

ON Semiconductor

FGA25N120ANTDTU 1200 V, 25 A NPT Trench IGBT

Features

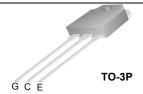
- · NPT Trench Technology, Positive Temperature Coefficient
- Low Saturation Voltage: V_{CE(sat), typ} = 2.0 V
 Q I_C = 25 A and T_C = 25°C
- Low Switching Loss: $E_{off, typ}$ = 0.96 mJ @ I_C = 25 A and T_C = 25°C
- · Extremely Enhanced Avalanche Capability

Description

Using ON Semiconductor'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 reso-nant or soft switching application such as induction heating, microwave oven.

Applications

· Induction Heating, Microwave Oven





Absolute Maximum Ratings

Symbol	Description		Ratings	Unit
V _{CES}	Collector-Emitter Voltage		1200	V
V _{GES}	Gate-Emitter Voltage		± 20	V
1	Collector Current	@ T _C = 25°C	50	A
I _C	Collector Current	@ T _C = 100°C	25	A
I _{CM (1)}	Pulsed Collector Current		90	A
1	Diode Continuous Forward Current	@ T _C = 25°C	50	A
I _F	Diode Continuous Forward Current	@ T _C = 100°C	25	A
I _{FM}	Diode Maximum Forward Current		150	A
D	Maximum Power Dissipation	@ T _C = 25°C	312	W
P_{D}	Maximum Power Dissipation	@ T _C = 100°C	125	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	mbol Parameter		Max.	Unit
$R_{\theta JC}(IGBT)$	Thermal Resistance, Junction-to-Case		0.4	°C/W
$R_{\theta JC}(DIODE)$	Thermal Resistance, Junction-to-Case		2.0	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient		40	°C/W

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FGA25N120ANTDTU-F109	FGA25N120ANTDTU	TO-3PN	Tube	N/A	N/A	30

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

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
Off Charac	teristics					
I _{CES}	Collector Cut-Off Current	V _{CE} = V _{CES} , V _{GE} = 0 V			3	mA
I _{GES}	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0 V$			± 250	nA
On Charac	teristics					
V _{GE(th)}	G-E Threshold Voltage	I_C = 25 mA, V_{CE} = V_{GE}	3.5	5.5	7.5	V
` '		I _C = 25 A, V _{GE} = 15 V		2.0		V
V _{CE(sat)}	Collector to Emitter Saturation Voltage	I _C = 25 A, V _{GE} = 15 V, T _C = 125°C		2.15		V
		I _C = 50 A, V _{GE} = 15 V		2.65		V
D	· · · · · · · · · · · · · · · · · · ·	·				
C _{ies}	Input Capacitance	V 00 V V 0 V		3700		pF
C _{oes}	Output Capacitance	$V_{CE} = 30 \text{ V}, V_{GE} = 0 \text{ V},$ f = 1 MHz		130		pF
C _{res}	Reverse Transfer Capacitance			80		pF
	Characteristics Turn-On Delay Time			50		ns
$t_{d(on)}$	Turn-On Delay Time			50		ns
t _r	Rise Time			60		ns
t _{d(off)}	Turn-Off Delay Time	V_{CC} = 600 V, I_{C} = 25 A, R_{G} = 10 Ω , V_{GE} = 15 V, Inductive Load, T_{C} = 25°C		190		ns
t _f	Fall Time			100		ns
E _{on}	Turn-On Switching Loss			4.1		mJ
E _{off}	Turn-Off Switching Loss			0.96		mJ
E _{ts}	Total Switching Loss			5.06		mJ
t _{d(on)}	Turn-On Delay Time			50		ns
t _r	Rise Time			60		ns
t _{d(off)}	Turn-Off Delay Time	V_{CC} = 600 V, I_{C} = 25 A,		200		ns
t _f	Fall Time	$R_G = 10\Omega$, $V_{GE} = 15 V$,		154		ns
E _{on}	Turn-On Switching Loss	Inductive Load, T _C = 125°C		4.3		mJ
E _{off}	Turn-Off Switching Loss			1.5		mJ
E _{ts}	Total Switching Loss			5.8		mJ
Qg	Total Gate Charge	V 000 V I 05 A		200		nC
Q _{ge}	Gate-Emitter Charge	V _{CE} = 600 V, I _C = 25 A, V _{GE} = 15 V		15		nC
Q _{gc}	Gate-Collector Charge			100		nC

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

Symbol	Parameter	Test Conditions		Min.	Тур.	Max.	Unit
V _{FM}	Diode Forward Voltage	I _F = 25 A	T _C = 25°C		2.0	3.0	V
			T _C = 125°C		2.1		
t Diede Deverse Desever	Diada Bayaraa Baaayary Tima	$di_F/dt = 200 A/\mu s$	T _C = 25°C		235	350	ns
t _{rr}	Diode Reverse Recovery Time		T _C = 125°C		300		
	Diode Peak Reverse Recovery Current		T _C = 25°C		27	40	Α
'rr rei			T _C = 125°C		31		
Q_{rr}	Diode Reverse Recovery Charge		T _C = 25°C		3130	4700	- nC
			T _C = 125°C		4650		

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

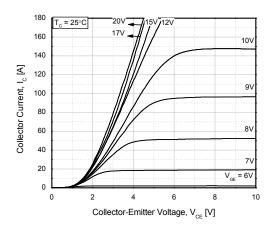


Figure 3. Saturation Voltage vs. Case
Temperature at Variant Current Level

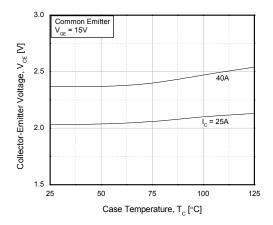


Figure 5. Saturation Voltage vs. V_{GE}

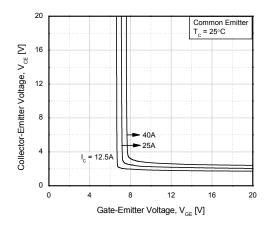


Figure 2. Typical Saturation Voltage Characteristics

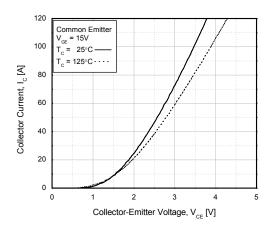


Figure 4. Saturation Voltage vs. V_{GE}

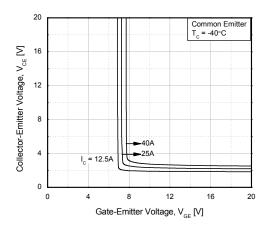
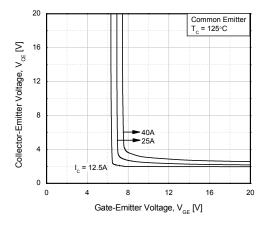


Figure 6. Saturation Voltage vs. V_{GE}



Typical Performance Characteristics (Continued)

Figure 7. Capacitance Characteristics

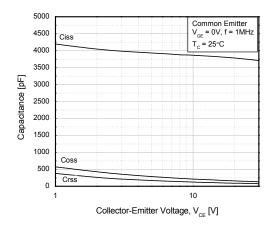


Figure 8. Turn-On Characteristics vs. Gate Resistance

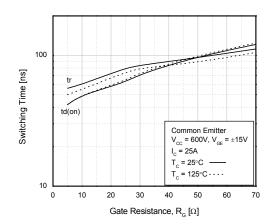


Figure 9. Turn-Off Characteristics vs.
Gate Resistance

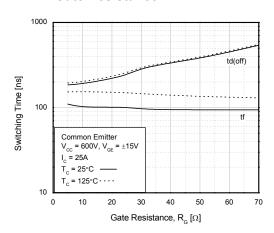


Figure 10. Switching Loss vs. Gate Resistance

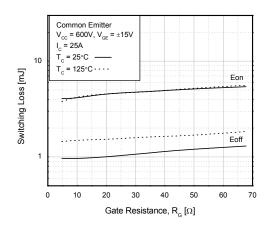


Figure 11. Turn-On Characteristics vs. Collector Current

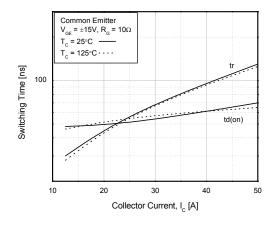
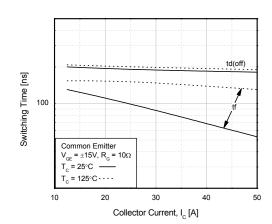


Figure 12. Turn-Off Characteristics vs. Collector Current



Typical Performance Characteristics (Continued)

Figure 13. Switching Loss vs. Collector Current

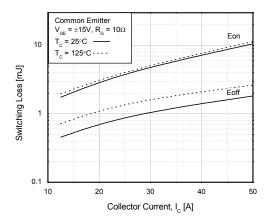


Figure 14. Gate Charge Characteristics

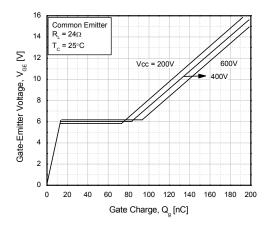


Figure 15. SOA Characteristics

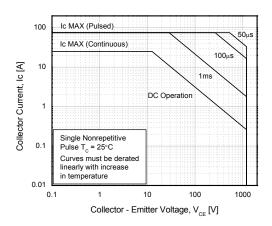


Figure 16. Turn-Off SOA

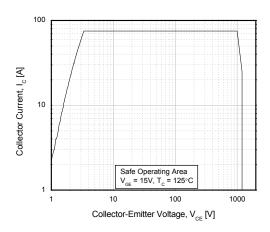
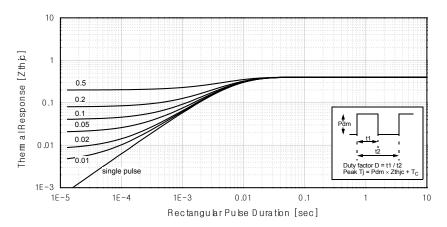


Figure 17. Transient Thermal Impedance of IGBT



Typical Performance Characteristics (Continued)

Figure 18. Forward Characteristics

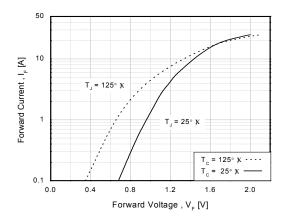


Figure 20. Stored Charge

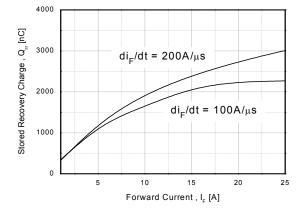


Figure 19. Reverse Recovery Current

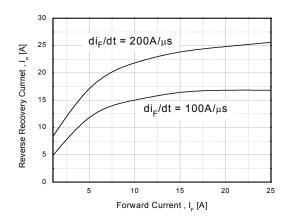
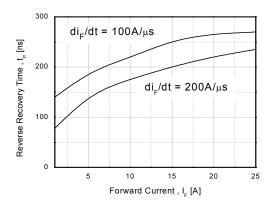
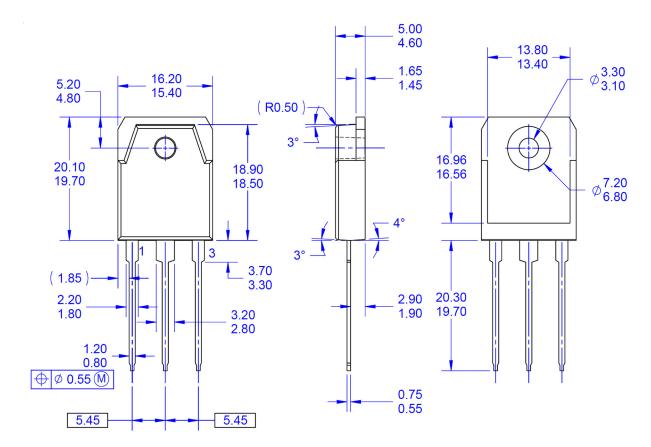
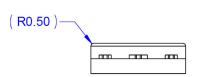


Figure 21. Reverse Recovery Time



Mechanical Dimensions





NOTES: UNLESS OTHERWISE SPECIFIED

- A) THIS PACKAGE CONFORMS TO EIAJ
- SC-65 PACKAGING STANDARD. ALL DIMENSIONS ARE IN MILLIMETERS. DIMENSION AND TOLERANCING PER ASME14.5-2009.
- DIMENSIONS ARE EXCLUSSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSSIONS.
 DRAWING FILE NAME: TO3PN03AREV1.
- FAIRCHILD SEMICONDUCTOR.

Figure 22. TO3PN, 3-Lead, Plastic, EIAJ SC-65

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