

General Description

This IGBT is produced using advanced Magnachip's Field Stop Trench IGBT Technology, which provides high performance, excellent quality and high ruggedness.

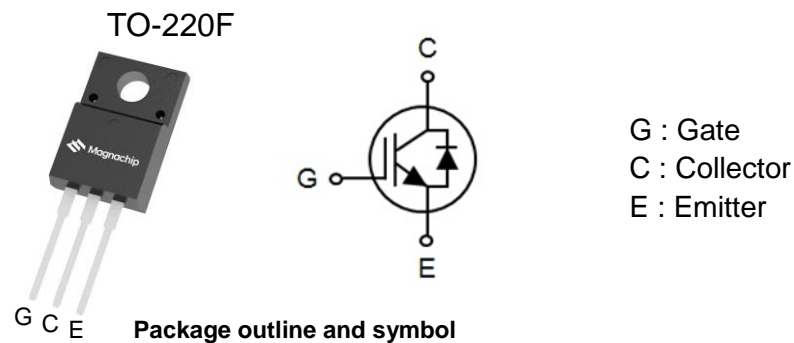
This device is for motor control.

Features

- High ruggedness for motor control
- $V_{CE(sat)}$ positive temperature coefficient
- Very soft, fast recovery anti-parallel diode
- Low EMI
- Maximum junction temperature 175°C

Applications

- Inverter for motor control



Maximum Ratings

| Parameter | Symbol | Rating | Unit |
|--|-------------|-------------------------|------------------|
| Collector-emitter voltage | V_{CE} | 650 | V |
| DC collector current, limited by T_{vjmax} | I_C | $T_C=25^\circ\text{C}$ | 30 |
| | | $T_C=100^\circ\text{C}$ | 15 |
| Pulsed collector current, t_p limited by T_{vjmax} | I_{Cpuls} | 60 | A |
| Diode forward current, limited by T_{vjmax} | I_F | $T_C=25^\circ\text{C}$ | 30 |
| | | $T_C=100^\circ\text{C}$ | 15 |
| Diode pulsed current, t_p limited by T_{vjmax} | I_{Fpuls} | 60 | A |
| Gate-emitter voltage | V_{GE} | ± 20 | V |
| Power dissipation | P_D | $T_C=25^\circ\text{C}$ | 48 |
| | | $T_C=100^\circ\text{C}$ | 24 |
| Short circuit withstand time $V_{CC} \leq 360\text{V}$, $V_{GE} = 15\text{V}$, $T_{vj} = 150^\circ\text{C}$ | t_{sc} | 5 | μs |
| Operating Junction temperature range | T_{vj} | -40~175 | $^\circ\text{C}$ |
| Storage temperature range | T_{stg} | -55~150 | $^\circ\text{C}$ |

Thermal Characteristics

| Parameter | Symbol | Rating | Unit |
|---|---------------|--------|--------------------|
| Thermal resistance junction-to-ambient | $R_{th(j-a)}$ | 62 | $^\circ\text{C/W}$ |
| Thermal resistance junction-to-case for IGBT | $R_{th(j-c)}$ | 3.0 | |
| Thermal resistance junction-to-case for Diode | $R_{th(j-c)}$ | 5.0 | |

Ordering Information

| Part Number | Marking | Temp. Range | Package | Packing | RoHS Status |
|-------------|----------|-------------|---------|---------|--------------|
| MBF15T65PEH | 15T65PEH | -55~150°C | TO-220F | Tube | Halogen Free |

Electrical Characteristics (T_{vj} = 25°C unless otherwise specified)

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|--------------------------------------|----------------------|--|-------------------------|------|------|------|
| Static Characteristics | | | | | | |
| Collector-emitter breakdown voltage | BV _{CES} | I _C = 2mA, V _{GE} = 0V | 650 | - | - | V |
| Collector-emitter saturation voltage | V _{CE(sat)} | I _C = 15A, V _{GE} = 15V | T _{vj} = 25°C | 1.65 | 2.00 | V |
| | | | T _{vj} = 175°C | 1.90 | | |
| Diode forward voltage | V _F | V _{GE} = 0V, I _F = 15A | T _{vj} = 25°C | 1.85 | 2.30 | V |
| | | | T _{vj} = 175°C | 1.95 | | |
| Gate-emitter threshold voltage | V _{GE(th)} | V _{CE} = V _{GE} , I _C = 0.5mA | 4.5 | 5.5 | 6.5 | V |
| Zero gate voltage collector current | I _{CES} | V _{CE} = 650V, V _{GE} = 0V, T _{vj} = 25°C | - | - | 20 | μA |
| Gate-emitter leakage current | I _{GES} | V _{GE} = 20V, V _{CE} = 0V | - | - | ±100 | nA |
| Dynamic Characteristics | | | | | | |
| Total gate charge | Q _G | V _{CE} = 520V, I _C = 15A, V _{GE} = 15V | - | 61 | | nC |
| Gate-emitter charge | Q _{GE} | | - | 11 | | |
| Gate-collector charge | Q _{GC} | | - | 35 | | |
| Input capacitance | C _{ies} | V _{CE} = 25V, V _{GE} = 0V, f = 1MHz | - | 1129 | - | pF |
| Output capacitance | C _{oes} | | - | 57 | - | |
| Reverse transfer capacitance | C _{res} | | - | 31 | - | |
| Switching Characteristics | | | | | | |
| Turn-on delay time | t _{d(on)} | V _{GE} = 15V, V _{CC} = 400V, I _C = 15A, R _G = 10Ω, Inductive Load, T _{vj} = 25°C | - | 19 | - | ns |
| Rise time | t _r | | - | 27 | - | |
| Turn-off delay time | t _{d(off)} | | - | 128 | - | |
| Fall time | t _f | | - | 32 | - | μJ |
| Turn-on switching energy | E _{on} | | - | 270 | - | |
| Turn-off switching energy | E _{off} | | - | 86 | - | |
| Total switching energy | E _{ts} | - | 356 | - | | |
| Turn-on delay time | t _{d(on)} | V _{GE} = 15V, V _{CC} = 400V, I _C = 15A, R _G = 10Ω, Inductive Load, T _{vj} = 175°C | - | 17 | - | ns |
| Rise time | t _r | | - | 29 | - | |
| Turn-off delay time | t _{d(off)} | | - | 150 | - | |
| Fall time | t _f | | - | 130 | - | μJ |
| Turn-on switching energy | E _{on} | | - | 342 | - | |
| Turn-off switching energy | E _{off} | | - | 288 | - | |
| Total switching energy | E _{ts} | - | 630 | - | | |
| Reverse recovery time | t _{rr} | I _F = 15A, di _F /dt = 200A/μs, T _{vj} = 25°C | - | 150 | - | ns |
| Reverse recovery current | I _{rr} | | - | 5.2 | - | A |
| Reverse recovery charge | Q _{rr} | | - | 390 | - | nC |
| Reverse recovery time | t _{rr} | I _F = 15A, di _F /dt = 200A/μs, T _{vj} = 175°C | - | 207 | - | ns |
| Reverse recovery current | I _{rr} | | - | 6.1 | - | A |
| Reverse recovery charge | Q _{rr} | | - | 631 | - | nC |

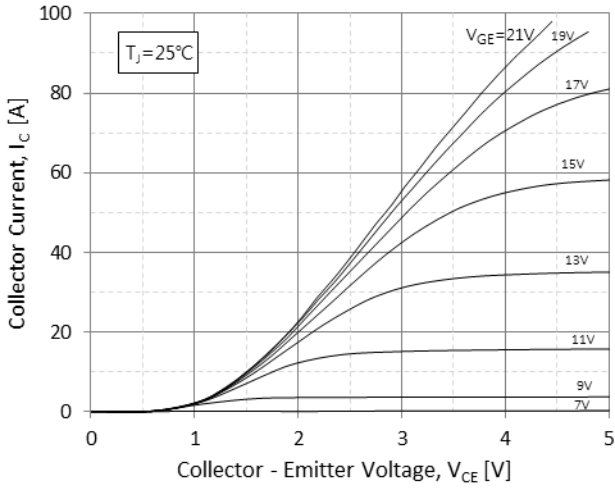


Fig.1 Typical Output Characteristics($T_J=25^\circ\text{C}$)

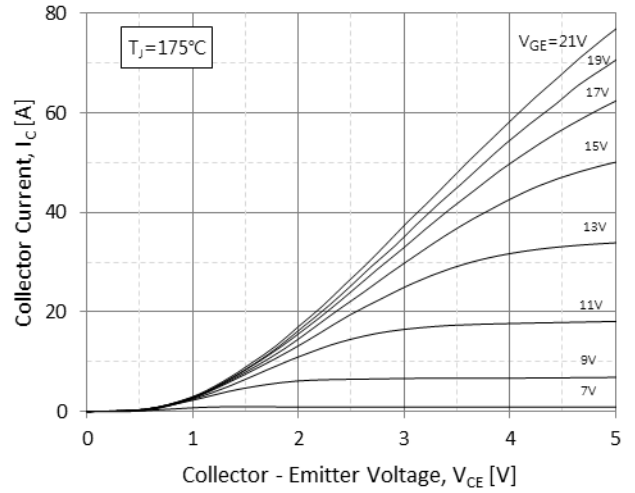


Fig.2 Typical Output Characteristics($T_J=175^\circ\text{C}$)

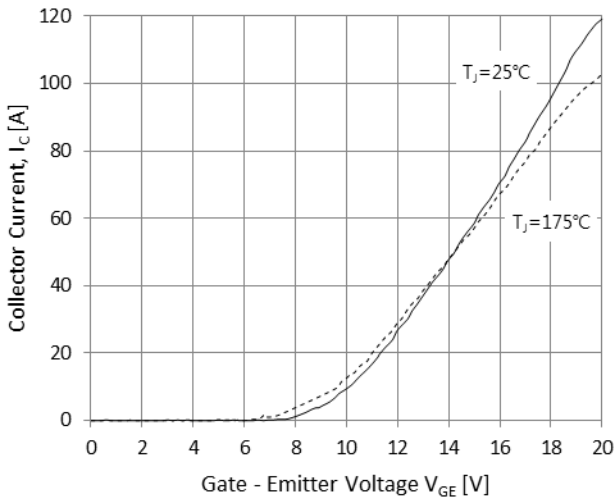


Fig.3 Typical Transfer Characteristics

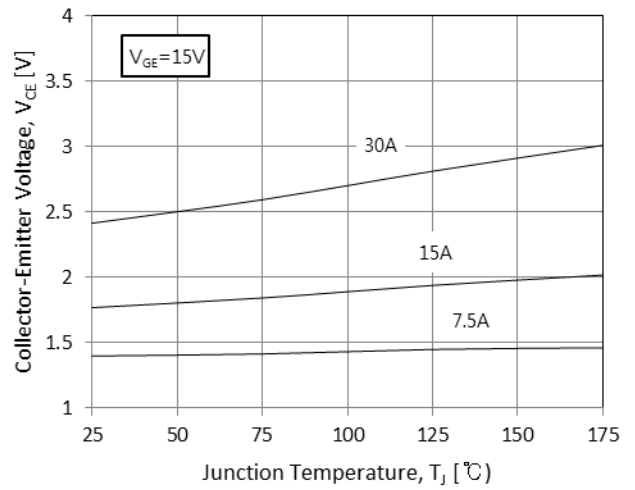


Fig.4 Typical Collector-Emmitter Saturation Voltage - Junction Temperature

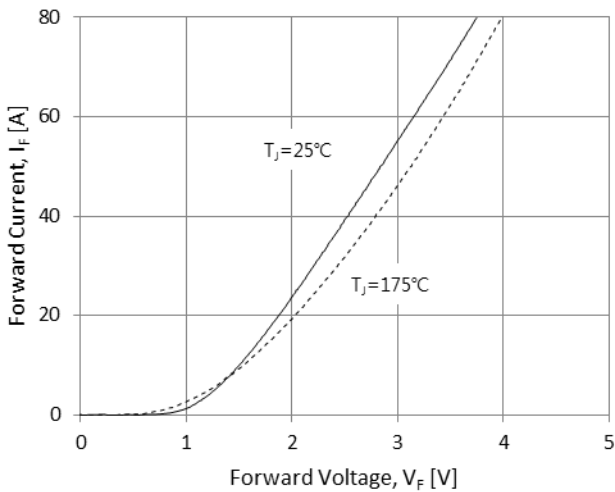


Fig.5 Diode Forward Characteristics

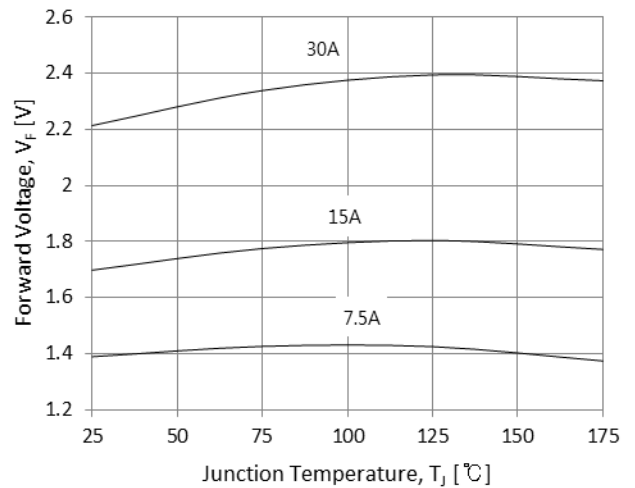


Fig.6 Diode Forward-Junction Temperature

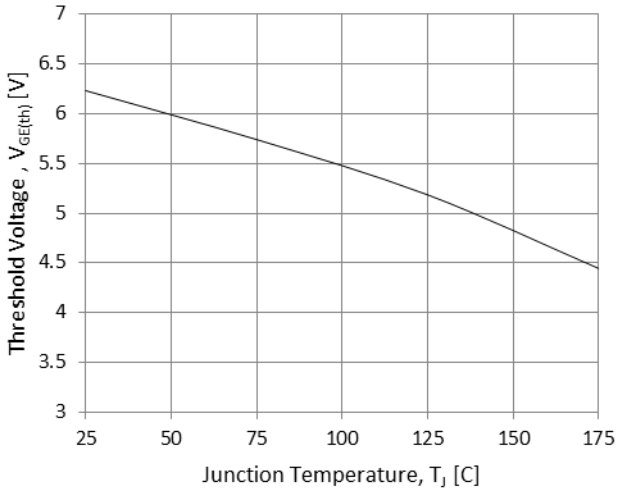


Fig.7 Threshold Voltage-Junction Temperature

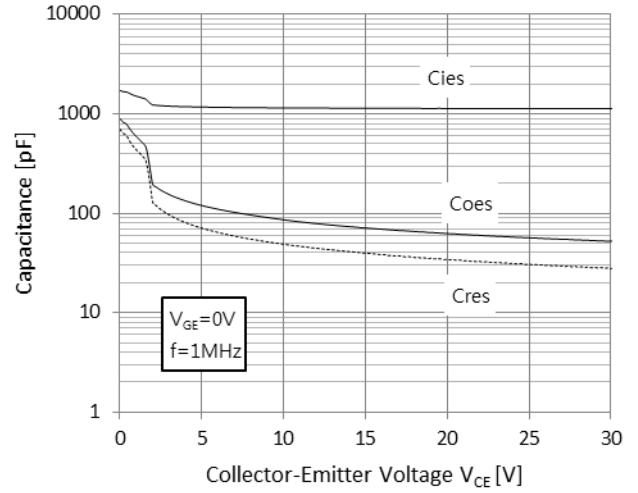


Fig.8 Typical Capacitance

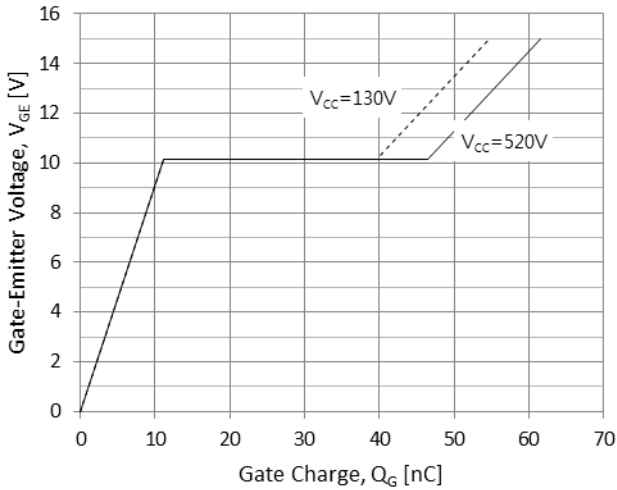


Fig.9 Typical Gate Charge

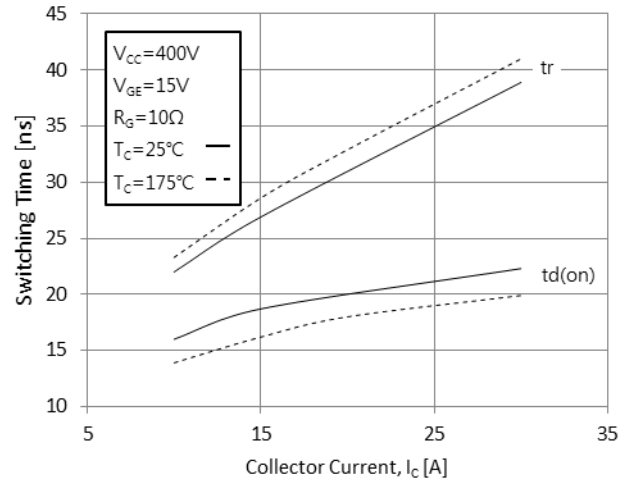


Fig.10 Typical Turn on-Collector Current

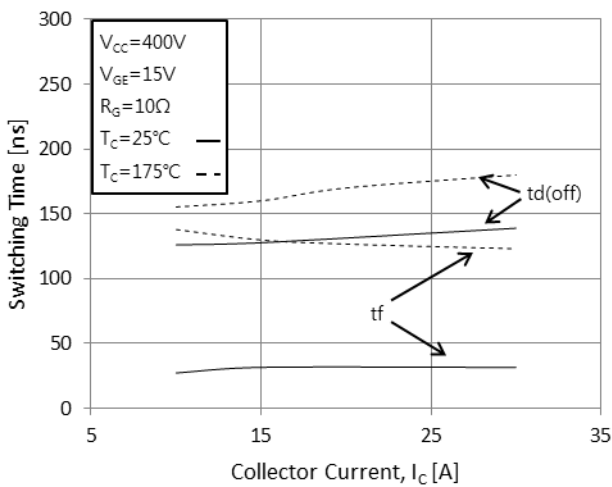


Fig.11 Typical Turn off-Collector Current

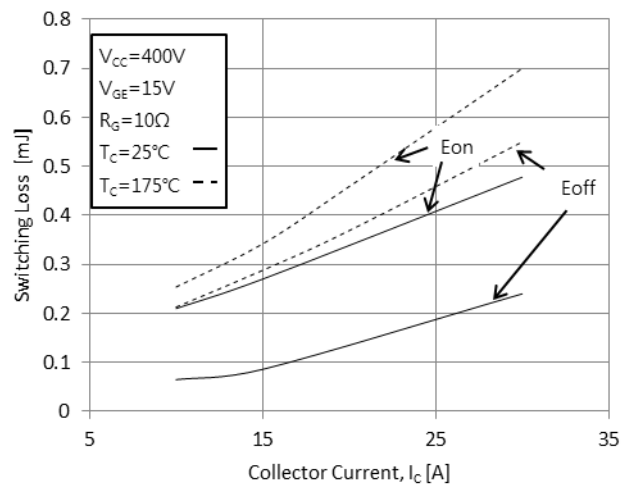


Fig.12 Switching Loss-Collector Current

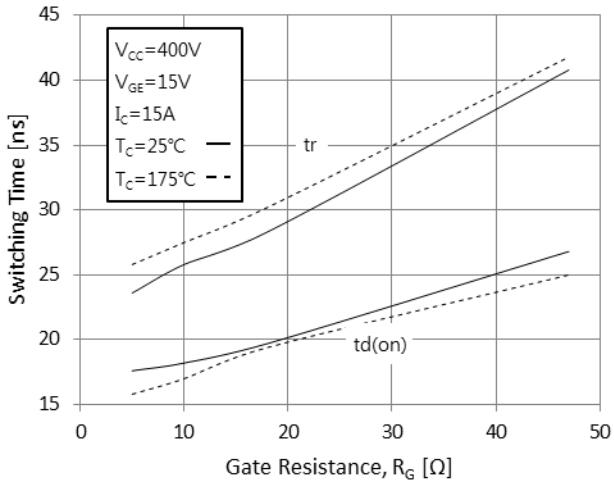


Fig.13 Turn on Characteristics-Gate Resistance

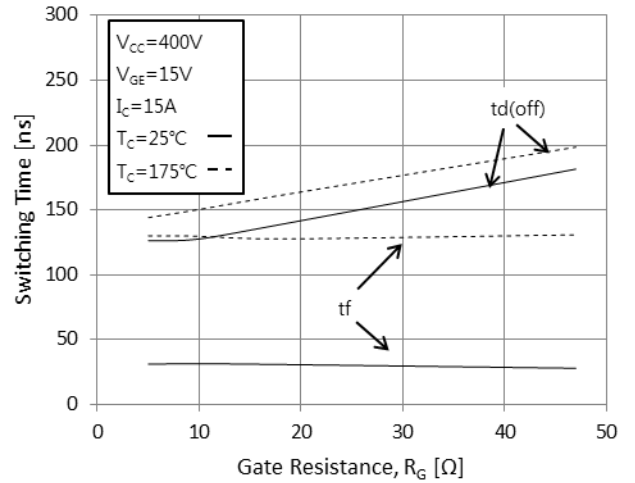


Fig.14 Turn off Characteristics-Gate Resistance

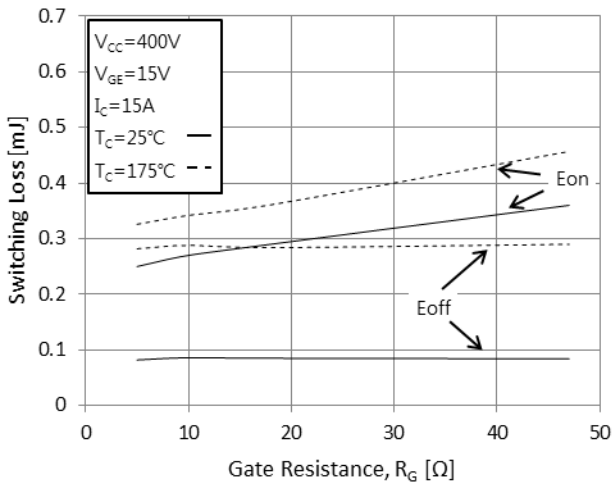


Fig.15 Switching Loss-Gate Resistance

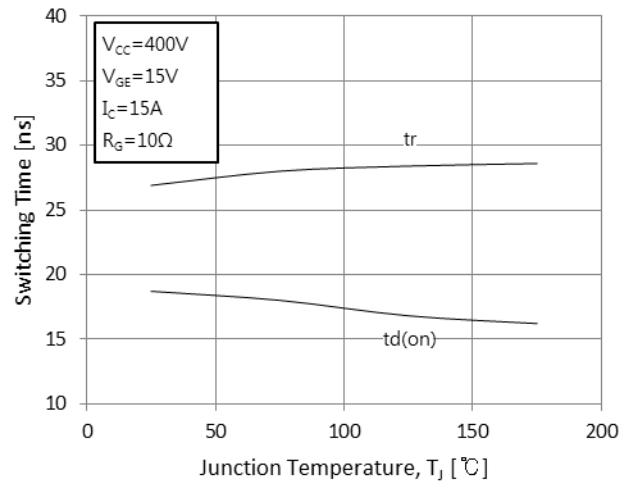


Fig.16 Turn on Characteristics-Junction Temperature

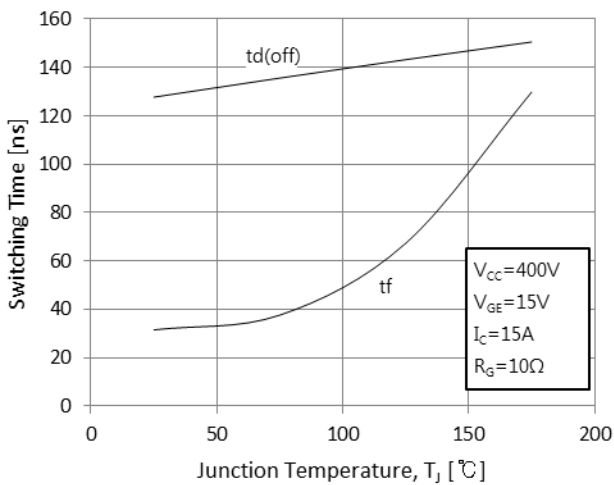


Fig.17 Turn off Characteristics-Junction Temperature

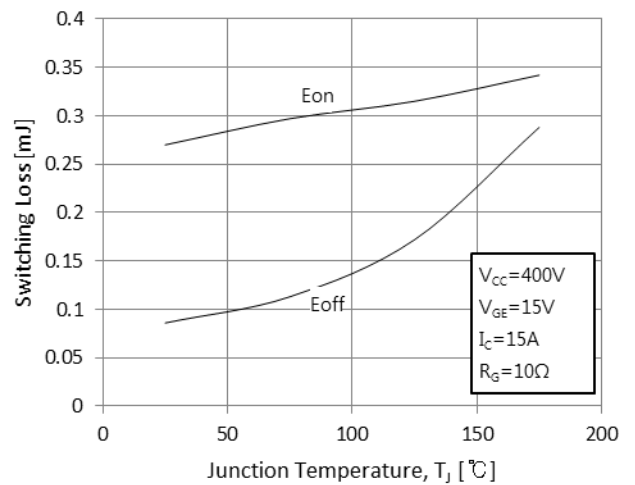


Fig.18 Switching Loss-Junction Temperature

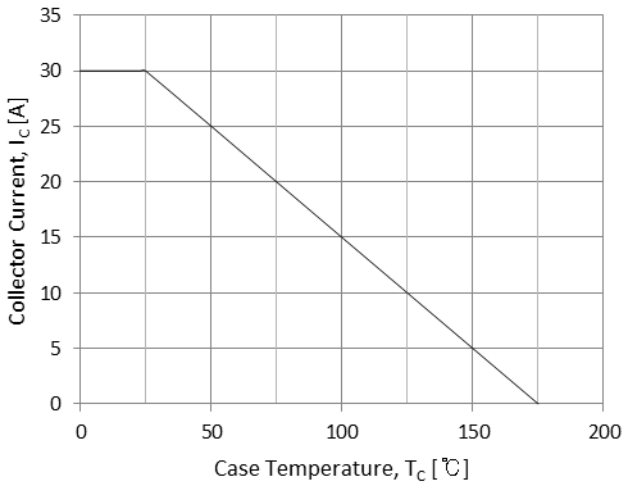


Fig.19 Case Temperature-Collector Current

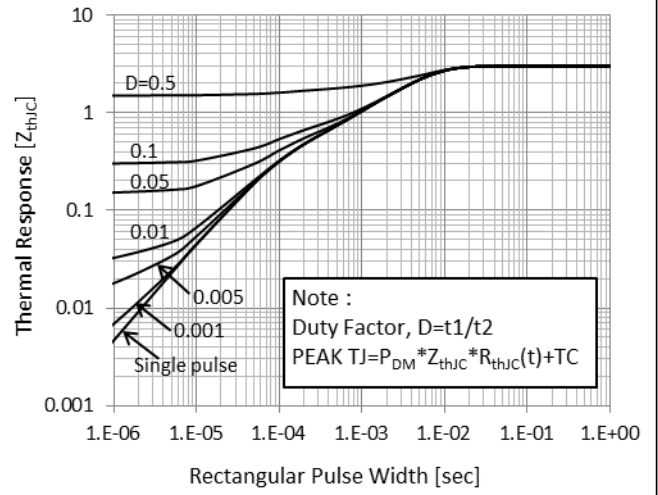


Fig.20 IGBT Transient Thermal Impedance

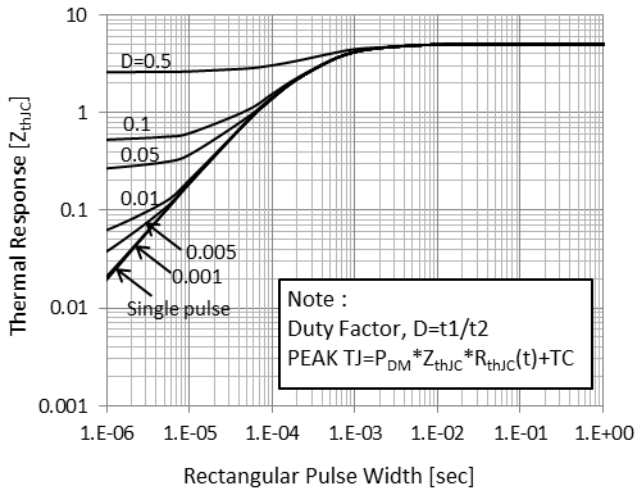



Fig.21 FRD Transient Thermal Impedance

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