

FAIRCHILD
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IGBT

FGL60N170D

General Description

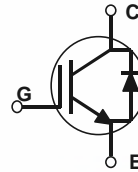
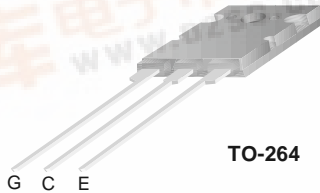
Fairchild's Insulated Gate Bipolar Transistor (IGBT) provides low conduction and switching losses. FGL60N170D is designed for the Induction Heating applications.

Features

- High Speed Switching
- Low Saturation Voltage : $V_{CE(sat)} = 5.0\text{ V @ } I_C = 60\text{ A}$
- High Input Impedance
- Built-in Fast Recovery Diode

Application

Home Appliance, Induction Heater, IH JAR, Micro Wave Oven



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

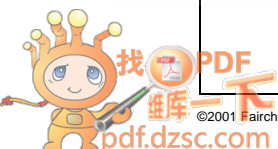
Symbol	Description	FGL60N170D	Units
V_{CES}	Collector-Emitter Voltage	1700	V
V_{GES}	Gate-Emitter Voltage	± 25	V
I_C	Collector Current @ $T_C = 25^\circ\text{C}$	60	A
	Collector Current @ $T_C = 100^\circ\text{C}$	30	A
$I_{CM(1)}$	Pulsed Collector Current	180	A
I_F	Diode Continuous Forward Current @ $T_C = 100^\circ\text{C}$	15	A
I_{FM}	Diode Maximum Forward Current	150	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 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	--	0.625	$^\circ\text{C/W}$
$R_{\theta JC}(\text{DIODE})$	Thermal Resistance, Junction-to-Case	--	0.83	$^\circ\text{C/W}$
$R_{\theta A}$	Thermal Resistance, Junction-to-Ambient	--	25	$^\circ\text{C/W}$



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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{CES}	Collector-Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 3mA$	1700	--	--	V
I_{CES}	Collector Cut-off Current	$V_{CE} = V_{CES}, V_{GE} = 0V$	--	--	3.0	mA
I_{GES}	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0V$	--	--	± 100	nA

On Characteristics

$V_{GE(th)}$	G-E Threshold Voltage	$I_C = 60mA, V_{CE} = V_{GE}$	3.5	5.0	7.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 60A, V_{GE} = 15V$	-	5.0	6.0	V

Dynamic Characteristics

C_{ies}	Input Capacitance	$V_{CE} = 30V, V_{GE} = 0V,$ $f = 1MHz$	--	2500	--	pF
C_{oes}	Output Capacitance		--	220	--	pF
C_{res}	Reverse Transfer Capacitance		--	80	--	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 600V, I_C = 60A,$ $R_G = 51\Omega, V_{GE} = 15V,$ Resistive Load, $T_C = 25^\circ\text{C}$	--	100	200	ns
t_r	Rise Time		--	350	700	ns
$t_{d(off)}$	Turn-Off Delay Time		--	200	400	ns
t_f	Fall Time		--	100	300	ns
Q_g	Total Gate Charge	$V_{CE} = 600V, I_C = 60A,$ $V_{GE} = 15V$	--	120	180	nC
Q_{ge}	Gate-Emitter Charge		--	20	30	nC
Q_{gc}	Gate-Collector Charge		--	45	70	nC

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{FM}	Diode Forward Voltage	$I_F = 15A$	--	1.35	1.6	V
		$I_F = 60A$	--	1.92	2.2	
t_{rr}	Diode Reverse Recovery Time	$I_F = 60A, di/dt = 20A/\mu\text{S}$	--	0.6	1.0	us
I_R	Instantaneous Reverse Current	$V_{RRM} = 1700V$	--	0.3	5	uA
C_J	Junction Capacitance	$V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$	--	80	--	pF

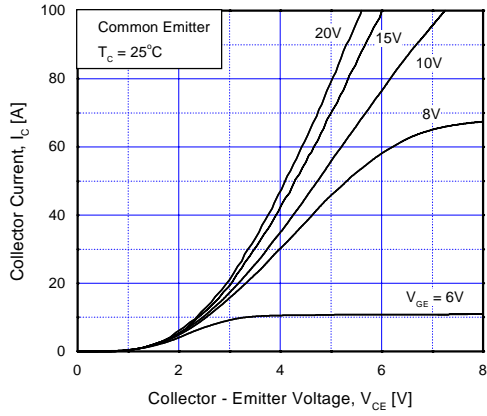


Fig 1. Typical Output Characteristics

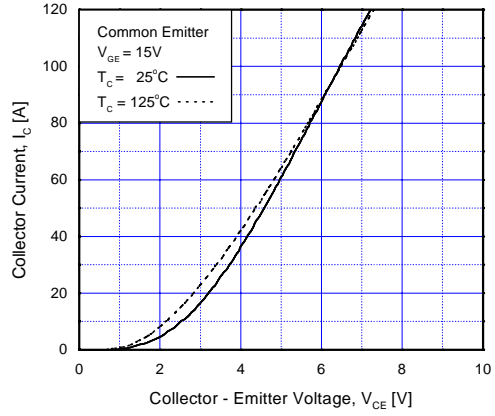


Fig 2. Typical Saturation Voltage Characteristics

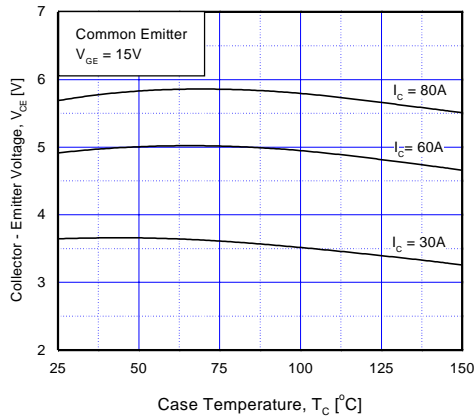


Fig 3. Collector to Emitter Saturation Voltage vs. Case Temperature

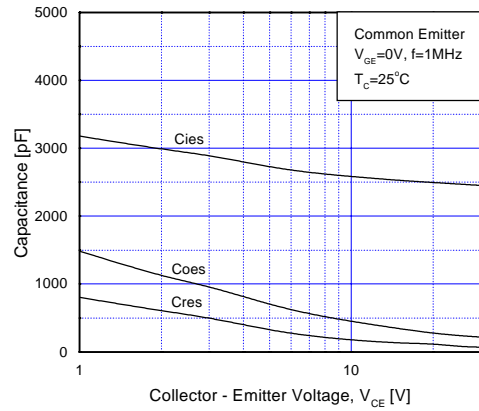


Fig 4. Typical Capacitance vs. Collector to Emitter Voltage

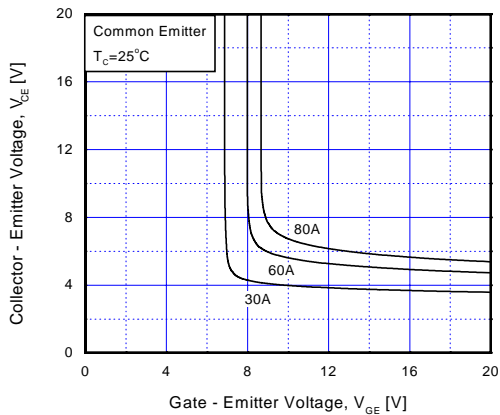


Fig 5. Saturation Voltage vs. V_{GE}

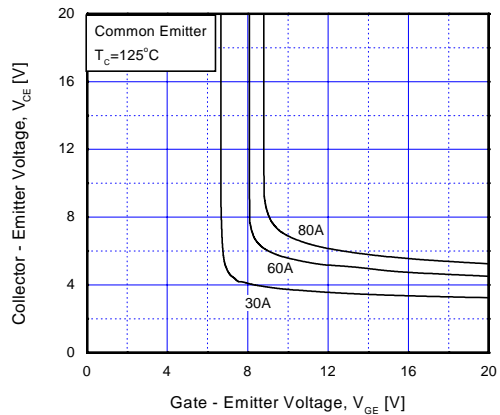


Fig 6. Saturation Voltage vs. V_{GE}

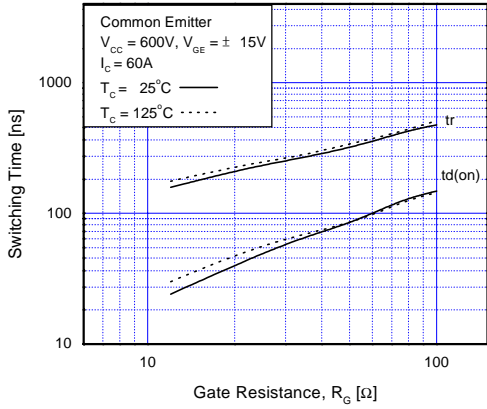


Fig 7. Turn on Characteristics vs. Gate Resistance

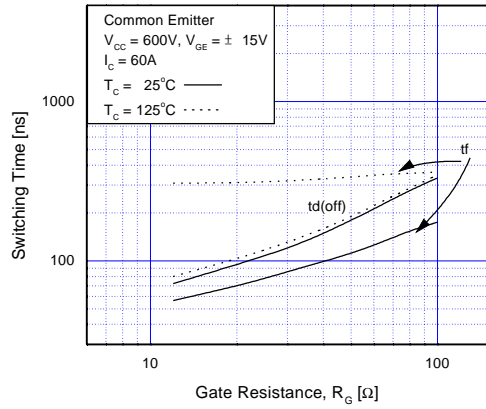


Fig 8. Turn off Characteristics vs. Gate Resistance

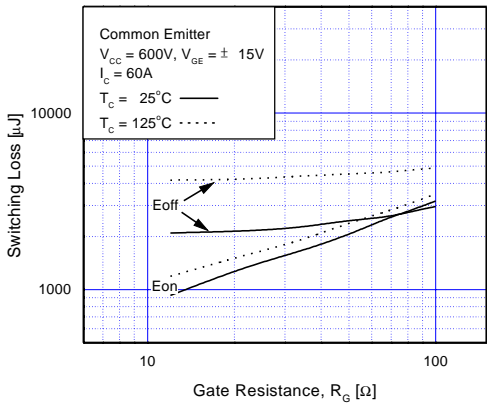


Fig 9. Switching Loss vs. Gate Resistance

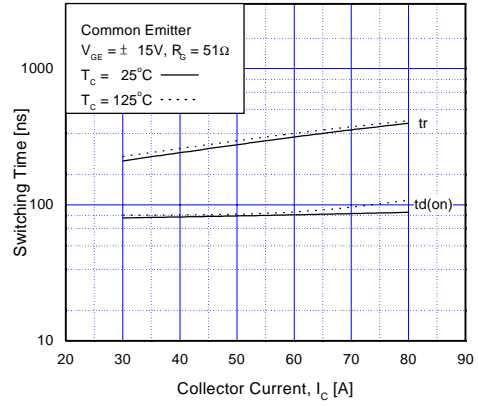


Fig 10. Turn on Characteristics vs. Collector Current

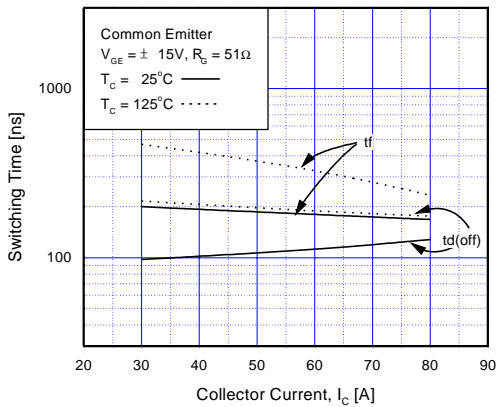


Fig 11. Turn off Characteristics vs. Collector Current

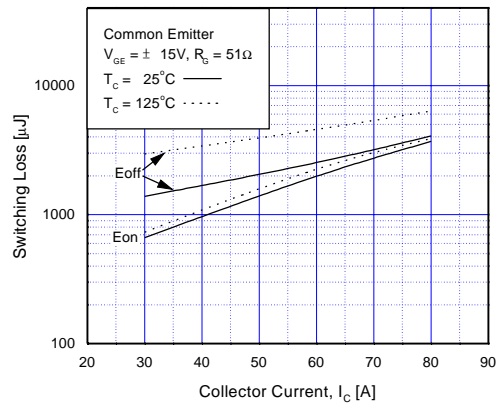


Fig 12. Switching Loss vs. Collector Current

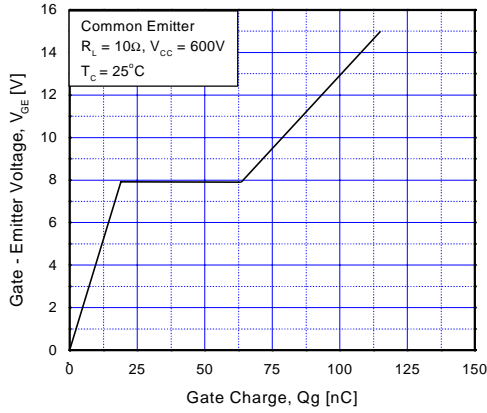


Fig 13. Gate Charge Characteristics

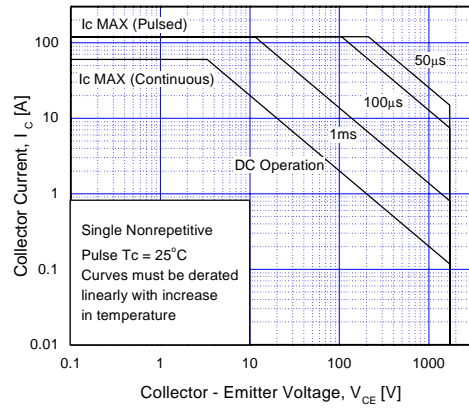


Fig 14. Turn off SOA Characteristics

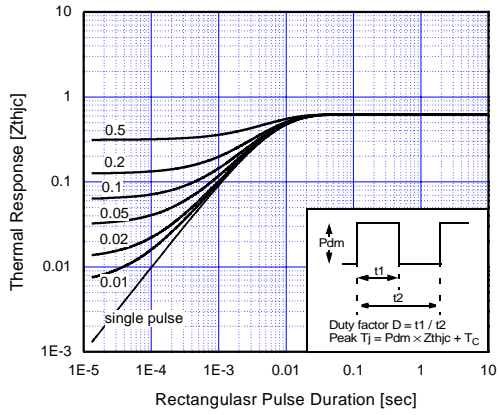


Fig 15. Transient Thermal Impedance of IGBT

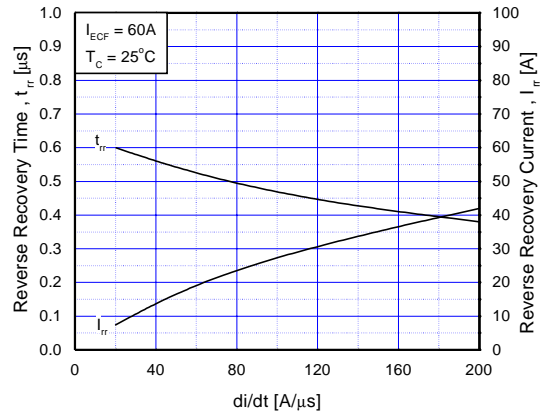


Fig 16. Typical Trr vs. di/dt

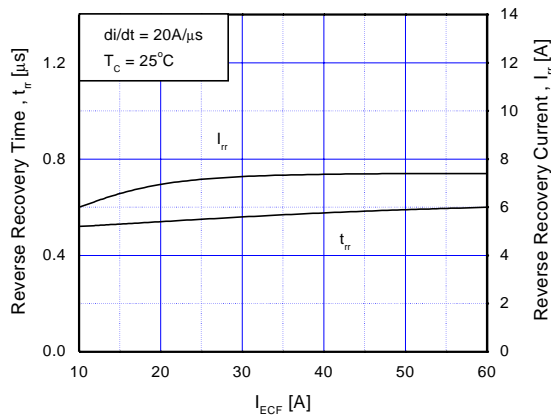


Fig 17. Typical Trr vs. Forward Current

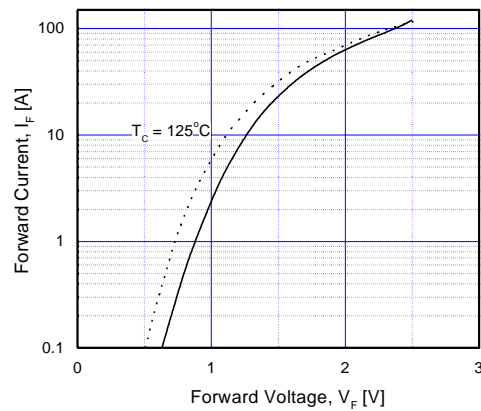


Fig 18. Typical Forward Voltage Drop vs. Forward Current

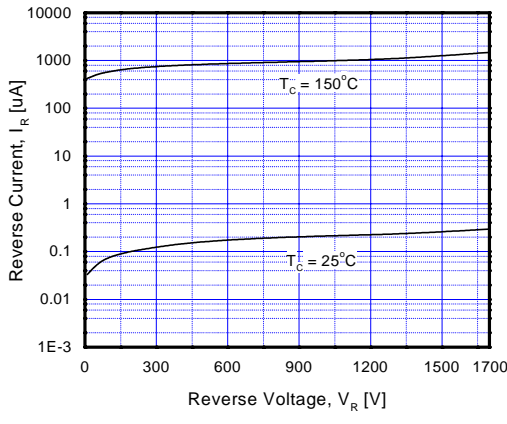


Fig 19. Reverse Current vs. Reverse Voltage

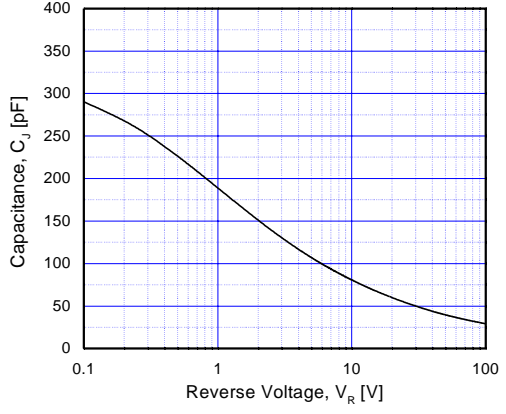
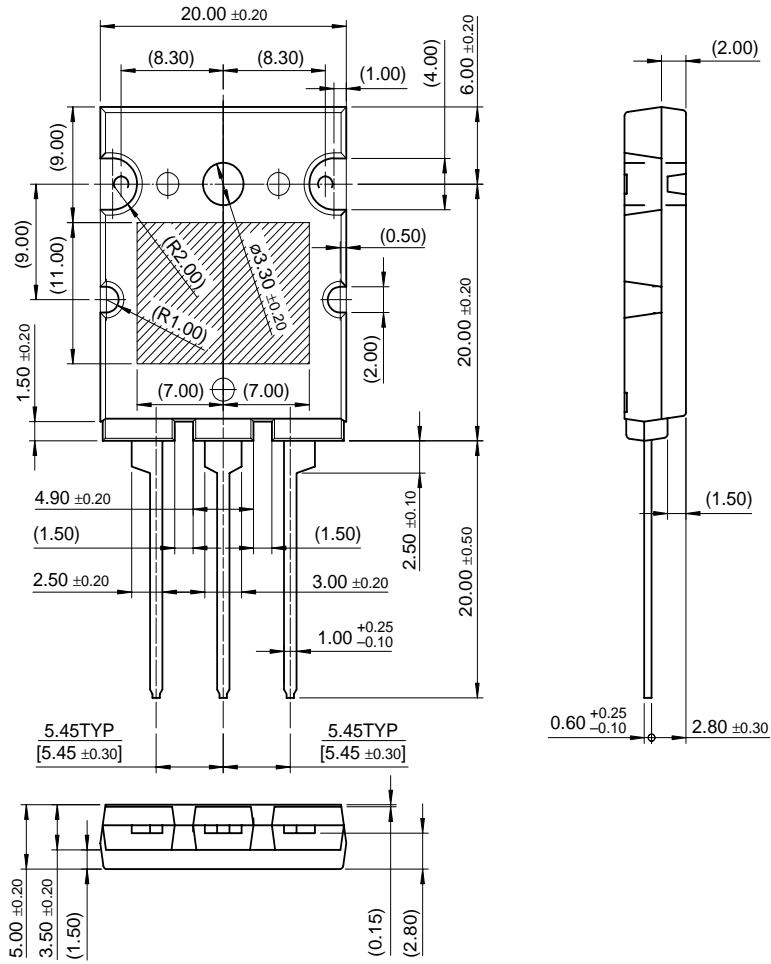


Fig 20. Capacitance vs. Reverse Voltage For Diode

Package Dimension

TO-264

FGL60N170D



Dimensions in Millimeters

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