



FGPF30N30TD

300V, 30A PDP Trench IGBT

Features

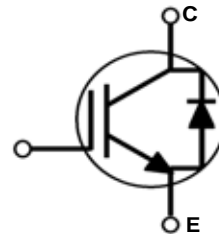
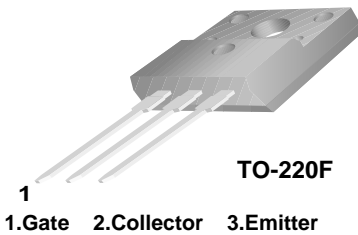
- High current capability
- Low saturation voltage: $V_{CE(sat)} = 1.4V @ I_C = 20A$
- High input impedance
- Fast switching
- RoHS compliant

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	± 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 pulse, Pulse width = 100usec, Duty = 0.1

* I_{c_pulse} 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_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{CES}	Collector to Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 250\mu A$	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	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	$I_C = 250\mu A, V_{CE} = V_{GE}$	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
Dynamic Characteristics						
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
Switching Characteristics						
$t_{d(on)}$	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

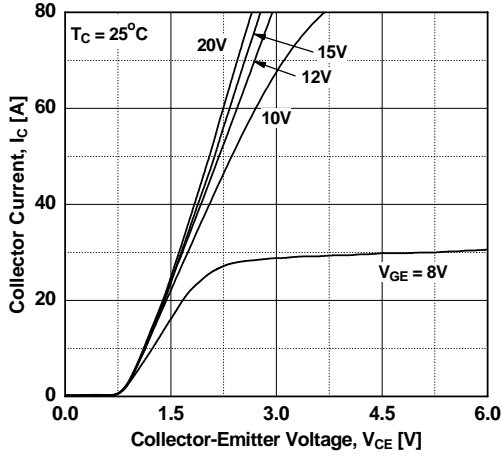


Figure 2. Typical Saturation Voltage Characteristics

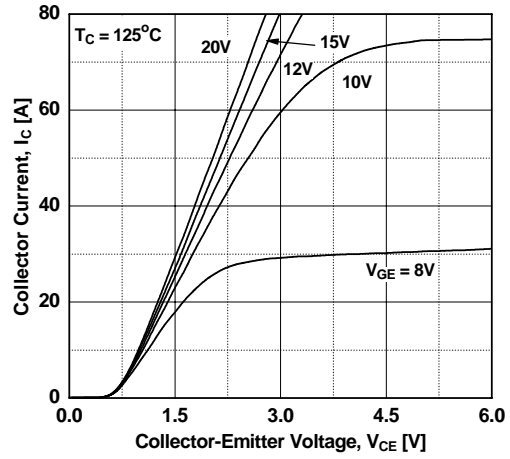


Figure 3. Typical Saturation Voltage Characteristics

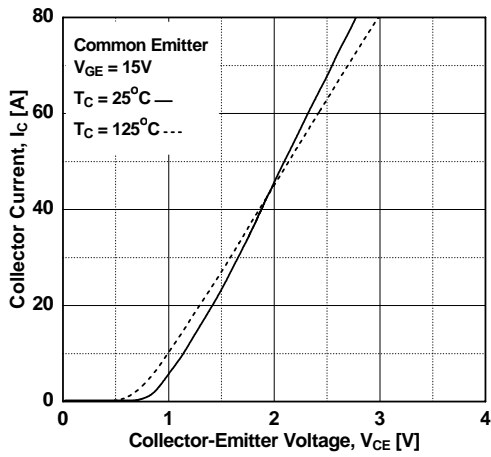


Figure 4. Transfer Characteristics

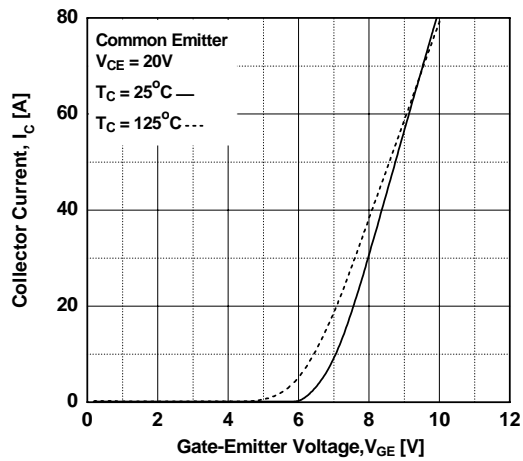


Figure 5. Saturation Voltage vs. Case

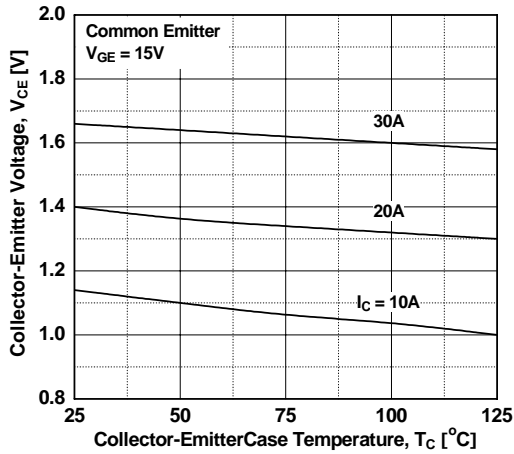
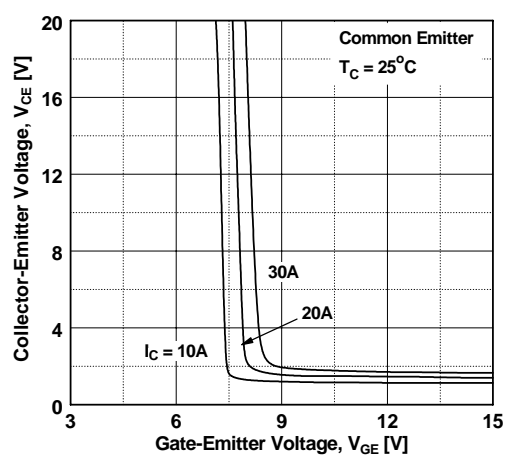


Figure 6. Saturation Voltage vs. Vge



Typical Performance Characteristics (Continued)

Figure 7. Saturation Voltage vs. V_{GE}

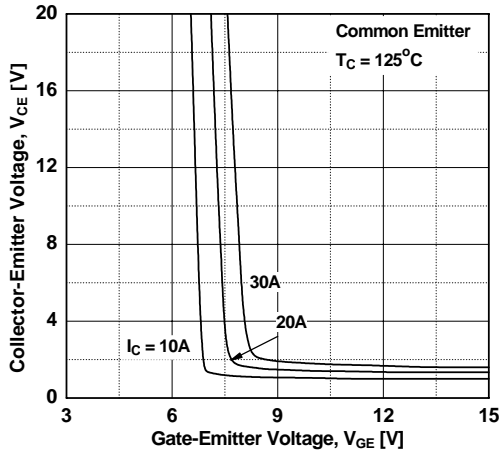


Figure 8. Capacitance Characteristics

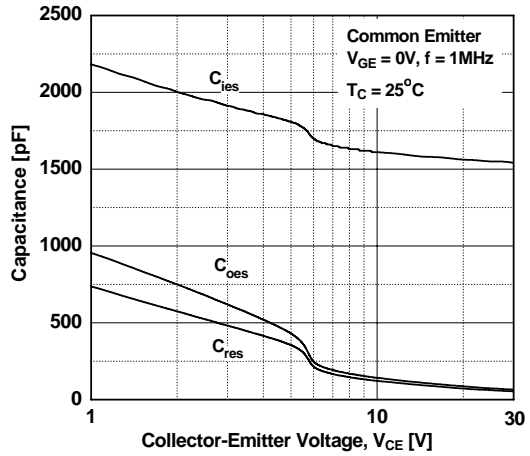


Figure 9. Gate Charge Characteristics

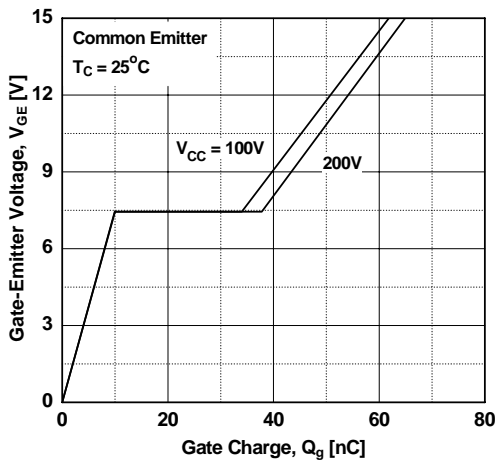


Figure 10. SOA Characteristics

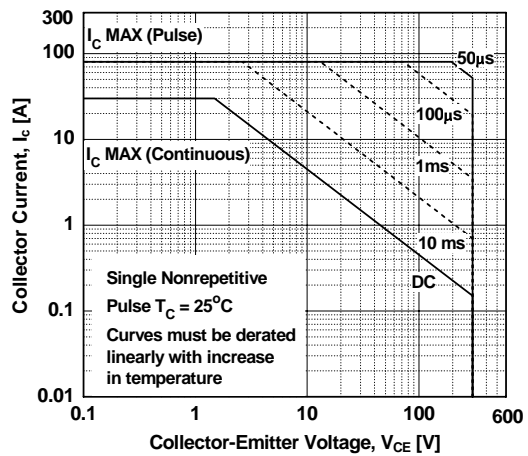


Figure 11. Turn-On Characteristics vs. Gate Resistance

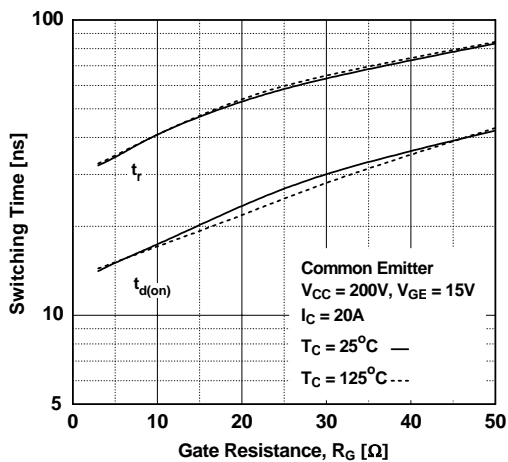
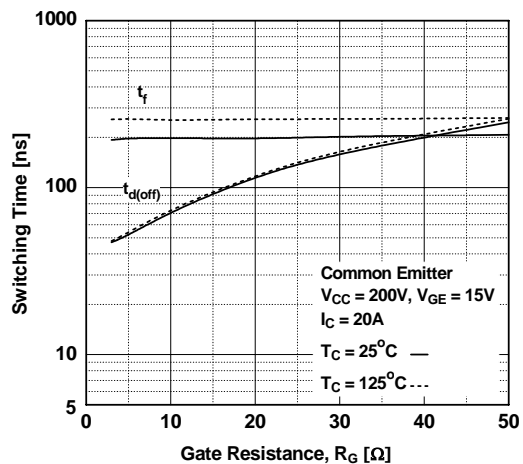


Figure 12. Turn-Off Characteristics vs. Gate Resistance



Typical Performance Characteristics (Continued)

Figure 13. Turn-On Characteristics vs. Collector Current

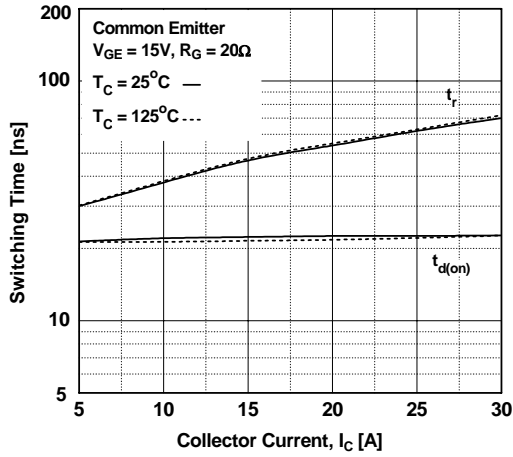


Figure 14. Turn-Off Characteristics vs. Collector Current

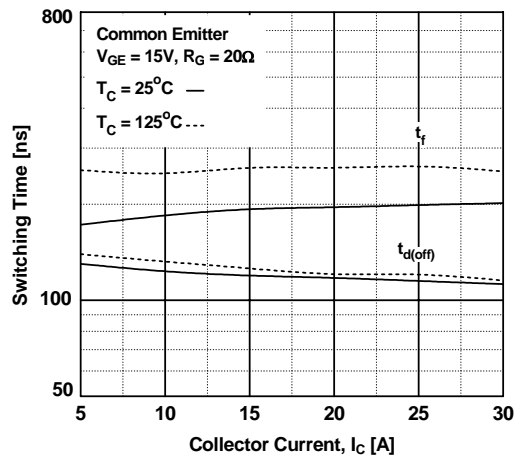


Figure 15. Switching Loss vs Gate Resistance

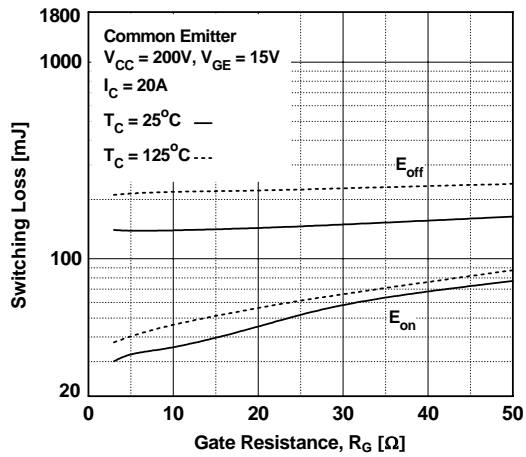


Figure 16. Switching Loss vs Collector Current

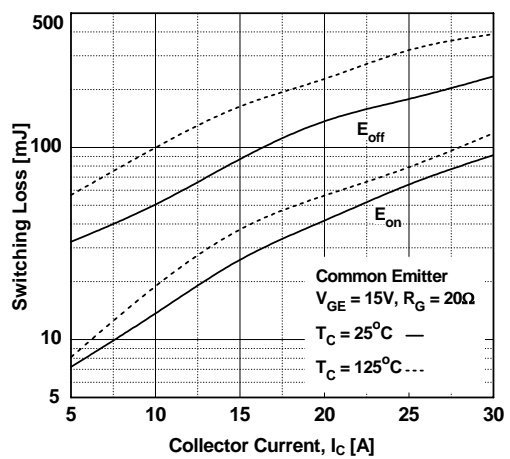
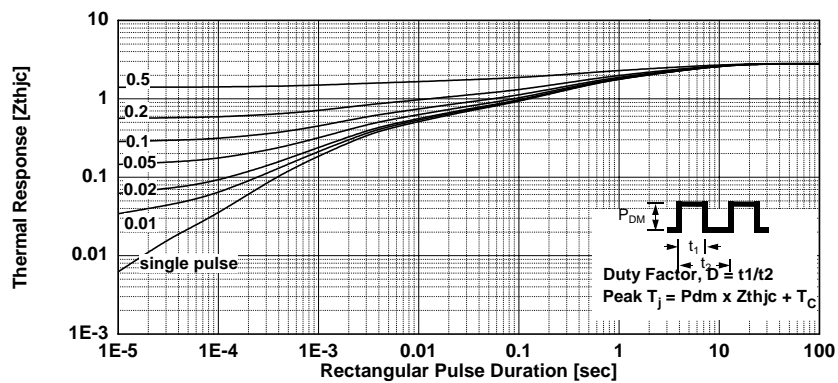


Figure 17. Transient Thermal Impedance of IGBT



Typical Performance Characteristics (Continued)

Figure 18. Forward Characteristics

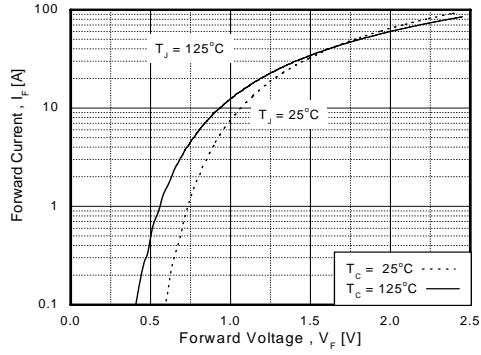
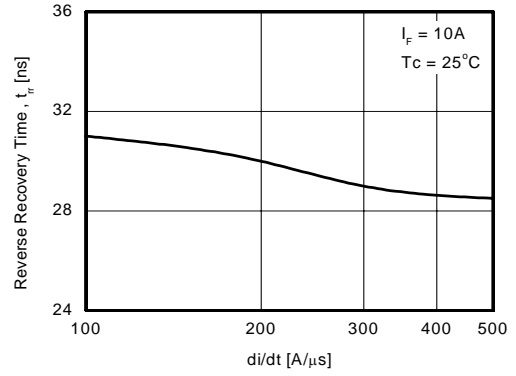
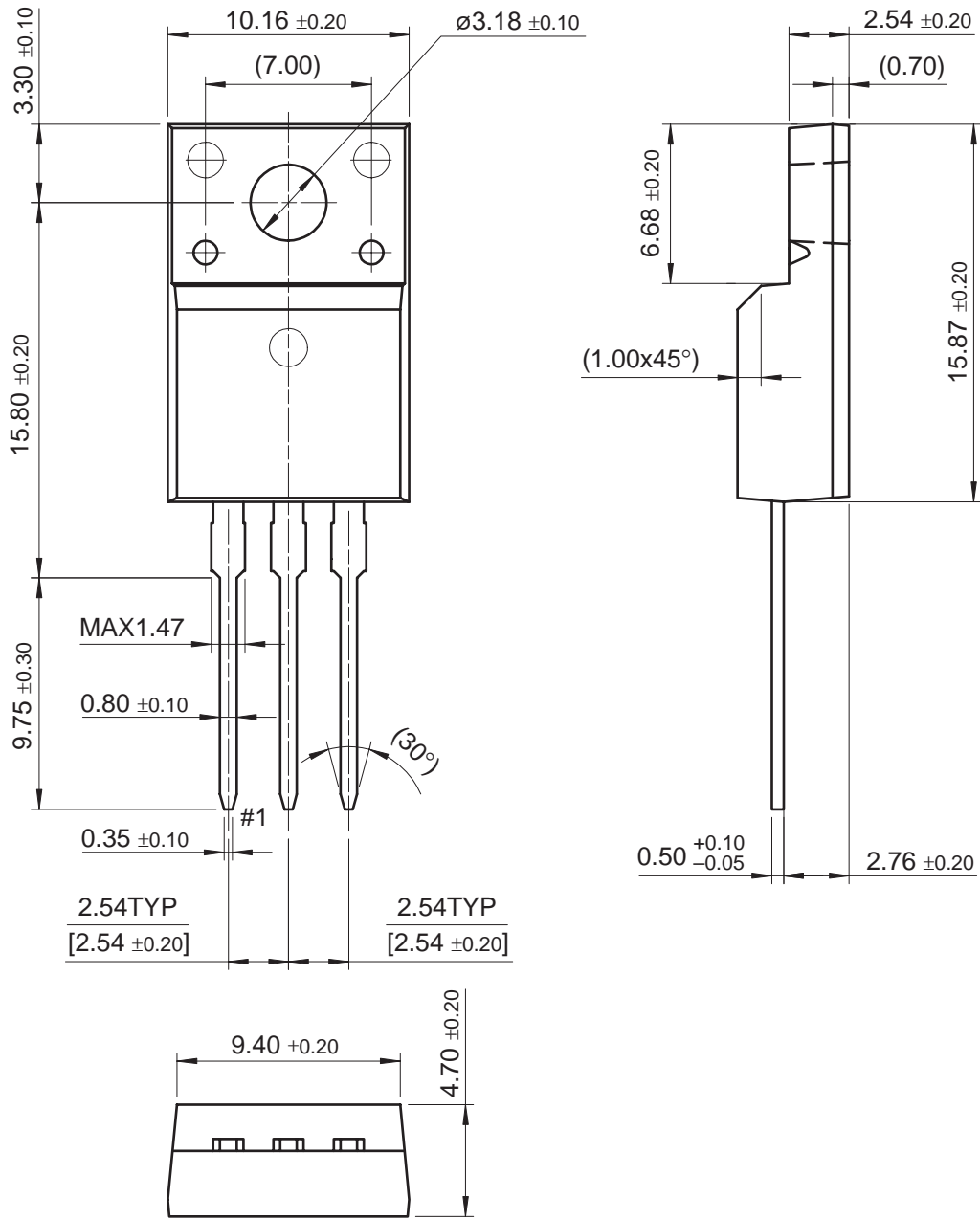


Figure 19. Typical Reverse Recovery Time



Mechanical Dimensions

TO-220F



Dimensions in Millimeters



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Rev. I29