

## IGBT Modules

**V<sub>CEs</sub>** 1200V

**I<sub>C</sub>** 15A

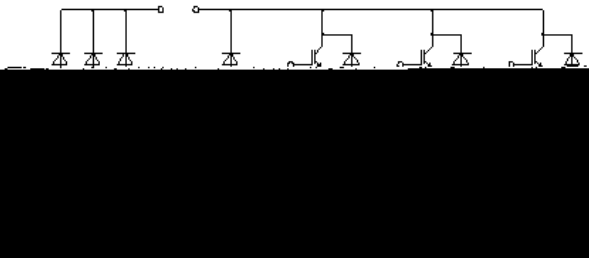
### Applications

- Motor Drivers
- AC and DC servo drive amplifier
- UPS (Uninterruptible Power Supplies)

### Features

- Low switching losses
- Low  $V_{ce(sat)}$  with positive temperature coefficient
- Including fast & soft recovery anti-parallel FWD
- Low inductance case
- High short circuit capability(10us)
- Isolated heatsink using DBC technology
- Maximum junction temperature 175

### Circuit



## IGBT- inverter

### Absolute Maximum Ratings

| Parameter                         | Symbol    | Conditions                        | Value    | Unit |
|-----------------------------------|-----------|-----------------------------------|----------|------|
| Collector-Emitter Voltage         | $V_{CES}$ | $V_{GE}=0V, I_C = 1mA, T_{vj}=25$ | 1200     | V    |
| Continuous Collector Current      | $I_C$     | $T_c=100, T_{vjmax}=175$          | 15       | A    |
| Repetitive Peak Collector Current | $I_{CRM}$ | $tp=1ms$                          | 30       | A    |
| Gate-Emitter Voltage              | $V_{GES}$ | $T_{vj}=25$                       | $\pm 20$ | V    |
| Total Power Dissipation           | $P_{tot}$ | $T_c=25, T_{vjmax}=175$           | 155      | W    |



**IGBT- inverter  
Characteristic values**

| Parameter                      | Symbol       | Conditions | Value |      |      | Unit |
|--------------------------------|--------------|------------|-------|------|------|------|
|                                |              |            | Min.  | Typ. | Max. |      |
| Gate-emitter Threshold Voltage | $V_{GE(th)}$ |            |       |      |      |      |



**Diode-inverter**  
**Absolute Maximum Ratings**

| Parameter                       | Symbol    | Conditions                    | Value | Unit   |
|---------------------------------|-----------|-------------------------------|-------|--------|
| Repetitive Peak Reverse Voltage | $V_{RRM}$ | $T_{vj}=25$                   | 1200  | V      |
| Continuous DC Forward Current   | $I_F$     |                               | 15    | A      |
| Repetitive Peak Forward Current | $I_{FRM}$ | $t_p=1ms$                     | 30    | A      |
| $I^2t$ -value                   | $I^2t$    | $V_R=0, t_p=10ms, T_{vj}=125$ | 16.0  | $A^2s$ |
|                                 |           | $V_R=0, t_p=10ms, T_{vj}=150$ | 14.0  |        |

**Characteristic values**

| Parameter                     | Symbol    | Conditions                         | Value |      |      | Unit |
|-------------------------------|-----------|------------------------------------|-------|------|------|------|
|                               |           |                                    | Min.  | Typ. | Max. |      |
| Forward Voltage               | $V_F$     | $I_F=15A, T_{vj}=25$               |       | 2.00 | 2.65 | V    |
|                               |           | $I_F=15A, T_{vj}=125$              |       | 2.10 |      |      |
|                               |           | $I_F=15A, T_{vj}=150$              |       | 2.10 |      |      |
| Recovered Charge              | $Q_{rr}$  | $I_F = 15A$                        |       | 1.20 |      | uC   |
| Peak Reverse Recovery Current | $I_{rr}$  | $V_R=600V$<br>$-di_F/dt = 600A/us$ |       | 13.0 |      | A    |
| Reverse Recovery Energy       | $E_{rec}$ | $T_{vj}=25$                        |       | 0.37 |      | mJ   |
| Recovered Charge              | $Q_{rr}$  | $I_F = 15 A$                       |       | 2.05 |      | uC   |
| Peak Reverse Recovery Current | $I_{rr}$  | $V_R=600V$<br>$-di_F/dt = 600A/us$ |       | 12.0 |      | A    |
| Reverse Recovery Energy       | $E_{rec}$ | $T_{vj}=125$                       |       | 0.68 |      | mJ   |



**IGBT-brake-chopper  
Absolute Maximum Ratings**

| Parameter                         | Symbol    | Conditions                      | Value    | Unit |
|-----------------------------------|-----------|---------------------------------|----------|------|
| Collector-Emitter Voltage         | $V_{CES}$ | $V_{GE}=0V, I_C=1mA, T_{vj}=25$ | 1200     | V    |
| Continuous Collector Current      | $I_C$     | $T_c=100, T_{vjmax}=175$        | 15       | A    |
| Repetitive Peak Collector Current | $I_{CRM}$ | $tp=1ms$                        | 30       | A    |
| Gate-Emitter Voltage              | $V_{GES}$ | $T_{vj}=25$                     | $\pm 20$ | V    |
| Total Power Dissipation           | $P_{tot}$ | $T_c=25, T_{vjmax}=175$         | 155      | W    |

**Characteristic values**

| Parameter                               | Symbol        | Conditions  | Value |      |      | Unit    |    |
|---|---------------|---|-------|------|------|---------|----|
|   |               |   | Min.  | Typ. | Max. |         |    |
| Gate-emitter Threshold Voltage          | $V_{GE(th)}$  | $V_{GE}=V_{CE}, I_C=0.5mA, T_{vj}=25$                                     | 5.2   | 6.0  | 6.8  | V       |    |
| Collector-Emitter Cut-off Current       | $I_{CES}$     | $V_{CE}=1200V, V_{GE}=0V, T_{vj}=25$                                      |       |      | 1.0  | mA      |    |
| Collector-Emitter Saturation Voltage    | $V_{CE(sat)}$ | $I_C=15A, V_{GE}=15V, T_{vj}=25$  |       | 1.85 | 2.25 | V       |    |
|   |               | $I_C=15A, V_{GE}=15V, T_{vj}=125$   |       | 2.15 |      |         |    |
|   |               | $I_C=15A, V_{GE}=15V, T_{vj}=150$   |       | 2.25 |      |         |    |
| Gate Charge                             | $Q_G$         |   |       | 0.09 |      | $\mu C$ |    |
| Input Capacitance                       | $C_{ies}$     | $V_{CE}=25V, V_{GE}=0V,$  |       | 1.35 |      | nF      |    |
| Reverse Transfer Capacitance            | $C_{res}$     | $f=1MHz, T_{vj}=25$   |       | 0.08 |      | nF      |    |
| Gate-Emitter leakage current            | $I_{GES}$     | $V_{CE}=0V, V_{GE}=20V, T_{vj}=25$  |       |      | 400  | nA      |    |
| Turn-on Delay Time                      | $t_{d(on)}$   | $I_C=15A$<br>$V_{CE}=600V$<br>$V_{GE}=\pm 15V$<br>$R_G=39$<br>$T_{vj}=25$ |       | 46   |      | ns      |    |
| Rise Time                               | $t_r$         |   |       | 45   |      | ns      |    |
| Turn-off Delay Time                     | $t_{d(off)}$  |   |       | 182  |      | ns      |    |
| Fall Time                               | $t_f$         |   |       | 168  |      | ns      |    |
| Energy Dissipation During Turn-on Time  | $E_{on}$      |   |       |      | 0.92 |         | mJ |
| Energy Dissipation During Turn-off Time | $E_{off}$     |   |       |      | 0.56 |         | mJ |



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|   |              |   |      |  |    |
|---|--------------|---|------|--|----|
| Turn-on Delay Time                      | $t_{d(on)}$  | $I_C = 15A$<br>$V_{CE} = 600 V$<br>$V_{GE} = \pm 15V$<br>$R_G = 39$<br>$T_{vj} = 125$ | 46   |  | ns |
| Rise Time                               | $t_r$        |   | 63   |  | ns |
| Turn-off Delay Time                     | $t_{d(off)}$ |   | 248  |  | ns |
| Fall Time                               | $t_f$        |   | 220  |  | ns |
| Energy Dissipation During Turn-on Time  | $E_{on}$     |   | 1.37 |  | mJ |
| Energy Dissipation During Turn-off Time | $E_{off}$    |   | 0.81 |  | mJ |

SC Data

$I_{sc}$

$T_p = 10\mu s, V_{GE} = 15V, T_{vj} = 150$  ,  
 $V_{ec} = 900V, V$



**Diode-Rectifier  
Absolute Maximum Ratings**

| Parameter                                    | Symbol      | Conditions                | Value | Unit   |
|--|-------------|---------------------------|-------|--------|
| Repetitive Peak Reverse Voltage              | $V_{RRM}$   | $T_j=25$                  | 1600  | V      |
| Average output Current<br>50/60Hz, sine wave | $I_{F(AV)}$ | $T_c=100$                 | 20    | A      |
| Maximum RMS Current at Rectifier Output      | $I_{RMSM}$  | $T_c=100$                 | 40    | A      |
| Surge Forward Current                        | $I_{FSM}$   | $V_R=0, t_p=10ms, T_j=45$ | 270   | A      |
| $I^2t$ -value                                | $I^2t$      | $V_R=0, t_p=10ms, T_j=45$ | 360   | $A^2s$ |

**Characteristic values**

| Parameter             | Symbol | Conditions           | Value |      |      | Unit |
|-----------------------|--------|----------------------|-------|------|------|------|
|                       |        |                      | Min.  | Typ. | Max. |      |
| Diode Forward Voltage | $V_F$  | $I_F=15A, T_j=150$   |       | 0.96 |      | V    |
| Reverse Current       | $I_R$  | $T_j=150, V_R=1600V$ |       |      | 1.0  | mA   |

**NTC-Thermistor  
Characteristic values**

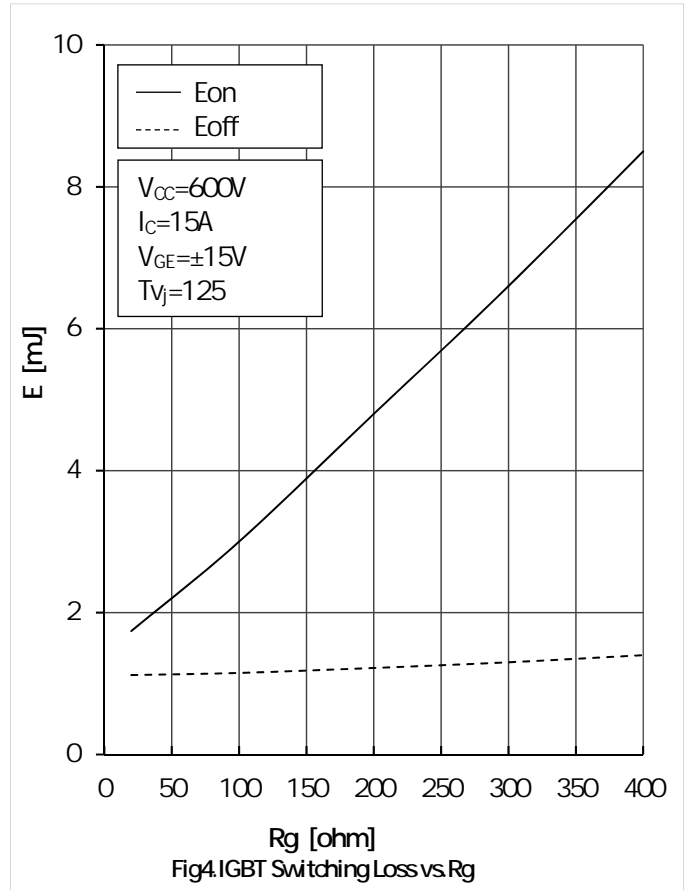
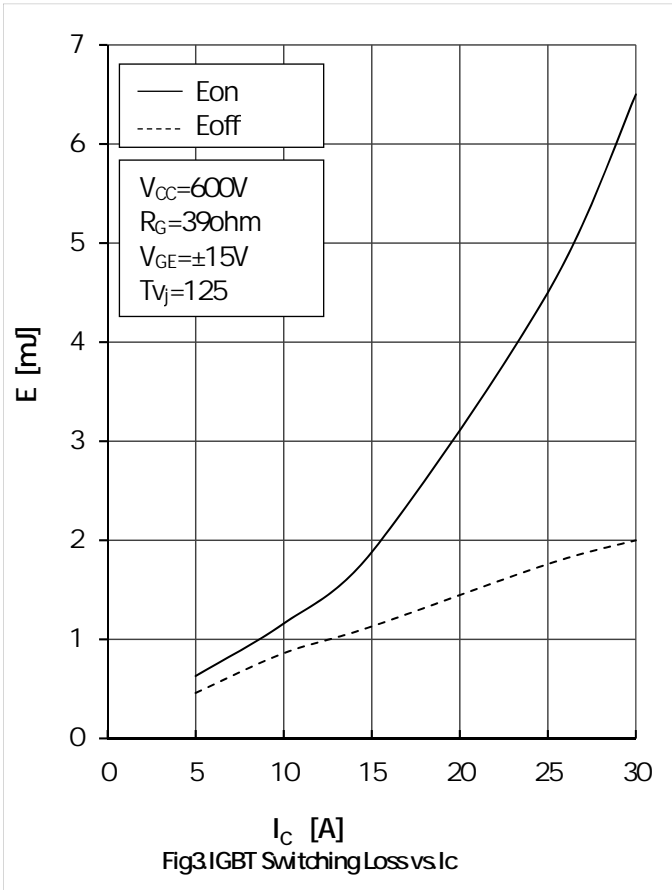
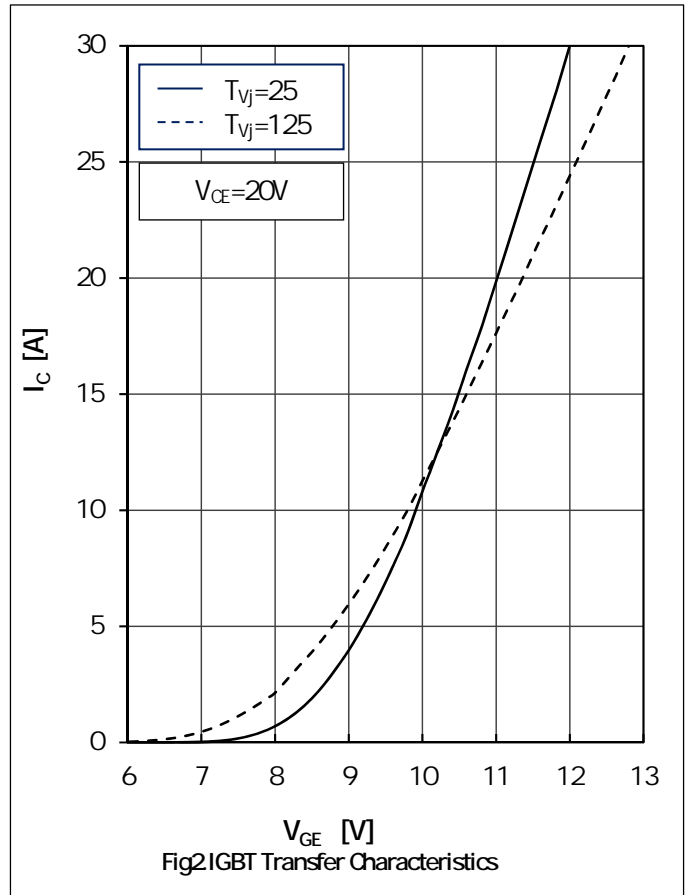
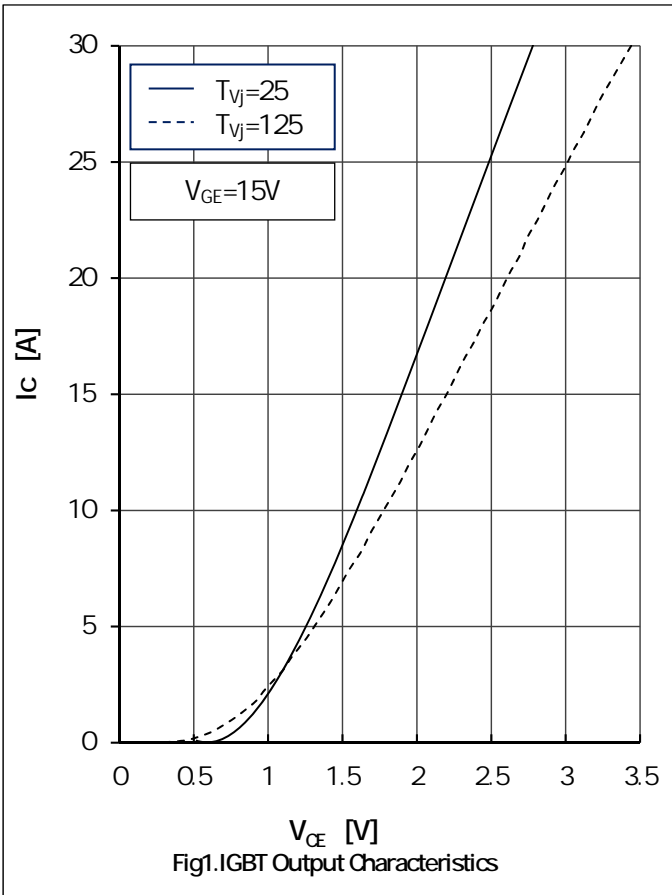
| Parameter         | Symbol      | Conditions                                     | Value |      |      | Unit |
|-------------------|-------------|--|-------|------|------|------|
|                   |             |  | Min.  | Typ. | Max. |      |
| Rated Resistance  | $R_{25}$    |  |       | 5.0  |      | k    |
| Deviation of R100 | R/R         | $T_c=100, R_{100}=493.3$                       | -5    |      | 5    | %    |
| Power Dissipation | $P_{25}$    |  |       |      | 20.0 | mW   |
| B-value           | $B_{25/50}$ | $R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$ |       | 3375 |      | K    |



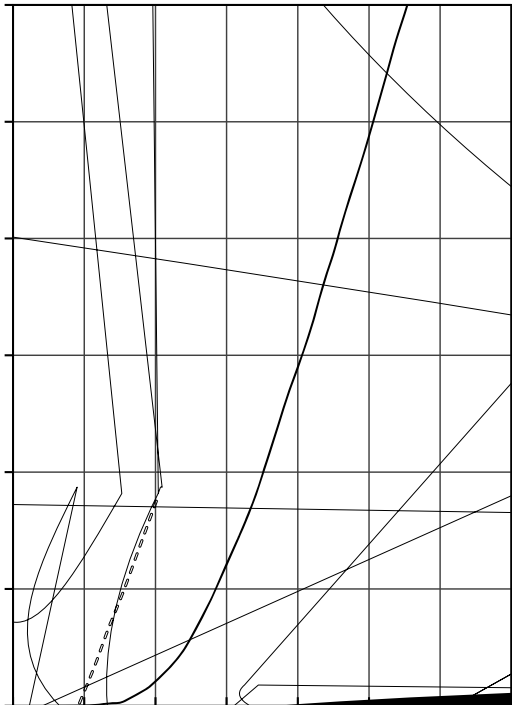
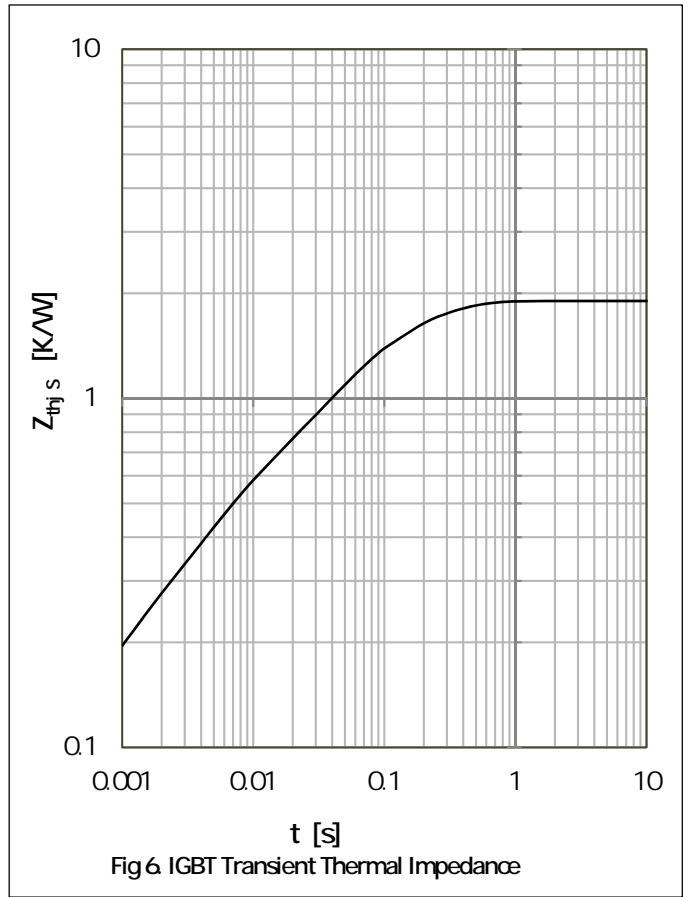
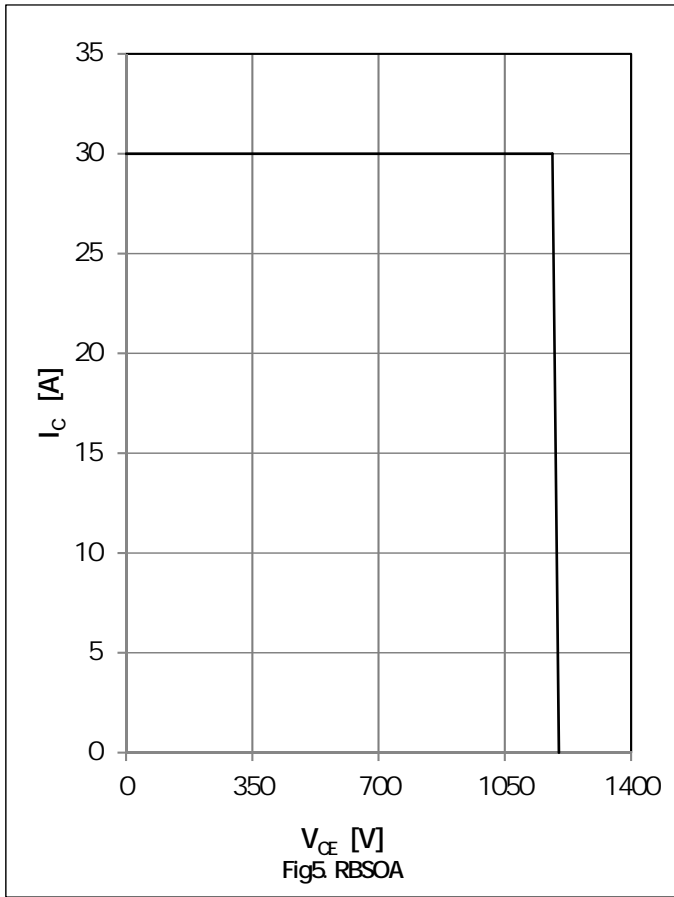
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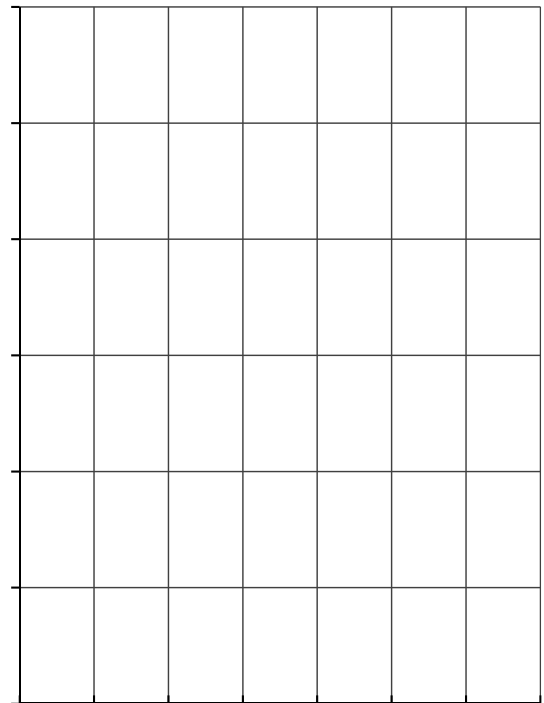
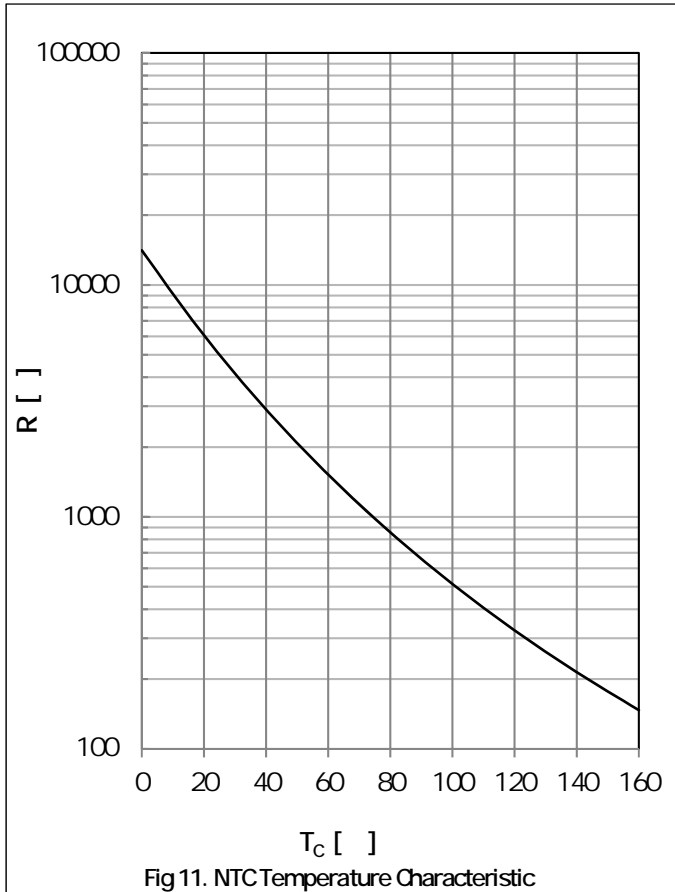
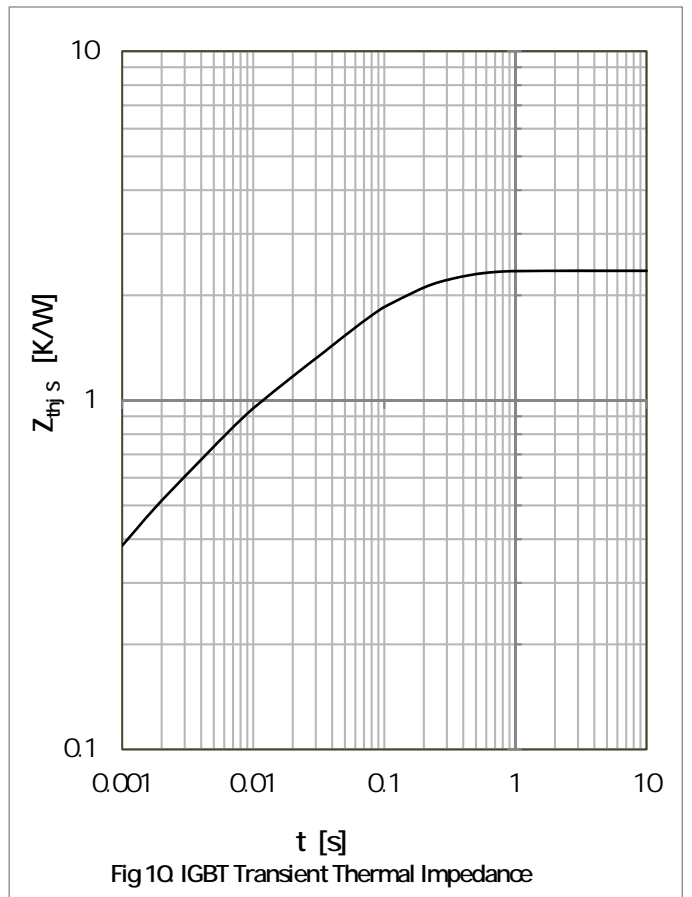
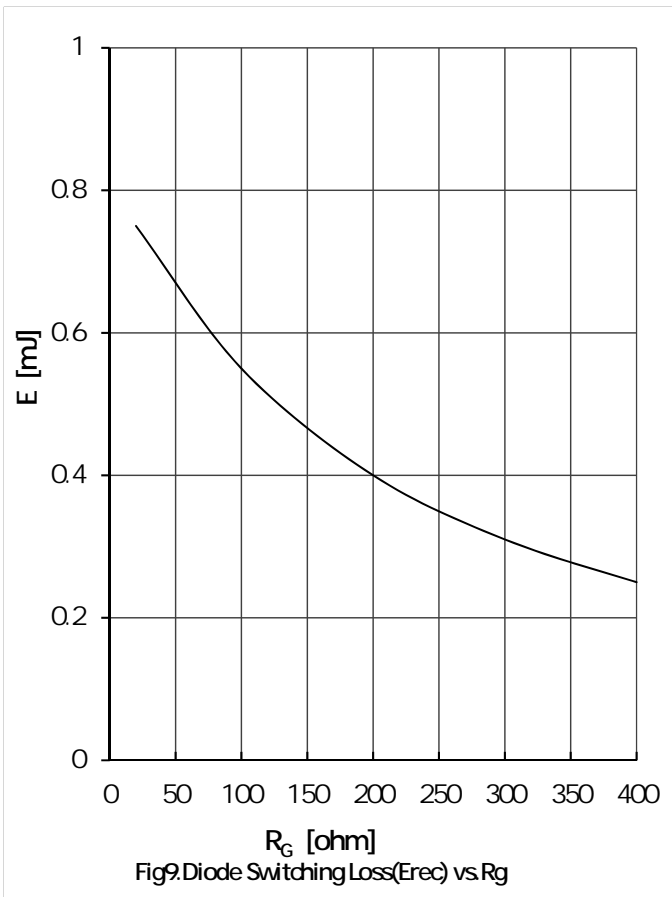
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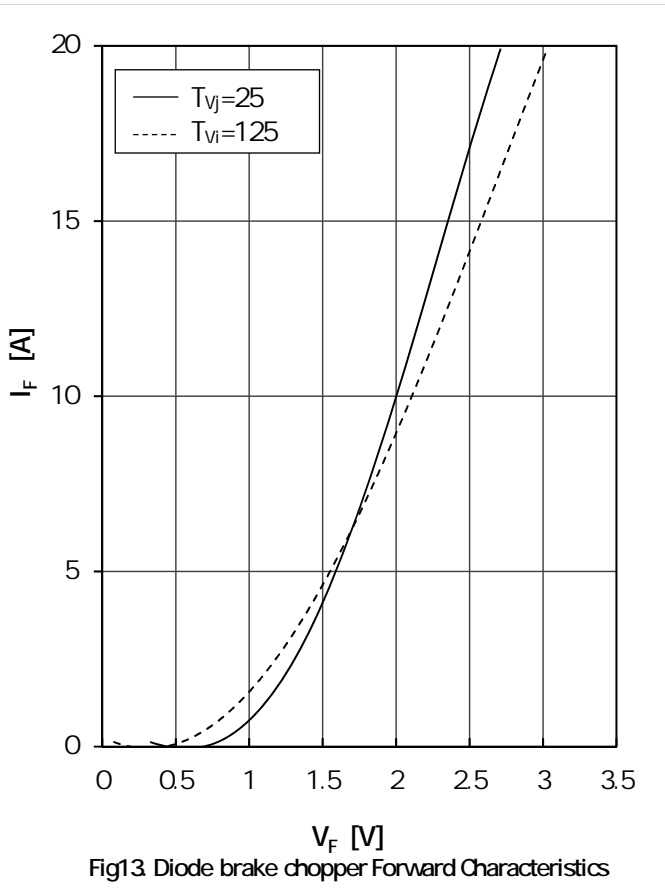
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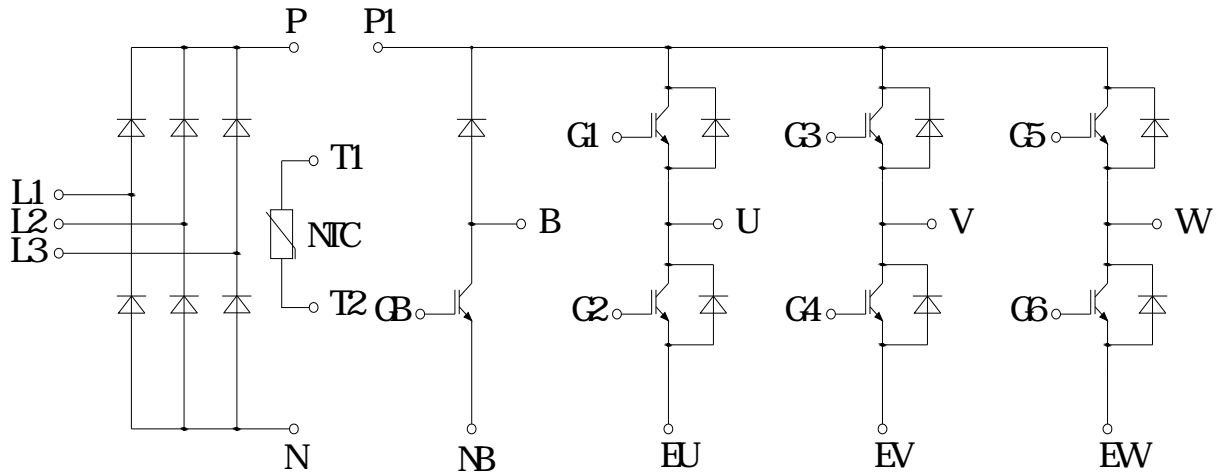








## Circuit Diagram



## Package Dimensions

