

# FGL40N150D

## General Description

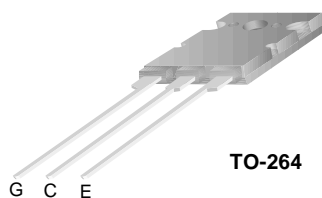
Fairchild's Insulated Gate Bipolar Transistor (IGBT) provides low conduction and switching losses. The FGL40N150D is designed for induction heating applications.

## Features

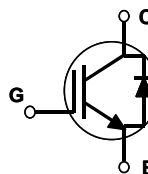
- High speed switching
- Low saturation voltage :  $V_{CE(sat)} = 3.5 \text{ V @ } I_C = 40\text{A}$
- High input impedance
- Built-in fast recovery diode

## Applications

Home appliances, induction heaters, IH JAR, and microwave ovens.



TO-264



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

Symbol	Description	FGL40N150D	Units
$V_{CES}$	Collector-Emitter Voltage	1500	V
$V_{GES}$	Gate-Emitter Voltage	$\pm 25$	V
$I_C$	Collector Current @ $T_C = 25^\circ\text{C}$	40	A
	Collector Current @ $T_C = 100^\circ\text{C}$	20	A
$I_{CM(1)}$	Pulsed Collector Current	120	A
$I_F$	Diode Continuous Forward Current @ $T_C = 100^\circ\text{C}$	10	A
$I_{FM}$	Diode Maximum Forward Current	100	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
$R_{\theta JC}$ (IGBT)	Thermal Resistance, Junction-to-Case	--	0.625	$^\circ\text{C/W}$
$R_{\theta JC}$ (DIODE)	Thermal Resistance, Junction-to-Case	--	0.83	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	25	$^\circ\text{C/W}$

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
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**Off Characteristics**

$BV_{CES}$	Collector-Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 3mA$	1500	--	--	V
$I_{CES}$	Collector Cut-Off Current	$V_{CE} = V_{CES}, V_{GE} = 0V$	--	--	3.0	mA
$I_{GES}$	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0V$	--	--	$\pm 100$	nA

**On Characteristics**

$V_{GE(th)}$	G-E Threshold Voltage	$I_C = 40mA, V_{CE} = V_{GE}$	3.5	5.0	7.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 40A, V_{GE} = 15V$	2.5	3.5	4.5	V

**Dynamic Characteristics**

$C_{ies}$	Input Capacitance	$V_{CE} = 30V, V_{GE} = 0V,$ $f = 1MHz$	--	2450	--	pF
$C_{oes}$	Output Capacitance		--	220	--	pF
$C_{res}$	Reverse Transfer Capacitance		--	75	--	pF

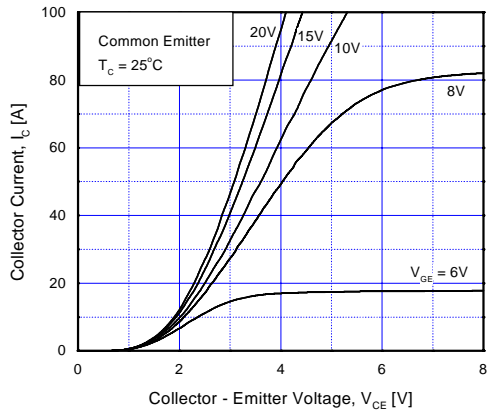
**Switching Characteristics**

$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 600V, I_C = 40A,$ $R_G = 51\Omega, V_{GE} = 15V,$ ResistiveLoad, $T_C = 25^\circ\text{C}$	--	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	$V_{CE} = 600V, I_C = 40A,$ $V_{GE} = 15V$	--	110	170	nC
$Q_{ge}$	Gate-Emitter Charge		--	15	25	nC
$Q_{gc}$	Gate-Collector Charge		--	40	60	nC

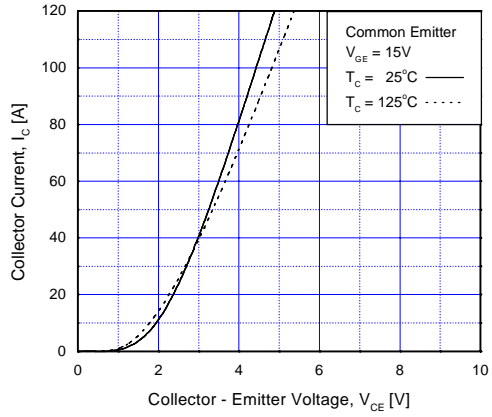
**Electrical Characteristics of DIODE**  $T_C = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
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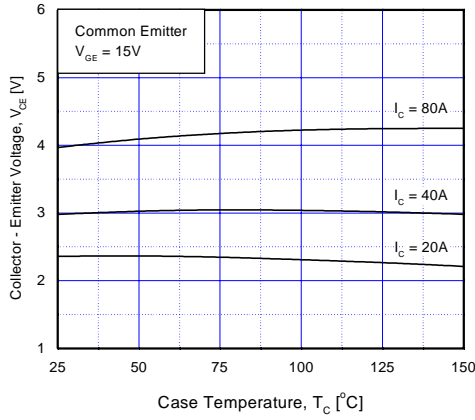
$V_{FM}$	Diode Forward Voltage	$I_F = 10A$	--	1.3	1.8	V
$t_{rr}$	Diode Reverse Recovery Time	$I_F = 10A, di/dt = 200A/us$	--	170	300	ns



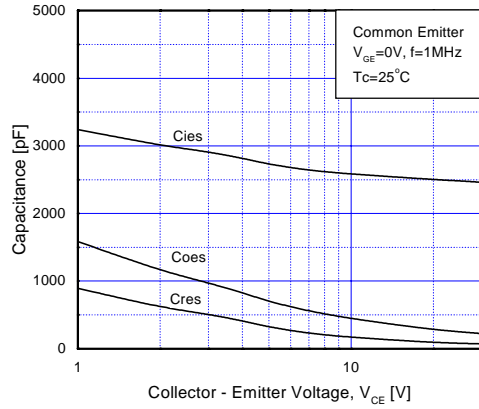
**Fig 1. Typical Output Characteristics**



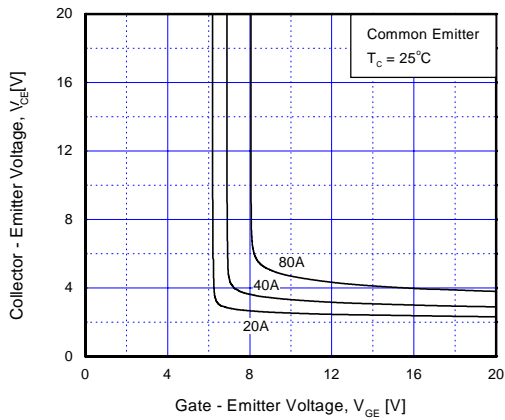
**Fig 2. Typical Output Characteristics**



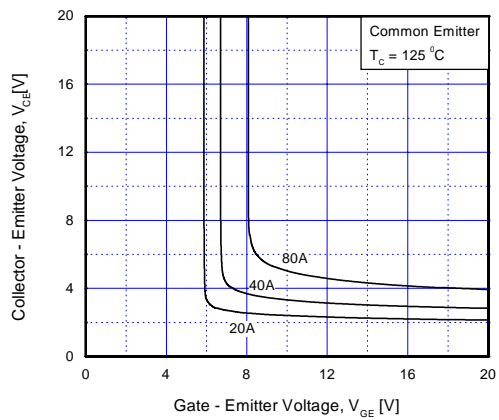
**Fig 3. Collector to Emitter Saturation Voltage vs. Case Temperature**



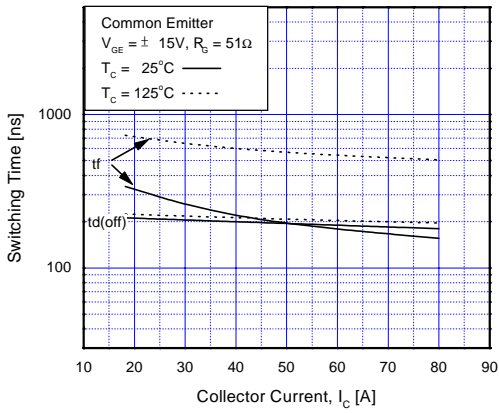
**Fig 4. Typical Capacitance vs. Collector to Emitter Voltage**



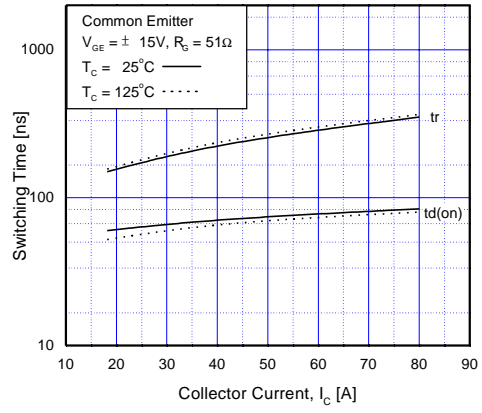
**Fig 5. Saturation Voltage vs.  $V_{GE}$**



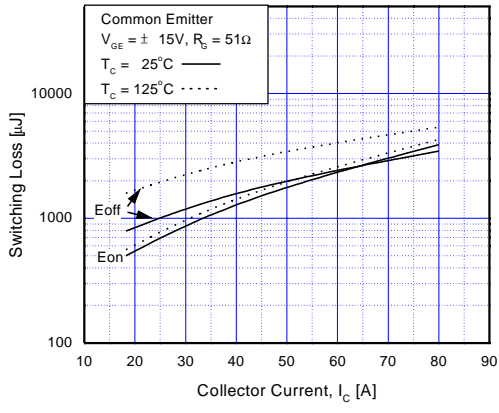
**Fig 6. Saturation Voltage vs.  $V_{GE}$**



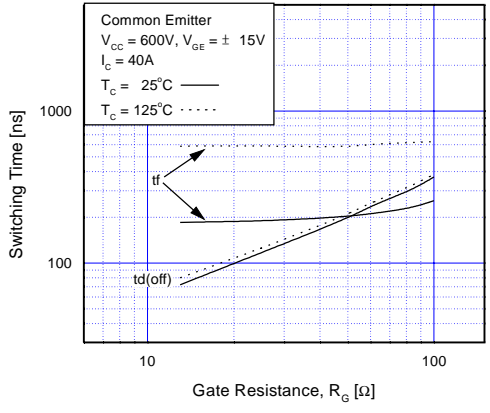
**Fig 7. Turn-Off Characteristics vs. Collector Current**



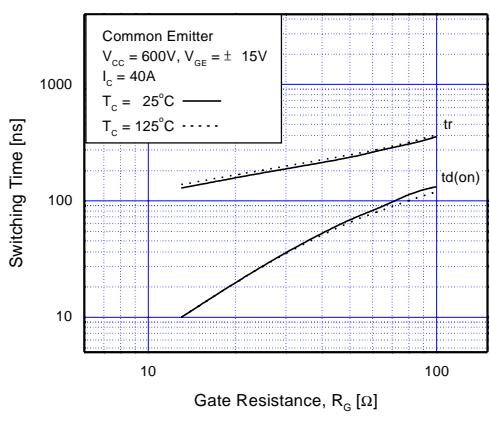
**Fig 8. Turn-On Characteristics vs. Collector Current**



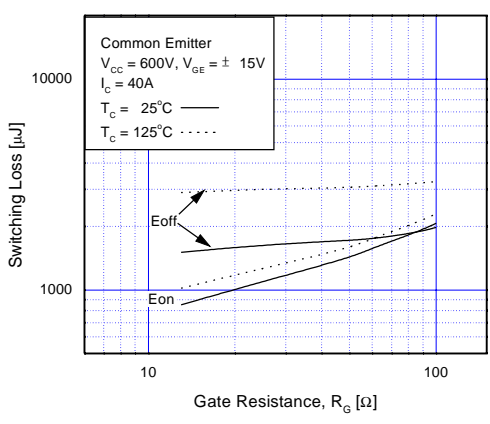
**Fig 9. Switching Loss vs. Collector Current**



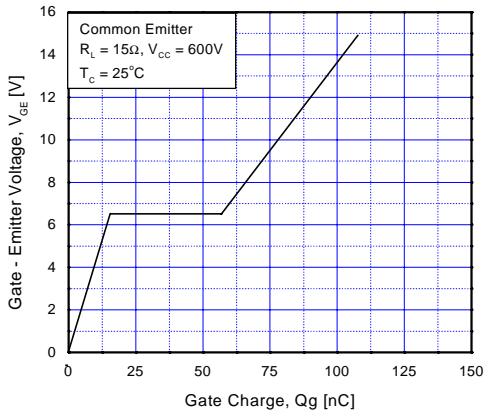
**Fig 10. Turn-Off Characteristics vs. Gate Resistance**



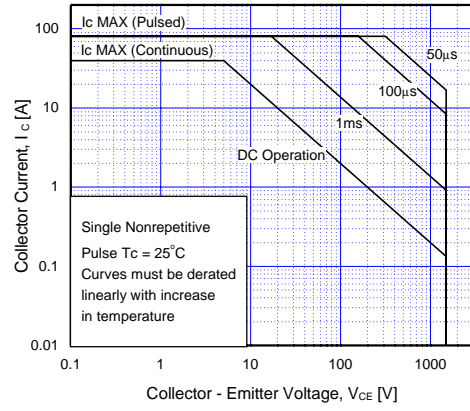
**Fig 11. Turn-On Characteristics vs. Gate Resistance**



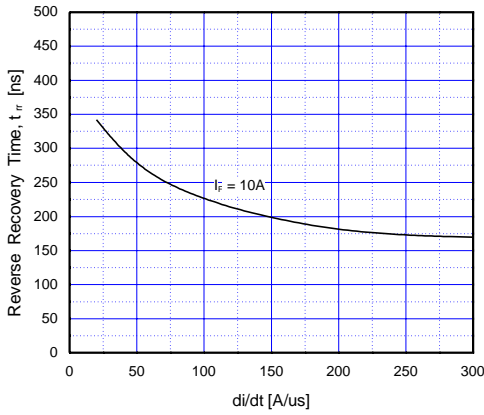
**Fig 12. Switching Loss vs. Gate Resistance**



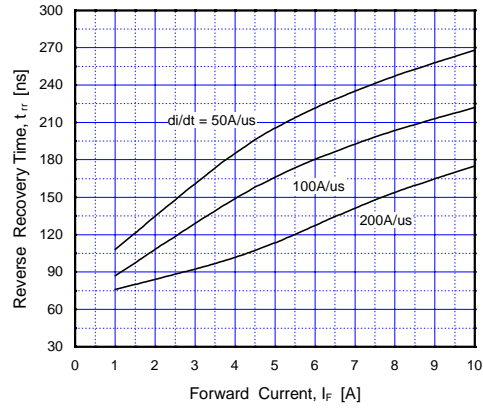
**Fig 13. Gate Charge Characteristics**



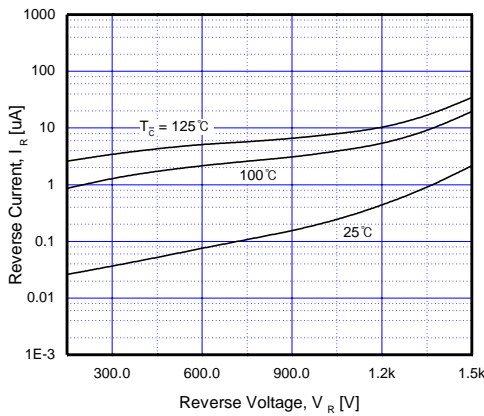
**Fig 14. SOA Characteristics**



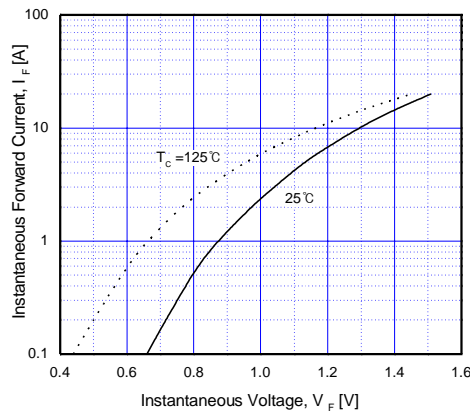
**Fig 15. Typical  $T_{rr}$  vs.  $di/dt$**



**Fig 16. Typical  $T_{rr}$  vs. Forward Current**



**Fig 17. Reverse Current vs. Reverse Voltage**



**Fig 18. Typical Forward Voltage Drop vs. Forward Current**



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