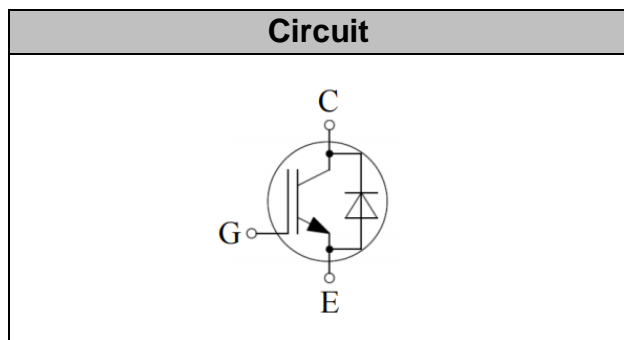


## IGBT Discrete

|                       |             |          |
|-----------------------|-------------|----------|
| $V_{CE}$              | <b>650</b>  | <b>V</b> |
| $I_C$                 | <b>50</b>   | <b>A</b> |
| $V_{CE(SAT)} I_C=50A$ | <b>1.40</b> | <b>V</b> |



## Applications

- Solar converters
- Uninterruptible power supplies
- Welding converters
- Mid to high range switching frequency converters

## Features

- High speed smooth switching device for hard & soft switching
- Maximum junction temperature 175°C
- Positive temperature coefficient
- High ruggedness, temperature stable

## 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>$T_C=100^\circ C$  | $I_C$       | 80<br>60 | A    |
| Diode Forward Current, limited by $T_{jmax}$<br>$T_C=25^\circ C$ value limited by bondwire<br>$T_C=100^\circ C$ | $I_F$       | 80<br>60 | A    |
| Continuous Gate-Emitter Voltage   | $V_{GE}$    | $\pm 20$ | V    |
| Transient Gate-Emitter Voltage<br>( $t_p \leq 10\mu s, D < 0.010$ )   | $V_{GE}$    | $\pm 30$ | V    |
| Turn off Safe Operating Area $V_{CE} \leq 650V$ ,<br>$T_j \leq 150^\circ C$                                     |             | 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, $T_j=175^\circ C, T_c=25^\circ C$  | $P_{tot}$   | 283      | W    |



|  |       |            |    |
|--|-------|------------|----|
| Operating Junction Temperature   | $T_j$ | -40...+175 | °C |
| Storage Temperature  | $T_s$ | -55...+150 | °C |
| Soldering Temperature, wave soldering 1.6mm (0.063in.) from case for 10s |       | 260        | °C |

## Electrical Characteristics of the IGBT ( $T_j = 25^\circ\text{C}$ unless otherwise specified):

| Parameter                            | Symbol        | Conditions  | Min. | Typ.                 | Max.         | Unit |
|--------------------------------------|---------------|---|------|----------------------|--------------|------|
| <b>Static</b>                        |               |   |      |                      |              |      |
| Collector-Emitter Breakdown Voltage  | $BV_{CES}$    | $V_{GE}=0V, I_C=250\mu A$   | 650  |                      | -            | V    |
| Gate Threshold Voltage               | $V_{GE(th)}$  | $V_{GE}=V_{CE}, I_C=0.50mA$   | 3.0  | 4.0                  | 5.0          | V    |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_{GE}=15V, I_C=50A$<br>$T_j=25^\circ\text{C}$ ,<br>$T_j=125^\circ\text{C}$<br>$T_j=150^\circ\text{C}$ | 1.10 | 1.40<br>1.60<br>1.70 | 1.70         | V    |
| Zero Gate Voltage Collector Current  | $I_{CES}$     | $V_{CE}=650V, V_{GE}=0V$<br>$T_j=25^\circ\text{C}$ ,<br>$T_j=150^\circ\text{C}$                         |      |                      | 0.25<br>3.00 | mA   |
| Gate-Emitter Leakage Current         | $I_{GES}$     | $V_{CE}=0V, V_{GE}=\pm 20V$   |      |                      | 100          | nA   |

| Parameter                    | Symbol    | Conditions                              | Min. | Typ. | Max. | Unit |
|------------------------------|-----------|---|------|------|------|------|
| <b>Dynamic</b>               |           |   |      |      |      |      |
| Input Capacitance            | $C_{ies}$ | $V_{CE}=25V, V_{GE}=0V,$<br>$f=1MHz$    | -    | 2.86 | -    | nF   |
| Reverse Transfer Capacitance | $C_{res}$ |   | -    | 0.02 | -    |      |
| Gate Charge                  | $Q_G$     | $V_{CC}=520V, I_C=50A,$<br>$V_{GE}=15V$ | -    | 0.14 | -    | uC   |

**Electrical Characteristics of the Diode** ( $T_j = 25^\circ\text{C}$  unless otherwise specified):

| Parameter             | Symbol | Conditions   | Min. | Typ.                 | Max. | Unit |
|-----------------------|--------|--|------|----------------------|------|------|
| <b>Static</b>         |        |  |      |                      |      |      |
| Diode Forward Voltage | $V_F$  | $I_F = 50\text{A}$<br>$T_j = 25^\circ\text{C}$ ,<br>$T_j = 125^\circ\text{C}$<br>$T_j = 150^\circ\text{C}$ |      | 1.60<br>1.50<br>1.40 | 2.00 | V    |

**Switching Characteristic, Inductive Load**

| Parameter  | Symbol              | Conditions   | Min. | Typ. | Max. | Unit |
|--|---------------------|--|------|------|------|------|
| <b>Dynamic , at <math>T_j = 25^\circ\text{C}</math></b>  |                     |  |      |      |      |      |
| Turn-on Delay Time                                       | $t_{d(\text{on})}$  | $V_{CC} = 400\text{V}$ , $I_C = 50\text{A}$ ,<br>$V_{GE} = -5\text{V} \sim 15\text{V}$ ,<br>$R_g = 10\Omega$ ,<br>Inductive Load | -    | 23   | -    | ns   |
| Rise Time  | $t_r$               |  | -    | 31   | -    | ns   |
| Turn-on Energy   | $E_{\text{on}}$     |  | -    | 1.89 | -    | mJ   |
| Turn-off Delay Time                                      | $t_{d(\text{off})}$ |  | -    | 83   | -    | ns   |
| Fall Time  | $t_f$               |  | -    | 49   | -    | ns   |
| Turn-off Energy  | $E_{\text{off}}$    |  | -    | 0.55 | -    | mJ   |
| Total switching energy                                   | $E_{\text{ts}}$     |  | -    | 2.44 | -    | mJ   |
| <b>Dynamic , at <math>T_j = 125^\circ\text{C}</math></b> |                     |  |      |      |      |      |
| Turn-on Delay Time                                       | $t_{d(\text{on})}$  | $V_{CC} = 400\text{V}$ , $I_C = 50\text{A}$ ,<br>$V_{GE} = -5\text{V} \sim 15\text{V}$ ,<br>$R_g = 10\Omega$ ,<br>Inductive Load | -    | 24   | -    | ns   |
| Rise Time  | $t_r$               |  | -    | 38   | -    | ns   |
| Turn-on Energy   | $E_{\text{on}}$     |  | -    | 1.93 | -    | mJ   |
| Turn-off Delay Time                                      | $t_{d(\text{off})}$ |  | -    | 90   | -    | ns   |
| Fall Time  | $t_f$               |  | -    | 62   | -    | ns   |
| Turn-off Energy  | $E_{\text{off}}$    |  | -    | 0.76 | -    | mJ   |
| Total switching energy                                   | $E_{\text{ts}}$     |  | -    | 2.69 | -    | mJ   |
| <b>Dynamic , at <math>T_j = 150^\circ\text{C}</math></b> |                     |  |      |      |      |      |
| Turn-on Delay Time                                       | $t_{d(\text{on})}$  | $V_{CC} = 400\text{V}$ , $I_C = 50\text{A}$ ,<br>$V_{GE} = -5\text{V} \sim 15\text{V}$ ,<br>$R_g = 10\Omega$ ,<br>Inductive Load | -    | 25   | -    | ns   |
| Rise Time  | $t_r$               |  | -    | 42   | -    | ns   |
| Turn-on Energy   | $E_{\text{on}}$     |  | -    | 1.99 | -    | mJ   |
| Turn-off Delay Time                                      | $t_{d(\text{off})}$ |  | -    | 95   | -    | ns   |
| Fall Time  | $t_f$               |  | -    | 70   | -    | ns   |
| Turn-off Energy  | $E_{\text{off}}$    |  | -    | 0.81 | -    | mJ   |
| Total switching energy                                   | $E_{\text{ts}}$     |  | -    | 2.80 | -    | mJ   |

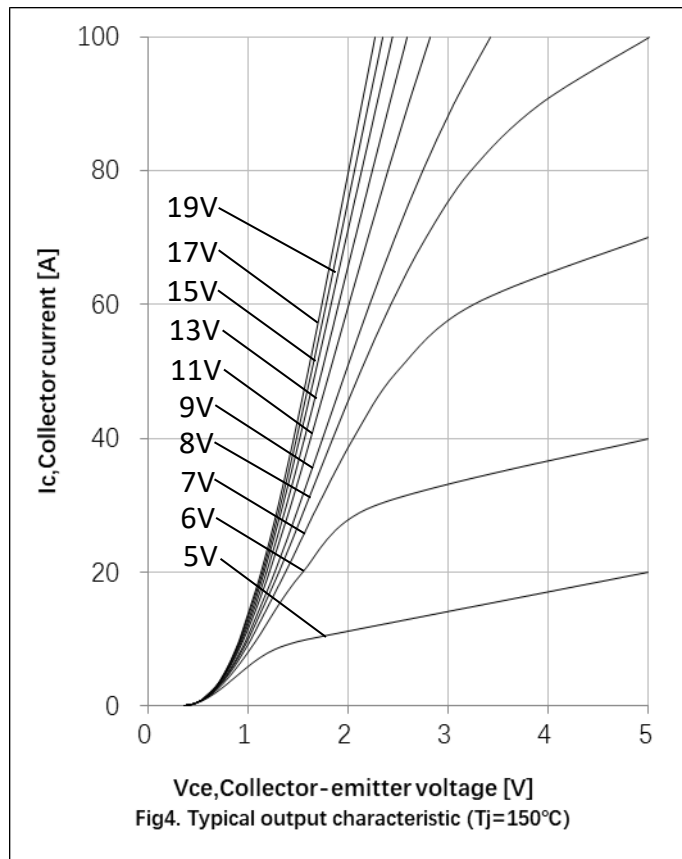
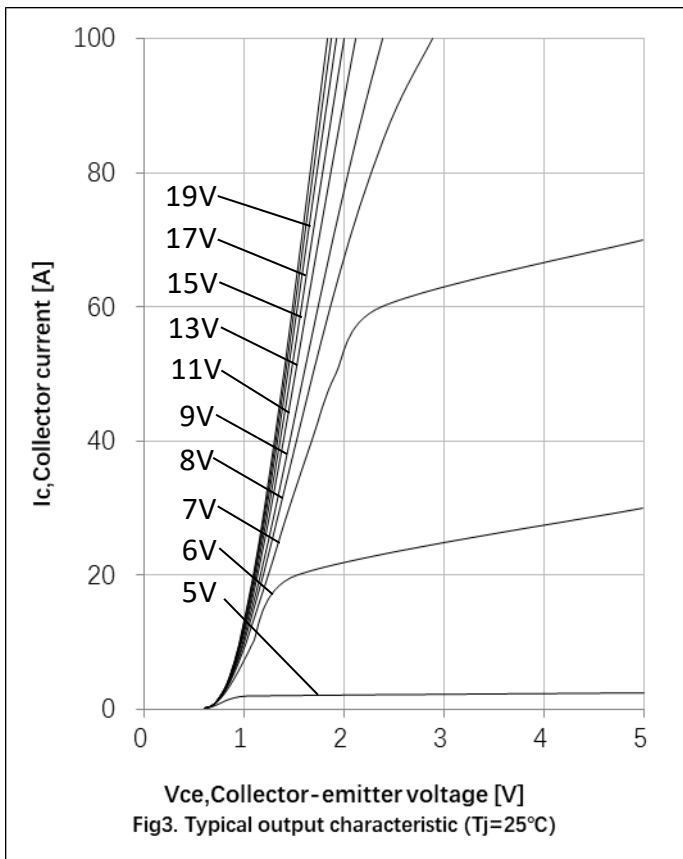
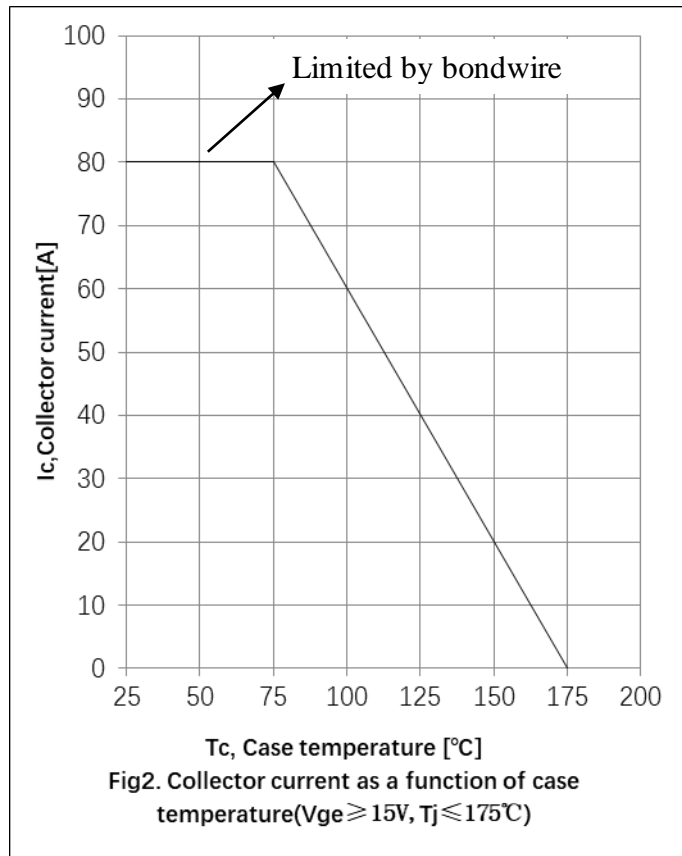
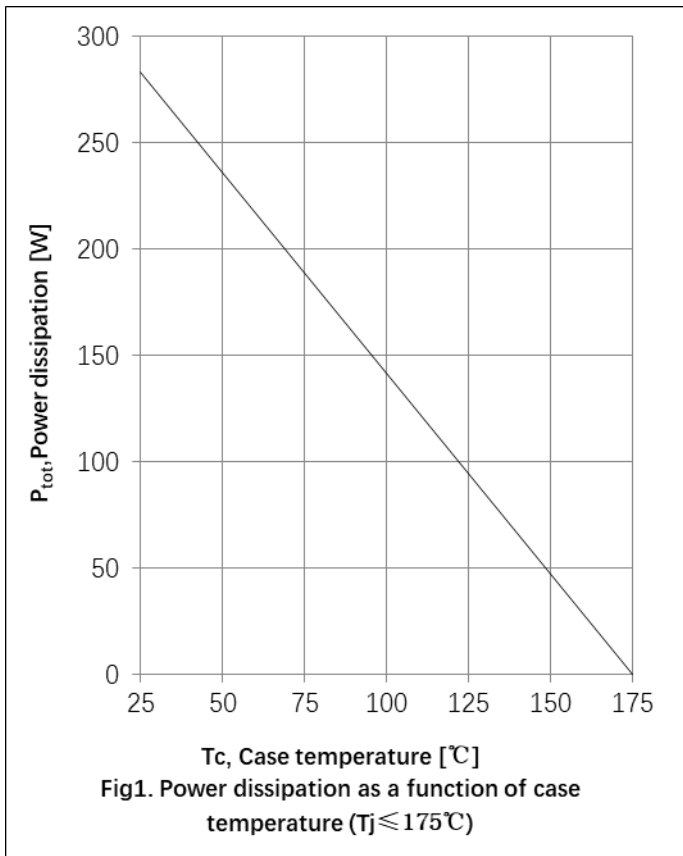


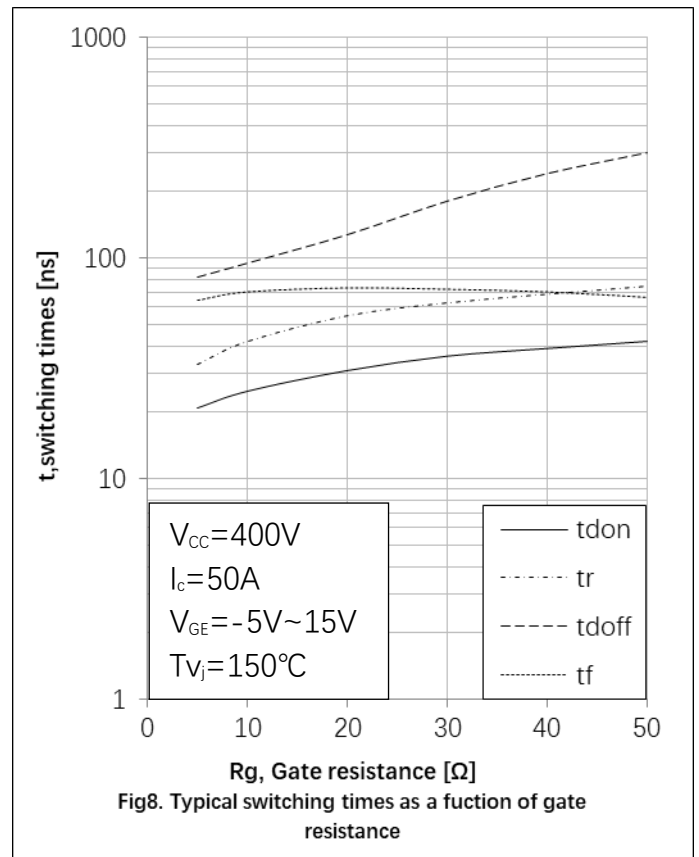
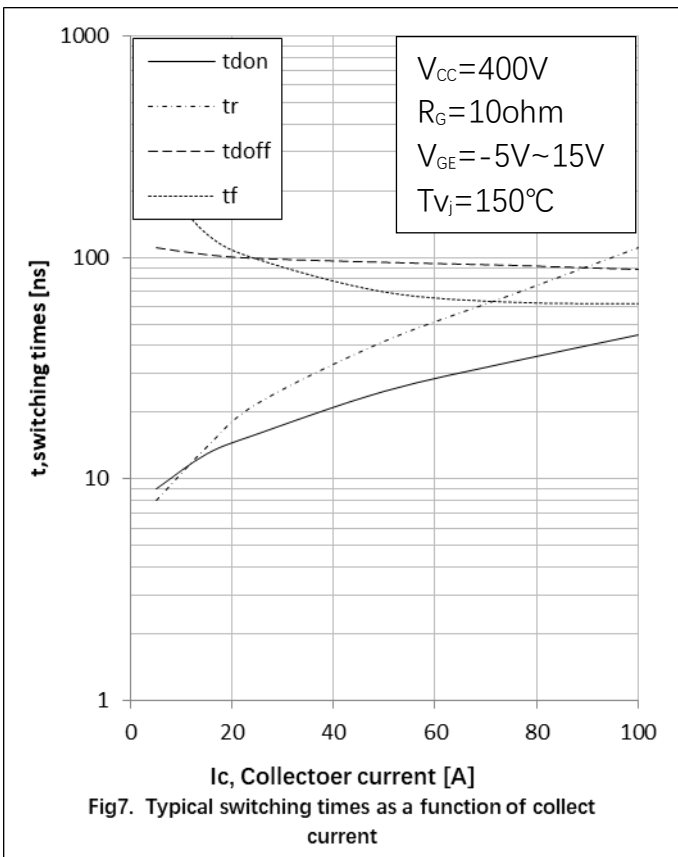
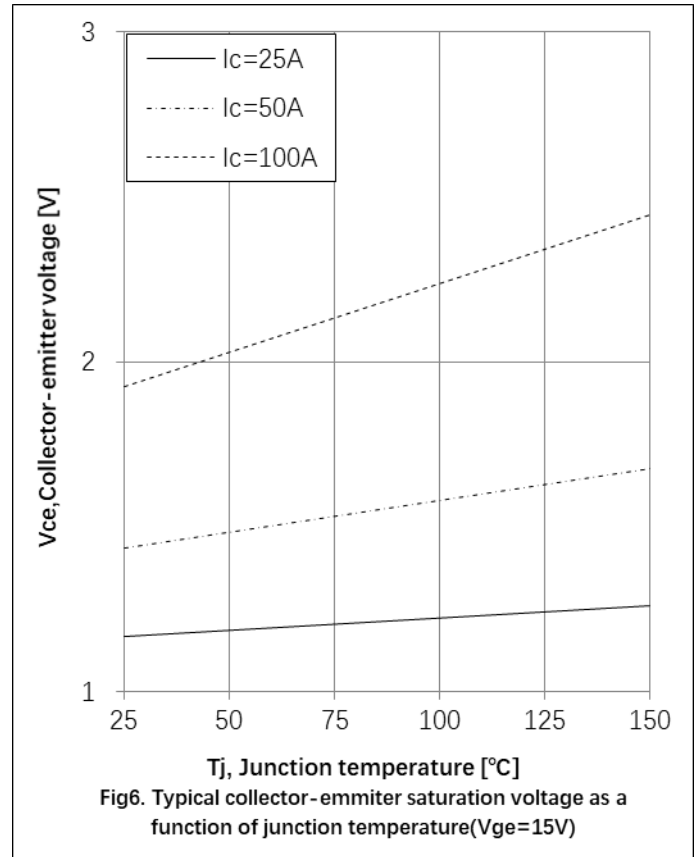
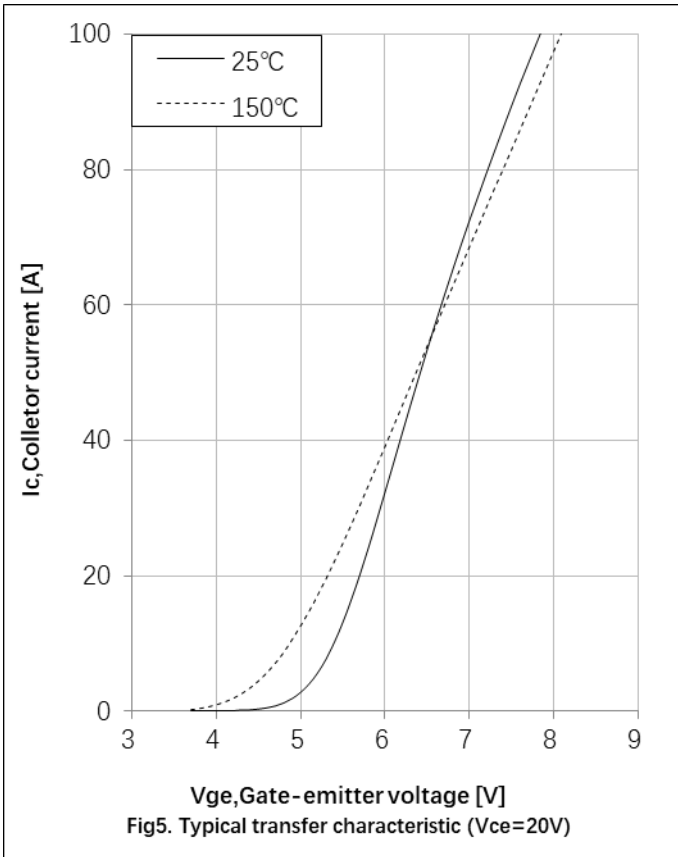
## Electrical Characteristics of the DIODE

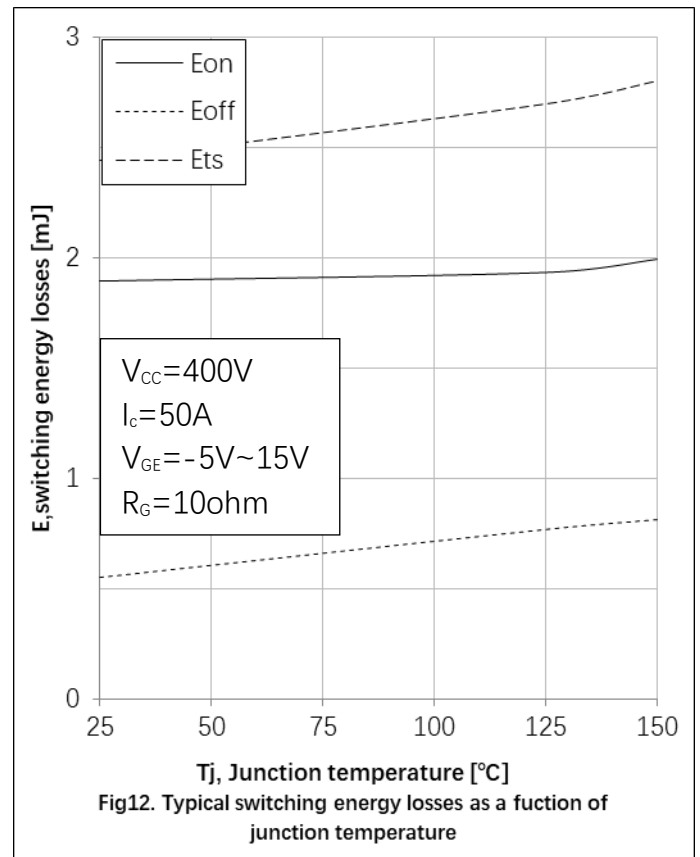
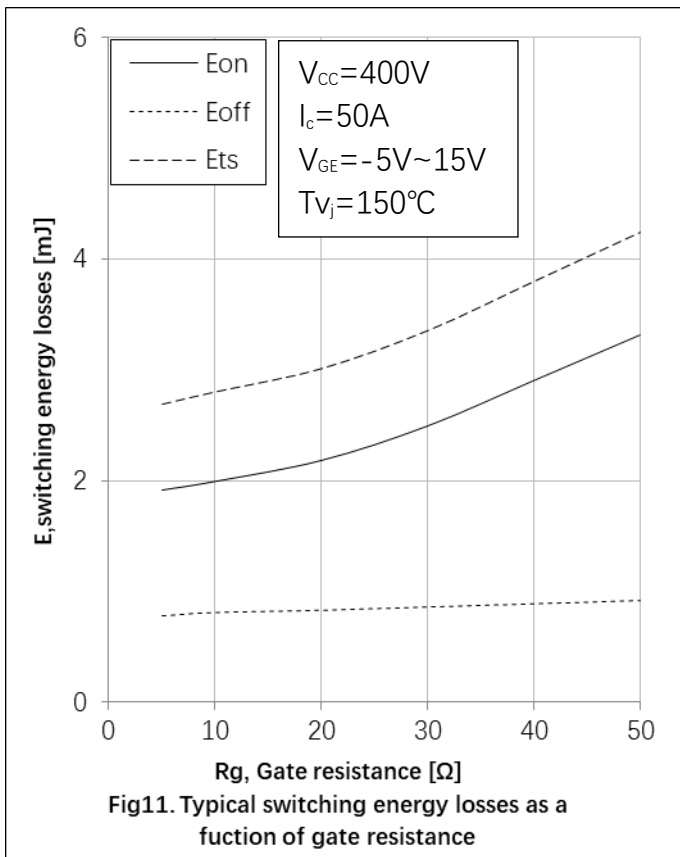
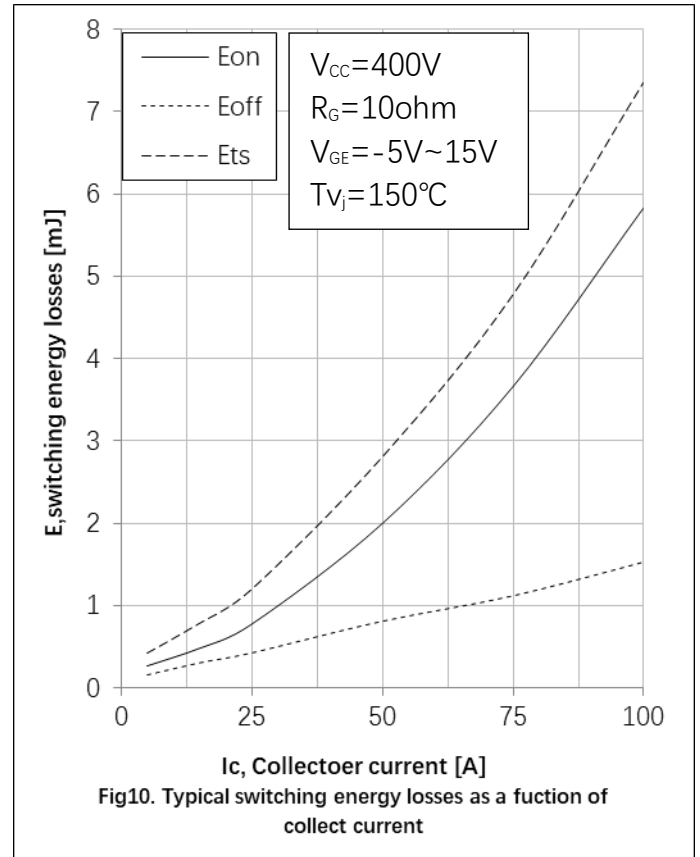
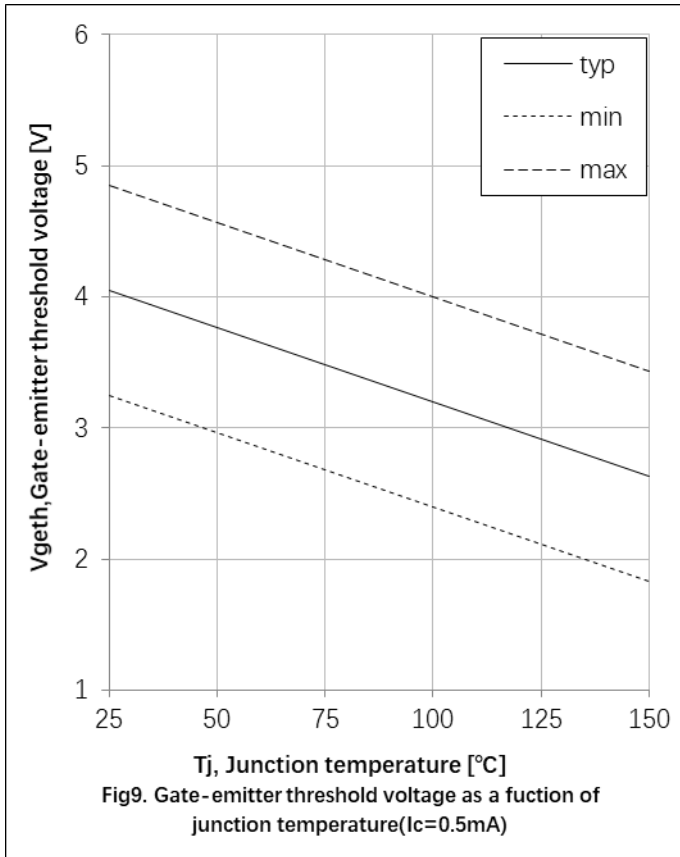
| Parameter                                | Symbol           | Conditions   | Min. | Typ. | Max. | Unit |
|--|------------------|--|------|------|------|------|
| <b>Dynamic , at T<sub>j</sub>= 25°C</b>  |                  |  |      |      |      |      |
| Reverse Recovery Current                 | I <sub>rr</sub>  | I <sub>F</sub> =50A, V <sub>R</sub> =400V<br>-di/dt=450A/μs, | -    | 15   | -    | A    |
| Reverse Recovery Charge                  | Q <sub>rr</sub>  |  | -    | 1.58 | -    | uC   |
| Diode reverse recovery time              | t <sub>rr</sub>  |  | -    | 148  | -    | ns   |
| Reverse Recovery Energy                  | E <sub>rec</sub> |  | -    | 0.29 | -    | mJ   |
| <b>Dynamic , at T<sub>j</sub>= 125°C</b> |                  |  |      |      |      |      |
| Reverse Recovery Current                 | I <sub>rr</sub>  | I <sub>F</sub> =50A, V <sub>R</sub> =400V<br>-di/dt=450A/μs, | -    | 21   | -    | A    |
| Reverse Recovery Charge                  | Q <sub>rr</sub>  |  | -    | 2.54 | -    | uC   |
| Diode reverse recovery time              | t <sub>rr</sub>  |  | -    | 183  | -    | ns   |
| Reverse Recovery Energy                  | E <sub>rec</sub> |  | -    | 0.65 | -    | mJ   |
| <b>Dynamic , at T<sub>j</sub>= 150°C</b> |                  |  |      |      |      |      |
| Reverse Recovery Current                 | I <sub>rr</sub>  | I <sub>F</sub> =50A, V <sub>R</sub> =400V<br>-di/dt=450A/μs, | -    | 24   | -    | A    |
| Reverse Recovery Charge                  | Q <sub>rr</sub>  |  | -    | 3.59 | -    | uC   |
| Diode reverse recovery time              | t <sub>rr</sub>  |  | -    | 218  | -    | ns   |
| Reverse Recovery Energy                  | E <sub>rec</sub> |  | -    | 0.79 | -    | mJ   |

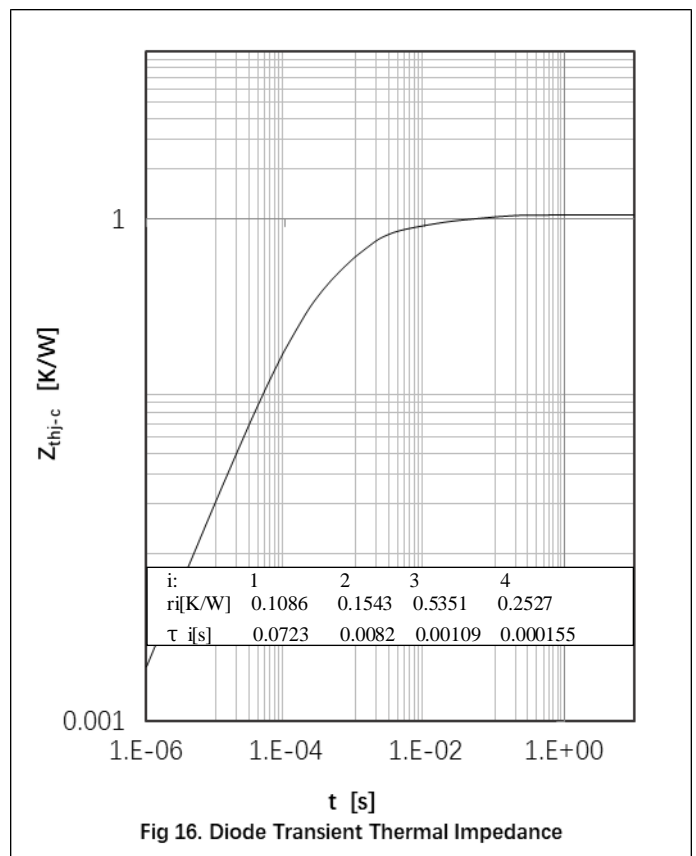
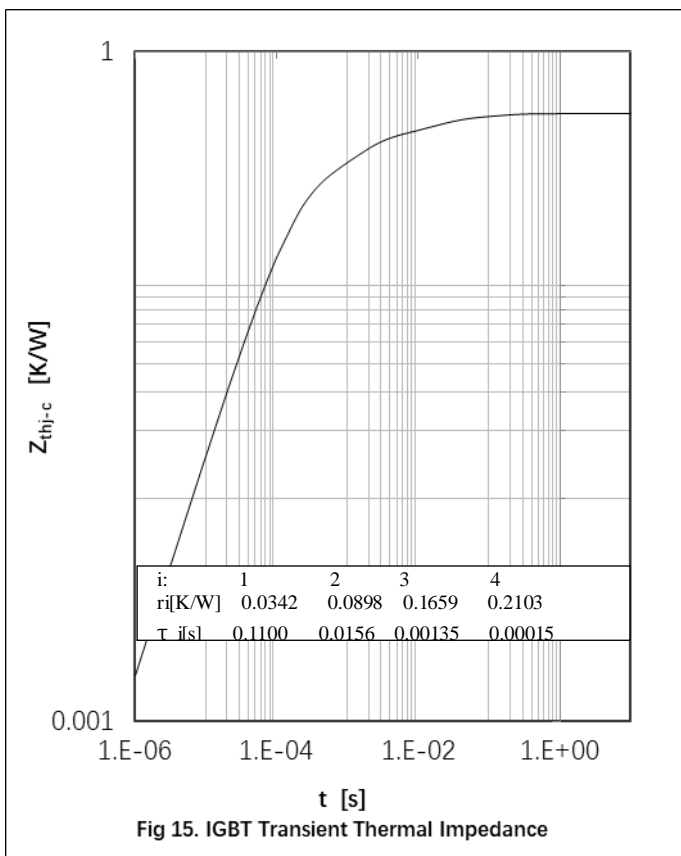
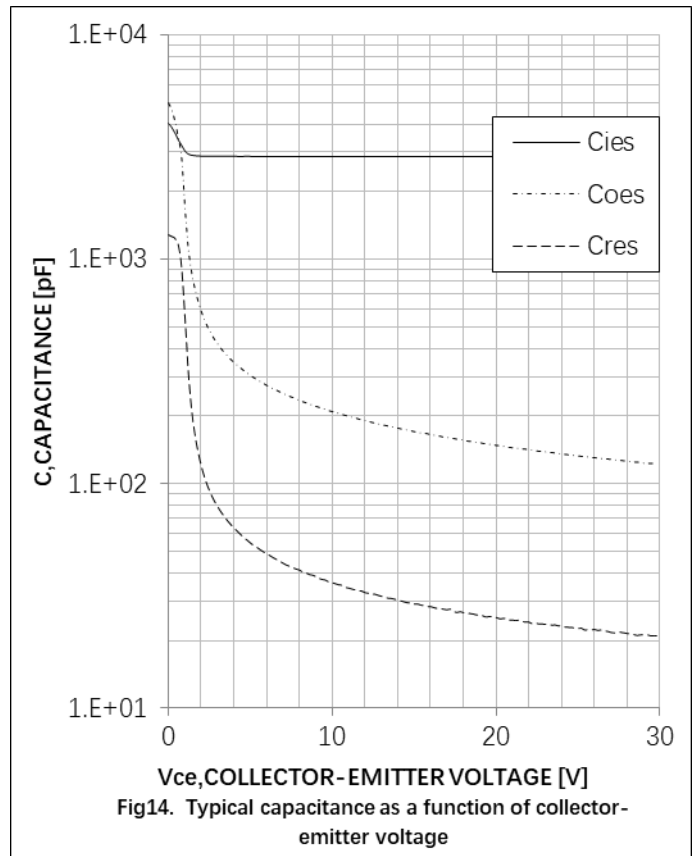
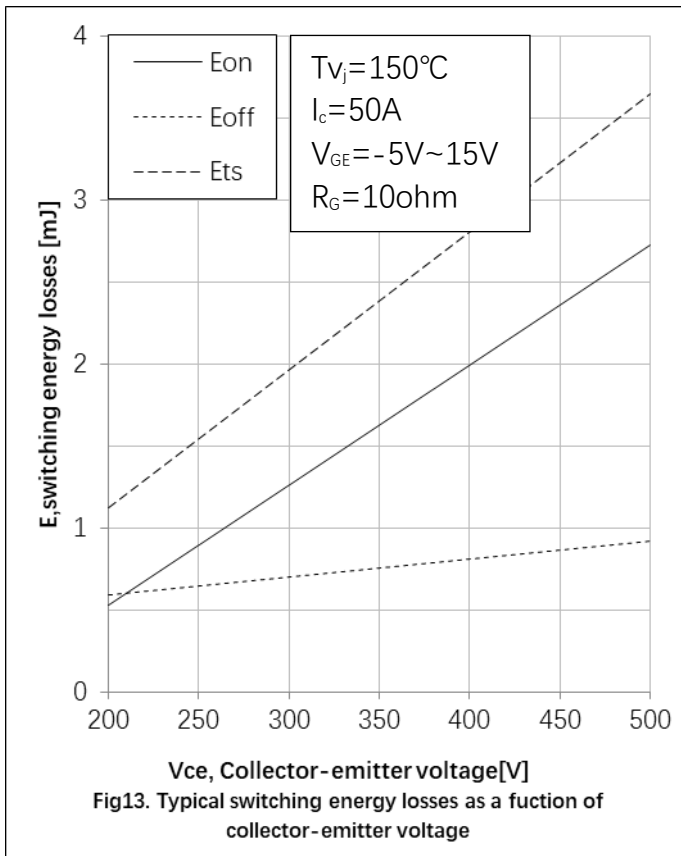
## Thermal Resistance

| Parameter                                 | Symbol               | Max. Value | Unit |
|---|----------------------|------------|------|
| IGBT Thermal Resistance, Junction - Case  | R <sub>th(j-c)</sub> | 0.53       | K/W  |
| Diode Thermal Resistance, Junction - Case | R <sub>th(j-c)</sub> | 1.05       | K/W  |
| Thermal Resistance, Junction - Ambient    | R <sub>th(j-a)</sub> | 40         | K/W  |

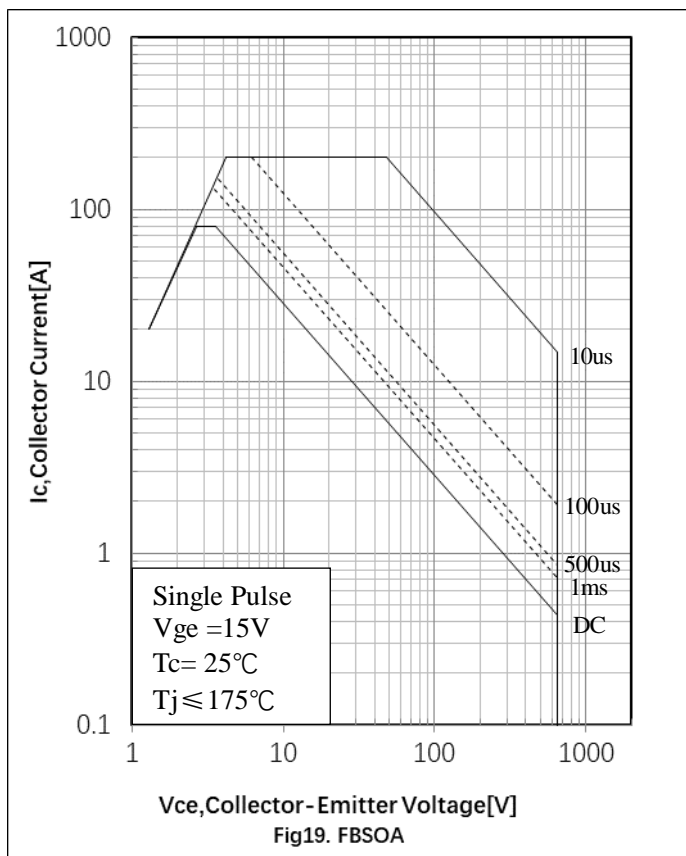
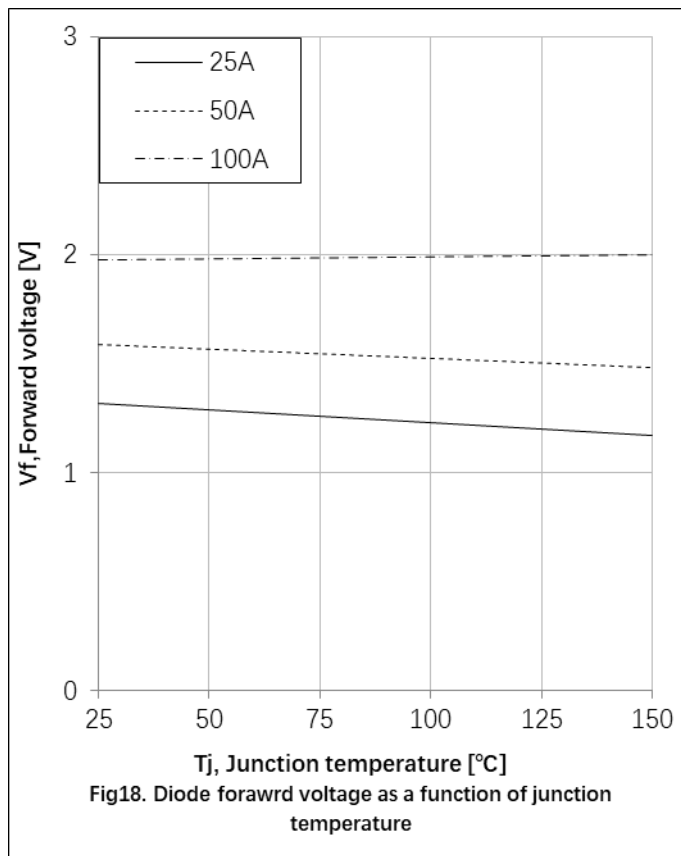
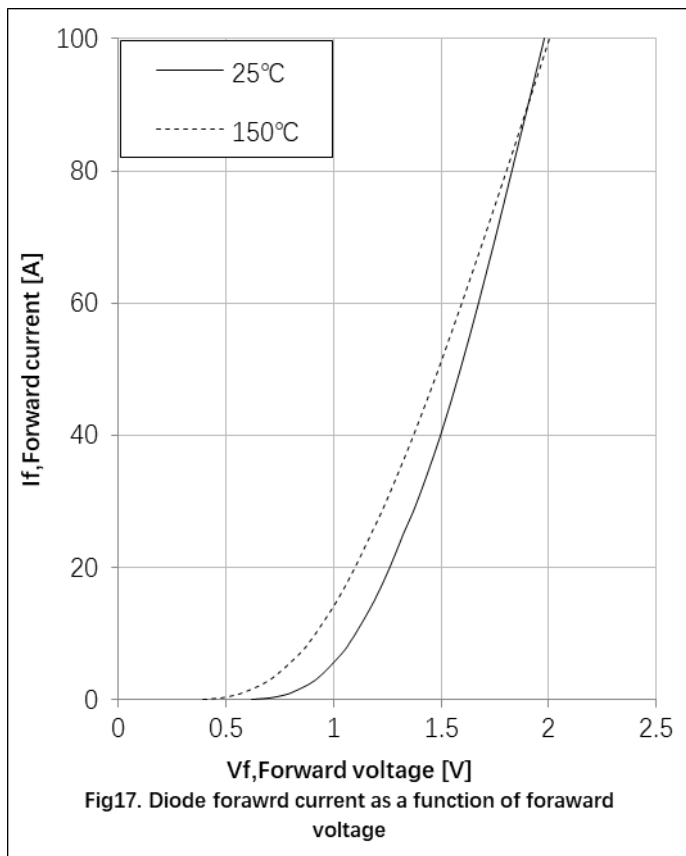




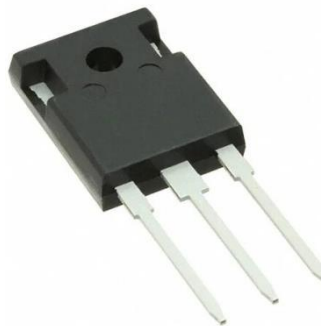
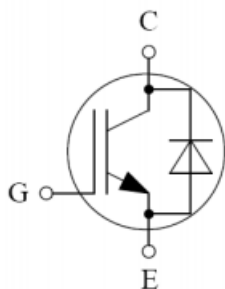




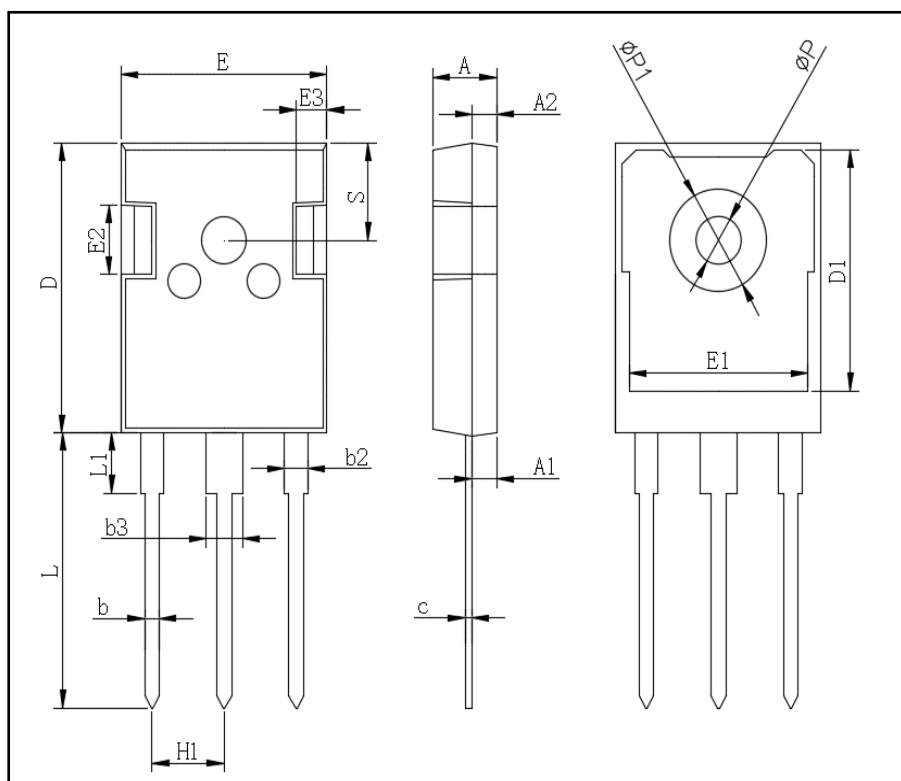




## ● Circuit Diagram



## ● 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  |
| Φ P      | 3.40    | 3.80  |
| Φ P1     | -       | 7.30  |
| S        | 6.15TYP |       |
| H1       | 5.44TYP |       |
| b3       | 2.80    | 3.20  |

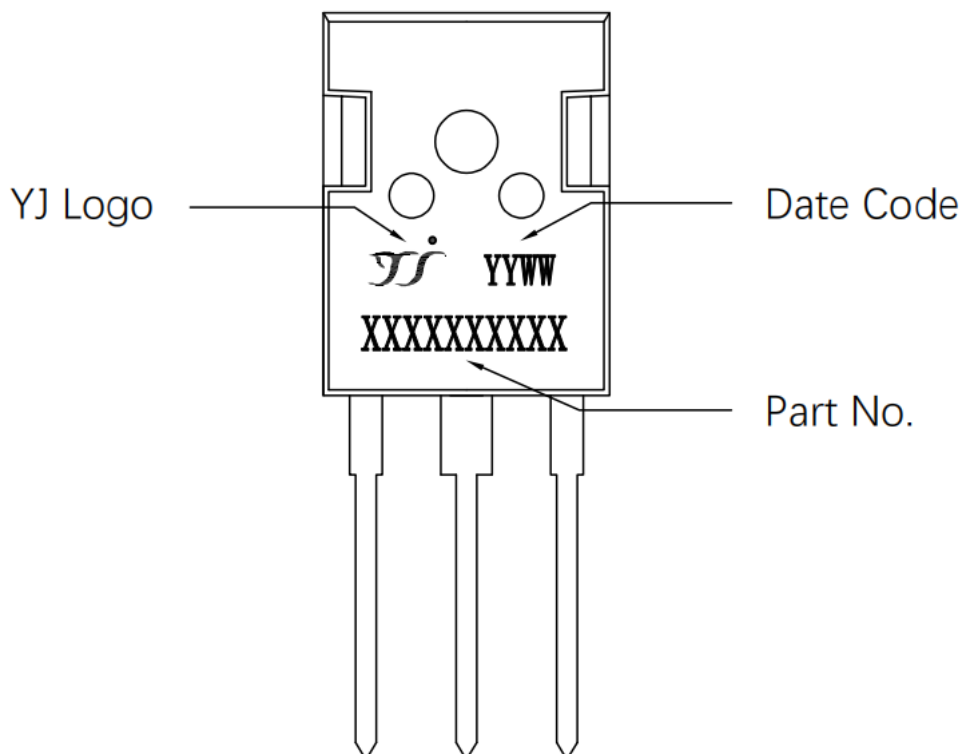


# DGW50N65CTS2A

**RoHS**  
COMPLIANT

| ISSUE | REVISION                  | DATE     |
|-------|---------------------------|----------|
| 1.0   | Add Datasheet             | 8-Sep-23 |
| 1.1   | Production Version Update | 8-Oct-23 |

## Marking Information



## Package Parameters

| Base Part Number | Package Type | Standard Pack |          | Orderable Part Number |
|------------------|--------------|---------------|----------|-----------------------|
|                  |              | Form          | Quantity |                       |
| DGW50N65CTS2A    | TO-247       | Tube          | 30       | DGW50N65CTS2A         |

