

FGA30S120P

Shorted Anode™ IGBT

Features

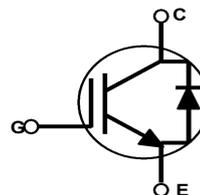
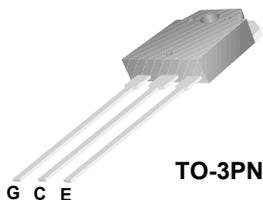
- High speed switching
- Low saturation voltage: $V_{CE(sat)} = 1.75V @ I_C = 30A$
- High input impedance
- RoHS compliant

Applications

- Induction Heating and Microwave Oven
- Soft Switching Applications

General Description

Using advanced Field Stop Trench and Shorted Anode technology, Fairchild's Shorted Anode™ Trench IGBTs offer superior conduction and switching performances, and easy parallel operation with exceptional avalanche capability. This device is designed for induction heating and microwave oven.



Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Description	Ratings	Units
V _{CEs}	Collector to Emitter Voltage	1300	V
V _{GES}	Gate to Emitter Voltage	±25	V
I _C	Collector Current @ T _C = 25°C	60	A
	Collector Current @ T _C = 100°C	30	A
I _{CM (1)}	Pulsed Collector Current	150	A
I _F	Diode Continuous Forward Current @ T _C = 25°C	60	A
I _F	Diode Continuous Forward Current @ T _C = 100°C	30	A
P _D	Maximum Power Dissipation @ T _C = 25°C	348	W
	Maximum Power Dissipation @ T _C = 100°C	174	W
T _J	Operating Junction Temperature	-55 to +175	°C
T _{stg}	Storage Temperature Range	-55 to +175	°C
T _L	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds	300	°C

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
R _{θJC} (IGBT)	Thermal Resistance, Junction to Case	--	0.43	°C/W
R _{θJA}	Thermal Resistance, Junction to Ambient	--	40	°C/W

Notes:
1: Limited by T_{jmax}

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FGA30S120P	FGA30S120P	TO-3PN	-	-	30

Electrical Characteristics of the IGBT $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
I_{CES}	Collector Cut-Off Current	$V_{CE} = 1300, V_{GE} = 0V$	-	-	1	mA
I_{GES}	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0V$	-	-	±500	nA
On Characteristics						
$V_{GE(th)}$	G-E Threshold Voltage	$I_C = 30\text{mA}, V_{CE} = V_{GE}$	4.5	6.0	7.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 30A, V_{GE} = 15V, T_C = 25^\circ\text{C}$	-	1.75	2.3	V
		$I_C = 30A, V_{GE} = 15V, T_C = 125^\circ\text{C}$	-	1.85	-	V
		$I_C = 30A, V_{GE} = 15V, T_C = 175^\circ\text{C}$	-	1.9	-	V
V_{FM}	Diode Forward Voltage	$I_F = 30A, T_C = 25^\circ\text{C}$	-	1.7	2.2	V
		$I_F = 30A, T_C = 175^\circ\text{C}$	-	2.1	-	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	$V_{CE} = 30V, V_{GE} = 0V, f = 1\text{MHz}$	-	3345	-	pF
C_{oes}	Output Capacitance		-	75	-	pF
C_{res}	Reverse Transfer Capacitance		-	60	-	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 600V, I_C = 30A, R_G = 10\Omega, V_{GE} = 15V, \text{Resistive Load}, T_C = 25^\circ\text{C}$	-	39	-	ns
t_r	Rise Time		-	360	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	620	-	ns
t_f	Fall Time		-	160	210	ns
E_{on}	Turn-On Switching Loss		-	1.3	-	mJ
E_{off}	Turn-Off Switching Loss		-	1.22	1.6	mJ
E_{ts}	Total Switching Loss		-	2.52	-	mJ
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 600V, I_C = 30A, R_G = 10\Omega, V_{GE} = 15V, \text{Resistive Load}, T_C = 175^\circ\text{C}$	-	38	-	ns
t_r	Rise Time		-	375	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	635	-	ns
t_f	Fall Time		-	270	-	ns
E_{on}	Turn-On Switching Loss		-	1.59	-	mJ
E_{off}	Turn-Off Switching Loss		-	1.78	-	mJ
E_{ts}	Total Switching Loss		-	3.37	-	mJ
Q_g	Total Gate Charge	$V_{CE} = 600V, I_C = 30A, V_{GE} = 15V$	-	78	-	nC
Q_{ge}	Gate to Emitter Charge		-	4.2	-	nC
Q_{gc}	Gate to Collector Charge		-	33.3	-	nC

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

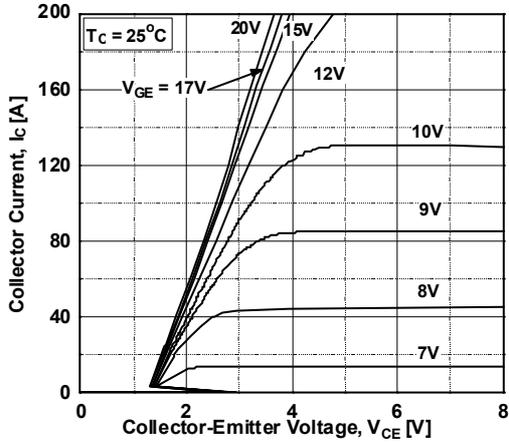


Figure 2. Typical Output Characteristics

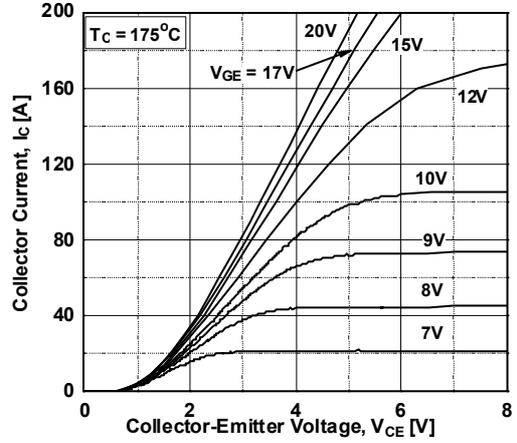


Figure 3. Typical Saturation Voltage Characteristics

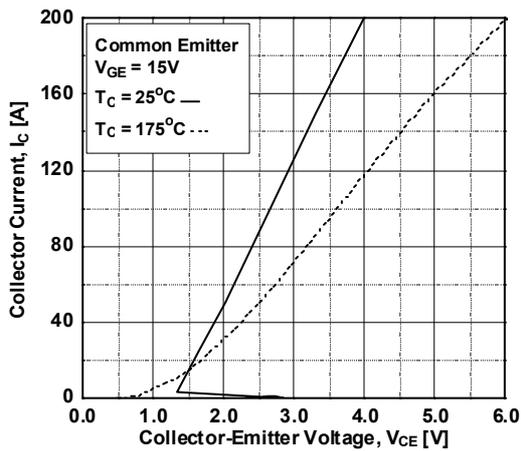


Figure 4. Transfer Characteristics

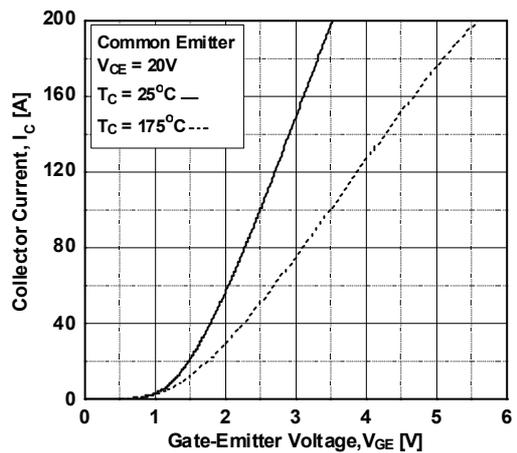


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

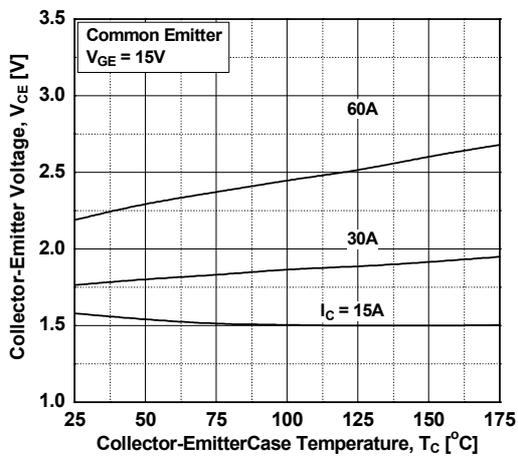
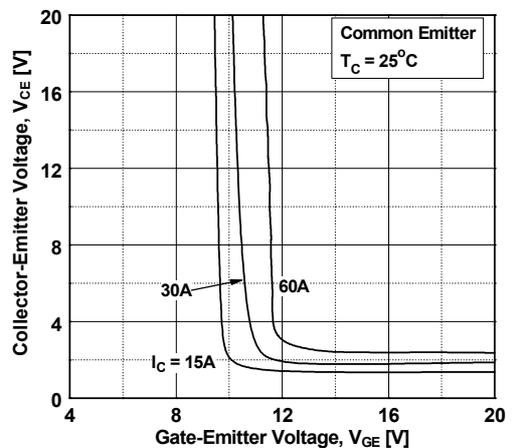


Figure 6. Saturation Voltage vs. Vge



Typical Performance Characteristics

Figure 7. Saturation Voltage vs. V_{GE}

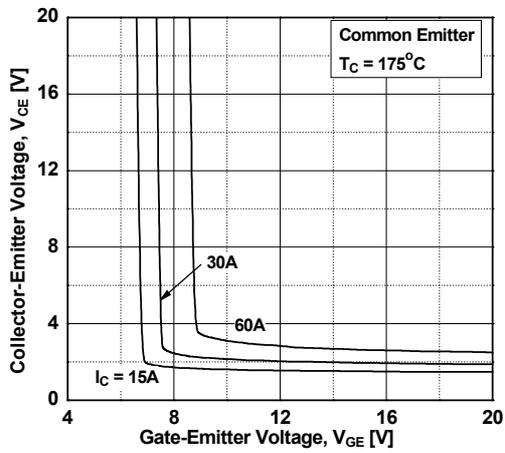


Figure 8. Capacitance Characteristics

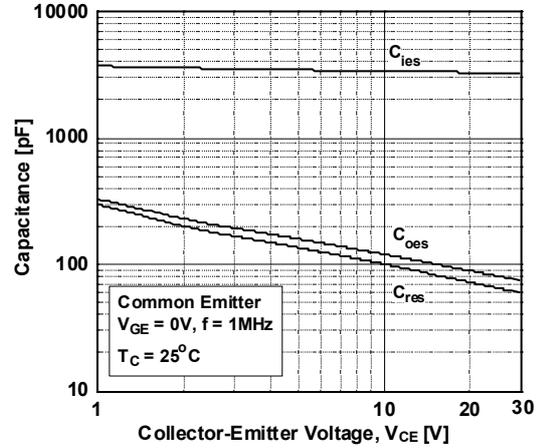


Figure 9. Gate Charge Characteristics

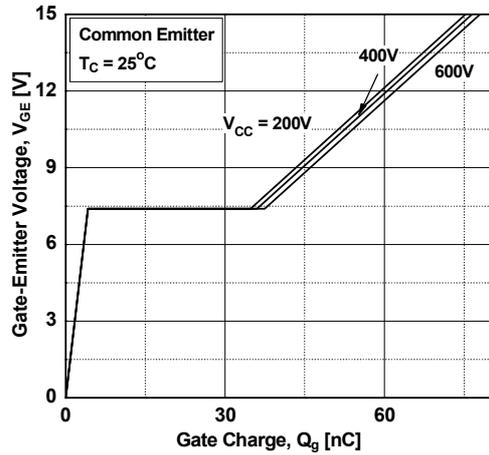


Figure 10. SOA Characteristics

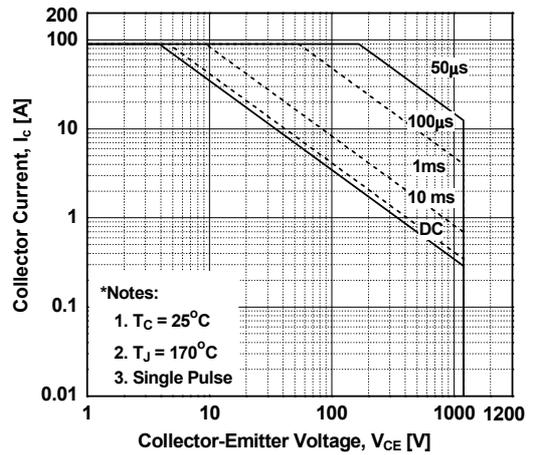


Figure 11. Turn-On Characteristics vs Gate Resistance

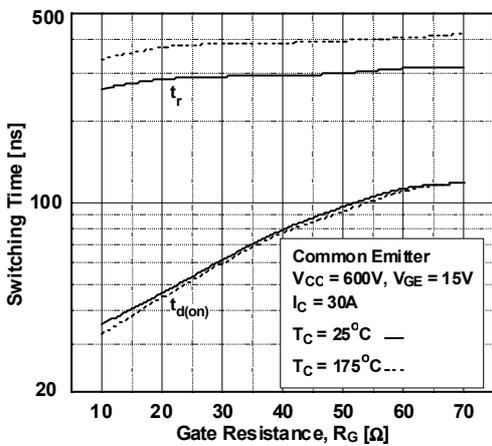
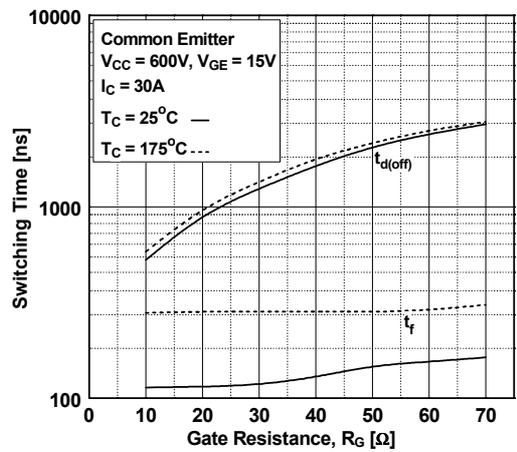


Figure 12. Turn-off Characteristics vs. Gate Resistance



Typical Performance Characteristics

Figure 13. Turn-on Characteristics VS. Collector Current

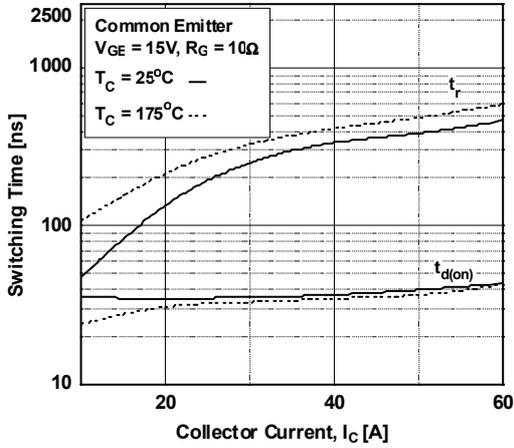


Figure 14. Turn-off Characteristics VS. Collector Current

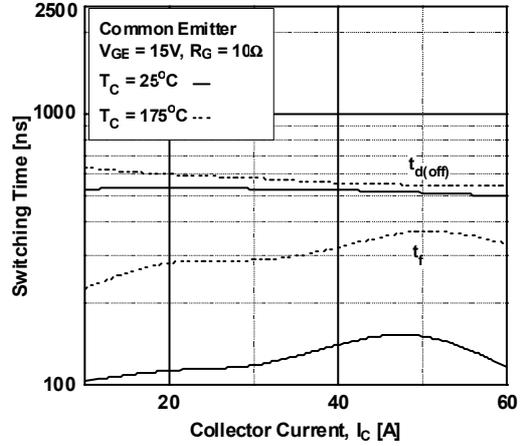


Figure 15. Switching Loss VS. Gate Resistance

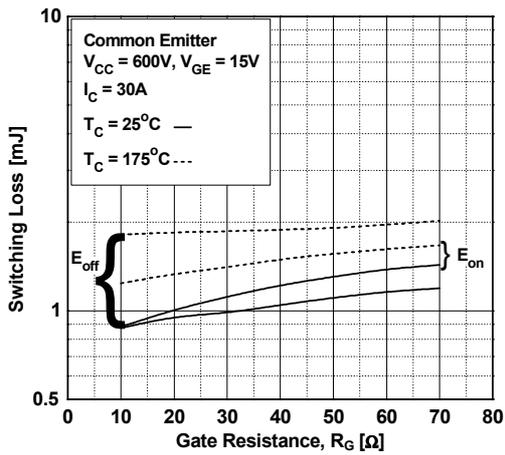


Figure 16. Switching Loss VS. Collector Current

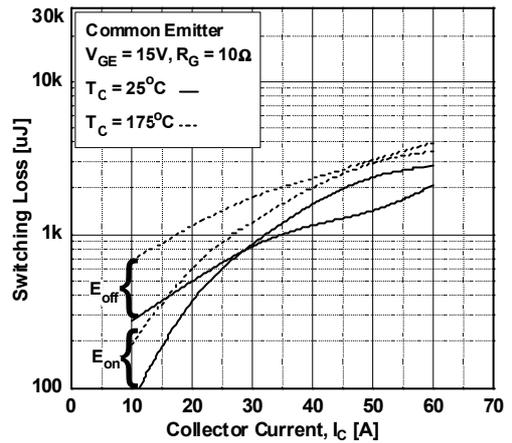


Figure 17. Turn off Switching SOA Characteristics

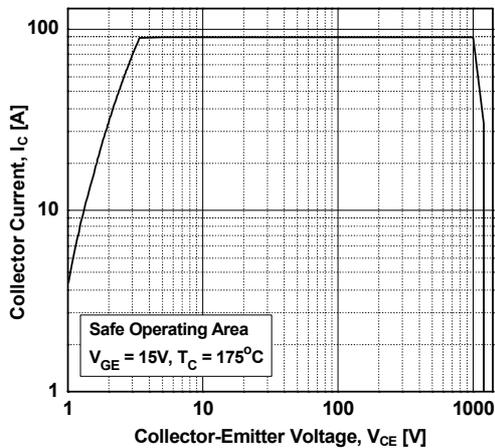


Figure 18. Forward Characteristics

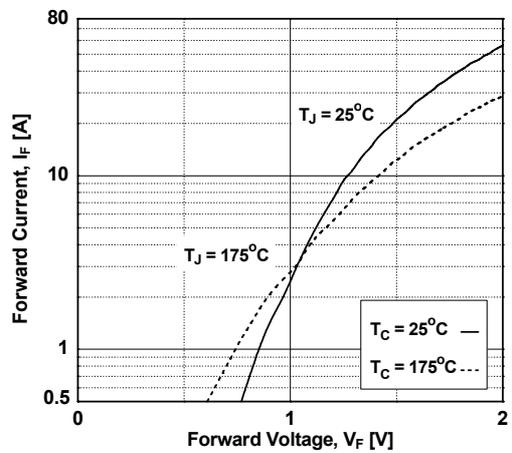
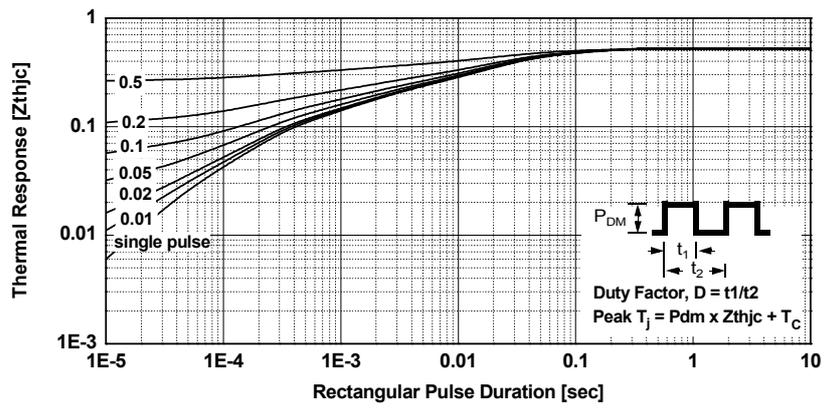


Figure 19. Transient Thermal Impedance of IGBT





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