FAIRCHILD SEMICONDUCTOR®

September 2006

# FGPF30N30
# 300V, 30A PDP IGBT

## Features

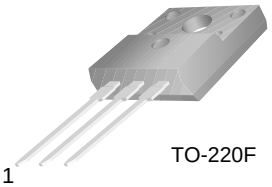
- High Current Capability
- Low saturation voltage: $V_{CE(sat)}$ =1.4V @ $I_C$ = 20A
- High Input Impedance
- Fast switching
- RoHS Complaint

## Application

. PDP System

## General Description

Employing Unified IGBT Technology, Fairchild's PDP IGBTs provides low conduction and switching loss. FGPF30N30 offers the optimum solution for PDP applications where low-condution loss is essential.



TO-220F

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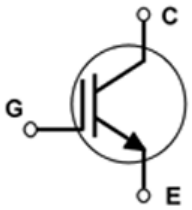
1.Gate 2.Collector 3.Emitter




## Absolute Maximum Ratings

| Symbol | Description | | FGPF30N30 | Units |
|---|---|---|---|---|
| $V_{CES}$ | Collector-Emitter Voltage | | 300 | V |
| $V_{GES}$ | Gate-Emitter Voltage | | ± 30 | V |
| $I_{C\ pulse(1)}$ | Pulsed Collector Current | @ $T_C$ = 25°C | 80 | A |
| $P_D$ | Maximum Power Dissipation | @ $T_C$ = 25°C | 46 | W |
| | Maximum Power Dissipation | @ $T_C$ = 100°C | 18.5 | 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 | -- | 2.7 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | -- | 62.5 | °C/W |

**Notes:**

(1)Repetitive test , pluse width = 100usec , Duty = 0.1

* Ic_pluse limited by max Tj

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## Package Marking and Ordering Information

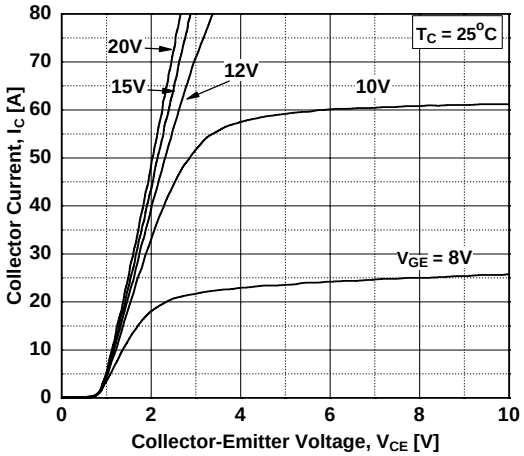
| Device Marking | Device | Package | Packaging Type | Qty per Tube | Max Qty per Box |
|---|---|---|---|---|---|
| FGPF30N30 | FGFP30N30TU | TO-220F | Rail / Tube | 50ea | - |

## Electrical Characteristics $T_C = 25^oC$ unless otherwise noted

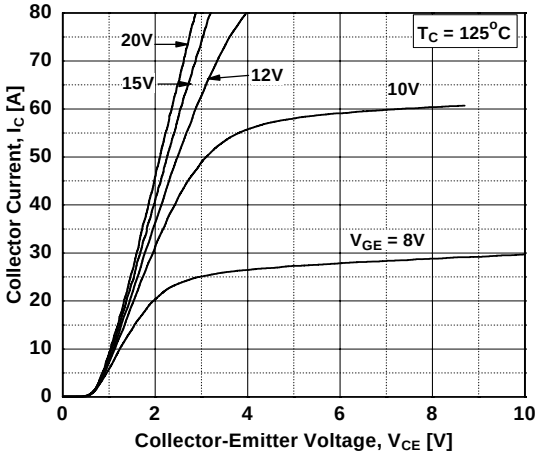
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $BV_{CES}$ | Collector-Emitter Breakdown Voltage | $V_{GE}$ = 0V, $I_C$ = 250uA | 300 | -- | -- | V |
| $\Delta B_{VCES}/\Delta T_J$ | Temperature Coefficient of Breakdown Voltage | $V_{GE}$ = 0V, $I_C$ = 250uA | -- | 0.6 | -- | V/$^o$C |
| $I_{CES}$ | Collector Cut-Off Current | $V_{CE}$ = $V_{CES}$, $V_{GE}$ = 0V | -- | -- | 100 | uA |
| $I_{GES}$ | G-E Leakage Current | $V_{GE}$ = $V_{GES}$, $V_{CE}$ = 0V | -- | -- | ± 250 | nA |
| **On Characteristics** | | | | | | |
| $V_{GE(th)}$ | G-E Threshold Voltage | $I_C$ = 250uA, $V_{CE}$ = $V_{GE}$ | 2.5 | 4.0 | 5.0 | V |
| $V_{CE(sat)}$ | Collector to Emitter Saturation Voltage | $I_C$ =10A, $V_{GE}$ = 15V | -- | 1.2 | 1.5 | V |
| | | $I_C$ =20A, $V_{GE}$ = 15V | -- | 1.4 | -- | V |
| | | $I_C$ = 30A, $V_{GE}$ = 15V, $T_C$ = 25$^o$C | -- | 1.8 | -- | V |
| | | $I_C$ = 30A, $V_{GE}$ = 15V, $T_C$ = 125$^o$C | -- | 1.9 | -- | V |
| **Dynamic Characteristics** | | | | | | |
| $C_{ies}$ | Input Capacitance | $V_{CE}$ = 30V, $V_{GE}$ = 0V, f = 1MHz | -- | 685 | -- | pF |
| $C_{oes}$ | Output Capacitance | | -- | 95 | -- | pF |
| $C_{res}$ | Reverse Transfer Capacitance | | -- | 30 | -- | pF |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{CC}$ = 200 V, $I_C$ = 20A, $R_G$ = 20Ω, $V_{GE}$ = 15V, Resistive Load, $T_C$ = 25$^o$C | -- | 10 | -- | ns |
| $t_r$ | Rise Time | | -- | 44 | -- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | -- | 76 | -- | ns |
| $t_f$ | Fall Time | | -- | 180 | 300 | ns |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{CC}$ = 200 V, $I_C$ = 20A, $R_G$ = 20Ω, $V_{GE}$ = 15V, Resistive Load, $T_C$ = 125$^o$C | -- | 10 | - | ns |
| $t_r$ | Rise Time | | -- | 46 | -- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | -- | 82 | -- | ns |
| $t_f$ | Fall Time | | -- | 270 | -- | ns |
| $Q_g$ | Total Gate Charge | $V_{CE}$ = 200 V, $I_C$ = 20A, $V_{GE}$ = 15V | -- | 39 | -- | nC |
| $Q_{ge}$ | Gate-Emitter Charge | | -- | 6 | -- | nC |
| $Q_{gc}$ | Gate-Collector Charge | | -- | 16 | -- | nC |

## Typical Performance CharacteristicsTypical Saturation VoltageCharacteristics

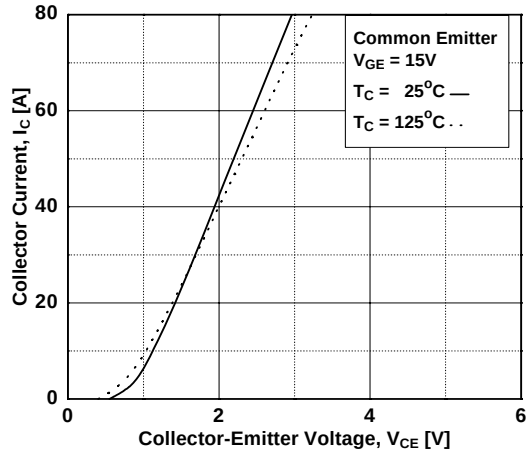
### Figure 1. Typical Output Characteristics



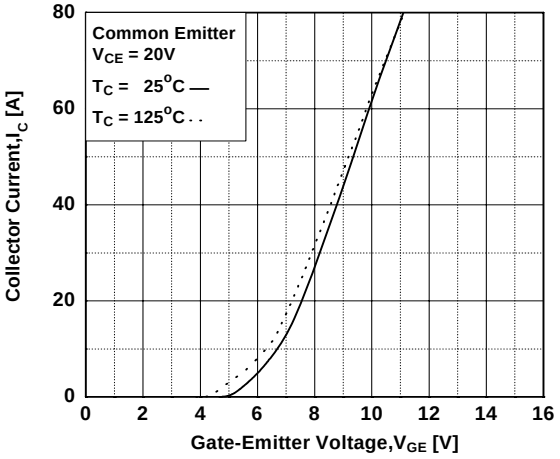

### Figure 2. Typical Output Characteristics



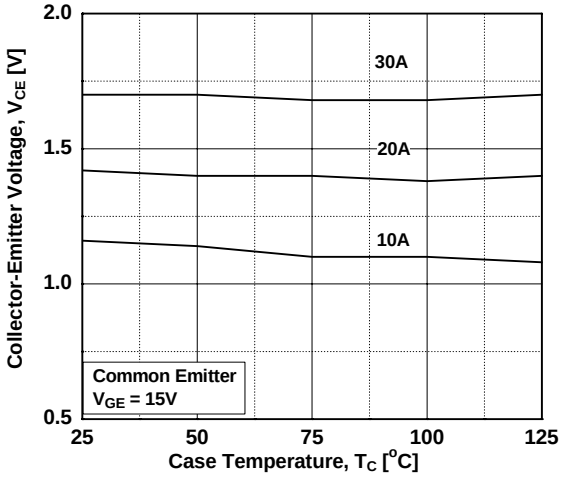

### Figure 3. Saturation Voltage



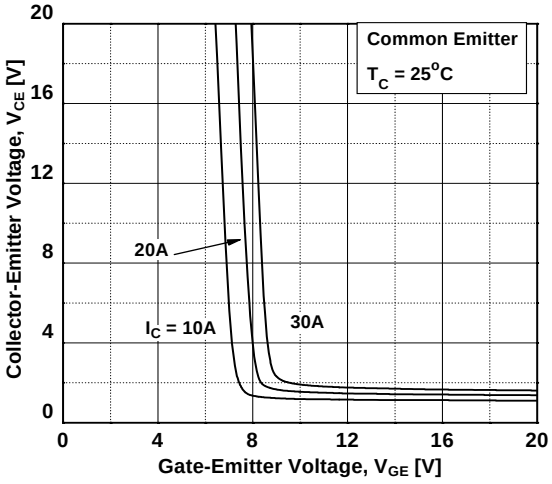

### Figure 4. Transfer Characteristics




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

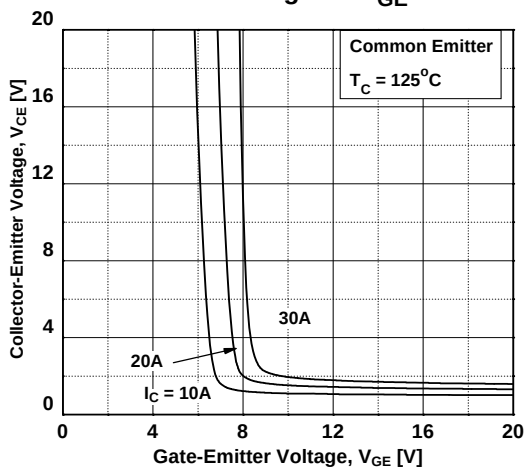



### Figure 6. Saturation Voltage vs.$V_{GE}$

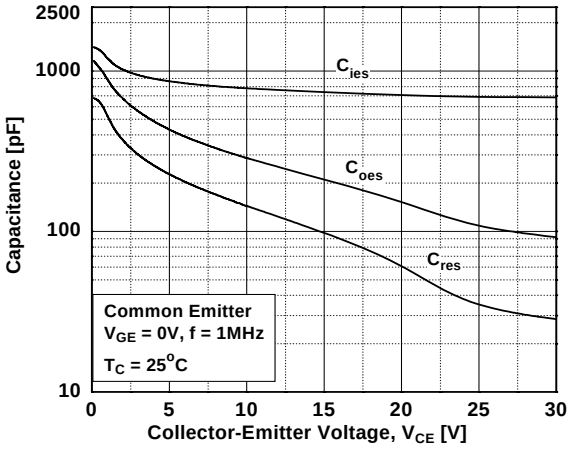


## Typical Performance Characteristics (Continued)

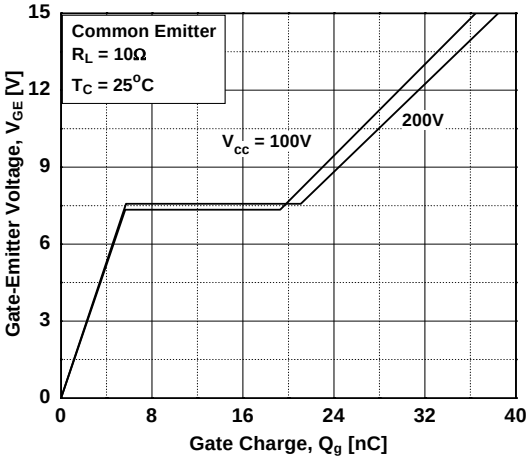
### Figure 7. Saturation Voltage vs. $V_{GE}$



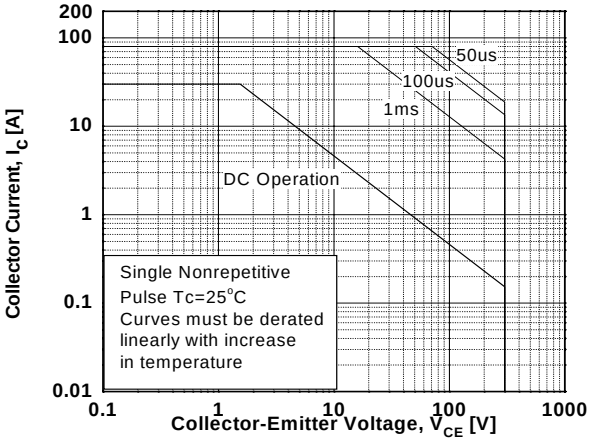

### Figure 8. Capacitance Characteristics



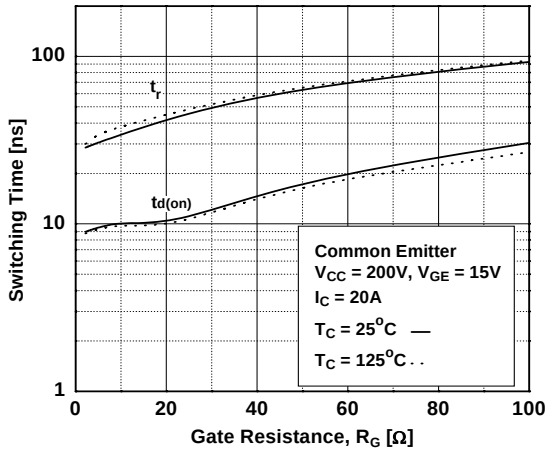

### Figure 9. Gate Charge Characteristics



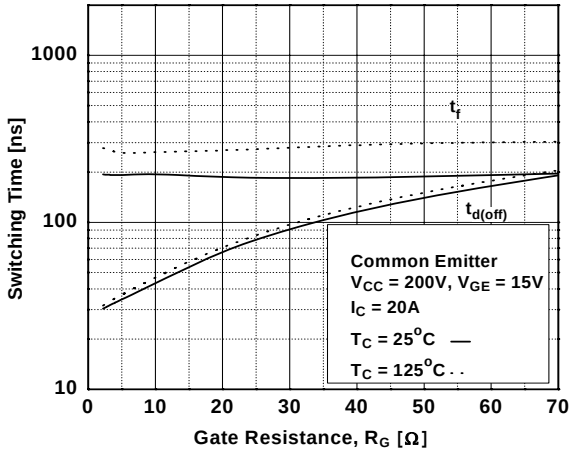

### Figure 10. SOA Characteristics




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




### Figure 12. Turn Off Characteristics vs. Gate Resistance



## Typical Performance Characteristics (Continued)

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

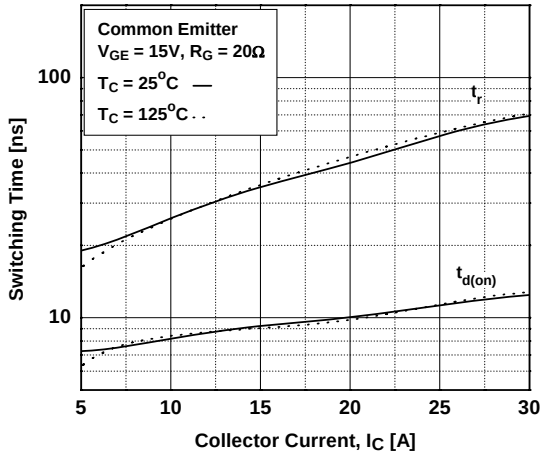



**Figure 14. Turn-Off Characteristics vs. Collector Current**

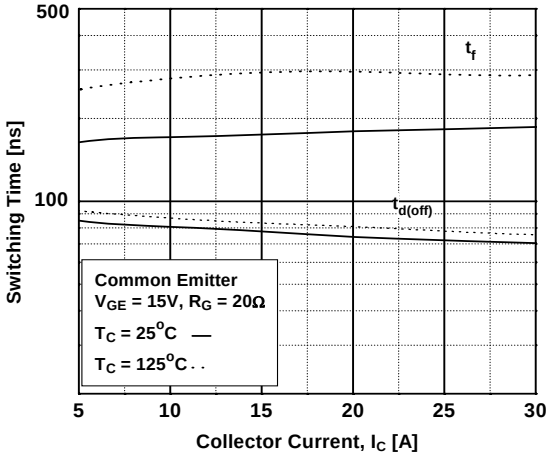



**Figure 15. Switching Loss vs Gate Resistance**

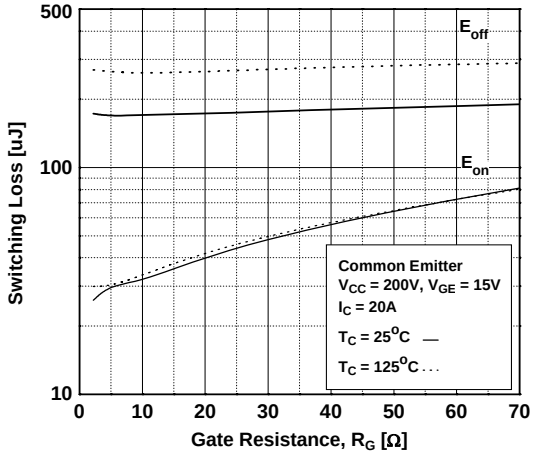



**Figure 16. Switching Loss vs Collector Current**

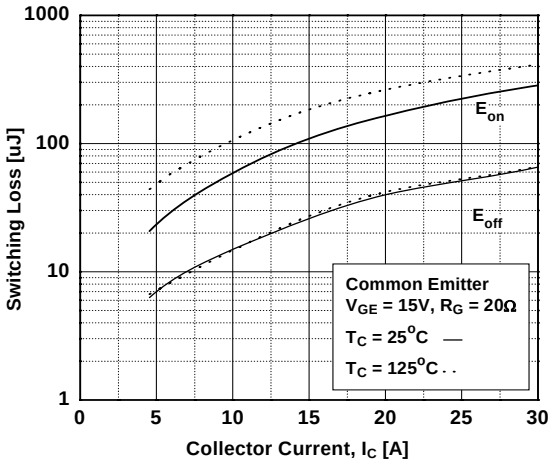
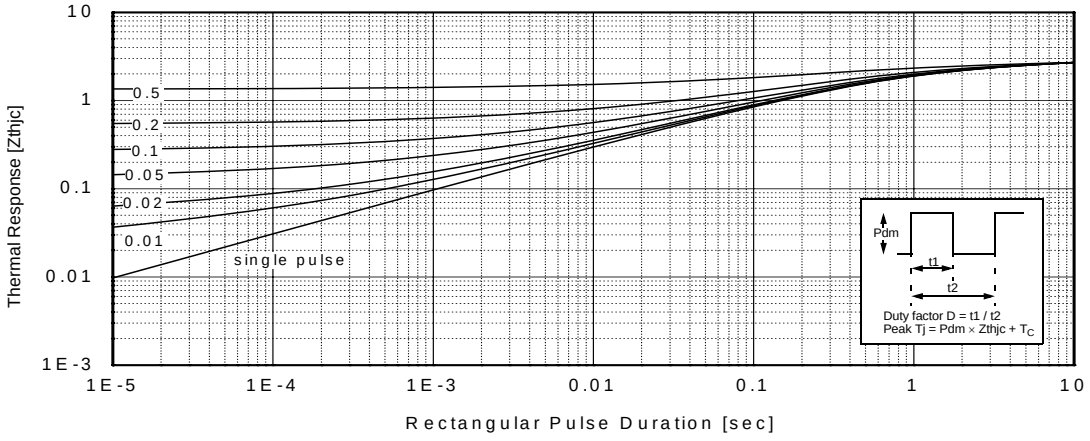



**Figure 17. Transient Thermal Impedance of IGBT**



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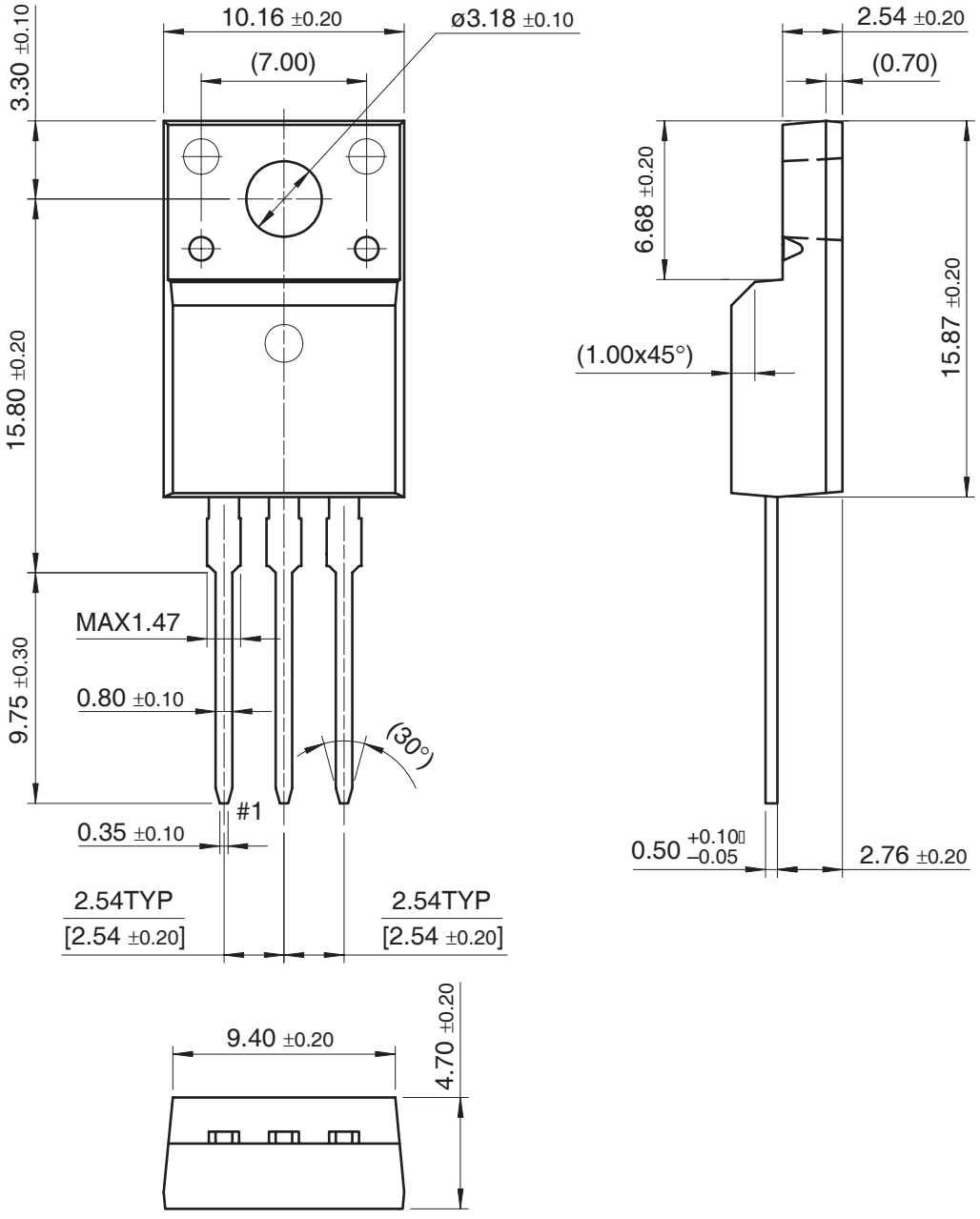
10.16 ±0.20
ø3.18 ±0.10
(7.00)
3.30 ±0.10
15.80 ±0.20
9.75 ±0.30
MAX1.47
0.80 ±0.10
(30°)
#1
0.35 ±0.10
2.54TYP
[2.54 ±0.20]
2.54TYP
[2.54 ±0.20]
9.40 ±0.20
4.70 ±0.20
2.54 ±0.20
(0.70)
6.68 ±0.20
15.87 ±0.20
(1.00x45°)
0.50 +0.10 −0.05
2.76 ±0.20

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