

FGPF45N45T

450V, 45A PDP Trench IGBT

Features

- High Current Capability
- Low saturation voltage: $V_{CE(sat)} = 1.6V @ I_C = 45A$
- High input impedance
- Fast switching
- RoHS compliant

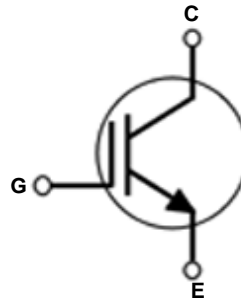
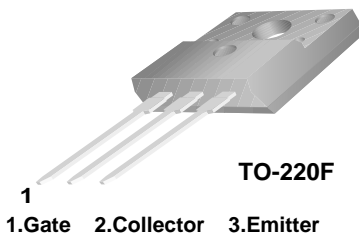
Applications

- PDP System



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.



Absolute Maximum Ratings

Symbol	Description	Ratings	Units
V_{CES}	Collector to Emitter Voltage	450	V
V_{GES}	Gate to Emitter Voltage	± 30	V
I_{CM} (1)	Pulsed Collector Current @ $T_C = 25^\circ C$	180	A
P_D	Maximum Power Dissipation @ $T_C = 25^\circ C$	51.6	W
	Maximum Power Dissipation @ $T_C = 100^\circ C$	20.6	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	$^\circ C$

Notes:

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

* I_{c_pluse} limited by max T_j

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$ (IGBT)	Thermal Resistance, Junction to Case	-	2.42	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	62.5	$^\circ C/W$

Package Marking and Ordering Information

Device Marking	Device	Package	Packaging Type	Qty per Tube	Max Qty per Box
FGPF45N45T	FGFP45N45TTU	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						
V_{CES}	Collector to Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 250\mu A$	450	-	-	V
$\frac{\Delta BV_{CES}}{\Delta T_J}$	Temperature Coefficient of Breakdown Voltage	$V_{GE} = 0V, I_C = 250\mu A$	-	0.5	-	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	4.3	5.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 20A, V_{GE} = 15V$	-	1.21	1.5	V
		$I_C = 45A, V_{GE} = 15V$	-	1.60	-	V
		$I_C = 45A, V_{GE} = 15V, T_C = 125^\circ C$	-	1.57	-	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	$V_{CE} = 30V, V_{GE} = 0V, f = 1MHz$	-	2140	-	pF
C_{oes}	Output Capacitance		-	130	-	pF
C_{res}	Reverse Transfer Capacitance		-	102	-	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 200V, I_C = 45A, R_G = 10\Omega, V_{GE} = 15V, \text{Resistive Load}, T_C = 25^\circ C$	-	26	-	ns
t_r	Rise Time		-	100	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	170	-	ns
t_f	Fall Time		-	220	330	ns
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 200V, I_C = 45A, R_G = 10\Omega, V_{GE} = 15V, \text{Resistive Load}, T_C = 125^\circ C$	-	22	-	ns
t_r	Rise Time		-	90	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	132	-	ns
t_f	Fall Time		-	280	-	ns
Q_g	Total Gate Charge	$V_{CE} = 200V, I_C = 45A, V_{GE} = 15V$	-	100	-	nC
Q_{ge}	Gate to Emitter Charge		-	15	-	nC
Q_{gc}	Gate to Collector Charge		-	46	-	nC

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

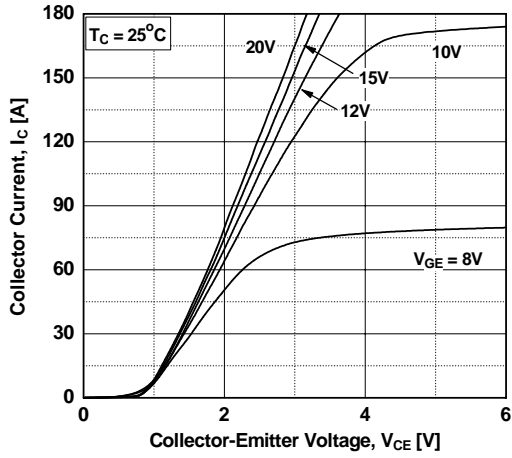


Figure 2. Typical Output Characteristics

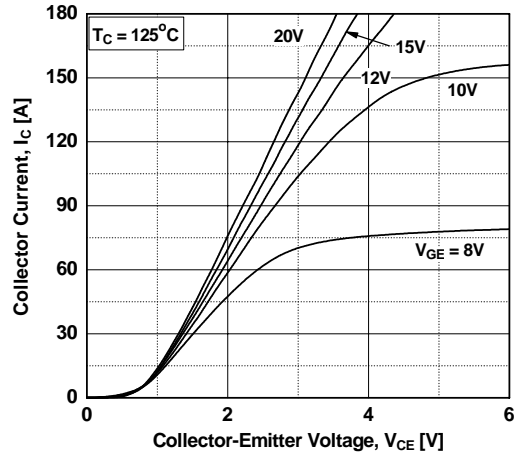


Figure 3. Typical Saturation Voltage Characteristics

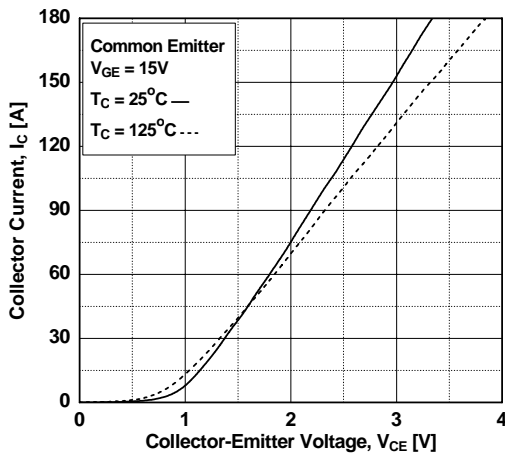


Figure 4. Transfer Characteristics

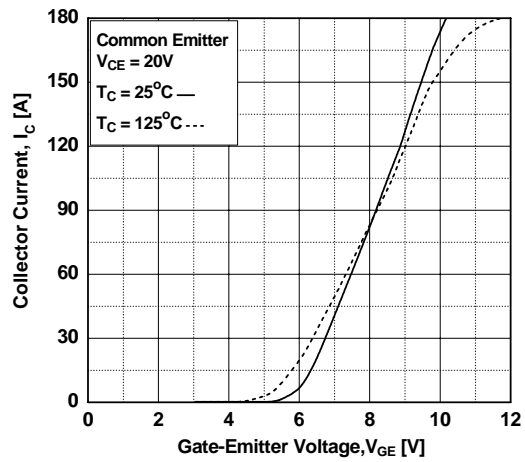


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

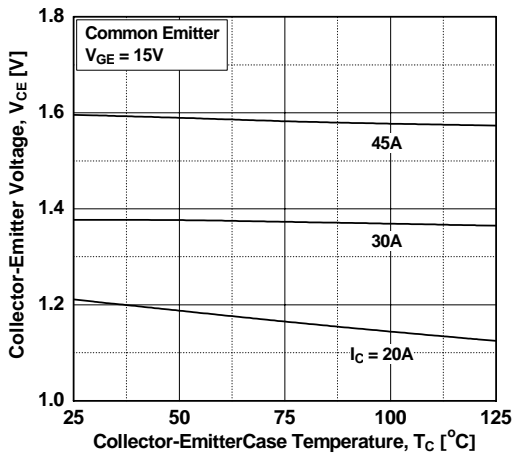
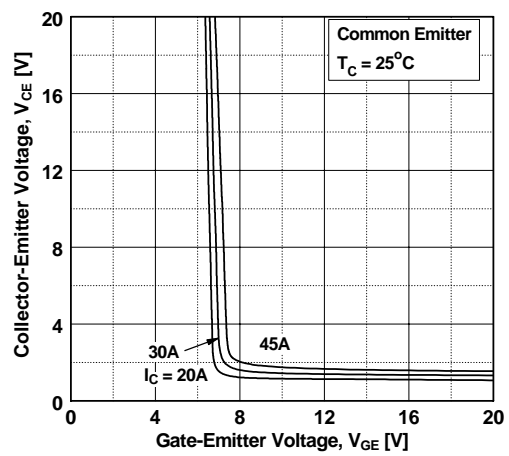


Figure 6. Saturation Voltage vs. Vge



Typical Performance Characteristics

Figure 7. Saturation Voltage vs. V_{GE}

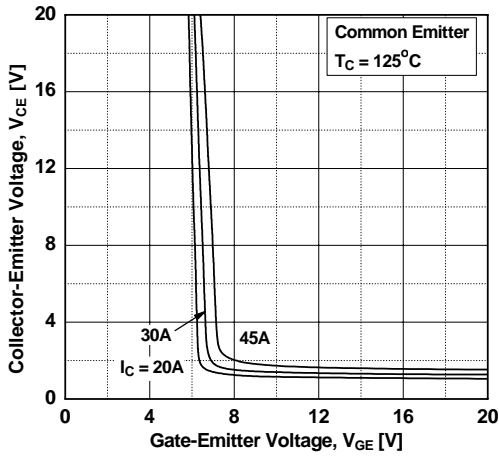


Figure 8. Capacitance Characteristics

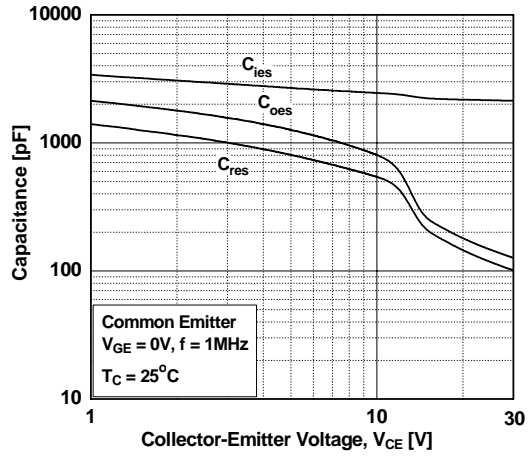


Figure 9. Gate charge Characteristics

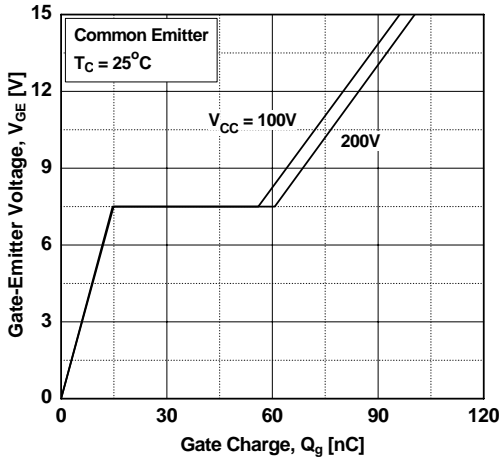


Figure 10. SOA Characteristics

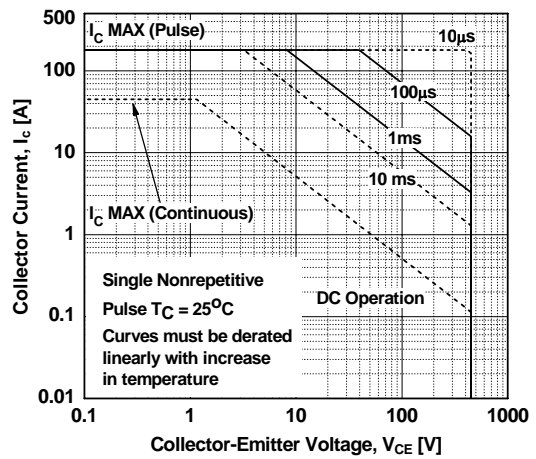


Figure 11. Turn-on Characteristics vs. Gate Resistance

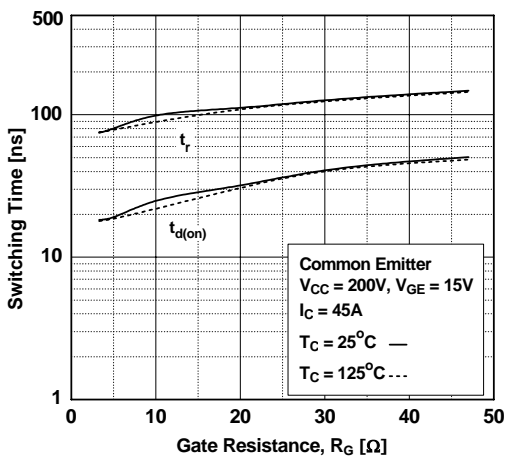
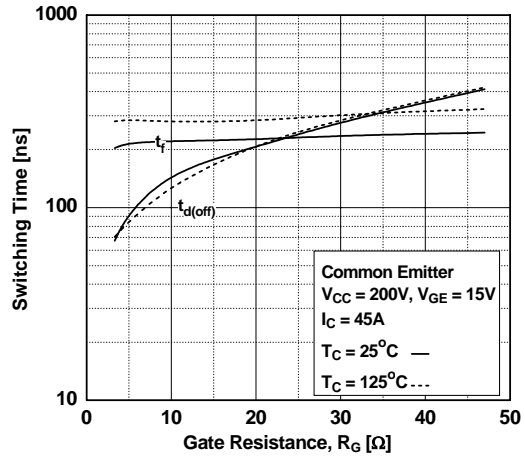


Figure 12. Turn-off Characteristics vs. Gate Resistance



Typical Performance Characteristics

Figure 13. Turn-on Characteristics vs. Collector Current

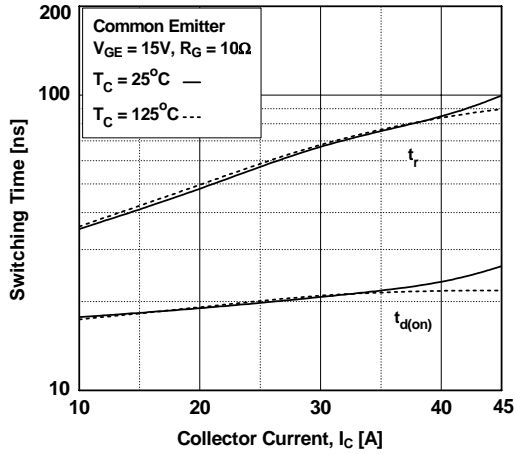


Figure 14. Turn-off Characteristics vs. Collector Current

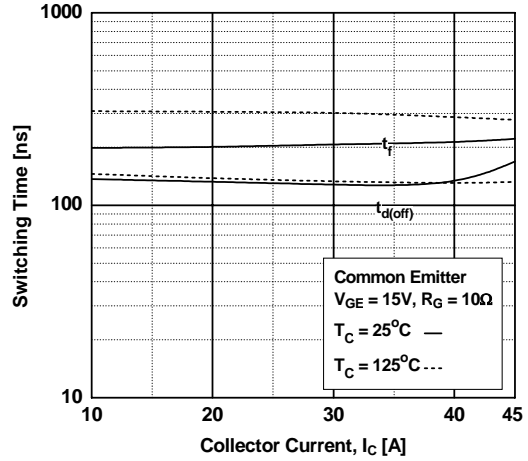


Figure 15. Switching Loss vs. Gate Resistance

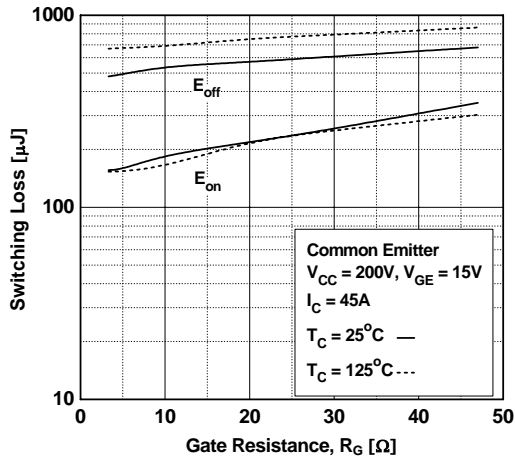


Figure 16. Switching Loss vs. Gate Resistance

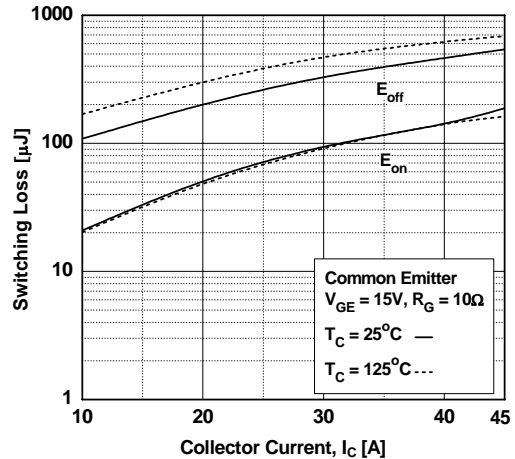
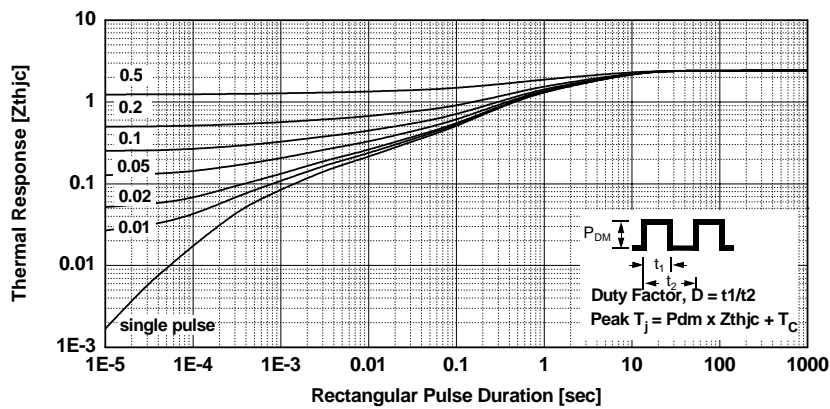
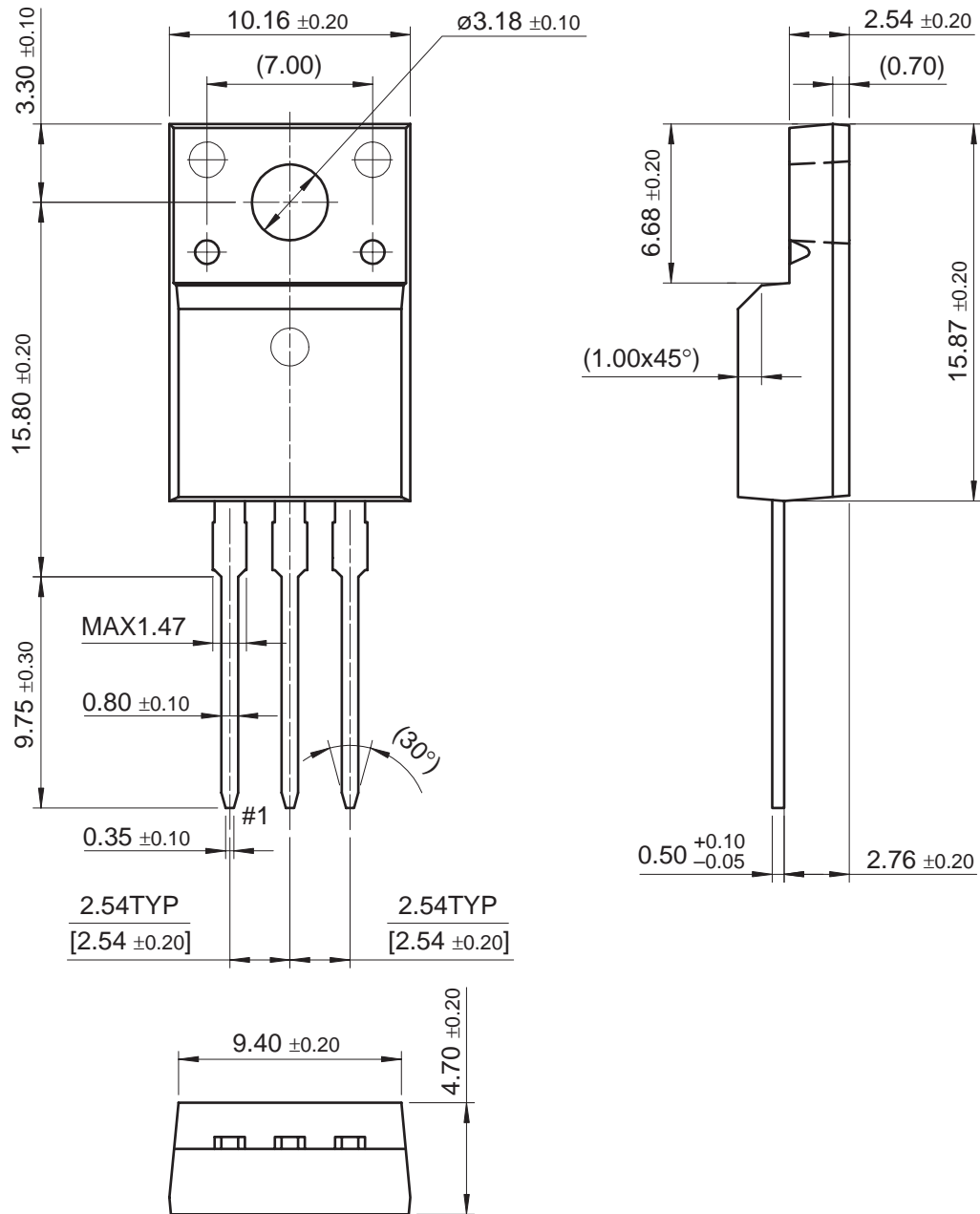


Figure 17. Transient Thermal Impedance of IGBT



Mechanical Dimensions

TO-220F




Dimensions in Millimeters



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