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April 2013

FGA30N120FTD 1200 V, 30 A Field Stop Trench IGBT

Features

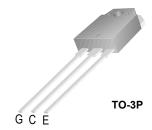
- Field Stop Trench Technology
- · High Speed Switching
- Low Saturation Voltage: $V_{CE(sat)} = 1.6 V @ I_C = 30 A$
- · High Input Impedance

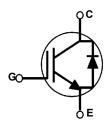
Applications

· Solar Inverter, UPS, Welder, PFC

General Description

Using advanced field stop trench technology, Fairchild®'s 1200V trench IGBTs offer superior conduction and switching performances for soft switching applications. The device can operate in parallel configuration with exceptional avalanche ruggedness. This device is designed for induction heating and microwave oven.





Absolute Maximum Ratings

Symbol	Description		Ratings	Unit
V _{CES}	Collector to Emitter Voltage		1200	V
V _{GES}	Gate to Emitter Voltage		± 25	V
I _C	Collector Current	@ T _C = 25°C	60	А
.0	Collector Current	@ T _C = 100°C	30	Α
I _{CM (1)}	Pulsed Collector Current	@ T _C = 25°C	90	А
I _F	Diode Continuous Forward Current	@ T _C = 100°C	30	А
P _D	Maximum Power Dissipation	@ T _C = 25°C	339	W
	Maximum Power Dissipation	@ T _C = 100°C	132	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 rating: Pulse width limited by max. junction temperature

Thermal Characteristics

Symbol	Parameter	Тур.	Max.	Unit
$R_{\theta JC}(IGBT)$	Thermal Resistance, Junction to Case	-	0.38	°C/W
$R_{\theta JC}(Diode)$	Thermal Resistance, Junction to Case	-	1.2	°C/W

$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	40	°C/W

Package Marking and Ordering Information





Device Marking	Device	Package	Eco Status	Packaging Type	Qty per Tube
FGA30N120FTD	FGA30N120FTDTU	TO-3PN	RoHS	Tube	30ea

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	teristics					
BV _{CES}	Collector to Emitter Breakdown Voltage	$V_{GE} = 0V, I_{C} = 250\mu A$	1200	-	-	V
I _{CES}	Collector Cut-Off Current	$V_{CE} = V_{CES}, V_{GE} = 0V$	-	-	1	mA
I _{GES}	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0V$	-	-	±250	nA
On Charac	teristics					
V _{GE(th)}	G-E Threshold Voltage	I_C = 30mA, V_{CE} = V_{GE}	3.5	6	7.5	V
- (- /		I _C = 30A, V _{GE} = 15V	-	1.6	2	V
V _{CE(sat)}	Collector to Emitter Saturation Voltage	I _C = 30A, V _{GE} = 15V, T _C = 125°C	-	2.0	-	V
Dynamic C	haracteristics		·			
C _{ies}	Input Capacitance		-	5140	-	pF
C _{oes}	Output Capacitance	V _{CE} = 30V _, V _{GE} = 0V, f = 1MHz	-	150	-	pF
C _{res}	Reverse Transfer Capacitance	1 = 1WIDZ	-	95	-	pF
Switching	Characteristics					
t _{d(on)}	Turn-On Delay Time		-	31	-	ns
t _r	Rise Time		-	101	-	ns
t _{d(off)}	Turn-Off Delay Time	$V_{CC} = 600V, I_{C} = 30A,$	-	198	-	ns
t _f	Fall Time	$R_G = 10\Omega$, $V_{GE} = 15V$,	-	259	-	ns
E _{on}	Turn-On Switching Loss	Resistive Load, T _C = 25°C	-	0.54	-	mJ
E _{off}	Turn-Off Switching Loss		-	1.16	1.51	mJ
E _{ts}	Total Switching Loss		-	1.70	-	mJ
t _{d(on)}	Turn-On Delay Time		-	40	-	ns
t _r	Rise Time		-	127	-	ns
t _{d(off)}	Turn-Off Delay Time	$V_{CC} = 600V, I_{C} = 30A,$	-	211	-	ns
t _f	Fall Time	$R_G = 10\Omega, V_{GE} = 15V,$	-	364	-	ns
E _{on}	Turn-On Switching Loss	Resistive Load, T _C = 125°C	-	0.74	-	mJ
E _{off}	Turn-Off Switching Loss		-	1.63	-	mJ
E _{ts}	Total Switching Loss		-	2.37	-	mJ
Qg	Total Gate Charge		-	208	-	nC
Q _{ge}	Gate to Emitter Charge	$V_{CE} = 600V, I_{C} = 30A,$ $V_{GE} = 15V$	-	41	-	nC
Q _{gc}	Gate to Collector Charge	VGE - 13V	_	97	_	nC

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

Symbol	Parameter	Test Conditions		Min.	Тур.	Max	Unit
V _{FM}	Diode Forward Voltage	I _F = 30A	T _C = 25°C	-	1.3	1.7	V
- FIVI	Blode Forward Voltage		$T_{\rm C} = 125^{\rm o}{\rm C}$	-	1.3	-	
t		I _r =30A.	$T_{\rm C} = 25^{\rm o}{\rm C}$	-	730	-	ns
ai.			$T_{\rm C} = 125^{\rm o}{\rm C}$	-	775	-	
l.,			$T_{\rm C} = 25^{\rm o}{\rm C}$	-	43	-	Α
111			$T_{\rm C} = 125^{\rm o}{\rm C}$	-	47	-	
Q _{rr}	Diode Reverse Recovery Charge		$T_{\rm C} = 25^{\rm o}{\rm C}$	-	5.9	-	μC
~ I	Tiese Hereies Heester, Sharge		$T_{\rm C} = 125^{\rm o}{\rm C}$	-	18.2	ı	μ0

Figure 1. Typical Output Characteristics

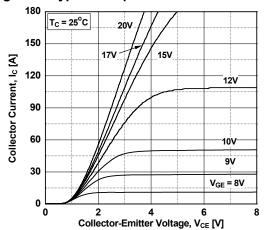


Figure 3. Typical Saturation Voltage Characteristics

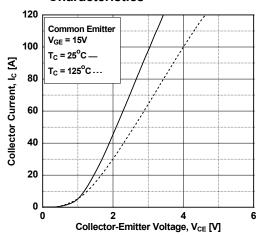


Figure 5. Saturation Voltage vs. Case
Temperature at Variant Current Level

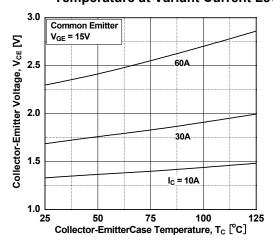


Figure 2. Typical Output Characteristics

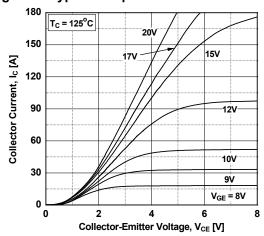


Figure 4. Transfer Characteristics

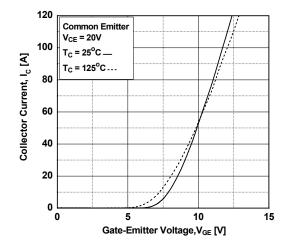


Figure 6. Saturation Voltage vs. V_{GE}

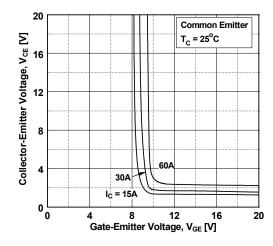


Figure 7. Saturation Voltage vs. V_{GE}

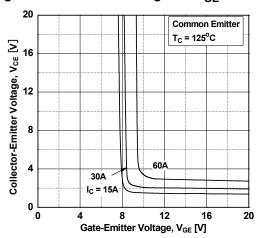


Figure 9. Gate charge Characteristics

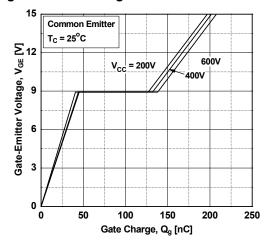


Figure 11. Turn-on Characteristics vs.
Gate Resistance

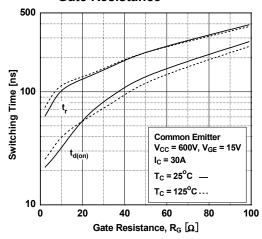


Figure 8. Capacitance Characteristics

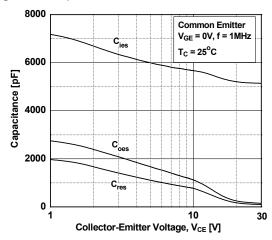


Figure 10. SOA Characteristics

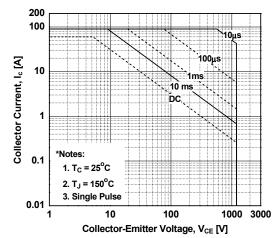


Figure 12. Turn-off Characteristics vs.
Gate Resistance

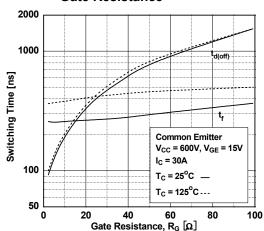


Figure 13. Turn-on Characteristics vs. **Collector Current**

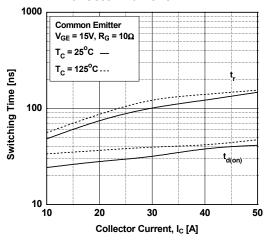


Figure 14. Turn-off Characteristics vs. **Collector Current**

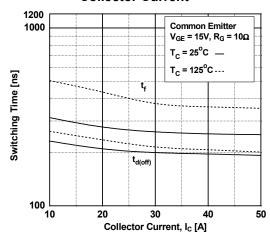


Figure 15. Switching Loss vs. Gate Resistance

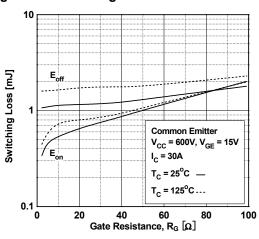


Figure 16. Switching Loss vs. Collector Current

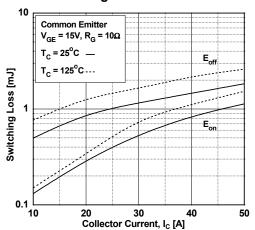
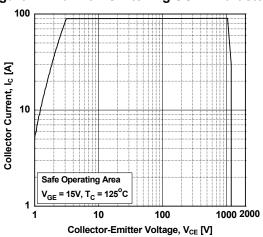


Figure 17. Turn off Switching SOA Characteristics Figure 18. Forward Characteristics



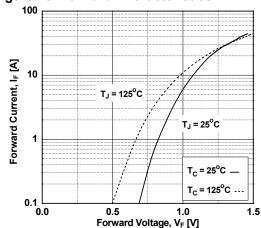


Figure 19. Reverse Current

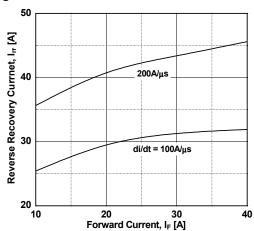


Figure 20. Stored Charge

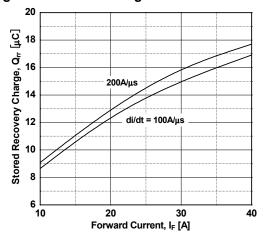


Figure 21. Reverse Recovery Time

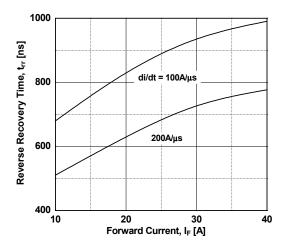
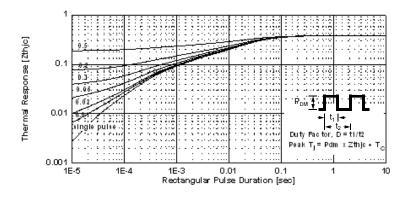
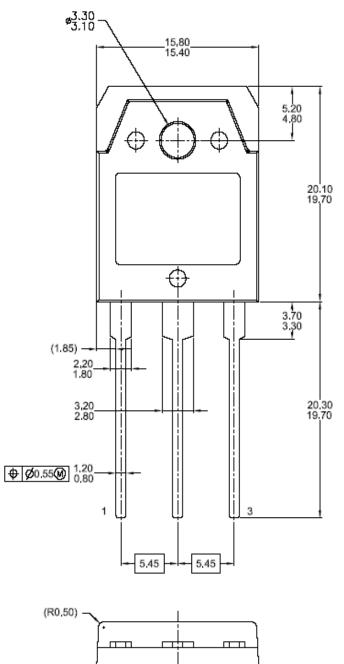


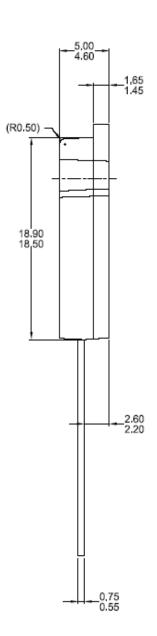
Figure 22. Transient Thermal Impedance of IGBT



Mechanical Dimensions

TO-3PN





Dimensions in Millimeters





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