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November 2014

FGPF4565

650 V Field Stop Trench IGBT

Features

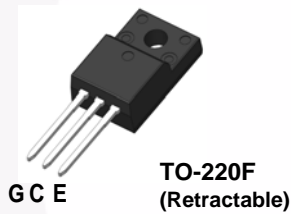
- High Current Capability
- Low Saturation Voltage: $V_{CE(sat)} = 1.5 \text{ V (Typ.) @ } I_C = 30 \text{ A}$
- High Input Impedance
- RoHS Compliant

Applications

- IPL (Intense Pulsed Light)

General Description

Using innovative field stop IGBT technology, Fairchild's new series of field stop trench IGBTs offer the optimum performance for IPL (Intense Pulsed Light).



Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Description	Ratings	Unit
V_{CES}	Collector to Emitter Voltage	650	V
V_{GES}	Gate to Emitter Voltage	± 25	V
$I_{C \text{ pulse (1)*}}$	Pulsed Collector Current @ $T_C = 25^\circ\text{C}$	170	A
P_D	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	30	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	12	W
T_J	Operating Junction Temperature	-55 to +150	$^\circ\text{C}$
T_{stg}	Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	-	4.1	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	-	62.5	$^\circ\text{C/W}$

Notes:

1. Half sine wave: $D < 0.01$, pulse width $< 1 \mu\text{sec}$,

* I_C pulse limit by max T_J

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FGPF4565	FGPF4565	TO-220F	Tube	N/A	N/A	50

Electrical Characteristics of the IGBT T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
BV_{CES}	Collector to Emitter Breakdown Voltage	$V_{GE} = 0\text{ V}, I_C = 1\text{ mA}$	650	-	-	V
$\frac{\Delta BV_{CES}}{\Delta T_J}$	Temperature Coefficient of Breakdown Voltage	$V_{GE} = 0\text{ V}, I_C = 1\text{ mA}$	-	0.65	-	V/°C
I_{CES}	Collector Cut-Off Current	$V_{CE} = V_{CES}, V_{GE} = 0\text{ V}$	-	-	250	μA
I_{GES}	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0\text{ V}$	-	-	±400	nA
On Characteristics						
$V_{GE(th)}$	G-E Threshold Voltage	$I_C = 250\text{ μA}, V_{CE} = V_{GE}$	3.0	4.0	5.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 20\text{ A}, V_{GE} = 15\text{ V}$	-	1.35	-	V
		$I_C = 30\text{ A}, V_{GE} = 15\text{ V}$	-	1.50	1.88	V
		$I_C = 30\text{ A}, V_{GE} = 15\text{ V}, T_C = 150^\circ\text{C}$	-	1.75	-	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	$V_{CE} = 30\text{ V}, V_{GE} = 0\text{ V}, f = 1\text{ MHz}$	-	1650	-	pF
C_{oes}	Output Capacitance		-	34	-	pF
C_{res}	Reverse Transfer Capacitance		-	17	-	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 400\text{ V}, I_C = 30\text{ A}, R_G = 5\text{ Ω}, V_{GE} = 15\text{ V},$ Resistive Load, $T_C = 25^\circ\text{C}$	-	11.2	-	ns
t_r	Rise Time		-	44.8	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	40.8	-	ns
t_f	Fall Time		-	153	-	ns
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 400\text{ V}, I_C = 30\text{ A}, R_G = 5\text{ Ω}, V_{GE} = 15\text{ V},$ Resistive Load, $T_C = 150^\circ\text{C}$	-	12.8	-	ns
t_r	Rise Time		-	59.2	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	40.8	-	ns
t_f	Fall Time		-	202	-	ns
Q_g	Total Gate Charge	$V_{CE} = 400\text{ V}, I_C = 30\text{ A}, V_{GE} = 15\text{ V}$	-	40.3	-	nC
Q_{ge}	Gate to Emitter Charge		-	8.8	-	nC
Q_{gc}	Gate to Collector Charge		-	10.4	-	nC

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

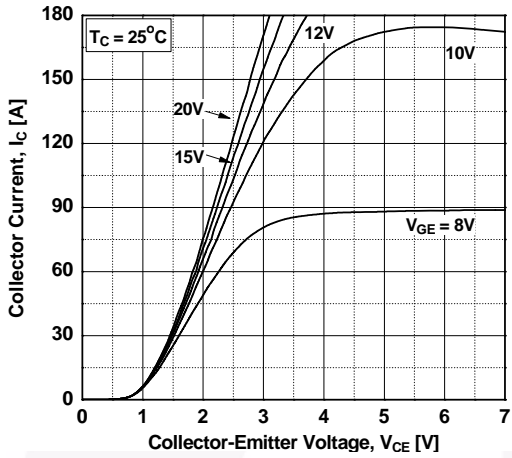


Figure 2. Typical Output Characteristics

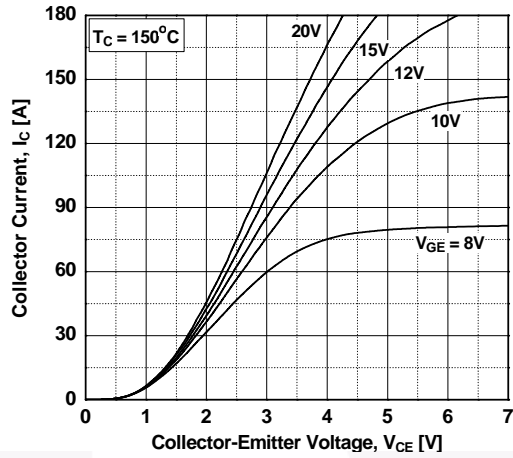


Figure 3. Typical Saturation Voltage Characteristics

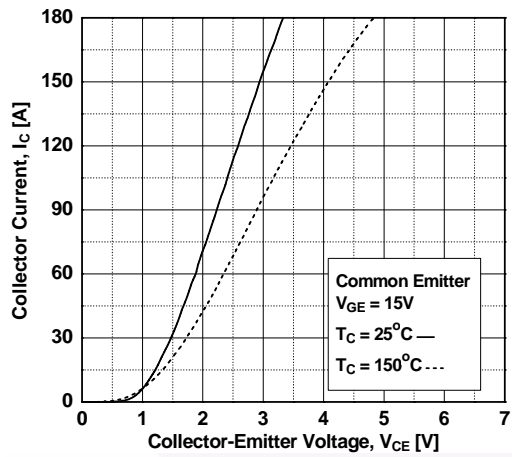


Figure 4. Saturation Voltage vs. Case Temperature at Variant Current Level

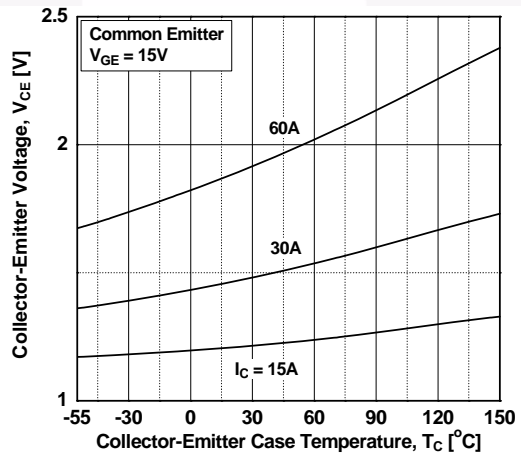


Figure 5. Saturation Voltage vs. V_{GE}

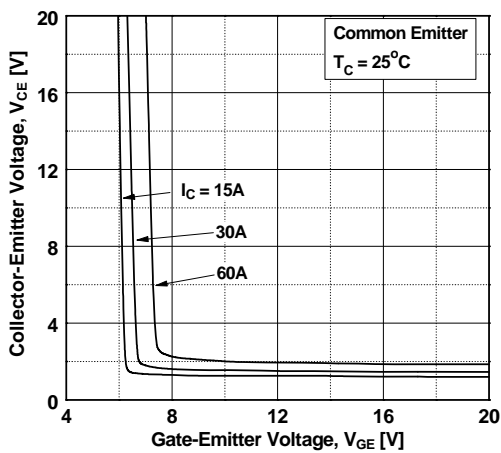
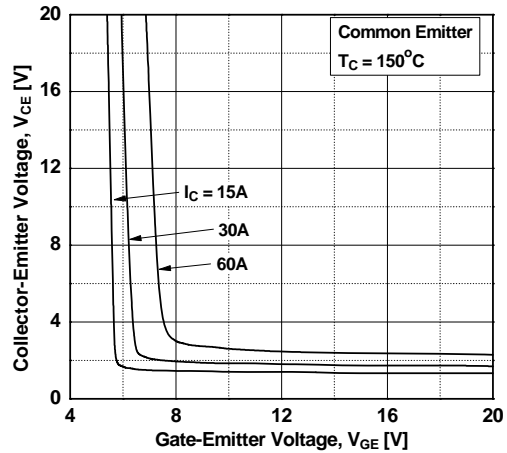


Figure 6. Saturation Voltage vs. V_{GE}



Typical Performance Characteristics

Figure 7. Capacitance Characteristics

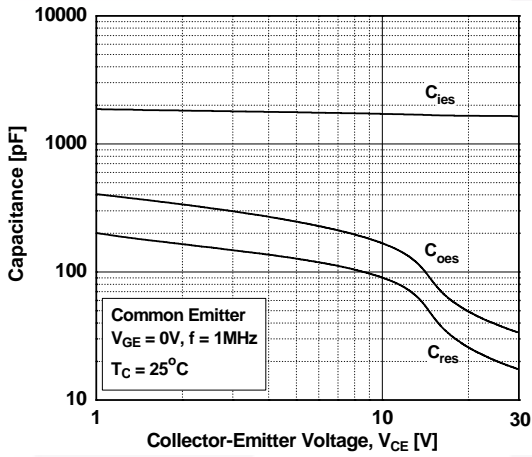


Figure 8. Gate charge Characteristics

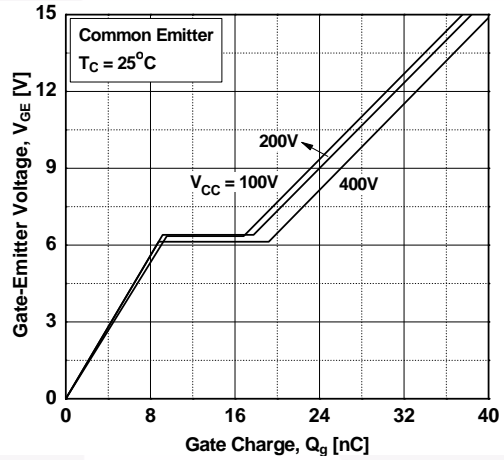


Figure 9. Turn-on Characteristics vs. Gate Resistance

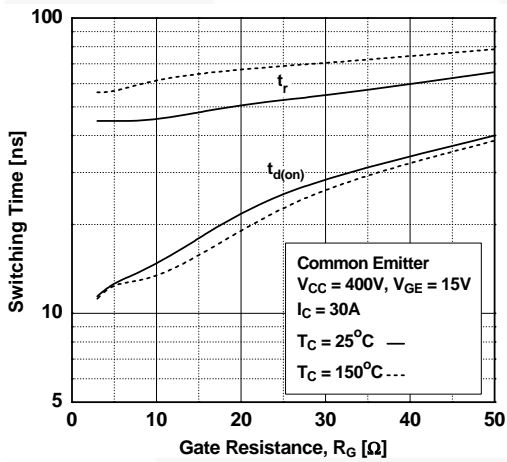


Figure 10. Turn-off Characteristics vs. Gate Resistance

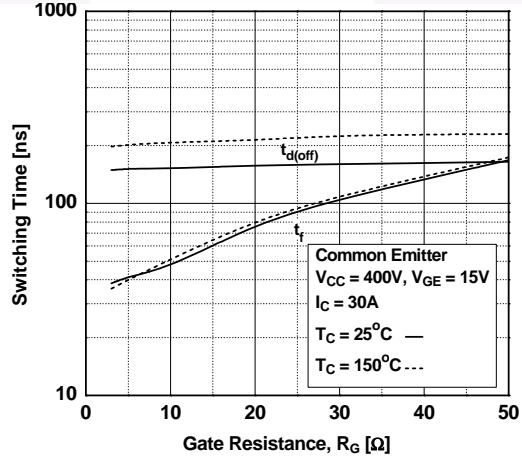


Figure 11. Switching Loss vs. Gate Resistance

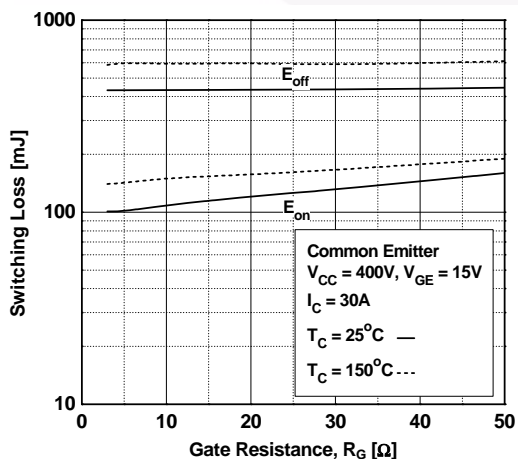
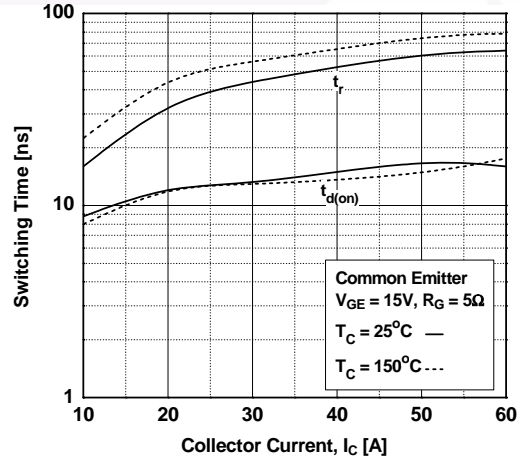


Figure 12. Turn-on Characteristics vs. Collector Current



Typical Performance Characteristics

Figure 13. Turn-off Characteristics vs. Collector Current

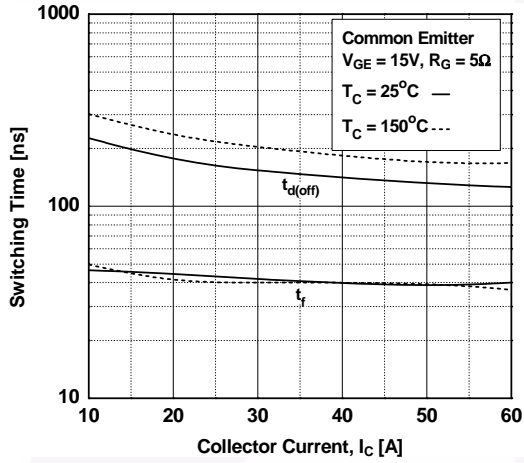


Figure 14. Switching Loss vs. Collector Current

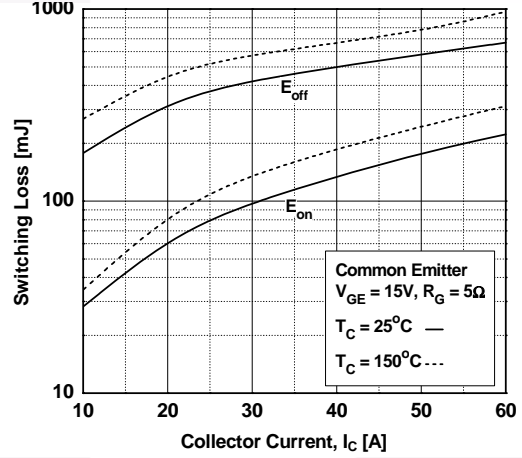
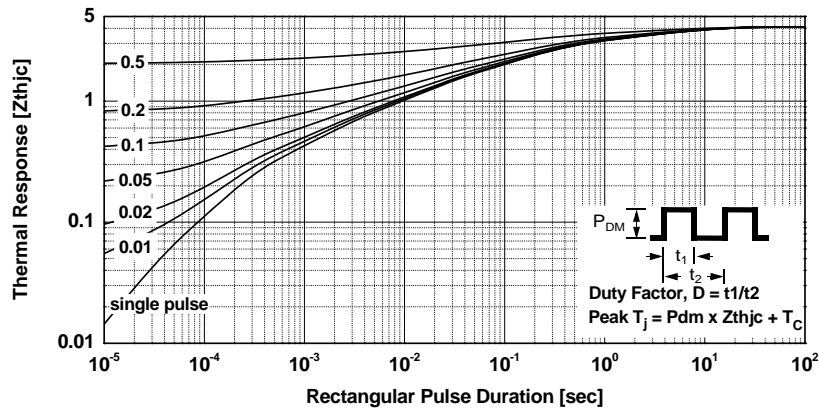
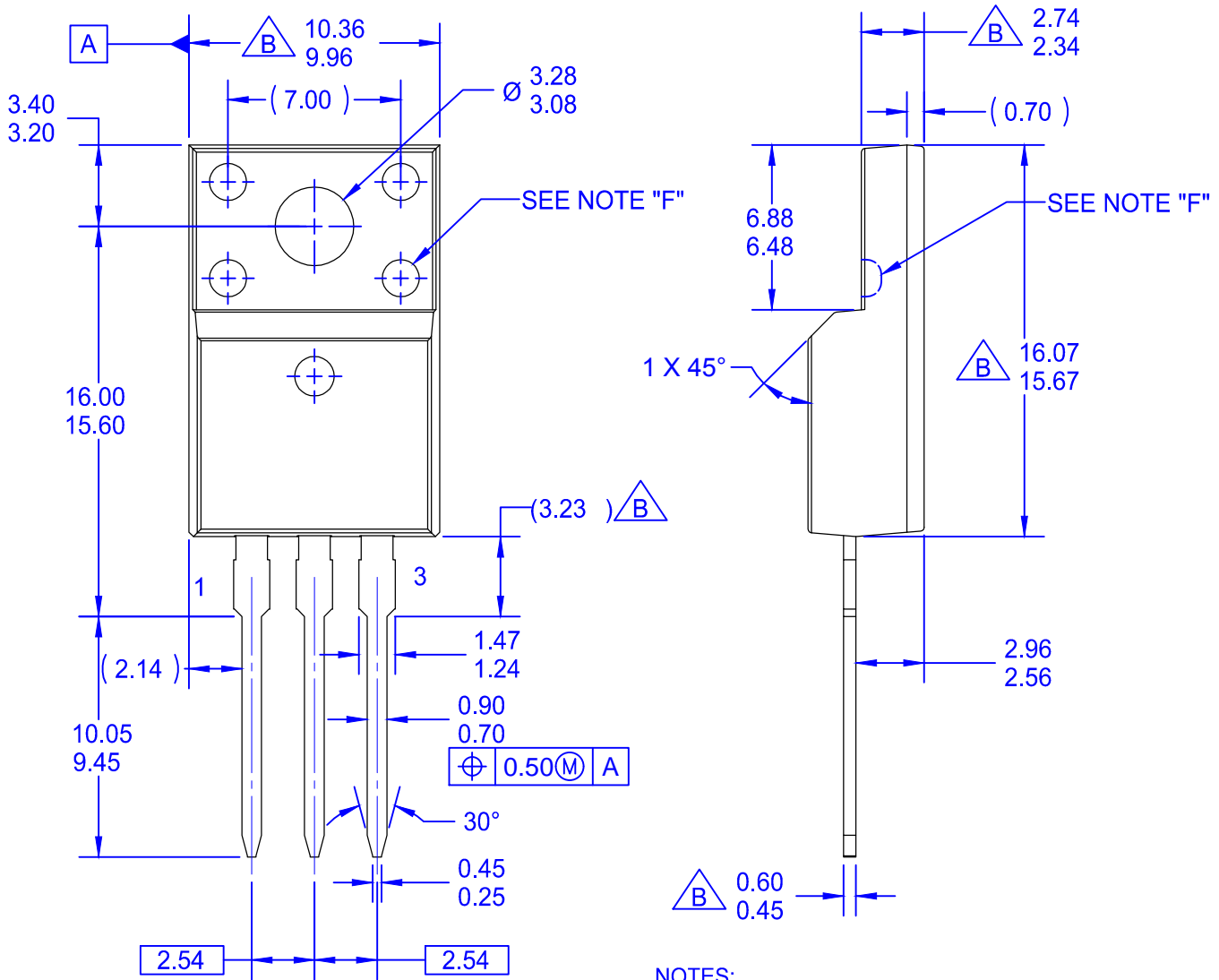


Figure 15. Transient Thermal Impedance of IGBT





NOTES:

- A. EXCEPT WHERE NOTED CONFORMS TO EIAJ SC91A.
- B. DOES NOT COMPLY EIAJ STD. VALUE.
- C. ALL DIMENSIONS ARE IN MILLIMETERS.
- D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.
- E. DIMENSION AND TOLERANCE AS PER ASME Y14.5-1994.
- F. OPTION 1 - WITH SUPPORT PIN HOLE.
OPTION 2 - NO SUPPORT PIN HOLE.
- G. DRAWING FILE NAME: TO220M03REV4





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