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آترین الکترونیک

تخصص، تنوع و کیفیت

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General Description

This IGBT is produced using advanced MagnaChip's Field Stop Trench IGBT Technology, which provides low $V_{CE(SAT)}$, high switching performance and excellent quality.

This device is for PFC, UPS & Inverter applications.

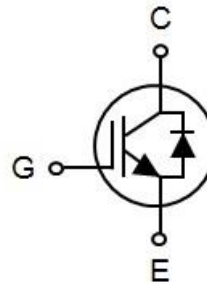
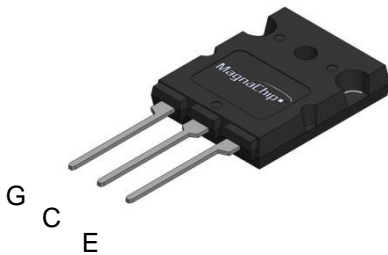
Applications

- PFC
- UPS
- Inverter

Features

- High Speed Switching & Low Power Loss
- $V_{CE(sat)} = 2.0V @ I_C = 40A$
- High Input Impedance
- $t_{rr} = 100ns$ (typ.)
- Ultra Soft, fast recovery anti-parallel diode
- Ultra narrowed VF distribution control
- Positive Temperature coefficient for easy paralleling

TO-247



Absolute Maximum Ratings

| Characteristics | | Symbol | Rating | Unit |
|---|---------------------|----------------|----------|------------|
| Collector-emitter voltage | | V_{CES} | 1200 | V |
| Gate-emitter voltage | | V_{GES} | ± 20 | V |
| Collector current | $T_C = 25^\circ C$ | I_C | 80 | A |
| | $T_C = 100^\circ C$ | | 40 | A |
| Pulsed collector current, pulse time limited by T_{jmax} | | I_{CM} | 160 | A |
| Diode forward current @ $T_C = 100^\circ C$ | | I_F | 40 | A |
| Diode pulsed current, Pulse time limited by T_{jmax} | | I_{FM} | 160 | A |
| Power dissipation | $T_C = 25^\circ C$ | P_D | 357 | W |
| | $T_C = 100^\circ C$ | | 142 | W |
| Short circuit withstand time $V_{CE} = 600V, V_{GE} = 15V, T_C = 150^\circ C$ Allowed number of short circuit < 1000 Time between short circuits $\geq 1.0s$ | | tsc | 10 | μs |
| Operating Junction and storage temperature range | | T_J, T_{stg} | -55~150 | $^\circ C$ |

Thermal Characteristics

| Characteristics | Symbol | Rating | Unit |
|---|-----------------|--------|--------------|
| Thermal resistance junction-to-ambient | $R_{\theta JA}$ | 40 | $^\circ C/W$ |
| Thermal resistance junction-to-case for IGBT | $R_{\theta JC}$ | 0.35 | |
| Thermal resistance junction-to-case for Diode | $R_{\theta JC}$ | 0.8 | |

Ordering Information

| Part Number | Marking | Temp. Range | Package | Packing | RoHS Status |
|----------------|-----------|-------------|---------|---------|-------------|
| MBQ40T120FESTH | 40T120FES | -55~150°C | TO-247 | Tube | Pb Free |

Electrical Characteristics (T_c =25°C unless otherwise specified)

| Characteristics | Symbol | Test Condition | Min | Typ | Max | Unit | |
|--|----------------------|--|------|------|------|------|----|
| Static Characteristics | | | | | | | |
| Collector-emitter breakdown voltage | BV _{CEs} | I _C = 1mA, V _{GE} = 0V | 1200 | - | - | V | |
| Gate-emitter threshold voltage | V _{GE(th)} | V _{CE} = V _{GE} , I _C = 1mA | 4.5 | 5.5 | 6.5 | V | |
| Zero gate voltage collector current | I _{CEs} | V _{CE} = 1200V, V _{GE} = 0V | - | - | 1 | mA | |
| Gate-emitter leakage current | I _{GES} | V _{GE} = 20V, V _{CE} = 0V | - | - | ±250 | nA | |
| Collector-emitter saturation voltage | V _{CE(sat)} | I _C = 40A, V _{GE} = 15V, T _C = 25°C | | 2.0 | 2.4 | V | |
| | | I _C = 40A, V _{GE} = 15V, T _C = 150°C | | 2.45 | | | |
| Dynamic and Switching Characteristics | | | | | | | |
| Total gate charge | Q _g | V _{CE} = 600V, I _C = 40A, V _{GE} = 15V | - | 341 | | nC | |
| Gate-emitter charge | Q _{ge} | | - | 52 | | | |
| Gate-collector charge | Q _{gc} | | - | 126 | | | |
| Input capacitance | C _{ies} | V _{CE} = 30V, V _{GE} = 0V, f = 1MHz | - | 6030 | - | pF | |
| Reverse transfer capacitance | C _{res} | | - | 107 | - | | |
| Output capacitance | C _{oes} | | - | 206 | - | | |
| Turn-on delay time | t _{d(on)} | V _{GE} = 15V, V _{CC} = 600V, I _C = 40A, R _G = 10Ω Inductive Load, T _C = 25°C | | 65 | | ns | |
| Rise time | t _r | | | 55 | | | |
| Turn-off delay time | t _{d(off)} | | | 308 | | | |
| Fall time | t _f | | | 40 | | | |
| Turn-on switching energy | E _{on} | | | 1.96 | | | mJ |
| Turn-off switching energy | E _{off} | | | 0.54 | | | |
| Total switching energy | E _{ts} | | 2.50 | | | | |
| Turn-on delay time | t _{d(on)} | V _{GE} = 15V, V _{CC} = 600V, I _C = 40A, R _G = 10Ω Inductive Load, T _C = 150°C | | 70 | | ns | |
| Rise time | t _r | | | 62 | | | |
| Turn-off delay time | t _{d(off)} | | | 325 | | | |
| Fall time | t _f | | | 62 | | | |
| Turn-on switching energy | E _{on} | | | 2.35 | | | mJ |
| Turn-off switching energy | E _{off} | | | 1.61 | | | |
| Total switching energy | E _{ts} | | 3.96 | | | | |

Diode Characteristics (T_c =25°C unless otherwise specified)

| | | | | | | |
|--------------------------|-----------------|--|---|------|-----|----|
| Forward voltage | V _F | I _F = 40A, T _C = 25°C | - | 2.4 | 3.0 | V |
| | | I _F = 40A, T _C = 150°C | - | 2.45 | | |
| Reverse recovery time | t _{rr} | I _F = 40A, di/dt = 200A/μs, T _C = 25°C | - | 100 | - | ns |
| Reverse recovery current | I _{rr} | | - | 7 | - | A |
| Reverse recovery charge | Q _{rr} | | - | 350 | - | nC |
| Reverse recovery time | t _{rr} | I _F = 40A, di/dt = 200A/μs, T _C = 150°C | - | 180 | - | ns |
| Reverse recovery current | I _{rr} | | - | 10 | - | A |
| Reverse recovery charge | Q _{rr} | | - | 900 | - | nC |

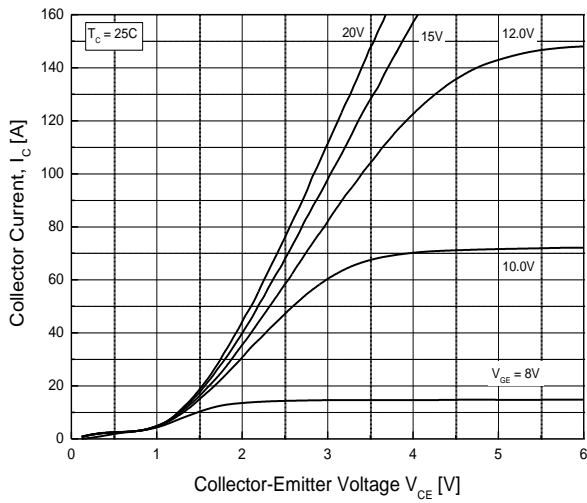


Fig.1 Typical Output Characteristics

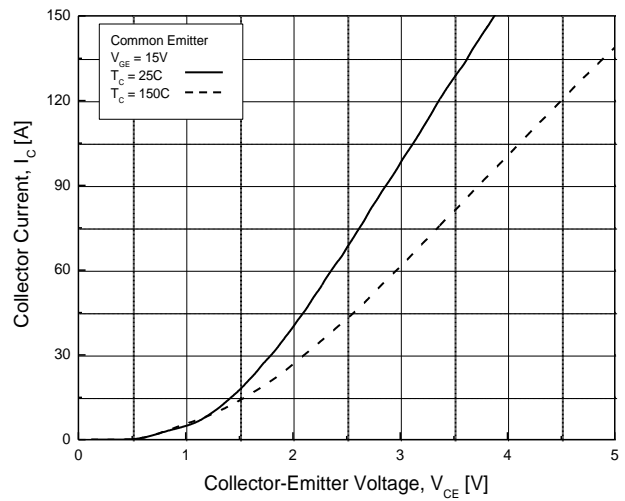


Fig.2 Typical Collector-Emitter Saturation Voltage

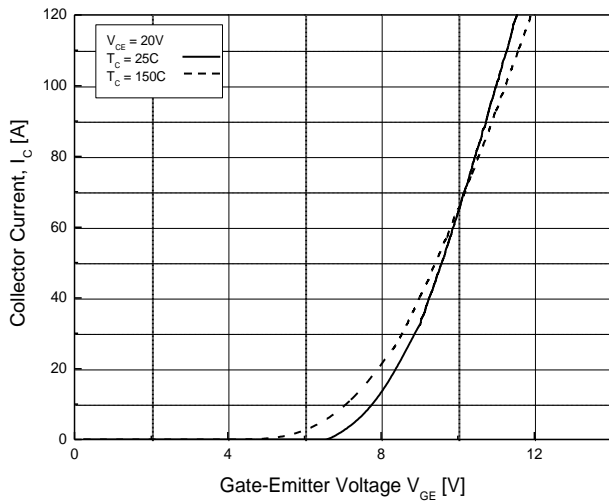


Fig.3 Typical Transfer Characteristics

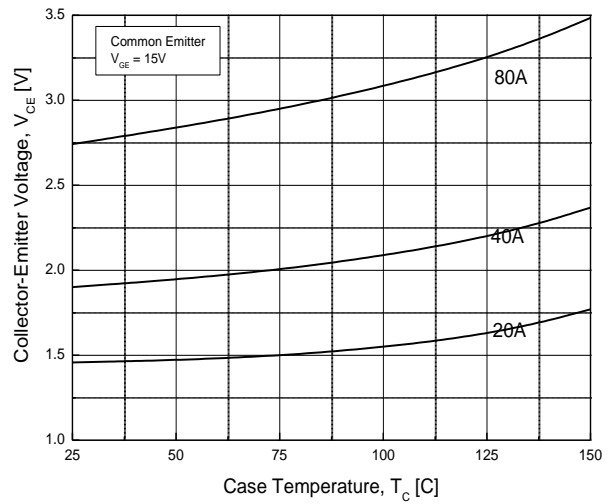


Fig.4 Typical Collector-Emitter Saturation Voltage at Case Temperature

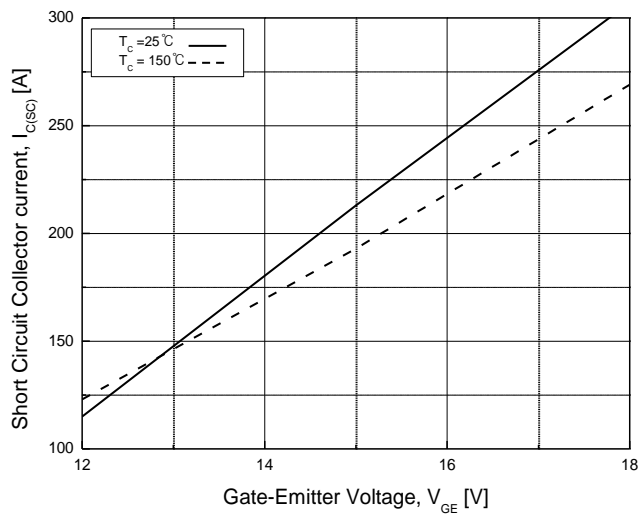


Fig.5 Typical Short Circuit Collector Current

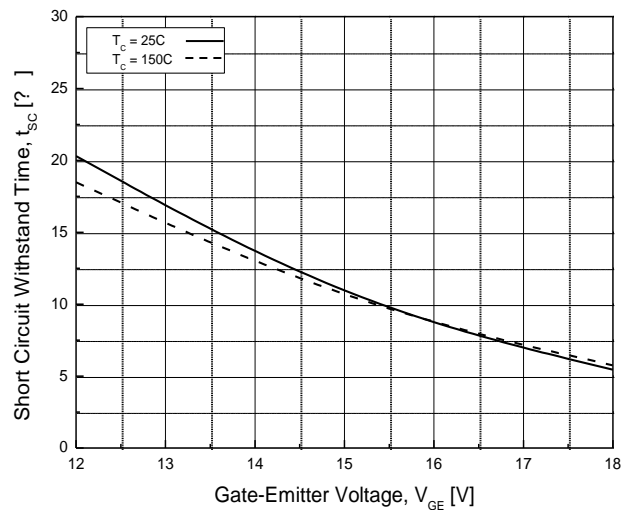


Fig.6 Typical Short Circuit Withstand Time

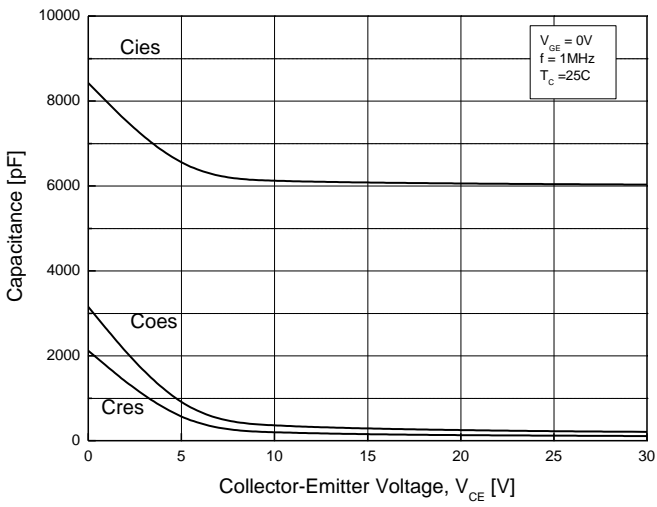


Fig.7 Typical Capacitance

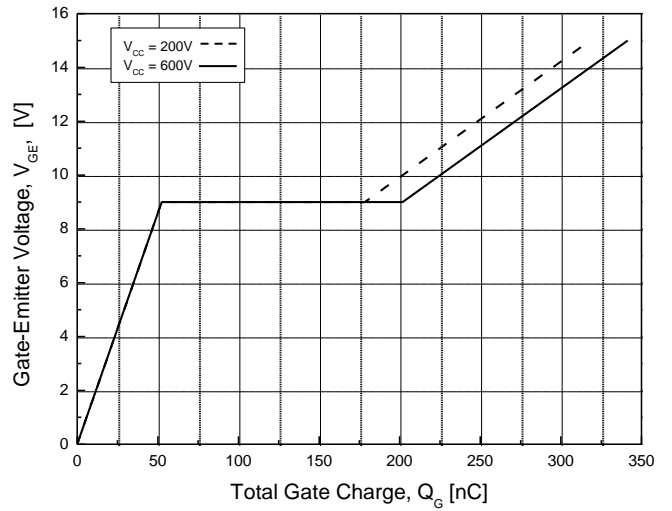


Fig.8 Typical Gate Charge

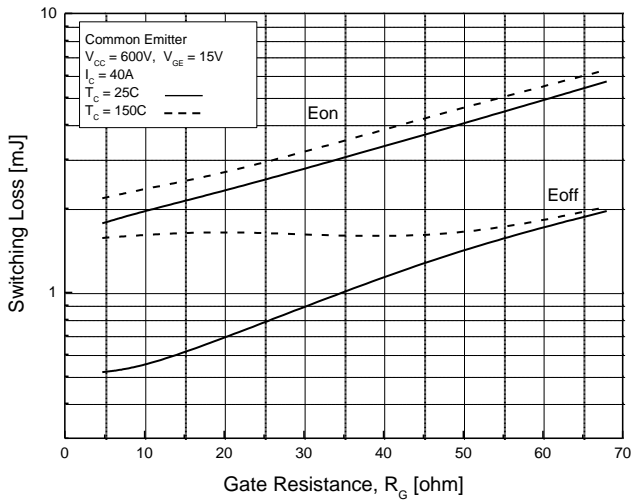


Fig.9 Switching Loss-Gate Resistance

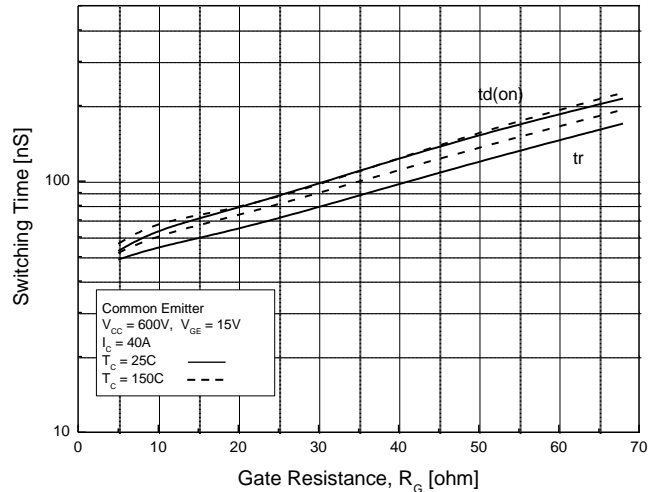


Fig.10 Turn on Characteristics-Gate Resistance

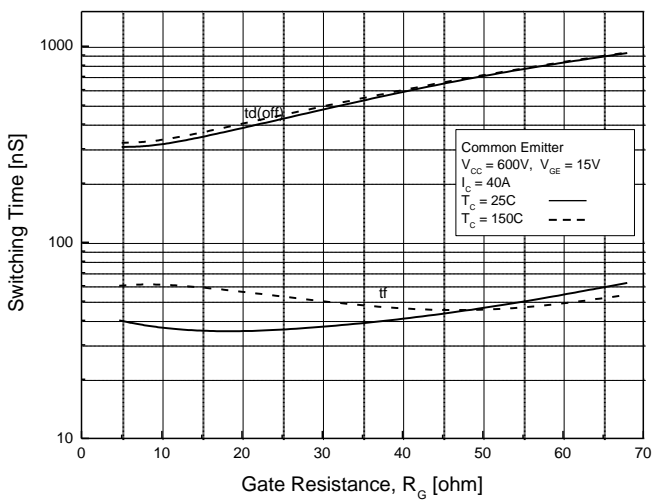


Fig.11 Turn off Characteristics-Gate Resistance

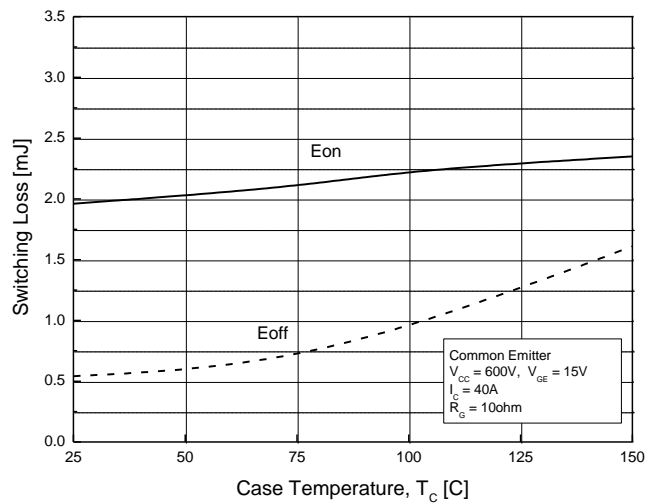


Fig.12 Switching Loss-Case Temperature

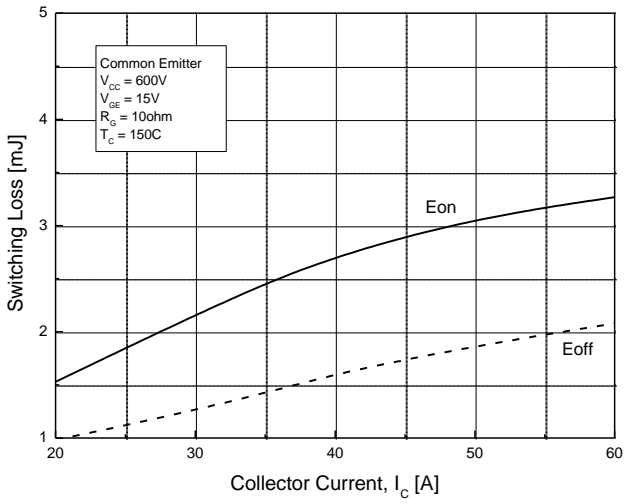


Fig.13 Switching Loss-Collector Current

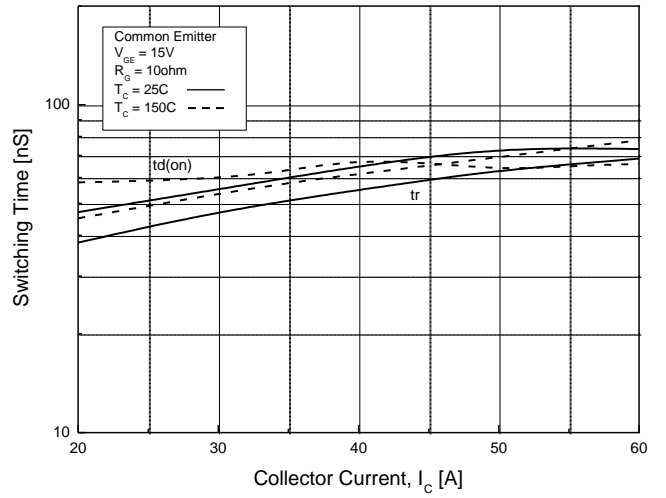


Fig.14 Typical Turn on-Collector Current

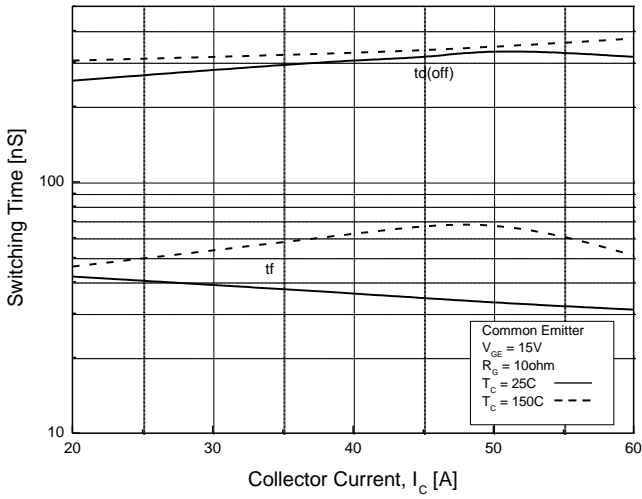


Fig.15 Typical Turn off-Collector Current

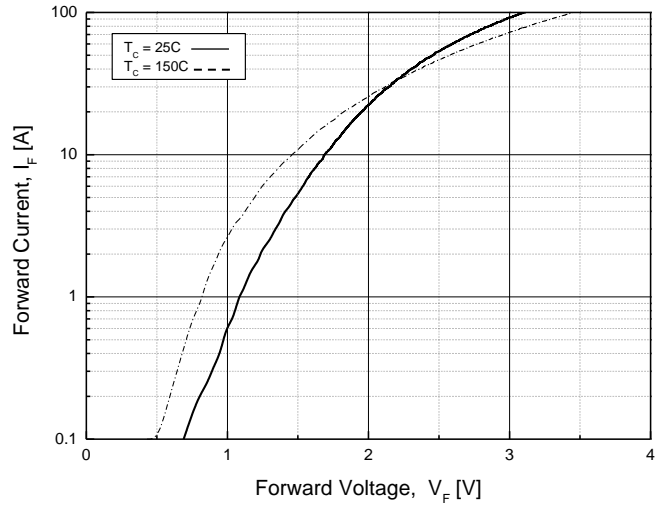


Fig.16 Diode Forward Characteristics

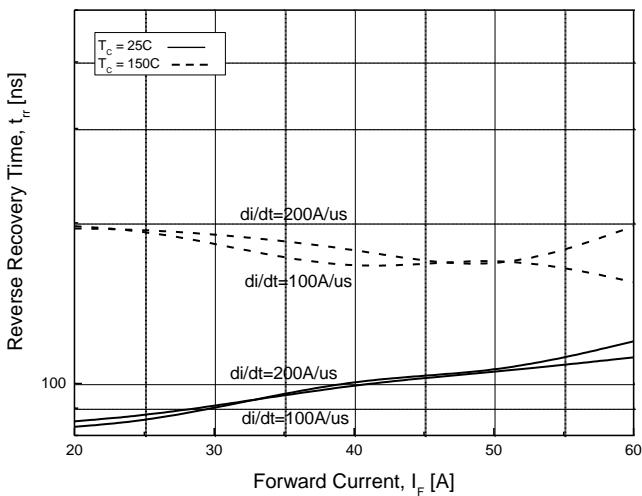


Fig.17 Typical Turn off-Collector Current

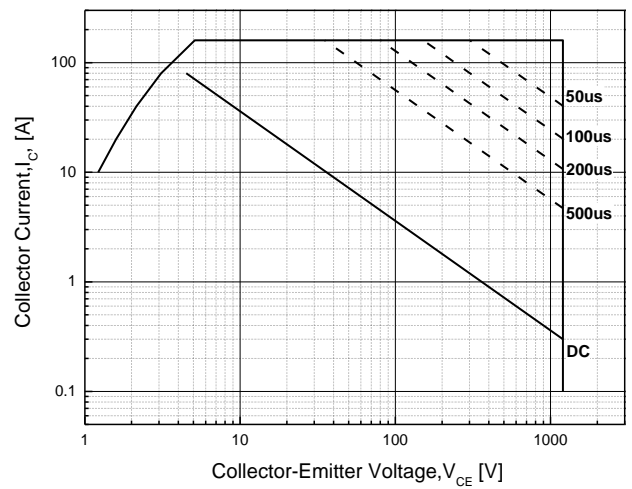


Fig.18 Forward Bias Safe Operating Area

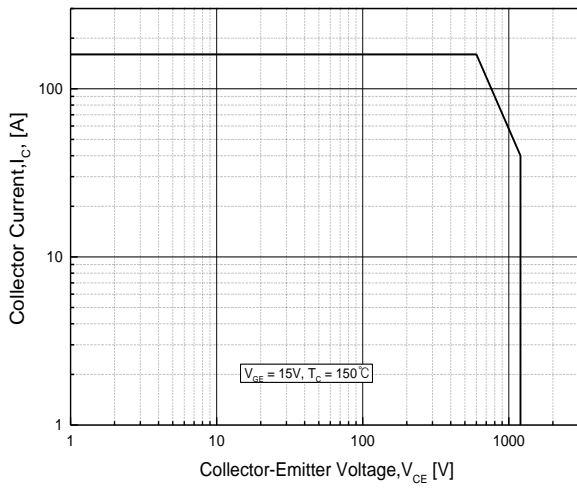


Fig.19 Reverse Bias Safe Operating Area

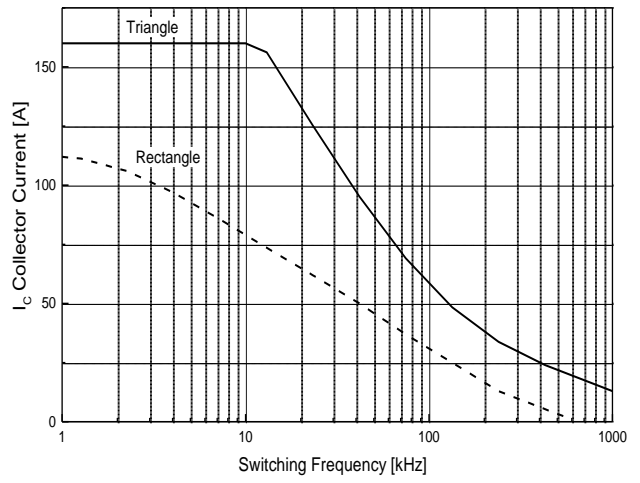


Fig.20 Switching frequency – Collector current

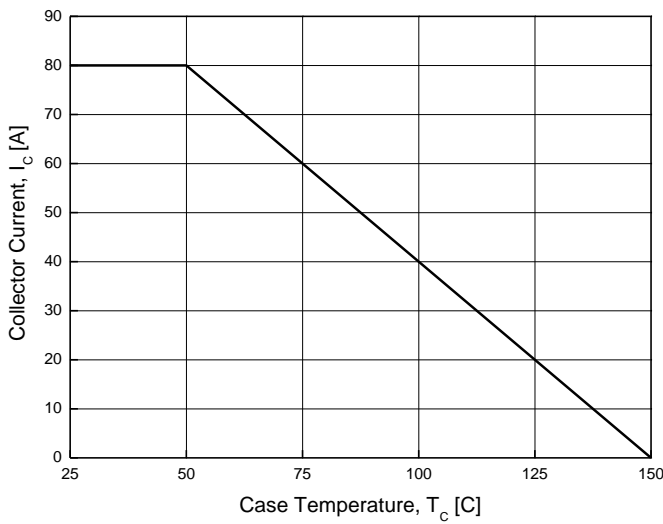


Fig.21 Case Temperature – Collector Current

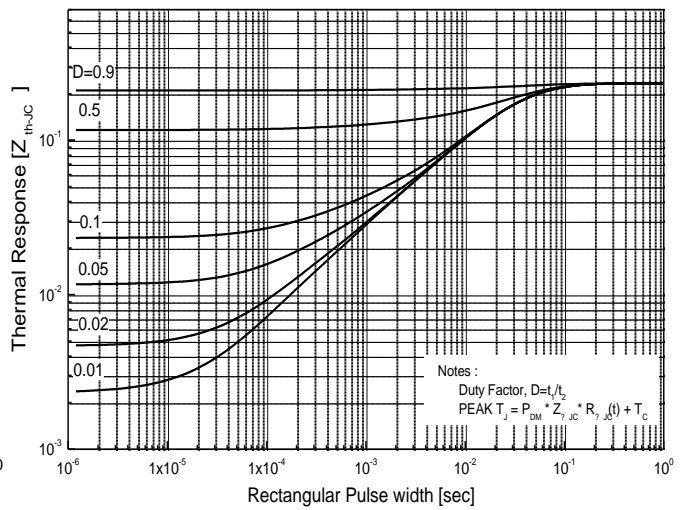
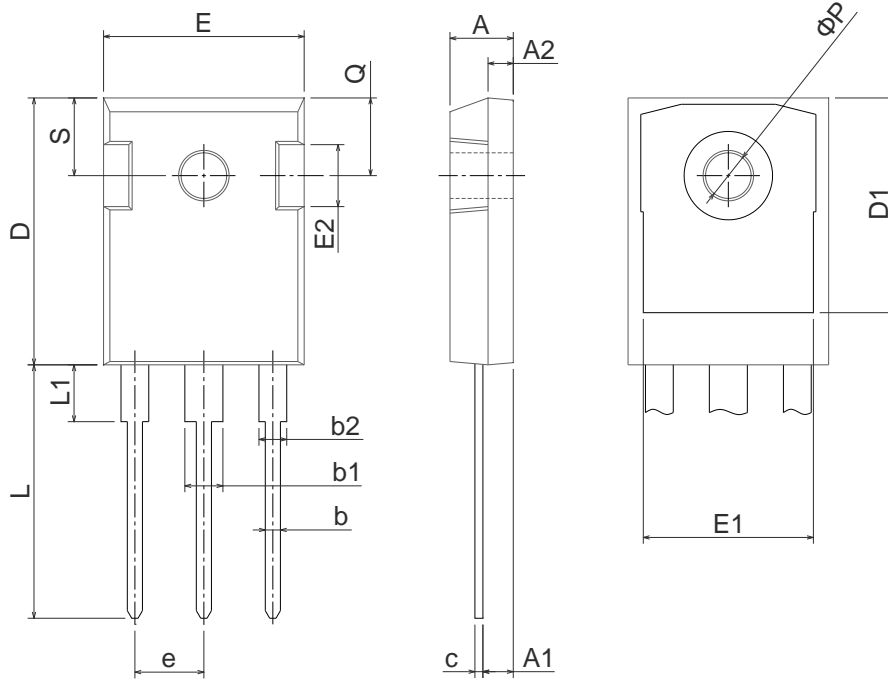


Fig.22 IGBT Transient Thermal Impedance

Physical Dimension

TO-247

Dimensions are in millimeters, unless otherwise specified



| Dimension | Min(mm) | Max(mm) |
|-----------|---------|---------|
| A | 4.70 | 5.31 |
| A1 | 2.20 | 2.60 |
| A2 | 1.50 | 2.49 |
| b | 0.99 | 1.40 |
| b1 | 2.59 | 3.43 |
| b2 | 1.65 | 2.39 |
| c | 0.38 | 0.89 |
| D | 20.30 | 21.46 |
| D1 | 13.08 | - |
| E | 15.45 | 16.26 |
| E1 | 13.06 | 14.02 |
| E2 | 4.32 | 5.49 |
| e | 5.45BSC | |
| L | 19.81 | 20.57 |
| L1 | - | 4.50 |
| ΦP | 3.50 | 3.70 |
| Q | 5.38 | 6.20 |
| S | 6.15BSC | |

DISCLAIMER:

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