

# FGL40N120AN

## 1200V NPT IGBT

### Features

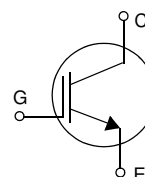
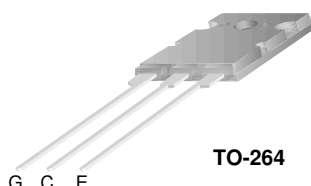
- High speed switching
- Low saturation voltage :  $V_{CE(sat)} = 2.6\text{ V @ } I_C = 40\text{ A}$
- High input impedance

### 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).

### Applications

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



### Absolute Maximum Ratings

Symbol	Parameter	FGL40N120AN	Units
$V_{CES}$	Collector-Emitter Voltage	1200	V
$V_{GES}$	Gate-Emitter Voltage	±25	V
$I_C$	Collector Current @ $T_C = 25^\circ\text{C}$	64	A
	Collector Current @ $T_C = 100^\circ\text{C}$	40	A
$I_{CM(1)}$	Pulsed Collector Current	160	A
$P_D$	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	500	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	200	W
SCWT	Short Circuit Withstand Time, $V_{CE} = 600\text{V}, V_{GE} = 15\text{V}, T_C = 125^\circ\text{C}$	10	µs
$T_J$	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) Pulse width limited by max. junction temperature

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}(\text{IGBT})$	Thermal Resistance, Junction-to-Case	--	0.25	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	25	°C/W

## Package Marking and Ordering Information

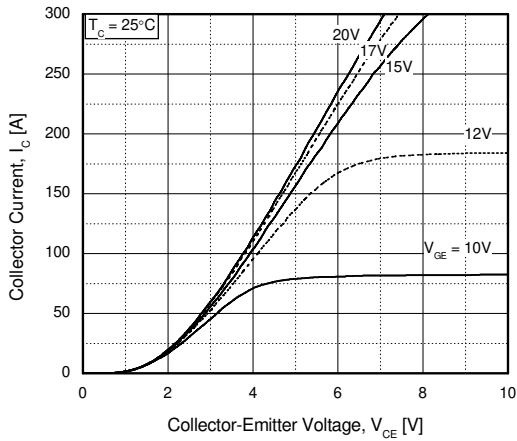
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FGL40N120AN	FGL40N120AN	TO-264	-	-	25

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

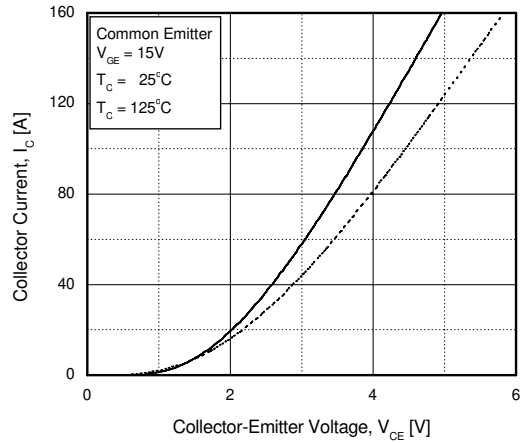
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
<b>Off Characteristics</b>						
BV <sub>CES</sub>	Collector-Emitter Breakdown Voltage	V <sub>GE</sub> = 0V, I <sub>C</sub> = 1mA	1200	--	--	V
BV <sub>CES</sub> /ΔT <sub>J</sub>	Temperature Coefficient of Breakdown Voltage	V <sub>GE</sub> = 0V, I <sub>C</sub> = 1mA	--	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	--	--	1	mA
I <sub>GES</sub>	G-E Leakage Current	V <sub>GE</sub> = V <sub>GES</sub> , V <sub>CE</sub> = 0V	--	--	±250	nA
<b>On Characteristics</b>						
V <sub>GE(th)</sub>	G-E Threshold Voltage	I <sub>C</sub> = 250μA, 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> = 40A, V <sub>GE</sub> = 15V	--	2.6	3.2	V
		I <sub>C</sub> = 40A, V <sub>GE</sub> = 15V, T <sub>C</sub> = 125°C	--	2.9	--	V
		I <sub>C</sub> = 64A, V <sub>GE</sub> = 15V	--	3.15	--	V
<b>Dynamic Characteristics</b>						
C <sub>ies</sub>	Input Capacitance	V <sub>CE</sub> = 30V, V <sub>GE</sub> = 0V f = 1MHz	--	3200	--	pF
C <sub>oes</sub>	Output Capacitance		--	370	--	pF
C <sub>res</sub>	Reverse Transfer Capacitance		--	125	--	pF
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>CC</sub> = 600V, I <sub>C</sub> = 40A, R <sub>G</sub> = 5Ω, V <sub>GE</sub> = 15V, Inductive Load, T <sub>C</sub> = 25°C	--	15	--	ns
t <sub>r</sub>	Rise Time		--	20	--	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	110	--	ns
t <sub>f</sub>	Fall Time		--	40	80	ns
E <sub>on</sub>	Turn-On Switching Loss		--	2.3	3.45	mJ
E <sub>off</sub>	Turn-Off Switching Loss		--	1.1	1.65	mJ
E <sub>ts</sub>	Total Switching Loss		--	3.4	5.1	mJ
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>CC</sub> = 600V, I <sub>C</sub> = 40A, R <sub>G</sub> = 5Ω, V <sub>GE</sub> = 15V, Inductive Load, T <sub>C</sub> = 125°C	--	20	--	ns
t <sub>r</sub>	Rise Time		--	25	--	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	120	--	ns
t <sub>f</sub>	Fall Time		--	45	--	ns
E <sub>on</sub>	Turn-On Switching Loss		--	2.5	--	mJ
E <sub>off</sub>	Turn-Off Switching Loss		--	1.8	--	mJ
E <sub>ts</sub>	Total Switching Loss		--	4.3	--	mJ
Q <sub>g</sub>	Total Gate charge	V <sub>CE</sub> = 600V, I <sub>C</sub> = 40A, V <sub>GE</sub> = 15V	--	220	330	nC
Q <sub>ge</sub>	Gate-Emitter Charge		--	25	38	nC
Q <sub>gc</sub>	Gate-Collector Charge		--	130	195	nC

## Typical Performance Characteristics

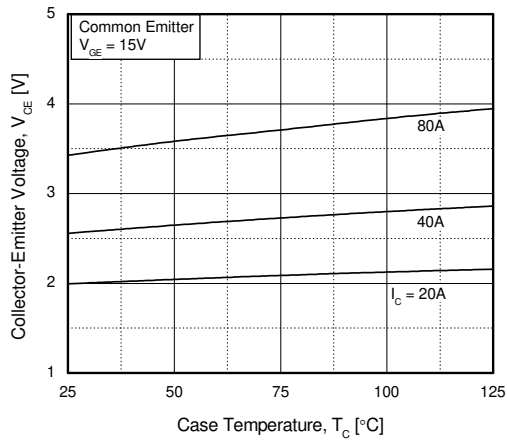
**Figure 1. Typical Output Characteristics**



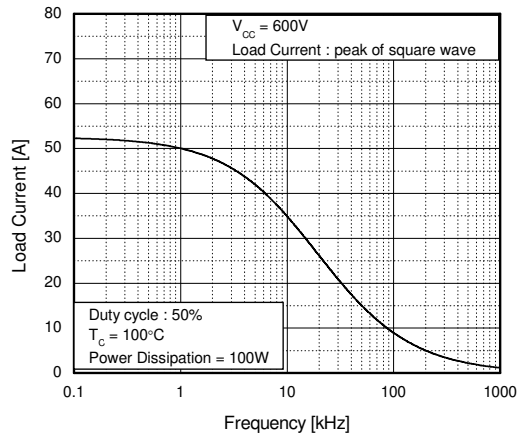
**Figure 2. Typical Saturation Voltage Characteristics**



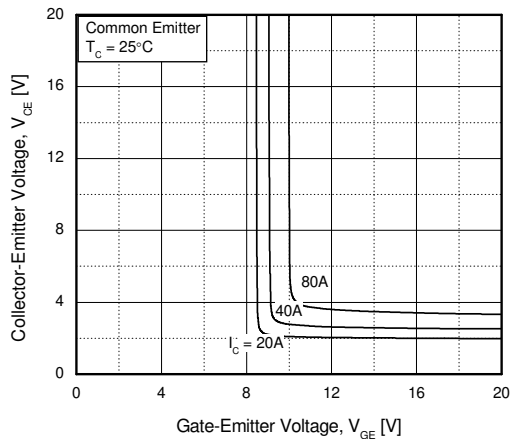
**Figure 3. Saturation Voltage vs. Case Temperature at Variant Current Level**



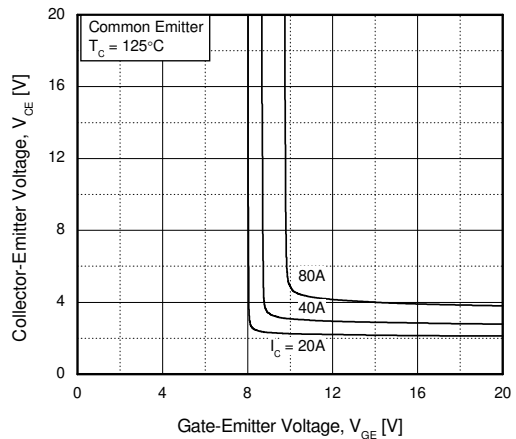
**Figure 4. Load Current vs. Frequency**



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

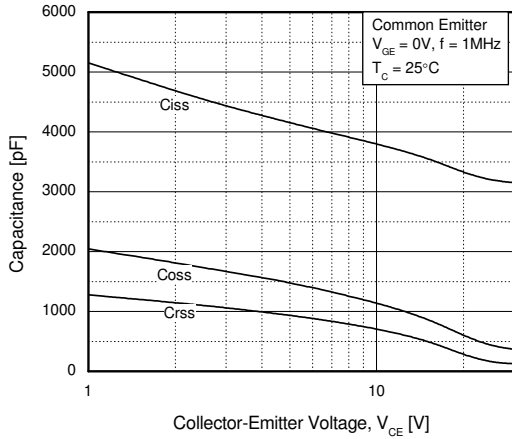


**Figure 6. Saturation Voltage vs. V\_GE**

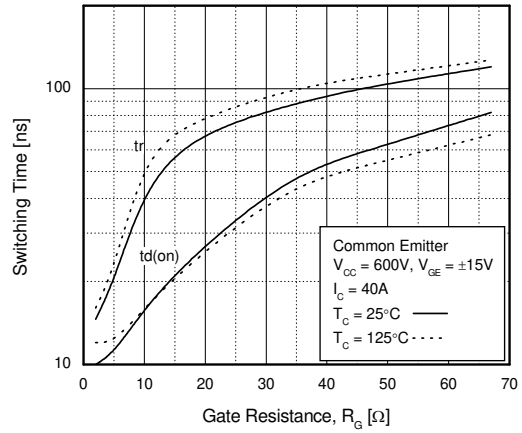


**Typical Performance Characteristics** (Continued)

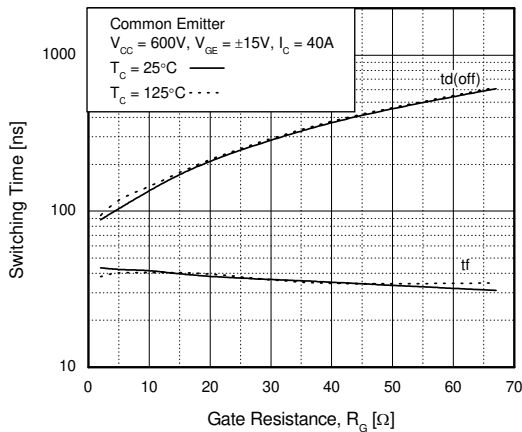
**Figure 7. Capacitance Characteristics**



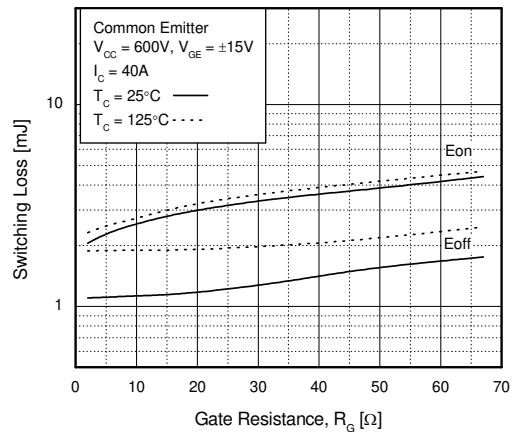
**Figure 8. Turn-On Characteristics vs. Gate Resistance**



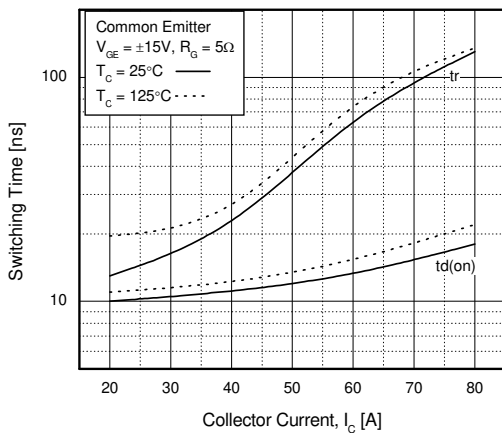
**Figure 9. Turn-Off Characteristics vs. Gate Resistance**



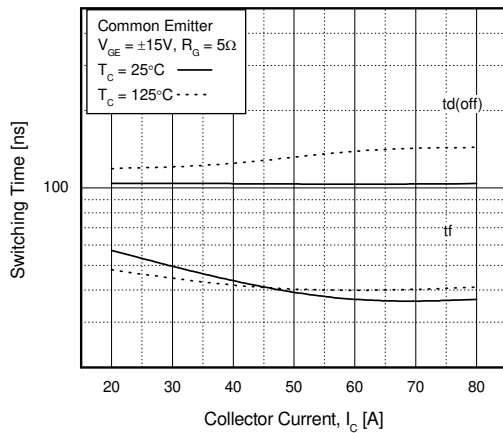
**Figure 10. Switching Loss vs. Gate Resistance**



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

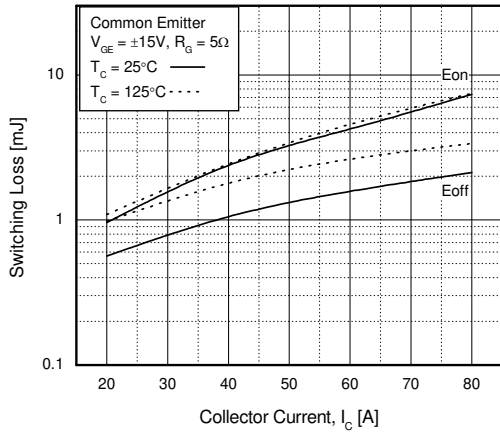


**Figure 12. Turn-Off Characteristics vs. Collector Current**

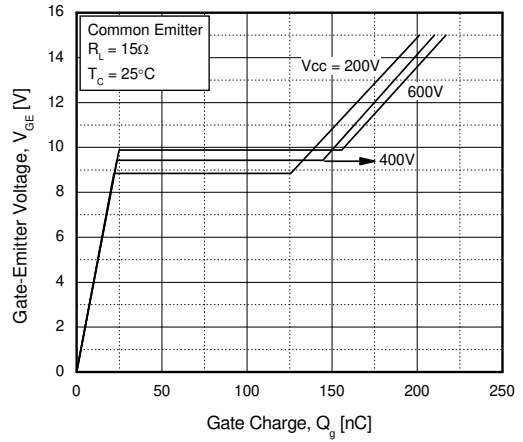


**Typical Performance Characteristics (Continued)**

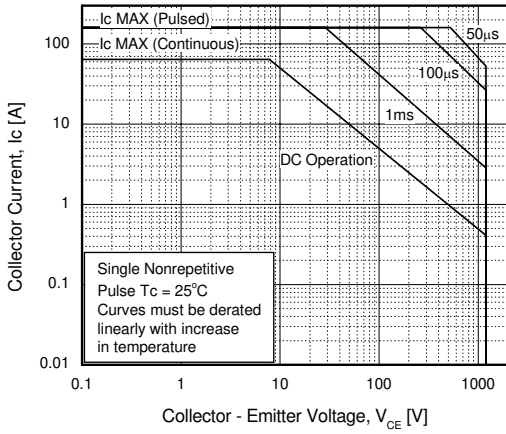
**Figure 13. Switching Loss vs. Collector Current**



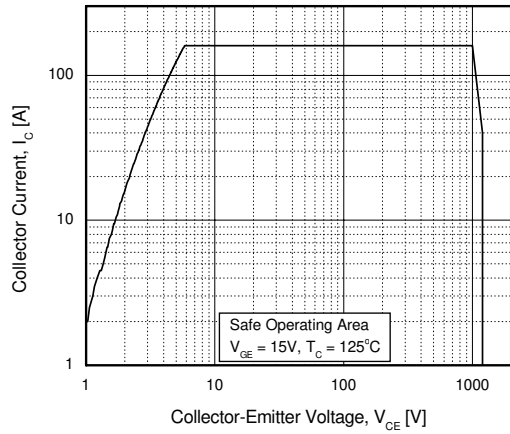
**Figure 14. Gate Charge Characteristics**



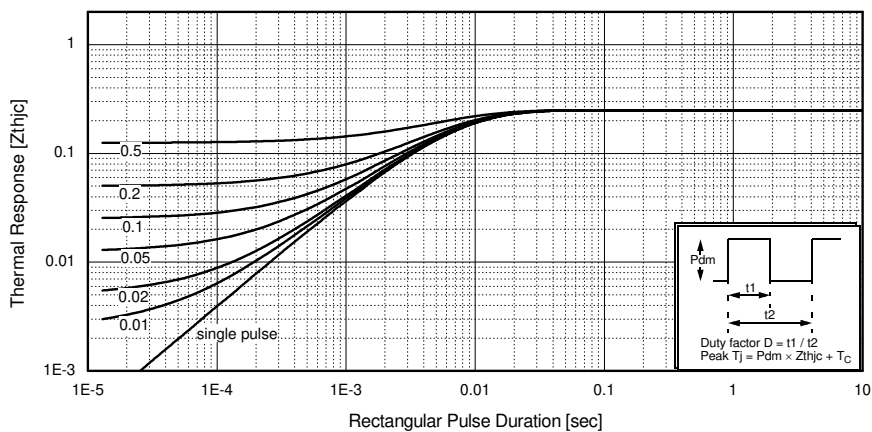
**Figure 15. SOA Characteristics**



**Figure 16. Turn-Off SOA**

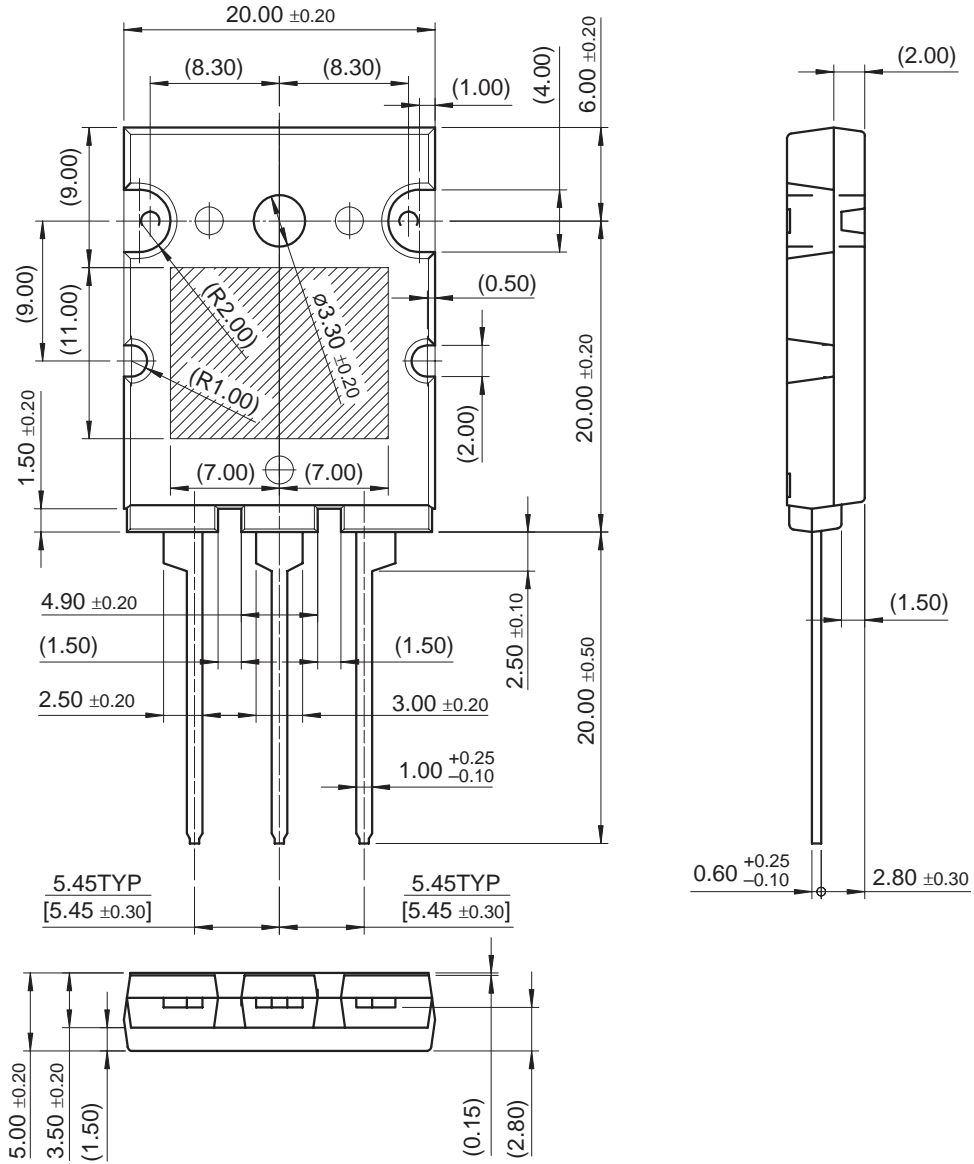


**Figure 17. Transient Thermal Impedance of IGBT**



### Mechanical Dimensions

## TO-264




Dimensions in Millimeters



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CorePLUS <sup>™</sup>	<i>i-Lo</i> <sup>™</sup>	PowerTrench <sup>®</sup>	The Power Franchise <sup>®</sup>
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## PRODUCT STATUS DEFINITIONS

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Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild Semiconductor. The datasheet is printed for reference information only.

Rev. I29

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## FGL40N120AN

1200V NPT IGBT

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### General description

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

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### Applications

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Product	Product status	Pb-free Status	Pricing*	Package type	Leads	Packing method	Package Marking Convention**
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FGL40N120ANTU	Full Production		\$10.78	<a href="#">TO-264</a>	3	RAIL	Line 1: <b>SY</b> (Fairchild logo) & <b>Z</b> (Asm. Plant Code) &E Line 2: FGL40N120 Line 3: AN &3
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\* Fairchild 1,000 piece Budgetary Pricing

\*\* A sample button will appear if the part is available through Fairchild's on-line samples program. If there is no sample button, please contact a [Fairchild distributor](#) to obtain samples



Indicates product with Pb-free second-level interconnect. For more information [click here](#).

Package marking information for product FGL40N120AN is available. [Click here for more information](#).

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### Qualification Support

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