

## FGL60N100D

### General Description

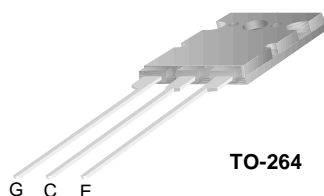
Insulated Gate Bipolar Transistors (IGBTs) with trench gate structure have superior performance in conduction and switching to planar gate structure, and also have wide noise immunity. These devices are well suitable for IH applications

### Features

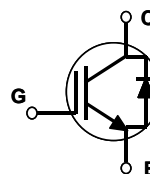
- High Speed Switching
- Low Saturation Voltage :  $V_{CE(sat)} = 2.5V @ I_C = 60A$
- High Input Impedance
- Built-in Fast Recovery Diode

### Application

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



TO-264



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

Symbol	Description	FGL60N100D	Units
$V_{CES}$	Collector-Emitter Voltage	1000	V
$V_{GES}$	Gate-Emitter Voltage	$\pm 25$	V
$I_C$	Collector Current @ $T_C = 25^\circ\text{C}$	60	A
	Collector Current @ $T_C = 100^\circ\text{C}$	42	A
$I_{CM(1)}$	Pulsed Collector Current	120	A
$I_F$	Diode Continuous Forward Current @ $T_C = 100^\circ\text{C}$	15	A
$P_D$	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	176	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	70	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
$R_{\theta JC}(\text{IGBT})$	Thermal Resistance, Junction-to-Case	--	0.71	$^\circ\text{C}/\text{W}$
$R_{\theta JC}(\text{DIODE})$	Thermal Resistance, Junction-to-Case	--	2.08	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	25	$^\circ\text{C}/\text{W}$

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

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

I <sub>CES</sub>	Collector Cut-Off Current	V <sub>CE</sub> = 1000V, V <sub>GE</sub> = 0V	--	--	1.0	mA
I <sub>GES</sub>	G-E Leakage Current	V <sub>GE</sub> = ± 25, V <sub>CE</sub> = 0V	--	--	± 500	nA

### On Characteristics

V <sub>GE(th)</sub>	G-E Threshold Voltage	I <sub>C</sub> = 60mA, V <sub>CE</sub> = V <sub>GE</sub>	4.0	5.0	7.0	V
V <sub>CE(sat)</sub>	Collector to Emitter Saturation Voltage	I <sub>C</sub> = 10A, V <sub>GE</sub> = 15V	--	1.6	2.0	V
		I <sub>C</sub> = 60A, V <sub>GE</sub> = 15V	--	2.5	2.9	V

### Dynamic Characteristics

C <sub>ies</sub>	Input Capacitance	V <sub>CE</sub> =10V, V <sub>GE</sub> = 0V, f = 1MHz	--	6300	--	pF
C <sub>oes</sub>	Output Capacitance		--	160	--	pF
C <sub>res</sub>	Reverse Transfer Capacitance		--	140	--	pF

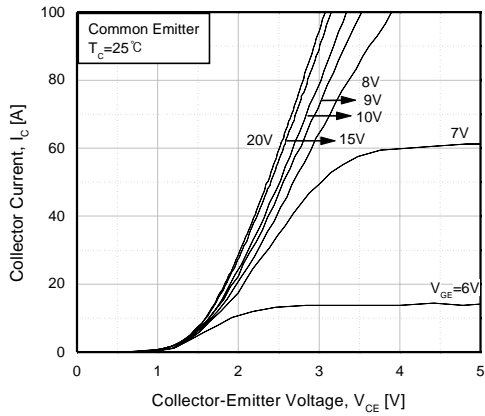
### Switching Characteristics

t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>CC</sub> = 600V, I <sub>C</sub> = 60A, R <sub>G</sub> = 51Ω, V <sub>GE</sub> =15V, Resistive Load, T <sub>C</sub> = 25°C	--	160	400	ns
t <sub>r</sub>	Rise Time		--	360	700	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		--	410	700	ns
t <sub>f</sub>	Fall Time		--	240	330	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>CE</sub> = 600 V, I <sub>C</sub> = 60A, V <sub>GE</sub> = 15V	--	230	300	nC
Q <sub>ge</sub>	Gate-Emitter Charge		--	45	--	nC
Q <sub>gc</sub>	Gate-Collector Charge		--	80	--	nC

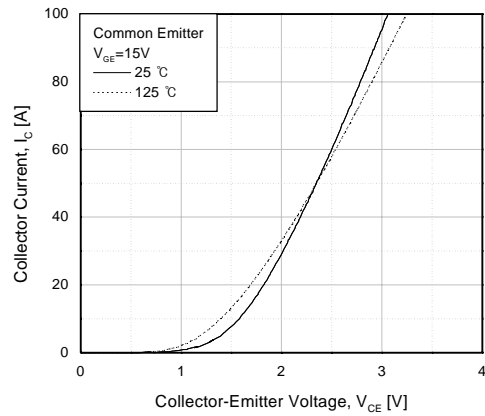
## Electrical Characteristics of DIODE T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
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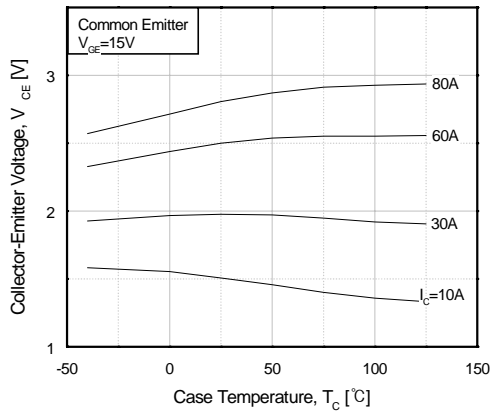
V <sub>FM</sub>	Diode Forward Voltage	I <sub>F</sub> = 15A	--	1.2	1.7	V
		I <sub>F</sub> = 60A	--	1.8	2.1	V
t <sub>rr</sub>	Diode Reverse Recovery Time	I <sub>F</sub> = 60A di/dt = -20A/us	--	1.2	1.5	us
I <sub>R</sub>	Instantaneous Reverse Current	V <sub>RRM</sub> = 1000V	--	0.05	2	uA



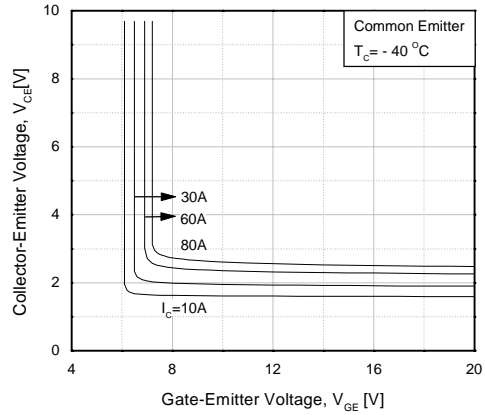
**Fig 1. Typical Output Characteristics**



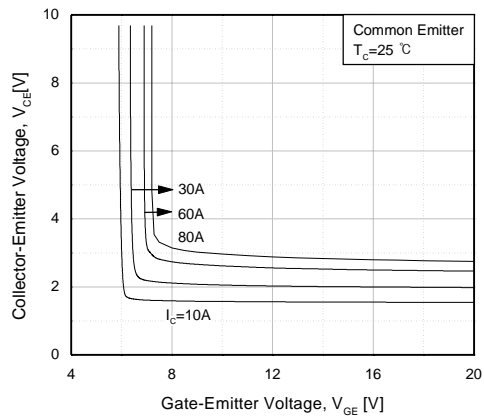
**Fig 2. Typical Saturation Voltage Characteristics**



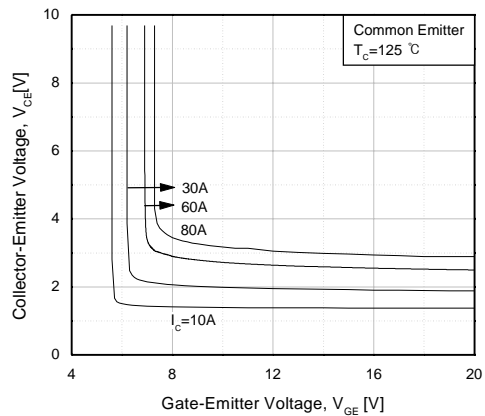
**Fig 3. Saturation Voltage vs. Case Temperature at Variant Current Level**



**Fig 4. Saturation Voltage vs. V<sub>GE</sub>**



**Fig 5. Saturation Voltage vs. V<sub>GE</sub>**



**Fig 6. Saturation Voltage vs. V<sub>GE</sub>**

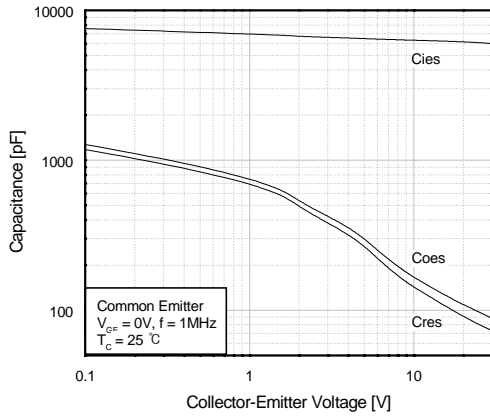


Fig 7. Capacitance Characteristics

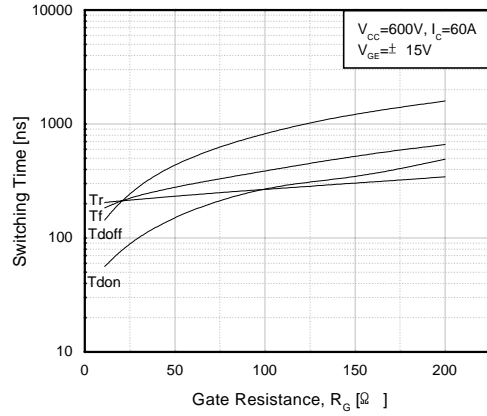


Fig 8. Switching Characteristics vs. Gate Resistance

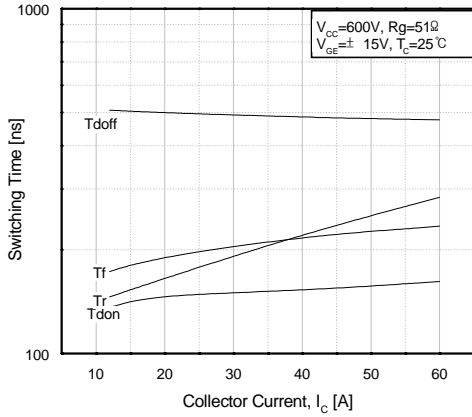


Fig 9. Switching Characteristics vs. Collector Current

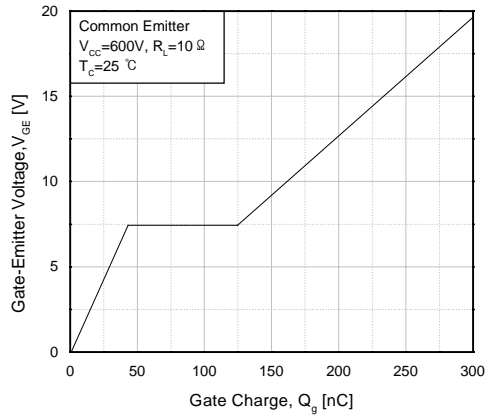


Fig 10. Gate Charge Characteristics

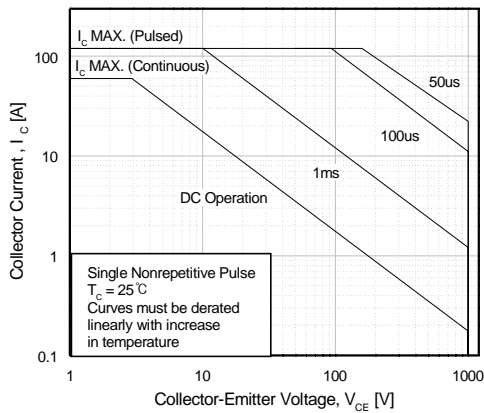


Fig 11. SOA Characteristics

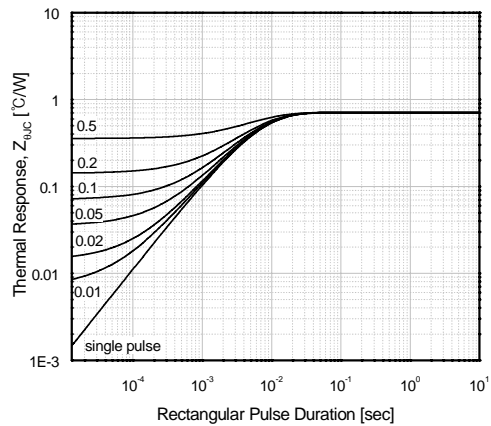


Fig 12. Transient Thermal Impedance of IGBT

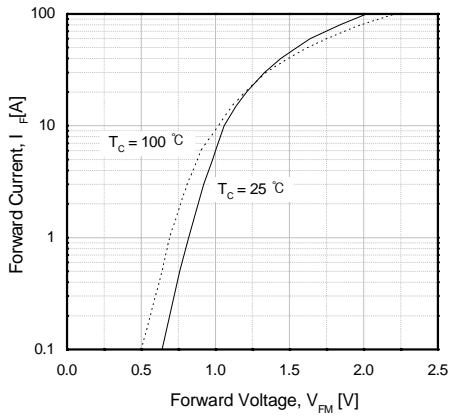


Fig 13. Forward Characteristics

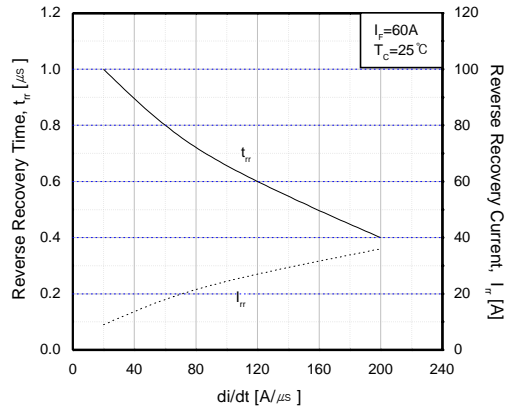


Fig 14. Reverse Recovery Characteristics vs. di/dt

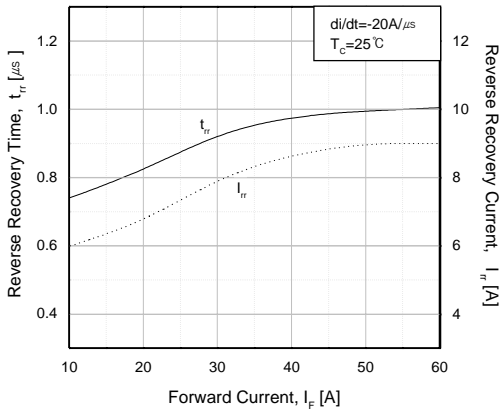


Fig 15. Reverse Recovery Characteristics vs. Forward Current

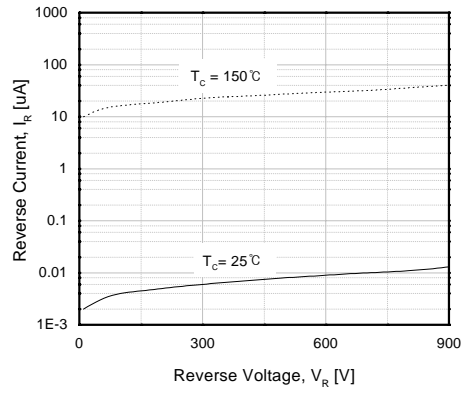


Fig 16. Reverse Current vs. Reverse Voltage

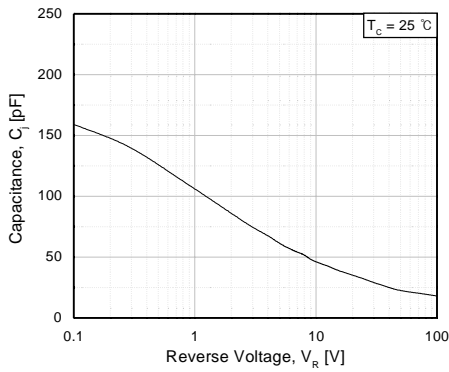


Fig 17. Junction capacitance

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Copak Discrete IGBT

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General description

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