FAIRCHILD
SEMICONDUCTOR®

FGPF50N30T
300V, 50A PDP IGBT

Features

- High current capability
- Low saturation voltage: $V_{CE(sat)}$ =1.4V @ I_C = 30A
- High input impedance
- Fast switching
- RoHS compliant

Applications

- PDP System

General Description

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

100% LEAD-FREE IMPLEMENTATION

TO-220F

1.Gate   2.Collector   3.Emitter

C

G

E
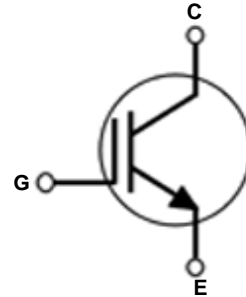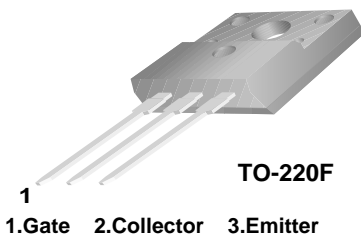
Absolute Maximum Ratings

Symbol	Description		Ratings	Units
V_{CES}	Collector to Emitter Voltage		300	V
V_{GES}	Gate to Emitter Voltage		± 30	V
$I_{CM (1)}$	Pulsed Collector Current	@ T_C = 25°C	120	A
P_D	Maximum Power Dissipation	@ T_C = 25°C	46.8	W
	Maximum Power Dissipation	@ T_C = 100°C	18.7	W
T_J	Operating Junction Temperature		-55 to +150	^{o}C
T_{stg}	Storage Temperature Range		-55 to +150	^{o}C
T_L	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds		300	^{o}C

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$(IGBT)	Thermal Resistance, Junction to Case	-	2.67	^{o}C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	62.5	^{o}C/W

Notes:
1: Repetitive test , Pulse width=100usec , Duty=0.1

* I_C_pluse limited by max Tj

Package Marking and Ordering Information

Device Marking	Device	Package	Packaging Type	Qty per Tube	Max Qty per Box
FGPF50N30T	FGPF50N30TTU	TO-220F	Rail / 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	300	-	-	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	-	-	250	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}	3.0	4.5	5.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C = 15A, V_{GE} = 15V	-	1.1	1.5	V
		I_C = 30A, V_{GE} = 15V	-	1.4	-	V
		I_C = 50A, V_{GE} = 15V, T_C = 25°C	-	1.65	-	V
		I_C = 50A, V_{GE} = 15V, T_C = 125°C	-	1.60	-	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	V_{CE} = 30V, V_{GE} = 0V, f = 1MHz	-	2320	-	pF
C_{oes}	Output Capacitance		-	92	-	pF
C_{res}	Reverse Transfer Capacitance		-	80	-	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 200V, I_C = 30A, R_G = 15Ω, V_{GE} = 15V, Resistive Load, T_C = 25°C	-	31	-	ns
t_r	Rise Time		-	78	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	156	-	ns
t_f	Fall Time		-	200	300	ns
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 200V, I_C = 30A, R_G = 15Ω, V_{GE} = 15V, Resistive Load, T_C = 125°C	-	30	-	ns
t_r	Rise Time		-	78	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	163	-	ns
t_f	Fall Time		-	260	-	ns
Q_g	Total Gate Charge	V_{CE} = 200V, I_C = 30A, V_{GE} = 15V	-	97	-	nC
Q_{ge}	Gate to Emitter Charge		-	15	-	nC
Q_{gc}	Gate to Collector Charge		-	41	-	nC

Typical Performance Characteristics

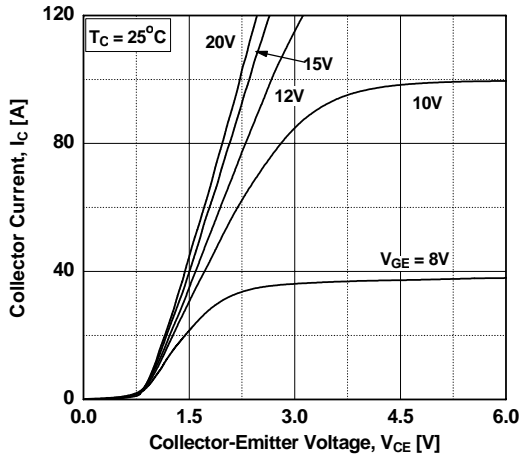### Figure 1. Typical Output Characteristics

Figure 2. Typical Output Characteristics
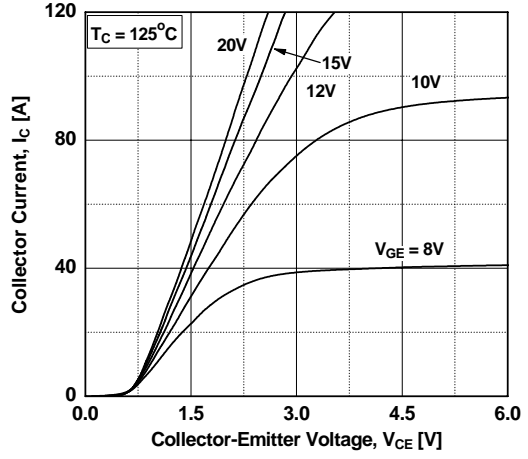

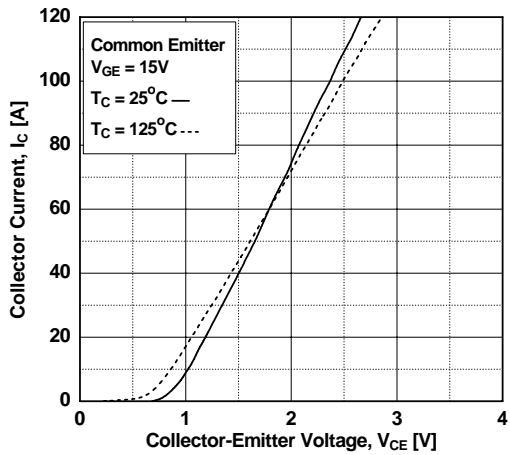### Figure 3. Typical Saturation Voltage Characteristics

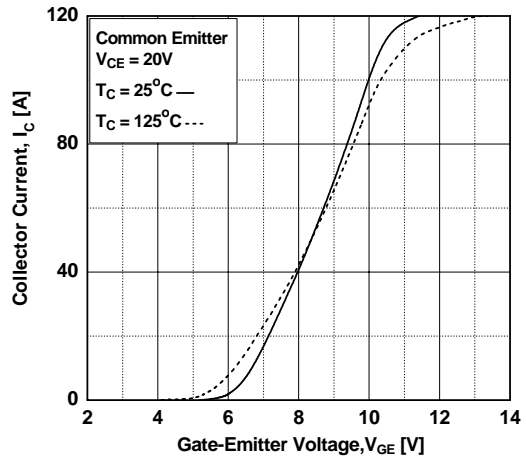### Figure 4. Transfer Characteristics

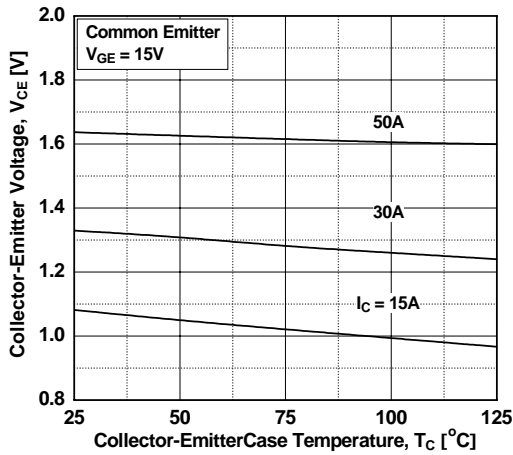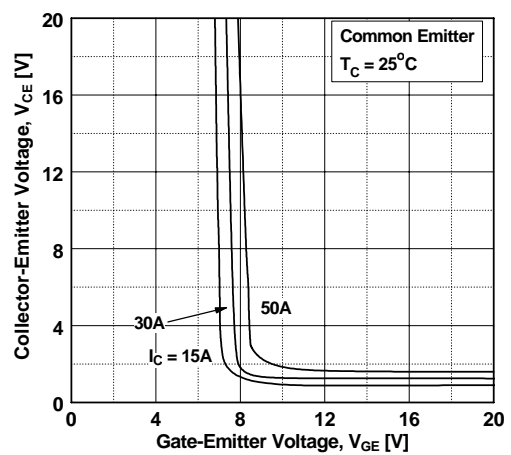### Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

Figure 6. Saturation Voltage vs. V_{GE}

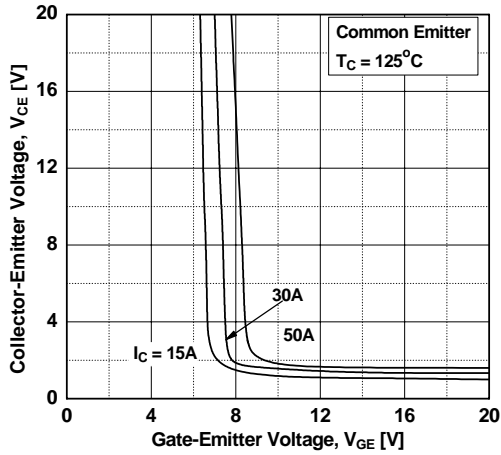# Typical Performance Characteristics

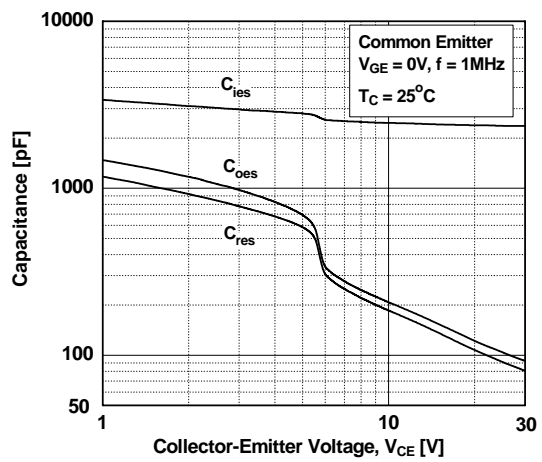### Figure 7. Saturation Voltage vs. V_{GE}

Figure 8. Capacitance Characteristics

Figure 9. Gate charge Characteristics
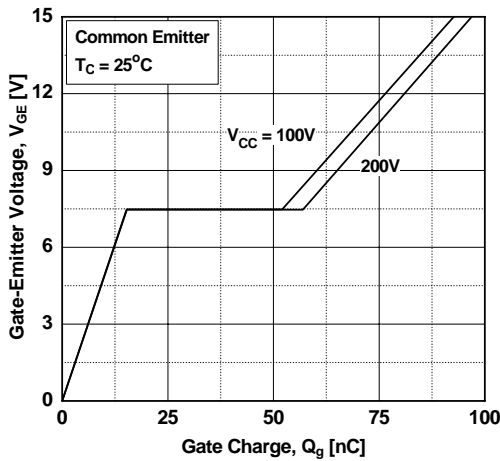
Figure 10. SOA Characteristics
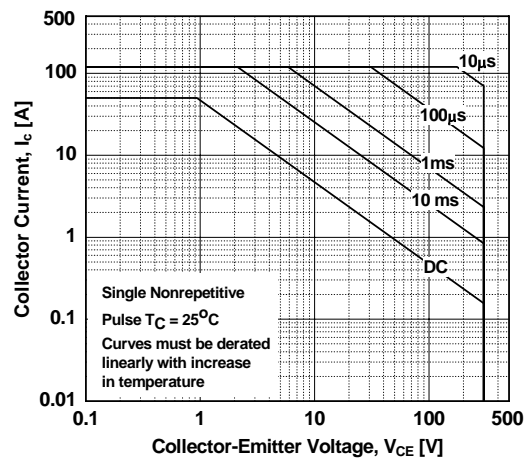
Figure 11. Turn-on Characteristics vs. Gate Resistance
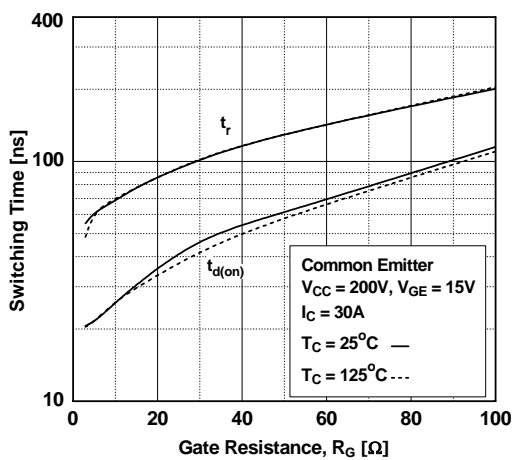
Figure 12. Turn-off Characteristics vs. Gate Resistance
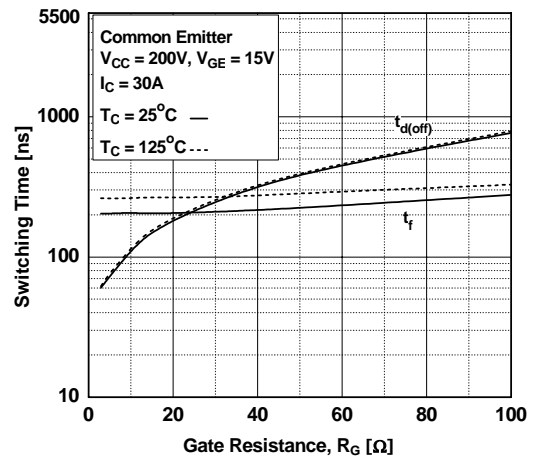
Typical Performance Characteristics
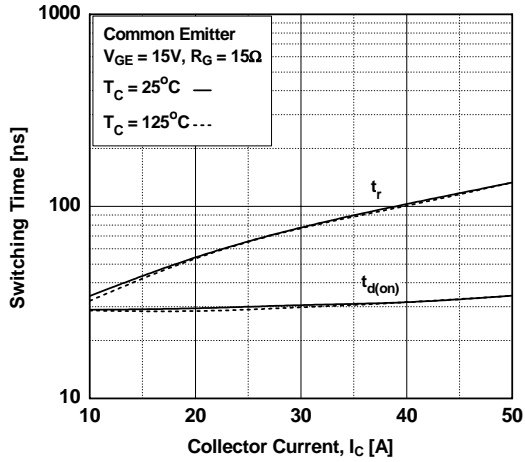
Figure 13. Turn-on Characteristics vs. Collector Current

Common Emitter
$V_{GE} = 15V$, $R_G = 15\Omega$
$T_C = 25^oC$ —
$T_C = 125^oC$ ···

Figure 14. Turn-off Characteristics vs. Collector Current

Common Emitter
$V_{GE} = 15V$, $R_G = 15\Omega$
$T_C = 25^oC$ —
$T_C = 125^oC$ ···
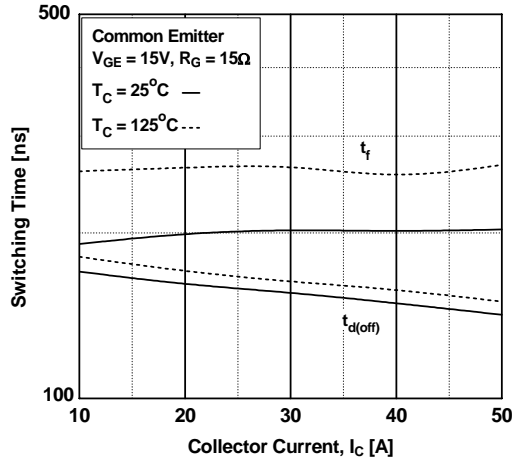
Figure 15. Switching Loss vs. Gate Resistance

Common Emitter
$V_{CC} = 200V$, $V_{GE} = 15V$
$I_C = 30A$
$T_C = 25^oC$ —
$T_C = 125^oC$ ···
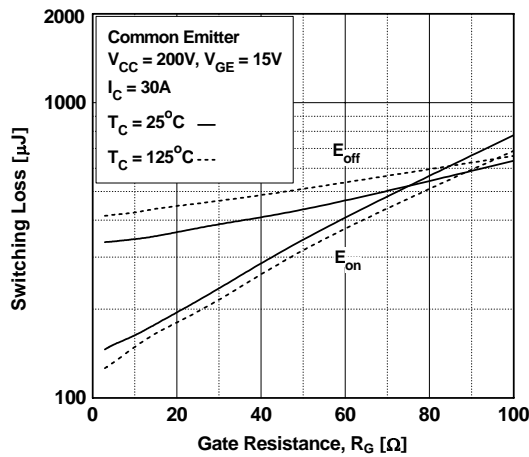
Figure 16. Switching Loss vs.Gate Resistance

Common Emitter
$V_{GE} = 15V$, $R_G = 15\Omega$
$T_C = 25^oC$ —
$T_C = 125^oC$ ···
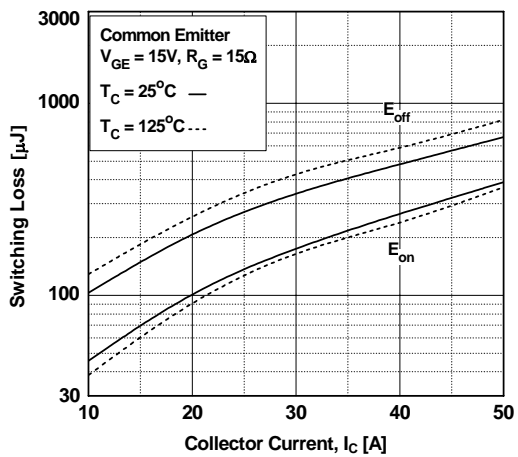
Figure 17.Transient Thermal Impedance of IGBT

Duty Factor, D = t1/t2
Peak T_j = Pdm x Zthjc + T_C
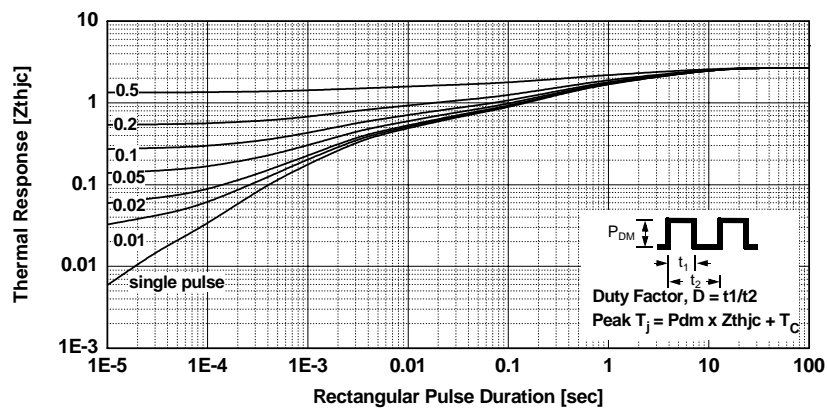
Mechanical Dimensions

TO-220F

10.16 ±0.20

(7.00)

ø3.18 ±0.10

3.30 ±0.10

15.80 ±0.20

MAX1.47

0.80 ±0.10

(30°)

#1

0.35 ±0.10

9.75 ±0.30

2.54TYP
[2.54 ±0.20]

2.54TYP
[2.54 ±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

9.40 ±0.20

4.70 ±0.20
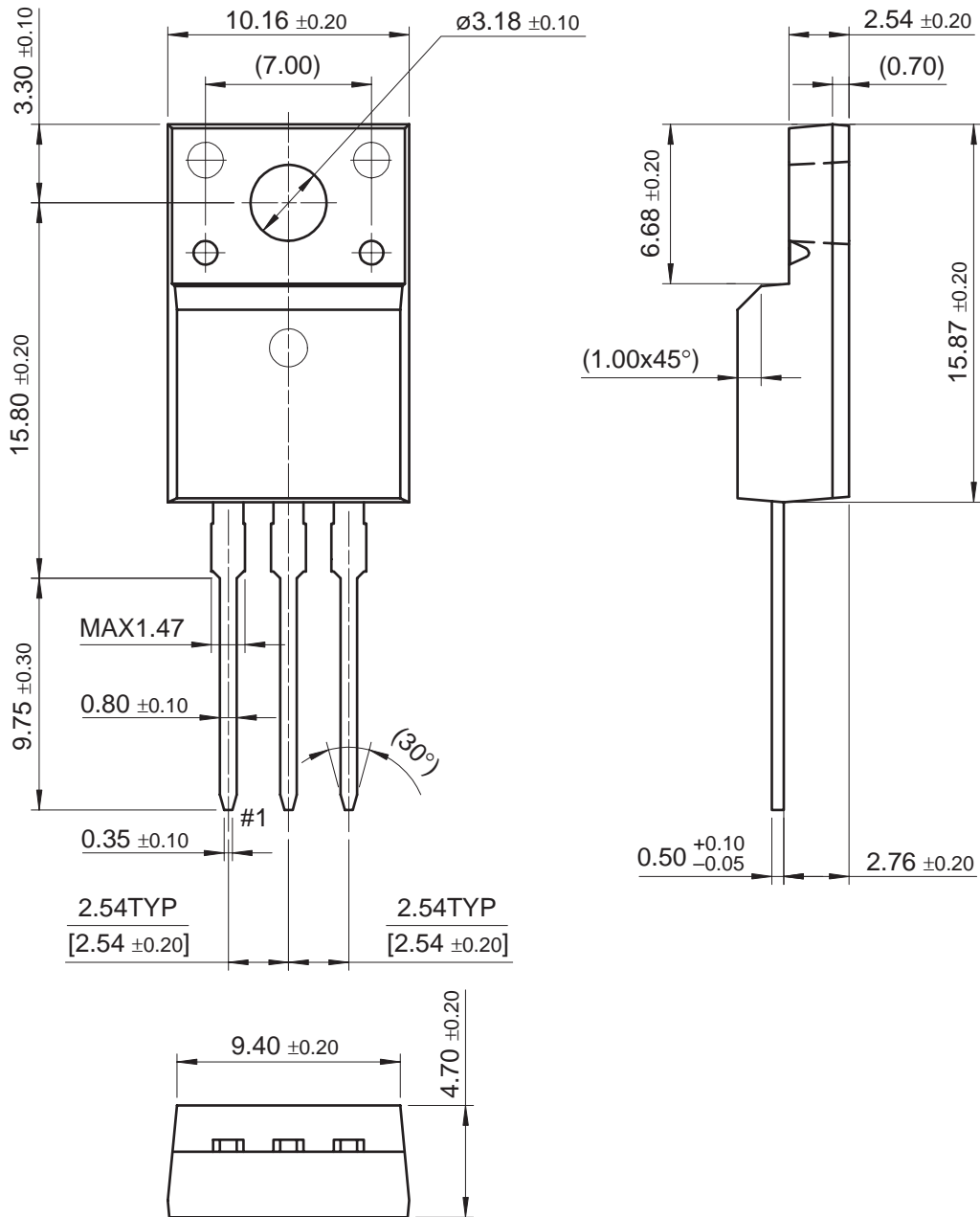
Dimensions in Millimeters

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EZSWITCH™ *	IntelliMAX™	QS™	TinyBuck™
EZ™	ISOPLANAR™	QT Optoelectronics™	TinyLogic®
	MegaBuck™	Quiet Series™	TINYOPTO™
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