

## FGA15N120AN

### General Description

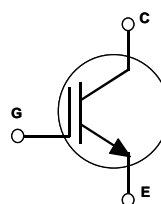
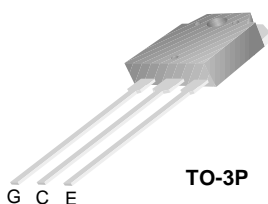
Employing NPT technology, Fairchild's AN series of IGBTs provides low conduction and switching losses. The AN series offers solutions for applications such as induction heating (IH), motor control, general purpose inverters and uninterruptible power supplies (UPS).

### Features

- High speed switching
- Low saturation voltage :  $V_{CE(sat)} = 2.4 \text{ V @ } I_C = 15\text{A}$
- 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	FGA15N120AN	Units
$V_{CES}$	Collector-Emitter Voltage	1200	V
$V_{GES}$	Gate-Emitter Voltage	$\pm 20$	V
$I_C$	Collector Current @ $T_C = 25^\circ\text{C}$	24	A
	Collector Current @ $T_C = 100^\circ\text{C}$	15	A
$I_{CM(1)}$	Pulsed Collector Current	45	A
$P_D$	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	200	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	80	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
$R_{\theta JC}(\text{IGBT})$	Thermal Resistance, Junction-to-Case	--	0.63	$^\circ\text{C/W}$
$R_{\theta JA}$	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> = 15mA, 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> = 15A, V <sub>GE</sub> = 15V	--	2.4	3.2	V
		I <sub>C</sub> = 15A, V <sub>GE</sub> = 15V, T <sub>C</sub> = 125°C	--	2.9	--	V
		I <sub>C</sub> = 24A, V <sub>GE</sub> = 15V	--	3.0	--	V

### Dynamic Characteristics

C <sub>ies</sub>	Input Capacitance	V <sub>CE</sub> = 30V, V <sub>GE</sub> = 0V, f = 1MHz	--	1150	--	pF
C <sub>oes</sub>	Output Capacitance		--	120	--	pF
C <sub>res</sub>	Reverse Transfer Capacitance		--	56	--	pF

### Switching Characteristics

t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>CC</sub> = 600 V, I <sub>C</sub> = 15A, R <sub>G</sub> = 20Ω, V <sub>GE</sub> = 15V, Inductive Load, T <sub>C</sub> = 25°C	--	90	--	ns
t <sub>r</sub>	Rise Time		--	70	--	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	310	--	ns
t <sub>f</sub>	Fall Time		--	60	120	ns
E <sub>on</sub>	Turn-On Switching Loss		--	3.27	4.9	mJ
E <sub>off</sub>	Turn-Off Switching Loss		--	0.6	0.9	mJ
E <sub>ts</sub>	Total Switching Loss	--	3.68	5.8	mJ	
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>CC</sub> = 600 V, I <sub>C</sub> = 15A, R <sub>G</sub> = 20Ω, V <sub>GE</sub> = 15V, Inductive Load, T <sub>C</sub> = 125°C	--	80	--	ns
t <sub>r</sub>	Rise Time		--	60	--	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	310	--	ns
t <sub>f</sub>	Fall Time		--	50	--	ns
E <sub>on</sub>	Turn-On Switching Loss		--	3.41	--	mJ
E <sub>off</sub>	Turn-Off Switching Loss		--	0.84	--	mJ
E <sub>ts</sub>	Total Switching Loss	--	4.25	--	mJ	
Q <sub>g</sub>	Total Gate Charge	V <sub>CE</sub> = 600 V, I <sub>C</sub> = 15A, V <sub>GE</sub> = 15V	--	120	180	nC
Q <sub>ge</sub>	Gate-Emitter Charge		--	9	14	nC
Q <sub>gc</sub>	Gate-Collector Charge		--	63	95	nC
L <sub>e</sub>	Internal Emitter Inductance	Measured 5mm from PKG	--	14	--	nH

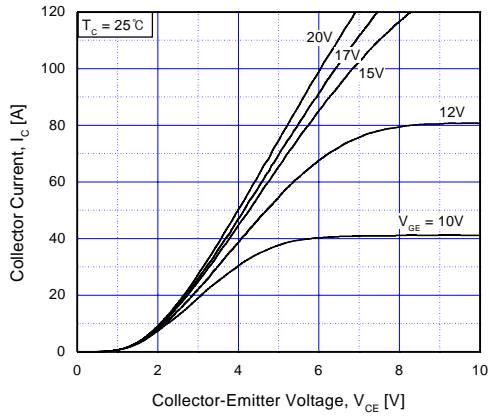


Fig 1. Typical Output Characteristics

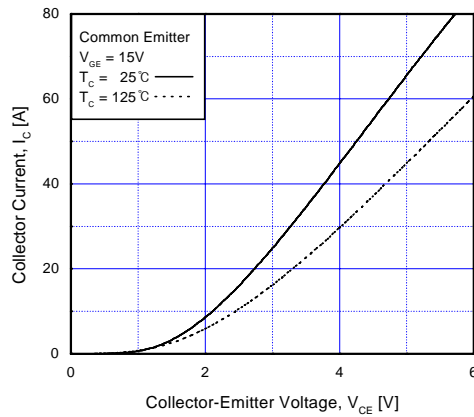


Fig 2. Typical Saturation Voltage Characteristics

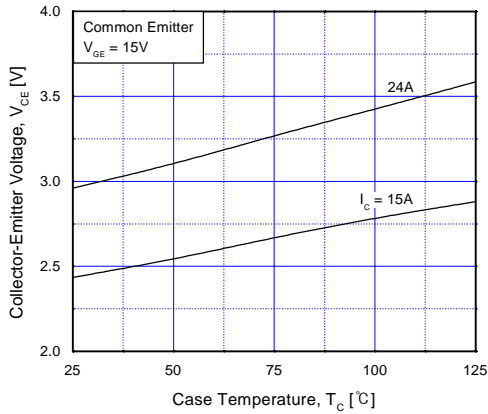


Fig 3. Saturation Voltage vs. Case Temperature at Variant Current Level

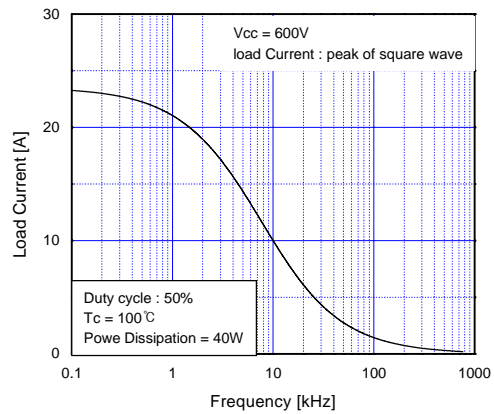


Fig 4. Load Current vs. Frequency

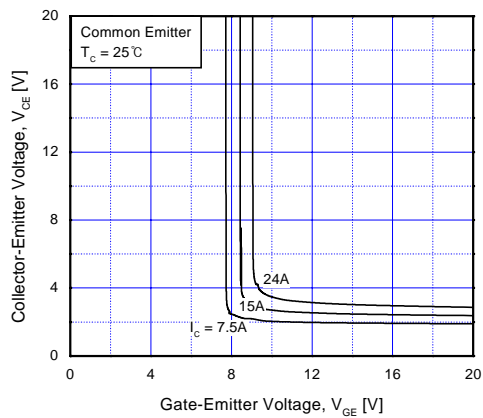


Fig 5. Saturation Voltage vs.  $V_{GE}$

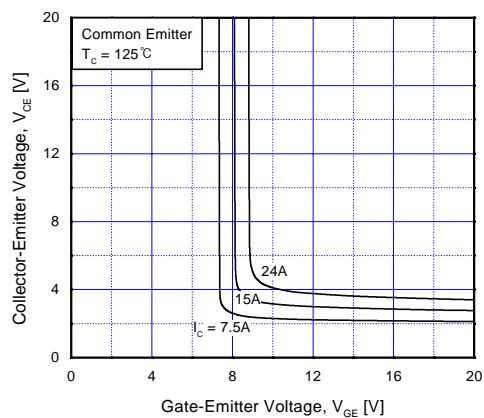
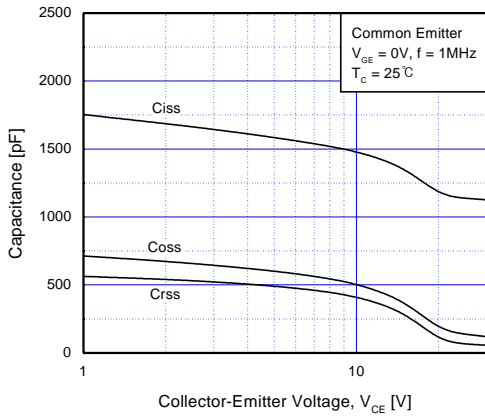
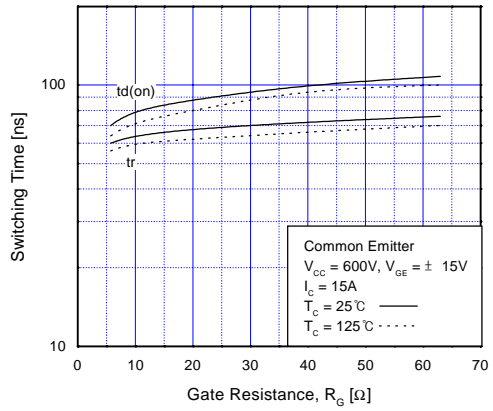


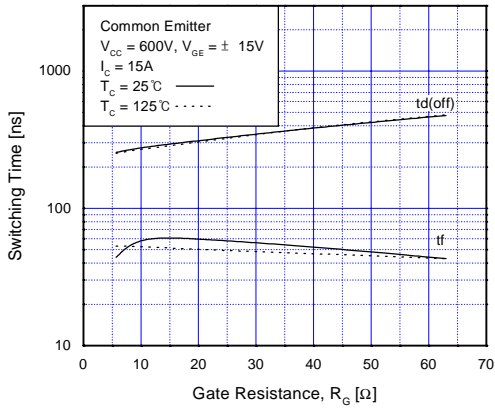
Fig 6. Saturation Voltage vs.  $V_{GE}$



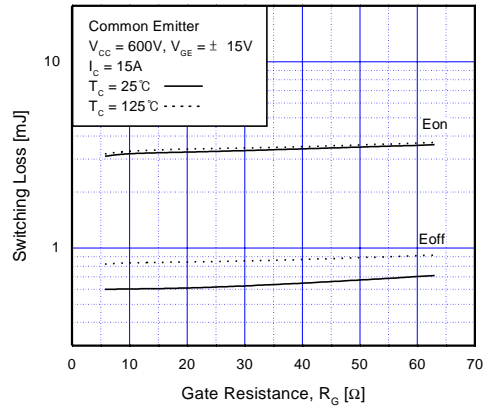
**Fig 7. Capacitance Characteristics**



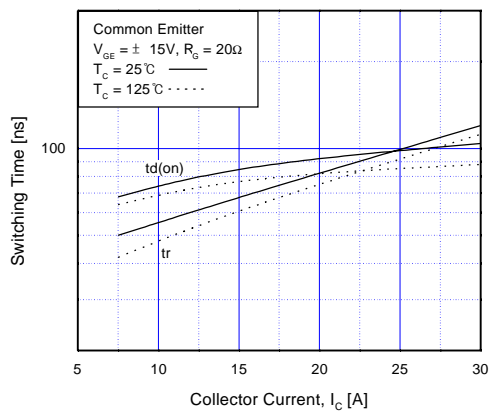
**Fig 8. Turn-On Characteristics vs. Gate Resistance**



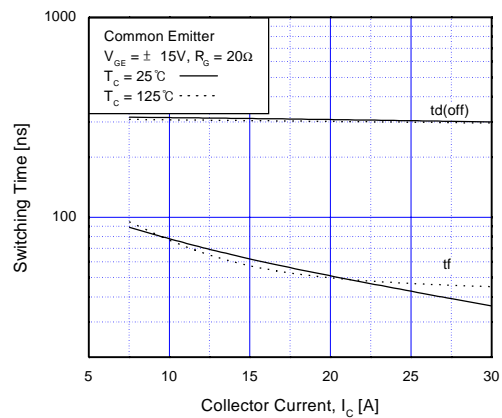
**Fig 9. Turn-Off Characteristics vs. Gate Resistance**



**Fig 10. Switching Loss vs. Gate Resistance**



**Fig 11. Turn-On Characteristics vs. Collector Current**



**Fig 12. Turn-Off Characteristics vs. Collector Current**

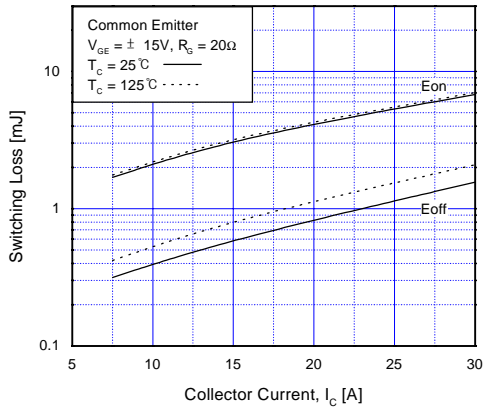


Fig 13. Switching Loss vs. Collector Current

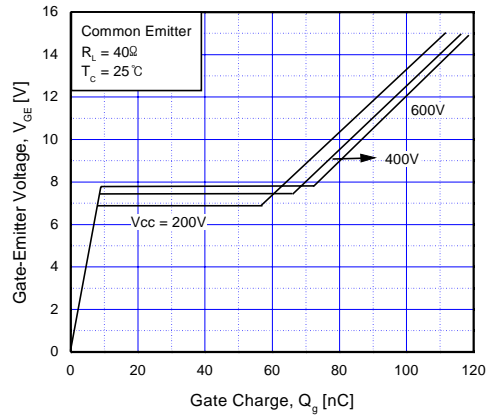


Fig 14. Gate Charge Characteristics

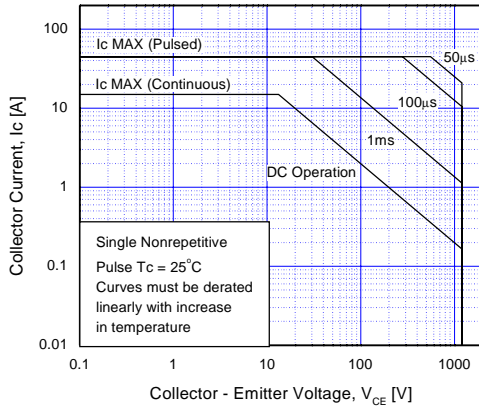


Fig 15. SOA Characteristics

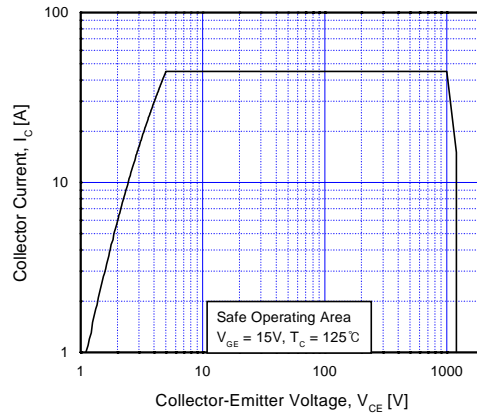


Fig 16. Turn-Off SOA

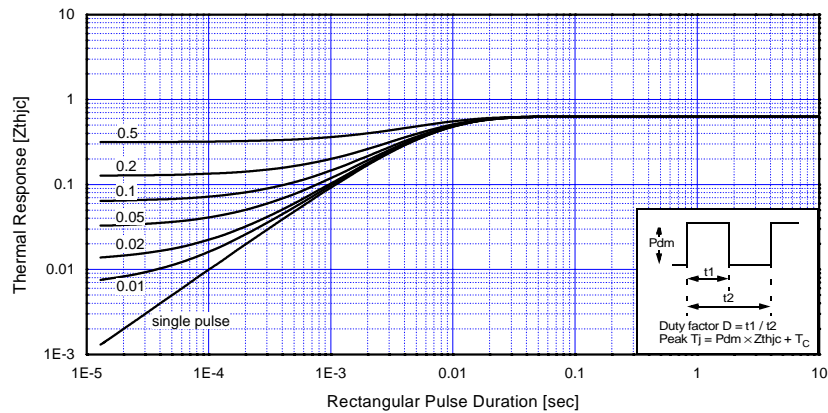
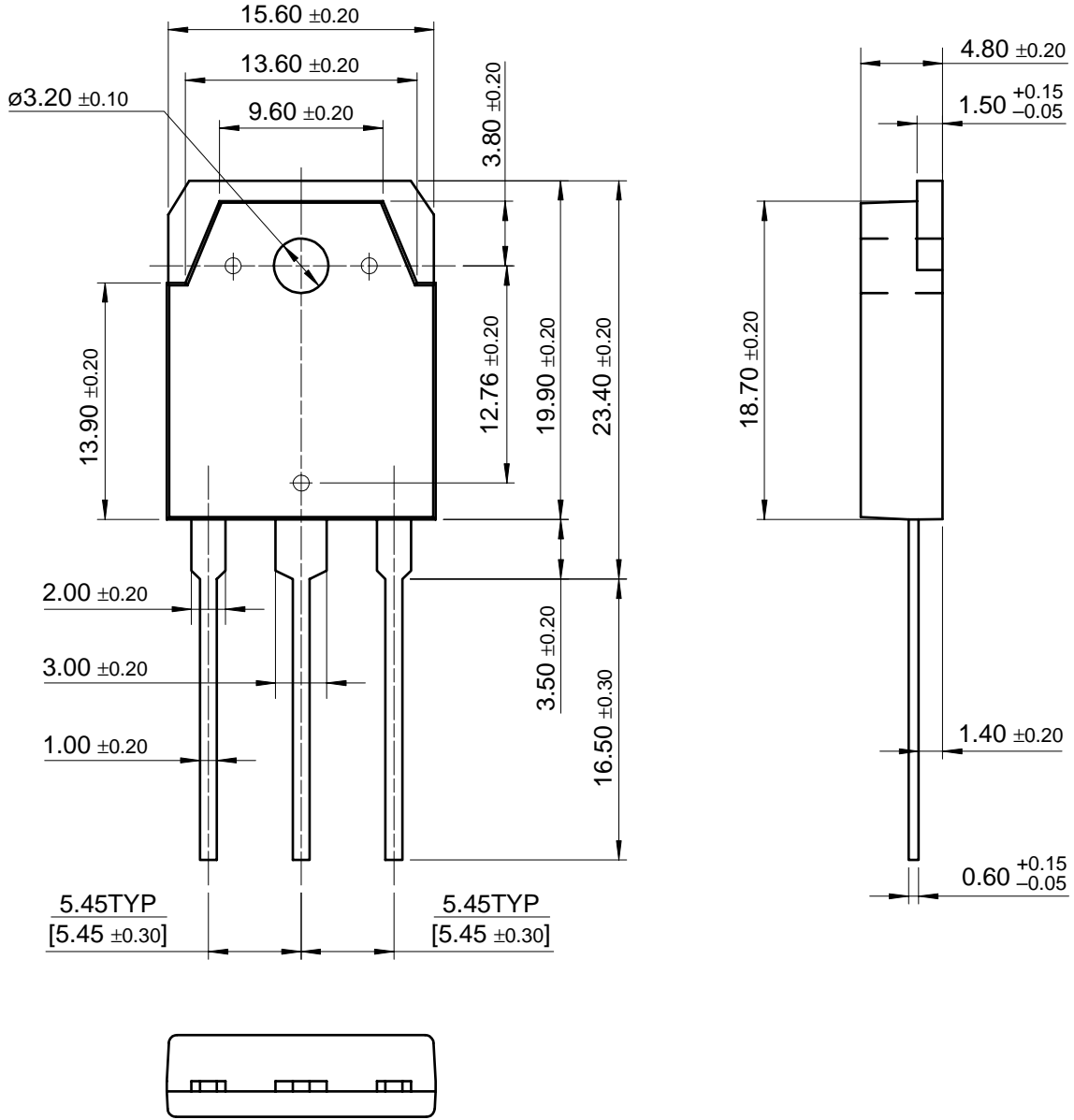


Fig 17. Transient Thermal Impedance of IGBT

Package Dimension

TO-3P (FS PKG CODE )



Dimensions in Millimeters

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