FAIRCHILD SEMICONDUCTOR®

February 2010

# FGPF4633
# 330V PDP IGBT

## Features

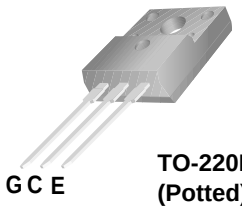
- High current capability
- Low saturation voltage: $V_{CE(sat)}$ = 1.55 V @ $I_C$ = 70A
- High input impedance
- Fast switching
- RoHS compliant

## Applications

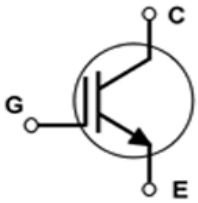
- PDP System

## General Description

Using Novel Trench IGBT Technology, Fairchild's new series of trench IGBTs offer the optimum performance for PDP applications where low conduction and switching losses are essential.




TO-220F
(Potted)




## Absolute Maximum Ratings

| Symbol | Description | | Ratings | Units |
|---|---|---|---|---|
| $V_{CES}$ | Collector to Emitter Voltage | | 330 | V |
| $V_{GES}$ | Gate to Emitter Voltage | | ± 30 | V |
| $I_{C\ pulse(1)*}$ | Collector Current | @ $T_C$ = 25°C | 300 | A |
| $P_D$ | Maximum Power Dissipation | @ $T_C$ = 25°C | 30.5 | W |
| | Maximum Power Dissipation | @ $T_C$ = 100°C | 12.2 | W |
| $T_J$ | Operating Junction Temperature | | -55 to +150 | °C |
| $T_{stg}$ | Storage Temperature Range | | -55 to +150 | °C |
| $T_L$ | Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds | | 300 | °C |

## Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Units |
|---|---|---|---|---|
| $R_{\theta JC}$(IGBT) | Thermal Resistance, Junction to Case | - | 4.1 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | - | 62.5 | °C/W |

**Notes:**

(1) Half Sine Wave, D < 0.01, pluse width < 5µsec

* Ic_pluse limited by max Tj

## Package Marking and Ordering Information

| Device Marking | Device | Package | Packaging Type | Qty per Tube | Max Qty per Box |
|---|---|---|---|---|---|
| FGPF4633 | FGPF4633TU | TO-220F | Tube | 50ea | - |

## Electrical Characteristics of the IGBT $T_C = 25°C$ unless otherwise noted

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $BV_{CES}$ | Collector to Emitter Breakdown Voltage | $V_{GE}$ = 0V, $I_C$ = 250μA | 330 | - | - | V |
| $\frac{\Delta BV_{CES}}{\Delta T_J}$ | Temperature Coefficient of Breakdown Voltage | $V_{GE}$ = 0V, $I_C$ = 250μA | - | 0.3 | - | V/°C |
| $I_{CES}$ | Collector Cut-Off Current | $V_{CE}$ = $V_{CES}$, $V_{GE}$ = 0V | - | - | 100 | μA |
| $I_{GES}$ | G-E Leakage Current | $V_{GE}$ = $V_{GES}$, $V_{CE}$ = 0V | - | - | ±400 | nA |
| **On Characteristics** | | | | | | |
| $V_{GE(th)}$ | G-E Threshold Voltage | $I_C$ = 250μA, $V_{CE}$ = $V_{GE}$ | 2.4 | 3.3 | 4.0 | V |
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage | $I_C$ = 20A, $V_{GE}$ = 15V | - | 1.1 | - | V |
| | | $I_C$ = 40A, $V_{GE}$ = 15V | - | 1.35 | - | |
| | | $I_C$ = 70A, $V_{GE}$ = 15V, $T_C$ = 25°C | - | 1.55 | 1.8 | V |
| | | $I_C$ = 70A, $V_{GE}$ = 15V, $T_C$ = 125°C | - | 1.61 | - | V |
| **Dynamic Characteristics** | | | | | | |
| $C_{ies}$ | Input Capacitance | $V_{CE}$ = 30V, $V_{GE}$ = 0V, f = 1MHz | - | 1715 | - | pF |
| $C_{oes}$ | Output Capacitance | | - | 75 | - | pF |
| $C_{res}$ | Reverse Transfer Capacitance | | - | 55 | - | pF |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{CC}$ = 200V, $I_C$ = 20A, $R_G$ = 5Ω, $V_{GE}$ = 15V, Resistive Load, $T_C$ = 25°C | - | 8 | - | ns |
| $t_r$ | Rise Time | | - | 30 | - | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | - | 52 | - | ns |
| $t_f$ | Fall Time | | - | 260 | - | ns |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{CC}$ = 200V, $I_C$ = 20A, $R_G$ = 5Ω, $V_{GE}$ = 15V, Resistive Load, $T_C$ = 125°C | - | 8 | - | ns |
| $t_r$ | Rise Time | | - | 32 | - | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | - | 53 | - | ns |
| $t_f$ | Fall Time | | - | 341 | - | ns |
| $Q_g$ | Total Gate Charge | $V_{CE}$ = 200V, $I_C$ = 20A, $V_{GE}$ = 15V | - | 60 | - | nC |
| $Q_{ge}$ | Gate to Emitter Charge | | - | 8 | - | nC |
| $Q_{gc}$ | Gate to Collector Charge | | - | 20 | - | nC |

## Typical Performance Characteristics

**Figure 1. Typical Output Characteristics**

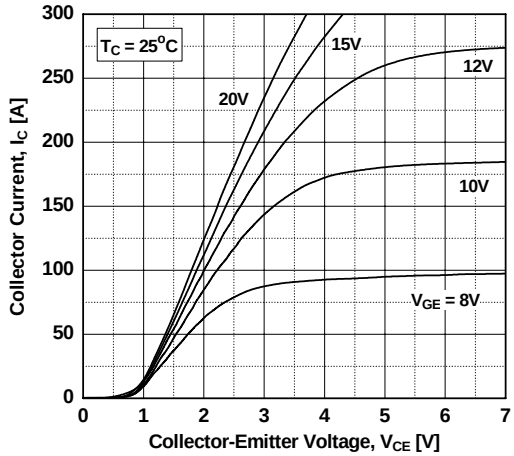



**Figure 2. Typical Output Characteristics**

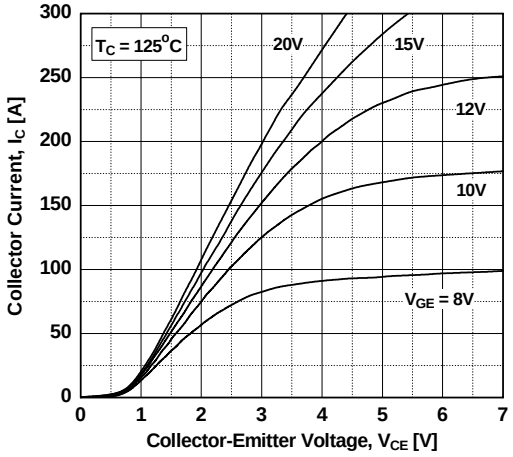



**Figure 3. Typical Saturation Voltage Characteristics**

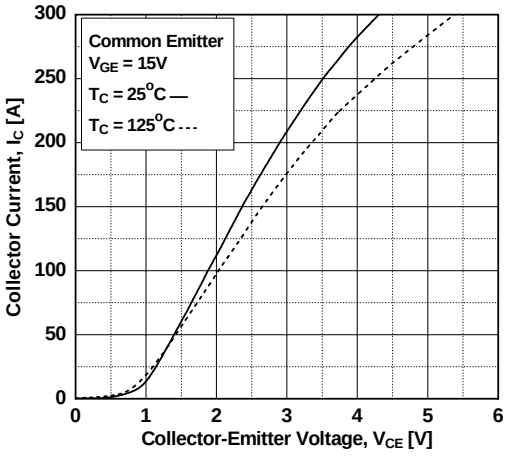



**Figure 4. Transfer Characteristics**

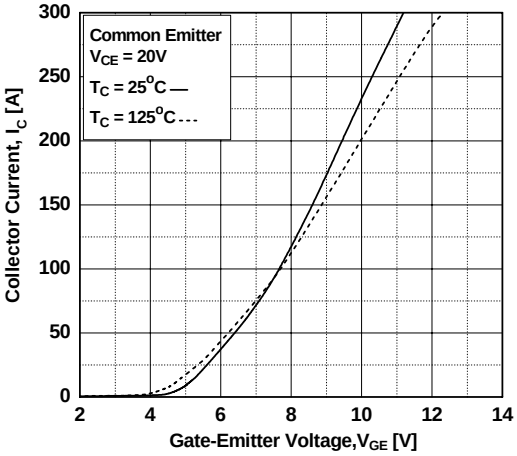



**Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level**

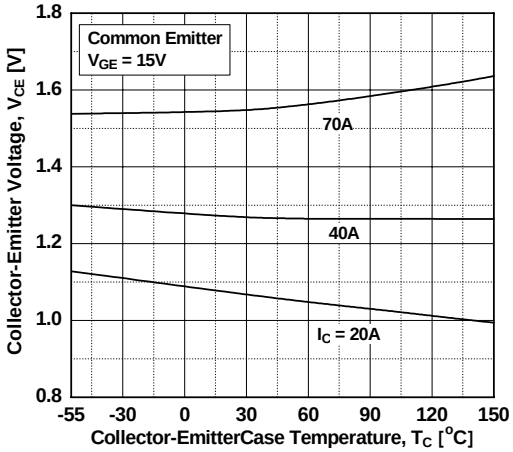
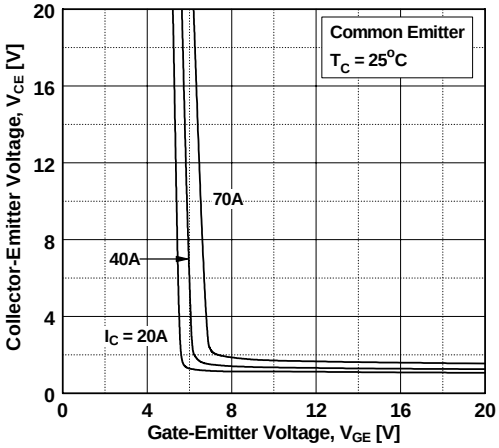
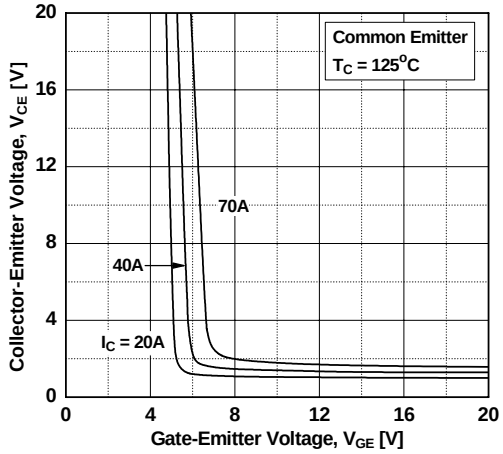



**Figure 6. Saturation Voltage vs. $V_{GE}$**

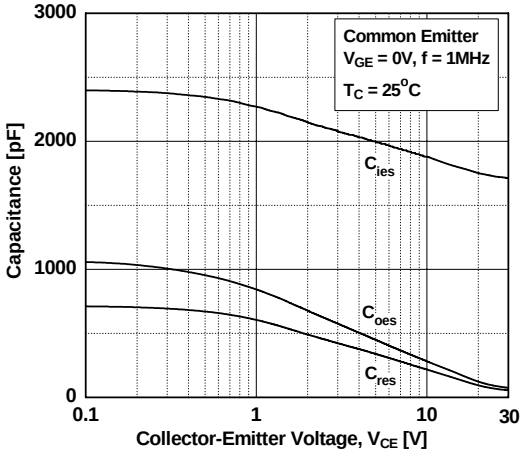


## Typical Performance Characteristics

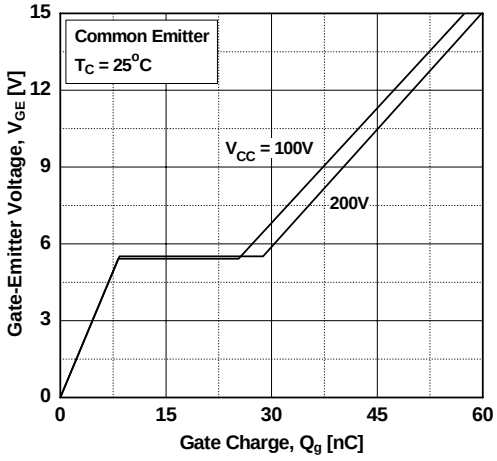
### Figure 7. Saturation Voltage vs. $V_{GE}$



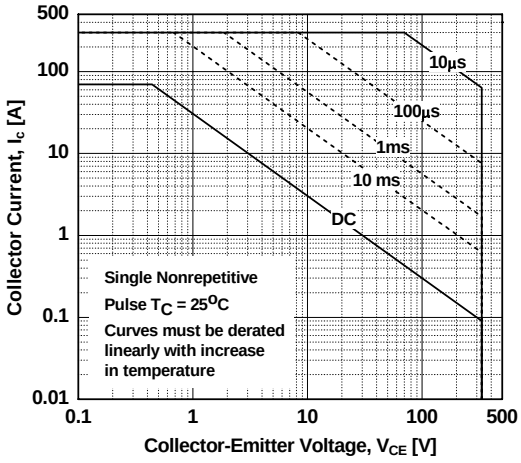

### Figure 8. Capacitance Characteristics



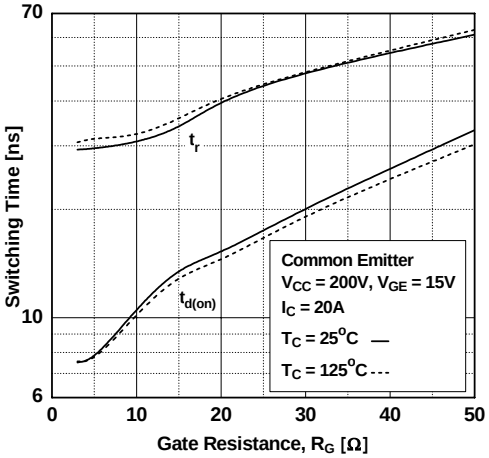

### Figure 9. Gate charge Characteristics



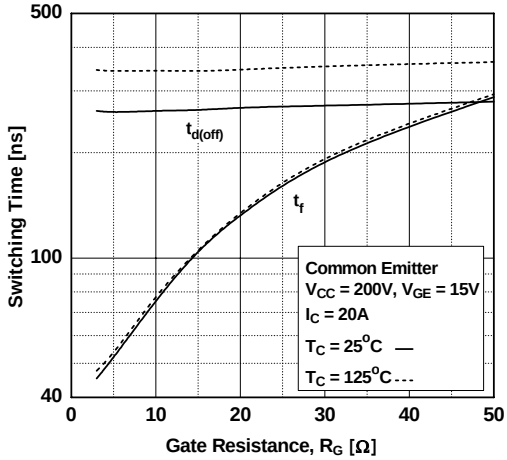

### Figure 10. SOA Characteristics




### Figure 11. Turn-on Characteristics vs. Gate Resistance




### Figure 12. Turn-off Characteristics vs. Gate Resistance



## Typical Performance Characteristics

**Figure 13. Turn-on Characteristics vs. Collector Current**

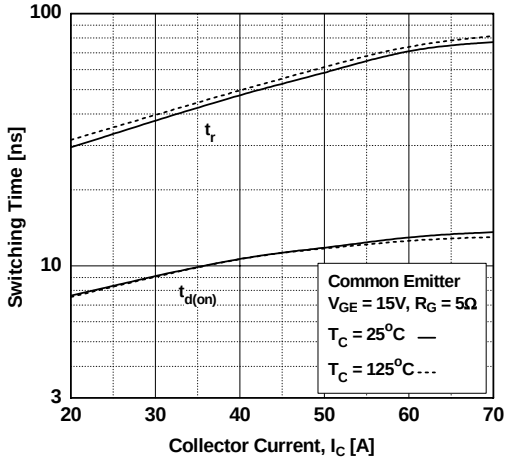



**Figure 14. Turn-off Characteristics vs. Collector Current**

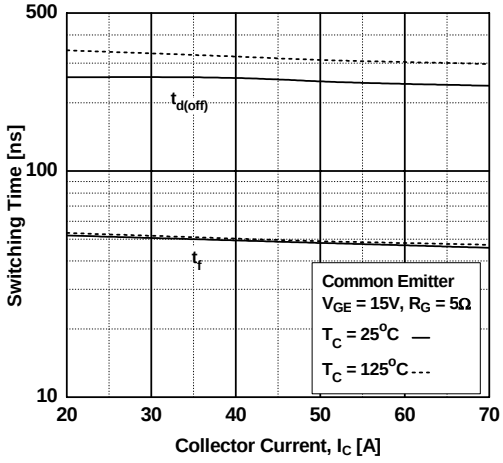



**Figure 15. Switching Loss vs. Gate Resistance**

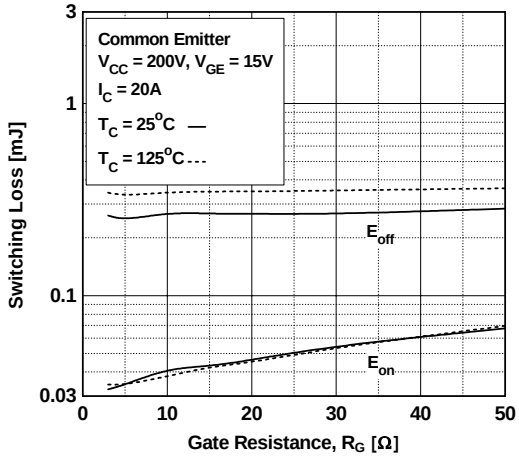



**Figure 16. Switching Loss vs. Collector Current**

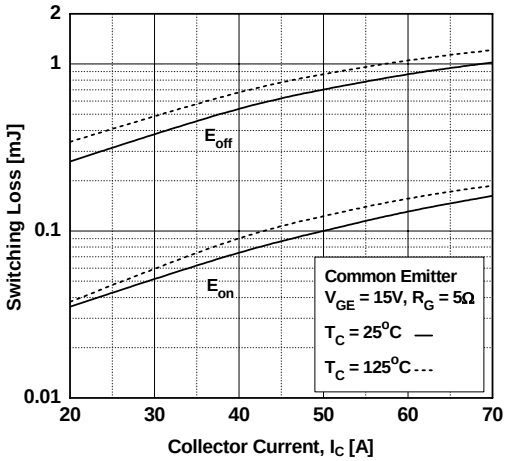
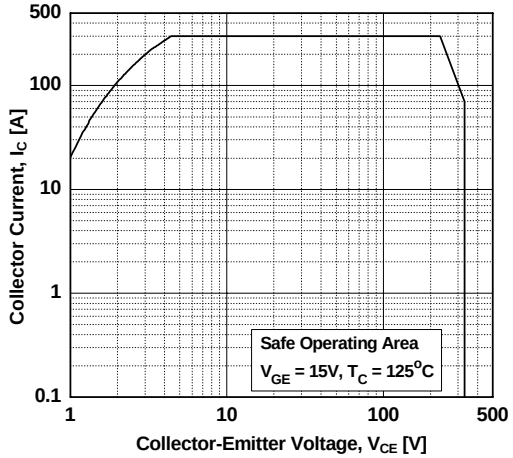
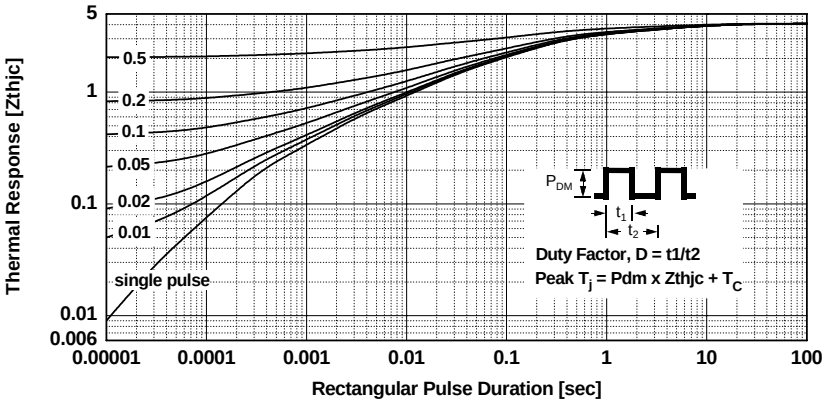



**Figure 17. Turn off Switching SOA Characteristics**



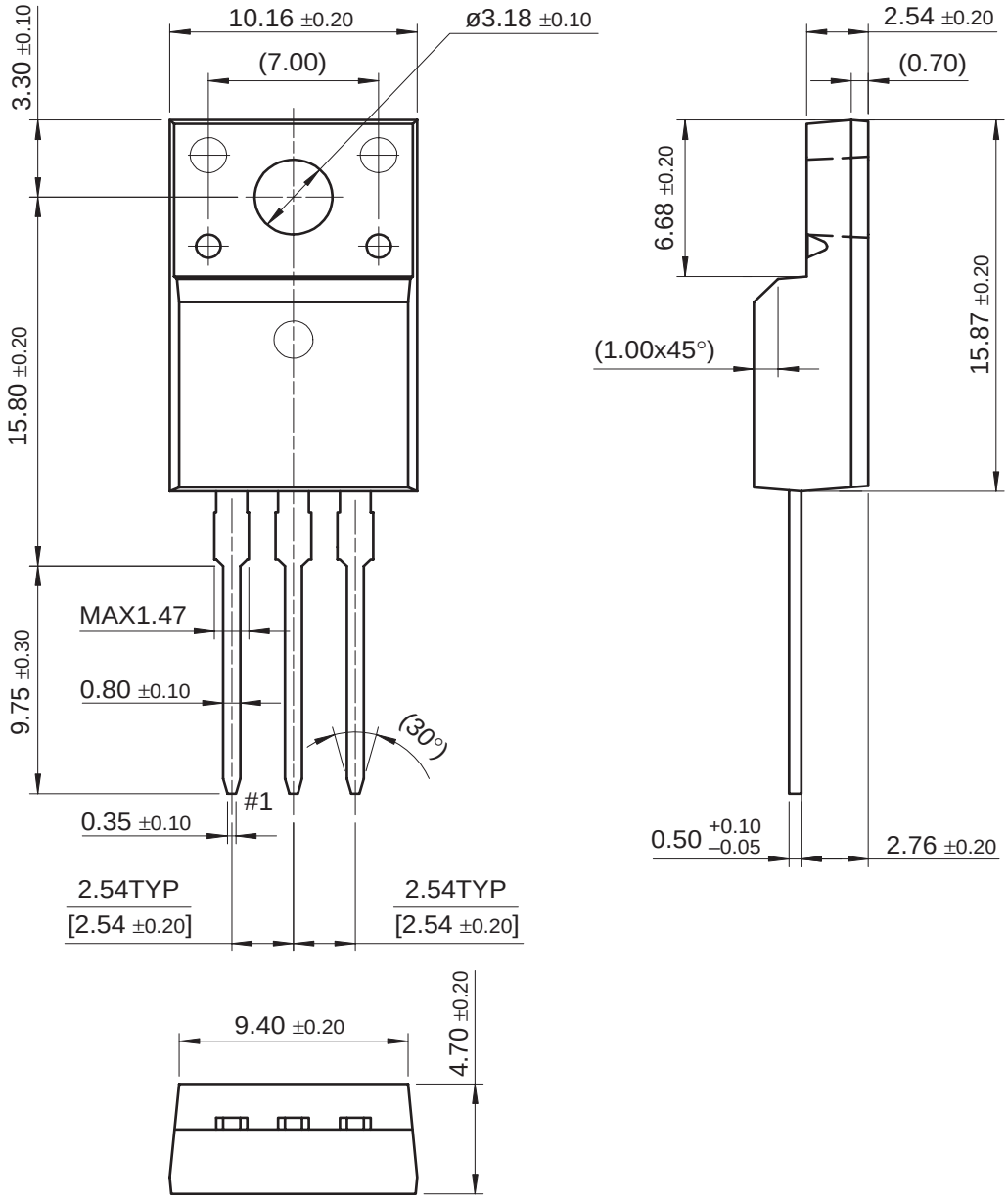
## Typical Performance Characteristics

**Figure 18.Transient Thermal Impedance of IGBT**



**Package Dimensions**

# TO-220F Potted




* Front/Back Side Isolation Voltage : AC 2700V

Dimensions in Millimeters

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SuperSOT™-8
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Rev. I47