FAIRCHILD SEMICONDUCTOR®

April 2009

FGPF30N45T
450V, 30A PDP Trench IGBT

Features

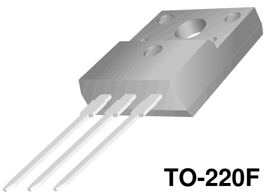
- High Current Capability
- Low saturation voltage: $V_{CE(sat)}$ =1.55V @ I_C = 30A
- High input impedance
- Fast switching

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.

Applications

- PDP System



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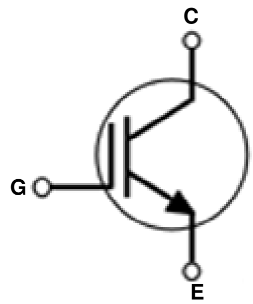
1.Gate 2.Collector 3.Emitter



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°C	120	A
P_D	Maximum Power Dissipation	@ T_C = 25°C	50.4	W
	Maximum Power Dissipation	@ T_C = 100°C	20.1	W
T_J	Operating Junction Temperature		-55 to +150	°C
T_{stg}	Storage Temperature Range		-55 to +150	°C
T_L	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds		300	°C

Notes:
1: Repetitive test , Pulse width=100usec , Duty=0.1
* Ic_pluse limited by max Tj

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$(IGBT)	Thermal Resistance, Junction to Case	-	2.48	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	62.5	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Eco Status	Packaging Type	Qty per Tube
FGPF30N45T	FGPF30N45TTU	TO-220F	RoHS	Rail / Tube	50ea

For Fairchild's definition of "green" Eco Status, please visit: http://www.fairchildsemi.com/company/green/rohs_green.html.

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	450	-	-	V
ΔBV_{CES} / ΔT_J	Temperature Coefficient of Breakdown Voltage	V_{GE} = 0V, I_C = 250μA	-	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 = 250μA, V_{CE} = V_{GE}	2.5	4.0	5.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C = 20A, V_{GE} = 15V	-	1.35	1.6	
		I_C = 30A, V_{GE} = 15V	-	1.55	-	V
		I_C = 30A, V_{GE} = 15V, T_C = 125°C	-	1.53	-	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	V_{CE} = 30V, V_{GE} = 0V, f = 1MHz	-	1610	-	pF
C_{oes}	Output Capacitance		-	88	-	pF
C_{res}	Reverse Transfer Capacitance		-	68	-	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	-	19	-	ns
t_r	Rise Time		-	57	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	119	-	ns
t_f	Fall Time		-	220	330	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	-	20	-	ns
t_r	Rise Time		-	60	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	122	-	ns
t_f	Fall Time		-	265	-	ns
Q_g	Total Gate Charge	V_{CE} = 200V, I_C = 30A, V_{GE} = 15V	-	73	-	nC
Q_{ge}	Gate to Emitter Charge		-	11	-	nC
Q_{gc}	Gate to Collector Charge		-	33	-	nC

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

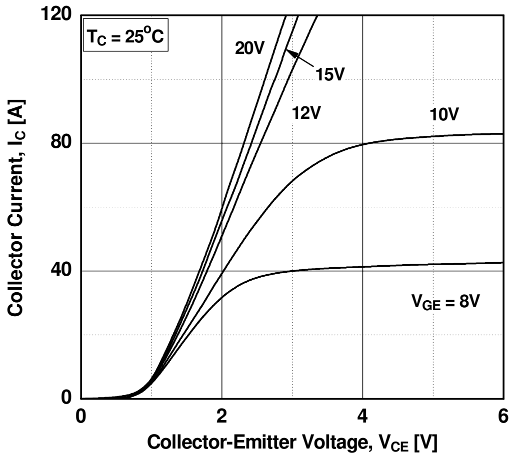


Figure 2. Typical Output Characteristics

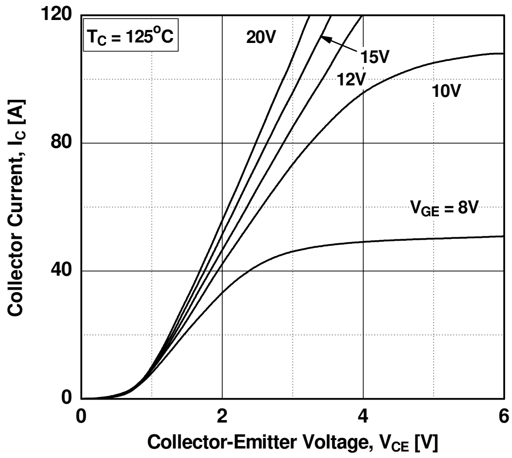


Figure 3. Typical Saturation Voltage Characteristics

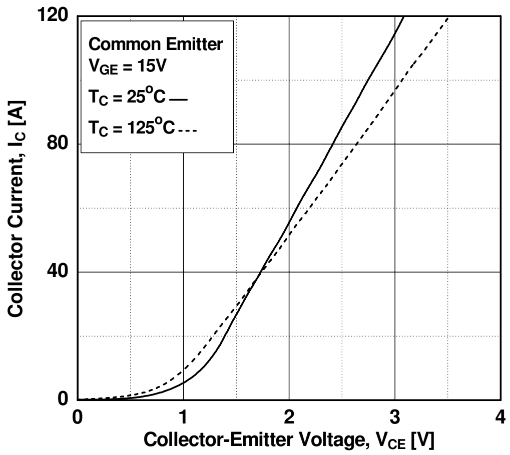


Figure 4. Transfer Characteristics

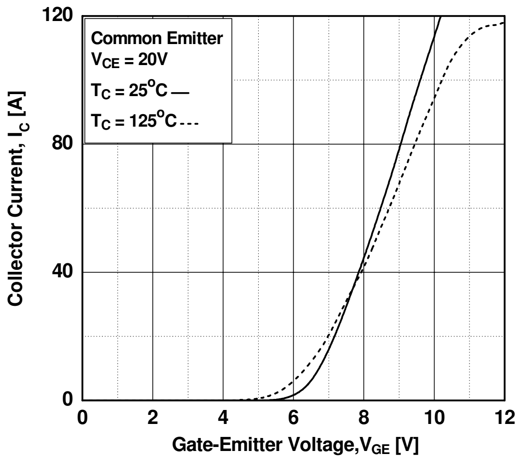


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

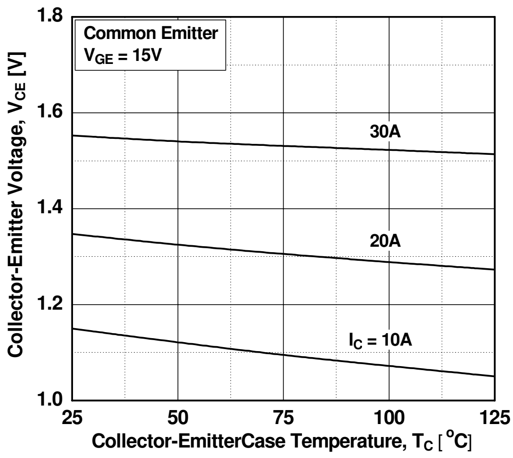
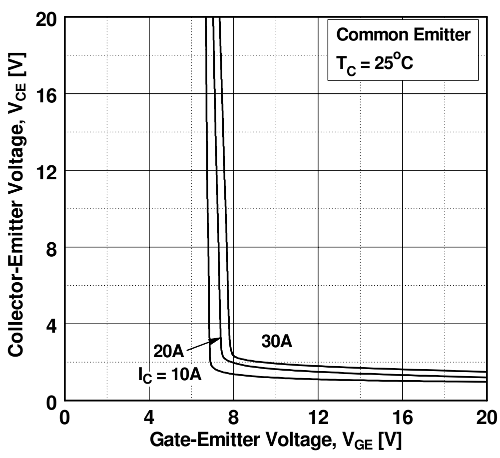


Figure 6. Saturation Voltage vs. V_{GE}



Typical Performance Characteristics

Figure 7. Saturation Voltage vs. V_{GE}

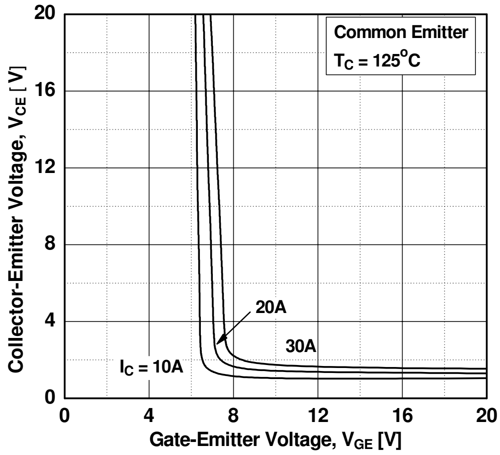


Figure 8. Capacitance Characteristics

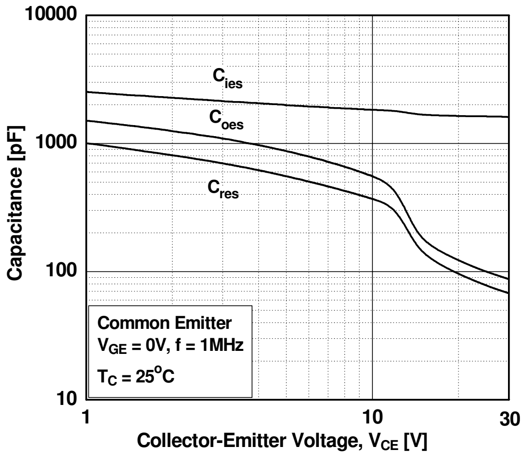


Figure 9. Gate charge Characteristics

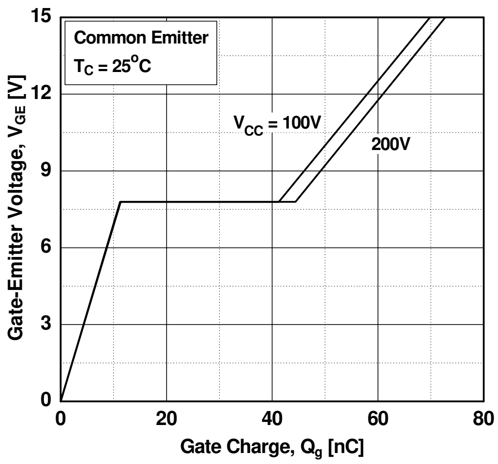


Figure 10. SOA Characteristics

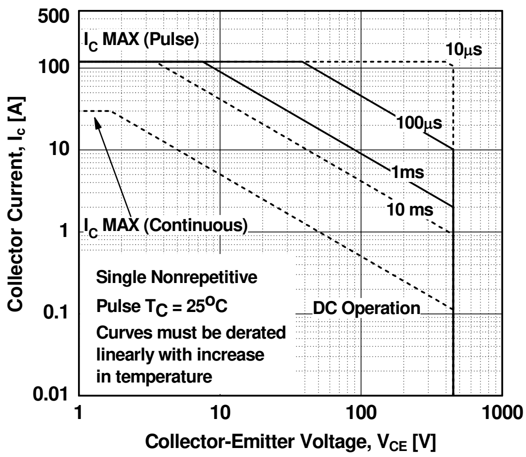


Figure 11. Turn-on Characteristics vs. Gate Resistance

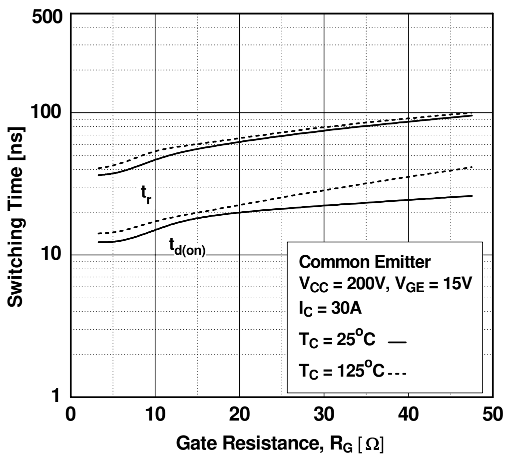
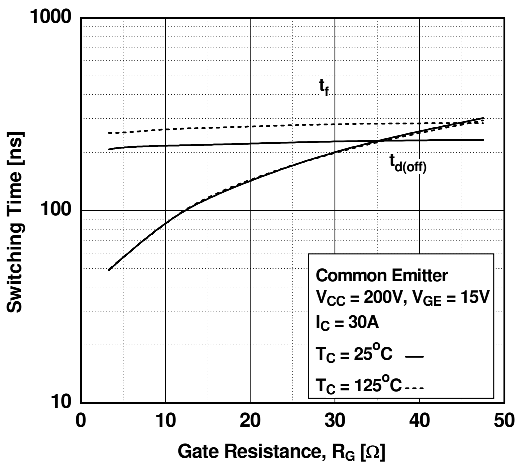


Figure 12. Turn-off Characteristics vs. Gate Resistance



Typical Performance Characteristics

Figure 13. Turn-on Characteristics vs. Collector Current

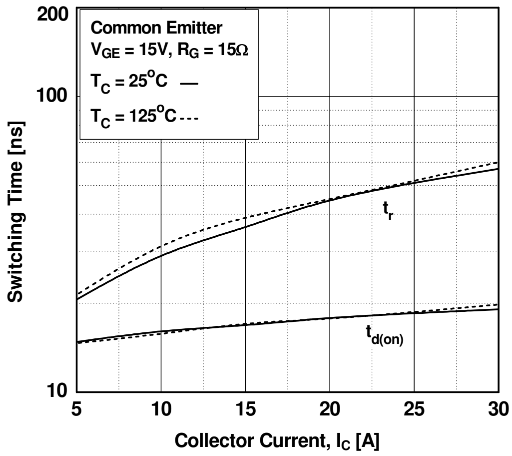


Figure 14. Turn-off Characteristics vs. Collector Current

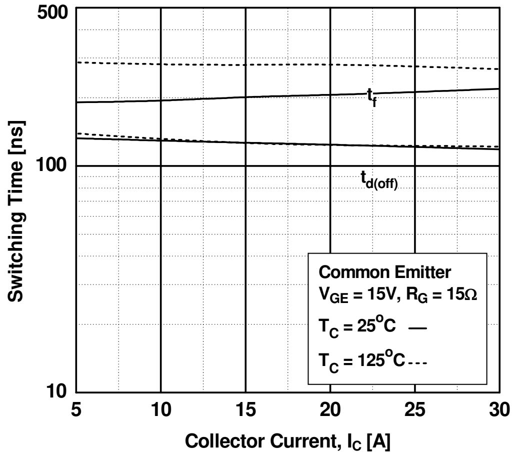


Figure 15. Switching Loss vs. Gate Resistance

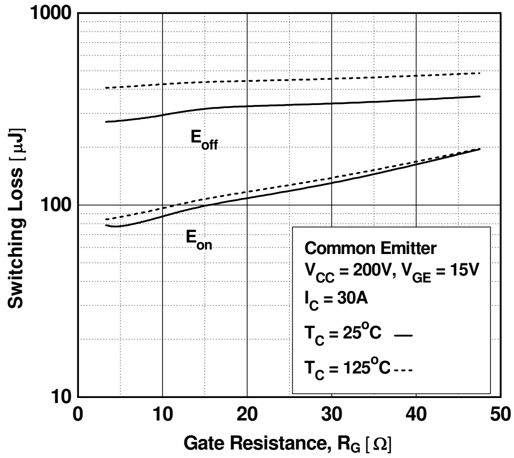


Figure 16. Switching Loss vs.Gate Resistance

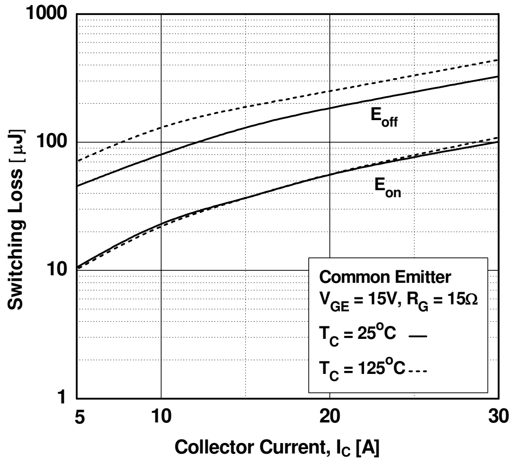
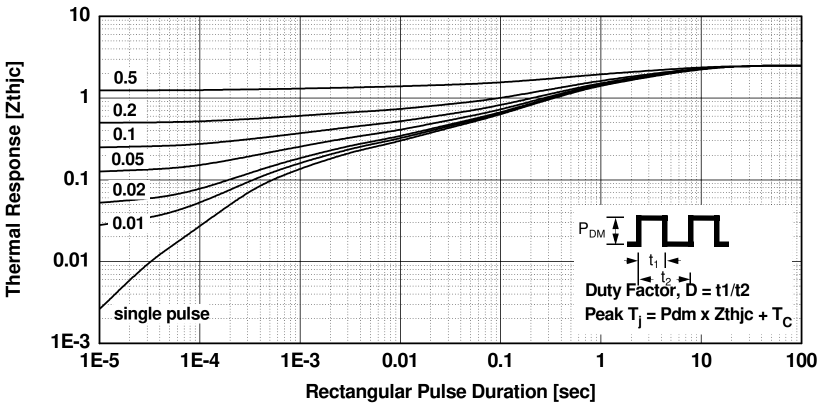
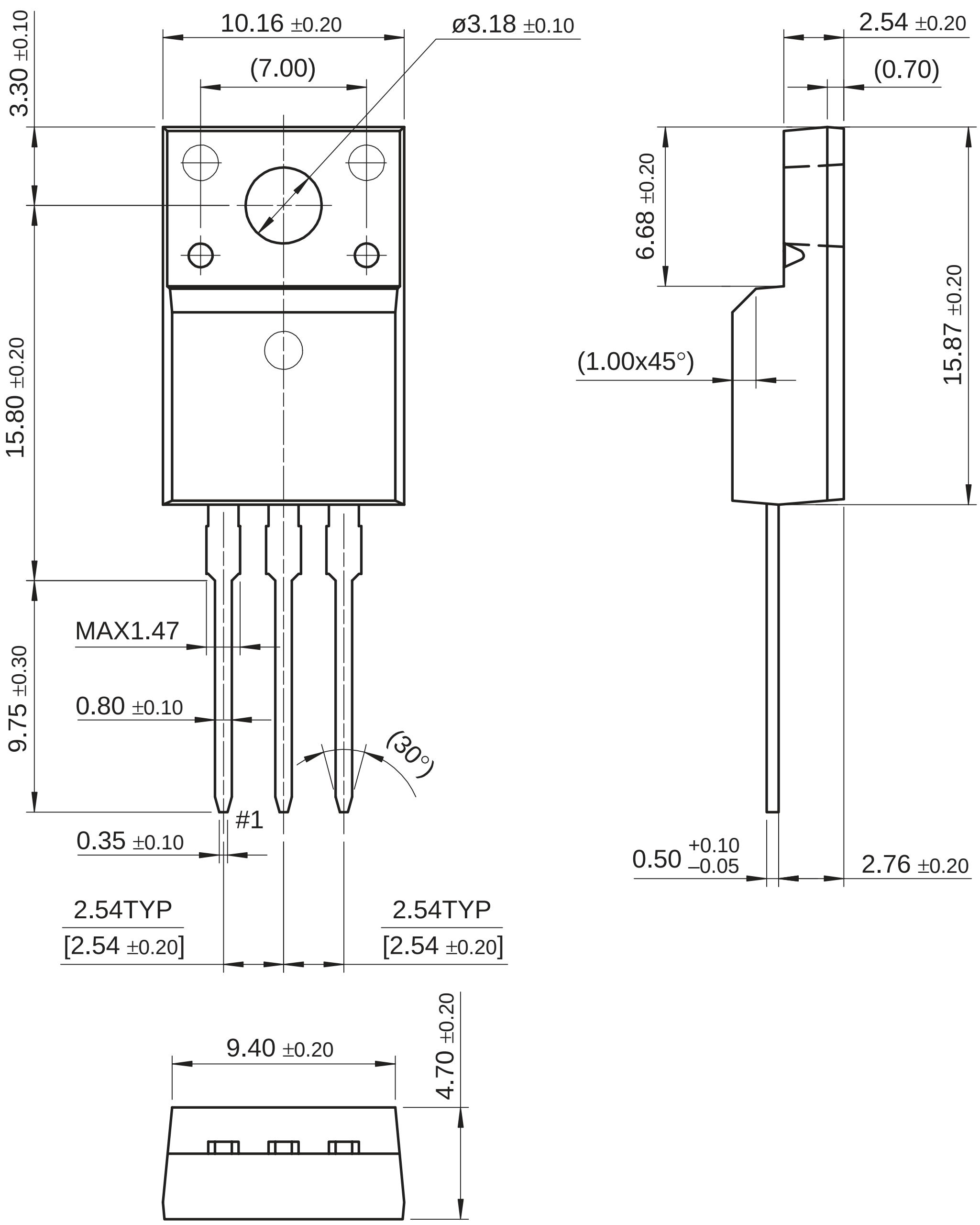


Figure 17. Transient Thermal Impedance of IGBT



Mechanical Dimensions

TO-220F



Dimensions in Millimeters

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Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

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