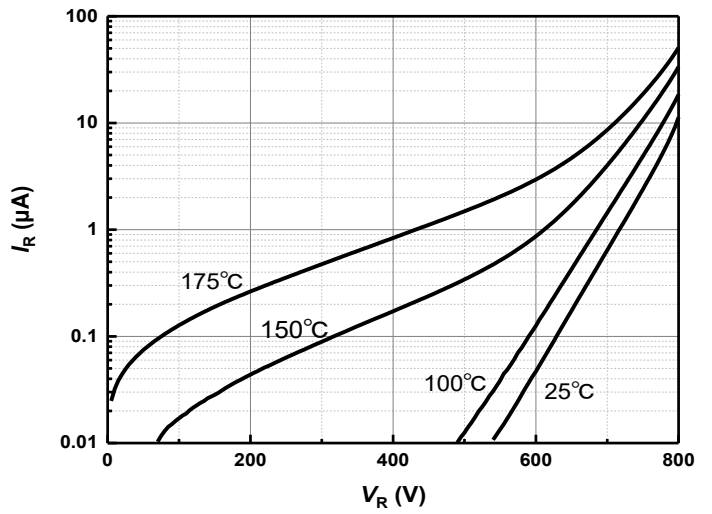
**AC Characteristics**

| Symbol | Parameter                 | Test conditions   | Value |                 |      | Unit    |
|--------|---------------------------|---|-------|-----------------|------|---------|
|        |                           |   | Min.  | Typ.            | Max. |         |
| $Q_C$  | Total capacitive charge   | $V_R=400V$ $T_J=25^{\circ}C$<br>$Q_C=\int_0^{V_R} C(V)dV$       |       | 45              |      | nC      |
| $C$    | Total capacitance         | $V_R=1V$ $f=1MHz$<br>$V_R=300V$ $f=1MHz$<br>$V_R=600V$ $f=1MHz$ |       | 705<br>78<br>74 |      | pF      |
| $E_C$  | Capacitance stored energy | $V_R=400$   |       | 11              |      | $\mu J$ |

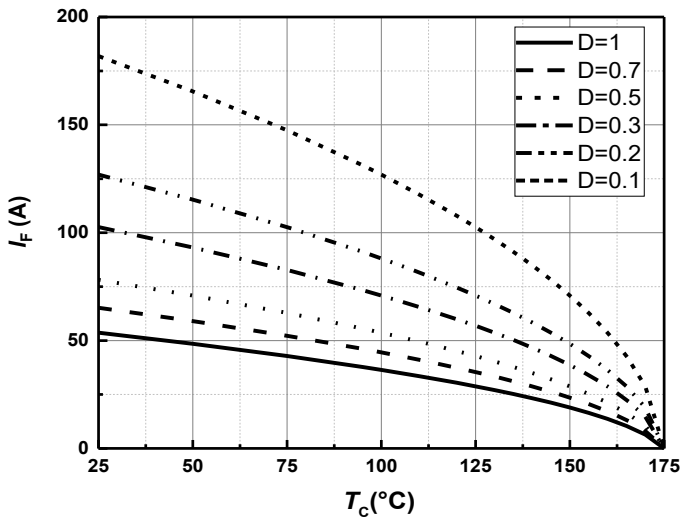
**Typical Performance (Per Leg)**



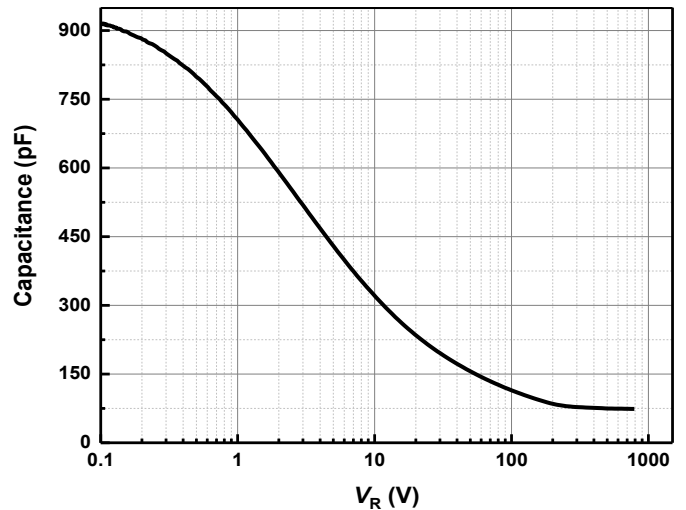
**Figure 1** Typical forward characteristics



**Figure 2** Typical reverse current as function of reverse voltage

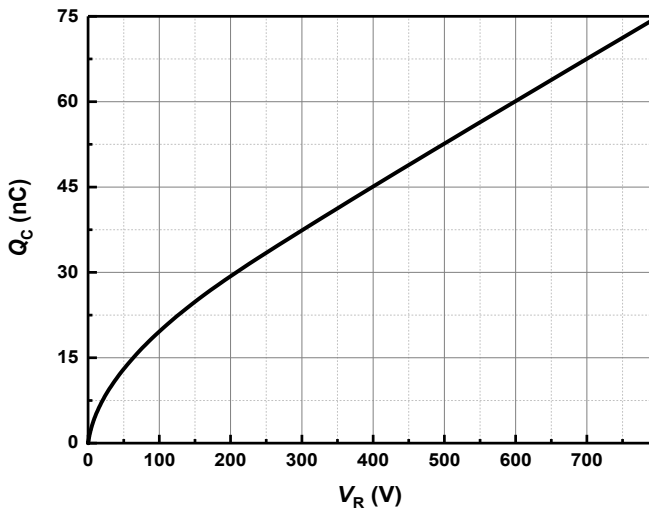


**Figure 3** Diode forward current as function of temperature, D=duty cycle

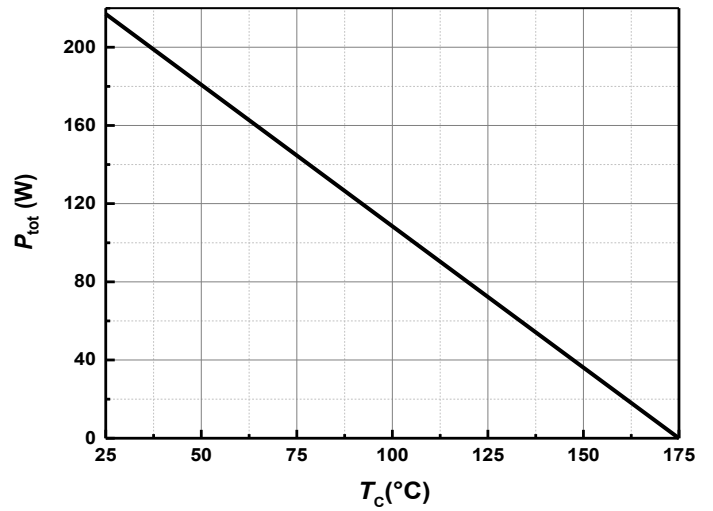


**Figure 4** Typical capacitance as function of reverse voltage,  $C=f(V_R)$ ;  $T_j=25^{\circ}$ C;  $f=1$  MHz

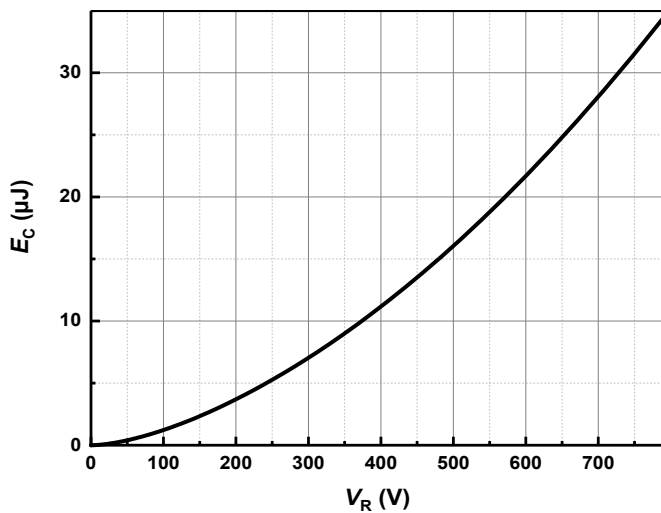
**Typical Performance**



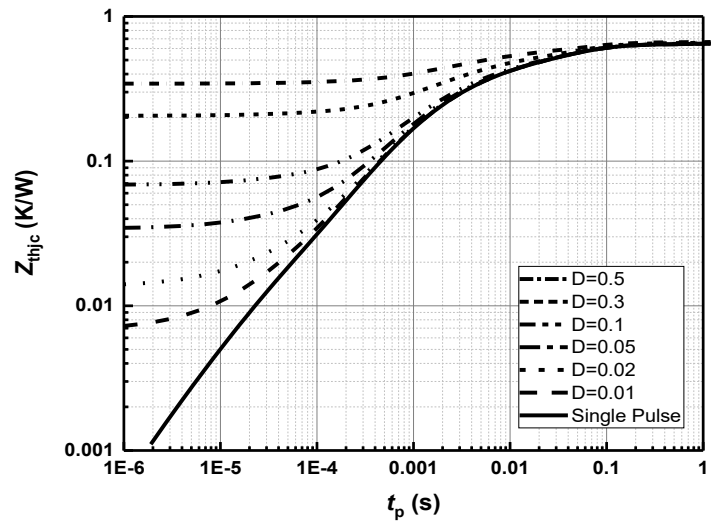
**Figure 5** Typical reverse charge as function of reverse voltage



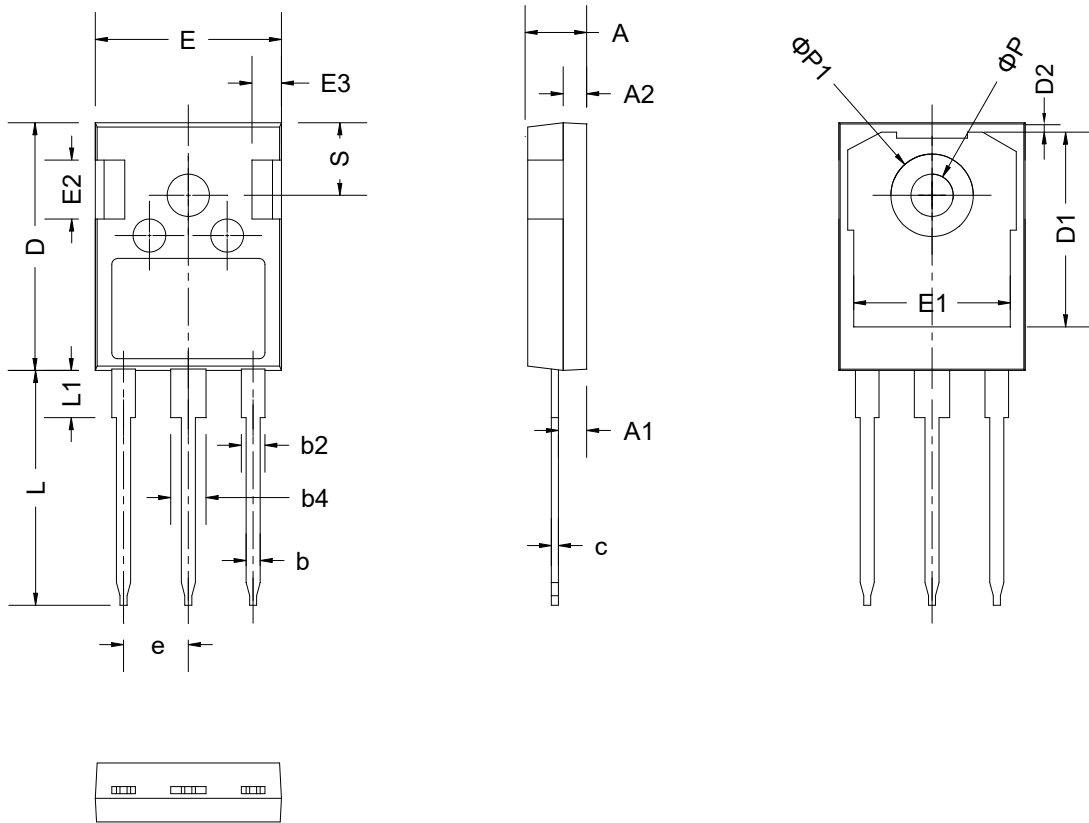
**Figure 6** Power dissipation as function of case temperature



**Figure 7** Capacitance stored energy



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

**Package Dimensions**


| SYMBOL | mm       |       |       |
|--------|----------|-------|-------|
|        | MIN      | NOM   | MAX   |
| A      | 4.80     | 5.00  | 5.20  |
| A1     | 2.21     | 2.41  | 2.59  |
| A2     | 1.85     | 2.00  | 2.15  |
| b      | 1.11     | -     | 1.36  |
| b2     | 1.91     | 2.01  | 2.21  |
| b4     | 2.91     | -     | 3.41  |
| c      | 0.51     | -     | 0.75  |
| D      | 20.80    | 21.00 | 21.30 |
| D1     | 16.25    | 16.55 | 16.85 |
| D2     | 1.05     | 1.17  | 1.35  |
| 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      | 5.436BSC |       |       |
| L      | 19.62    | 19.92 | 20.22 |
| L1     | -        | -     | 4.30  |
| φ P    | 3.40     | 3.60  | 3.80  |
| φ P1   | -        | -     | 7.40  |
| S      | 6.00     | 6.15  | 6.30  |

**Revision History**

| <b>Document Version</b> | <b>Date of Release</b> | <b>Description of Changes</b> |
|-------------------------|------------------------|-------------------------------|
| Rev. 0.0                | 2022-09-28             | Release of the datasheet.     |
|                         |                        |                               |
|                         |                        |                               |
|                         |                        |                               |

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**Shenzhen, China**  
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