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FGB5N60UNDF 600 V, 5 A **Short Circuit Rated IGBT**

Features

- Short Circuit Rated 10 us
- High Current Capability
- High Input Impedance
- · Fast Switching
- **RoHS Compliant**

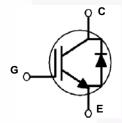
Applications

• Sewing Machine, CNC, Home Appliances, Motor Control



Using advanced NPT IGBT technology, Fairchild's the NPT IGBTs offer the optimum performance for low-power inverterdriven applications where low-losses and short-circuit ruggedness features are essential, such as sewing machine, CNC, motor control and home appliances.





Absolute Maximum Ratings

Symbol	Description		Ratings	Unit	
V _{CES}	Collector to Emitter Voltage		600	V	
V_{GES}	Gate to Emitter Voltage		± 20	V	
I _C	Collector Current	$@ T_C = 25^{\circ}C$	10	A	
.0	Collector Current @ T _C = 100°C		5	A	
I _{CM (1)}	Pulsed Collector Current	@ T _C = 25°C	15	А	
I _F	Diode Forward Current	$@ T_C = 25^{\circ}C$	5	A	
·F	Diode Forward Current	$@ T_C = 100^{\circ}C$	2.5	A	
P _D	Maximum Power Dissipation	$@ T_C = 25^{\circ}C$	73.5	W	
, p	Maximum Power Dissipation	$@ T_C = 100^{\circ}C$	29.4	W	
T _J	Operating Junction Temperature		-55 to +150	°C	
T _{stg}	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	Тур.	Max.	Unit
$R_{\theta JC}(IGBT)$	Thermal Resistance, Junction to Case		1.7	°C/W
$R_{\theta JC}(Diode)$	Thermal Resistance, Junction to Case		4.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (PCB Mount)(2)		40	°C/W

2: Mounted on 1" square PCB (FR4 or G-10 material)

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

Package Marking and Ordering Information

Device Marking	Device	Package	Rel Size	Tape Width	Quantity
FGB5N60UNDF	FGB5N60UNDF	TO-263AB(D ² -PAK)		-	50

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

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
Off Charac	teristics					
BV _{CES}	Collector to Emitter Breakdown Voltage	$V_{GE} = 0V, I_{C} = 250\mu A$	600	-	-	V
I _{CES}	Collector Cut-Off Current	$V_{CE} = V_{CES}, V_{GE} = 0V$	-	-	1	mA
I _{GES}	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0V$	-	-	±10	uA
On Charac	teristics					
V _{GE(th)}	G-E Threshold Voltage	$I_C = 5mA$, $V_{CE} = V_{GE}$	5.5	6.8	8.5	V
5=()		I _C = 5A, V _{GE} = 15V	-	1.9	2.4	V
V _{CE(sat)}	Collector to Emitter Saturation Voltage	I _C = 5A, V _{GE} = 15V, T _C = 125°C	-	2.3	-	V
Dynamic C	haracteristics			1		
C _{ies}	Input Capacitance		-	181		pF
C _{oes}	Output Capacitance	$V_{CE} = 30V_{,} V_{GE} = 0V_{,}$ f = 1MHz	-	28		pF
C _{res}	Reverse Transfer Capacitance	I = IIVIDZ	-	7		pF
Switching	Characteristics		1			
t _{d(on)}	Turn-On Delay Time		-	5.4		ns
t _r	Rise Time		-	1.9		ns
t _{d(off)}	Turn-Off Delay Time	$V_{CC} = 400V, I_{C} = 5A,$	-	25.4		ns
t _f	Fall Time	$R_G = 10\Omega$, $V_{GE} = 15V$, Inductive Load, $T_C = 25^{\circ}C$	-	101	202	ns
E _{on}	Turn-On Switching Loss		-	0.08		mJ
E _{off}	Turn-Off Switching Loss		-	0.07		mJ
E _{ts}	Total Switching Loss		-	0.15		mJ
t _{d(on)}	Turn-On Delay Time		- /	5.2		ns
t _r	Rise Time		-	2.3		ns
t _{d(off)}	Turn-Off Delay Time	$V_{CC} = 400V, I_{C} = 5A,$	-	26.6		ns
t _f	Fall Time	$R_G = 10\Omega$, $V_{GE} = 15V$, Inductive Load, $T_C = 125^{\circ}C$	-	125		ns
E _{on}	Turn-On Switching Loss	maddive Load, 1C = 120 C	-	0.15		mJ
E _{off}	Turn-Off Switching Loss		-	0.09		mJ
E _{ts}	Total Switching Loss		-	0.24		mJ
T _{sc}	Short Circuit Withstand Time	$V_{CC} = 350V,$ $R_G = 100\Omega, V_{GE} = 15V,$ $T_C = 150^{\circ}C$	10	-	- \	μs

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

Qg	Total Gate Charge		-	12.1	nC
Q _{ge}	Gate to Emitter Charge	$V_{CE} = 400V, I_{C} = 5A,$ $V_{GE} = 15V$	i	1.7	nC
Q _{gc}	Gate to Collector Charge	*GE = 10*	-	7.2	nC

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

Symbol	Parameter		Test Conditions		Min.	Тур.	Max	Unit	
V _{FM}	Diode Forward Voltage	l '	= 5A	•	$T_C = 25^{\circ}C$	-	1.7	2.2	V
FINI	Diode Forward Vollage	1F = 0/1		ŀ	T _C = 125°C		1.6	-	•
t _{rr}	Diode Reverse Recovery Time				$T_C = 25^{\circ}C$		35		ns
111			ŀ	T _C = 125°C	1	87			
Q _{rr}	Diode Reverse Recovery Charge	i i = 3/λ, αιε/αι = 200/λ/μ3			$T_C = 25^{\circ}C$	-	71		nC
~11	Diode Neverse Necestery Charge				T _C = 125°C		240	-	

Figure 1. Typical Output Characteristics

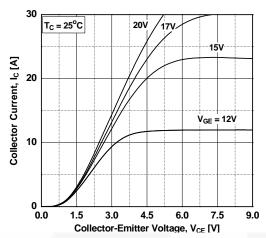


Figure 3. Typical Saturation Voltage Characteristics

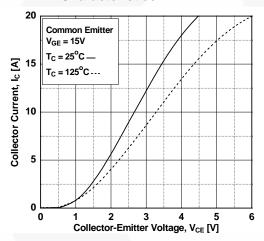


Figure 5. Saturation Voltage vs. Case
Temperature at Variant Current Level

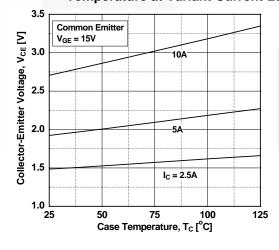


Figure 2. Typical Output Characteristics

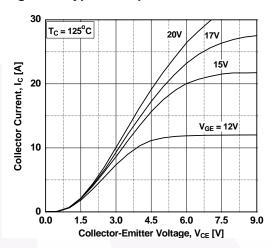


Figure 4. Transfer Characteristics

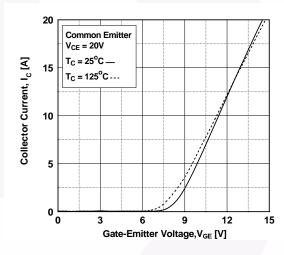


Figure 6. Saturation Voltage vs. V_{GE}

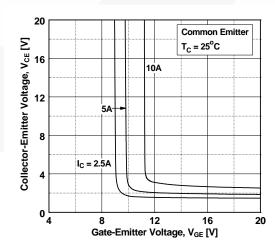


Figure 7. Saturation Voltage vs. V_{GE}

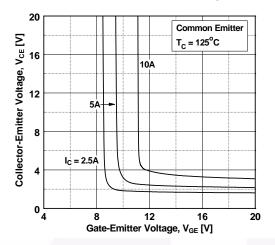


Figure 9. Gate charge Characteristics

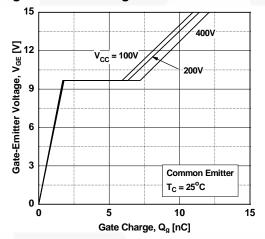


Figure 11. Turn-on Characteristics vs.
Gate Resistance

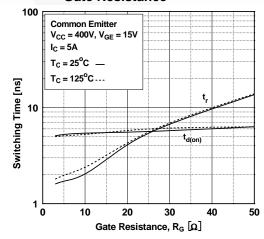


Figure 8. Capacitance Characteristics

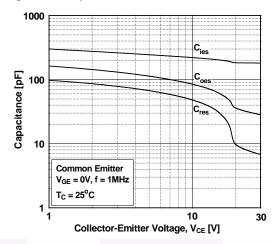


Figure 10. SOA Characteristics

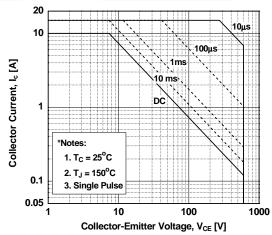


Figure 12. Turn-off Characteristics vs.
Gate Resistance

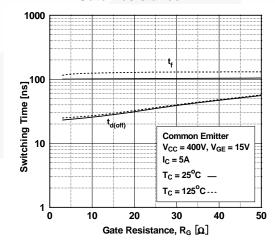


Figure 13. Turn-on Characteristics vs.
Collector Current

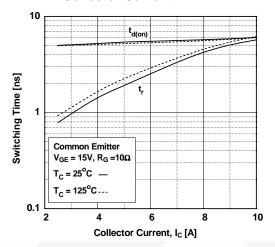


Figure 15. Switching Loss vs.
Gate Resistance

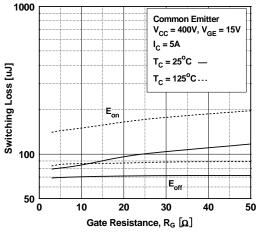


Figure 17. Turn off Switching SOA Characteristics

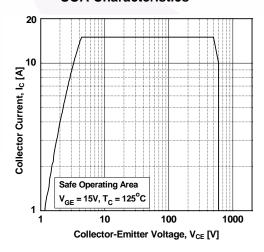


Figure 14. Turn-off Characteristics vs. Collector Current

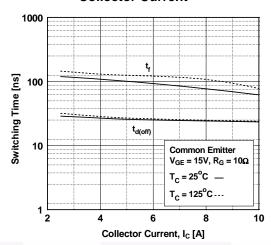


Figure 16. Switching Loss vs Collector Current

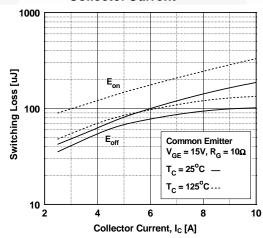


Figure 18. Forward Characteristics

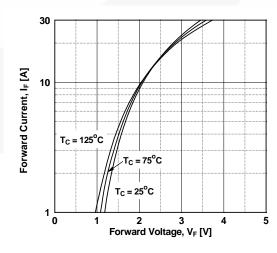


Figure 19. Reverse Current

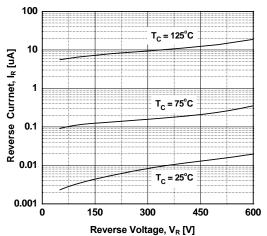


Figure 20. Stored Charge

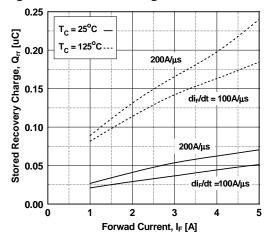


Figure 21. Reverse Recovery Time

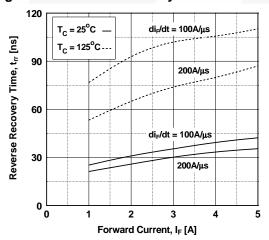
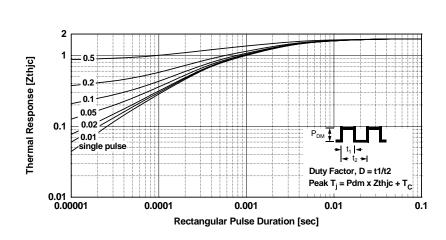


Figure 22. Transient Thermal Impedance of IGBT



Mechanical Dimensions

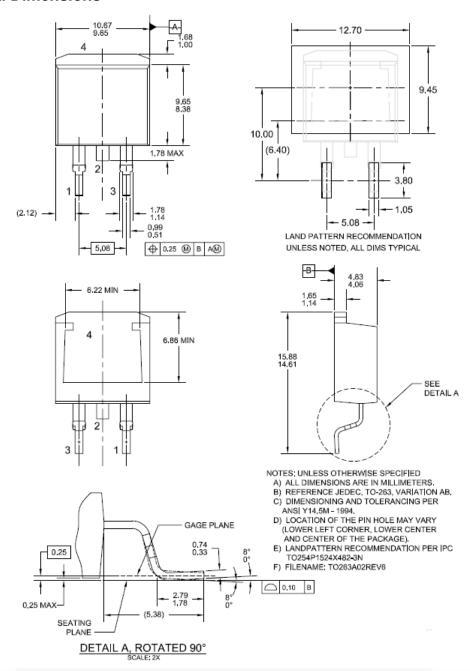


Figure 23. TO-263 2L (D2PAK) - 2LD,TO263, SURFACE MOUNT

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Dimensions in Millimeters





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No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
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Rev. 166

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