

## SGL60N90DG3

### General Description

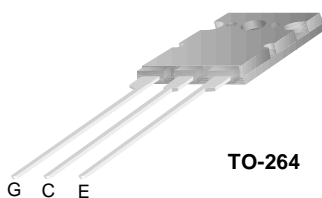
Insulated Gate Bipolar Transistors (IGBTs) with a trench gate structure provide superior conduction and switching performance in comparison with transistors having a planar gate structure. They also have wide noise immunity. These devices are very suitable for induction heating applications.

### Features

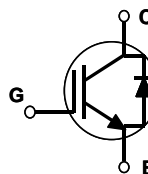
- High speed switching
- Low saturation voltage :  $V_{CE(sat)} = 2.0 \text{ V @ } I_C = 60\text{A}$
- High input impedance
- Built-in fast recovery diode

### Applications

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



TO-264



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

Symbol	Description	SGL60N90DG3	Units
$V_{CES}$	Collector-Emitter Voltage	900	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 @ $T_C = 25^\circ\text{C}$	180	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	72	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	--	0.69	$^\circ\text{C/W}$
$R_{\theta JC}(\text{DIODE})$	Thermal Resistance, Junction-to-Case	--	2.08	$^\circ\text{C/W}$
$R_{\theta JA}$	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
<b>Off Characteristics</b>						
$BV_{CES}$	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	$V_{GE} = V_{GES}, V_{CE} = 0V$	--	--	$\pm 500$	nA
<b>On Characteristics</b>						
$V_{GE(th)}$	G-E Threshold Voltage	$I_C = 60mA, V_{CE} = V_{GE}$	4.0	5.0	7.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 10A, V_{GE} = 15V$	--	1.4	1.8	V
		$I_C = 60A, V_{GE} = 15V$	--	2.0	2.7	V
<b>Dynamic Characteristics</b>						
$C_{ies}$	Input Capacitance	$V_{CE}=10V, V_{GE} = 0V,$ $f = 1MHz$	--	6500	--	pF
$C_{oes}$	Output Capacitance		--	250	--	pF
$C_{res}$	Reverse Transfer Capacitance		--	220	--	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, $T_C = 25^\circ\text{C}$	--	250	400	ns
$t_r$	Rise Time		--	450	700	ns
$t_{d(off)}$	Turn-Off Delay Time		--	450	700	ns
$t_f$	Fall Time		--	250	400	ns
$Q_g$	Total Gate Charge	$V_{CE} = 600V, I_C = 60A,$ $V_{GE} = 15V$	--	260	300	nC
$Q_{ge}$	Gate-Emitter Charge		--	70	--	nC
$Q_{gc}$	Gate-Collector Charge		--	60	--	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	$I_F = 15A$	--	1.2	1.7	V
		$I_F = 60A$	--	1.75	2.0	V
$t_{rr}$	Diode Reverse Recovery Time	$I_F = 60A$ di/dt = 20 A/us	--	1.2	1.5	us
$I_R$	Instantaneous Reverse Current	$V_{RRM} = 900V$	--	0.05	2	uA

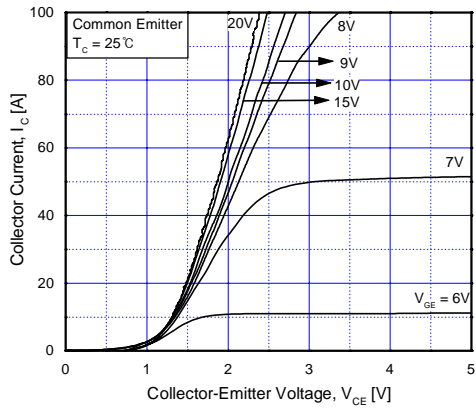


Fig 1. Typical Output Characteristics

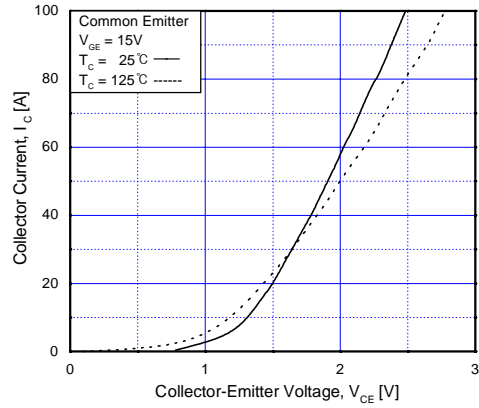


Fig 2. Typical Saturation Voltage Characteristics

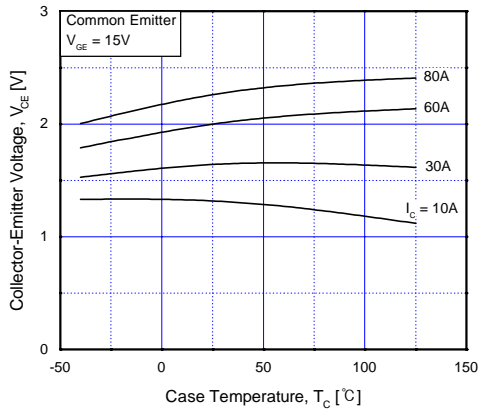


Fig 3. Saturation Voltage vs. Case Temperature at Variant Current Level

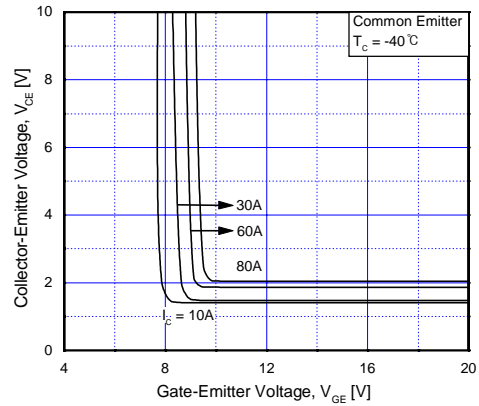


Fig 4. Saturation Voltage vs.  $V_{GE}$

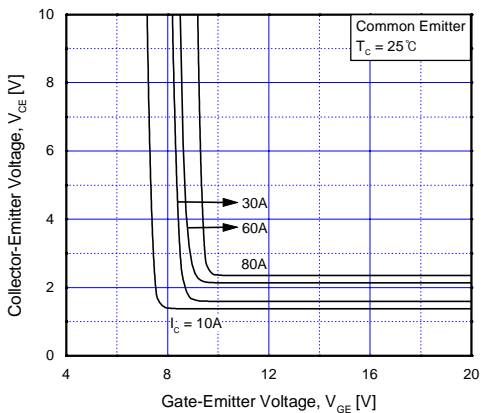


Fig 5. Saturation Voltage vs.  $V_{GE}$

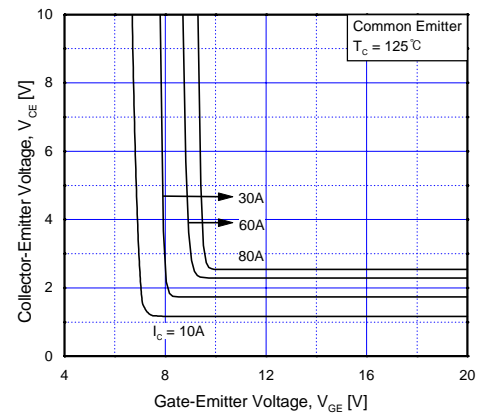


Fig 6. Saturation Voltage vs.  $V_{GE}$

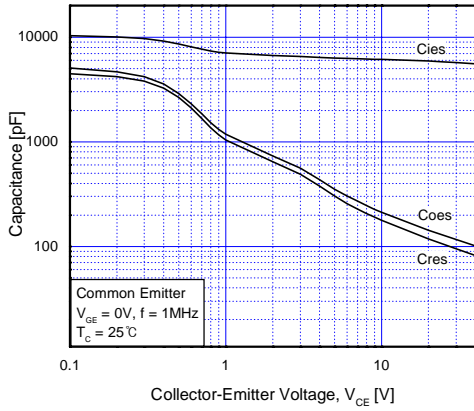


Fig 7. Capacitance Characteristics

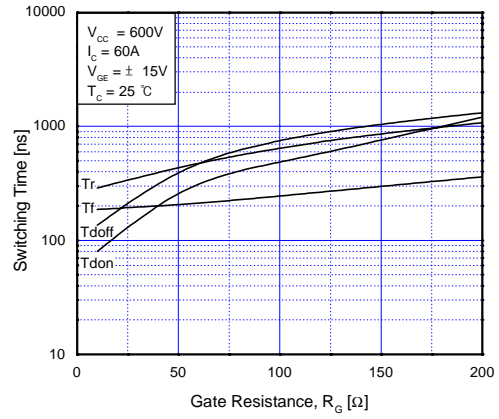


Fig 8. Switching Characteristics vs. Gate Resistance

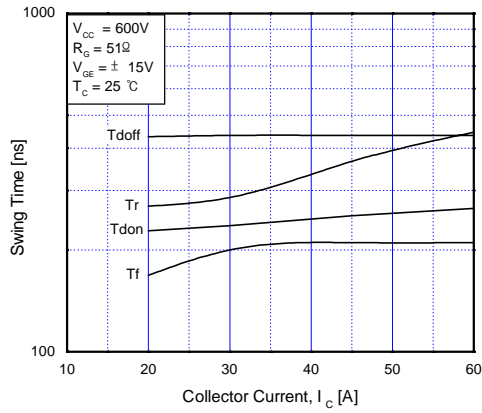


Fig 9. Switching Characteristics vs. Collector Current

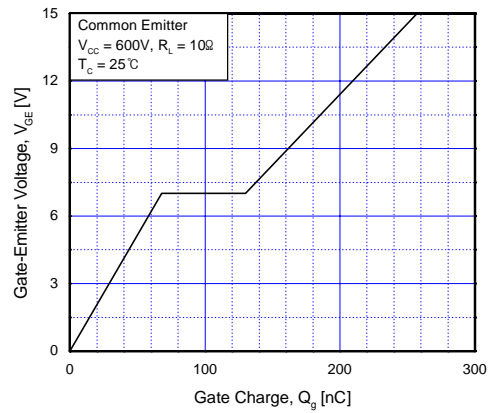


Fig 10. Gate Charge Characteristics

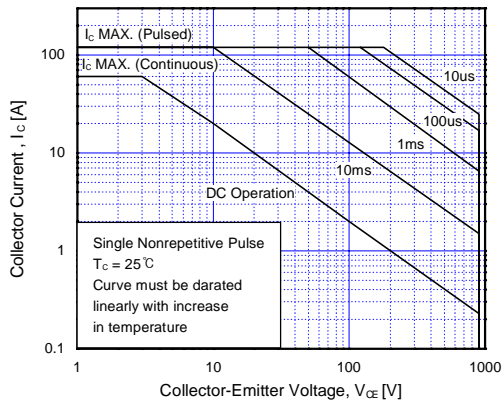


Fig 11. SOA Characteristics

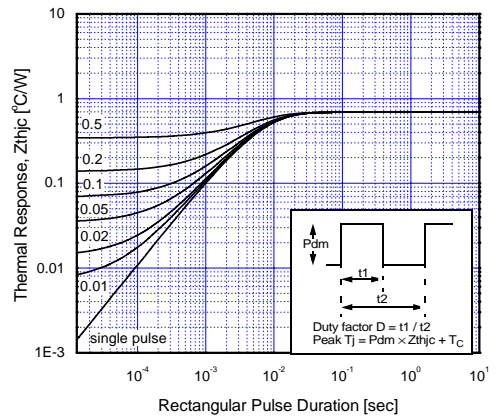


Fig 12. Transient Thermal Impedance of IGBT

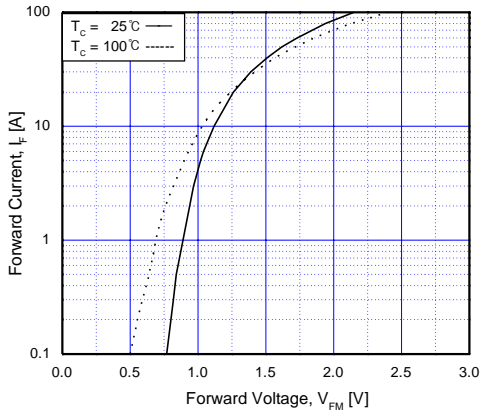


Fig 13. Forward Characteristics

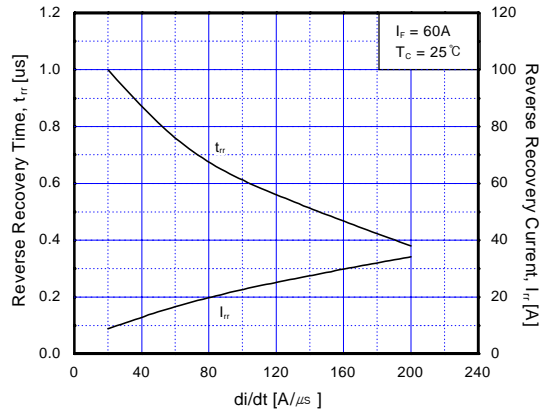


Fig 14. Reverse Recovery Characteristics vs. di/dt

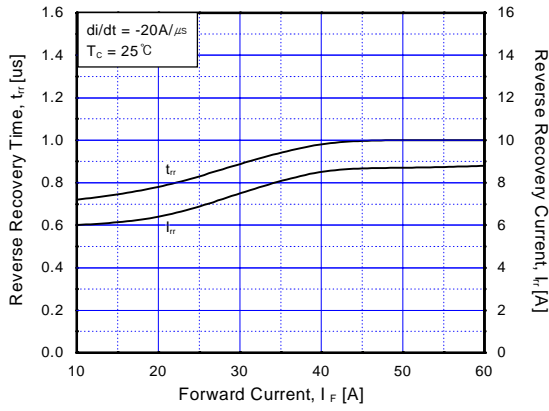


Fig 15. Reverse Recovery Characteristics vs. Forward Current

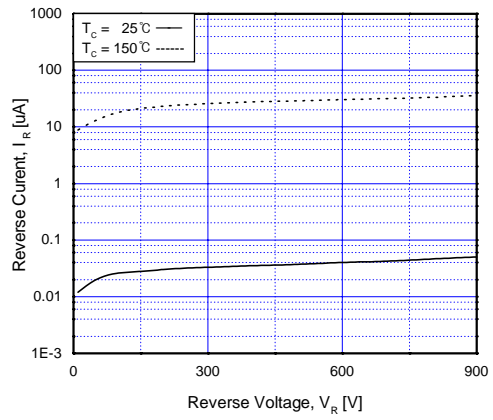


Fig 16. Reverse Current vs. Reverse Voltage

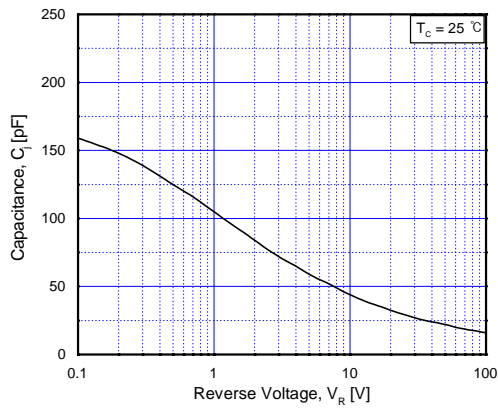


Fig 17. Junction capacitance



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