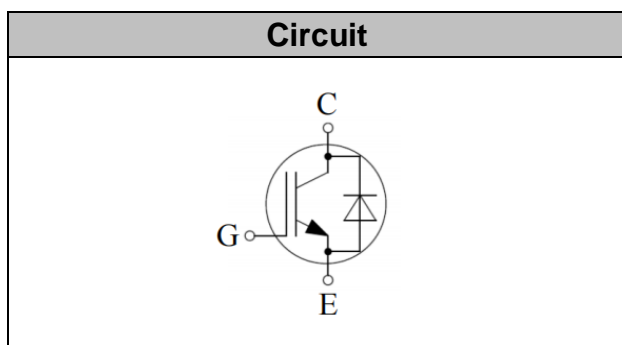


IGBT Discrete

| | | |
|------------------------|-------------|----------|
| V_{CE} | 650 | V |
| I_C | 120 | A |
| $V_{CE(SAT)} I_C=120A$ | 1.60 | V |



Applications

- General purpose inverters
- Uninterruptible power supply
- Medium to low switching frequency power 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} $T_C=25^\circ C$ value limited by bondwire $T_C=100^\circ C$ | I_C | 160 120 | A |
| Diode Forward Current, limited by T_{jmax} $T_C=25^\circ C$ value limited by bondwire $T_C=100^\circ C$ | I_F | 160 120 | A |
| Continuous Gate-Emitter Voltage | V_{GE} | ± 20 | V |
| Transient Gate-Emitter Voltage ($t_p \leq 10\mu s, D < 0.010$) | V_{GE} | ± 30 | V |
| Turn off Safe Operating Area $V_{CE} \leq 650V$, $T_j \leq 150^\circ C$ | | 240 | A |
| Pulsed Collector Current, $V_{GE}=15V$, t_p limited by T_{jmax} | I_{CM} | 240 | A |
| Diode Pulsed Current, t_p limited by T_{jmax} | I_{Fpuls} | 240 | A |
| Power Dissipation, $T_j=175^\circ C, T_c=25^\circ C$ | P_{tot} | 576 | 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 |
|--------------------------------------|---------------|--|------|----------------------|--------------|------|
| Static | | | | | | |
| Collector-Emitter Breakdown Voltage | BV_{CES} | $V_{GE}=0V, I_C=250\mu A$ | 650 | | - | V |
| Gate Threshold Voltage | $V_{GE(th)}$ | $V_{GE}=V_{CE}, I_C=1mA$ | 3.5 | 4.0 | 4.5 | V |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_{GE}=15V, I_C=120A$ $T_j=25^\circ\text{C}$, $T_j=125^\circ\text{C}$ $T_j=150^\circ\text{C}$ | | 1.60 2.00 2.10 | 1.85 | V |
| Zero Gate Voltage Collector Current | I_{CES} | $V_{CE}=650V, V_{GE}=0V$ $T_j=25^\circ\text{C}$, $T_j=150^\circ\text{C}$ | | | 0.25 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 |
|------------------------------|-----------|--|------|------|------|------|
| Dynamic | | | | | | |
| Input Capacitance | C_{ies} | $V_{CE}=25V, V_{GE}=0V,$ $f=1MHz$ | - | 5.32 | - | nF |
| Reverse Transfer Capacitance | C_{res} | | - | 0.09 | - | |
| Gate Charge | Q_G | $V_{CC}=300V, I_C=120A,$ $V_{GE}=-5V\sim+15V$ | - | 0.36 | - | uC |

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

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|-----------------------|--------|---|------|----------------------|------|------|
| Static | | | | | | |
| Diode Forward Voltage | V_F | $I_F = 120\text{A}$ $T_j = 25^\circ\text{C}$, $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$ | | 1.75 1.65 1.60 | 2.15 | V |

Switching Characteristic, Inductive Load

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|--|--------------|--|------|------|------|------|
| Dynamic , at $T_j = 25^\circ\text{C}$ | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{CC} = 400\text{V}$, $I_C = 120\text{A}$, $V_{GE} = -5\text{V} \sim 15\text{V}$, $R_g = 10\Omega$ Inductive Load | - | 39 | - | ns |
| Rise Time | t_r | | - | 79 | - | ns |
| Turn-on Energy | E_{on} | | - | 4.07 | - | mJ |
| Turn-off Delay Time | $t_{d(off)}$ | | - | 164 | - | ns |
| Fall Time | t_f | | - | 55 | - | ns |
| Turn-off Energy | E_{off} | | - | 2.28 | - | mJ |
| Dynamic , at $T_j = 125^\circ\text{C}$ | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{CC} = 400\text{V}$, $I_C = 120\text{A}$, $V_{GE} = -5\text{V} \sim 15\text{V}$, $R_g = 10\Omega$ Inductive Load | - | 38 | - | ns |
| Rise Time | t_r | | - | 80 | - | ns |
| Turn-on Energy | E_{on} | | - | 4.31 | - | mJ |
| Turn-off Delay Time | $t_{d(off)}$ | | - | 168 | - | ns |
| Fall Time | t_f | | - | 56 | - | ns |
| Turn-off Energy | E_{off} | | - | 2.44 | - | mJ |
| Dynamic , at $T_j = 150^\circ\text{C}$ | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{CC} = 400\text{V}$, $I_C = 120\text{A}$, $V_{GE} = -5\text{V} \sim 15\text{V}$, $R_g = 10\Omega$ Inductive Load | - | 37 | - | ns |
| Rise Time | t_r | | - | 82 | - | ns |
| Turn-on Energy | E_{on} | | - | 4.43 | - | mJ |
| Turn-off Delay Time | $t_{d(off)}$ | | - | 171 | - | ns |
| Fall Time | t_f | | - | 56 | - | ns |
| Total switching energy | E_{ts} | | - | 2.52 | - | mJ |

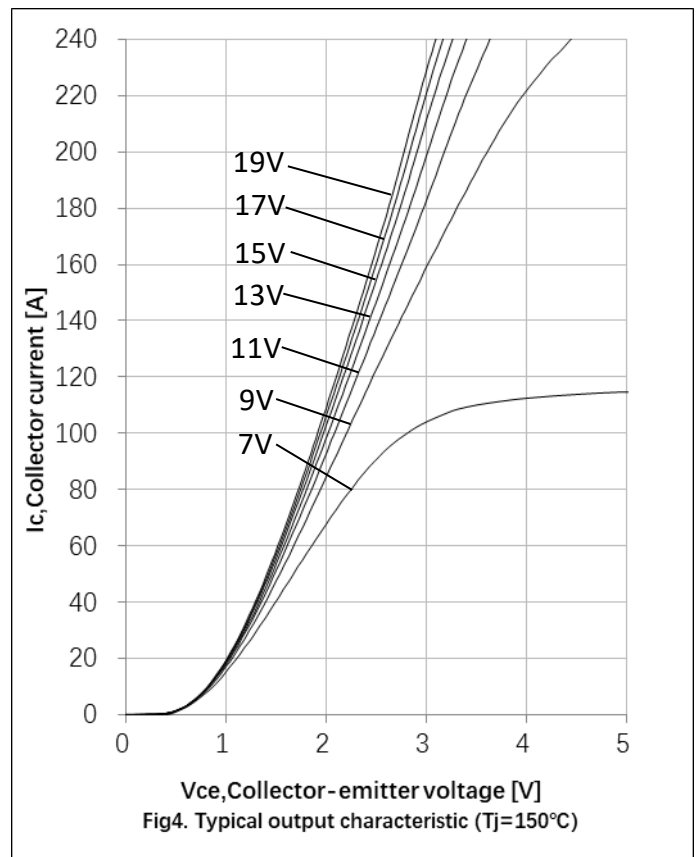
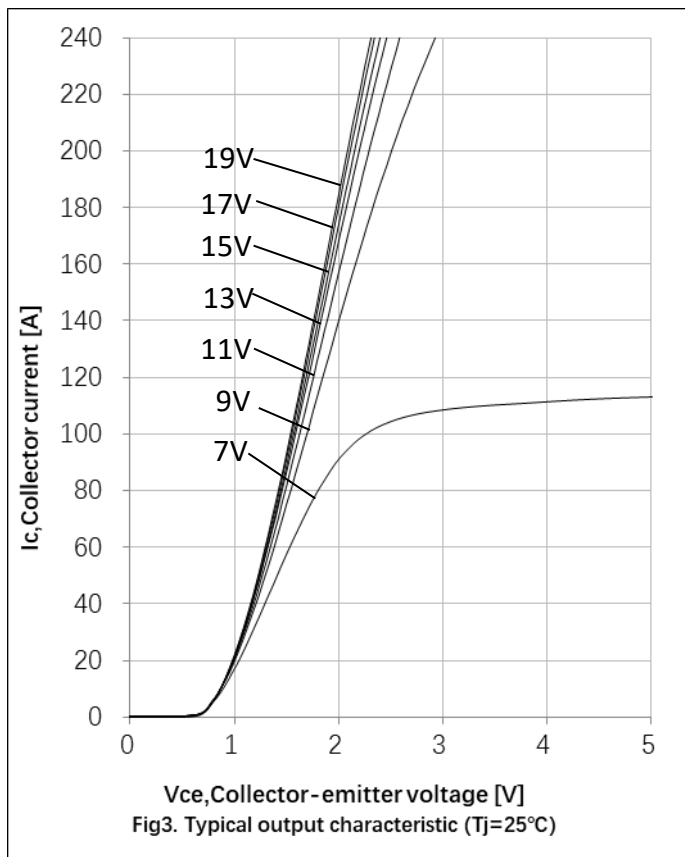
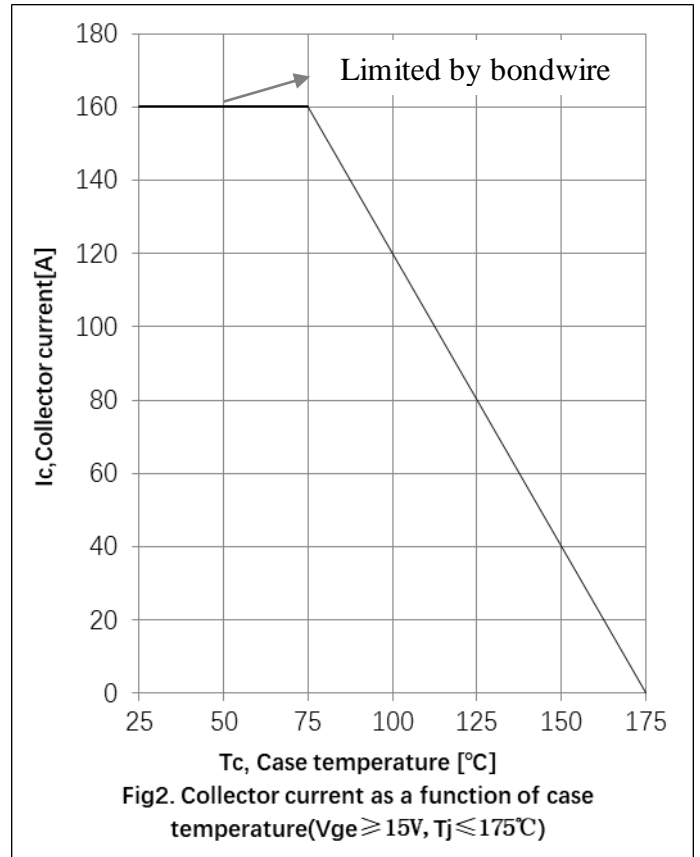
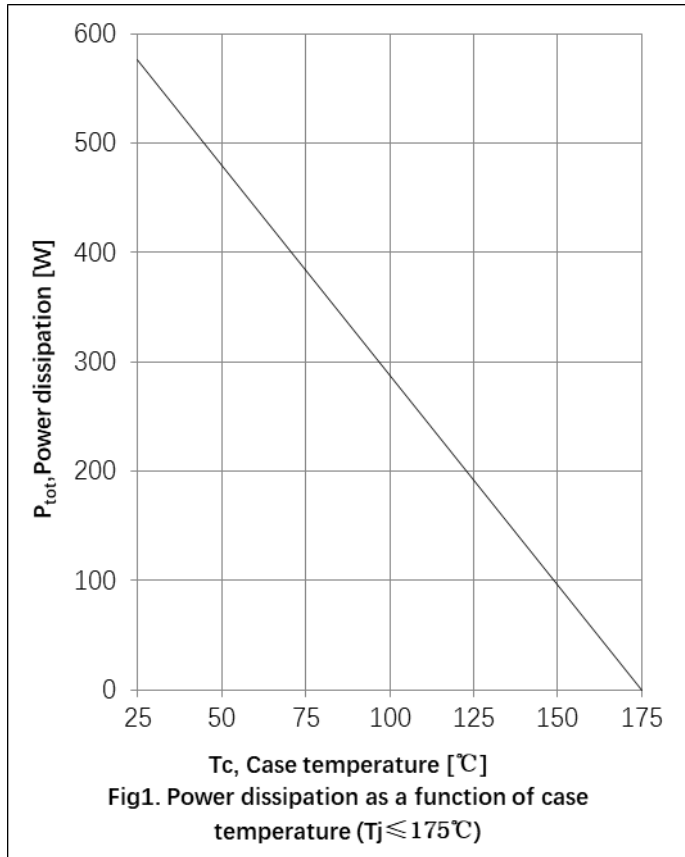


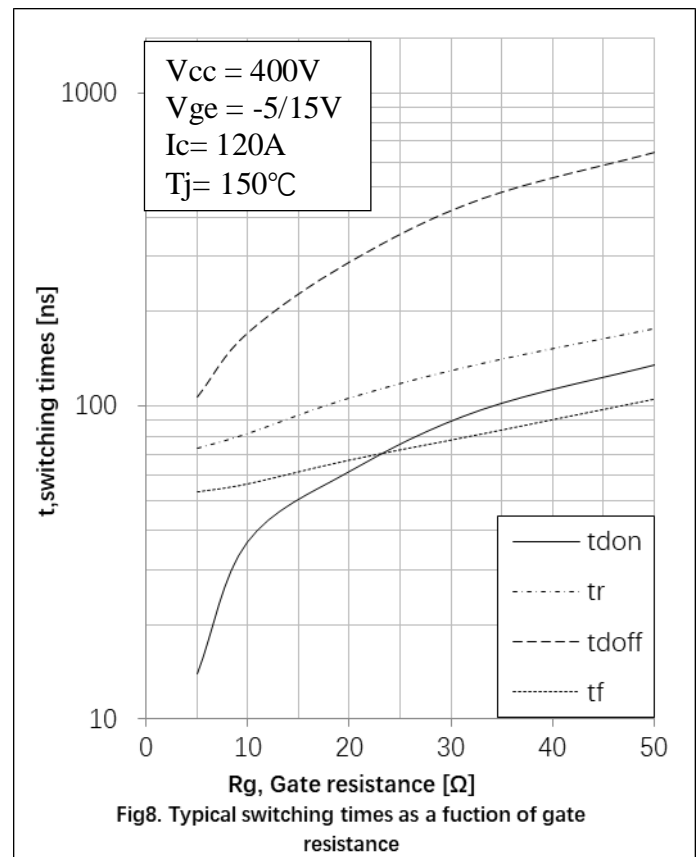
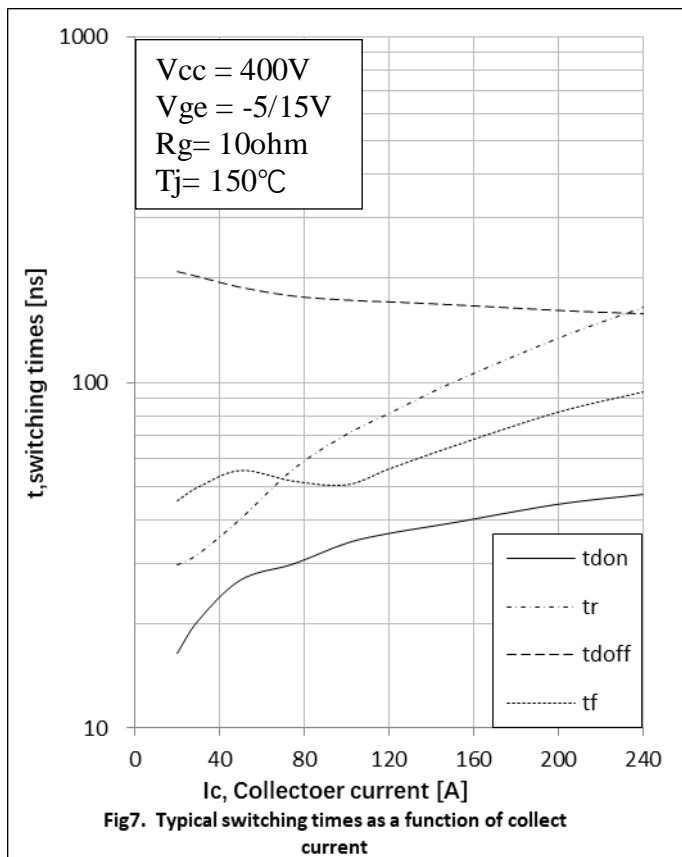
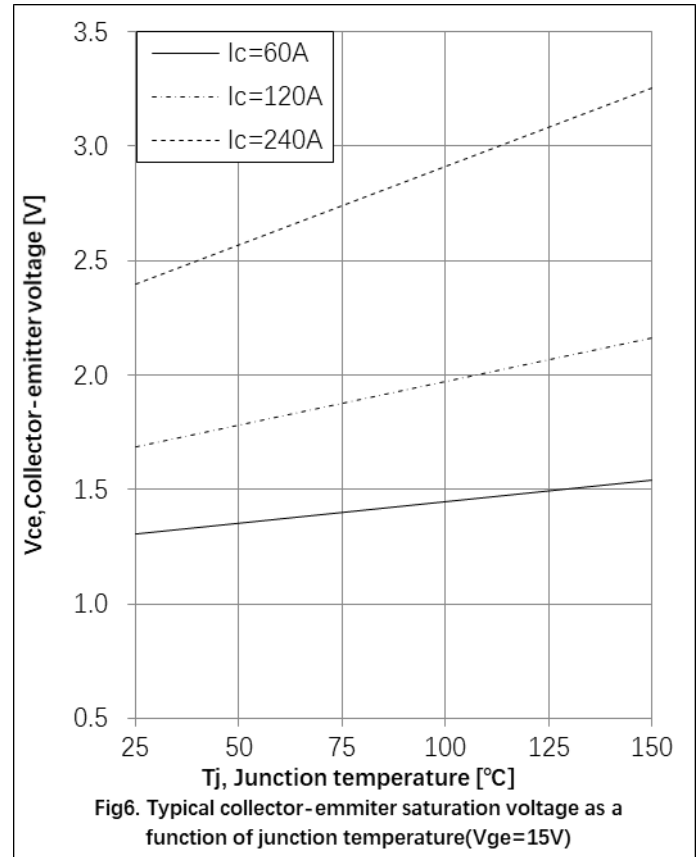
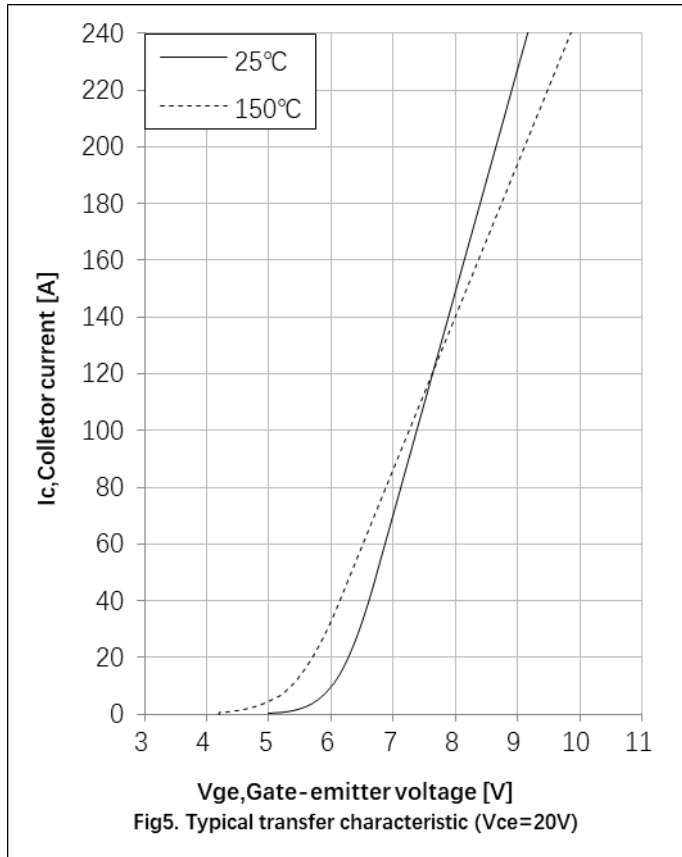
Electrical Characteristics of the DIODE

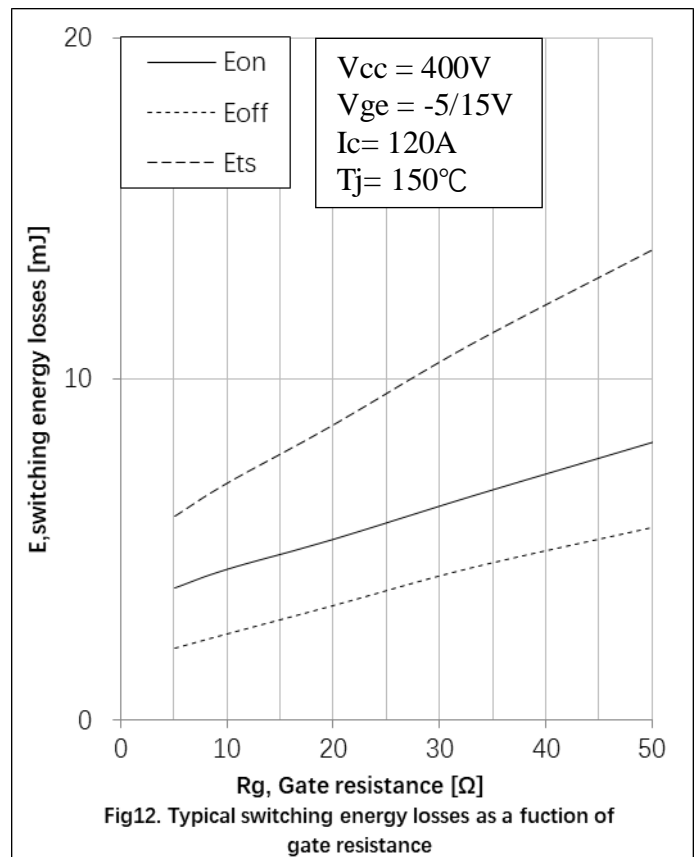
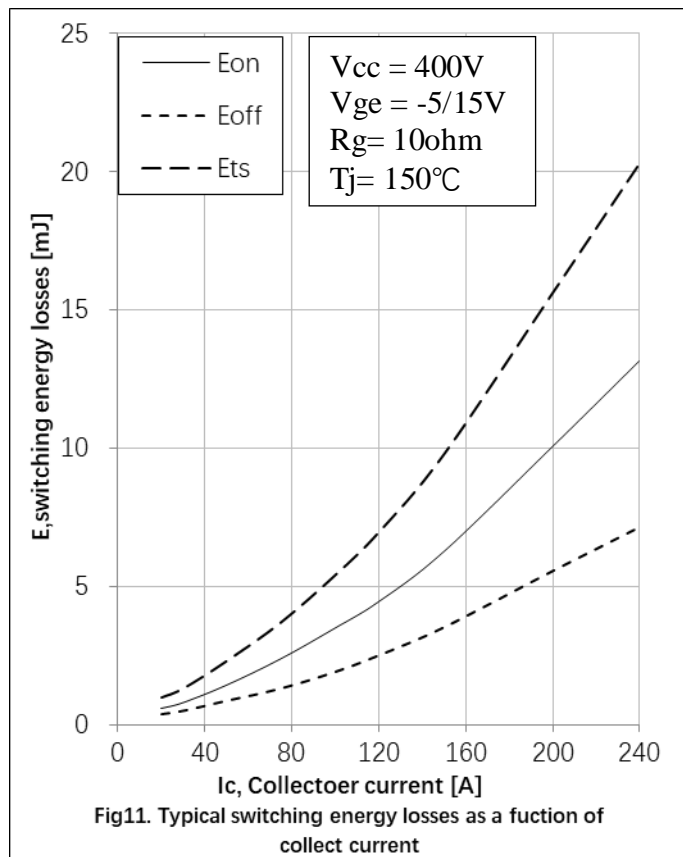
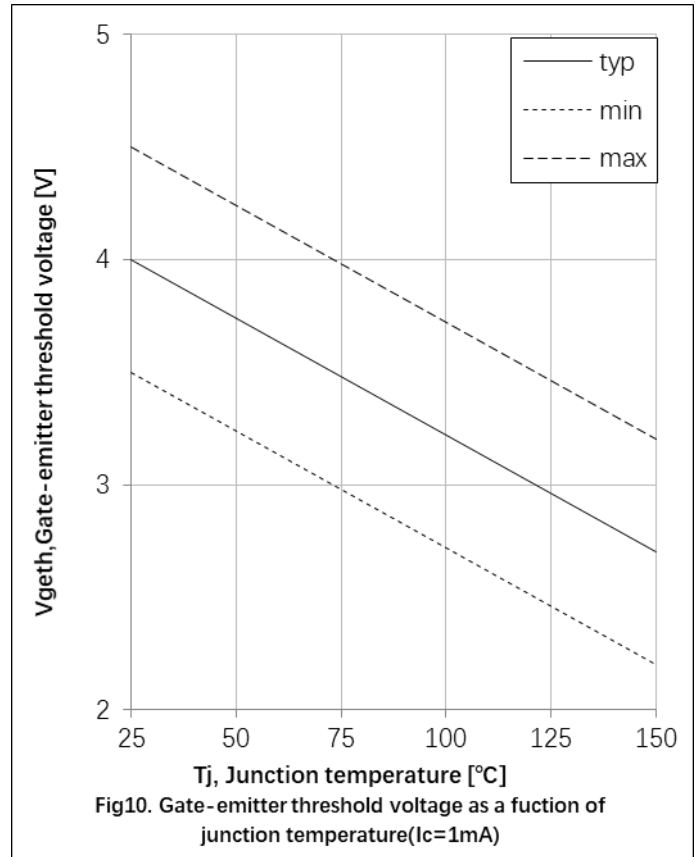
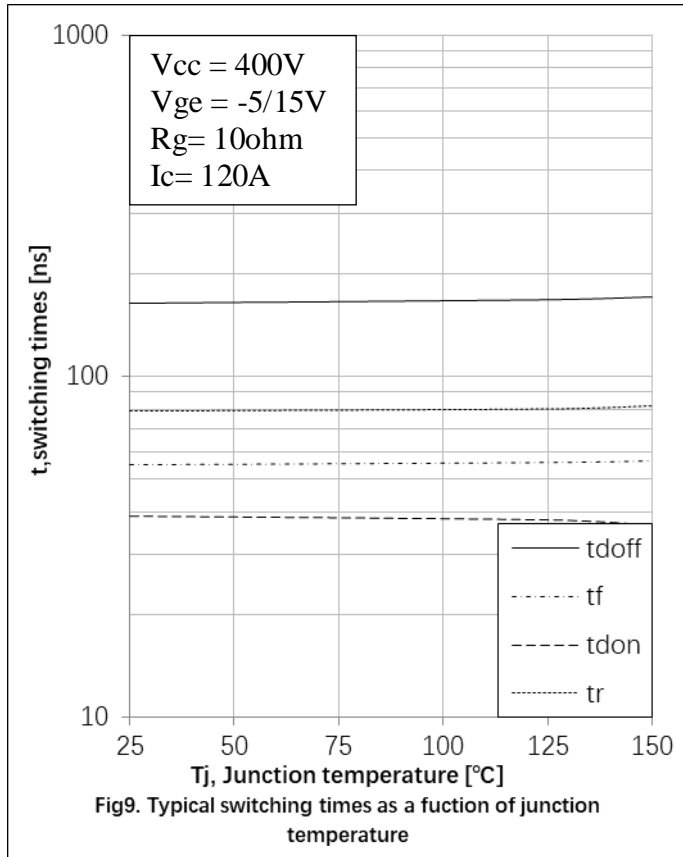
| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|--|------------------|--|------|------|------|------|
| Dynamic , at T_j= 25°C | | | | | | |
| Reverse Recovery Current | I _{rr} | I _F =120A, V _R =300V -di/dt=550A/μs, | - | 27 | - | A |
| Reverse Recovery Charge | Q _{rr} | | - | 2.2 | - | uC |
| Diode reverse recovery time | trr | | - | 139 | - | ns |
| Reverse Recovery Energy | E _{rec} | | - | 0.19 | - | mJ |
| Dynamic , at T_j= 125°C | | | | | | |
| Reverse Recovery Current | I _{rr} | I _F =120A, V _R =300V -di/dt=550A/μs, | - | 43 | - | A |
| Reverse Recovery Charge | Q _{rr} | | - | 5.1 | - | uC |
| Diode reverse recovery time | trr | | - | 189 | - | ns |
| Reverse Recovery Energy | E _{rec} | | - | 0.56 | - | mJ |
| Dynamic , at T_j= 150°C | | | | | | |
| Reverse Recovery Current | I _{rr} | I _F =120A, V _R =300V -di/dt=550A/μs, | - | 49 | - | A |
| Reverse Recovery Charge | Q _{rr} | | - | 6.8 | - | uC |
| Diode reverse recovery time | trr | | - | 236 | - | ns |
| Reverse Recovery Energy | E _{rec} | | - | 0.73 | - | mJ |

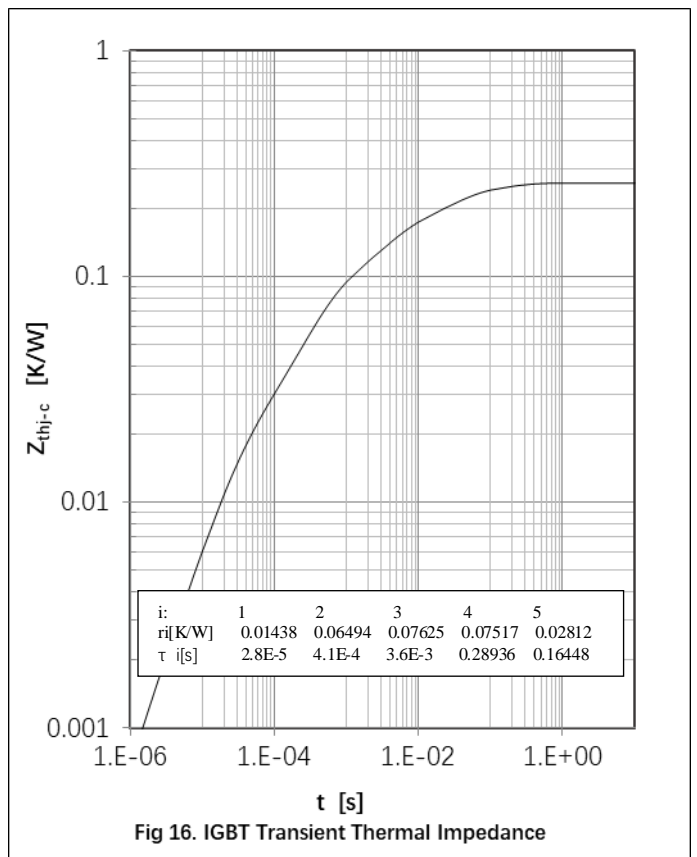
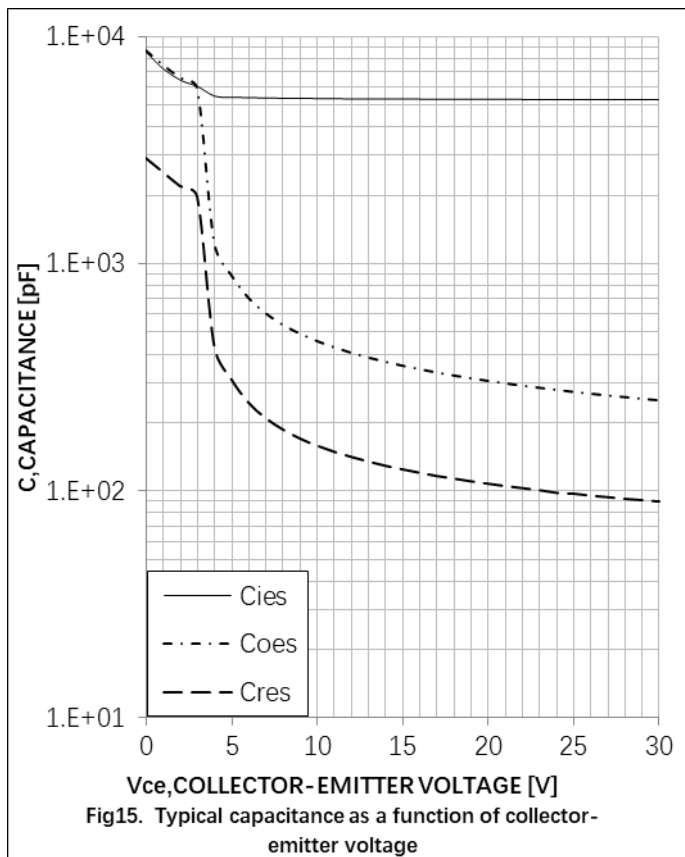
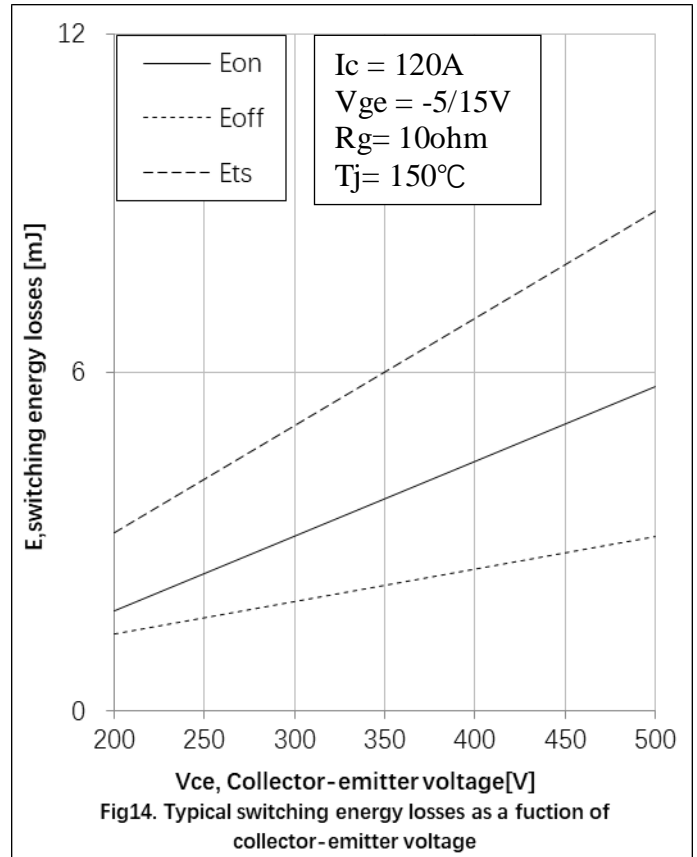
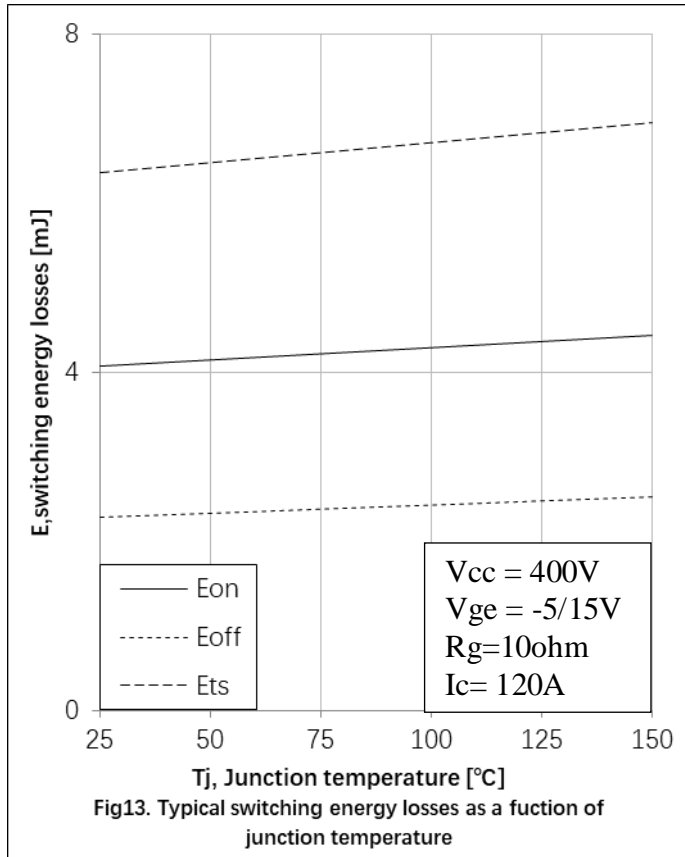
Thermal Resistance

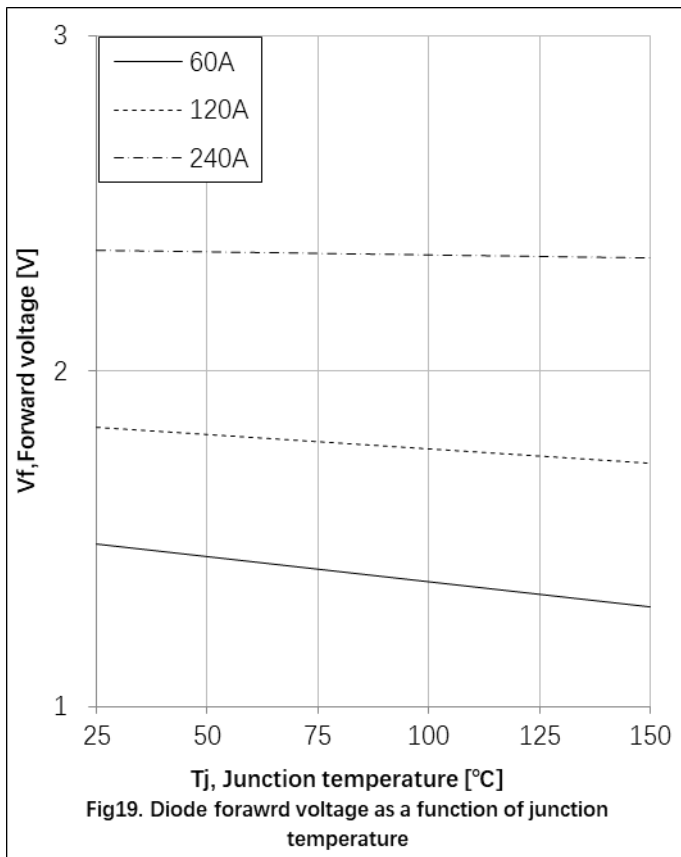
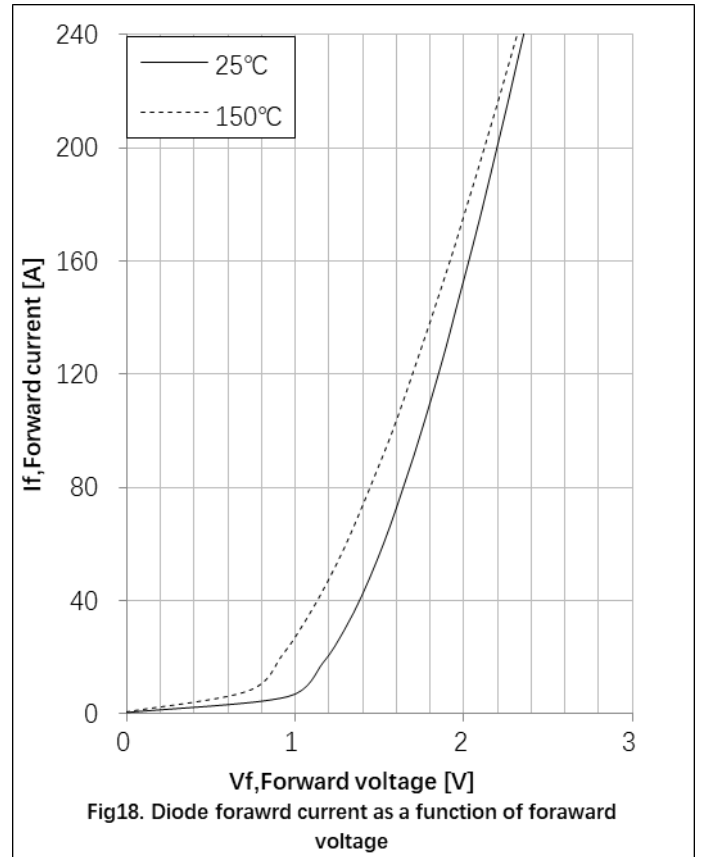
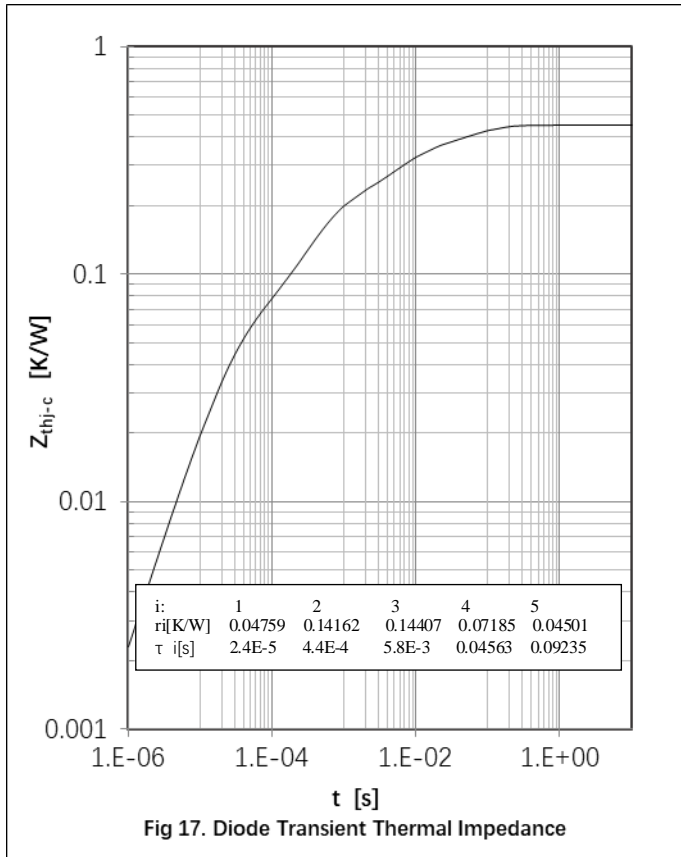
| Parameter | Symbol | Max. Value | Unit |
|---|----------------------|------------|------|
| IGBT Thermal Resistance, Junction - Case | R _{th(j-c)} | 0.26 | K/W |
| Diode Thermal Resistance, Junction - Case | R _{th(j-c)} | 0.45 | K/W |
| Thermal Resistance, Junction - Ambient | R _{th(j-a)} | 40 | K/W |



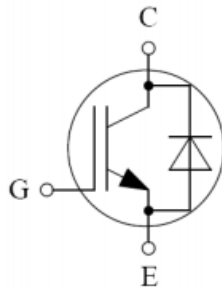






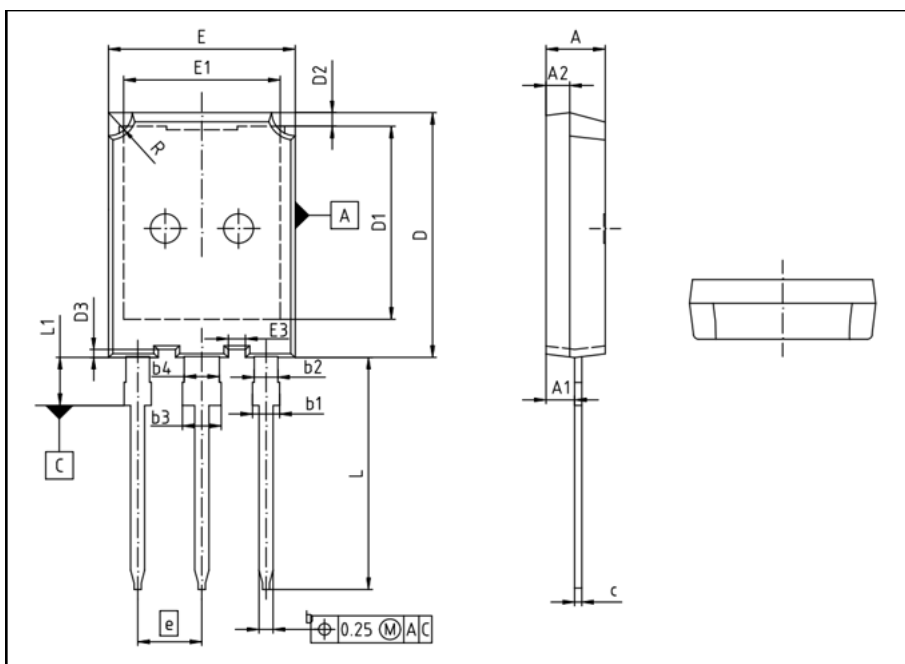


Circuit Diagram



● Package Outline Information

CASE: TO 247plus



| DIM | MILLIMETERS | |
|-----|-------------|-------|
| | MIN | MAX |
| A | 4.90 | 5.10 |
| A1 | 2.31 | 2.51 |
| A2 | 1.90 | 2.10 |
| b | 1.16 | 1.26 |
| b1 | 1.86 | 2.16 |
| b2 | 1.96 | 2.06 |
| c | 0.58 | 0.64 |
| D | 20.90 | 21.10 |
| D1 | 16.25 | 16.85 |
| D2 | 1.05 | 1.35 |
| D3 | 0.58 | 0.78 |
| E | 15.70 | 15.90 |
| E1 | 13.10 | 13.50 |
| E3 | 1.35 | 1.55 |
| e | 5.44(BSC) | |
| L | 19.78 | 20.08 |
| L1 | 4.03 | 4.23 |
| R | 1.90 | 2.10 |



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