

**IGBT**

SGF15N90D

General Description

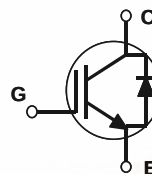
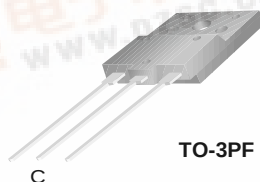
Insulated Gate Bipolar Transistors (IGBTs) with a trench gate structure provide superior conduction and switching performance in comparison with transistors having a planar gate structure. They also have wide noise immunity. These devices are very suitable for induction heating applications.

Features

- High speed switching
- Low saturation voltage : $V_{CE(sat)} = 2.0\text{ V}$ @ $I_C = 15\text{ A}$
- High input impedance
- Built-in fast recovery diode

Applications

Home appliances, induction heaters, induction heating JARs, and microwave ovens.



Absolute Maximum Ratings

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

Symbol	Description	SGF15N90D	Units
V_{CES}	Collector-Emitter Voltage	900	V
V_{GES}	Gate-Emitter Voltage	± 25	V
I_C	Collector Current @ $T_C = 25^\circ\text{C}$	15	A
	Collector Current @ $T_C = 100^\circ\text{C}$	12	A
$I_{CM(1)}$	Pulsed Collector Current	30	A
I_F	Diode Continuous Forward Current @ $T_C = 100^\circ\text{C}$	12	A
P_D	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	83	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	33	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	--	1.5	$^\circ\text{C/W}$
$R_{\theta JC}(\text{DIODE})$	Thermal Resistance, Junction-to-Case	--	2.86	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	40	$^\circ\text{C/W}$

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{CES}	Collector-Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 250\mu A$	900	--	--	V
I_{CES}	Collector Cut-off Current	$V_{CE} = V_{CES}, V_{GE} = 0V$	--	--	1.0	mA
I_{GES}	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0V$	--	--	± 500	nA

On Characteristics

$V_{GE(th)}$	G-E Threshold Voltage	$I_C = 15mA, V_{CE} = V_{GE}$	4.0	5.0	7.0	V
$V_{CE(sat)}$	Collector to Emitter	$I_C = 2.5A, V_{GE} = 15V$	--	1.4	1.8	V
	Saturation Voltage	$I_C = 15A, V_{GE} = 15V$	--	2.0	2.7	V

Dynamic Characteristics

C_{ies}	Input Capacitance	$V_{CE}=10V, V_{GE} = 0V,$ $f = 1MHz$	--	1500	--	pF
C_{oes}	Output Capacitance		--	80	--	pF
C_{res}	Reverse Transfer Capacitance		--	50	--	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 600V, I_C = 15A,$ $R_G = 51\Omega, V_{GE} = 15V,$ Resistive Load, $T_C 25^\circ\text{C}$	--	50	80	ns
t_r	Rise Time		--	180	280	ns
$t_{d(off)}$	Turn-Off Delay Time		--	150	230	ns
t_f	Fall Time		--	200	320	ns
Q_g	Total Gate Charge	$V_{CE} = 600V, I_C = 15A,$ $V_{GE} = 15V$	--	60	80	nC
Q_{ge}	Gate-Emitter Charge		--	15	--	nC
Q_{gc}	Gate-Collector Charge		--	20	--	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	$I_F = 4A$	--	1.1	1.6	V
		$I_F = 15A$	--	1.45	1.7	V
t_{rr}	Diode Reverse Recovery Time	$I_F = 15A, di/dt = 20 A/\mu s$	--	0.8	1.2	μs
I_R	Instantaneous Reverse Current	$V_{RRM} = 900V$	--	0.03	1.2	μA

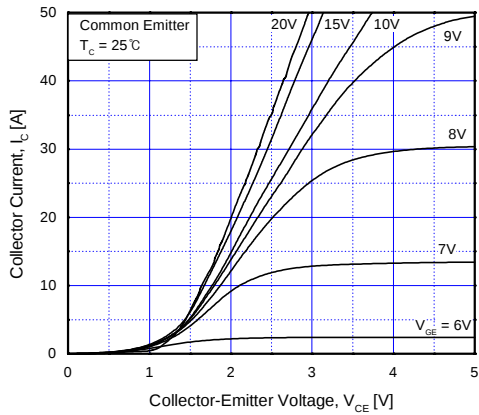


Fig 1. Typical Output Characteristics

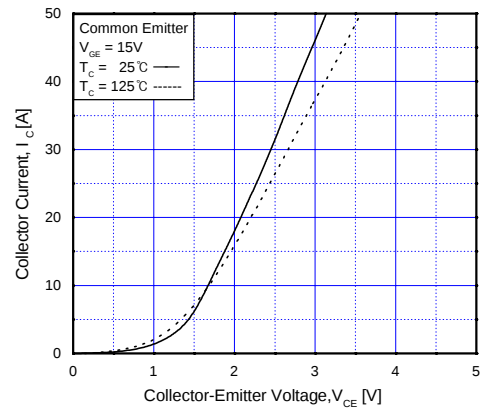


Fig 2. Typical Saturation Voltage Characteristics

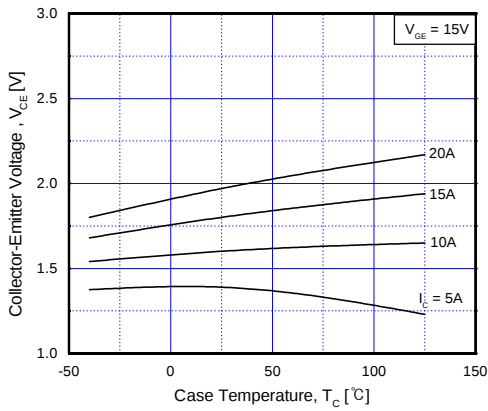


Fig 3. Saturation Voltage vs. Case Temperature at Variant Current Level

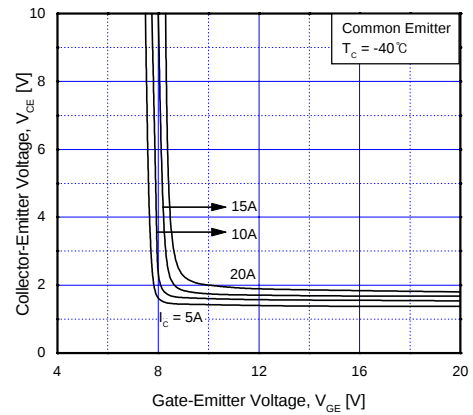


Fig 4. Saturation Voltage vs. V_{GE}

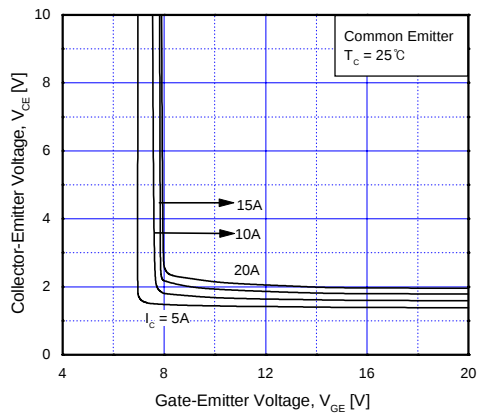


Fig 5. Saturation Voltage vs. V_{GE}

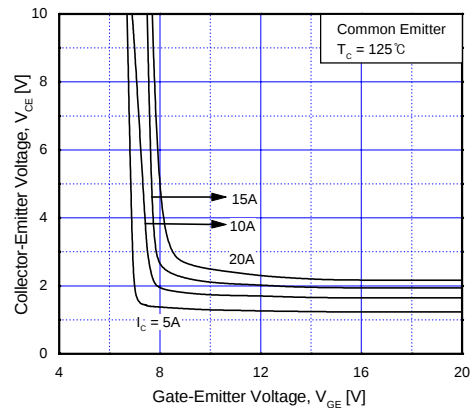


Fig 6. Saturation Voltage vs. V_{GE}

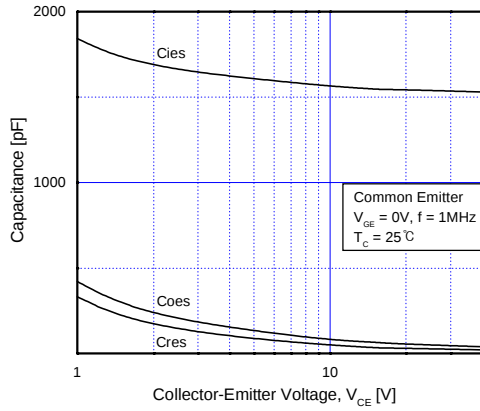


Fig 7. Capacitance Characteristics

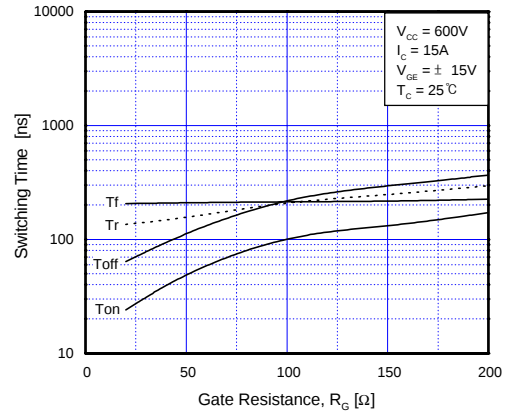


Fig 8. Switching Characteristics vs. Gate Resistance

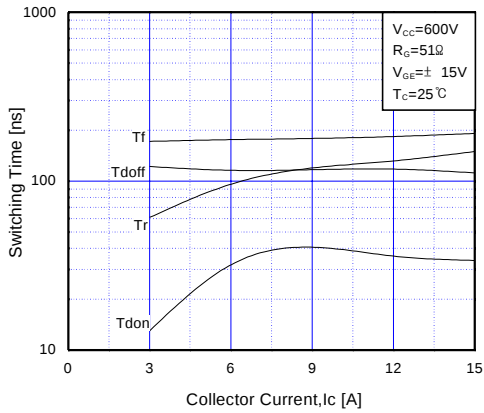


Fig 9. Switching Characteristics vs. Collector current

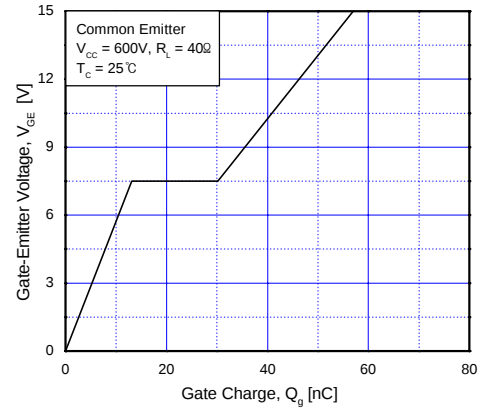


Fig 10. Gate Charge Characteristics

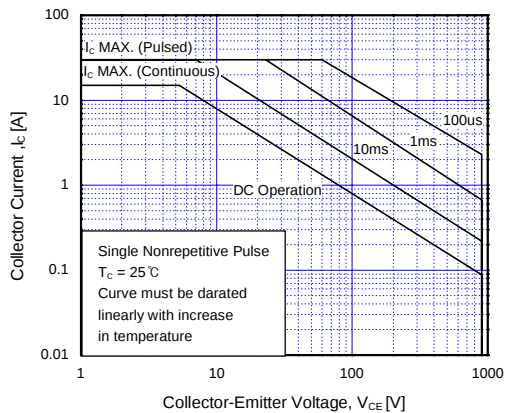


Fig 11. SOA Characteristics

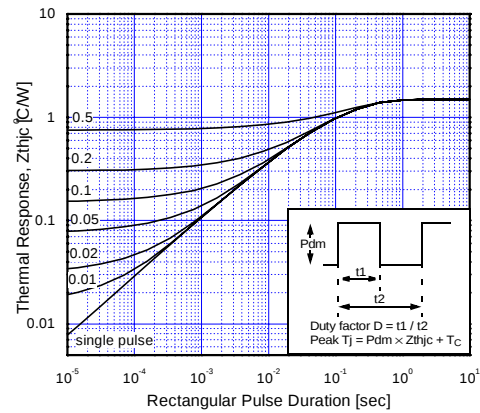


Fig 12. Transient Thermal Impedance of IGBT

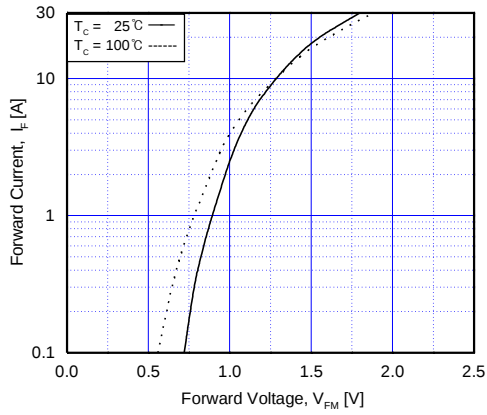


Fig 13. Forward Characteristics

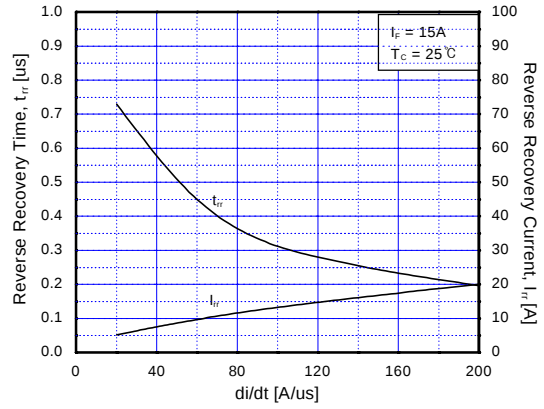


Fig 14. Reverse Recovery Characteristics vs. di/dt

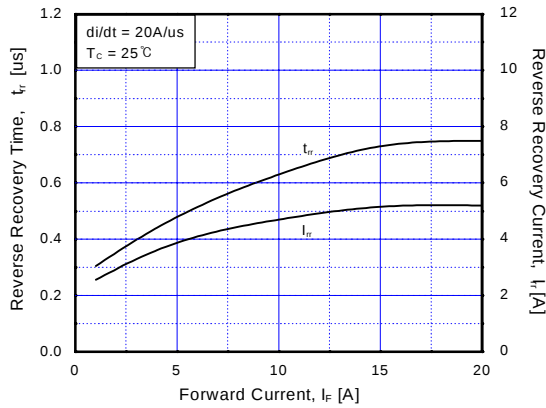


Fig 15. Reverse Recovery Characteristics vs. Forward current

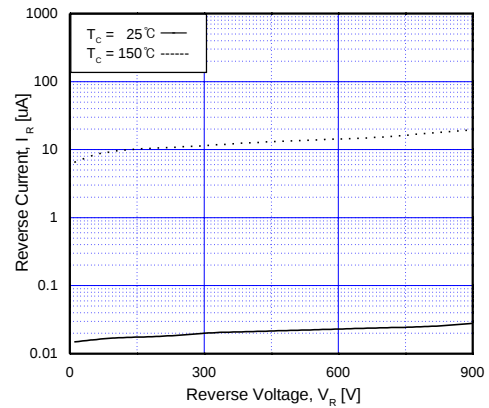


Fig 16. Reverse Current vs. Reverse Voltage

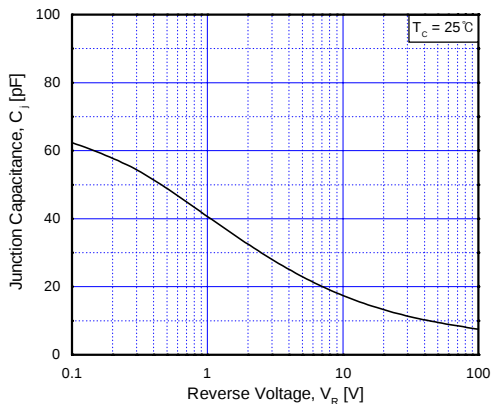
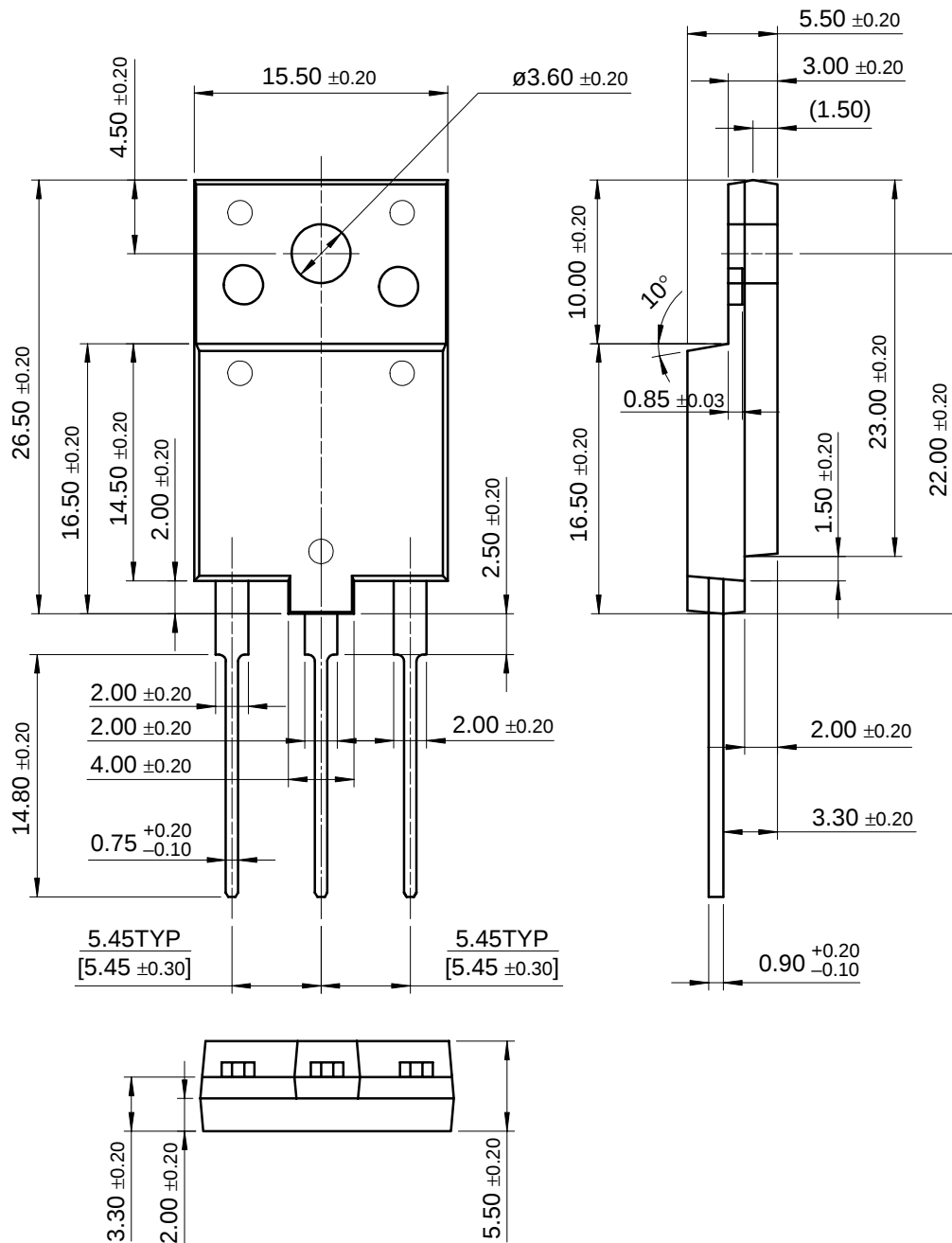


Fig 17. Junction Capacitance

Package Dimension

TO-3PF

SGF15N90D



Dimensions in Millimeters

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