

SGL40T120SFD-H20

1200V 40A FieldStop Trench IGBT

Features

- FieldStop Trench Technology, Positive temperature coefficient
- $V_{CE(sat)}=2.0V@I_C=40A$
- $t_{rr}=55ns(typ.)$
- High Speed Switching & Low Power Loss
- High Input Impedance

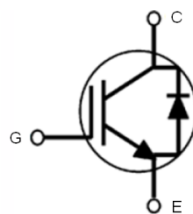
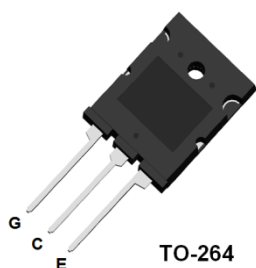
Applications

- PFC, UPS, Inverter, Welding machine

Description

The device is designed by advanced FieldStop Trench technology process. This IGBT offer low $V_{CE(sat)}$, high speed switching performance and excellent quality for application such as PFC,UPS, Welding machine, inverter and other switching applications.

Package Type & Internal Circuit



Absolute Maximum Ratings

Symbol	Parameter		Ratings	Unit
V _{CES}	Collector to Emitter Voltage		1200	V
V _{GES}	Gate to Emitter Voltage		±20	V
I _C	Collector Current	T _C =25℃	70	A
		T _C =100℃	40	A
I _{CM}	Pulsed Collector Current		160	A
I _F	Diode Continuous Forward Current	T _C =100℃	40	A
I _{FM}	Diode Maximum Forward Current		240	A
P _D	Maximum Power Dissipation	T _C =25℃	480	W
		T _C =100℃	190	W
T _J	Operating Junction Temperature Range		-55~+150	℃
T _{STG}	Storage Temperature Range		-55~+150	℃

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
$R_{th(J-C)}$ (IGBT)	Thermal Resistance, Junction to case for IGBT	0.26	$^{\circ}C/W$
$R_{th(J-C)}$ (Diode)	Thermal Resistance, Junction to case for Diode	0.8	$^{\circ}C/W$
$R_{th(J-A)}$	Thermal Resistance, Junction to Ambient	26	$^{\circ}C/W$

**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	$V_{GE}=0V, I_C=1mA$	1200	-	-	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=40A, V_{GE}=15V$	-	2.0	2.6	V
		$I_C=40A, V_{GE}=15V, T_C=150^{\circ}\text{C}$	-	2.35	-	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{CE}=V_{GE}, I_C=1mA$	4.5	5.5	6.5	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	$I_F=40A$	-	3.7	3.9	V
		$I_F=40A, T_C=150^{\circ}\text{C}$	-	2.5	-	V
t_{rr}	Diode Reverse Recovery Time	$I_F=40A,$ $di/dt=-200A/\mu s$	-	55	-	ns
I_{rr}	Diode Peak Reverse Recovery Current		-	10.2	-	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	$I_C=40A,$ $V_{CC}=600V,$ $V_{GE}=15V,$ $R_G=10\Omega$ Inductive Load, $T_C=25^{\circ}\text{C}$	-	148	-	ns
t_r	Rising Time		-	96	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	345	-	ns
t_f	Falling Time		-	19	-	ns
E_{on}	Turn-on Switching Loss		-	1.98	-	mJ
E_{off}	Turn-off Switching Loss		-	0.56	-	mJ
E_{ts}	Total Switching Loss	$I_C=40A,$ $V_{CC}=600V,$ $V_{GE}=15V,$ $R_G=10\Omega$ Inductive Load, $T_C=150^{\circ}\text{C}$	-	2.54	-	mJ
$t_{d(on)}$	Turn-on Delay Time		-	152	-	ns
t_r	Rising Time		-	99	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	360	-	ns
t_f	Falling Time		-	47	-	ns
E_{on}	Turn-on Switching Loss		-	2.56	-	mJ
E_{off}	Turn-off Switching Loss	$V_{GE}=0V, V_{CE}=30V,$ $f=1.0MHz$	-	1.64	-	mJ
E_{ts}	Total Switching Loss		-	4.2	-	mJ
C_{ies}	Input Capacitance		-	6030	-	pF
C_{res}	Reverse Transfer Capacitance	$I_C=40A,$ $V_{CC}=600V$ $V_{GE}=15V$	-	107	-	pF
C_{oes}	Output Capacitance		-	206	-	pF
Q_g	Total Gate Charge		-	350	-	nC
Q_{ge}	Gate to Emitter Charge		-	55	-	nC
Q_{gc}	Gate to Collector Charge	$V_{CE}=15V$	-	127	-	nC
t_{sc}	Short Circuit Withstand Time	$V_{CC}=600V, V_{GE}=15V$	10	-	-	us

Typical Performance Characteristics

Fig. 1. Typical Output Characteristics

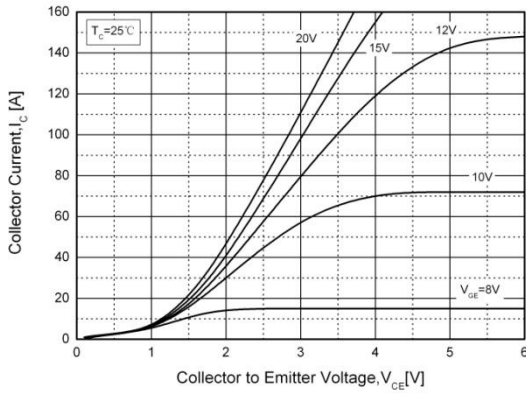


Fig. 2. Typical Saturation Voltage Characteristics

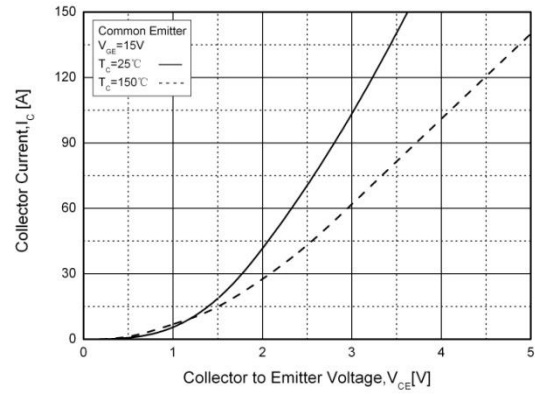


Fig. 3. Typical Saturation Voltage vs. T_C

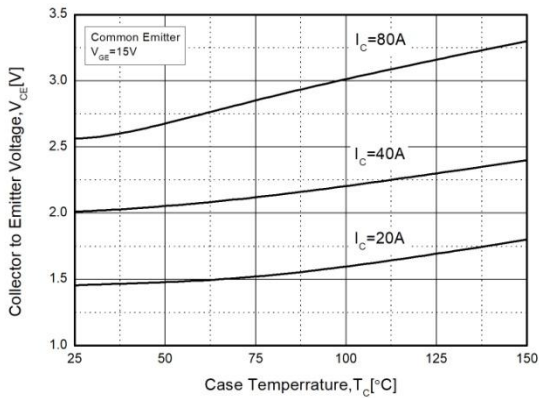


Fig. 4. Diode Forward Characteristics

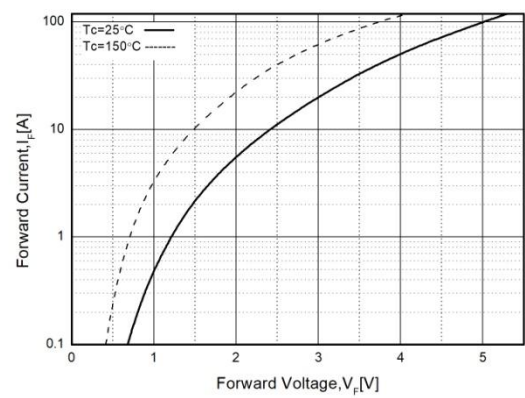


Fig. 5. Typical Capacitance Characteristics

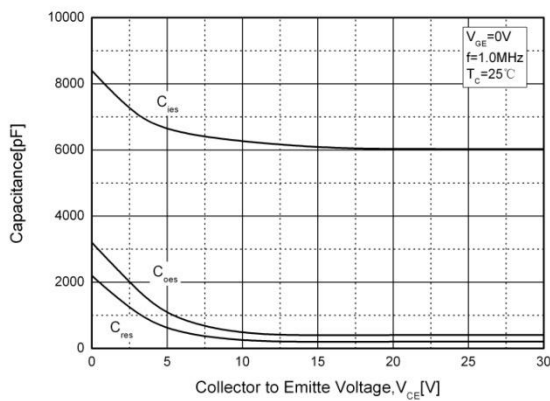
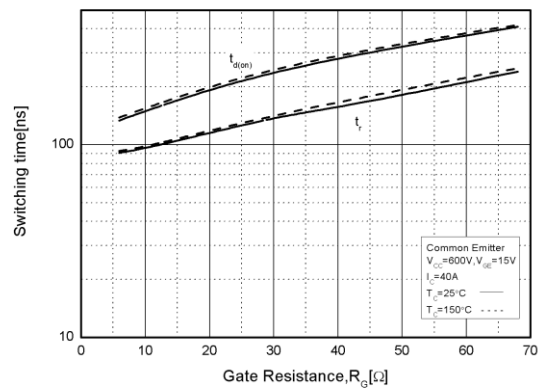
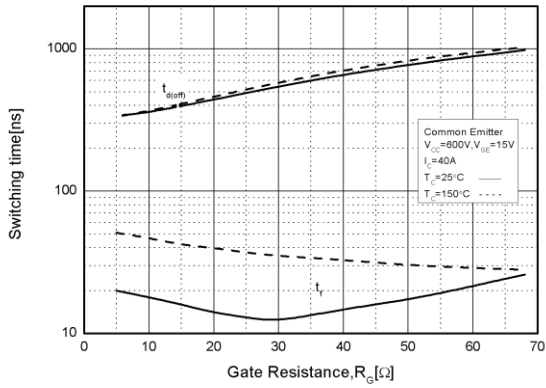
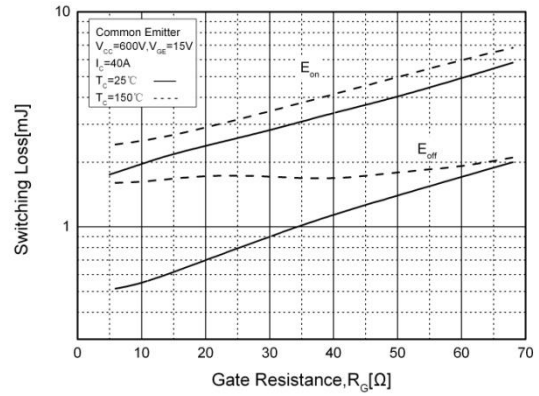
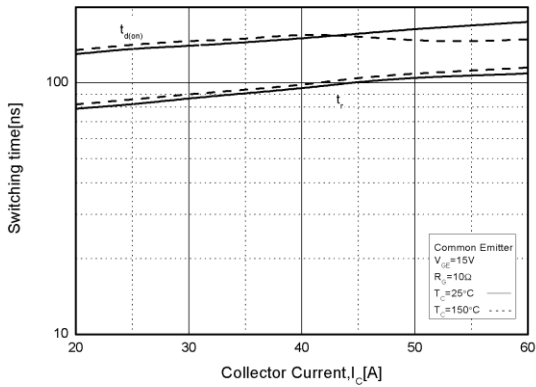
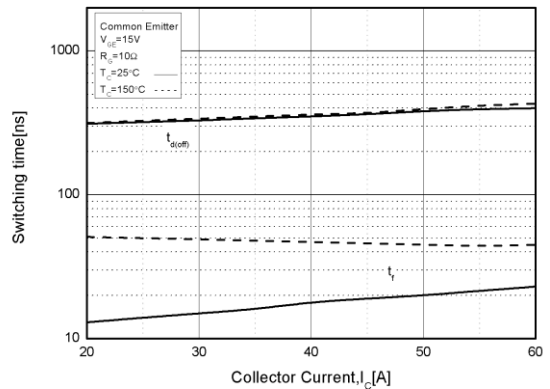
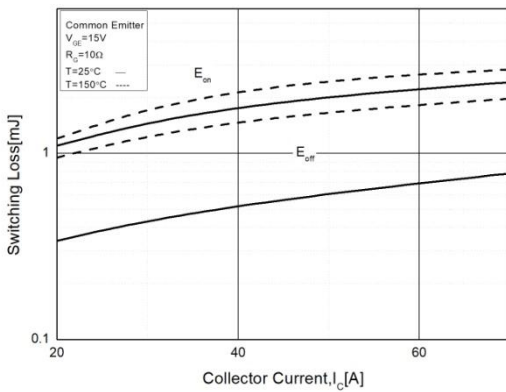


Fig. 6. Turn-on Characteristics vs. R_G



Typical Performance Characteristics

Fig. 7. Turn-off Characteristics vs. R_G

Fig. 8. Switching Loss vs. R_G

Fig. 9. Turn-on Characteristics vs. I_C

Fig. 10. Turn-off Characteristics vs. I_C

Fig. 11. Switching Loss vs. I_C


Package Dimensions

TO-264

(Dimensions in Millimeters)

