

SGA45T60SMD

45A 600V Field Stop Trench IGBT

Features

- Field Stop Trench Technology
- Typical $V_{CE(sat)} = 1.9V @ I_C=45A$
- Soft Fast Reverse Recovery Diode
- High Speed Switching
- RoHS Compliant

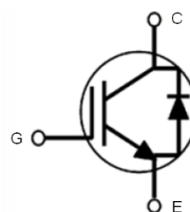
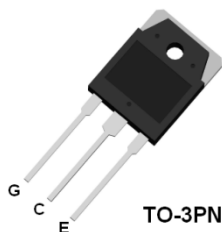
Applications

- Welder, UPS, Solar Inverter
- High Switching Frequency Inverter

Description

This Insulated Gate Bipolar Transistor (IGBT) use advanced Field Stop Trench Technology. It offer lower losses and higher energy efficiency for application such as Welder, UPS, Solar Inverter and other high Frequency Inverter System.

Package Type & Internal Circuit



Absolute Maximum Ratings

Symbol	Parameter	Ratings	Unit	
V_{CES}	Collector to Emitter Voltage	600	V	
V_{GES}	Gate to Emitter Voltage	± 20	V	
I_C	Collector Current	$T_C=25^\circ C$	90	A
		$T_C=100^\circ C$	45	A
I_{CM}	Pulsed Collector Current	130	A	
I_F	Diode Continuous Forward Current	$T_C=100^\circ C$	20	A
I_{FM}	Diode Maximum Forward Current	100	A	
P_D	Maximum Power Dissipation	$T_C=25^\circ C$	280	W
		$T_C=100^\circ C$	110	W
T_J	Operating Junction Temperature Range	-55~+150	$^\circ C$	
T_{STG}	Storage Temperature Range	-55~+150	$^\circ C$	

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
$R_{th(J-C)}$ (IGBT)	Thermal Resistance, Junction to case for IGBT	0.45	$^\circ C/W$
$R_{th(J-C)}$ (Diode)	Thermal Resistance, Junction to case for Diode	1.25	$^\circ C/W$
$R_{th(J-A)}$	Thermal Resistance, Junction to Ambient	40	$^\circ C/W$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{CES}	Collector to Emitter Breakdown Voltage	$V_{GE}=0V, I_C=250\mu A$	600	-	-	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=45A, V_{GE}=15V$	-	1.9	2.4	V
		$I_C=45A, V_{GE}=15V, T_C=125\text{ }^\circ\text{C}$	-	2.2	-	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{CE}=V_{GE}, I_C=250\mu A$	4.0	5.5	7.0	V
I_{CES}	Zero Gate Voltage Collector Current	$V_{CE}=V_{CES}, V_{GE}=0V$	-	-	1	mA
I_{GES}	Gate to Emitter Leakage Current	$V_{GE}=V_{GES}, V_{CE}=0V$	-	-	± 250	nA

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	$I_F=20A$	-	1.8	2.6	V
		$I_F=20A, T_C=125\text{ }^\circ\text{C}$	-	1.3	-	V
t_{rr}	Diode Reverse Recovery Time	$I_F=20A, di/dt=-200A/\mu s$	-	80	-	ns
I_{rr}	Diode Peak Reverse Recovery Current		-	6	-	A
Q_{rr}	Diode Reverse Recovery Charge		-	240	-	nC

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
$t_{d(on)}$	Turn-on Delay Time	$I_C=45A, V_{CC}=300V, V_{GE}=15V, R_G=10\Omega, \text{Inductive Load}, T_C=25\text{ }^\circ\text{C}$	-	86	-	ns	
t_r	Turn-on Rise Time		-	140	-	ns	
$t_{d(off)}$	Turn-off Delay Time		-	218	-	ns	
t_f	Turn-off Fall Time		-	32	-	ns	
E_{on}	Turn-on Switching Loss		-	1.67	-	mJ	
E_{off}	Turn-off Switching Loss		-	0.97	-	mJ	
E_{ts}	Total Switching Loss		-	2.64	-	mJ	
C_{ies}	Input Capacitance		$V_{GE}=0V, V_{CE}=30V, f=1.0MHz$	-	3070	-	pF
C_{oes}	Output Capacitance			-	123	-	pF
C_{res}	Reverse Transfer Capacitance			-	80	-	pF
Q_g	Total Gate Charge	$I_C=45A, V_{CC}=400V, V_{GE}=15V$	-	165	-	nC	
Q_{ge}	Gate to Emitter Charge		-	15	-	nC	
Q_{gc}	Gate to Collector Charge		-	96	-	nC	
t_{sc}	Short Circuit Withstand Time	$V_{CC}=400V, V_{GE}=15V$	10	-	-	us	

Typical Performance Characteristics

Fig. 1. Typical Output Characteristics

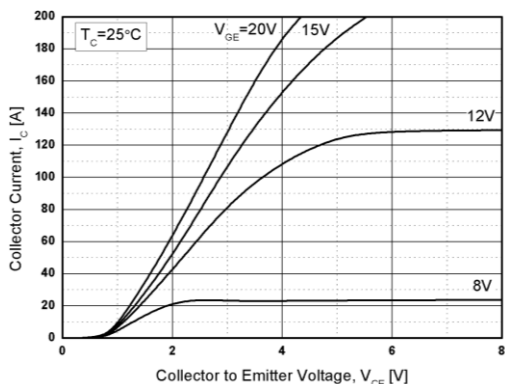


Fig. 2. Typical Saturation Voltage Characteristics

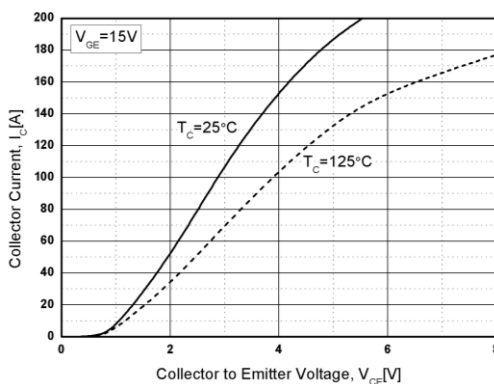


Fig. 3. Saturation Voltage vs. T_C

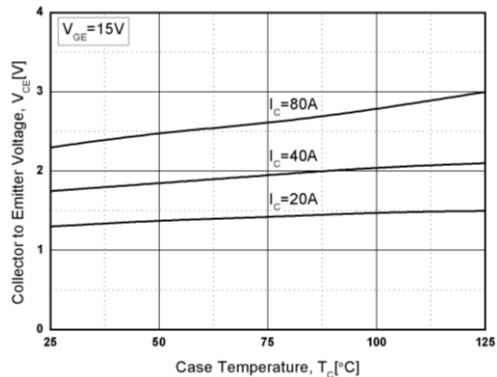


Fig. 4. Saturation Voltage vs. V_{GE}

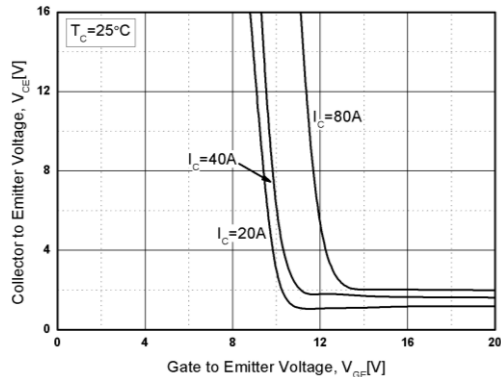


Fig. 5. Saturation Voltage vs. V_{GE}

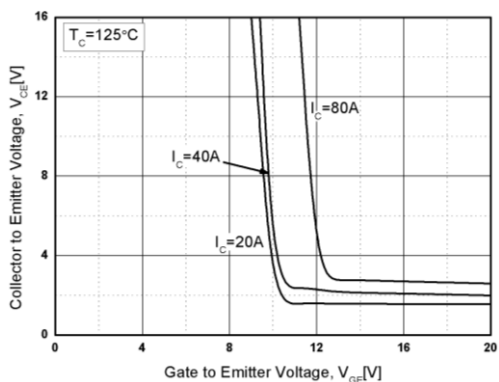
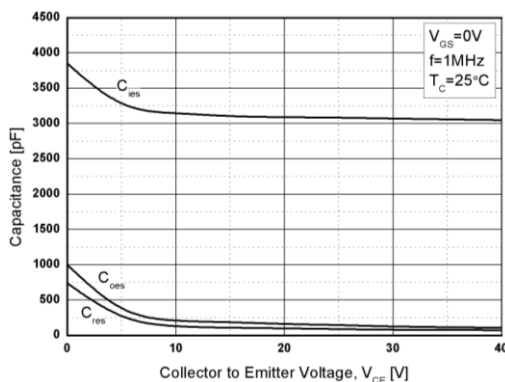


Fig. 6. Capacitance Characteristics



Typical Performance Characteristics

Fig. 7. Switching Characteristics vs. R_G

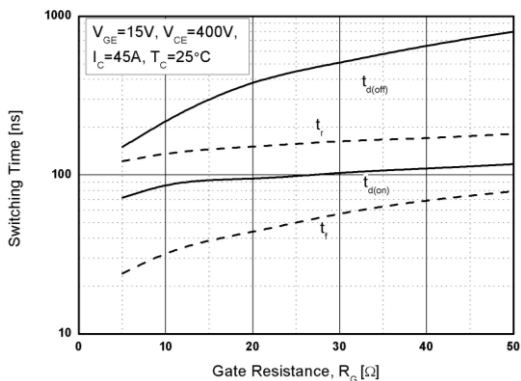


Fig. 8. Switching Loss vs. R_G

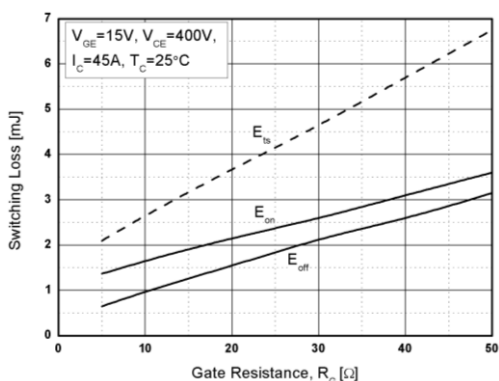


Fig. 9. Switching Characteristics vs. I_C

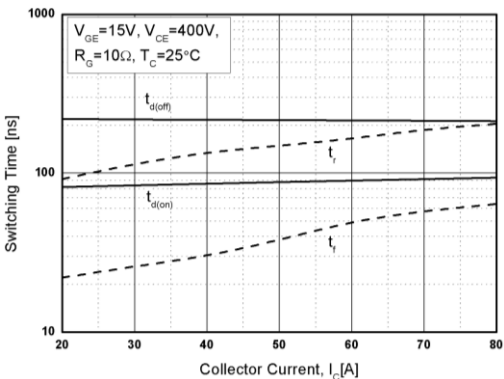


Fig. 10. Switching Loss vs. I_C

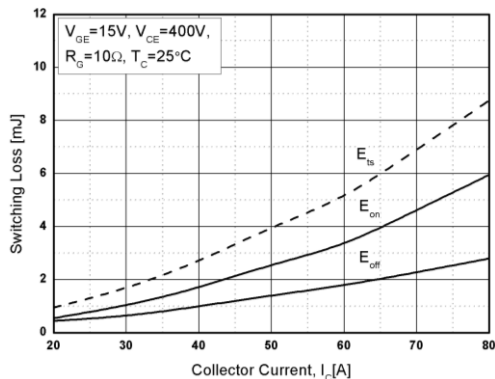


Fig. 11. Gate Charge Characteristics

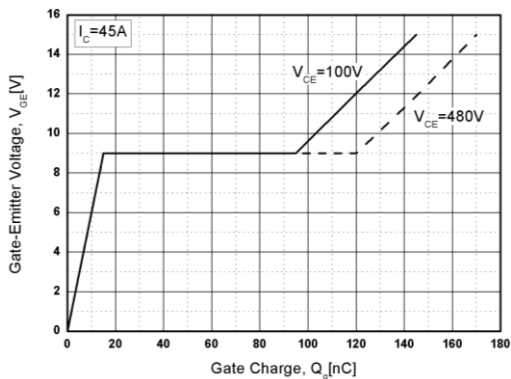
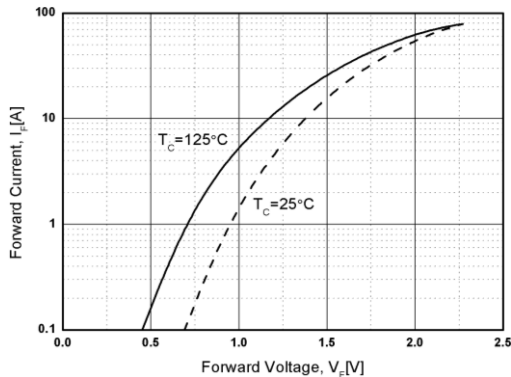


Fig. 12. Diode Forward Characteristics



Typical Performance Characteristics

Fig. 13. Diode Reverse Characteristics

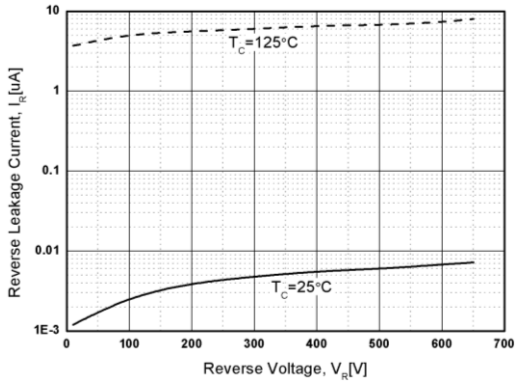


Fig. 14. Safe Operating Area

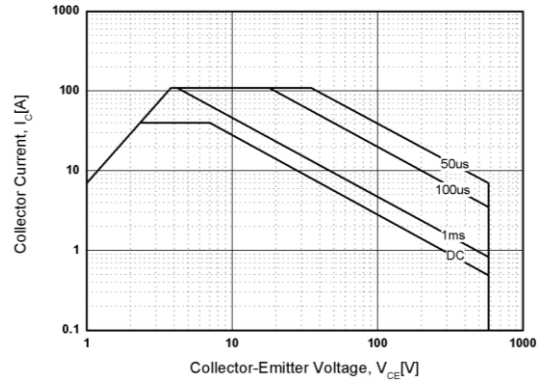
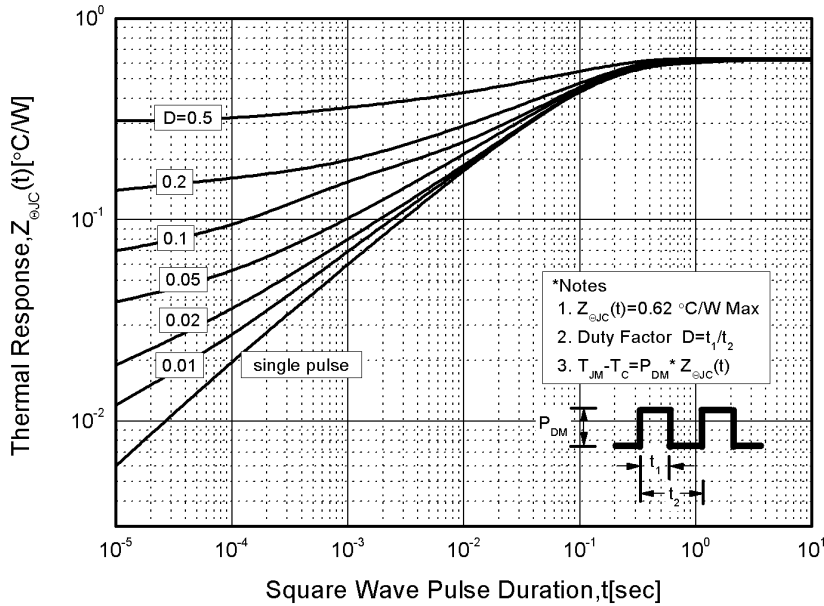


Fig. 15. IGBT Transient Thermal Impedance



Package Dimensions

TO-3PN

(Dimensions in Millimeters)

