

$V_{RRM} = 1200\text{ V}$   
 $I_F (T_C=165^\circ\text{C}) = 2\text{ A}$   
 $Q_C = 12\text{ nC}$

## 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

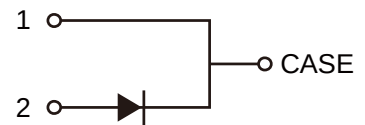
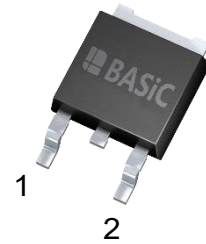
- Pin1- Cathode
- Pin2- Anode

## Package Parameters

| Part Number | Marking   | Package  |
|-------------|-----------|----------|
| B1D02120E   | B1D02120E | TO-252-2 |

TO-252-2

CASE



**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                    |
| $I_F$         | Continuous forward current           | $T_c=25^{\circ}\text{C}$<br>$T_c=165^{\circ}\text{C}$         | 11<br>2  | A                    |
| $I_{FSM}$     | Non-repetitive forward surge current | $T_c=25^{\circ}\text{C}$ , $t_p=10\text{ms}$ , Half Sine Wave | 16       | A                    |
| $\int i^2 dt$ | $i^2 t$ value                        | $T_c=25^{\circ}\text{C}$ , $t_p=10\text{ms}$                  | 1.28     | $\text{A}^2\text{S}$ |
| $P_{tot}$     | Power dissipation                    | $T_c=25^{\circ}\text{C}$<br>$T_c=110^{\circ}\text{C}$         | 80<br>34 | W                    |
| $T_j$         | Operating junction temperature       |                                                               | -55~175  | $^{\circ}\text{C}$   |
| $T_{stg}$     | Storage temperature                  |                                                               | -55~175  | $^{\circ}\text{C}$   |

**Thermal Characteristics**

| Symbol       | Parameter                                | Value |       |      | Unit |
|--------------|------------------------------------------|-------|-------|------|------|
|              |                                          | Min.  | Typ.  | Max. |      |
| $R_{th(jc)}$ | Thermal resistance from junction to case |       | 1.872 |      | 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 | $I_F=2A$ $T_j=25^{\circ}C$<br>$I_F=2A$ $T_j=175^{\circ}C$       |       | 1.42<br>1.90 |      | V       |
| $I_R$    | Reverse current       | $V_R=1200V$ $T_j=25^{\circ}C$<br>$V_R=1200V$ $T_j=175^{\circ}C$ |       | 1<br>20      |      | $\mu A$ |

**AC Characteristics**

| Symbol | Parameter                 | Test conditions                                                 | Value |                    |      | Unit    |
|--------|---------------------------|-----------------------------------------------------------------|-------|--------------------|------|---------|
|        |                           |                                                                 | Min.  | Typ.               | Max. |         |
| $Q_C$  | Total capacitive charge   | $V_R=800V$ $T_j=25^{\circ}C$<br>$Q_C = \int_0^{V_R} C(V)dV$     |       | 12                 |      | nC      |
| $C$    | Total capacitance         | $V_R=1V$ $f=1MHz$<br>$V_R=400V$ $f=1MHz$<br>$V_R=800V$ $f=1MHz$ |       | 132<br>11.8<br>8.9 |      | pF      |
| $E_C$  | Capacitance stored energy | $V_R=800V$                                                      |       | 6.3                |      | $\mu J$ |

### Typical Performance

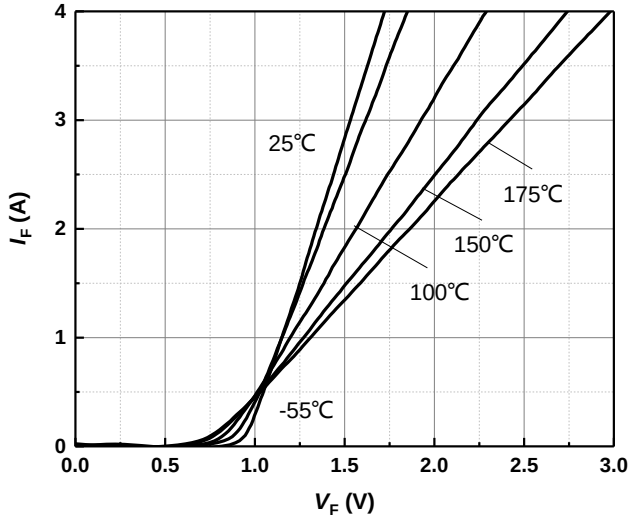


Figure 1. Typical forward characteristics

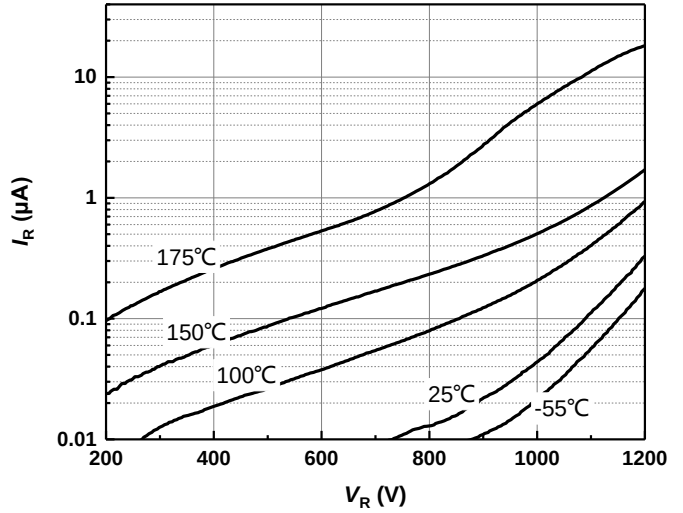


Figure 2. Typical reverse current as function of reverse voltage

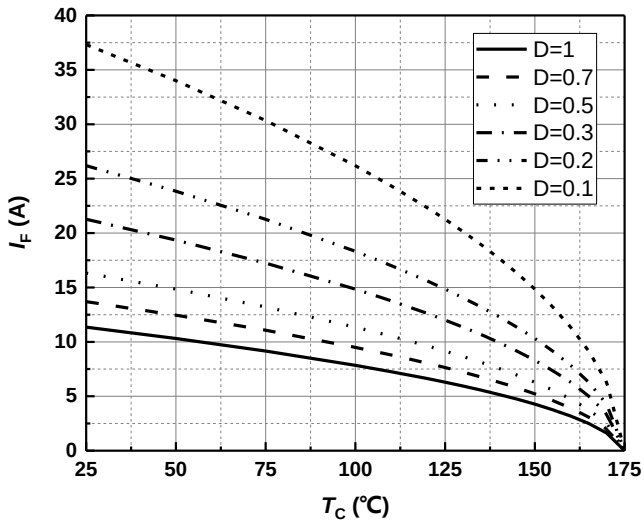


Figure 3. Diode forward current as function of temperature, D=duty cycle

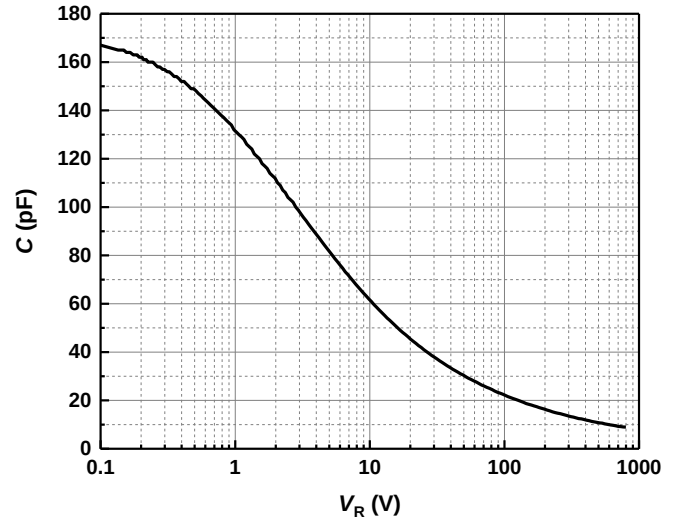
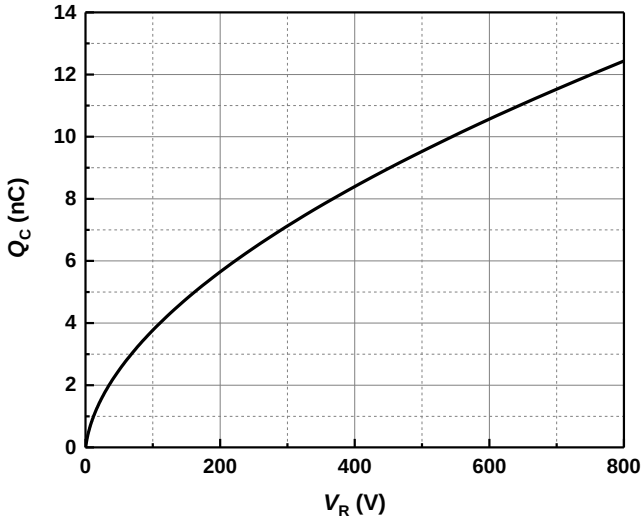
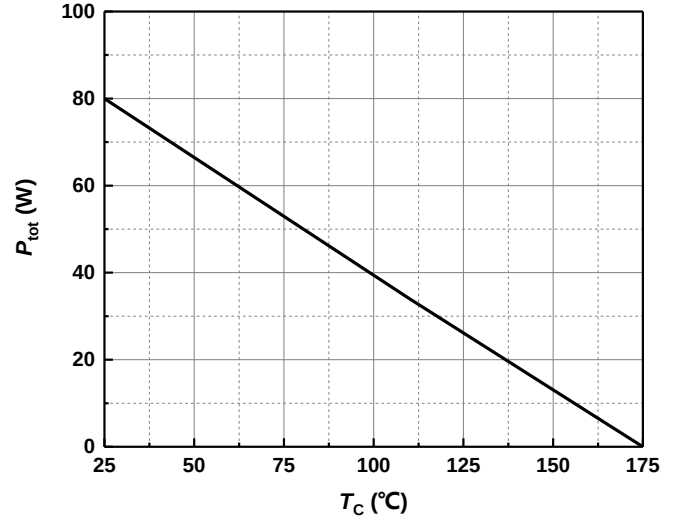


Figure 4. Typical capacitance as function of reverse voltage,  $C=f(V_R)$ ;  $T_J=25^\circ\text{C}$ ;  $f=1\text{ MHz}$

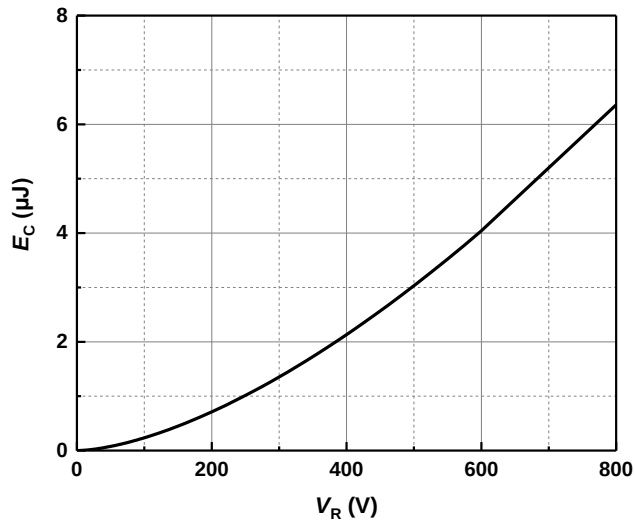
**Typical Performance**



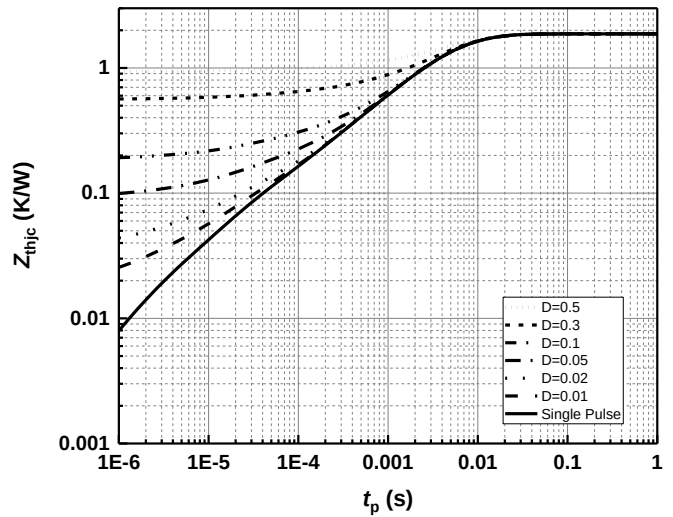
**Figure 5. Typical reverse charge as function of reverse voltage**



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

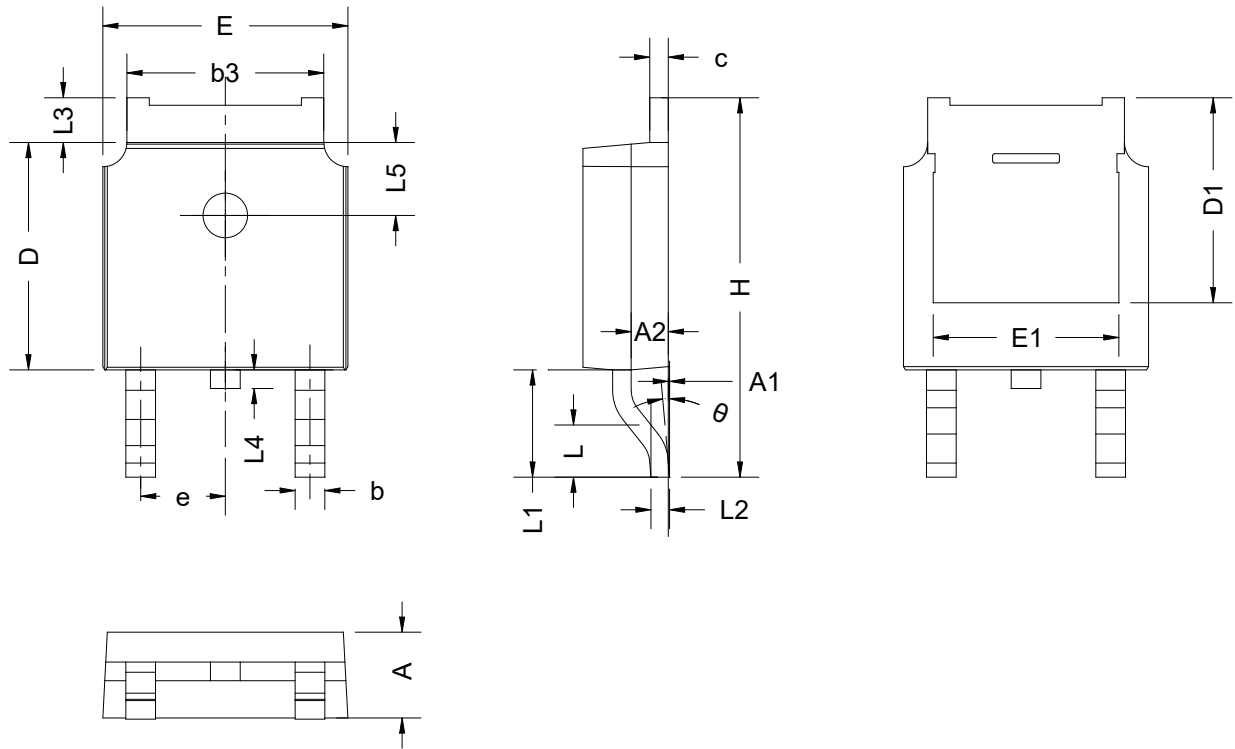


**Figure 7. Capacitance stored energy**



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

**Package Dimensions**



| SYMBOL | mm        |       |       |
|--------|-----------|-------|-------|
|        | MIN       | NOM   | MAX   |
| A      | 2.20      | 2.30  | 2.38  |
| A1     | 0.00      | -     | 0.20  |
| A2     | 0.90      | 1.07  | 1.17  |
| b      | 0.68      | 0.78  | 0.90  |
| b3     | 5.23      | 5.33  | 5.46  |
| c      | 0.43      | 0.53  | 0.61  |
| D      | 5.98      | 6.10  | 6.22  |
| D1     | 5.30 REF  |       |       |
| E      | 6.40      | 6.60  | 6.73  |
| E1     | 4.63      | -     | -     |
| e      | 2.286 BSC |       |       |
| H      | 9.40      | 10.10 | 10.50 |
| L      | 1.38      | 1.50  | 1.75  |
| L1     | 2.90 REF  |       |       |
| L2     | 0.51 BSC  |       |       |
| L3     | 0.88      | -     | 1.28  |
| L4     | 0.50      | -     | 1.00  |
| L5     | 1.65      | 1.80  | 1.95  |
| θ      | 0°        | -     | 8°    |

**Revision History**

| <b>Document Version</b> | <b>Date of Release</b> | <b>Description of Changes</b> |
|-------------------------|------------------------|-------------------------------|
| Rev. 1.0                | 2020-07-06             | Release of the datasheet.     |
| Rev. 1.1                | 2020-12-02             | Characteristics updated.      |
|                         |                        |                               |
|                         |                        |                               |

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