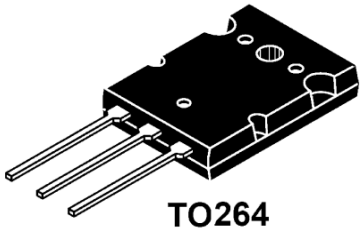
佳恩半导体
JIAENSEMI

# JNG50T120LIU2

## *IGBT*

## Features




- 1200V,50A
- $V_{CE(sat)(typ.)}$=2.2V@$V_{GE}$=15V,$I_C$=50A
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms
- Square RBSOA

## General Description

JIAEN Trench IGBTs offer lower losses and higher energy efficiency for application such as UPS, Induction converters, Uninterruptible power supplies and other soft switching applications.

## Absolute Maximum Ratings

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $V_{CES}$ | Collector-Emitter Voltage | 1200 | V |
| $V_{GES}$ | Gate-Emitter Voltage | ± 20 | V |
| $I_C$ | Continuous Collector Current ( $T_C$=25 ℃) | 100 | A |
| | Continuous Collector Current ( $T_C$=100℃) | 50 | A |
| $I_{CM}$ | Pulsed Collector Current (Note 1) | 150 | A |
| $I_F$ | Diode Continuous Forward Current ( $T_C$=100 ℃) | 50 | A |
| $I_{FM}$ | Diode Maximum Forward Current (Note 1) | 150 | A |
| $t_{sc}$ | Short Circuit Withstand Time | 10 | us |
| $P_D$ | Maximum Power Dissipation ( $T_C$=25 ℃) | 329 | W |
| | Maximum Power Dissipation ( $T_C$=100℃) | 131 | W |
| $T_J$ | Operating Junction Temperature Range | -40 to +150 | ℃ |
| $T_{STG}$ | Storage Temperature Range | -40 to +150 | ℃ |

## Thermal Characteristics

| Symbol | Parameter | Max. | Units |
|---|---|---|---|
| $R_{th\ j\text{-}c}$ | Thermal Resistance, Junction to case for IGBT | 0.38 | ℃/ W |
| $R_{th\ j\text{-}c}$ | Thermal Resistance, Junction to case for Diode | 0.5 | ℃/ W |
| $R_{th\ j\text{-}a}$ | Thermal Resistance, Junction to Ambient | 25 | ℃/ W |

## Electrical Characteristics ( $T_C$=25℃ unless otherwise noted )

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $BV_{CES}$ | Collector-Emitter Breakdown Voltage | $V_{GE}$= 0V, $I_C$= 250uA | 1200 | - | - | V |
| $I_{CES}$ | Collector-Emitter Leakage Current | $V_{CE}$= 1200V, $V_{GE}$= 0V | - | - | 100 | uA |
| $I_{GES}$ | Gate Leakage Current, Forward | $V_{GE}$= ± 20V, $V_{CE}$= 0V | - | - | ± 100 | nA |
| $V_{GE(th)}$ | Gate Threshold Voltage | $V_{GE}$= $V_{CE}$, $I_C$= 250uA | 4.5 | - | 6.5 | V |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $V_{GE}$=15V, $I_C$= 50A | - | 2.2 | - | V |
| $Q_g$ | Total Gate Charge | $V_{CC}$=960V<br>$V_{GE}$=15V<br>IC=50A | - | 261 | - | nC |
| $Q_{ge}$ | Gate-Emitter Charge | | - | 65.1 | - | nC |
| $Q_{gc}$ | Gate-Collector Charge | | - | 120 | - | nC |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{CC}$=600V<br>$V_{GE}$=15V<br>$I_C$=50A<br>$R_G$=15Ω<br>Inductive Load<br>$T_C$=25 ℃ | - | 94 | - | ns |
| $t_r$ | Turn-on Rise Time | | - | 128 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 332 | - | ns |
| $t_f$ | Turn-off Fall Time | | - | 72 | - | ns |
| Eon | Turn-on Switching Loss | | - | 5.7 | - | mJ |
| Eoff | Turn-off Switching Loss | | - | 1.8 | - | mJ |
| Ets | Total Switching Loss | | - | 7.5 | - | mJ |
| $C_{ies}$ | Input Capacitance | $V_{CE}$=25V<br>$V_{GE}$=0V<br>f = 100KHz | - | 7433 | - | pF |
| $C_{oes}$ | Output Capacitance | | - | 213 | - | pF |
| $C_{res}$ | Reverse Transfer Capacitance | | - | 47 | - | pF |

## Electrical Characteristics of Diode ( $T_C$=25℃ unless otherwise noted )

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $V_F$ | Diode Forward Voltage | $I_F$=50A | - | 2.0 | 3.5 | V |
| $t_{rr}$ | Diode Reverse Recovery Time | $V_{CE}$ = 600V<br>$I_F$= 50A<br>diF/dt = 300A/us | - | 900 | - | ns |
| $I_{rr}$ | Diode peak Reverse Recovery Current | | - | 19 | - | A |
| $Q_{rr}$ | Diode Reverse Recovery Charge | | - | 5406 | - | nC |

**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature

## Typical Performance Characteristics

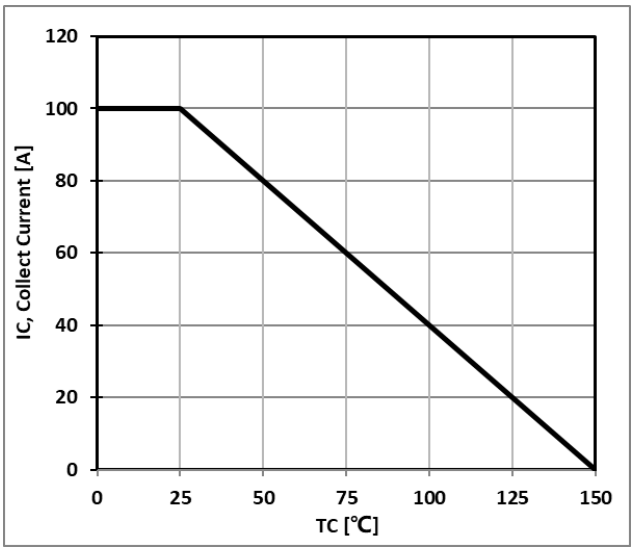



Figure 1: Maximum DC Collector Current VS. case temprature

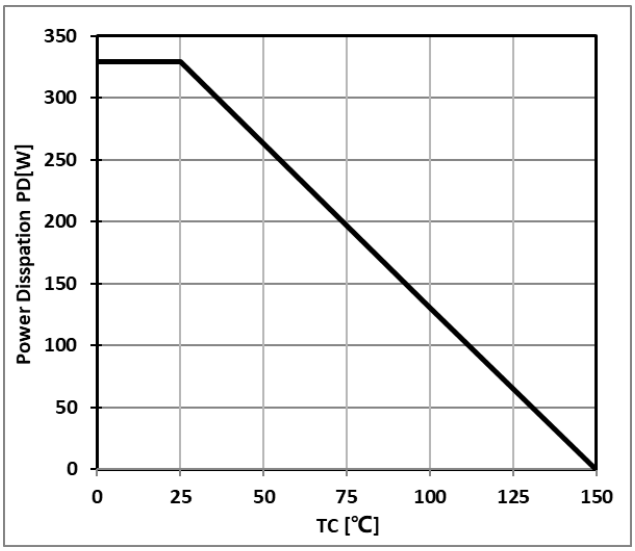



Figure 2: Power Dissipation VS. Case Temperature

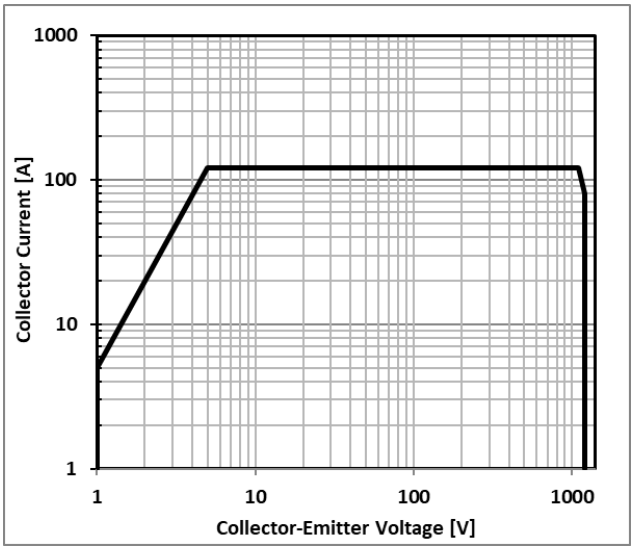



Figure 3: Reverse Bias SOA,TJ=125℃,VGE=15V

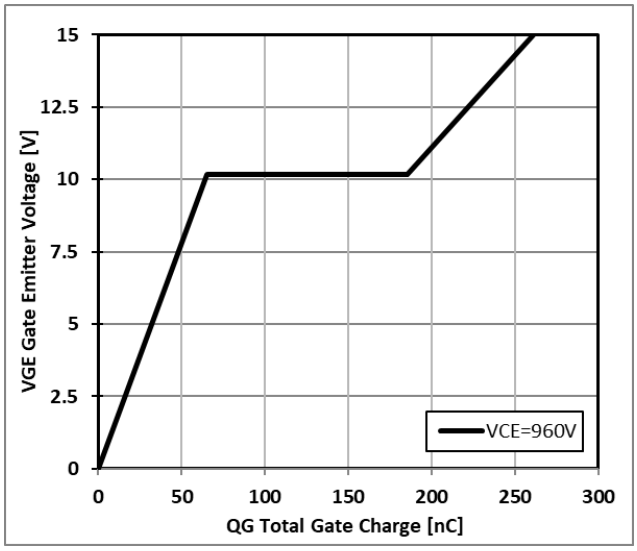



Figure 4: Typical Gate charge VS. VGE,IC=50A

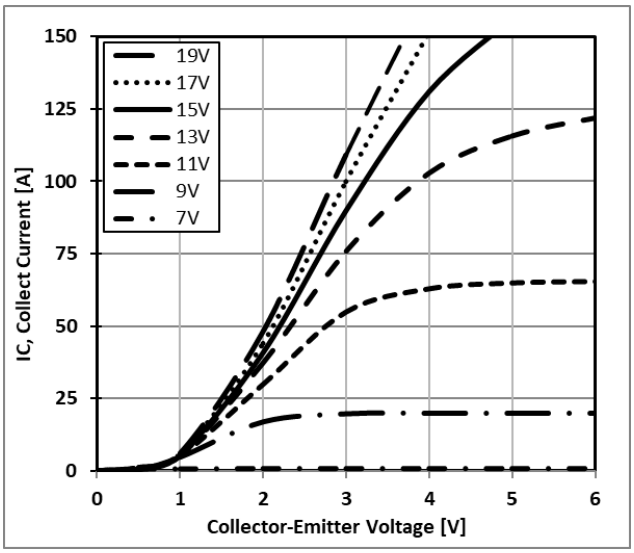



Figure 5: Typical IGBT Output characteristics, TC=25℃;tp=300us

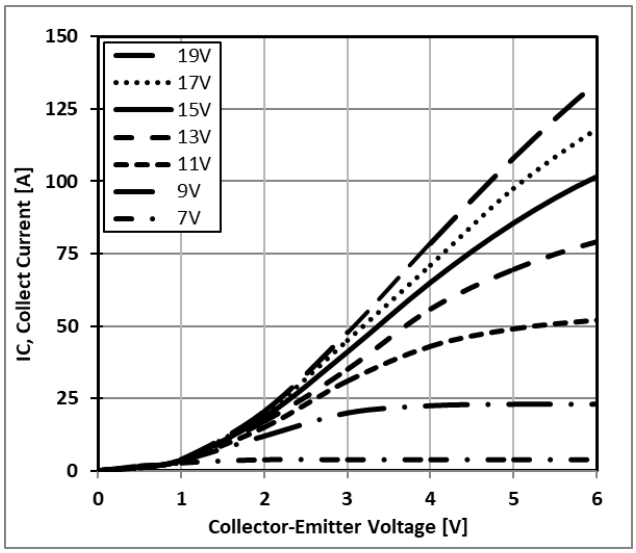



Figure 6: Typical IGBT Output characteristics, TC=150℃;tp=300us

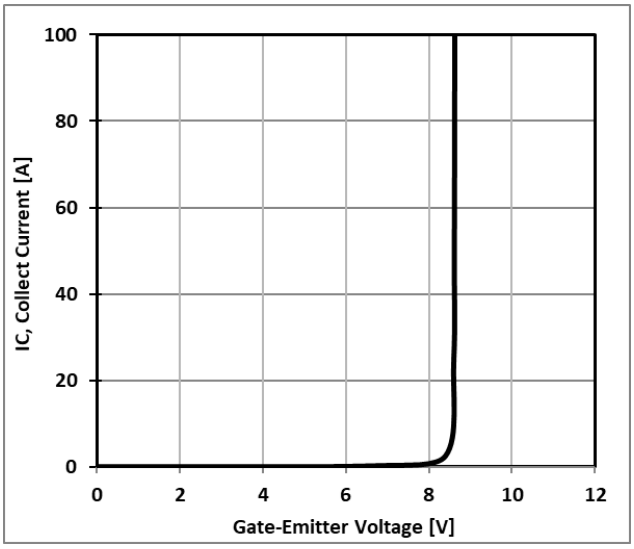



Figure 7: Typical Gate Threshold Voltage

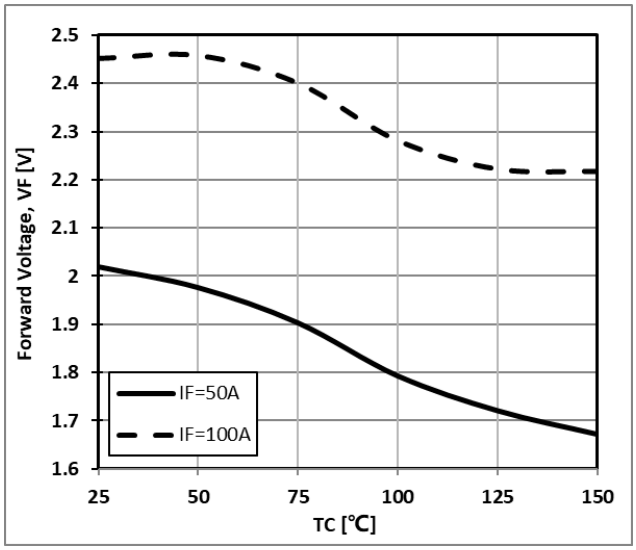



Figure 8: Typical Forward Voltage vs IF

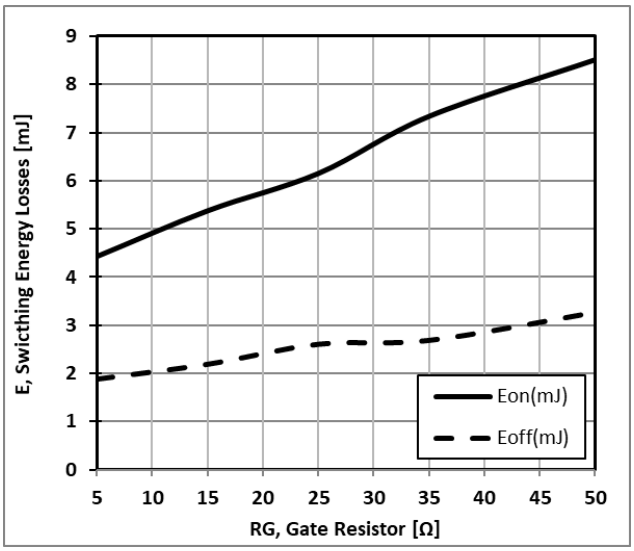



Figure 9: Typical Energy Loss VS. RG, TC=25℃, L=200uH,VCE=600V,VGE=15V,IC=50A

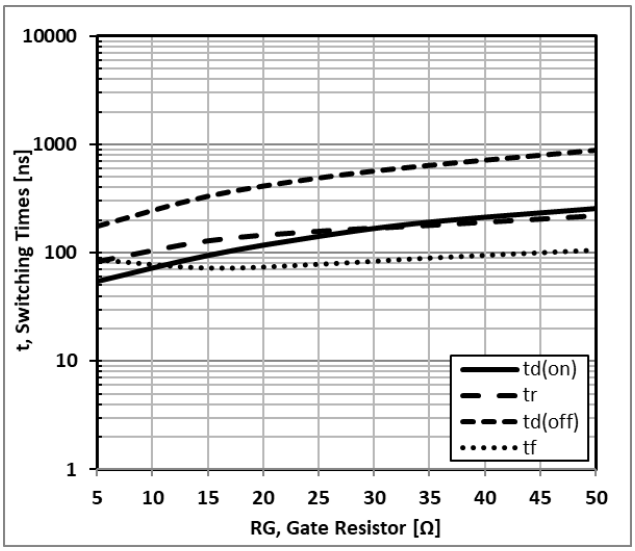



Figure 10: Typical Switching Time VS. RG, TC=25℃, L=200uH,VCE=600V,VGE=15V,IC=50A

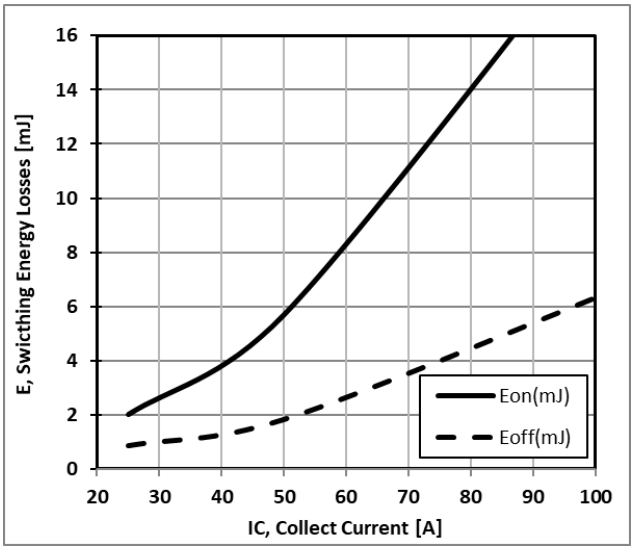



Figure 11: Typical Energy Loss VS. IC,TC=25℃, L=200uH, VCE=600V, VGE=15V,RG=15Ω

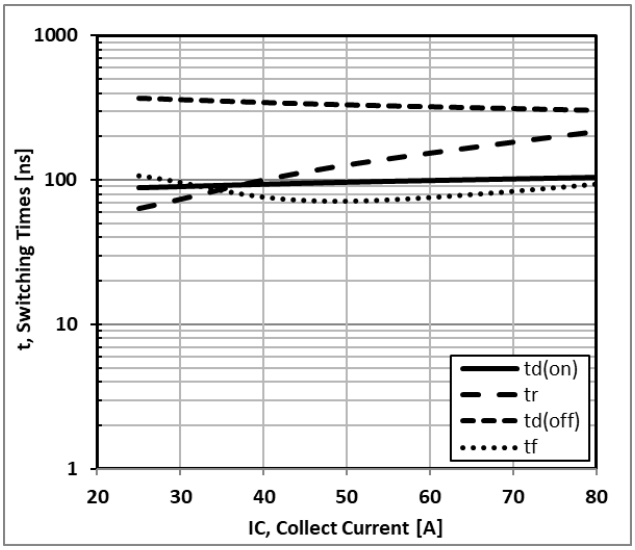



Figure 12: Typical Switching Time VS. IC,TC=25℃, L=200uH,VCE=600V,VGE=15V,RG=15Ω

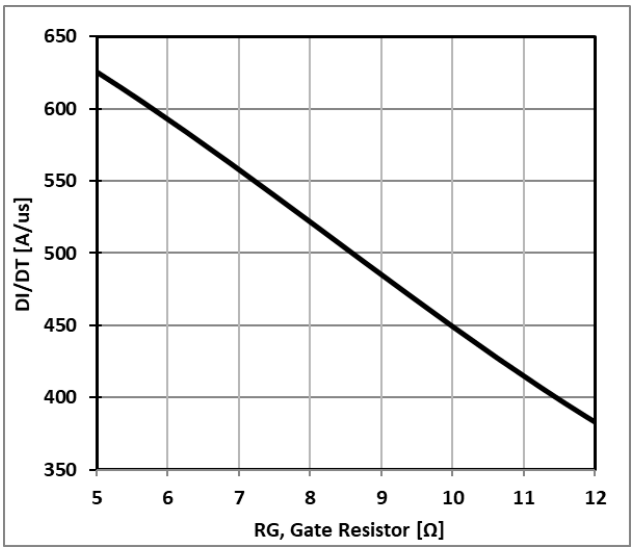



Figure 13: Typical Diode DI/DT VS. RG,TC=25℃

VCC=600V, VGE=15V, IF=50A

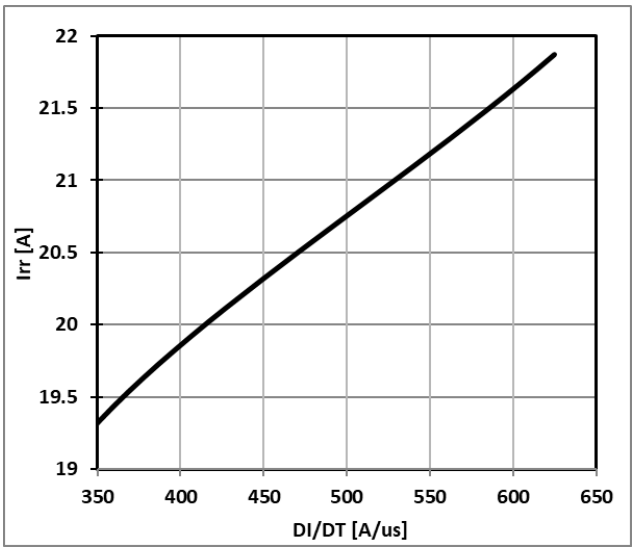



Figure 14: Typical Diode IRR VS. DI/DT,TC=25℃

VCC=600V,VGE=15V, IF=50A

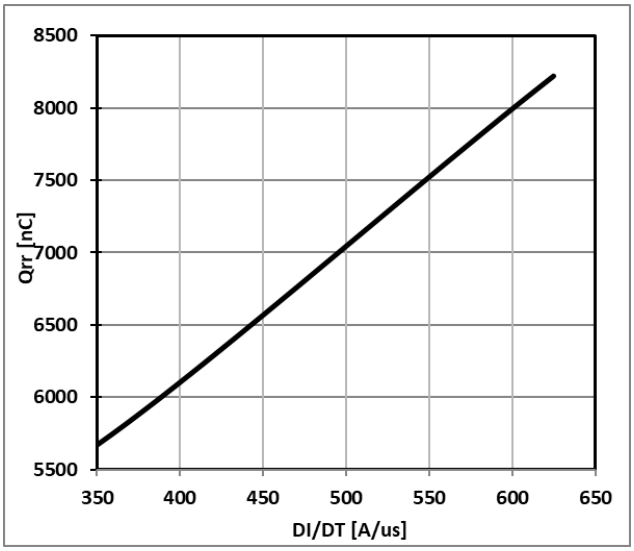



Figure 15: Typical Diode Qrr VS. DI/DT,TC=25℃

VCC=600V, VGE=15V, IF=50A

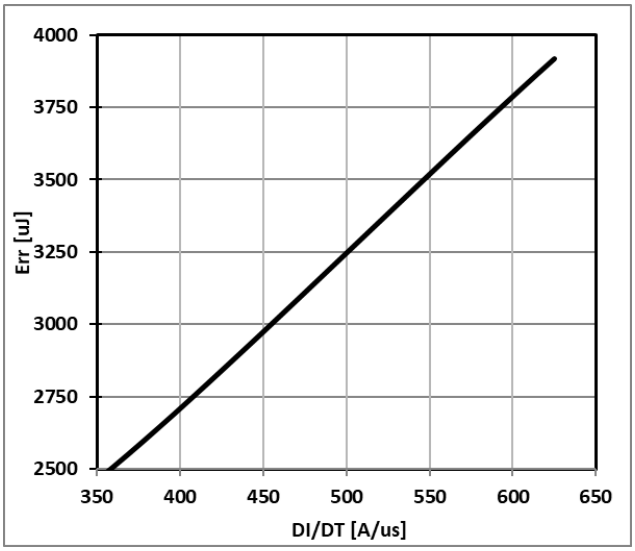



Figure 16: Typical Diode Err VS. DI/DT,TC=25℃

VCC=600V, VGE=15V, IF=50A

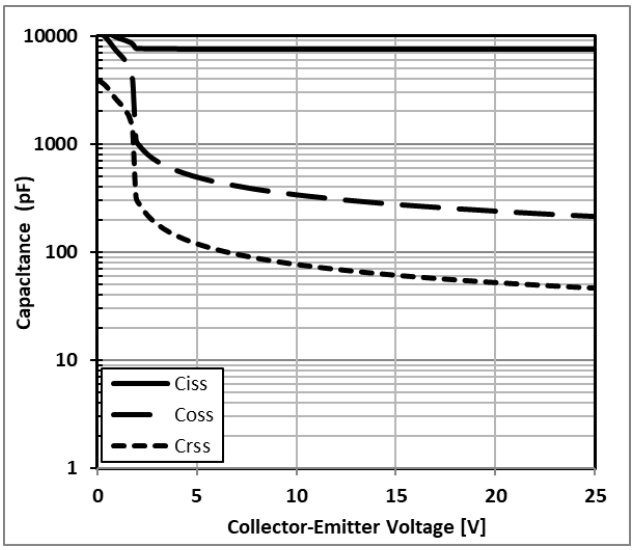



Figure 17: Typical Capacitance VS. VCE, VGE=0V,f=100KHz

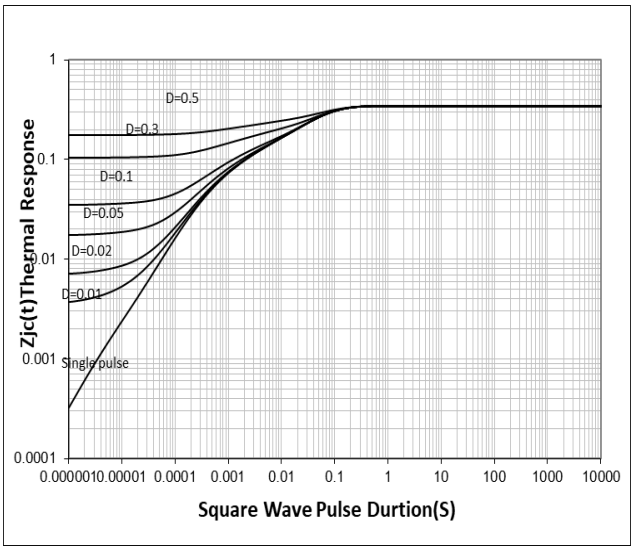
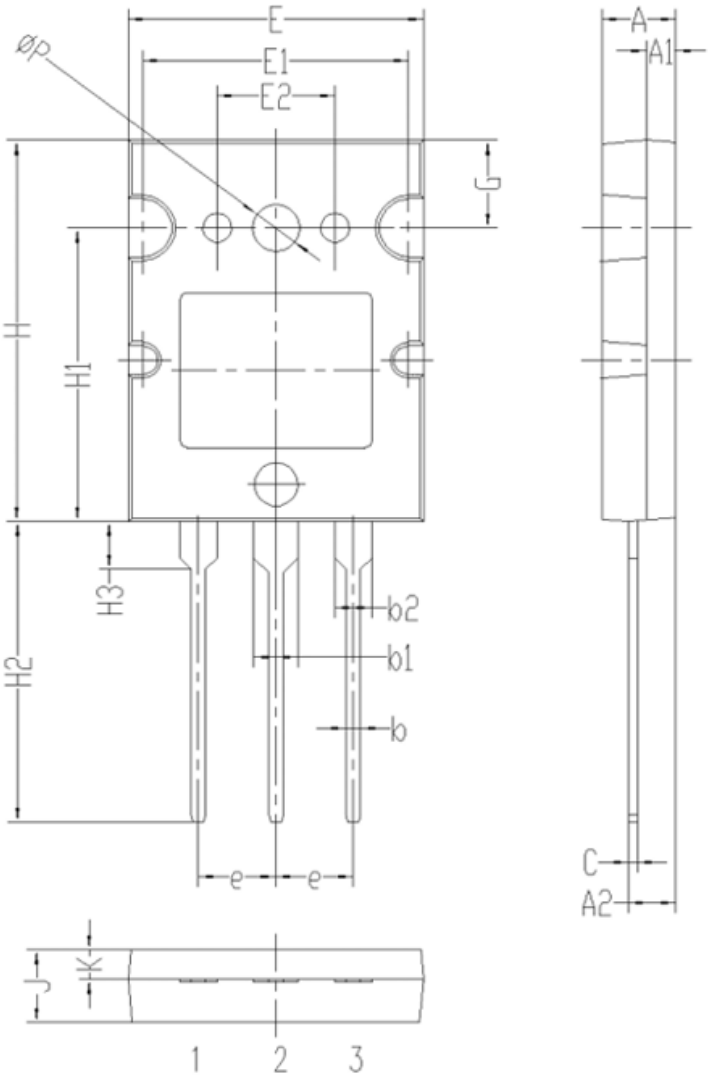



Figure 18: Normalized transient thermal impedance junction-to-case

## TO-264 PACKAGE OUTLINE




| | 单位: mm | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | 4.8 | 5 | 5.2 |
| A1 | 1.8 | 2 | 2.2 |
| A2 | 3 | 3.2 | 3.4 |
| b | 0.8 | 1 | 1.2 |
| b1 | 2.8 | 3 | 3.2 |
| b2 | 2.3 | 2.5 | 2.7 |
| c | 0.4 | 0.6 | 0.8 |
| e | 5.25 | 5.45 | 5.65 |
| E | 19.8 | 20 | 20.2 |
| E1 | 17.8 | 18 | 18.2 |
| E2 | 7.8 | 8 | 8.2 |
| H | 25.8 | 26 | 26.2 |
| H1 | 19.8 | 20 | 20.2 |
| H2 | 20 | 20.5 | 21 |
| H3 | 3.05 | 3.25 | 3.45 |
| G | 5.8 | 6 | 6.2 |
| ØP | 3.1 | 3.3 | 3.5 |
| J | 4.8 | 5 | 5.2 |
| K | 1.8 | 2 | 2.2 |

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