FAIRCHILD SEMICONDUCTOR®

July, 2007

FGA25N120ANTD/FGA25N120ANTD_F109
1200V NPT Trench IGBT

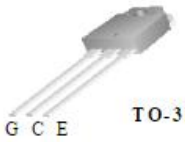
Features

- NPT Trench Technology, Positive temperature coefficient
- Low saturation voltage: VCE(sat), typ = 2.0V @ IC = 25A and TC = 25°C
- Low switching loss: Eoff, typ = 0.96mJ @ IC = 25A and TC = 25°C
- Extremely enhanced avalanche capability

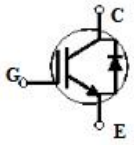
Description

Using Fairchild's proprietary trench design and advanced NPT technology, the 1200V NPT IGBT offers superior conduction and switching performances, high avalanche ruggedness and easy parallel operation.

This device is well suited for the resonant or soft switching application such as induction heating, microwave oven, etc.



TO-3PN



Absolute Maximum Ratings

Symbol	Description		FGA25N120ANTD	Units
VCES	Collector-Emitter Voltage		1200	V
VGES	Gate-Emitter Voltage		± 20	V
IC	Collector Current	@ TC = 25°C	50	A
	Collector Current	@ TC = 100°C	25	A
ICM	Pulsed Collector Current (Note 1)		90	A
IF	Diode Continuous Forward Current	@ TC = 100°C	25	A
IFM	Diode Maximum Forward Current		150	A
PD	Maximum Power Dissipation	@ TC = 25°C	312	W
	Maximum Power Dissipation	@ TC = 100°C	125	W
TJ	Operating Junction Temperature		-55 to +150	°C
Tstg	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	Typ.	Max.	Units
RθJC	Thermal Resistance, Junction-to-Case for IGBT	--	0.4	°C/W
RθJC	Thermal Resistance, Junction-to-Case for Diode	--	2.0	°C/W
RθJA	Thermal Resistance, Junction-to-Ambient	--	40	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FGA25N120ANTD	FGA25N120ANTD	TO-3P	--	--	30

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
ICES	Collector Cut-Off Current	VCE = VCES, VGE = 0V	--	--	3	mA
IGES	G-E Leakage Current	VGE = VGES, VCE = 0V	--	--	± 250	nA
On Characteristics						
VGE(th)	G-E Threshold Voltage	IC = 25mA, VCE = VGE	3.5	5.5	7.5	V
VCE(sat)	Collector to Emitter Saturation Voltage	IC = 25A, VGE = 15V	--	2.0	2.5	V
		IC = 25A, VGE = 15V, TC = 125°C	--	2.15	--	V
		IC = 50A, VGE = 15V	--	2.65	--	V
Dynamic Characteristics						
Cies	Input Capacitance	VCE = 30V, VGE = 0V, f = 1MHz	--	3700	--	pF
Coes	Output Capacitance		--	130	--	pF
Cres	Reverse Transfer Capacitance		--	80	--	pF
Switching Characteristics						
td(on)	Turn-On Delay Time	VCC = 600 V, IC = 25A, RG = 10Ω, VGE = 15V, Inductive Load, TC = 25°C	--	50	--	ns
tr	Rise Time		--	60	90	ns
td(off)	Turn-Off Delay Time		--	190	--	ns
tf	Fall Time		--	100	180	ns
Eon	Turn-On Switching Loss		--	4.1	6.2	mJ
Eoff	Turn-Off Switching Loss		--	0.96	1.5	mJ
Ets	Total Switching Loss		--	5.06	7.7	mJ
td(on)	Turn-On Delay Time	VCC = 600 V, IC = 25A, RG = 10Ω, VGE = 15V, Inductive Load, TC = 125°C	--	50	--	ns
tr	Rise Time		--	60	--	ns
td(off)	Turn-Off Delay Time		--	200	--	ns
tf	Fall Time		--	154	--	ns
Eon	Turn-On Switching Loss		--	4.3	6.9	mJ
Eoff	Turn-Off Switching Loss		--	1.5	2.4	mJ
Ets	Total Switching Loss		--	5.8	9.3	mJ
Qg	Total Gate Charge	VCE = 600 V, IC = 25A, VGE = 15V	--	200	300	nC
Qge	Gate-Emitter Charge		--	15	23	nC
Qgc	Gate-Collector Charge		--	100	150	nC

Notes:
(1) Repetitive rating: Pulse width limited by max. junction temperature

Electrical Characteristics of DIODE T$_C$ = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_{FM}	Diode Forward Voltage	IF = 25A	TC = 25°C	--	2.0	3.0	V
			TC = 125°C	--	2.1	--	
t_{rr}	Diode Reverse Recovery Time	IF = 25A dI/dt = 200A/	TC = 25°C	--	235	350	ns
			TC = 125°C	--	300	--	
I_{rr}	Diode Peak Reverse Recovery Current		TC = 25°C	--	27	40	A
			TC = 125°C	--	31	--	
Q_{rr}	Diode Reverse Recovery Charge		TC = 25°C	--	3130	4700	nC
			TC = 125°C	--	4650	--	

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

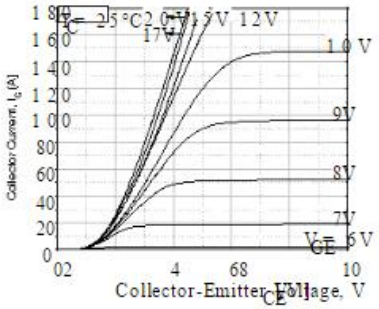


Figure 2. Typical Saturation Voltage Characteristics

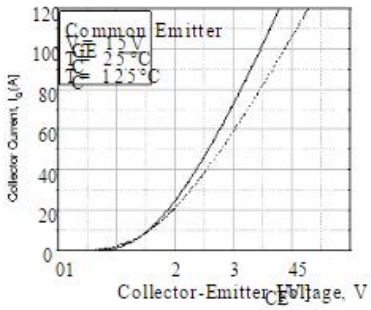


Figure 3. Saturation Voltage vs. Case Temperature at Variant Current Level

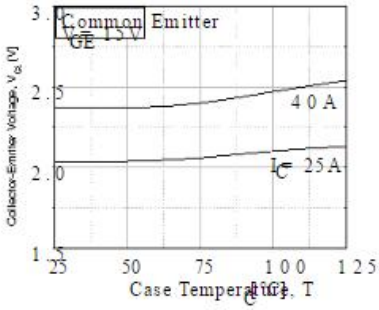


Figure 4. Saturation Voltage vs. VGE

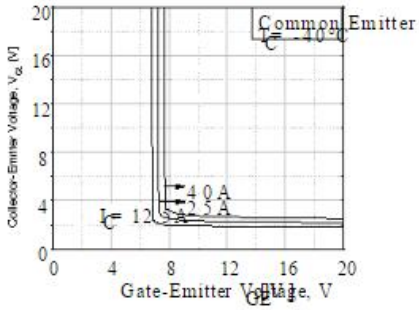


Figure 5. Saturation Voltage vs. VGE

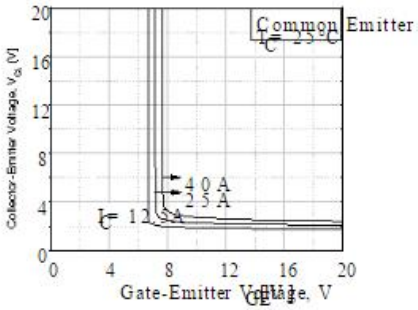
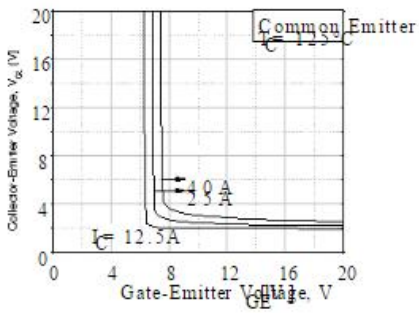


Figure 6. Saturation Voltage vs. VGE



Typical Performance Characteristics (Continued)

Figure 7. Capacitance Characteristics

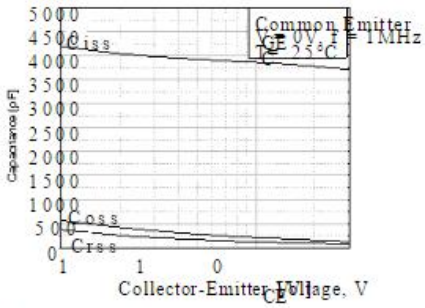


Figure 8. Turn-On Characteristics vs. Gate Resistance

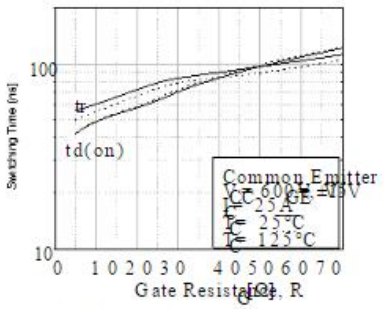


Figure 9. Turn-Off Characteristics vs. Gate Resistance

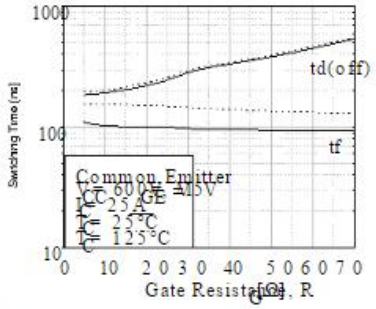


Figure 10. Switching Loss vs. Gate Resistance

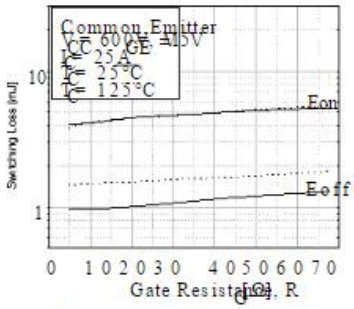


Figure 11. Turn-On Characteristics vs. Collector Current

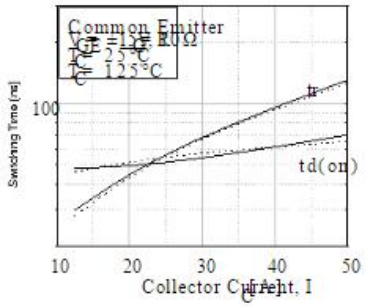
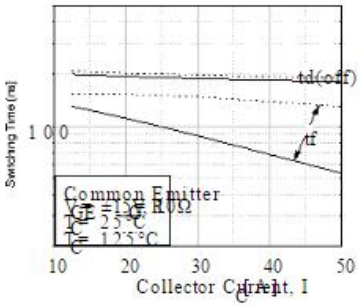


Figure 12. Turn-Off Characteristics vs. Collector Current



Typical Performance Characteristics (Continued)

Figure 13. Switching Loss vs. Collector Current

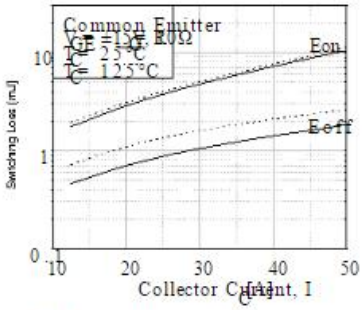


Figure 14. Gate Charge Characteristics

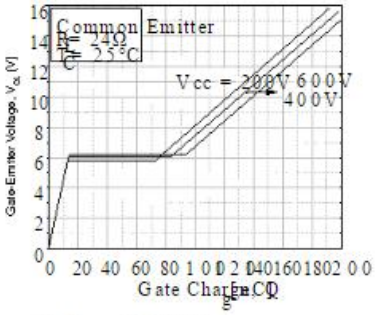


Figure 15. SOA Characteristics

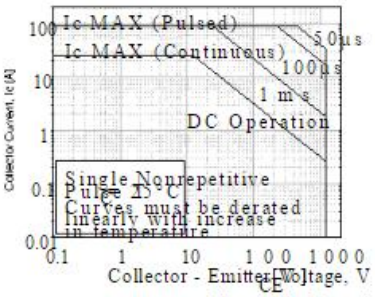


Figure 16. Turn-Off SOA

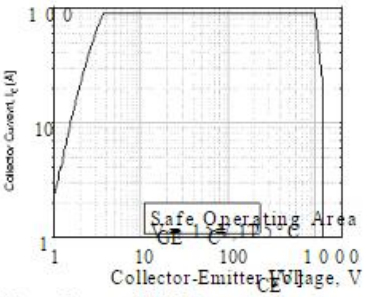
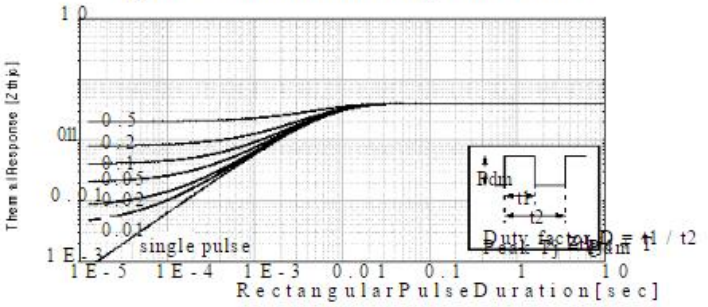


Figure 17. Transient Thermal Impedance of IGBT



Typical Performance Characteristics (Continued)

Figure 18. Forward Characteristics

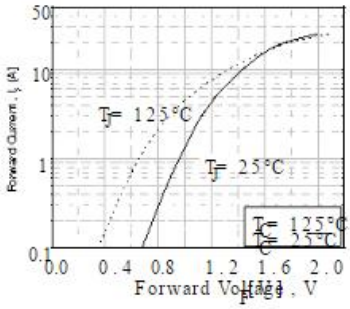


Figure 19. Reverse Recovery Current

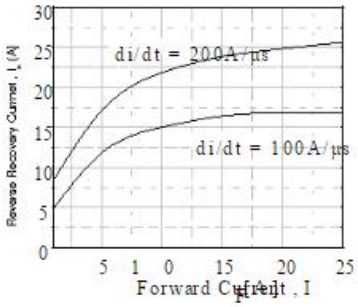


Figure 20. Stored Charge

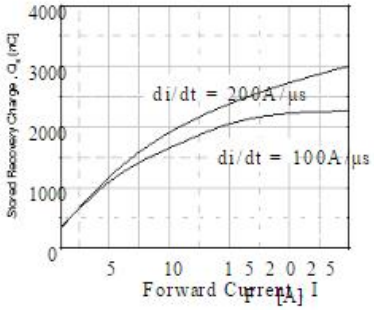
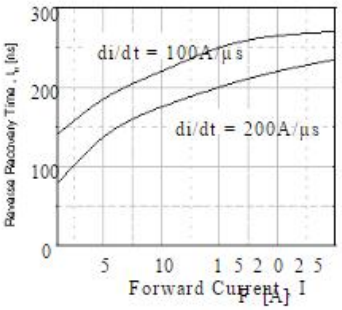
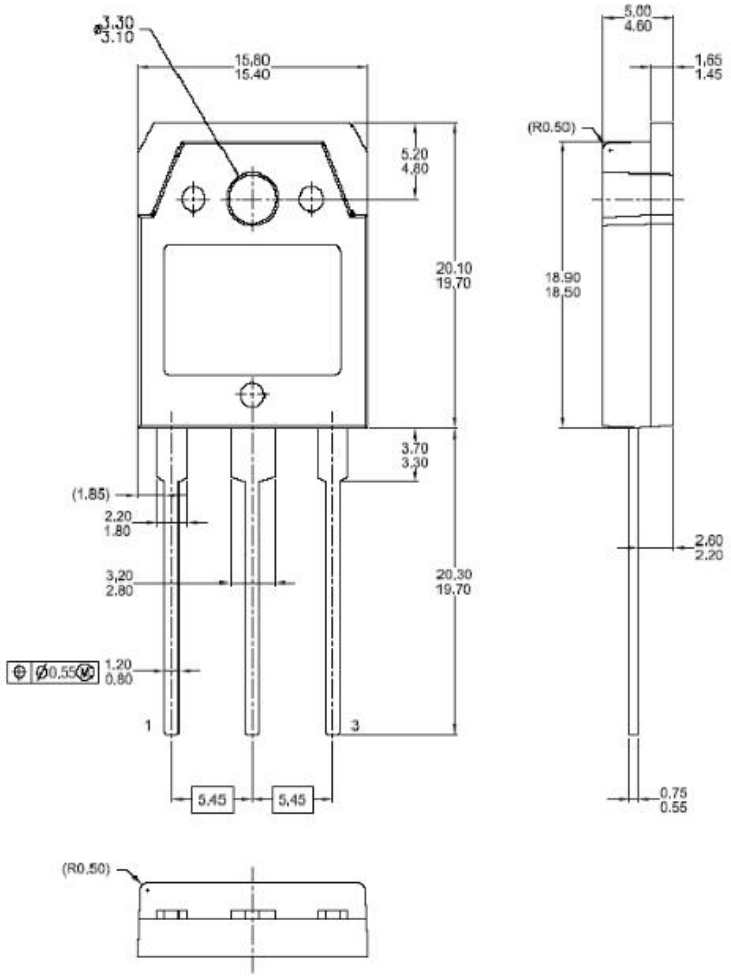


Figure 21. Reverse Recovery Time



Mechanical Dimensions (continued)

TO-3PN



Dimensions in Millimeters

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FASTr™	MicroPak™	QT Optoelectronics™	TinyPWM™	
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2. A critical component is any component of a life su
whose failure to perform can be reasonabl
failure of the life support device or syste
or effectiveness.

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