

## IGBT Discrete

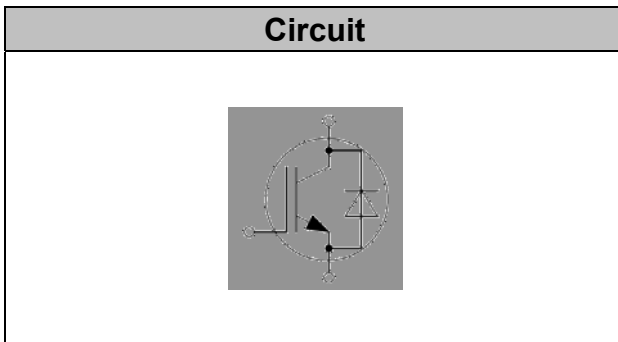
|                            |             |          |
|----------------------------|-------------|----------|
| $V_{CE}$                   | <b>650</b>  | <b>V</b> |
| $I_C$                      | <b>50</b>   | <b>A</b> |
| $V_{CE(SAT)}$<br>$I_C=50A$ | <b>1.60</b> | <b>V</b> |

## Applications

High frequency switching application  
Resonant converters  
Uninterruptible power supply  
Welding converters

## Features

High speed smooth switching device for hard & soft switching  
Maximum junction temperature 175  
Positive temperature coefficient  
High ruggedness, temperature stable  
Pb-free lead plating; RoHS compliant



## ■Maximum Ratings

| Parameter   | Symbol      | Value          | Unit        |
|---|-------------|----------------|-------------|
| Collector-Emitter Breakdown Voltage   | $V_{CE}$    | 650            | V           |
| DC Collector Current, limited by $T_{jmax}$<br>$T_C=25^{\circ}C$ value limited by bondwire<br>$T_C= 100^{\circ}C$   | $I_C$       | 85<br>60       | A           |
| Diode Forward Current, limited by $T_{jmax}$<br>$T_C= 25^{\circ}C$ value limited by bondwire<br>$T_C= 100^{\circ}C$ | $I_F$       | 85<br>60       | A           |
| Continuous Gate-Emitter Voltage   | $V_{GE}$    | $\pm 20$       | V           |
| Transient Gate-Emitter Voltage<br>( $t_p \le 10\mu s, D < 0.010$ )  | $V_{GE}$    | $\pm 30$       | V           |
| Turn off Safe Operating Area $V_{CE} 650V$ ,<br>$T_j 150^{\circ}C$  |             | 200            | A           |
| Pulsed Collector Current, $V_{GE}=15V$ ,<br>$t_p$ limited by $T_{jmax}$   | $I_{CM}$    | 200            | A           |
| Diode Pulsed Current, $t_p$ limited by $T_{jmax}$   | $I_{Fpuls}$ | 200            | A           |
| Power Dissipation , $T_j=175^{\circ}C$ , $T_C=25^{\circ}C$  | $P_{tot}$   | 326            | W           |
| Operating Junction Temperature  | $T_j$       | -<br>40...+175 | $^{\circ}C$ |
| Storage Temperature   | $T_s$       | -<br>55...+150 | $^{\circ}C$ |
| Soldering Temperature, wave soldering 1.6mm (0.063in.) from case<br>for 10s   |             | 260            | $^{\circ}C$ |



# DGW50N65CTL1

## ■Electrical Characteristics of the IGBT $T_j=25$ unless otherwise specified

| Parameter                            | Symbol   | Conditions   | Min. | Typ. | Max. | Unit |
|--------------------------------------|----------|--|------|------|------|------|
| <b>Static</b>                        |          |  |      |      |      |      |
| Collector-Emitter Breakdown Voltage  | BVCES    | $V_{GE}=0V, I_C=250\mu A$  | 650  |      | -    | V    |
| Gate Threshold Voltage               | VGE(th)  | $V_{GE}=V_{CE}, I_C=0.75mA$  | 4.25 | 5.05 | 5.85 | V    |
| Collector-Emitter Saturation Voltage | VCE(sat) | $V_{GE}=15V, I_C=50A$<br>$T_j=25^\circ C,$<br>$T_j=125^\circ C$<br>$T_i$ |      |      |      |      |



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## ■Switching Characteristic, Inductive Load

| Parameter                              | Symbol              | Conditions   | Min. | Typ. | Max. | Unit |
|--|---------------------|--|------|------|------|------|
| <b>Dynamic , at T<sub>j</sub>= 25</b>  |                     |  |      |      |      |      |
| Turn-on Delay Time                     | t <sub>d(on)</sub>  | V <sub>CC</sub> =300V, I <sub>C</sub> =50A,<br>V <sub>GE</sub> = 0v~15V,<br>R <sub>g</sub> =10 ,L <sub>s</sub> =60nH | -    | 55   | -    | ns   |
| Rise Time                              | t <sub>r</sub>      |  | -    | 56   | -    | ns   |
| Turn-on Energy                         | E <sub>on</sub>     |  | -    | 1.27 | -    | mJ   |
| Turn-off Delay Time                    | t <sub>d(off)</sub> |  | -    | 319  | -    | ns   |
| Fall Time                              | t <sub>f</sub>      |  | -    | 24   | -    | ns   |
| Turn-off Energy                        | E <sub>off</sub>    |  | -    | 0.65 | -    | mJ   |
| Total switching energy                 | E <sub>ts</sub>     |  |      |      | 1.92 |      |
| <b>Dynamic , at T<sub>j</sub>= 125</b> |                     |  |      |      |      |      |
| Turn-on Delay Time                     | t <sub>d(on)</sub>  | V <sub>CC</sub> =300V, I <sub>C</sub> =50A,<br>V <sub>GE</sub> = 0v~15V,<br>R <sub>g</sub> =10 ,L <sub>s</sub> =60nH | -    | 53   | -    | ns   |
| Rise Time                              | t <sub>r</sub>      |  | -    | 61   | -    | ns   |
| Turn-on Energy                         | E <sub>on</sub>     |  | -    | 1.51 | -    | mJ   |
| Turn-off Delay Time                    | t <sub>d(off)</sub> |  | -    | 351  | -    | ns   |
| Fall Time                              | t <sub>f</sub>      |  | -    | 59   | -    | ns   |
| Turn-off Energy                        | E <sub>off</sub>    |  | -    | 0.80 | -    | mJ   |
| Total switching energy                 | E <sub>ts</sub>     |  |      |      | 2.31 |      |
| <b>Dynamic , at T<sub>j</sub>= 150</b> |                     |  |      |      |      |      |
| Turn-on Delay Time                     | t <sub>d(on)</sub>  | V <sub>CC</sub> =300V, I <sub>C</sub> =50A,<br>V <sub>GE</sub> = 0v~15V,<br>R <sub>g</sub> =10 ,L <sub>s</sub> =60nH | -    | 52   | -    | ns   |
| Rise Time                              | t <sub>r</sub>      |  | -    | 60   | -    | ns   |
| Turn-on Energy                         | E <sub>on</sub>     |  | -    | 1.62 | -    | mJ   |
| Turn-off Delay Time                    | t <sub>d(off)</sub> |  | -    | 361  | -    | ns   |
| Fall Time                              | t <sub>f</sub>      |  | -    | 71   | -    | ns   |
| Turn-off Energy                        | E <sub>off</sub>    |  | -    | 0.85 | -    | mJ   |
| Total switching energy                 | E <sub>ts</sub>     |  |      |      | 2.47 |      |





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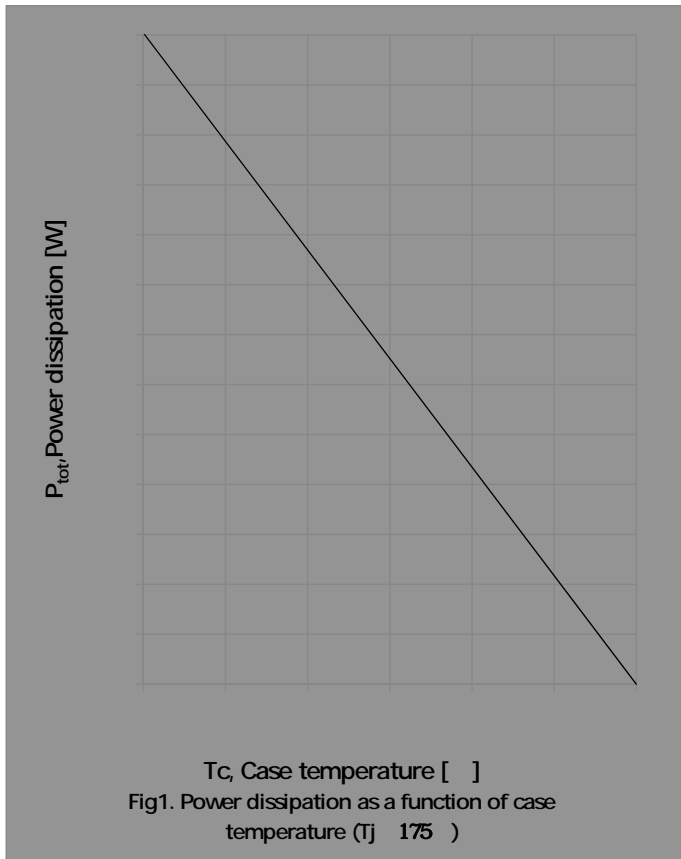
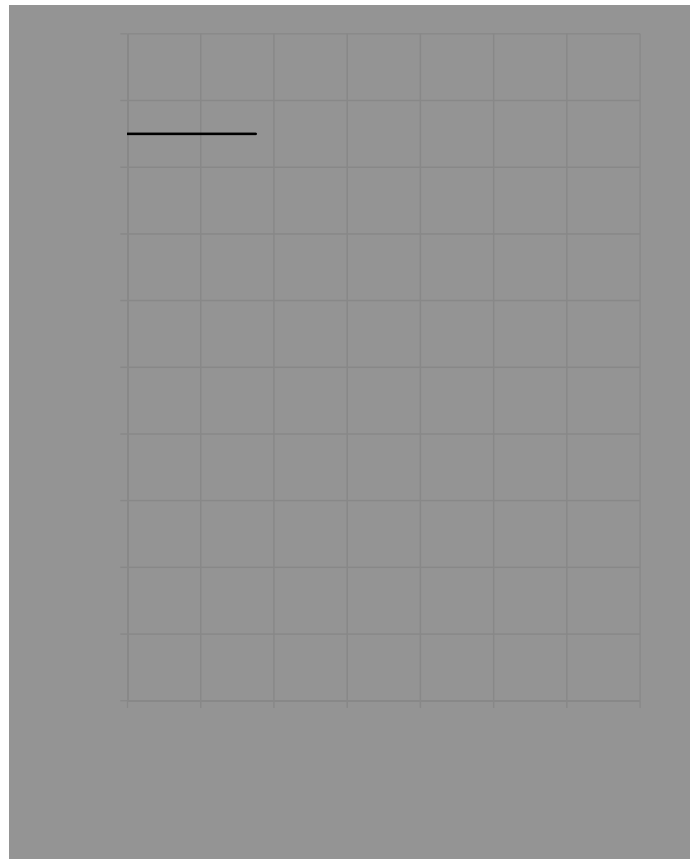
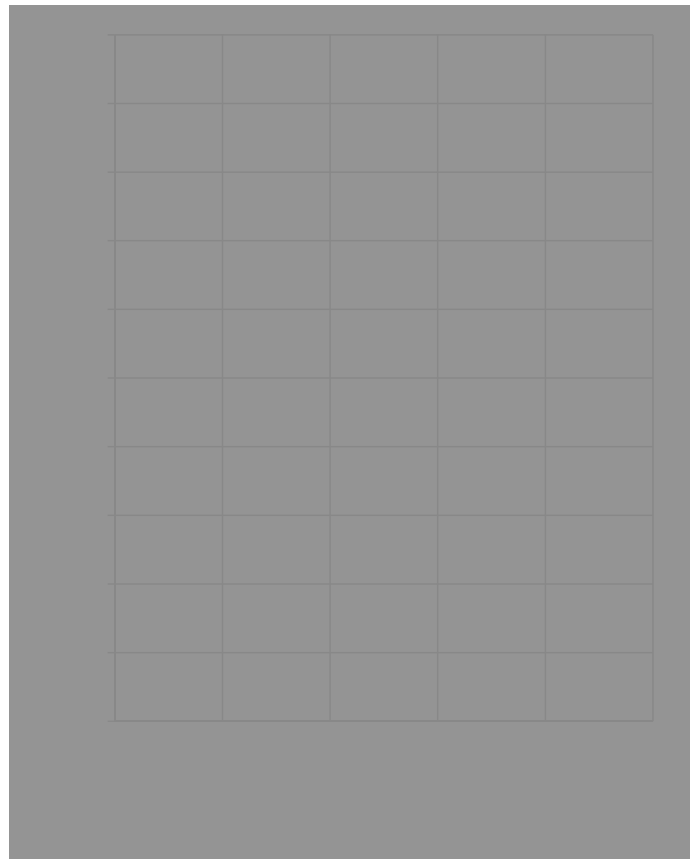
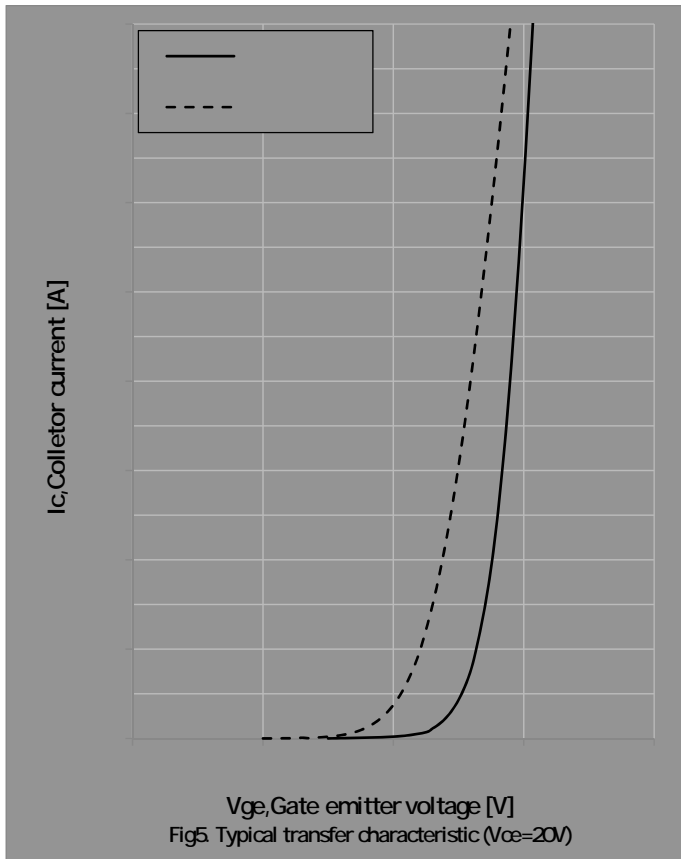


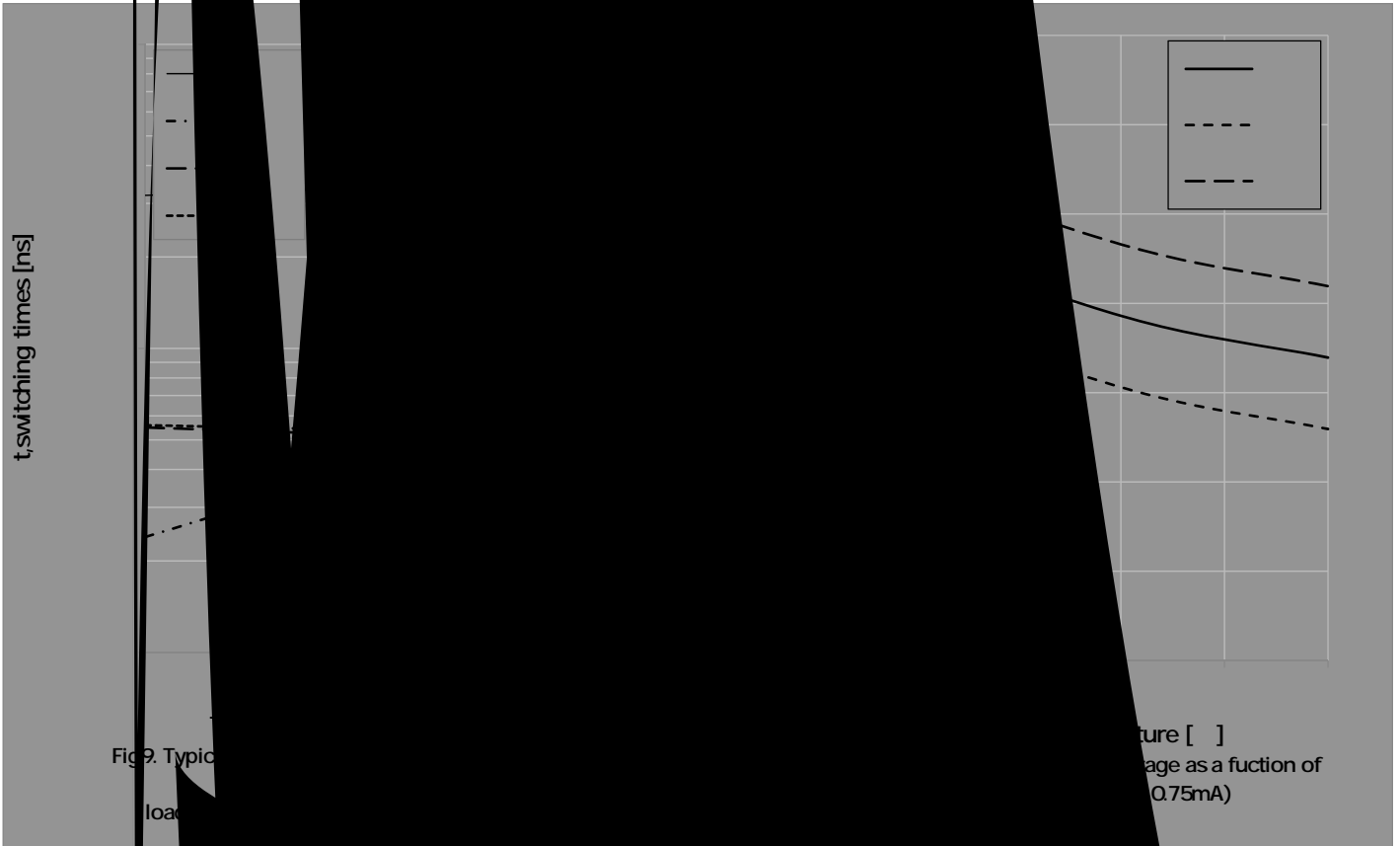
Fig1. Power dissipation as a function of case temperature ( $T_j = 175^\circ\text{C}$ )





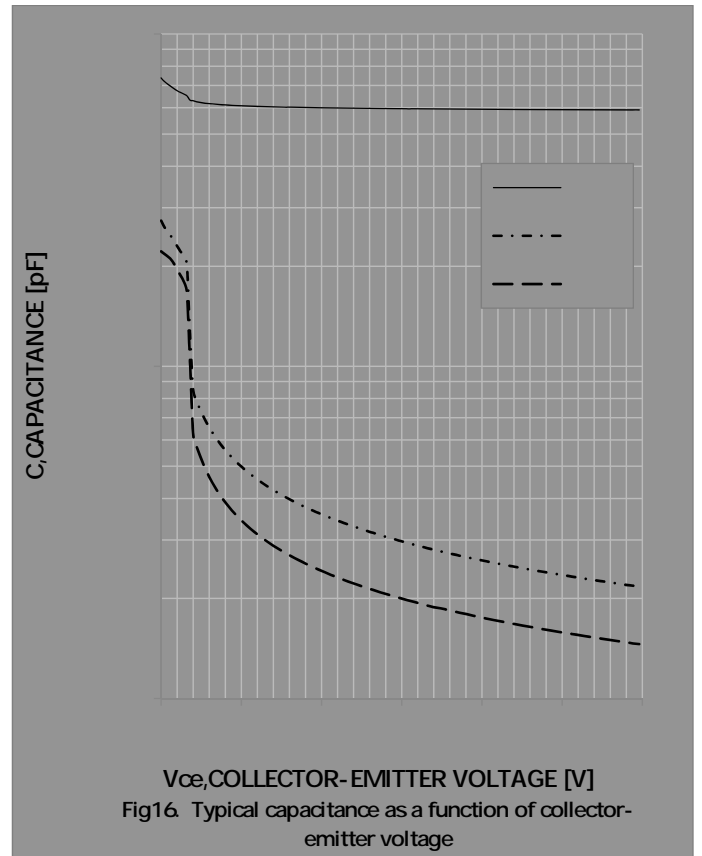
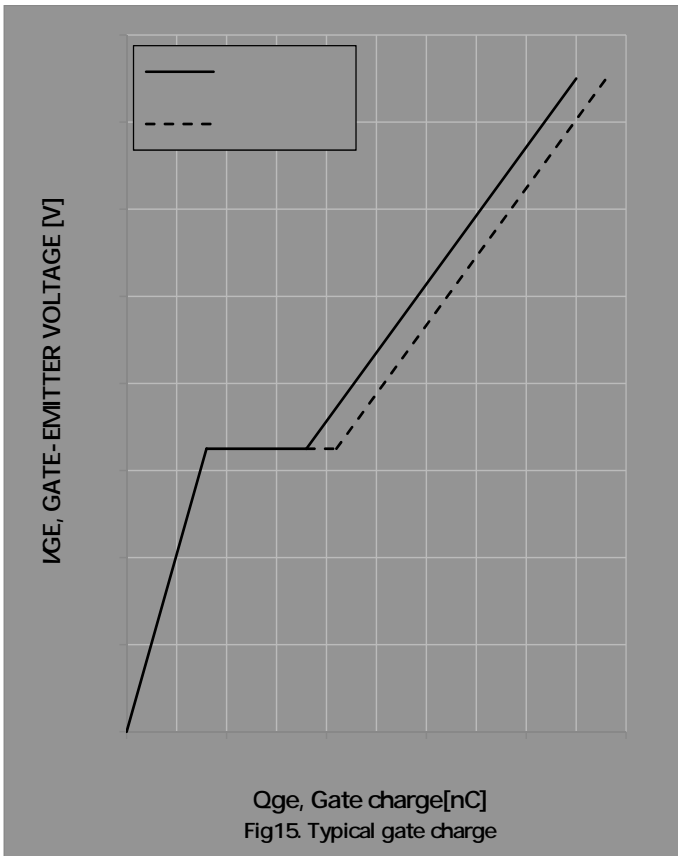
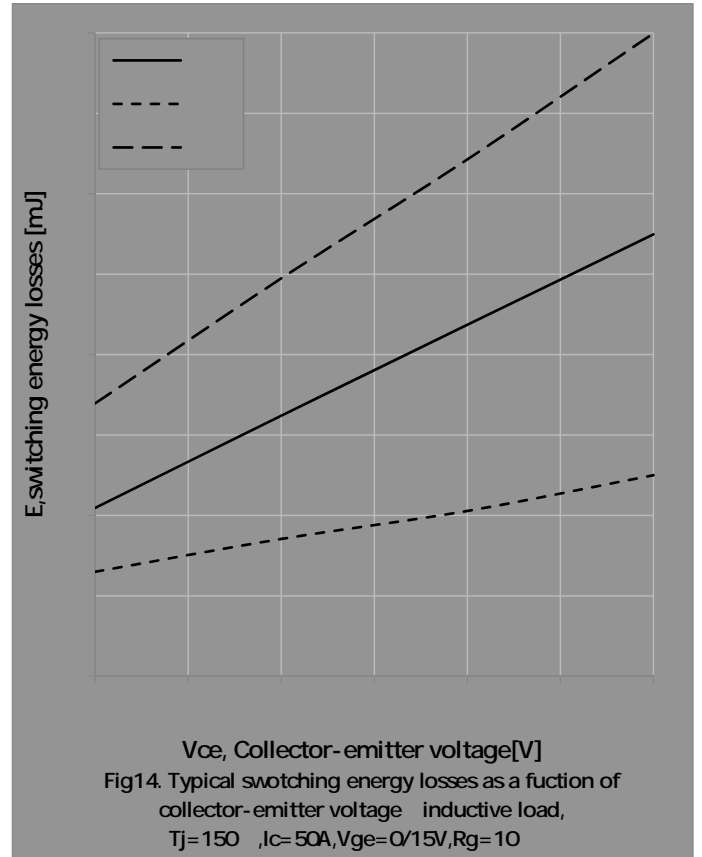
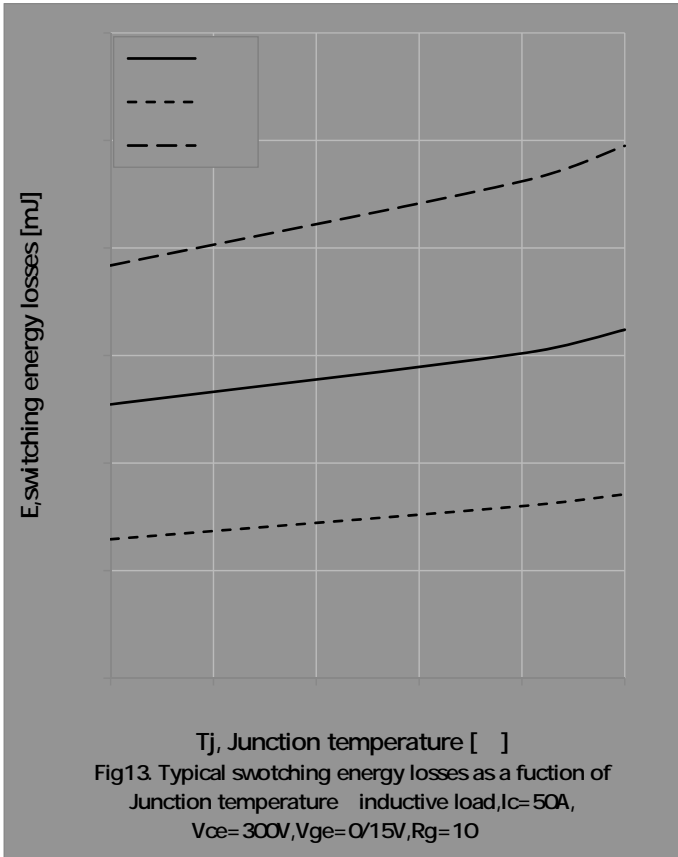
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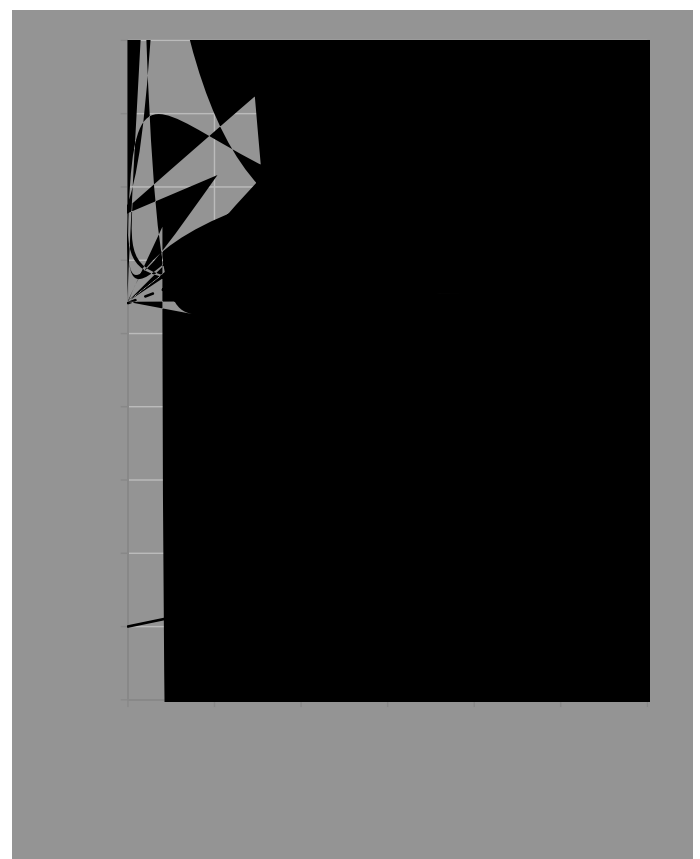
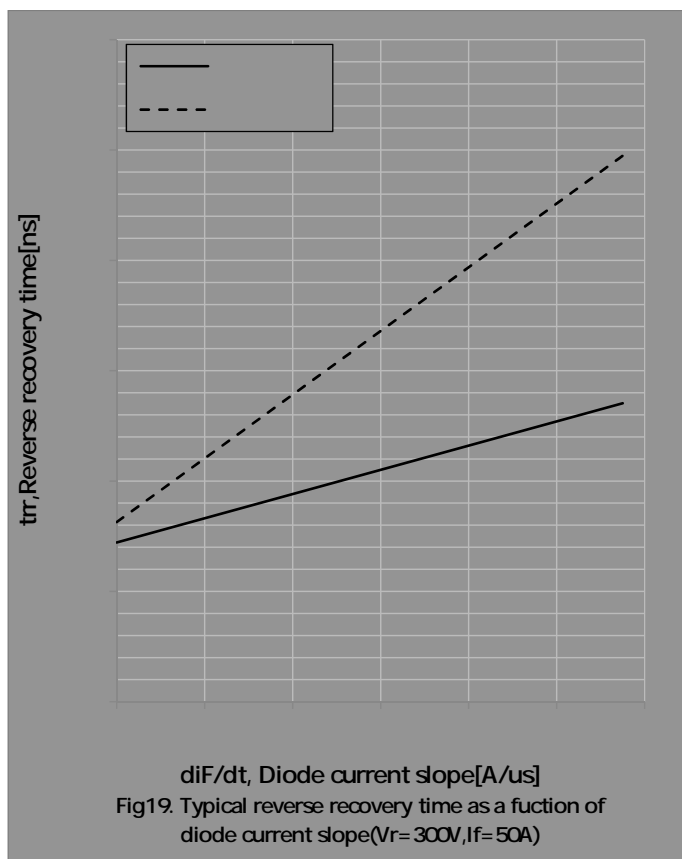
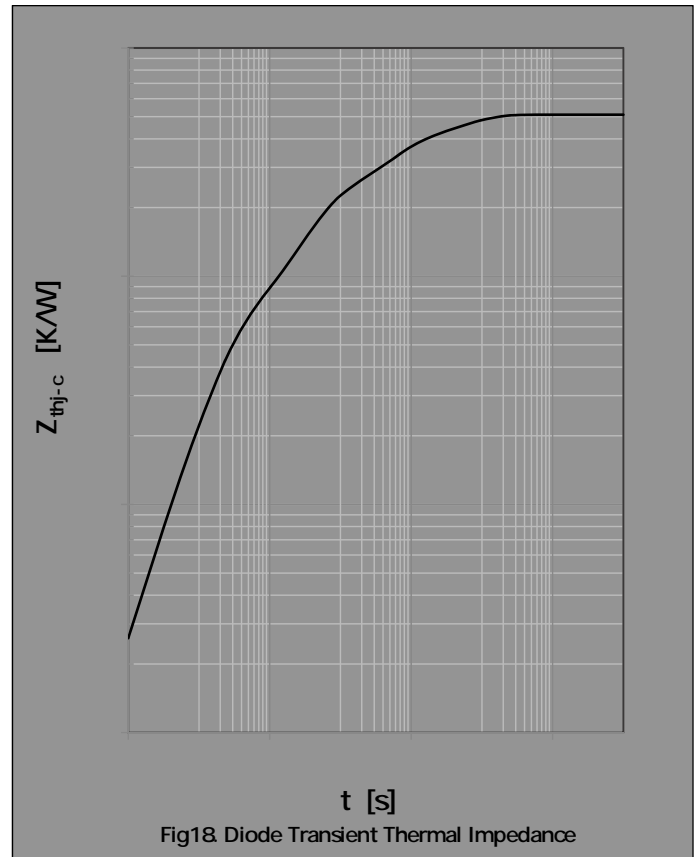
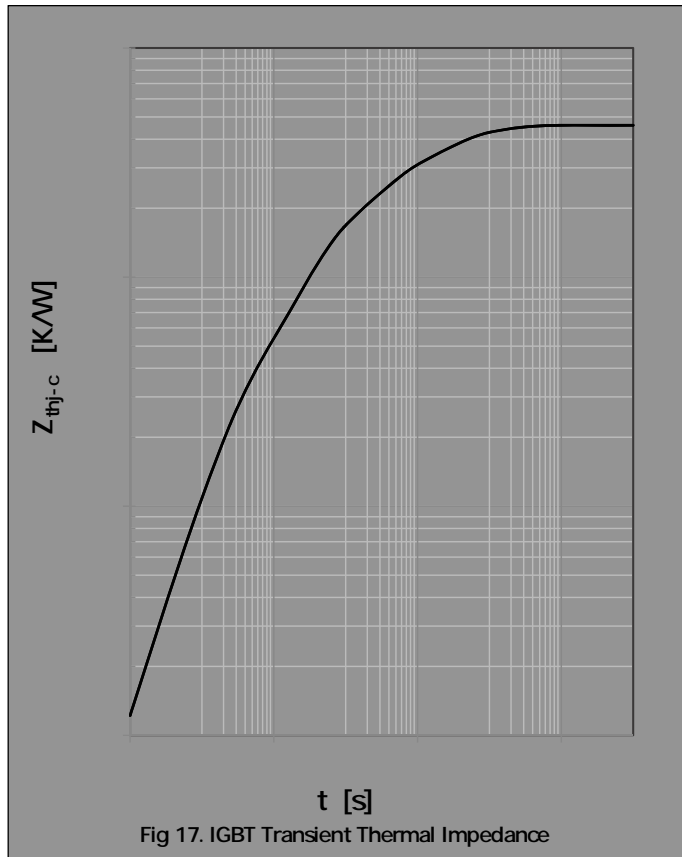
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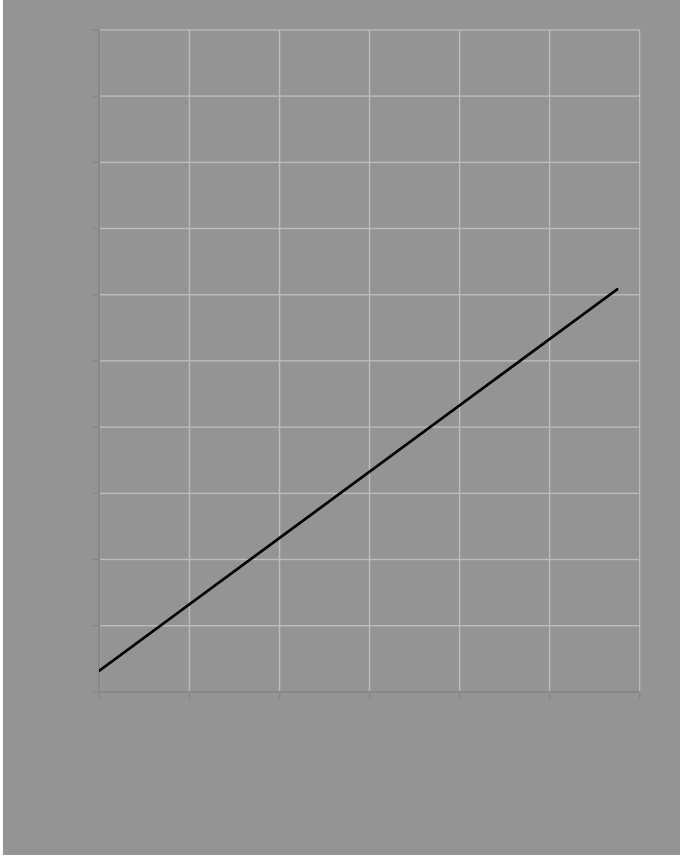
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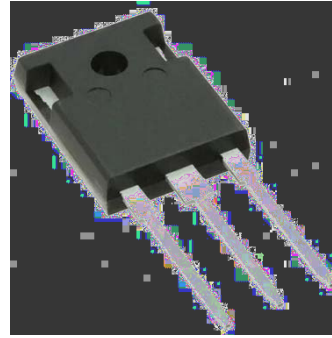
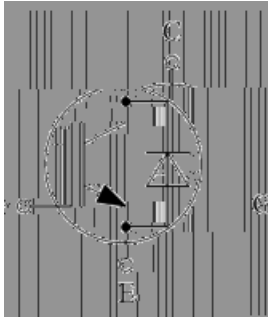
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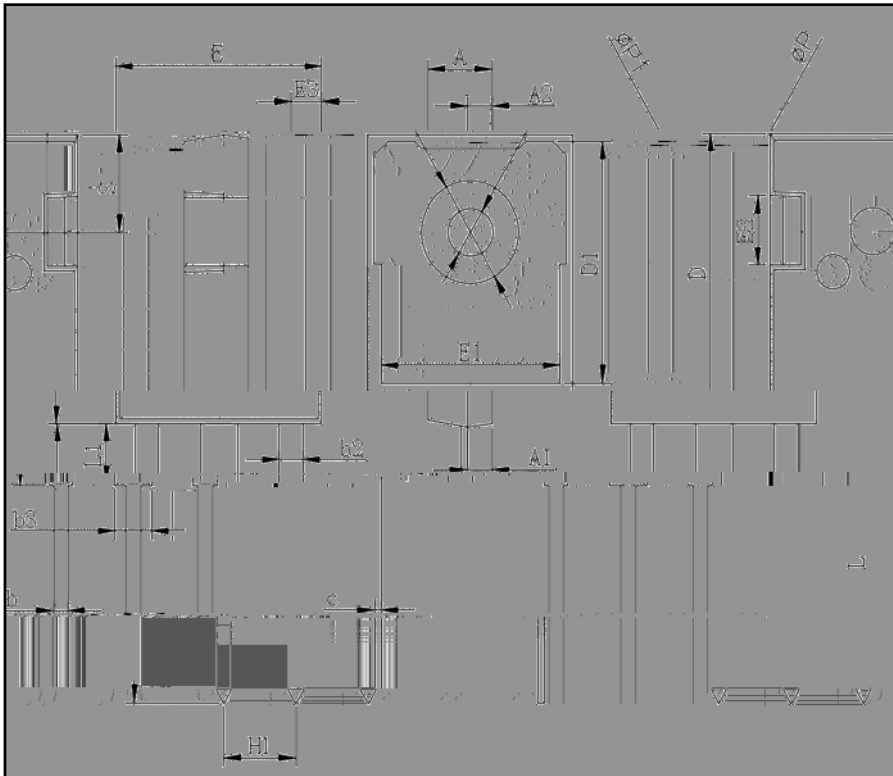


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## ■Circuit Diagram



## ■Package Outline Information



| TO-247AB |         |       |
|----------|---------|-------|
| Dim      | Min     | Max   |
| A        | 4.80    | 5.20  |
| A1       | 2.21    | 2.61  |
| A2       | 1.85    | 2.15  |
| b        | 1.0     | 1.4   |
| b2       | 1.91    | 2.21  |
| C        | 0.5     | 0.7   |
| D        | 20.70   | 21.30 |
| D1       | 16.25   | 16.85 |
| E        | 15.50   | 16.10 |
| E1       | 13.0    | 13.6  |
| E2       | 4.80    | 5.20  |
| E3       | 2.30    | 2.70  |
| L        | 19.62   | 20.22 |
| L1       | -       | 4.30  |
| P        | 3.40    | 3.80  |
| P1       | -       | 7.30  |
| S        | 6.15TYP |       |
| H1       | 5.44TYP |       |
| b3       | 2.80    | 3.20  |