

## FGA25N120AN

### General Description

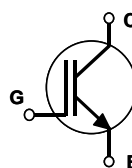
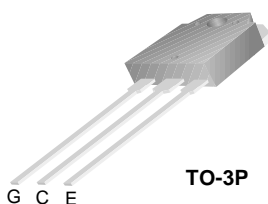
Employing NPT technology, Fairchild's AN series of IGBTs provides low conduction and switching losses. The AN series offers an solution for application such as induction heating (IH), motor control, general purpose inverters and uninterruptible power supplies (UPS).

### Features

- High speed switching
- Low saturation voltage :  $V_{CE(sat)} = 2.5 \text{ V @ } I_C = 25\text{A}$
- High input impedance

### Applications

Induction Heating, UPS, AC & DC motor controls and general purpose inverters.



### Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Description	FGA25N120AN	Units
$V_{CES}$	Collector-Emitter Voltage	1200	V
$V_{GES}$	Gate-Emitter Voltage	$\pm 20$	V
$I_C$	Collector Current @ $T_C = 25^\circ\text{C}$	40	A
	Collector Current @ $T_C = 100^\circ\text{C}$	25	A
$I_{CM(1)}$	Pulsed Collector Current	75	A
$P_D$	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	310	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	125	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	$^\circ\text{C}$

**Notes :**

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

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	--	0.4	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	40	$^\circ\text{C/W}$

## Electrical Characteristics of the IGBT T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
<b>Off Characteristics</b>						
BV <sub>CES</sub>	Collector-Emitter Breakdown Voltage	V <sub>GE</sub> = 0V, I <sub>C</sub> = 3mA	1200	--	--	V
ΔBV <sub>CES</sub> /ΔT <sub>J</sub>	Temperature Coefficient of Breakdown Voltage	V <sub>GE</sub> = 0V, I <sub>C</sub> = 3mA	--	0.6	--	V/°C
I <sub>CES</sub>	Collector Cut-Off Current	V <sub>CE</sub> = V <sub>CES</sub> , V <sub>GE</sub> = 0V	--	--	3	mA
I <sub>GES</sub>	G-E Leakage Current	V <sub>GE</sub> = V <sub>GES</sub> , V <sub>CE</sub> = 0V	--	--	± 100	nA

### On Characteristics

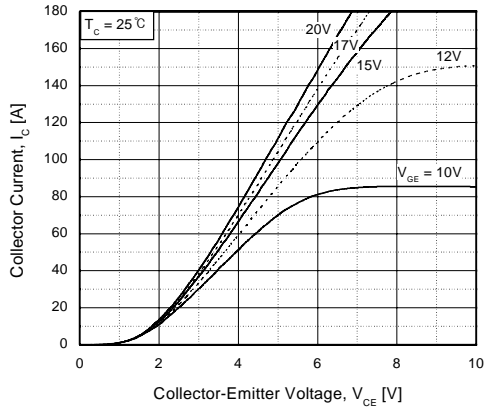
V <sub>GE(th)</sub>	G-E Threshold Voltage	I <sub>C</sub> = 25mA, V <sub>CE</sub> = V <sub>GE</sub>	3.5	5.5	7.5	V
V <sub>CE(sat)</sub>	Collector to Emitter Saturation Voltage	I <sub>C</sub> = 25A, V <sub>GE</sub> = 15V	--	2.5	3.2	V
		I <sub>C</sub> = 25A, V <sub>GE</sub> = 15V, T <sub>C</sub> = 125°C	--	2.9	--	V
		I <sub>C</sub> = 40A, V <sub>GE</sub> = 15V	--	3.1	--	V

### Dynamic Characteristics

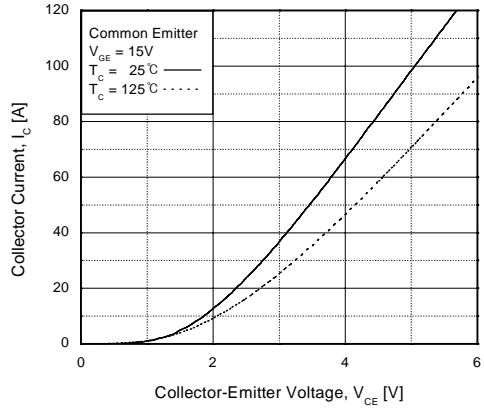
C <sub>ies</sub>	Input Capacitance	V <sub>CE</sub> = 30V, V <sub>GE</sub> = 0V, f = 1MHz	--	2100	--	pF
C <sub>oes</sub>	Output Capacitance		--	180	--	pF
C <sub>res</sub>	Reverse Transfer Capacitance		--	90	--	pF

### Switching Characteristics

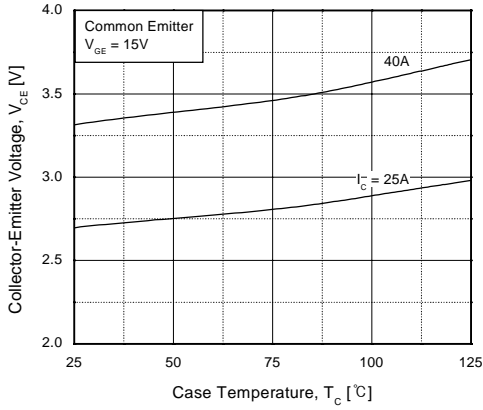
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>CC</sub> = 600 V, I <sub>C</sub> = 25A, R <sub>G</sub> = 10Ω, V <sub>GE</sub> = 15V, Inductive Load, T <sub>C</sub> = 25°C	--	60	--	ns
t <sub>r</sub>	Rise Time		--	60	--	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	170	--	ns
t <sub>f</sub>	Fall Time		--	45	90	ns
E <sub>on</sub>	Turn-On Switching Loss		--	4.8	7.2	mJ
E <sub>off</sub>	Turn-Off Switching Loss		--	1.0	1.5	mJ
E <sub>ts</sub>	Total Switching Loss	--	5.7	8.7	mJ	
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>CC</sub> = 600 V, I <sub>C</sub> = 25A, R <sub>G</sub> = 10Ω, V <sub>GE</sub> = 15V, Inductive Load, T <sub>C</sub> = 125°C	--	60	--	ns
t <sub>r</sub>	Rise Time		--	60	--	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	180	--	ns
t <sub>f</sub>	Fall Time		--	70	--	ns
E <sub>on</sub>	Turn-On Switching Loss		--	5.5	--	mJ
E <sub>off</sub>	Turn-Off Switching Loss		--	1.4	--	mJ
E <sub>ts</sub>	Total Switching Loss	--	6.9	--	mJ	
Q <sub>g</sub>	Total Gate Charge	V <sub>CE</sub> = 600 V, I <sub>C</sub> = 25A, V <sub>GE</sub> = 15V	--	200	300	nC
Q <sub>ge</sub>	Gate-Emitter Charge		--	15	23	nC
Q <sub>gc</sub>	Gate-Collector Charge		--	105	160	nC
L <sub>e</sub>	Internal Emitter Inductance	Measured 5mm from PKG	--	14	--	nH



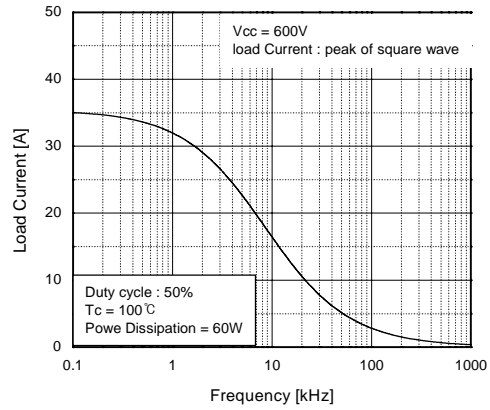
**Fig 1. Typical Output Characteristics**



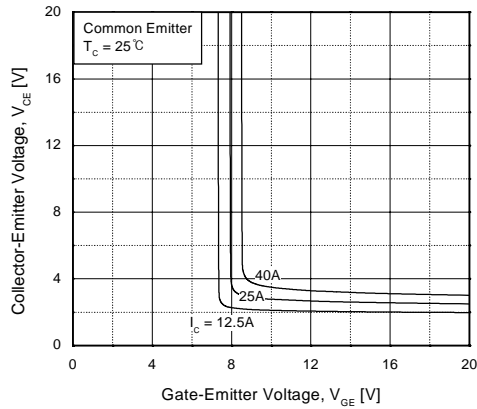
**Fig 2. Typical Saturation Voltage Characteristics**



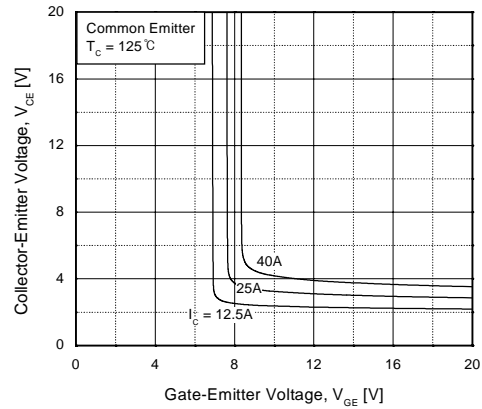
**Fig 3. Saturation Voltage vs. Case Temperature at Variant Current Level**



**Fig 4. Load Current vs. Frequency**



**Fig 5. Saturation Voltage vs. V\_GE**



**Fig 6. Saturation Voltage vs. V\_GE**

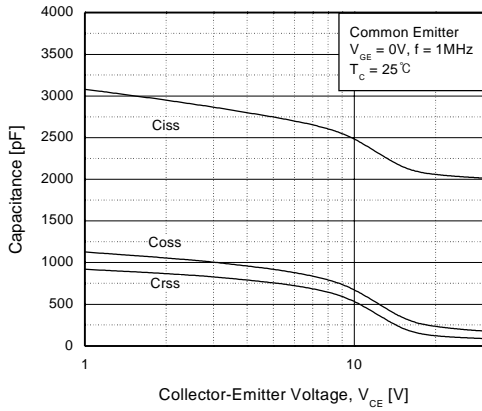


Fig 7. Capacitance Characteristics

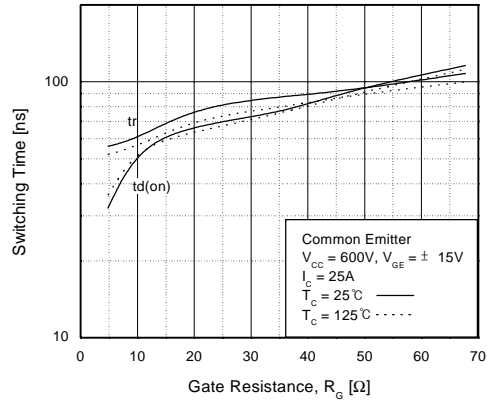


Fig 8. Turn-On Characteristics vs. Gate Resistance

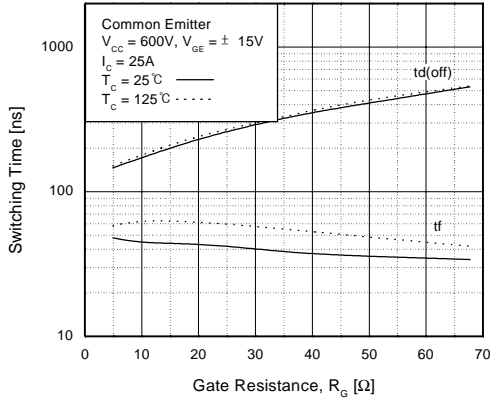


Fig 9. Turn-Off Characteristics vs. Gate Resistance

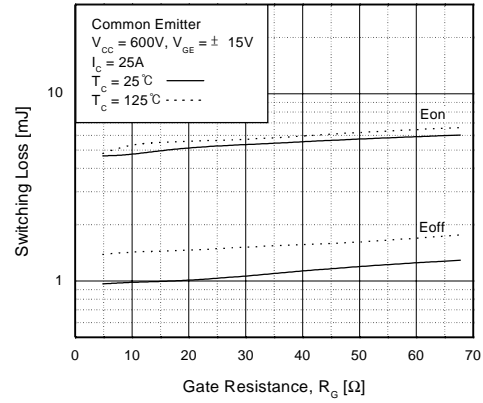


Fig 10. Switching Loss vs. Gate Resistance

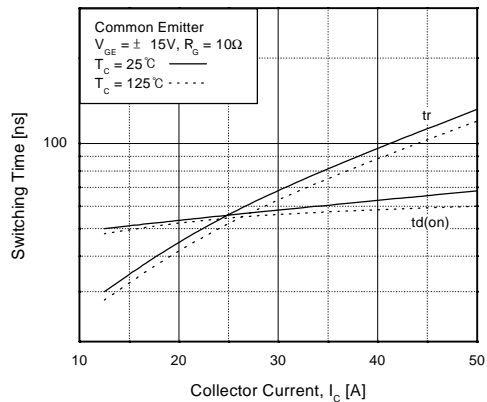


Fig 11. Turn-On Characteristics vs. Collector Current

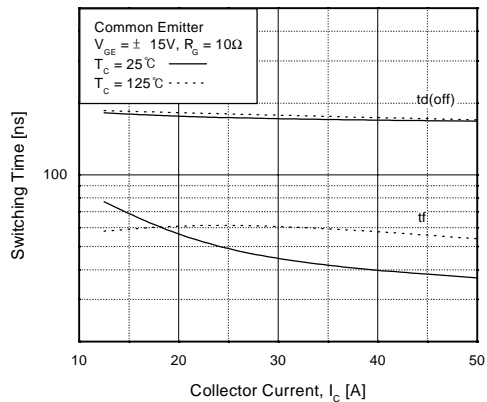
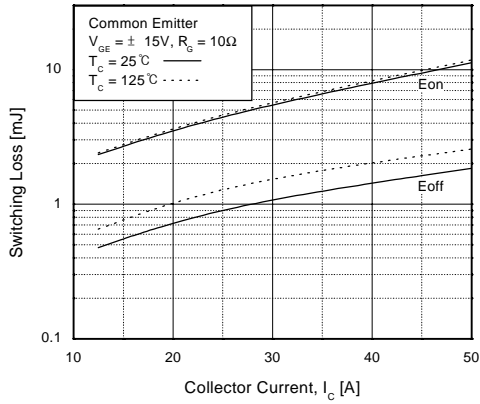
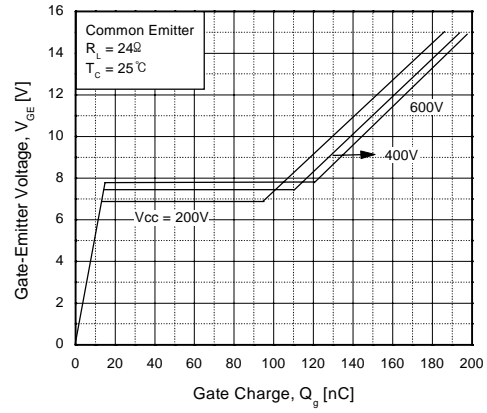


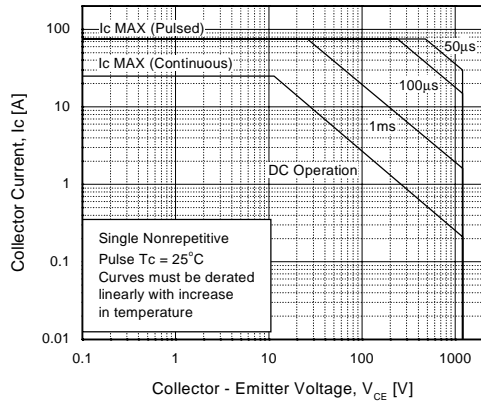
Fig 12. Turn-Off Characteristics vs. Collector Current



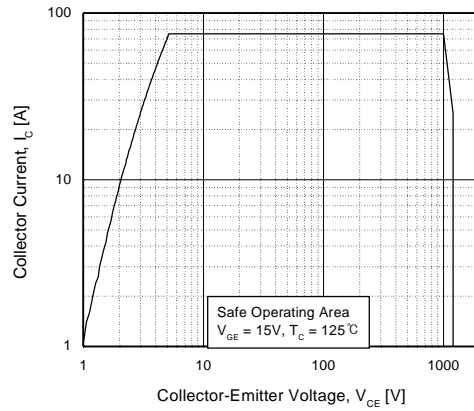
**Fig 13. Switching Loss vs. Collector Current**



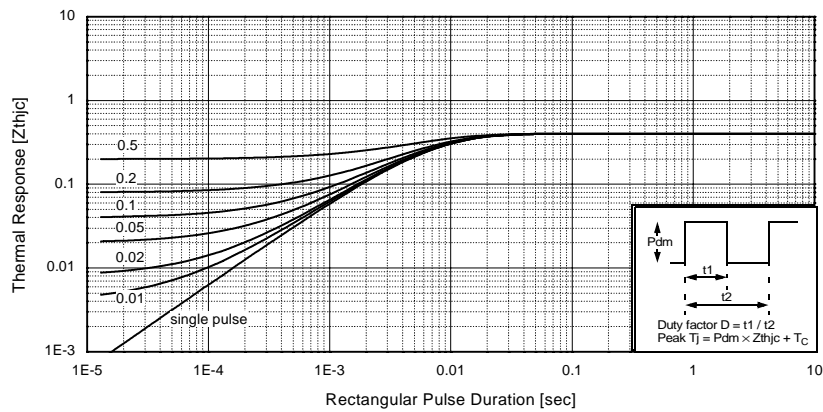
**Fig 14. Gate Charge Characteristics**



**Fig 15. SOA Characteristics**



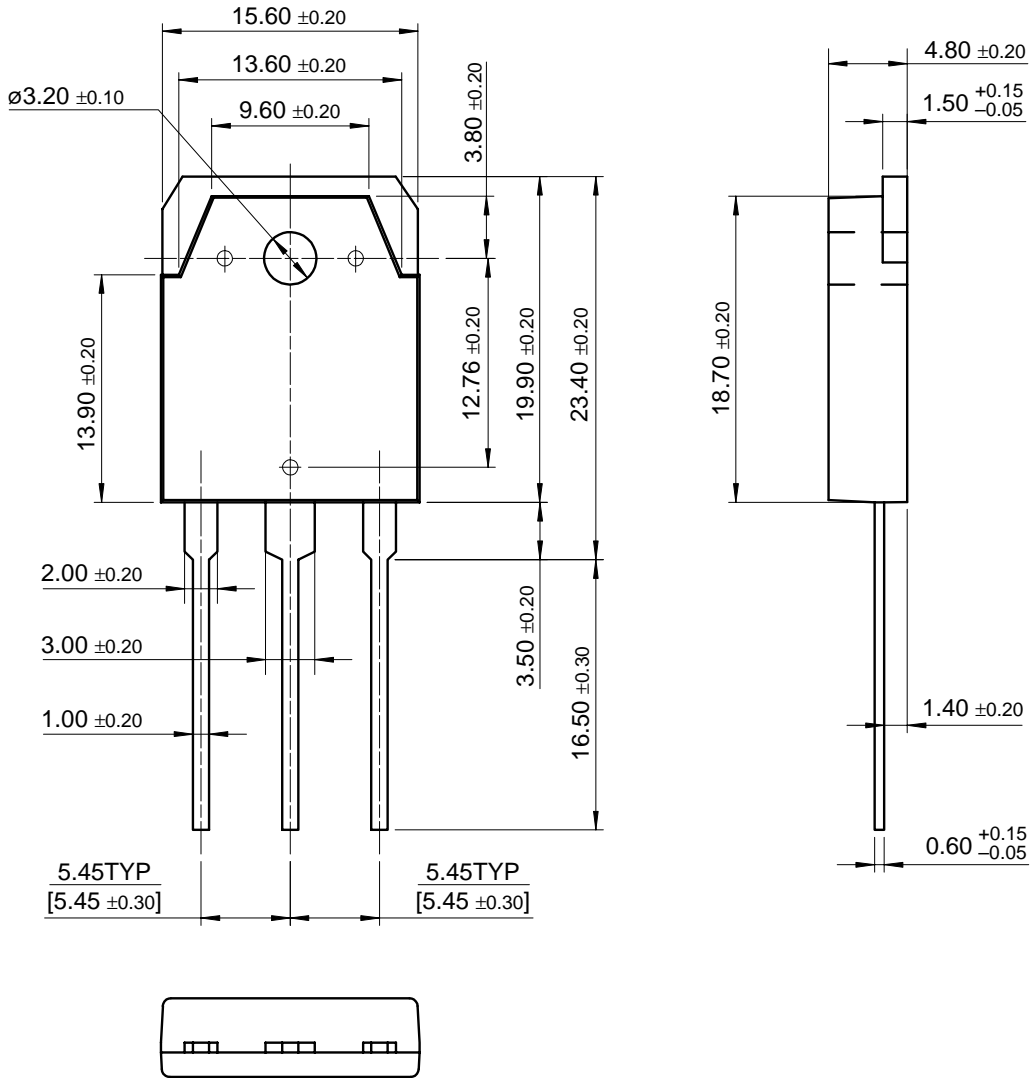
**Fig 16. Turn-Off SOA**



**Fig 17. Transient Thermal Impedance of IGBT**

Package Dimension

TO-3P (FS PKG CODE)



Dimensions in Millimeters

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