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# SGL40N150D

## General Description

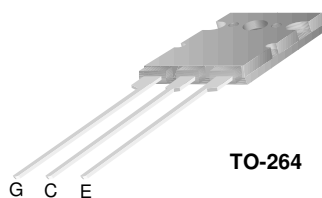
Fairchild's Insulated Gate Bipolar Transistor (IGBT) provides low conduction and switching losses. The SGL40N150D is designed for induction heating applications.

## Features

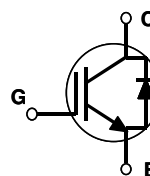
- High speed switching
- Low saturation voltage :  $V_{CE(sat)} = 3.7 \text{ V @ } I_C = 40\text{A}$
- High input impedance
- Built-in fast recovery diode

## 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	SGL40N150D	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
<b>Off Characteristics</b>						
$BV_{CES}$	Collector-Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 250\mu A$	1500	--	--	V
$I_{CES}$	Collector Cut-Off Current	$V_{CE} = V_{CES}, V_{GE} = 0V$	--	--	250	$\mu A$
$I_{GES}$	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	$I_C = 40A, V_{GE} = 15V$	--	3.7	4.7	V

**Dynamic Characteristics**

$C_{ies}$	Input Capacitance	$V_{CE} = 10V, V_{GE} = 0V,$ $f = 1MHz$	--	4000	--	pF
$C_{oes}$	Output Capacitance		--	700	--	pF
$C_{res}$	Reverse Transfer Capacitance		--	300	--	pF

**Switching Characteristics**

$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 600V, I_C = 40A,$ $R_G = 51\Omega, V_{GE} = 15V,$ Resistive Load, $T_C = 25^\circ\text{C}$	--	90	200	ns
$t_r$	Rise Time		--	230	700	ns
$t_{d(off)}$	Turn-Off Delay Time		--	245	400	ns
$t_f$	Fall Time		--	230	400	ns
$Q_g$	Total Gate Charge	$V_{CE} = 600V, I_C = 40A,$ $V_{GE} = 15V$	--	140	170	nC
$Q_{ge}$	Gate-Emitter Charge		--	25	25	nC
$Q_{gc}$	Gate-Collector Charge		--	45	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	$I_F = 10A$	--	1.3	1.8	V
$t_{rr}$	Diode Reverse Recovery Time	$I_F = 10A, di/dt = 200A/\mu s$	--	170	300	ns

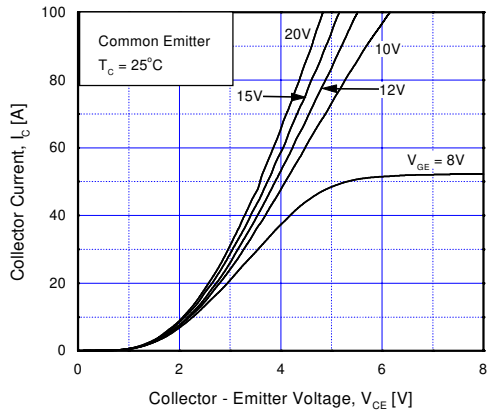


Fig 1. Typical Output Characteristics

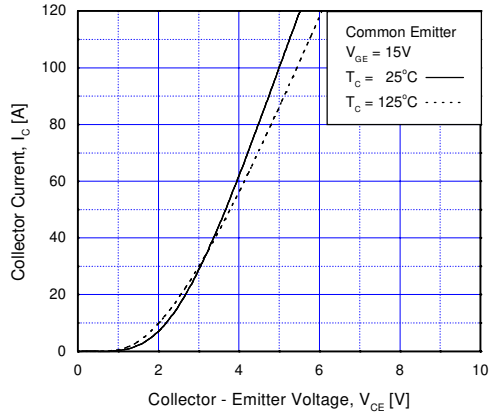


Fig 2. Typical Output Characteristics

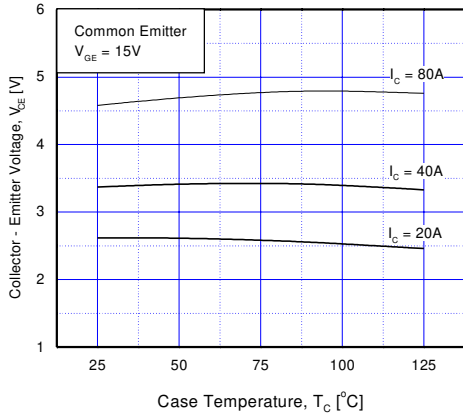


Fig 3. Collector to Emitter Saturation Voltage vs. Case Temperature

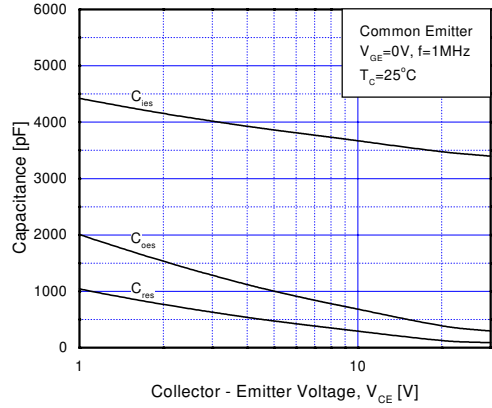


Fig 4. Typical Capacitance vs. Collector to Emitter Voltage

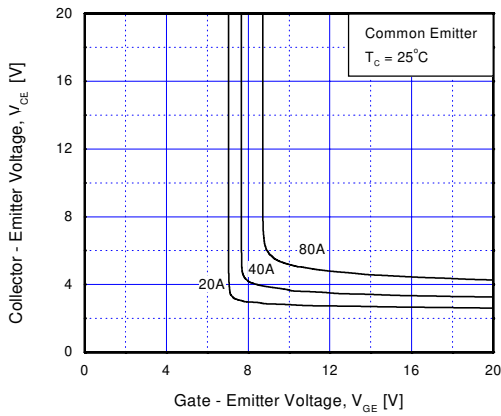


Fig 5. Saturation Voltage vs.  $V_{GE}$

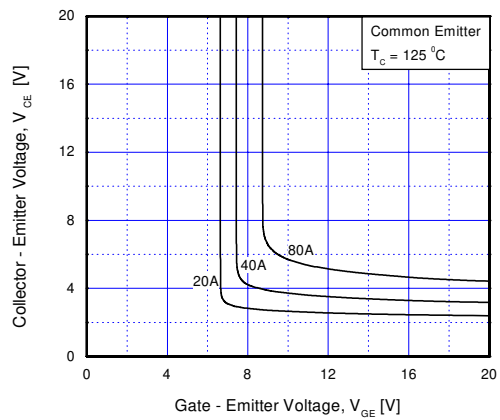


Fig 6. Saturation Voltage vs.  $V_{GE}$

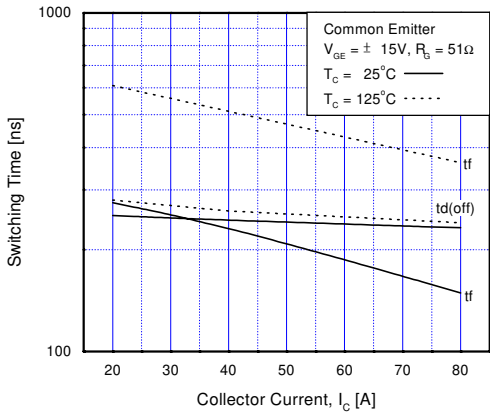


Fig 7. Turn-Off Characteristics vs. Collector Current

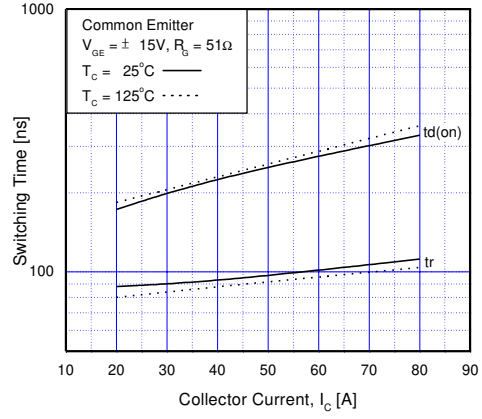


Fig 8. Turn-On Characteristics vs. Collector Current

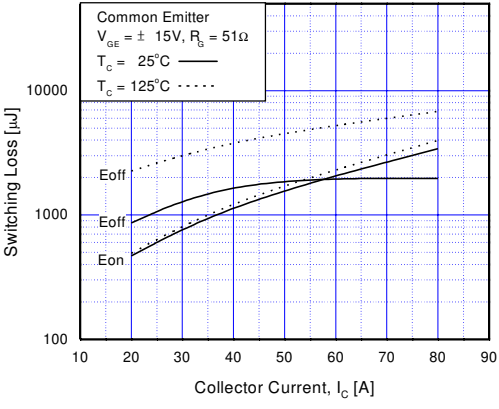


Fig 9. Switching Loss vs. Collector Current

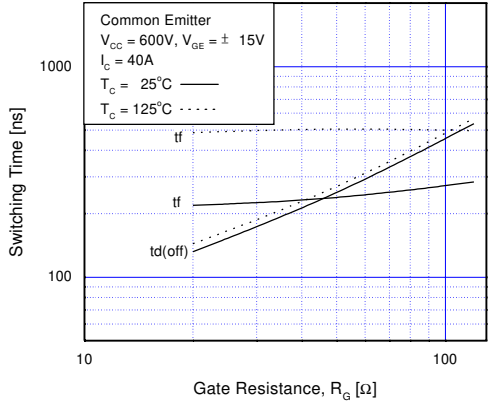


Fig 10. Turn-Off Characteristics vs. Gate Resistance

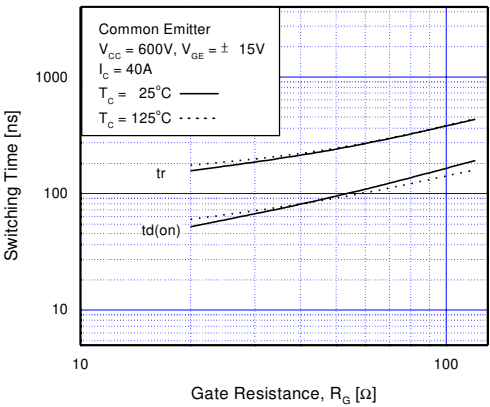


Fig 11. Turn-On Characteristics vs. Gate Resistance

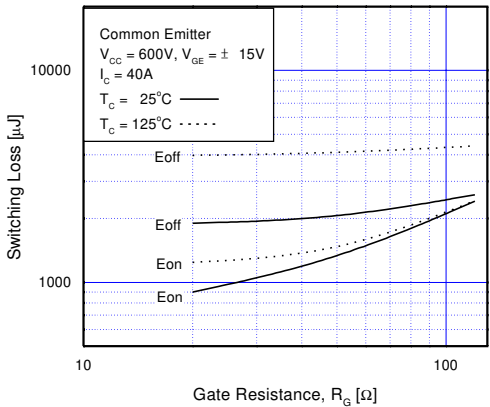


Fig 12. Switching Loss vs. Gate Resistance

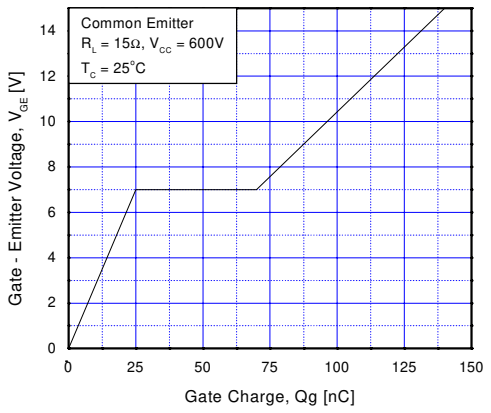


Fig 13. Gate Charge Characteristics

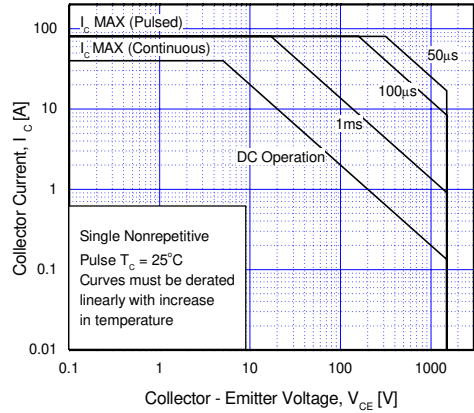


Fig 14. SOA Characteristics

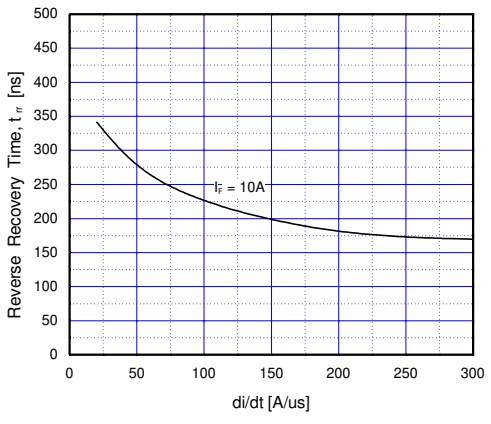


Fig 15. Typical  $T_{rr}$  vs.  $di/dt$

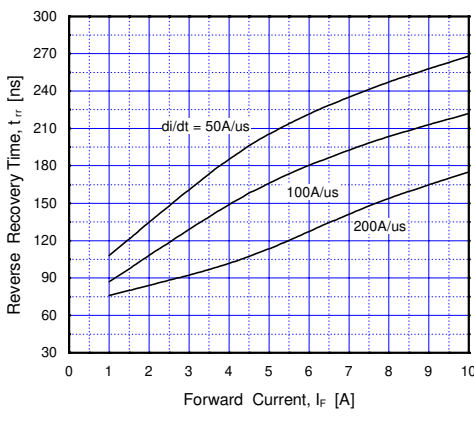


Fig 16. Typical  $T_{rr}$  vs. Forward Current

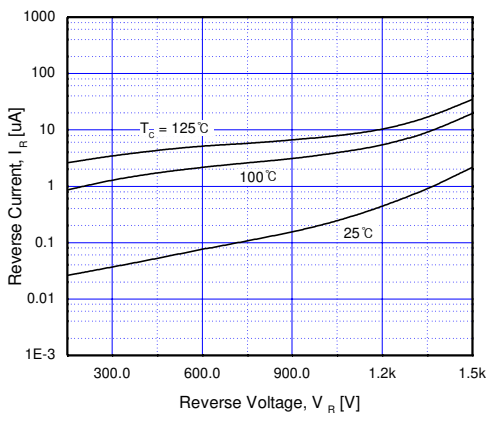


Fig 17. Reverse Current vs. Reverse Voltage

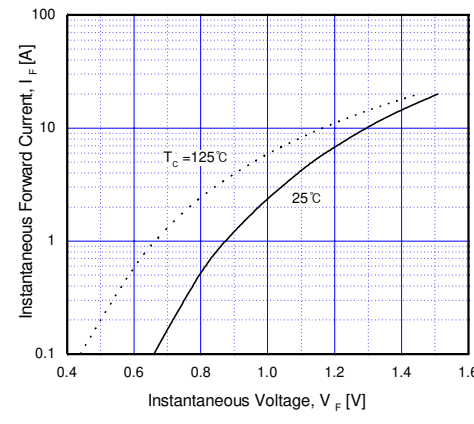
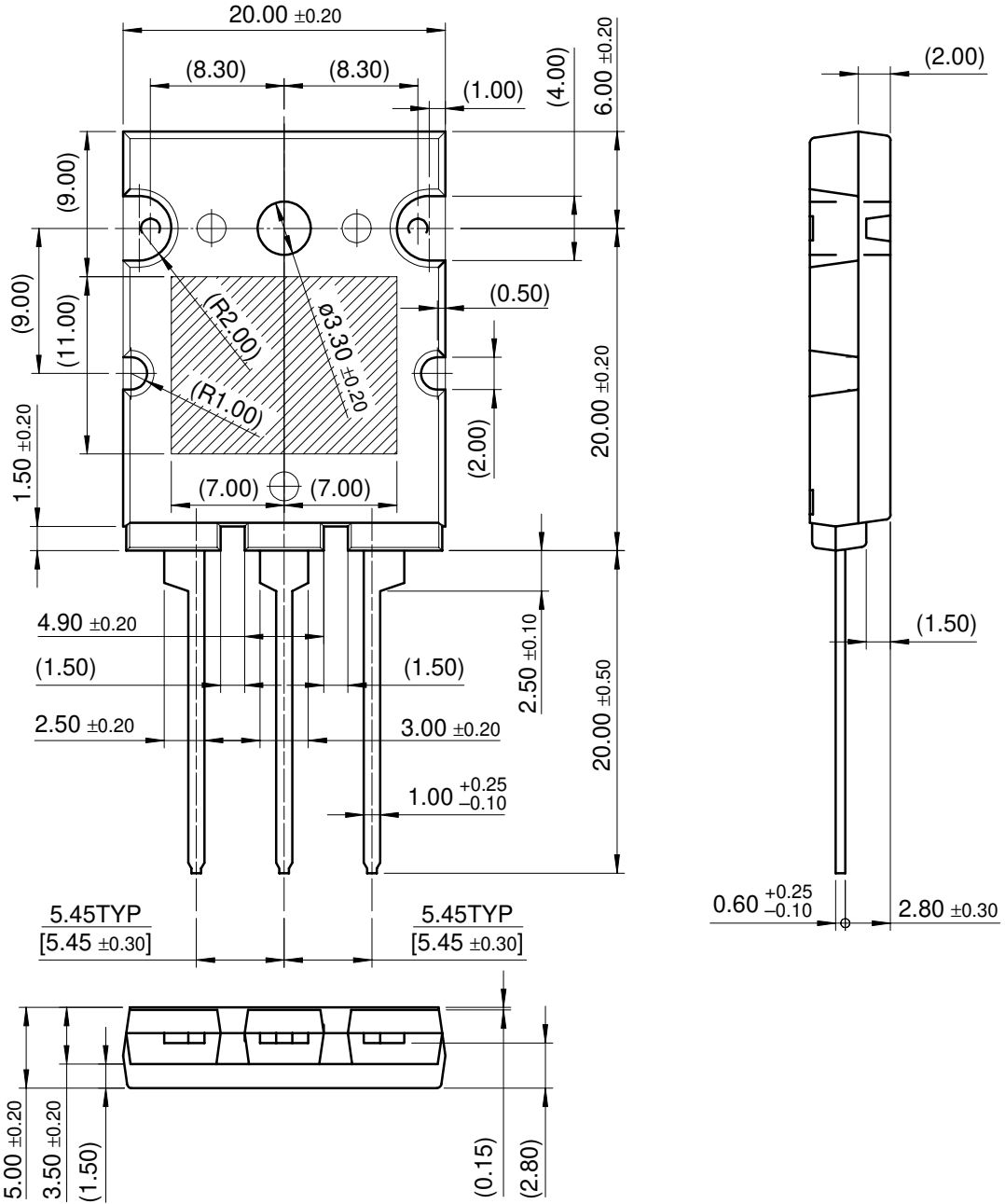


Fig 18. Typical Forward Voltage Drop vs. Forward Current

Package Dimension

TO-264

SGL40N150D



Dimensions in Millimeters

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