# DGTD65T15H2TF

**650V FIELD STOP IGBT IN ITO220AB**

## Description

The DGTD65T15H2TF is produced using advanced Field Stop Trench IGBT Technology, which provides high-performance, excellent quality, and high ruggedness.

## Features

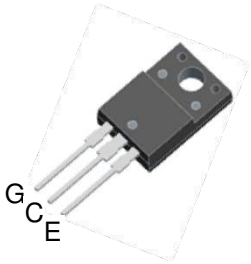
- High Ruggedness for Motor Control
- $V_{CE(sat)}$ Positive Temperature Coefficient
- Very Soft, Fast Recovery Anti-Parallel Diode
- Low EMI
- Maximum Junction Temperature +175°C
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

## Applications

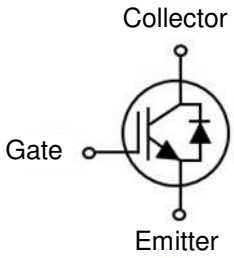
- Motor Drive

## Mechanical Data

- Case: ITO220AB (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 e3
- Weight: 1.9 grams (Approximate)




ITO220AB (Type MC)



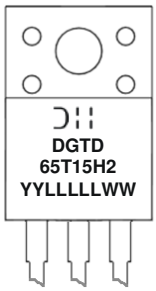

Device Symbol

## Ordering Information (Note 4)

| Product | Marking | Quantity |
|---|---|---|
| DGTD65T15H2TF | DGTD65T15H2 | 1000 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. 50 devices per tube.

## Marking Information




= Manufacturer's Marking
DGTD65T15H2 = 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.)

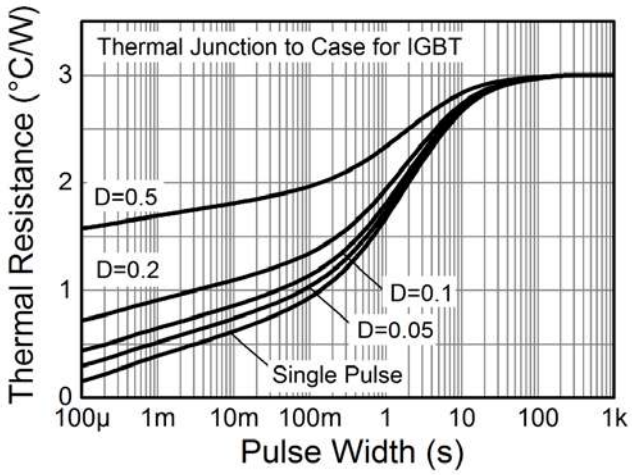
| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Collector-Emitter Voltage | | $V_{CE}$ | 650 | V |
| DC Collector Current, Limited by $T_{jmax}$ | $T_C$ = +25°C | $I_C$ | 30 | A |
| | $T_C$ = +100°C | | 15 | A |
| Pulsed Collector Current, $t_p$ Limited by $T_{jmax}$ | | $I_{Cpuls}$ | 60 | A |
| Diode Forward Current Limited by $T_{jmax}$ | $T_C$ = +25°C | $I_F$ | 30 | A |
| | $T_C$ = +100°C | | 15 | A |
| Diode Pulsed Current, $t_p$ Limited by $T_{jmax}$ | | $I_{Fpuls}$ | 60 | A |
| Gate-Emitter Voltage | | $V_{GE}$ | ±20 | V |
| Short Circuit Withstand Time<br>$V_{CC}$ ≤ 360V, $V_{GE}$ = 15V, $T_j$ = +150°C | | $t_{SC}$ | 5 | µs |

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

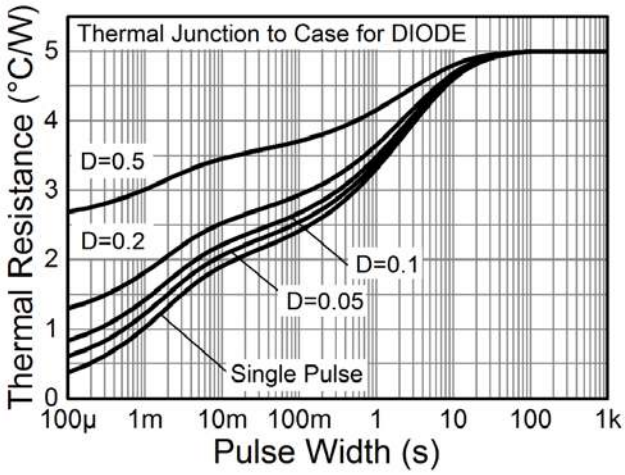
| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Power Dissipation Linear Derating Factor (Note 7) | $T_C$ = +25°C | $P_D$ | 48 | W |
| | $T_C$ = +100°C | | 24 | |
| Thermal Resistance, Junction to Ambient (Note 6) | | $R_{\Theta JA}$ | 62 | °C/W |
| Thermal Resistance, Junction to Case for IBGT (Note 7) | | $R_{\Theta JC}$ | 3.0 | |
| Thermal Resistance, Junction to Case for Diode (Note 7) | | $R_{\Theta JC}$ | 5.0 | |
| Operating Temperature | | $T_j$ | -40 to +175 | °C |
| Storage Temperature Range | | $T_{STG}$ | -55 to +150 | |

Note: 6. For a device mounted in a socket in still air conditions. Collector lead length 10mm.
7. For a device mounted on a Force Cooled Aluminium Heatsink 80x80x60mm.

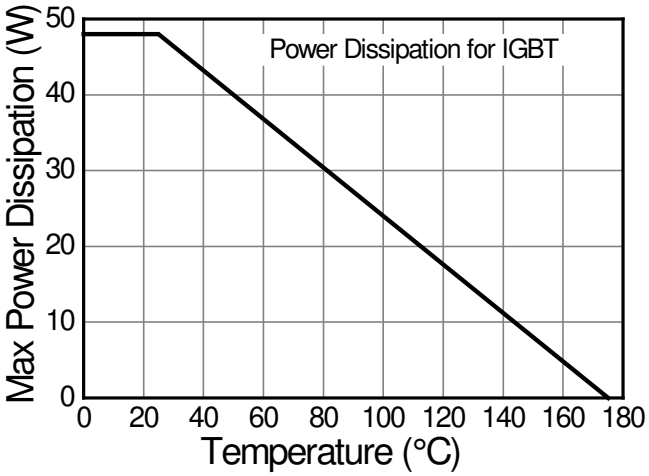
## Thermal Characteristics and Derating Information



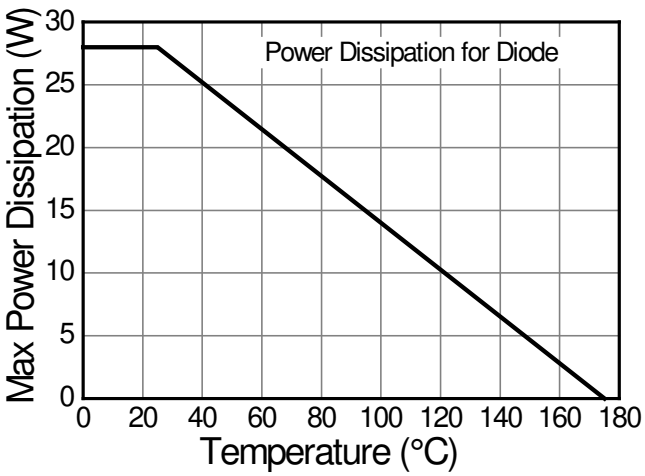

**Transient Thermal Impedance**



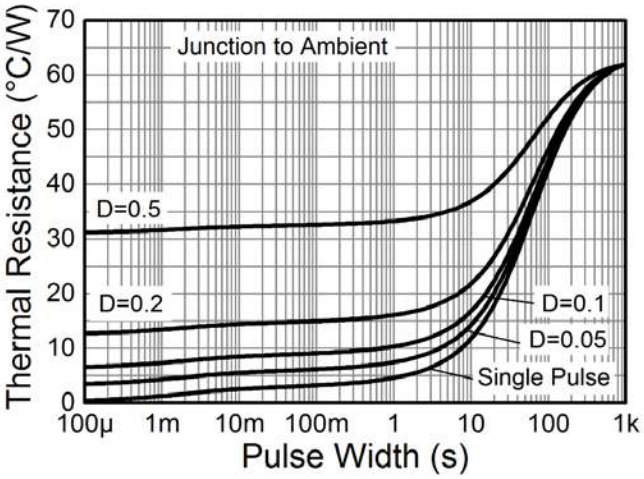

**Transient Thermal Impedance**



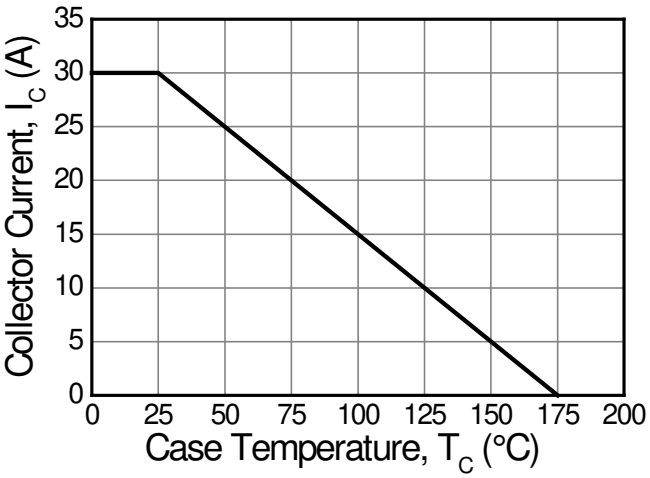

**Derating Curve**




**Derating Curve**




**Transient Thermal Impedance**




**Case Temperature-Collector Current**

## 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 | $T_j$ = +25°C | $V_{CE(sat)}$ | — | 1.65 | 2.00 | V | $I_C$ = 15A, $V_{GE}$ = 15V |
| | $T_j$ = +175°C | | — | 1.90 | — | | |
| Diode Forward Voltage | $T_j$ = +25°C | $V_F$ | — | 1.85 | 2.30 | V | $V_{GE}$ = 0V, $I_F$ = 15A |
| | $T_j$ = +175°C | | — | 1.95 | — | | |
| Gate-Emitter Threshold Voltage | | $V_{GE(th)}$ | 4.5 | 5.5 | 6.5 | V | $V_{CE}$ = $V_{GE}$, $I_C$ = 0.5mA |
| Zero Gate Voltage Collector Current | | $I_{CES}$ | — | — | 20 | μA | $V_{CE}$ = 650V, $V_{GE}$ = 0V, $T_j$ = +25°C |
| Gate-Emitter Leakage Current | | $I_{GES}$ | — | — | ±100 | nA | $V_{GE}$ = 20V, $V_{CE}$ = 0V |
| **DYNAMIC CHARACTERISTICS** | | | | | | | |
| Total Gate Charge | | $Q_g$ | — | 61 | — | nC | $V_{CE}$ = 520V, $I_C$ = 15A, $V_{GE}$ = 15V |
| Gate-Emitter Charge | | $Q_{ge}$ | — | 11 | — | | |
| Gate-Collector Charge | | $Q_{gc}$ | — | 35 | — | | |
| Input Capacitance | | $C_{ies}$ | — | 1129 | — | pF | $V_{CE}$ = 25V, $V_{GE}$ = 0V, f = 1MHz |
| Reverse Transfer Capacitance | | $C_{res}$ | — | 57 | — | | |
| Output Capacitance | | $C_{oes}$ | — | 31 | — | | |
| **SWITCHING CHARACTERISTICS** | | | | | | | |
| Turn-On Delay Time | | $t_{d(on)}$ | — | 19 | — | ns | $V_{GE}$ = 15V, $V_{CC}$ = 400V, $I_C$ = 15A, $R_G$ = 10Ω, Inductive Load, $T_j$ = +25°C |
| Rise Time | | $t_r$ | — | 27 | — | | |
| Turn-Off Delay Time | | $t_{d(off)}$ | — | 128 | — | | |
| Fall Time | | $t_f$ | — | 32 | — | | |
| Turn-On Switching Energy | | $E_{on}$ | — | 270 | — | μJ | |
| Turn-Off Switching Energy | | $E_{off}$ | — | 86 | — | | |
| Total Switching Energy | | $E_{ts}$ | — | 356 | — | | |
| Turn-On Delay Time | | $t_{d(on)}$ | — | 17 | — | ns | $V_{GE}$ = 15V, $V_{CC}$ = 400V, $I_C$ = 15A, $R_G$ = 10Ω, Inductive Load, $T_j$ = +175°C |
| Rise Time | | $t_r$ | — | 29 | — | | |
| Turn-Off Delay Time | | $t_{d(off)}$ | — | 150 | — | | |
| Fall Time | | $t_f$ | — | 130 | — | | |
| Turn-On Switching Energy | | $E_{on}$ | — | 342 | — | μJ | |
| Turn-Off Switching Energy | | $E_{off}$ | — | 288 | — | | |
| Total Switching Energy | | $E_{ts}$ | — | 630 | — | | |
| Reverse Recovery Time | | $t_{rr}$ | — | 150 | — | ns | $I_F$ = 15A, $di_F/dt$ = 200A/μs, $T_j$ = +25°C |
| Reverse Recovery Current | | $I_{rr}$ | — | 5.2 | — | A | |
| Reverse Recovery Charge | | $Q_{rr}$ | — | 390 | — | nC | |
| Reverse Recovery Time | | $t_{rr}$ | — | 207 | — | ns | $I_F$ = 15A, $di_F/dt$ = 200A/μs, $T_j$ = +175°C |
| Reverse Recovery Current | | $I_{rr}$ | — | 6.1 | — | A | |
| Reverse Recovery Charge | | $Q_{rr}$ | — | 631 | — | nC | |

## Typical Performance Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

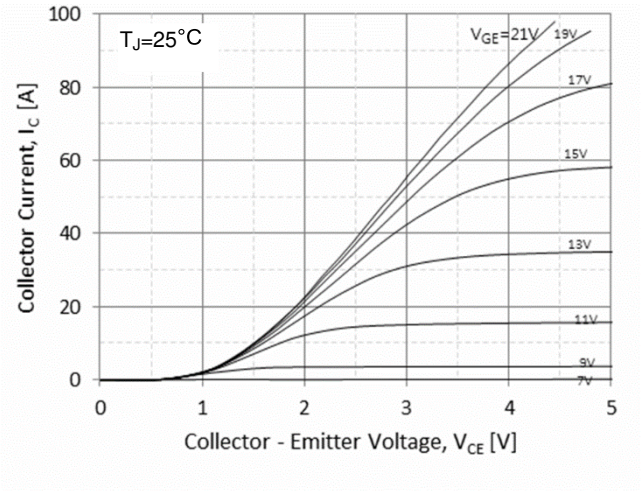



Fig.1 Typical Output Characteristics($T_J$=25℃)

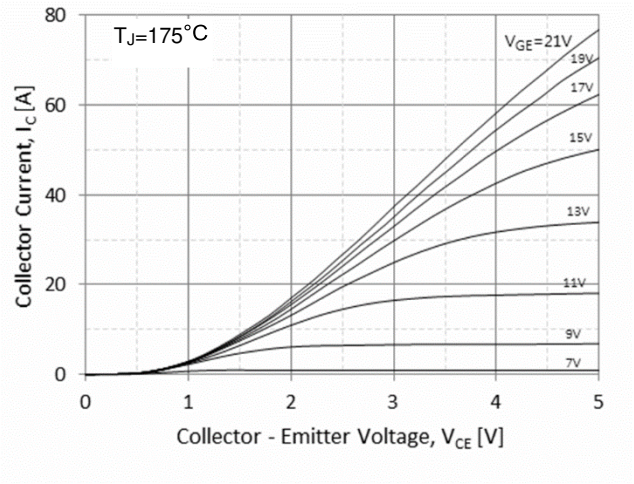



Fig.2 Typical Output Characteristics($T_J$=175℃)

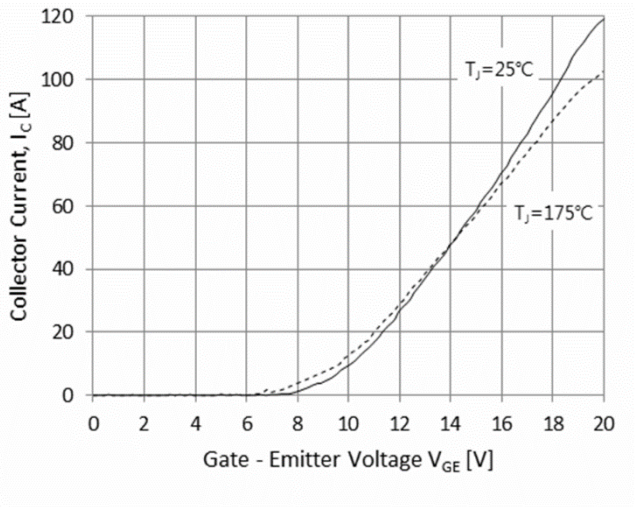



Fig.3 Typical Transfer Characteristics

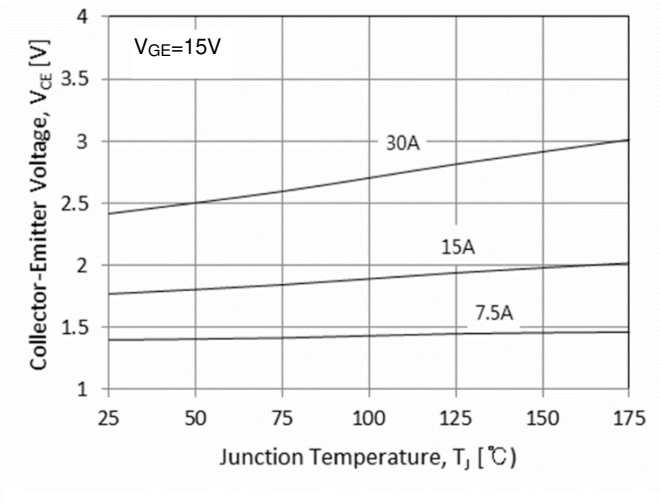



Fig.4 Typical Collector-Emitter Saturation Voltage -Junction Temperature

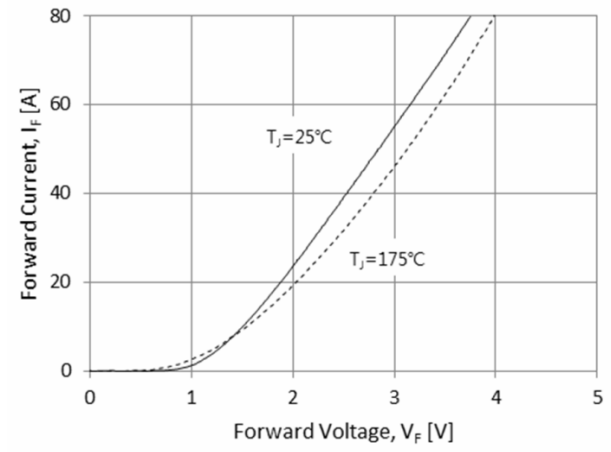



Fig.5 Diode Forward Characteristics

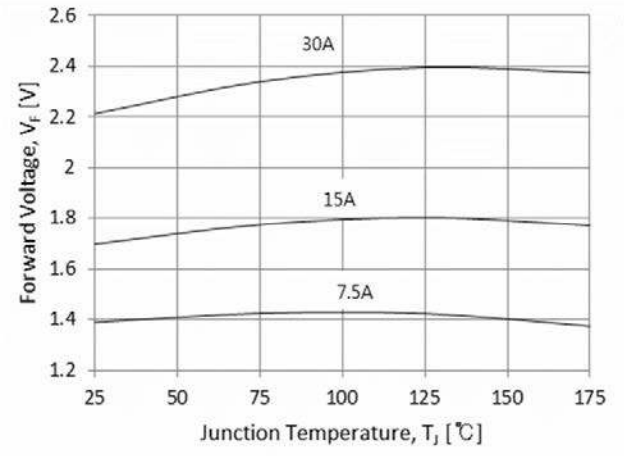



Fig.6 Diode Forward-Junction Temperature

## Typical Performance Characteristics (@$T_A$ = +25°C, unless otherwise specified.) (continued)

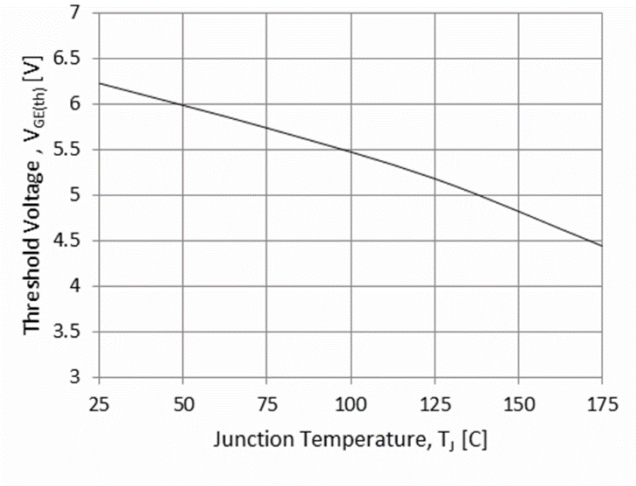



Fig.7 Threshold Voltage-Junction Temperature

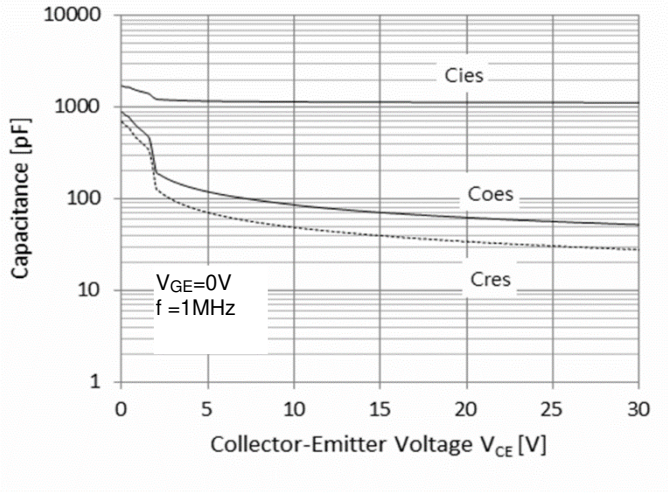



Fig.8 Typical Capacitance

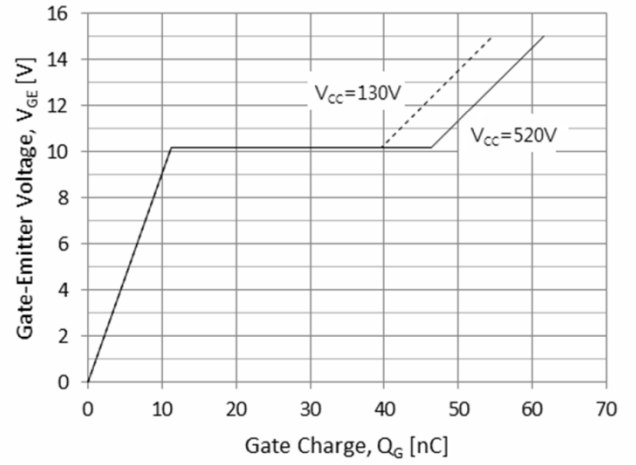



Fig.9 Typical Gate Charge

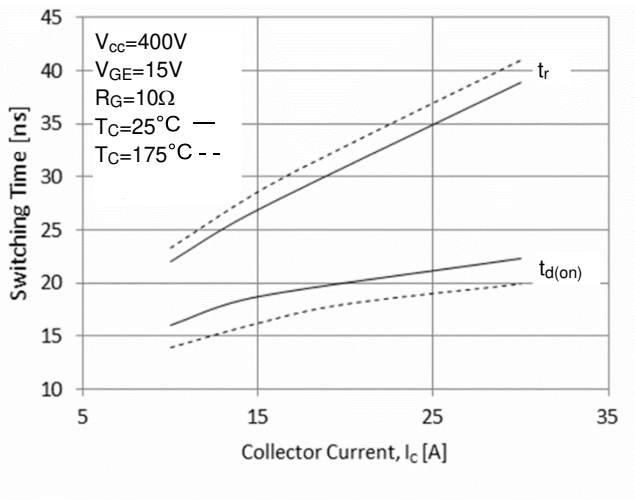



Fig.10 Typical Turn on-Collector Current

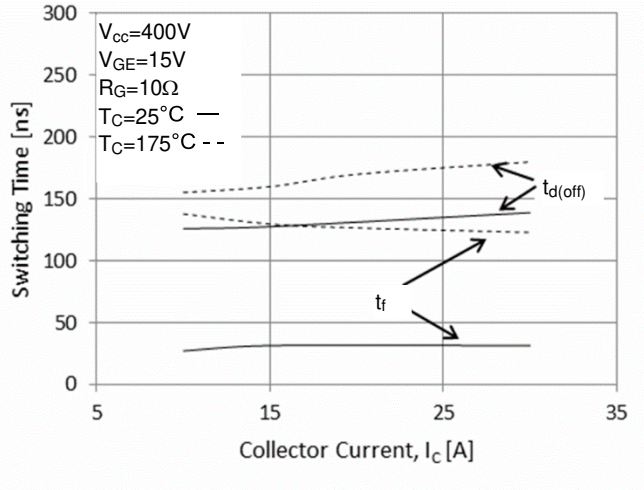



Fig.11 Typical Turn off-Collector Current

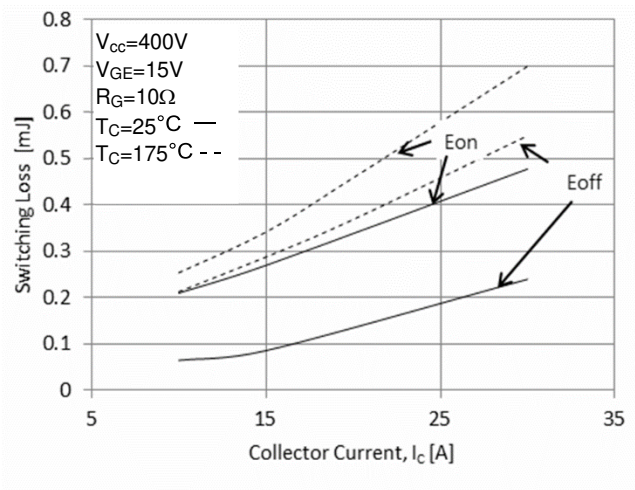



Fig.12 Switching Loss-Collector Current

## Typical Performance Characteristics (@$T_A$ = +25°C, unless otherwise specified.) (cont.)

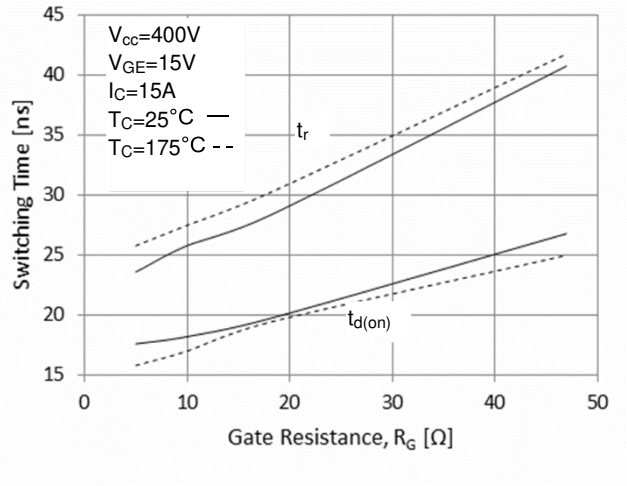



Fig.13 Turn on Characteristics-Gate Resistance

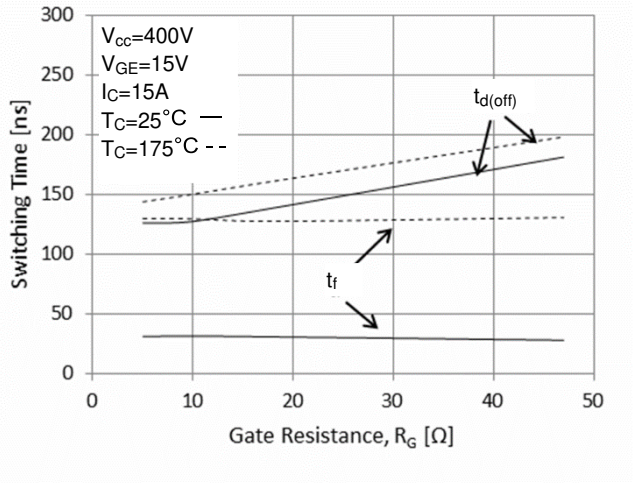



Fig.14 Turn off Characteristics-Gate Resistance

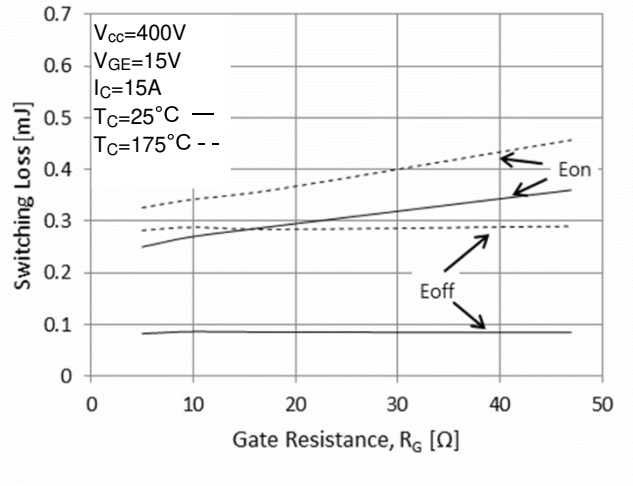



Fig.15 Switching Loss-Gate Resistance

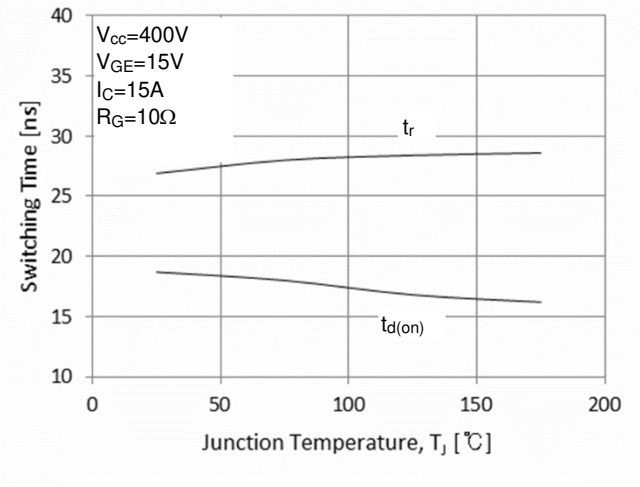



Fig.16 Turn on Characteristics-Junction Temperature

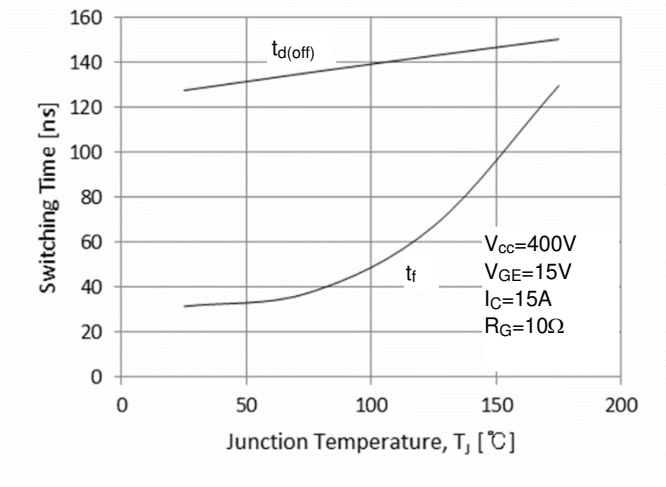



Fig.17 Turn off Characteristics-Junction Temperature

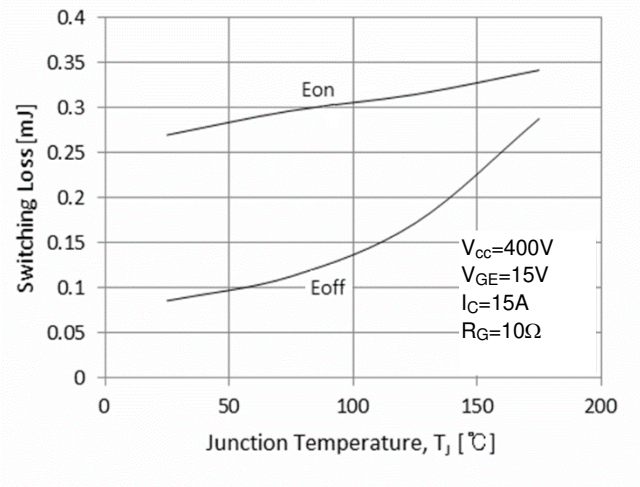
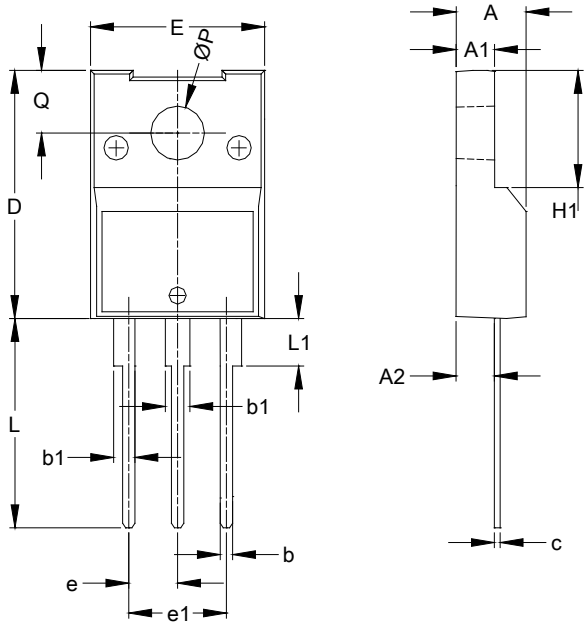



Fig.18 Switching Loss-Junction Temperature

## Package Outline Dimensions

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

**ITO220AB (Type MC)**




| ITO220AB (Type MC) | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 4.30 | 4.80 | — |
| **A1** | 2.50 | 3.10 | — |
| **A2** | 2.30 | 2.90 | — |
| **b** | 0.50 | 1.00 | — |
| **b1** | 0.95 | 1.70 | — |
| **c** | 0.40 | 0.80 | — |
| **D** | 14.50 | 16.40 | — |
| **H1** | 6.20 | 7.20 | — |
| **E** | 9.60 | 10.40 | — |
| **e** | — | — | 2.54 |
| **e1** | — | — | 5.08 |
| **L** | 12.20 | 14.20 | — |
| **L1** | 2.90 | 4.70 | — |
| **P** | 3.00 | 3.40 | — |
| **Q** | 2.40 | 3.50 | — |
| **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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1. are intended to implant into the body, or

2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

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