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FGPF70N30TD 300V, 70A PDP IGBT



Features

- High current capability
- Low saturation voltage: $V_{CE(sat)} = 1.5V @ I_C = 40A$
- High input impedance
- Fast switching
- RoHS compliant

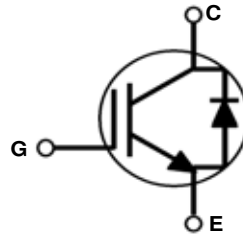
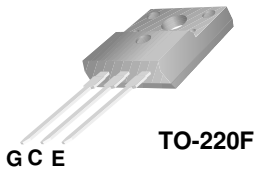


General Description

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.

Application

- PDP System



Absolute Maximum Ratings

Symbol	Description	Ratings	Units
V_{CES}	Collector-Emitter Voltage	300	V
V_{GES}	Gate-Emitter Voltage	± 30	V
$I_C \text{ pulse}(1)^*$	Pulsed Collector Current @ $T_C = 25^\circ C$	160	A
P_D	Maximum Power Dissipation @ $T_C = 25^\circ C$	49.2	W
	Maximum Power Dissipation @ $T_C = 100^\circ C$	19.7	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
$R_{\theta JC}(\text{IGBT})$	Thermal Resistance, Junction-to-Case	--	2.54	$^\circ C/W$
$R_{\theta JC}(\text{DIODE})$	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 test, pulse width = 100usec, Duty = 0.1
* $I_C \text{ pulse}$ limited by max T_J

Package Marking and Ordering Information

Device Marking	Device	Package	Packaging Type	Qty per Tube	Max Qty per Box
FGPF70N30TD	FGPF70N30TDTU	TO-220F	Tube	50ea	-

Electrical Characteristics T_C = 25°C 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
ΔBV _{CES} / ΔT _J	Temperature Coefficient of Breakdown Voltage	V _{GE} = 0V, I _C = 250uA	--	0.2	--	V/°C
I _{CES}	Collector Cut-Off Current	V _{CE} = V _{CES} , V _{GE} = 0V	--	--	250	uA
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 = 250uA, V _{CE} = V _{GE}	3.0	4.5	5.5	V
V _{CE(sat)}	Collector to Emitter Saturation Voltage	I _C = 20A, V _{GE} = 15V	--	1.2	1.5	V
		I _C = 40A, V _{GE} = 15V	--	1.5	--	V
		I _C = 70A, V _{GE} = 15V T _C = 25°C	--	1.8	--	V
		I _C = 70A, V _{GE} = 15V T _C = 125°C	--	1.9	--	V
Dynamic Characteristics						
C _{ies}	Input Capacitance	V _{CE} = 30V, V _{GE} = 0V f = 1MHz	--	3000	--	pF
C _{oes}	Output Capacitance		--	160	--	pF
C _{res}	Reverse Transfer Capacitance		--	110	--	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{CC} = 200V, I _C = 40A R _G = 15Ω, V _{GE} = 15V Resistive Load, T _C = 25°C	--	32	--	ns
t _r	Rise Time		--	90	--	ns
t _{d(off)}	Turn-Off Delay Time		--	175	--	ns
t _f	Fall Time	V _{CC} = 200V, I _C = 40A R _G = 15Ω, V _{GE} = 15V Resistive Load, T _C = 125°C	--	170	300	ns
t _{d(on)}	Turn-On Delay Time		--	30	--	ns
t _r	Rise Time		--	90	--	ns
t _{d(off)}	Turn-Off Delay Time		--	185	--	ns
t _f	Fall Time	V _{CE} = 200V, I _C = 40A V _{GE} = 15V	--	235	--	ns
Q _g	Total Gate Charge		--	125	--	nC
Q _{ge}	Gate-Emitter Charge		--	25	--	nC
Q _{gc}	Gate-Collector Charge	--	55	--	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	$I_F = 10\text{A}$	$T_C = 25^\circ\text{C}$	--	21	--	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	$T_C = 25^\circ\text{C}$	--	2.8	--	A
			$T_C = 125^\circ\text{C}$	--	5.6	--	
Q_{rr}	Diode Reverse Recovery Charge		$T_C = 25^\circ\text{C}$	--	29.4	--	nC
			$T_C = 125^\circ\text{C}$	--	98	--	

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

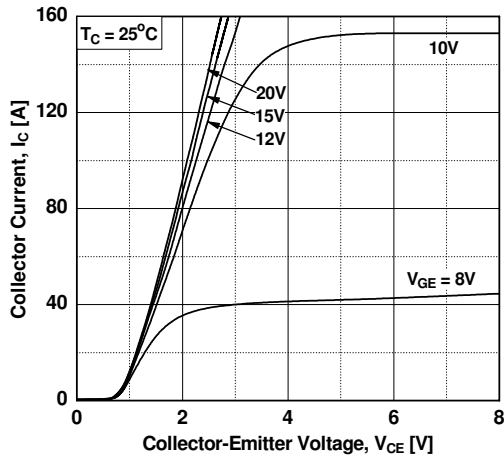


Figure 2. Typical Output Characteristics

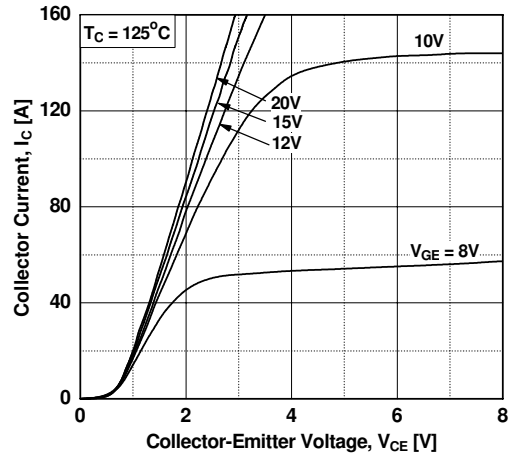


Figure 3. Typical Saturation Voltage Characteristics

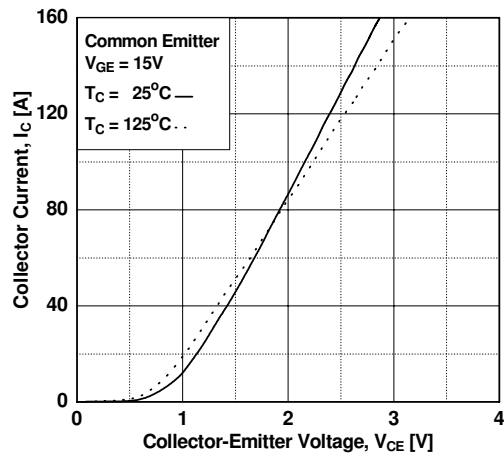


Figure 4. Transfer Characteristics

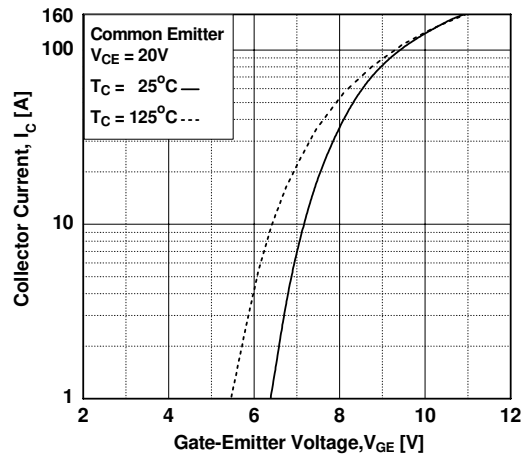


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

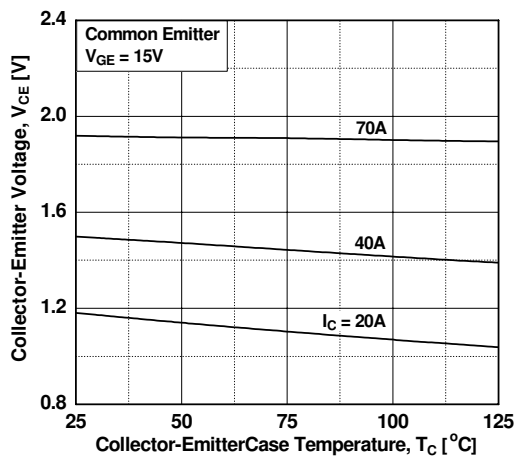
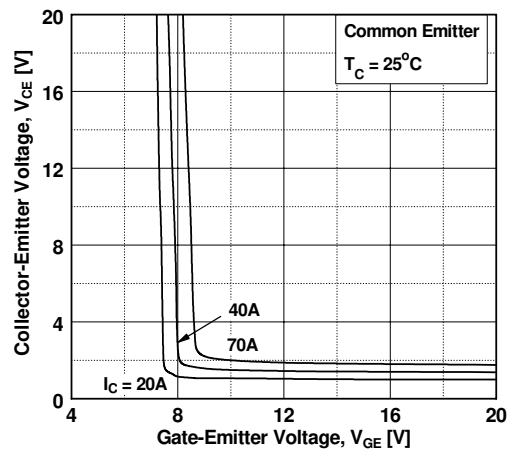


Figure 6. Saturation Voltage vs. Vge



Typical Performance Characteristics (Continued)

Figure 7. Saturation Voltage vs. V_{GE}

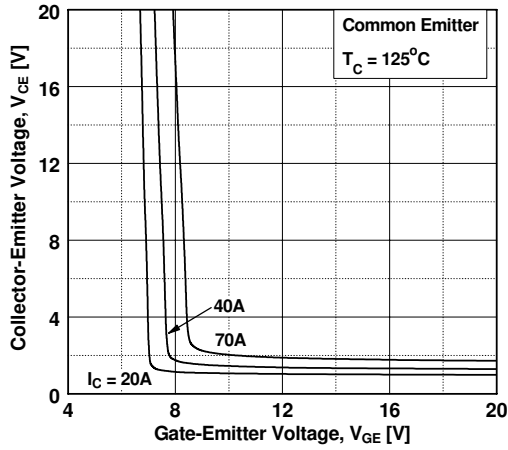


Figure 8. Capacitance Characteristics

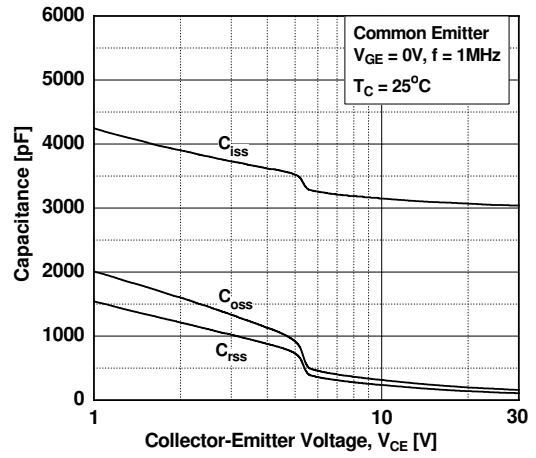


Figure 9. Gate Charge Characteristics

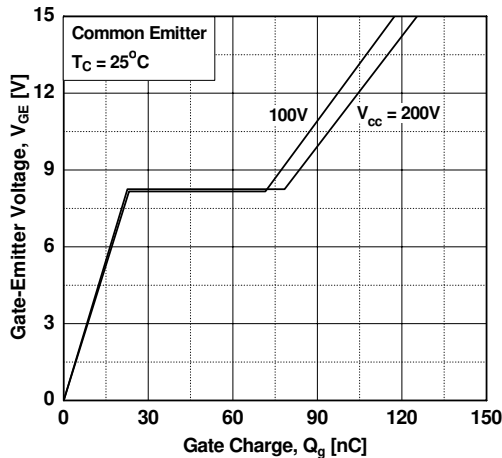


Figure 10. SOA Characteristics

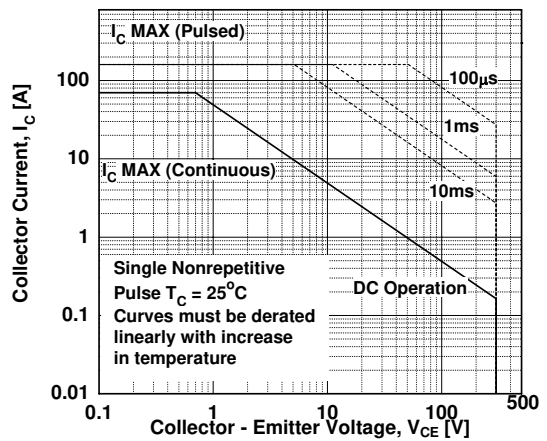


Figure 11. Turn-on Characteristics vs. Gate Resistance

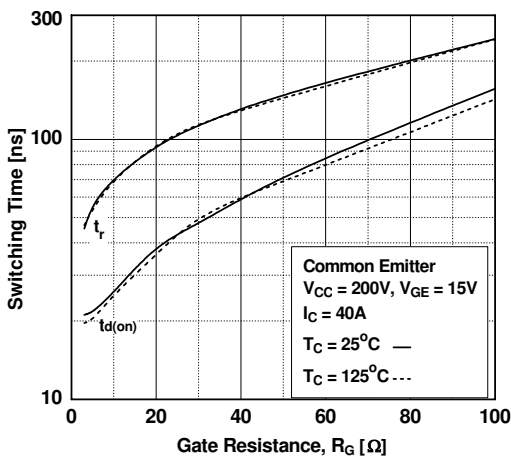
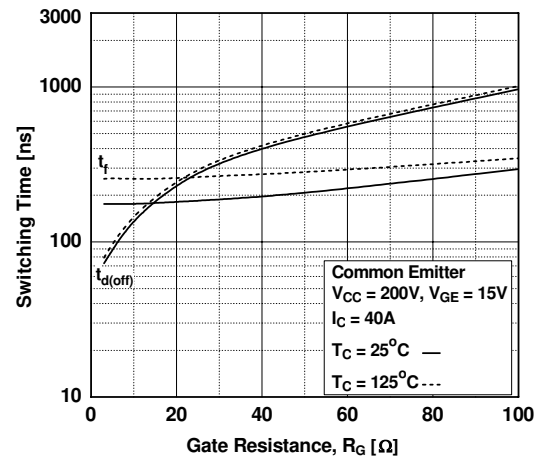


Figure 12. Turn-off Characteristics vs. Gate Resistance



Typical Performance Characteristics (Continued)

Figure 13. Turn-on Characteristics vs. Collector Current

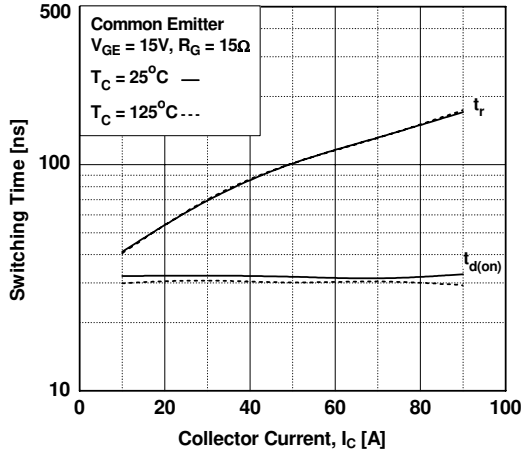


Figure 14. Turn-off Characteristics vs. Collector Current

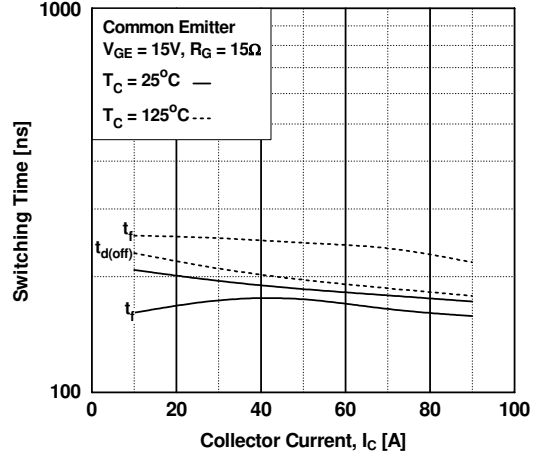


Figure 15. Switching Loss vs. Gate Resistance

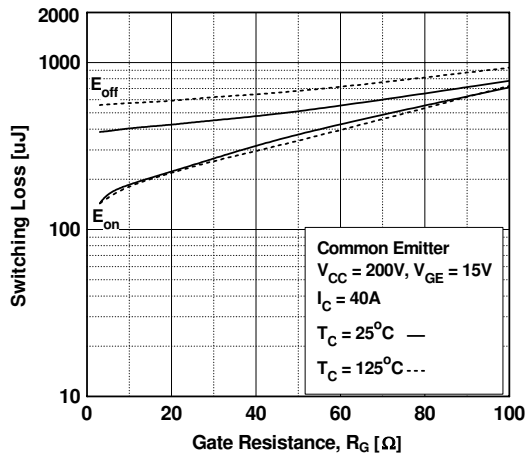


Figure 16. Switching Loss vs. Collector Current

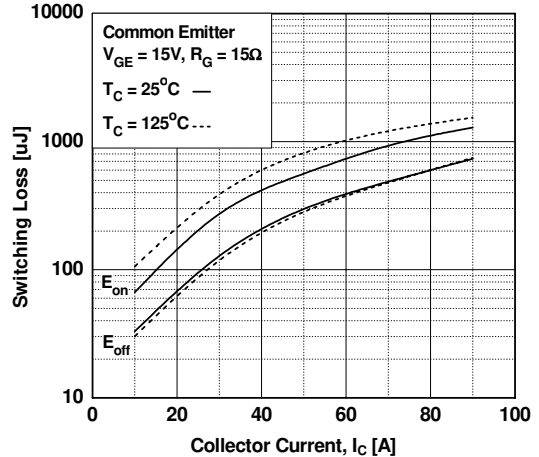
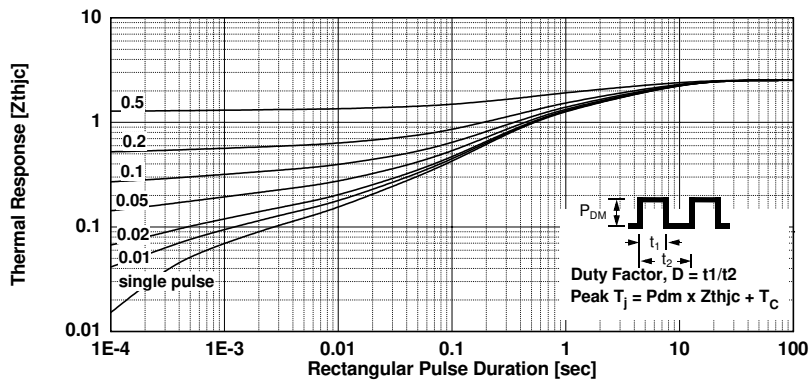


Figure 17. Transient Thermal Impedance of IGBT



Typical Performance Characteristics (Continued)

Figure 18. Forward Characteristics

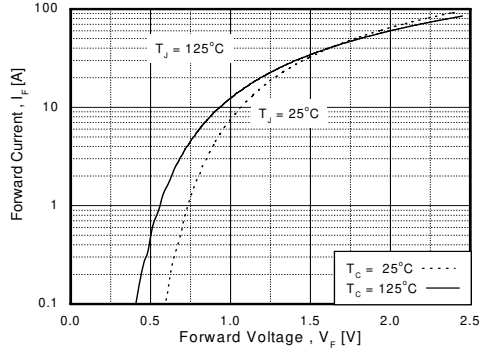


Figure 19. Typical Reverse Recovery Current

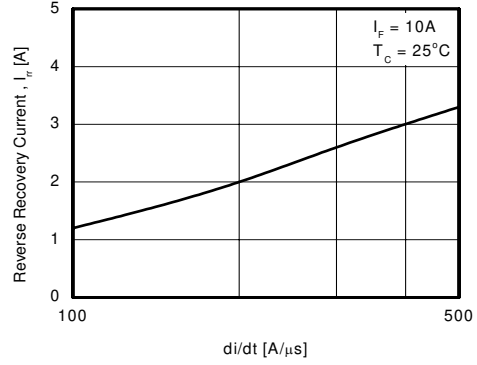
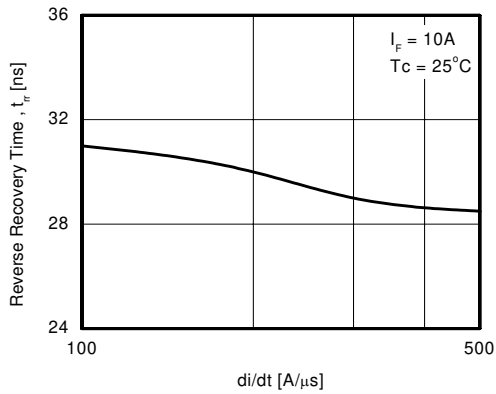
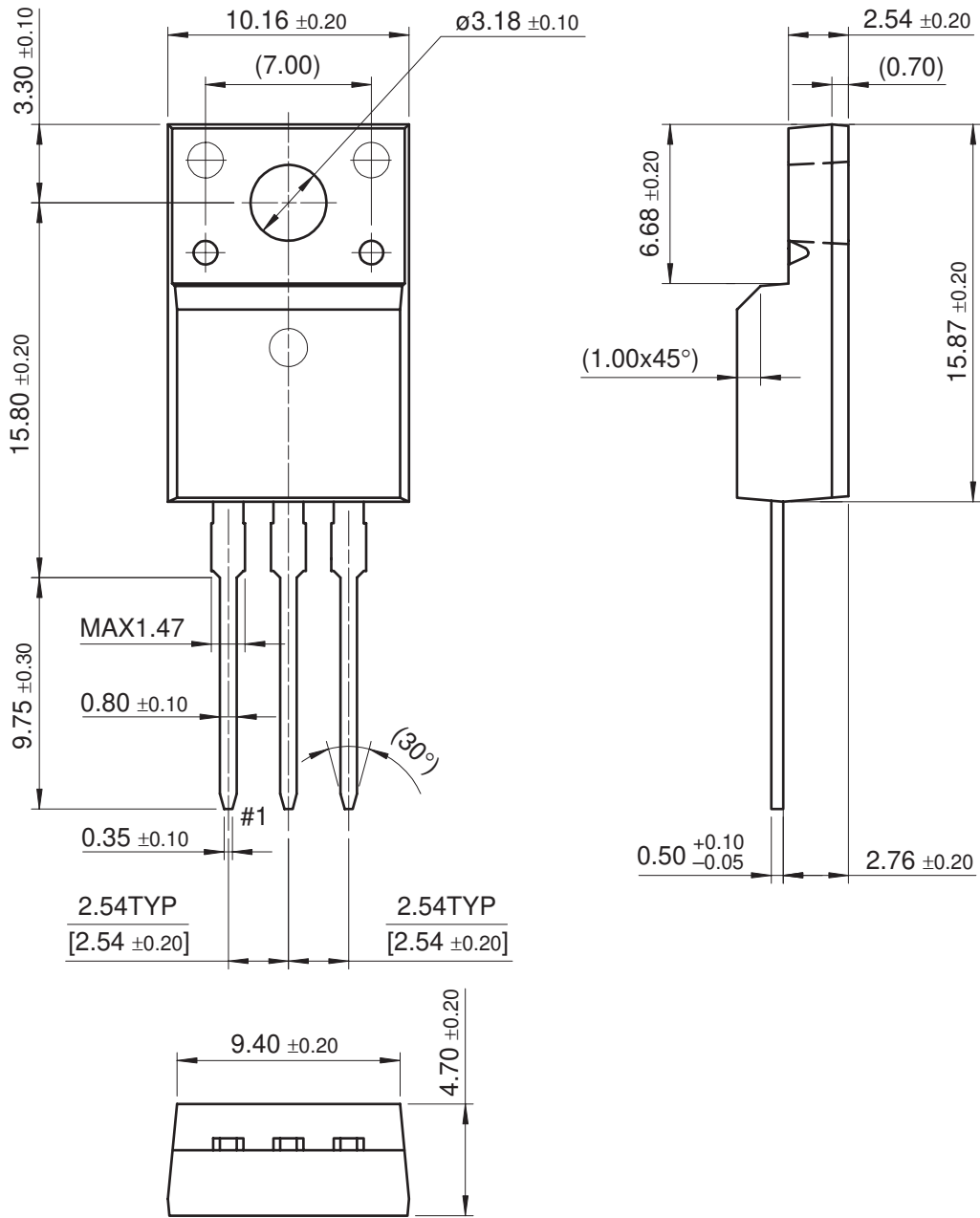


Figure 20. Typical Reverse Recovery Time




TO-220F





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Rev. I29