

Description

The DGTD65T40S2PT is produced using advanced Field Stop Trench IGBT Technology, which provides excellent quality and high switching performance.

Features

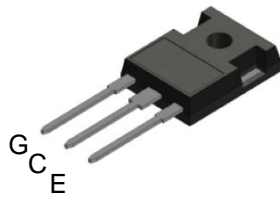
- High Speed Switching & Low Power Loss
- $V_{CE(SAT)} = 1.8V @ I_C = 40A$
- $t_{RR} = 60ns$ (Typ) @ $di_F/dt = 820A/\mu s$
- $E_{OFF} = 0.4mJ @ T_C = +25^\circ C$
- Maximum Junction Temperature $+175^\circ C$
- **Lead-Free Finish & RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Applications

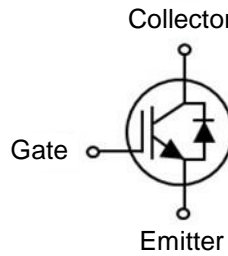
- UPS
- Welder
- Solar Inverter
- IH Cooker

Mechanical Data

- Case: TO247 (Type MC)
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Terminals: Finish – Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208
- Weight: 5.6 grams (Approximate)



TO247 (Type MC)



Device Symbol

Ordering Information (Note 4)

| Part Number | Marking | Quantity |
|---------------|-------------|-------------------------------|
| DGTD65T40S2PT | DGTD65T40S2 | 450 per Box in Tubes (Note 5) |

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
 2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.
 5. 30 Devices per Tube.

Marking Information



- ⤵|| = Manufacturer's Marking
- DGTD65T40S2 = Product Type Marking Code
- YY = Year (ex: 18 = 2018)
- LLLLL = Lot Code
- WW = Week (01 to 53)

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|--------------------|-------------------------|------|
| Collector-Emitter Voltage | V _{CE} | 650 | V |
| DC Collector Current, Limited by T _{Jmax} | I _C | T _C = +25°C | 80 |
| | | T _C = +100°C | 40 |
| Pulsed Collector Current, t _p Limited by T _{Jmax} | I _{Cpuls} | 120 | A |
| Diode Forward Current Limited by T _{Jmax} | I _F | T _C = +25°C | 40 |
| | | T _C = +100°C | 20 |
| Diode Pulsed Current, t _p Limited by T _{Jmax} | I _{Fpuls} | 120 | A |
| Gate-Emitter Voltage | V _{GE} | ±20 | V |

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|------------------|-------------------------|------|
| Power Dissipation Linear Derating Factor (Note 6) | P _D | T _C = +25°C | 230 |
| | | T _C = +100°C | 115 |
| Thermal Resistance, Junction to Ambient (Note 6) | R _{θJA} | 40 | °C/W |
| Thermal Resistance, Junction to Case for IGBT (Note 6) | R _{θJC} | 0.65 | |
| Thermal Resistance, Junction to Case for Diode (Note 6) | R _{θJC} | 1.75 | |
| Operating Temperature | T _J | -40 to +175 | °C |
| Storage Temperature Range | T _{STG} | -55 to +150 | |

Note: 6. When mounted on a standard JEDEC 2-layer FR-4 board.

Electrical Characteristics (@T_J = +25°C, unless otherwise specified.)

| Parameter | Symbol | Min | Typ | Max | Unit | Condition | |
|--------------------------------------|----------------------|-------------------------|------|------|------|---|---|
| STATIC CHARACTERISTICS | | | | | | | |
| Collector-Emitter Breakdown Voltage | BV _{CES} | 650 | — | — | V | I _C = 2mA, V _{GE} = 0V | |
| Collector-Emitter Saturation Voltage | V _{CE(SAT)} | T _J = +25°C | — | 1.8 | 2.30 | V | I _C = 40A, V _{GE} = 15V |
| | | T _J = +175°C | — | 2.30 | — | | |
| Diode Forward Voltage | V _F | T _J = +25°C | — | 1.50 | 1.95 | V | V _{GE} = 0V, I _F = 20A |
| | | T _J = +175°C | — | 1.50 | — | | |
| Gate-Emitter Threshold Voltage | V _{GE(TH)} | 3.5 | 5.0 | 6.5 | V | V _{CE} = V _{GE} , I _C = 40mA | |
| Zero Gate Voltage Collector Current | I _{CES} | — | — | 40 | μA | V _{CE} = 650V, V _{GE} = 0V | |
| Gate-Emitter Leakage Current | I _{GES} | — | — | ±100 | nA | V _{GE} = 20V, V _{CE} = 0V | |
| DYNAMIC CHARACTERISTICS | | | | | | | |
| Total Gate Charge | Q _g | — | 60 | — | nC | V _{CE} = 520V, I _C = 40A, V _{GE} = 15V | |
| Gate-Emitter Charge | Q _{ge} | — | 13 | — | | | |
| Gate-Collector Charge | Q _{gc} | — | 25 | — | | | |
| Input Capacitance | C _{ies} | — | 1565 | — | pF | V _{CE} = 25V, V _{GE} = 0V, f = 1MHz | |
| Reverse Transfer Capacitance | C _{res} | — | 37 | — | | | |
| Output Capacitance | C _{oes} | — | 120 | — | | | |
| SWITCHING CHARACTERISTICS | | | | | | | |
| Turn-on Delay Time | t _{D(ON)} | — | 6 | — | ns | V _{GE} = 15V, V _{CC} = 400V, I _C = 40A, R _G = 10Ω, Inductive Load, T _{VJ} = +25°C | |
| Rise Time | t _r | — | 36 | — | | | |
| Turn-off Delay Time | t _{D(OFF)} | — | 55 | — | | | |
| Fall Time | t _f | — | 64 | — | mJ | | |
| Turn-on Switching Energy | E _{ON} | — | 0.5 | — | | | |
| Turn-off Switching Energy | E _{OFF} | — | 0.4 | — | | | |
| Total Switching Energy | E _{TS} | — | 0.9 | — | ns | I _F = 20A, di _F /dt = 820A/μs, T _{VJ} = +25°C | |
| Reverse Recovery Time | t _{RR} | — | 60 | — | | | |
| Reverse Recovery Current | I _{RR} | — | 18 | — | | | |
| Reverse Recovery Charge | Q _{RR} | — | 696 | — | nC | V _{GE} = 15V, V _{CC} = 400V, I _C = 40A, R _G = 10Ω, Inductive Load, T _{VJ} = +175°C | |
| Turn-on Delay Time | t _{D(ON)} | — | 7 | — | ns | | |
| Rise Time | t _r | — | 41 | — | | | |
| Turn-off Delay Time | t _{D(OFF)} | — | 60 | — | | mJ | |
| Fall Time | t _f | — | 102 | — | | | |
| Turn-on Switching Energy | E _{ON} | — | 1.04 | — | mJ | | |
| Turn-off Switching Energy | E _{OFF} | — | 0.57 | — | | | |
| Total Switching Energy | E _{TS} | — | 1.61 | — | | | |
| Reverse Recovery Time | t _{RR} | — | 72 | — | ns | I _F = 20A, di _F /dt = 820A/μs, T _{VJ} = +175°C | |
| Reverse Recovery Current | I _{RR} | — | 22 | — | A | | |
| Reverse Recovery Charge | Q _{RR} | — | 864 | — | nC | | |

Typical Performance Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

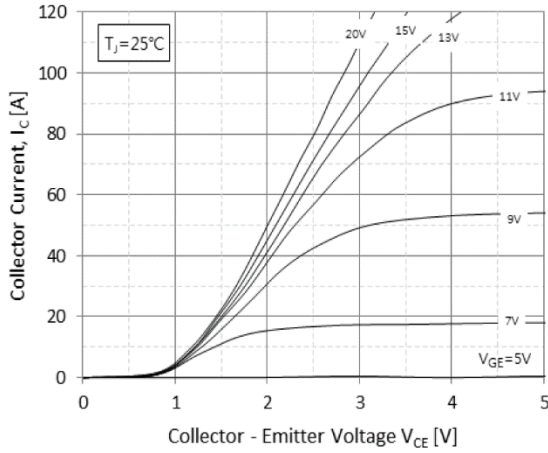


Fig.1 Typical Output Characteristics ($T_J = 25^\circ\text{C}$)

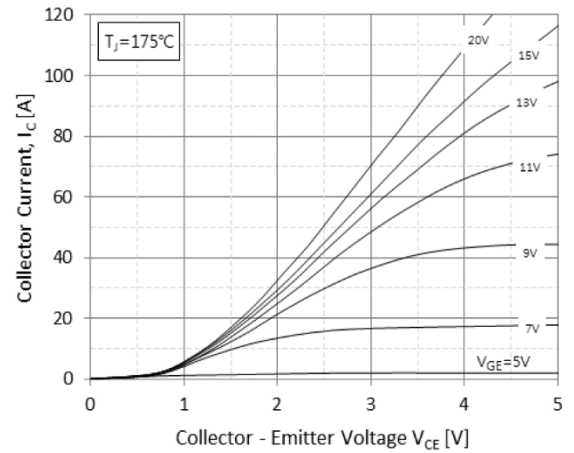


Fig.2 Typical Output Characteristics ($T_J = 175^\circ\text{C}$)

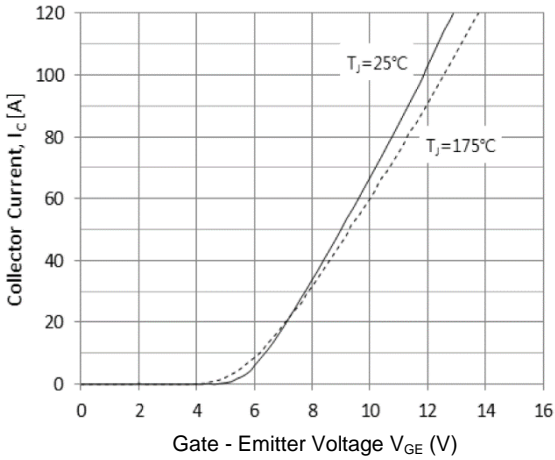


Fig.3 Typical Transfer Characteristics

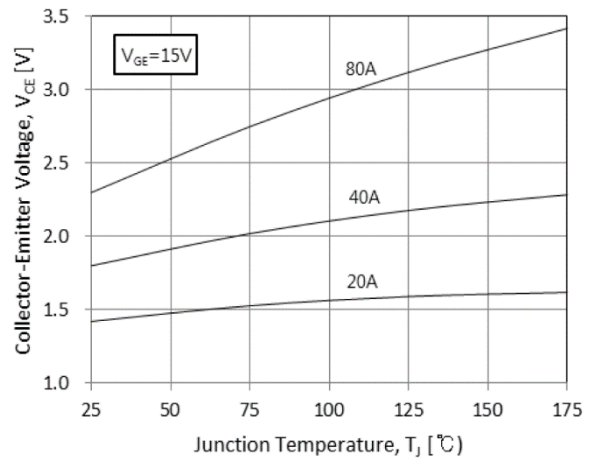


Fig.4 Typical Collector-Emmitter Saturation Voltage -Junction Temperature

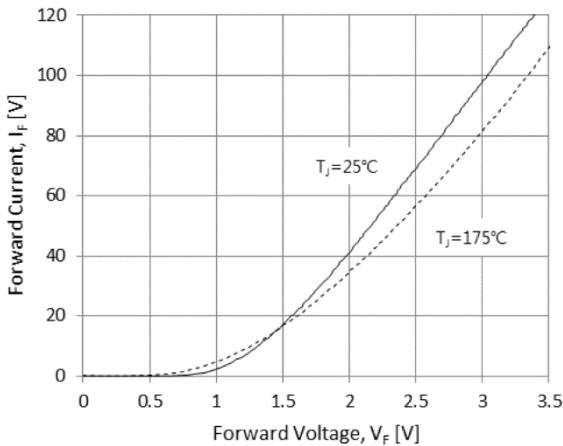


Fig.5 Diode Forward Characteristics

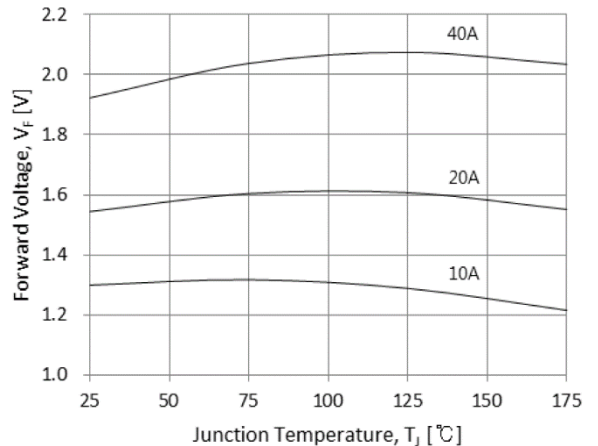


Fig.6 Diode Forward-Junction Temperature

Typical Performance Characteristics (Cont.)

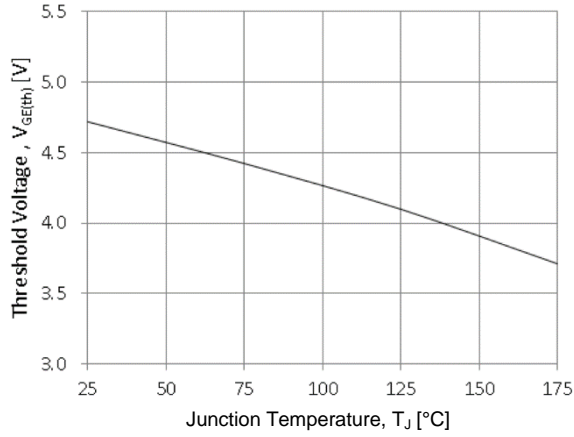


Fig.7 Threshold Voltage-Junction Temperature

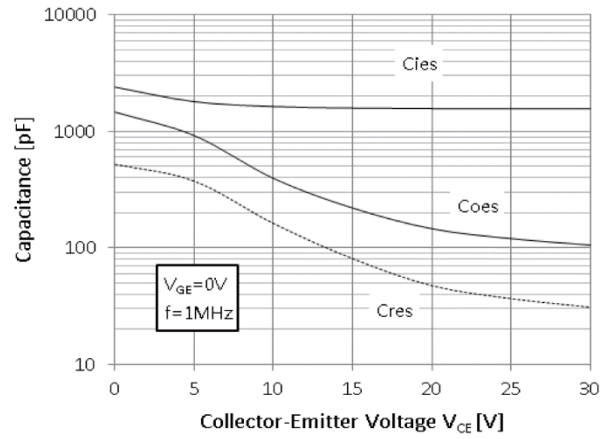


Fig.8 Typical Capacitance

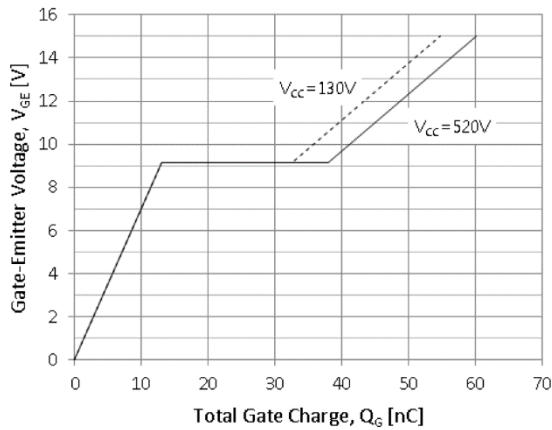


Fig.9 Typical Gate Charge

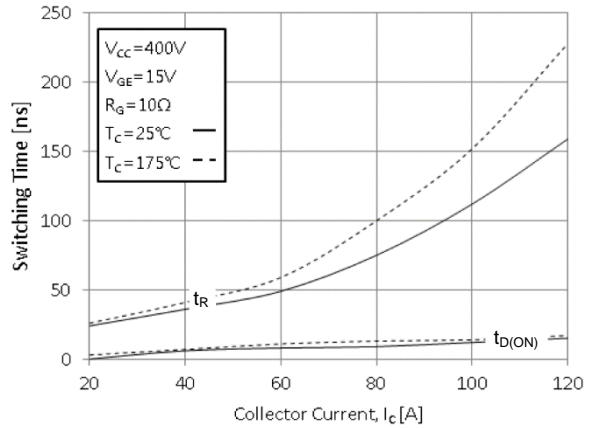


Fig.10 Typical Turn on-Collector Current

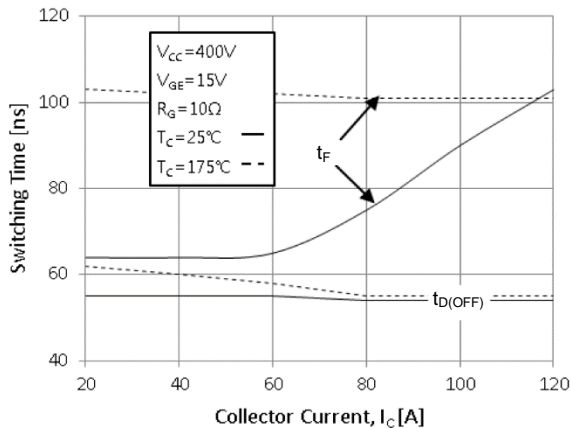


Fig.11 Typical Turn off-Collector Current

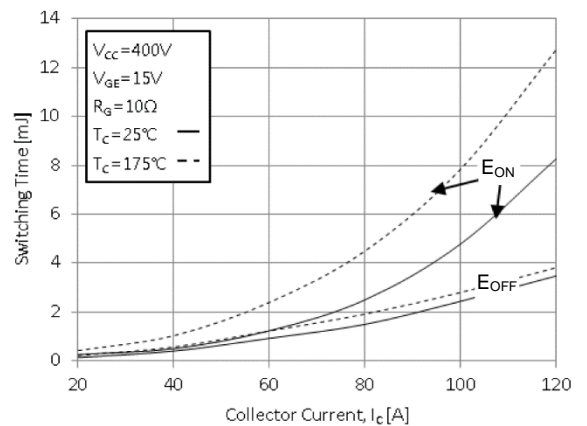


Fig.12 Switching Loss-Collector Current

Typical Performance Characteristics (Cont.)

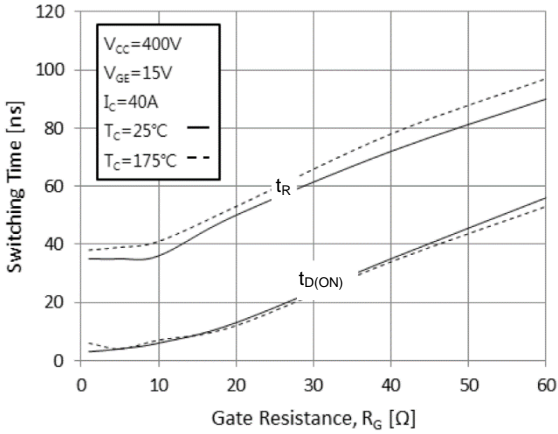


Fig.13 Turn on Characteristics-Gate Resistance

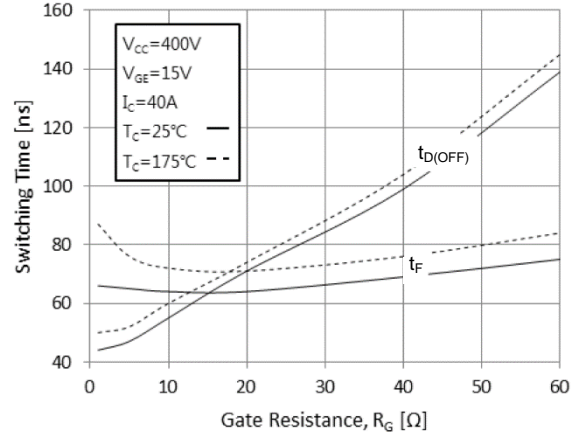


Fig.14 Turn off Characteristics-Gate Resistance

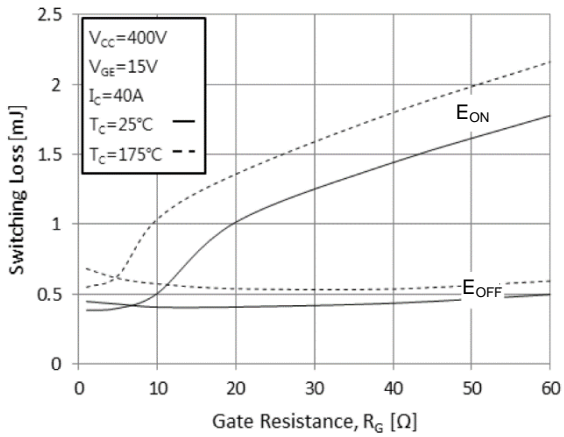


Fig.15 Switching Loss-Gate Resistance

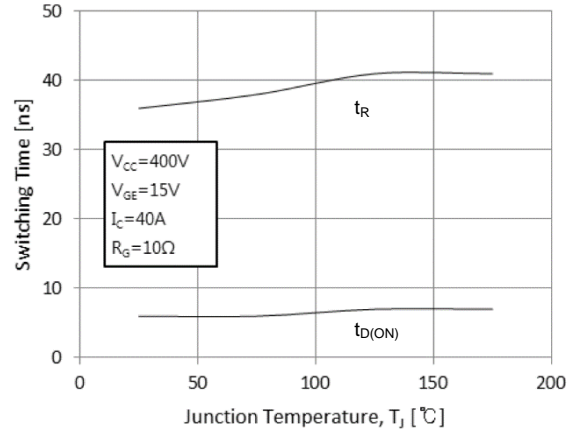


Fig.16 Turn on Characteristics-Junction Temperature

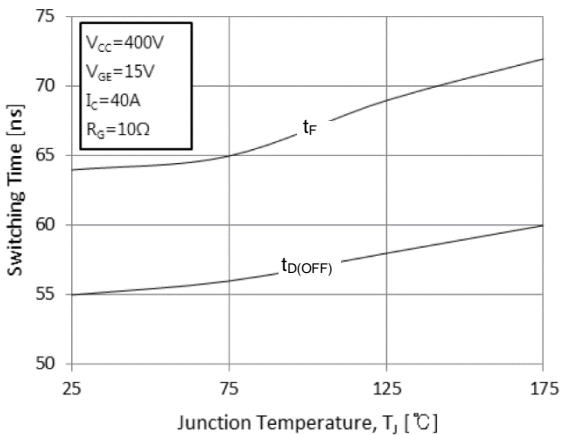


Fig.17 Turn off Characteristics-Junction Temperature

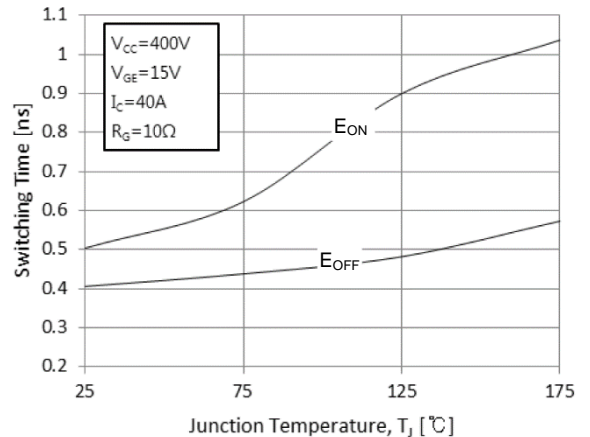


Fig.18 Switching Loss-Junction Temperature

Typical Performance Characteristics (Cont.)

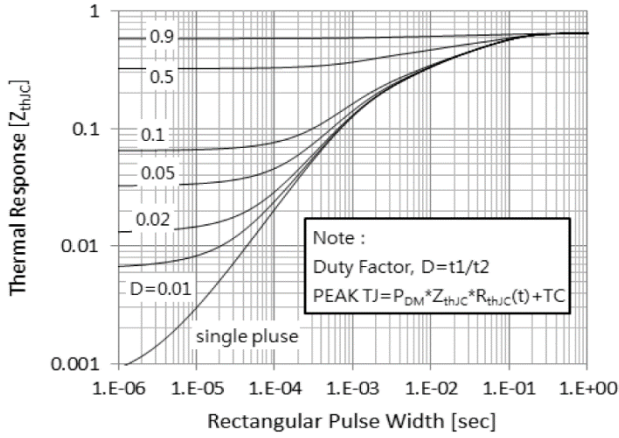


Fig.19 IGBT Transient Thermal Impedance

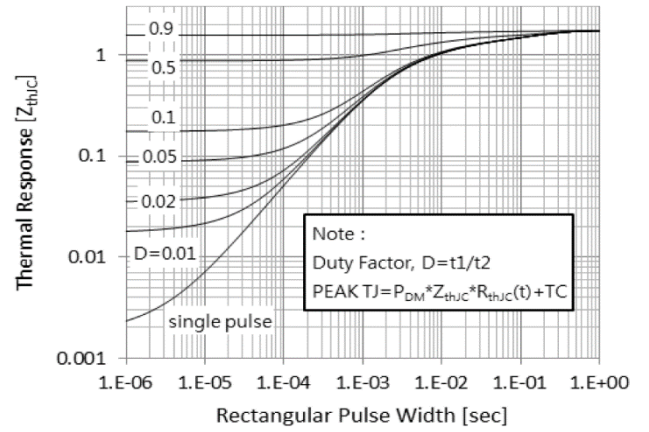
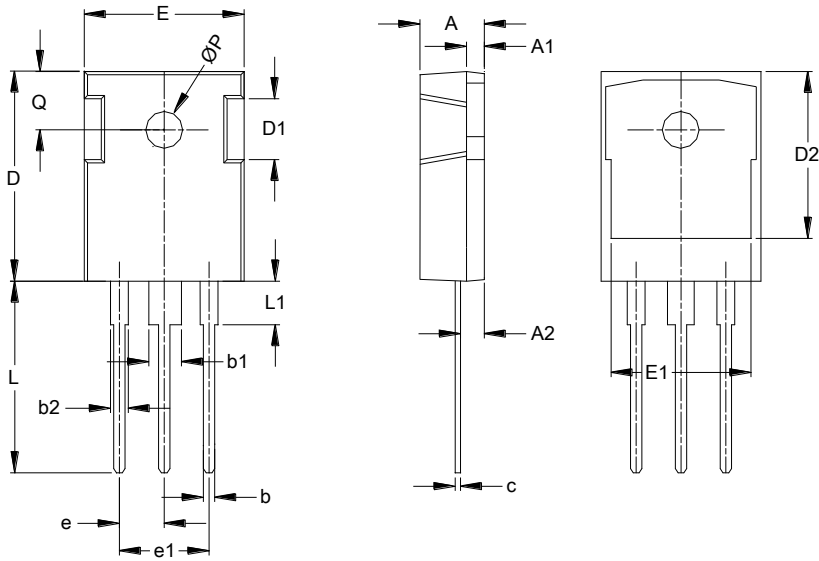


Fig.20 FRD Transient Thermal Impedance

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

TO247 (Type MC)



| TO247 (Type MC) | | | |
|-----------------------------|-------|-------|-----|
| Dim | Min | Max | Typ |
| A | 4.700 | 5.310 | - |
| A1 | 1.500 | 2.490 | - |
| A2 | 2.200 | 2.600 | - |
| b | 0.990 | 1.400 | - |
| b1 | 2.590 | 3.430 | - |
| b2 | 1.650 | 2.390 | - |
| c | 0.380 | 0.890 | - |
| D | 20.30 | 21.46 | - |
| D1 | 4.320 | 5.490 | - |
| D2 | 13.08 | - | - |
| E | 15.45 | 16.26 | - |
| E1 | 13.06 | 14.02 | - |
| e | 5.450 | | - |
| e1 | 10.90 | | - |
| L | 19.81 | 20.57 | - |
| L1 | - | 4.500 | - |
| Q | 5.380 | 6.200 | - |
| øP | 3.500 | 3.700 | - |
| All Dimensions in mm | | | |

Note : For high-voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device Terminals and PCB tracking.

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