

April 2013

FGPF50N33BT 330 V PDP Trench IGBT

Features

- · High Current Capability
- Low Saturation Voltage: V_{CE(sat)} =1.6 V @ I_C = 50 A
- · High Input Impedance
- · RoHS Compliant

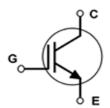
General Description

Using novel trench IGBT technology, Fairchild®'s new series of trench IGBTs offer the optimum performance for PDP TV applications where low conduction and switching losses are essen-

Applications

PDP TV





Absolute Maximum Ratings

Symbol	Description		Ratings	Unit
V _{CES}	Collector to Emitter Voltage		330	V
V_{GES}	Gate to Emitter Voltage		± 30	V
I _C	Collector Current	@ T _C = 25°C	50	Α
I _{Cpulse (1)*}	Pulsed Collector Current	@ $T_C = 25^{\circ}C$	120	Α
I _{Cpulse (2)*}	Pulsed Collector Current	@ T _C = 25°C	160	Α
P _D	Maximum Power Dissipation	@ T _C = 25°C	43	W
. 0	Maximum Power Dissipation	@ T _C = 100°C	17.2	W
TJ	Operating Junction Temperature		-55 to +150	°C
T _{stg}	Storage Temperature Range		-55 to +150	°C
TL	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds		300	°C

Thermal Characteristics

Symbol	Parameter	Тур.	Max.	Unit	
$R_{\theta JC}(IGBT)$	Thermal Resistance, Junction to Case	-	2.9	°C/W	
$R_{\theta JA}$	A Thermal Resistance, Junction to Ambient		62.5	°C/W	

- 1: Repetitive test , Pulse width=100usec , Duty=0.1 2: Half Sine Wave, D < 0.01, pluse width < 10usec

*Ic_pluse limited by max Tj

Package Marking and Ordering Information

Device Marking	Device	Package	Eco Status	Packaging Type	Qty per Tube
FGPF50N33BT	FGPF50N33BTTU	TO-220F	RoHS	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 $T_C = 25^{\circ}C$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
Off Charac	cteristics					
BV _{CES}	Collector to Emitter Breakdown Voltage	V_{GE} = 0V, I_{C} = 250 μ A, Tc=25 $^{\circ}$ C	330	-	-	V
		V_{GE} = 0V, I_{C} = 250 μ A, Tc=125 $^{\circ}$ C	340	-	-	V
ΔBV _{CES} ΔΤ _J	Temperature Coefficient of Breakdown Voltage	V _{GE} = 0V, I _C = 250μA	-	0.2	-	V/°C
I _{CES}	Collector Cut-Off Current	$V_{CE} = V_{CES}$, $V_{GE} = 0V$, $Tc=25^{\circ}C$	-	-	20	μΑ
		$V_{CE} = V_{CES}$, $V_{GE} = 0V$, $Tc=125^{\circ}C$	-	-	200	μΑ
I _{GES}	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0V$	-	-	±200	nA
On Charac	eteristics					
V _{GE(th)}	G-E Threshold Voltage	$I_{C} = 250 \mu A, V_{CE} = V_{GE}$	2.3	3.3	4.3	V
, ,		I _C = 20A, V _{GE} = 15V,	-	1.2	1.5	V
		I _C = 30A, V _{GE} = 15V,	-	1.3	-	V
V _{CE(sat)} Collect	Collector to Emitter Saturation Voltage	I _C = 50A, V _{GE} = 15V, T _C = 25°C	-	1.6	-	V
		I _C = 50A, V _{GE} = 15V, T _C = 125°C	-	1.7	-	٧
Dynamic C	Characteristics					
C _{ies}	Input Capacitance		-	980	-	pF
C _{oes}	Output Capacitance	V _{CE} = 30V _, V _{GE} = 0V, f = 1MHz	-	70	-	pF
C _{res}	Reverse Transfer Capacitance	- I - IIVINZ	-	40	-	pF
Switching	Characteristics	,			1	
t _{d(on)}	Turn-On Delay Time		_	9	_	ns
t _r	Rise Time	V _{CC} = 200V, I _C = 20A,	-	33	-	ns
t _{d(off)}	Turn-Off Delay Time	$R_G = 5\Omega$, $V_{GE} = 15V$, Resistive Load, $T_C = 25^{\circ}C$	-	32	-	ns
t _f	Fall Time		-	202	-	ns
t _{d(on)}	Turn-On Delay Time		-	9	-	ns
t _r	Rise Time	$V_{CC} = 200V, I_C = 20A,$	-	37	-	ns
t _{d(off)}	Turn-Off Delay Time	$R_G = 5Ω$, $V_{GE} = 15V$, Resistive Load, $T_C = 125$ °C	-	33	-	ns
t _f	Fall Time		-	332	-	ns
Qg	Total Gate Charge		-	35	-	nC
Q _{ge}	Gate to Emitter Charge	$V_{CE} = 200V, I_{C} = 20A,$	-	6	-	nC
Q _{gc}	Gate to Collector Charge	V _{GE} = 15V	-	14	-	nC

Figure 1. Typical Output Characteristics

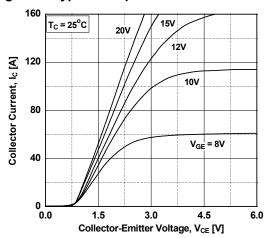


Figure 3. Typical Saturation Voltage Characteristics

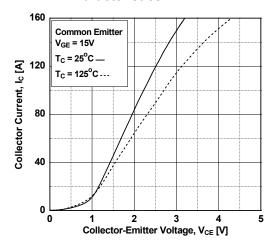


Figure 5. Saturation Voltage vs. Case

Temperature at Variant Current Level

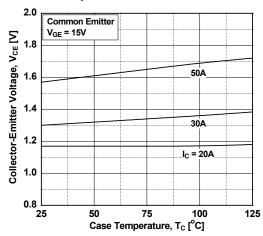


Figure 2. Typical Output Characteristics

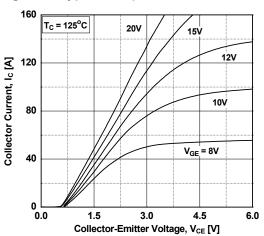


Figure 4. Transfer Characteristics

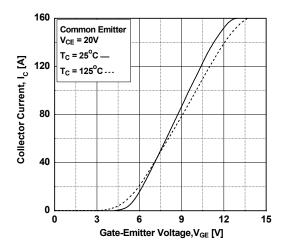


Figure 6. Saturation Voltage vs. V_{GE}

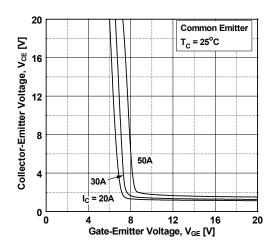


Figure 7. Saturation Voltage vs. V_{GE}

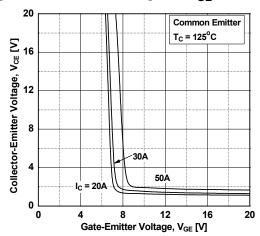


Figure 9. Gate charge Characteristics

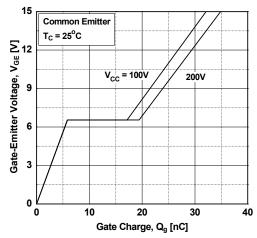


Figure 11. Turn-on Characteristics vs.
Gate Resistance

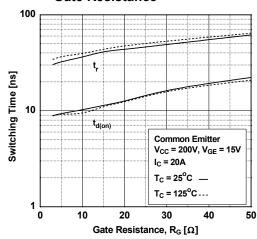


Figure 8. Capacitance Characteristics

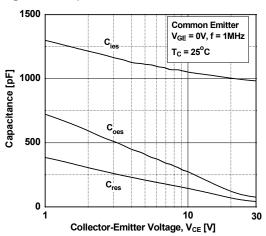


Figure 10. SOA Characteristics

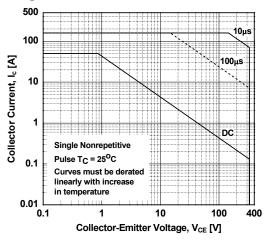


Figure 12. Turn-off Characteristics vs.
Gate Resistance

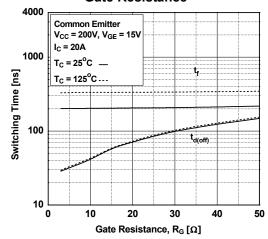


Figure 13. Turn-on Characteristics vs. Collector Current

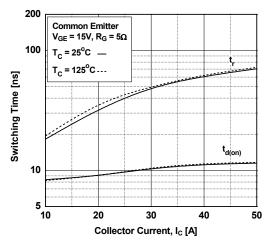


Figure 14. Turn-off Characteristics vs.
Collector Current

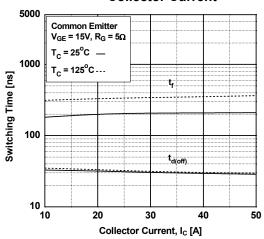


Figure 15. Switching Loss vs. Gate Resistance

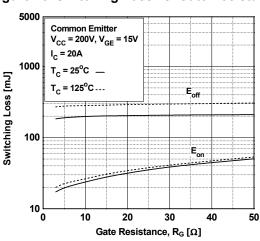


Figure 16. Switching Loss vs. Collector Current

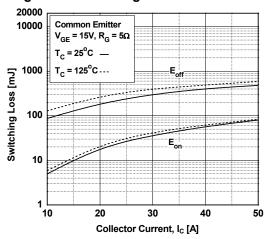
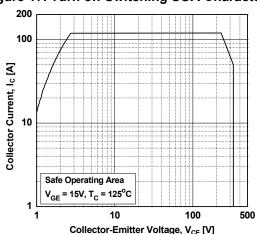
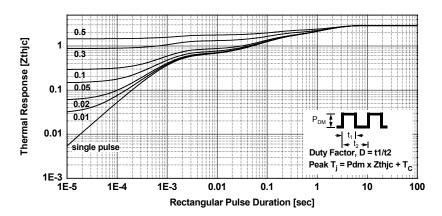


Figure 17. Turn off Switching SOA Characteristics

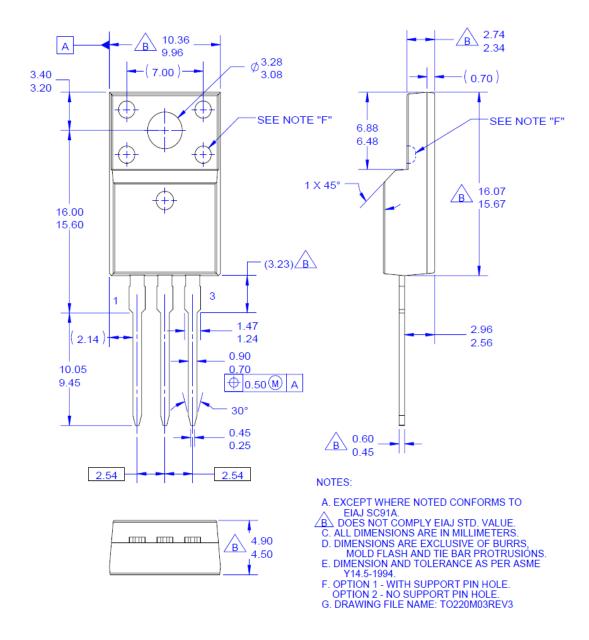






Package Dimensions

TO-220F (Retractable)



* Front/Back Side Isolation Voltage : AC 2700V

Dimensions in Millimeters





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