FAIRCHILD SEMICONDUCTOR®

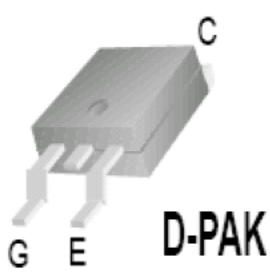
March 2006

FGD2N40L
400V N-Channel Logic Level IGBT

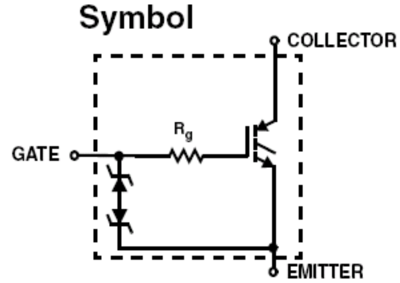
Features
- $V_{CE(SAT)}$ = 1.6V @ I_C = 2.5A, V_{GE} = 2.4V
- 6kV ESD Protected
- High Peak Current Density
- TO-252 (D-Pak)
- Low $V_{GE(TH)}$

Applications
- Small Engine Ignition Applications

General Description
This N-Channel IGBT is a MOS gated, logic level device which has been especially tailored for small engine ignition applications. The gate is ESD protected with a zener diode.



Symbol



Device Maximum Ratings T_A= 25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
BV_{CES}	Collector to Emitter Breakdown Voltage	400	V
I_C	Collector Current Continuous(DC)	7	A
I_{CP}	Collector Current Pulsed(100μs)	29	A
V_{GES}	Gate to Emitter Voltage Continuous(DC)	±8	V
V_{GEP}	Gate to Emitter Voltage Pulsed	±10	V
P_D	Power Dissipation Total T_C = 25°C	29	W
T_J	Operating Junction Temperature Range	-40 to 150	°C
T_{STG}	Storage Junction Temperature Range	-40 to 150	°C
ESD	Electrostatic Discharge Voltage at 100pF, 1500Ω	6	kV

Package Marking and Ordering Information

Device Marking	Device	Package	Tape Width	Quantity
FGD2N40	FGD2N40L	D-PAK	12mm / 16mm	2500

Electrical Characteristics T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
Off Characteristics							
BV_{CES}	Collector to Emitter Breakdown Voltage	I_C = 1mA, V_{GE} = 0V		400	-	-	V
BV_{GES}	Gate-Emitter Breakdown Voltage	I_{GES} = ±1mA		±10	-	-	V
I_{CES}	Collector to Emitter leakage Current	V_{CE} = 320V	T_C = +25°C	-	-	10	μA
			T_C = +125°C	-	-	250	μA
I_{GES}	Gate-Emitter Leakage Current	V_{GE} = ±8		-	-	±10	μA
On Characteristics							
$V_{CE(SAT)}$	Collector to Emitter Saturation Voltage	I_C = 2.5A, V_{GE} = 2.4V(NOTE1)		-	1.3	1.6	V
Dynamic Characteristics							
$Q_{G(ON)}$	Gate Charge	I_C = 2.5A, V_{CE} = 300V, V_{GE} = 10V		-	11	-	nC
V_{GEP}	Gate to Emitter Plateau Voltage	I_C = 2.5A, V_{CE} = 300V		-	1.8	-	V
$V_{GE(TH)}$	Gate to Emitter Threshold Voltage	I_C = 1.0mA, V_{CE} = V_{GE}		0.70	0.85	1.2	V
C_{IES}	Input Capacitance	V_{CE} = 10V, V_{GE} = 0V, f =1MHz		-	357	-	pF
R_G	Internal Gate Series Resistance				300		ohms
Switching Characteristics							
t_{ON}	Turn-On Time	V_{CC} = 300V, I_C = 2.5A, V_{GE} = 4V, R_L = 120Ω, R_G = 51Ω, T_J = 25°C		-	0.142	-	μs
$t_{d(ON)I}$	Current Turn-On Delay Time			-	0.047	-	μs
t_{rI}	Current Rise Time			-	0.095	-	μs
t_{OFF}	Turn-Off Time			-	2.152	-	μs
$t_{d(OFF)I}$	Current Turn-Off Delay Time			-	0.650	-	μs
t_{fI}	Current Fall Time			-	1.529	-	μs

Thermal Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance Junction-Case	TO-252 (D-Pak)	-	-	4.29	°C/W

Notes:
1: Pulse Duration = 100 μsec

Typical Performance Characteristics

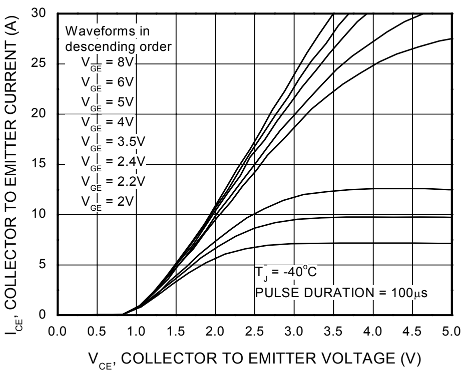


Figure 1. Collector Current Vs. Collector to Emitter On-State Voltage

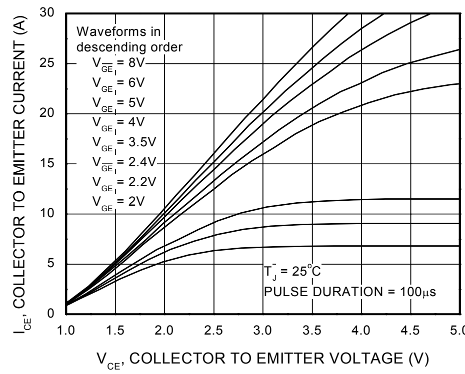


Figure 2. Collector Current Vs. Collector to Emitter On-State Voltage

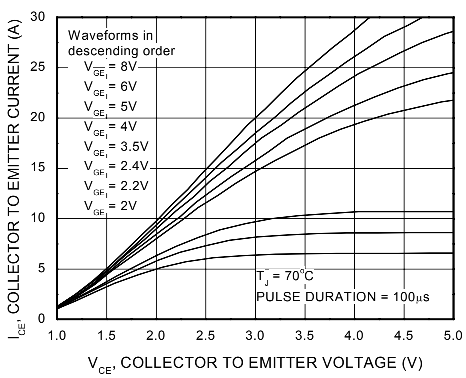


Figure 3. Collector Current Vs. Collector to Emitter On-State Voltage

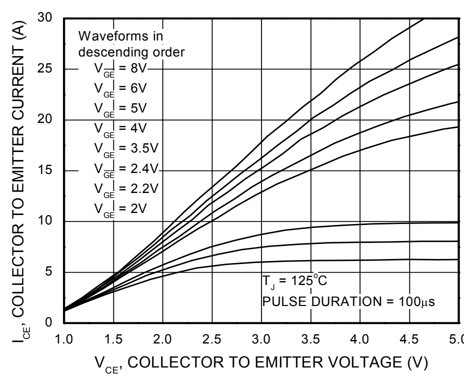


Figure 4. Collector Current Vs. Collector to Emitter On-State Voltage

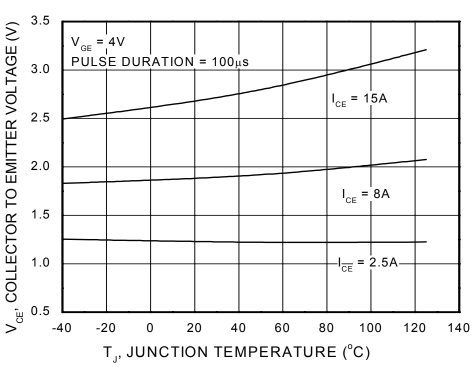


Figure 5. Collector to Emitter Saturation Voltage Vs. Junction Temperature

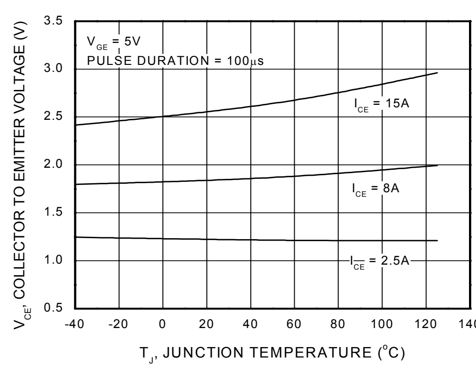


Figure 6. Collector to Emitter Saturation Voltage Vs. Junction Temperature

Typical Performance Characteristics

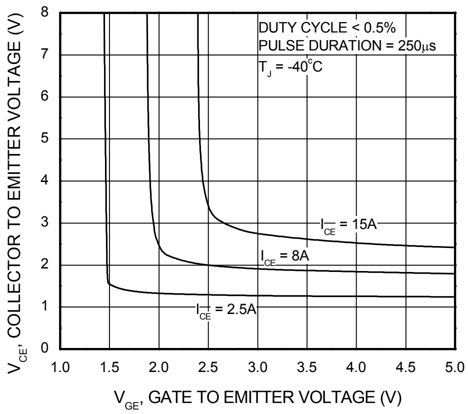


Figure 7. Collector to Emitter On-State Voltage Vs. Gate to Emitter Voltage

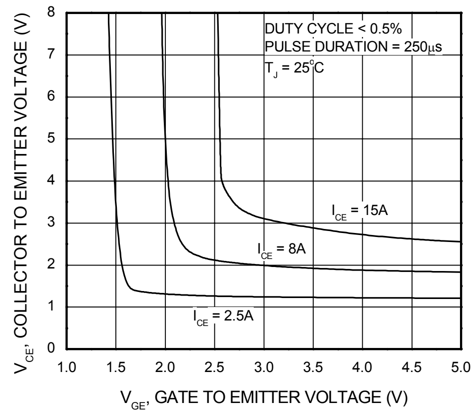


Figure 8. Collector to Emitter On-State Voltage Vs. Gate to Emitter Voltage

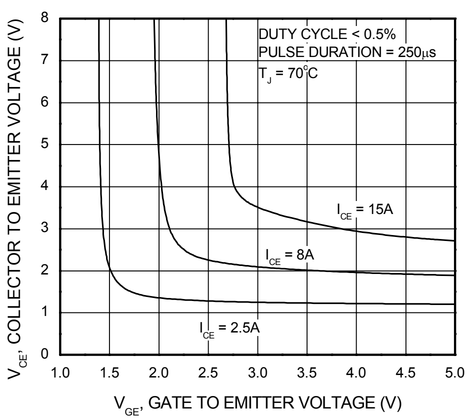


Figure 9. Collector to Emitter On-State Voltage Vs. Gate to Emitter Voltage

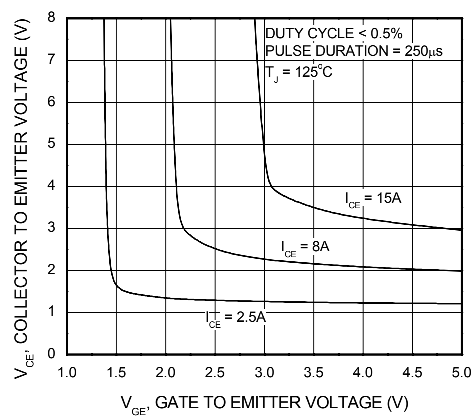


Figure 10. Collector to Emitter On-State Voltage Vs. Gate to Emitter Voltage

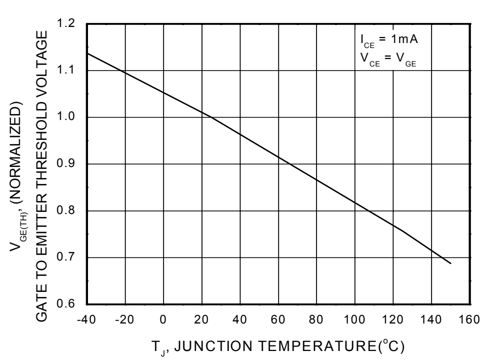


Figure 11. Normalized Gate to Emitter Threshold Voltage Vs. Junction Temperature

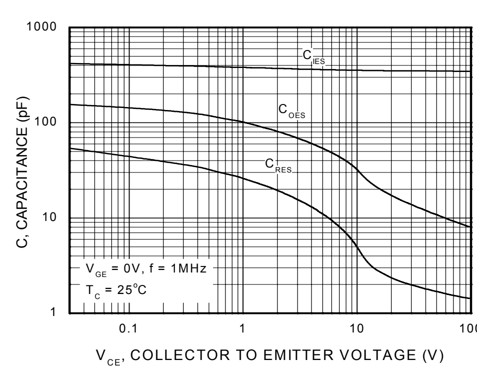


Figure 12. Capacitance Vs. Collector to Emitter Voltage

Typical Performance Characteristics

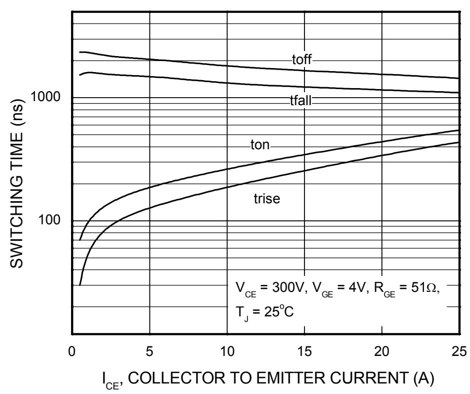


Figure 13. Switching Time Vs. Collector Current

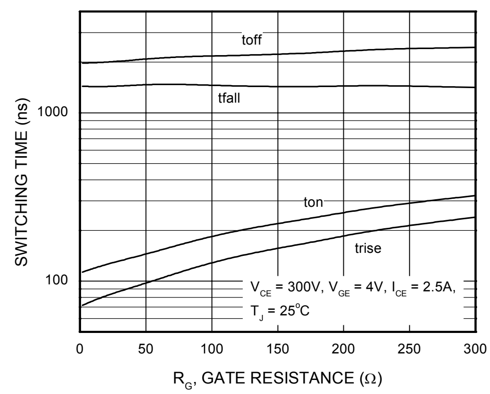


Figure 14. Switching Time Vs. Gate Resistance

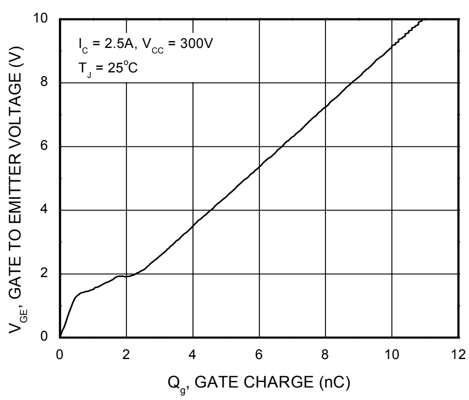


Figure 15. Gate Charge

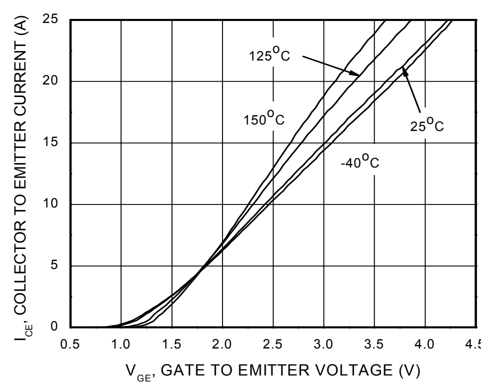


Figure 16. Transfer

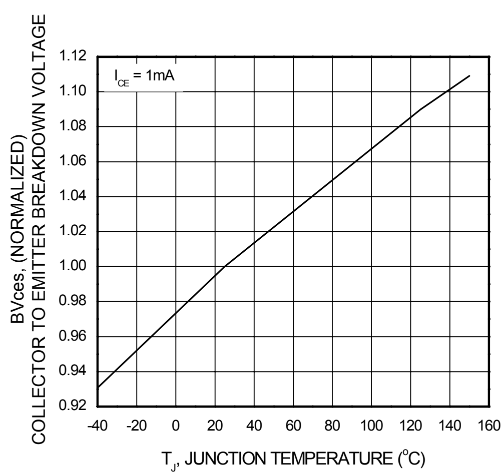


Figure 17. Normalized Collector to Emitter Breakdown Voltage Vs. Junction Temperature

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