



# FGPF30N30TD

## 300V, 30A PDP Trench IGBT

### Features

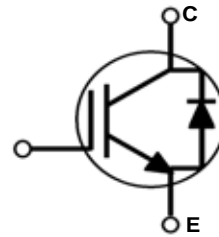
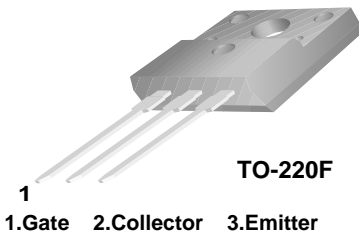
- High current capability
- Low saturation voltage:  $V_{CE(sat)} = 1.4V @ I_C = 20A$
- High input impedance
- Fast switching
- RoHS compliant

### 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.

### Applications

- PDP System



### Absolute Maximum Ratings

Symbol	Description	Ratings	Units
$V_{CES}$	Collector to Emitter Voltage	300	V
$V_{GES}$	Gate to Emitter Voltage	$\pm 30$	V
$I_{C\ pulse\ (1)}$	Pulsed Collector Current @ $T_C = 25^\circ C$	80	A
$I_F$	Diode Continuous Forward Current @ $T_C = 100^\circ C$	10	A
$I_{FM}$	Diode Maximum Forward Current	40	A
$P_D$	Maximum Power Dissipation @ $T_C = 25^\circ C$	44.6	W
	Maximum Power Dissipation @ $T_C = 100^\circ C$	17.8	W
$T_J$	Operating Junction Temperature	-55 to +150	$^\circ C$
$T_{stg}$	Storage Temperature Range	-55 to +150	$^\circ C$
$T_L$	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds	300	$^\circ C$

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}(IGBT)$	Thermal Resistance, Junction to Case	-	2.8	$^\circ C/W$
$R_{\theta JC}(DIODE)$	Thermal Resistance, Junction-to-Case for Diode	--	3.0	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	62.5	$^\circ C/W$

**Notes :**

(1) Repetitive tesse, Pulse width = 100usec, Duty = 0.1

\*  $I_{c\_pluse}$  limited by max  $T_J$

### Package Marking and Ordering Information

Device Marking	Device	Package	Packaging Type	Qty per Tube	Max Qty per Box
FGPF30N30TD	FGPF30N30TDTU	TO-220F	Rail / Tube	50ea	-

### Electrical Characteristics of the IGBT T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
<b>Off Characteristics</b>						
$V_{CES}$	Collector to Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 250\mu A$	300	-	-	V
$\frac{\Delta BV_{CES}}{\Delta T_J}$	Temperature Coefficient of Breakdown Voltage	$V_{GE} = 0V, I_C = 250\mu A$	-	0.26	-	V/°C
$I_{CES}$	Collector Cut-Off Current	$V_{CE} = V_{CES}, V_{GE} = 0V$	-	-	100	$\mu A$
$I_{GES}$	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0V$	-	-	±400	nA
<b>On Characteristics</b>						
$V_{GE(th)}$	G-E Threshold Voltage	$I_C = 250\mu A, V_{CE} = V_{GE}$	3.0	4.5	5.5	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
		$I_C = 30A, V_{GE} = 15V, T_C = 25^\circ C$	-	1.7	-	V
		$I_C = 30A, V_{GE} = 15V, T_C = 125^\circ C$	-	1.6	-	V
<b>Dynamic Characteristics</b>						
$C_{ies}$	Input Capacitance	$V_{CE} = 30V, V_{GE} = 0V, f = 1MHz$	-	1540	--	pF
$C_{oes}$	Output Capacitance		-	65	--	pF
$C_{res}$	Reverse Transfer Capacitance		-	55	--	pF
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 200V, I_C = 20A, R_G = 20\Omega, V_{GE} = 15V, \text{Inductive Load}, T_C = 25^\circ C$	-	22	--	ns
$t_r$	Rise Time		-	33	--	ns
$t_{d(off)}$	Turn-Off Delay Time		-	130	--	ns
$t_f$	Fall Time		-	180	300	ns
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 200V, I_C = 20A, R_G = 20\Omega, V_{GE} = 15V, \text{Inductive Load}, T_C = 125^\circ C$	-	21	--	ns
$t_r$	Rise Time		-	34	--	ns
$t_{d(off)}$	Turn-Off Delay Time		-	140	--	ns
$t_f$	Fall Time		-	260	--	ns
$Q_g$	Total Gate Charge	$V_{CE} = 200V, I_C = 20A, V_{GE} = 15V$	-	65	--	nC
$Q_{ge}$	Gate to Emitter Charge		-	10	--	nC
$Q_{gc}$	Gate to Collector Charge		-	26	--	nC

**Electrical Characteristics of DIODE**  $T_C = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units	
$V_{FM}$	Diode Forward Voltage	$I_F = 10\text{A}$	$T_C = 25^\circ\text{C}$	--	1.1	1.4	V
			$T_C = 125^\circ\text{C}$	--	0.9	--	
$t_{rr}$	Diode Reverse Recovery Time	$I_F = 10\text{A}$	$T_C = 25^\circ\text{C}$	--	22	--	ns
			$T_C = 125^\circ\text{C}$	--	35	--	
$I_{rr}$	Diode Peak Reverse Recovery Current	$dI/dt = 200\text{A}/\mu\text{s}$ Diode Forward Voltage	$T_C = 25^\circ\text{C}$	--	2.7	--	A
			$T_C = 125^\circ\text{C}$	--	5.6	--	
$Q_{rr}$	Diode Reverse Recovery Charge		$T_C = 25^\circ\text{C}$	--	29.7	--	nC
			$T_C = 125^\circ\text{C}$	--	98	--	

## Typical Performance Characteristics

Figure 1. Typical Output Characteristics

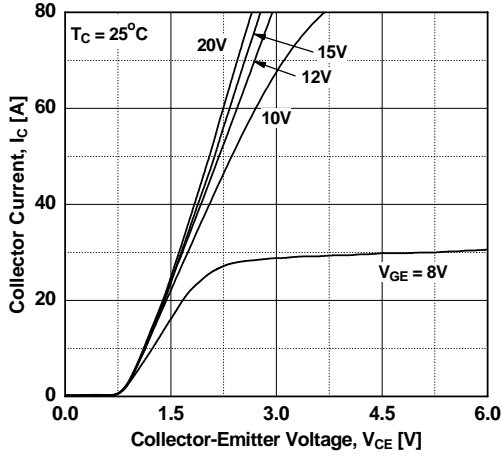


Figure 2. Typical Saturation Voltage Characteristics

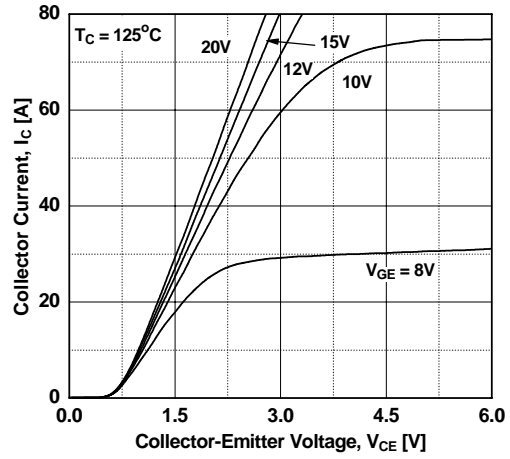


Figure 3. Typical Saturation Voltage Characteristics

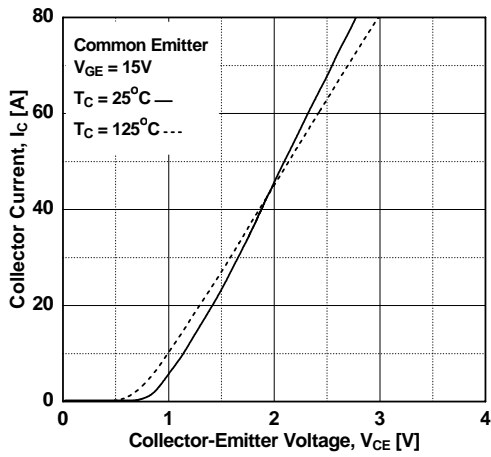


Figure 4. Transfer Characteristics

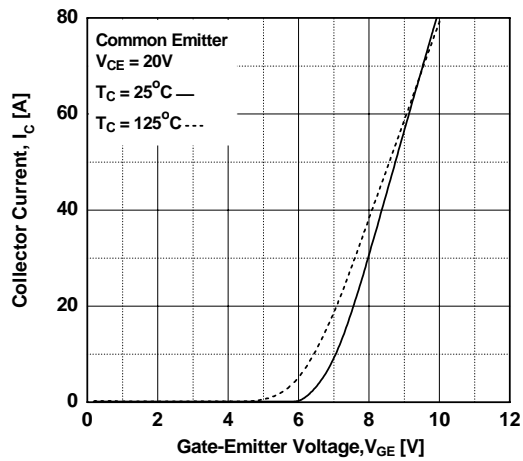


Figure 5. Saturation Voltage vs. Case

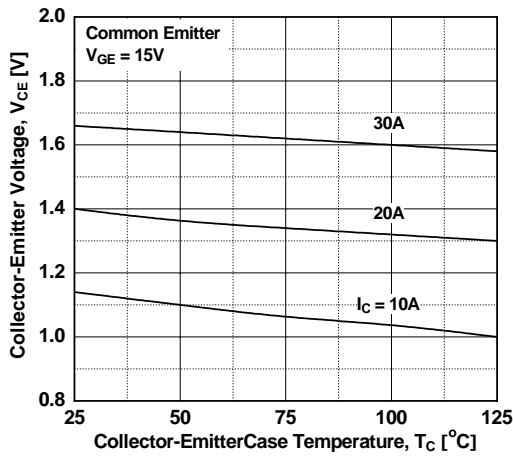
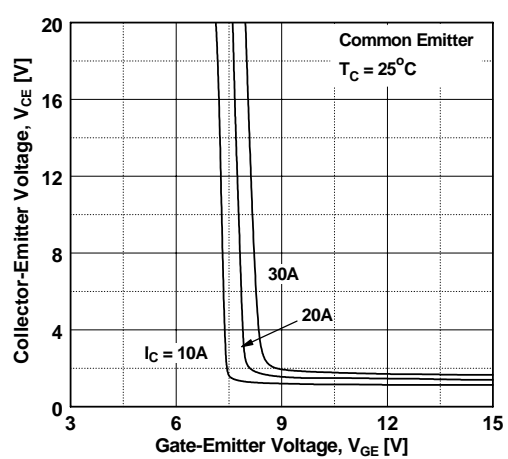
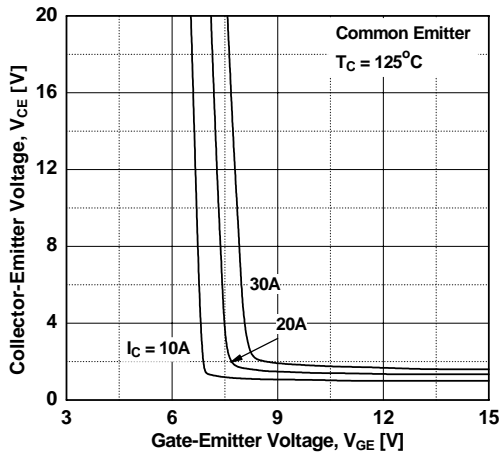


Figure 6. Saturation Voltage vs. Vge

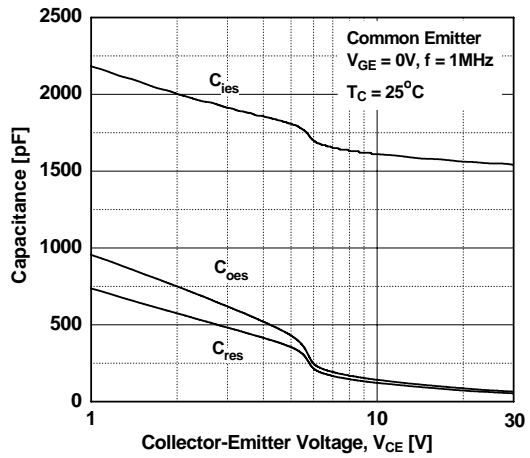


**Typical Performance Characteristics** (Continued)

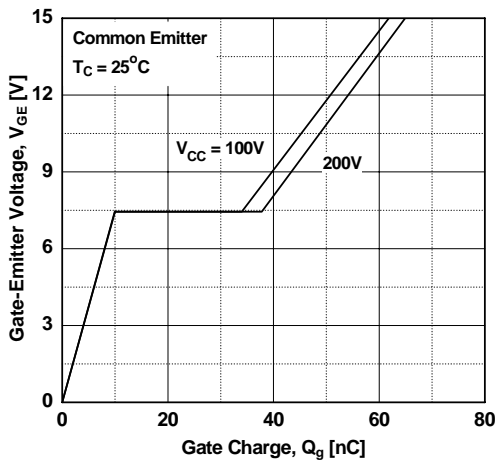
**Figure 7. Saturation Voltage vs. V<sub>GE</sub>**



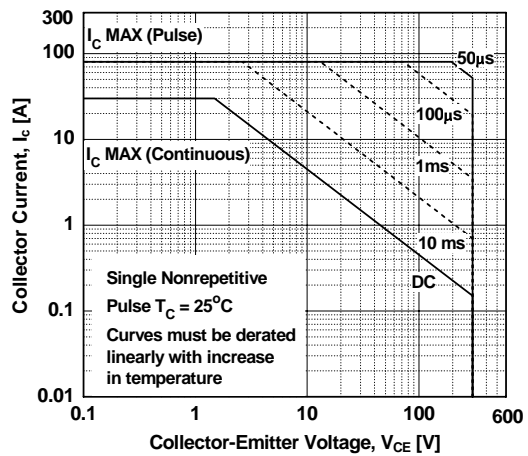
**Figure 8. Capacitance Characteristics**



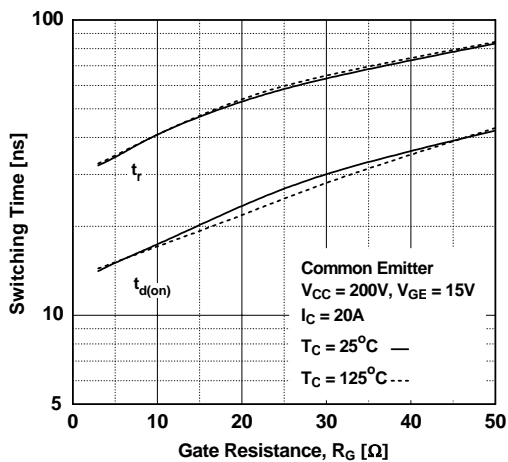
**Figure 9. Gate Charge Characteristics**



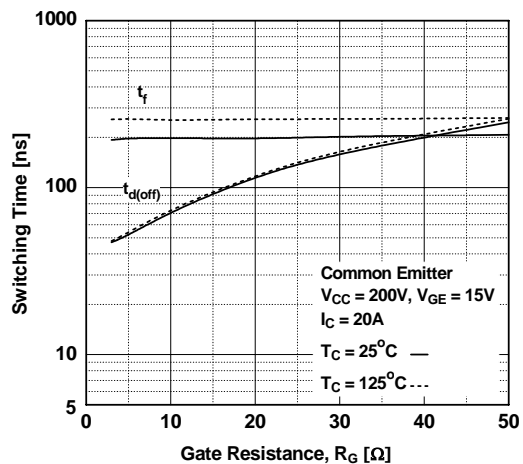
**Figure 10. SOA Characteristics**



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

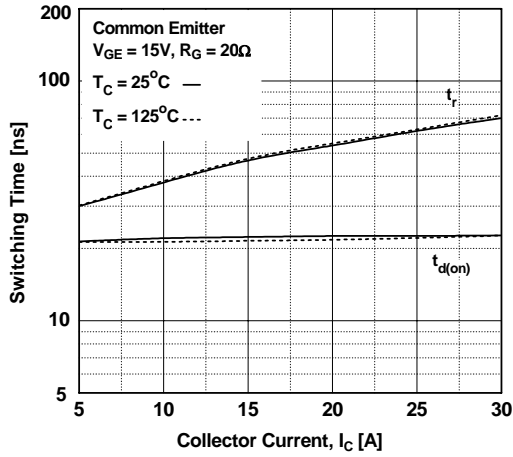


**Figure 12. Turn-Off Characteristics vs. Gate Resistance**

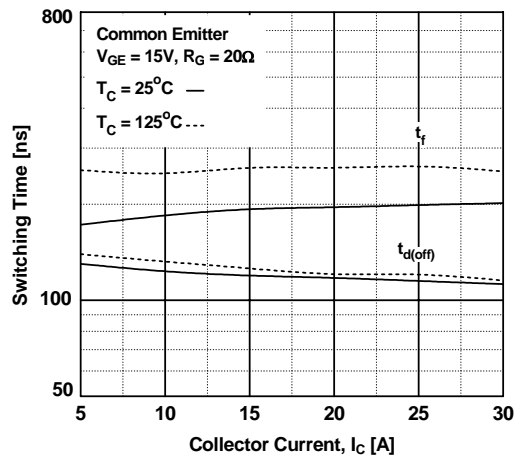


**Typical Performance Characteristics (Continued)**

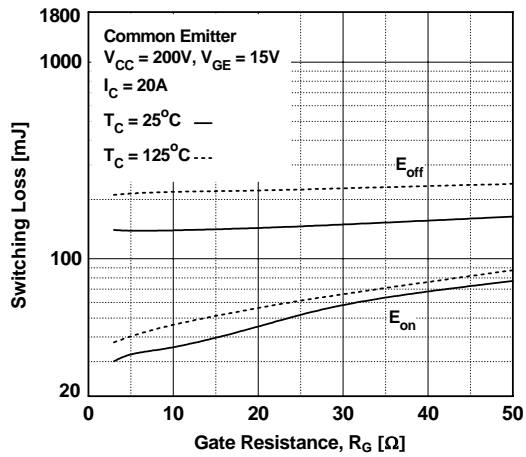
**Figure 13. Turn-On Characteristics vs. Collector Current**



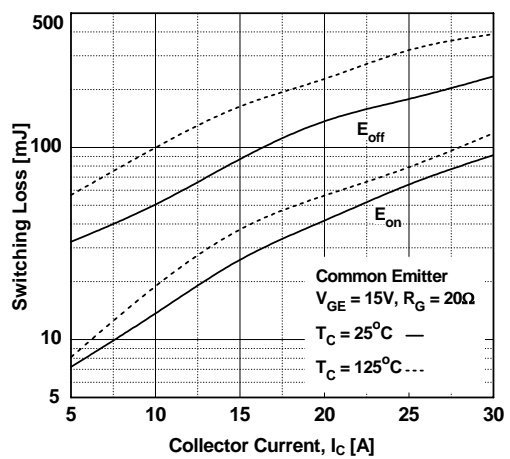
**Figure 14. Turn-Off Characteristics vs. Collector Current**



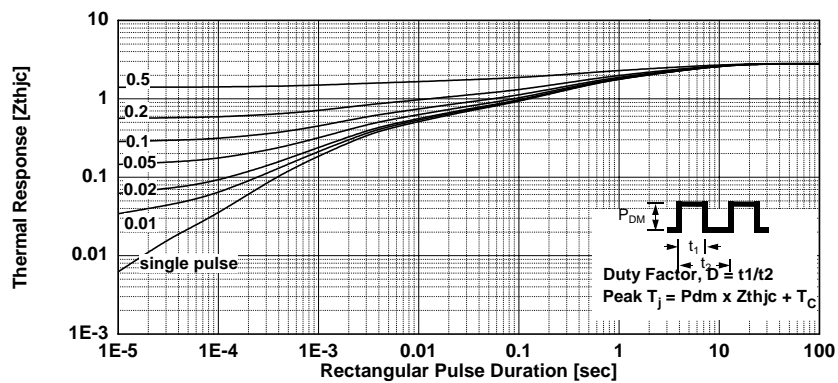
**Figure 15. Switching Loss vs Gate Resistance**



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



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



Typical Performance Characteristics (Continued)

Figure 18. Forward Characteristics

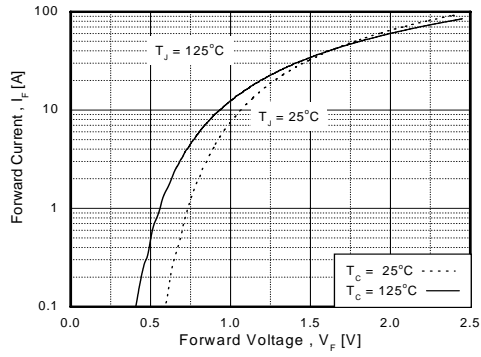
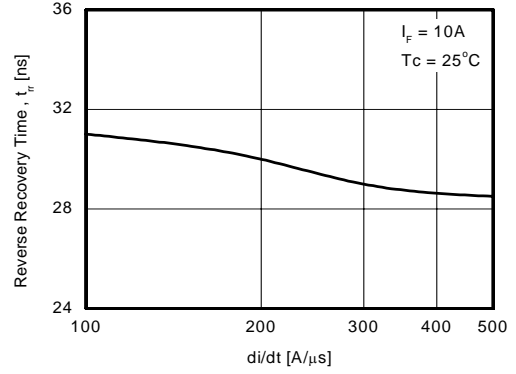
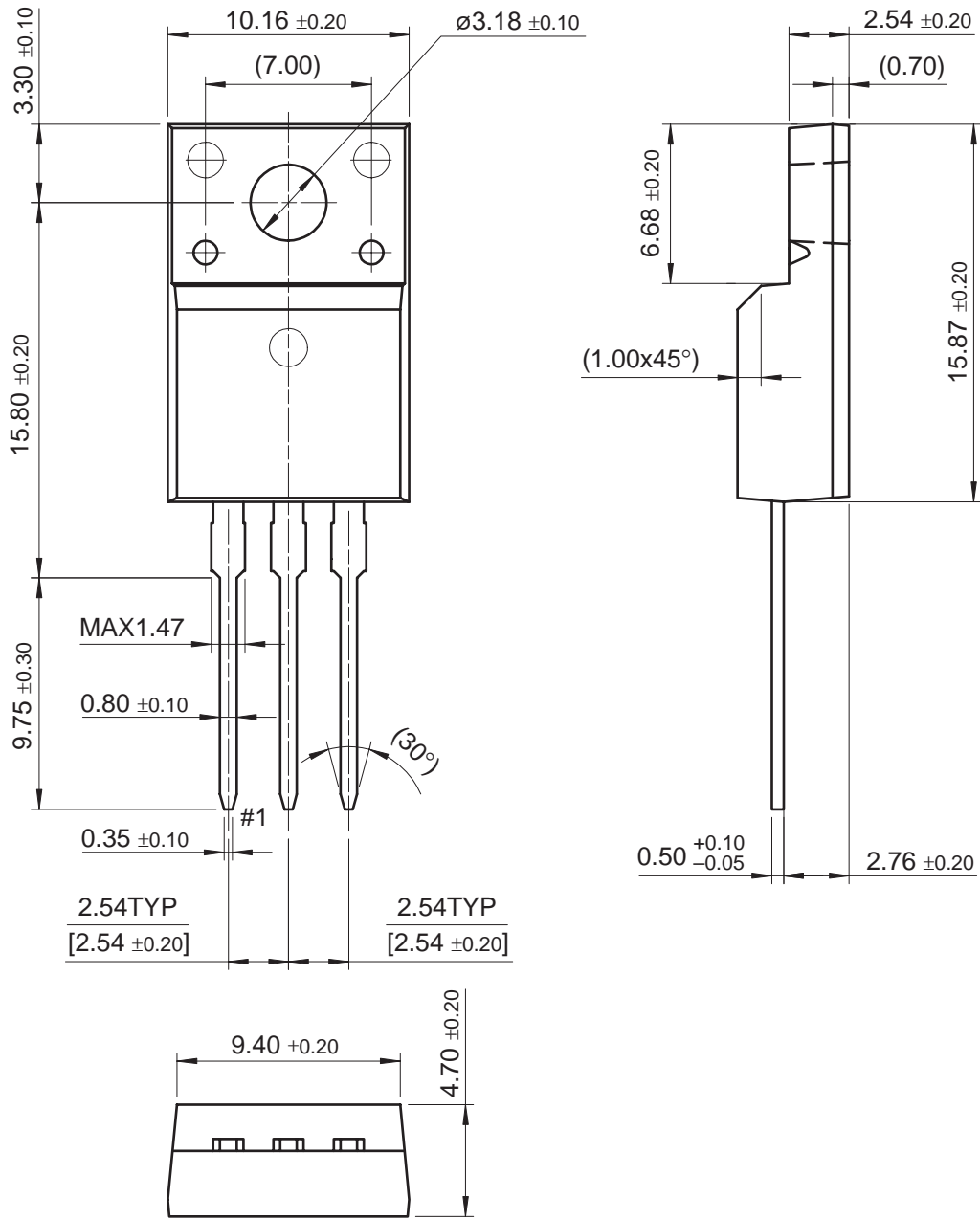


Figure 19. Typical Reverse Recovery Time



Mechanical Dimensions

TO-220F



Dimensions in Millimeters





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