650V 40A FieldStop Trench IGBT

Features

- FieldStop Trench Technology, Positive temperature coefficient
- $V_{CE(sat)}$=2.0V@I_C=40A
- High Speed Switching & Low Power Loss
- High Input Impedance
- SiC Schottky Barrier Diode

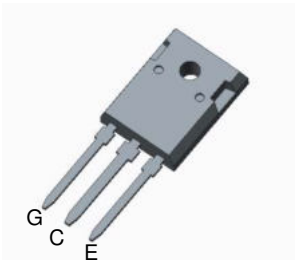
Description

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, Welder, PV Inverter and other switching applications.

Applications

- PFC, UPS, Welder, PV Inverter

Package Type & Internal Circuit



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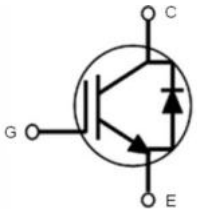


Absolute Maximum Ratings

Symbol	Parameter		Ratings	Unit
V_{CES}	Collector to Emitter Voltage		650	V
V_{GES}	Gate to Emitter Voltage		±20	V
I_C	Collector Current	T_C=25℃	80	A
		T_C=100℃	40	A
I_{CM}	Pulsed Collector Current		120	A
I_F	Diode Continuous Forward Current	T_C=100℃	10	A
I_{FSM}	Non-repetitive Peak Surge Current	Tp=10ms, half sine wave	60	A
		Tp=200us, square wave	240	A
P_D	Maximum Power Dissipation	T_C=25℃	167	W
		T_C=100℃	83	W
T_J	Operating Junction Temperature Range		-40~+175	℃
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	0.9	℃/W
$R_{th\ (J-C)}$ (Diode)	Thermal Resistance, Junction to case for Diode	1.2	℃/W
$R_{th\ (J-A)}$	Thermal Resistance, Junction to Ambient	40	℃/W

Electrical Characteristics of IGBT @T_C=25 ℃ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{CES}	Collector to Emitter Breakdown Voltage	V_{GE}=0V, I_C=250uA	650	-	-	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℃	-	2.3	-	V
$V_{GE(th)}$	Gate Threshold Voltage	V_{CE}=V_{GE}, I_C=250uA	4.0	5.3	6.0	V
I_{CES}	Zero Gate Voltage Collector Current	V_{CE}=V_{CES}, V_{GE}=0V	-	-	1	uA
I_{GES}	Gate to Emitter Leakage Current	V_{GE}=V_{GES}, V_{CE}=0V	-	-	±250	nA

Electrical Characteristics of Diode @T_C=25 ℃ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	I_F=10A	-	1.5	1.80	V
		I_F=10A, T_C=150℃	-	1.8	2.2	V
I_R	Reverse Leakage Current	V_R=650V	-	20	100	uA
C	Total Capacitance	V_R=0V, f=1MHz	-	490	-	pF
		V_R=200V, f=1MHz	-	50	-	
		V_R=400V, f=1MHz	-	45	-	
Q_C	Total Capacitive Charge	V_R=325V, I_F=10A, di/dt=-200A/us	-	28	-	nC
t_c	Switching Time		-	25	-	ns

Switching Characteristics @T_C=25 ℃ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	I_C=40A, V_{CC}=325V, V_{GE}=15V, R_G=10Ω, Inductive Load, T_C=25℃	-	25.0	-	ns
t_r	Rising Time		-	23.0	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	86.1	-	ns
t_f	Falling Time		-	18.1	-	ns
E_{on}	Turn-on Switching Loss		-	1.30	-	mJ
E_{off}	Turn-off Switching Loss		-	0.55	-	mJ
E_{ts}	Total Switching Loss		-	1.84	-	mJ
$t_{d(on)}$	Turn-on Delay Time	I_C=40A, V_{CC}=325V, V_{GE}=15V, R_G=10Ω Inductive Load, T_C=125℃	-	24.4	-	ns
t_r	Rising Time		-	24.6	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	96.7	-	ns
t_f	Falling Time		-	21.5	-	ns
E_{on}	Turn-on Switching Loss		-	1.74	-	mJ
E_{off}	Turn-off Switching Loss		-	0.71	-	mJ
E_{ts}	Total Switching Loss		-	2.56	-	mJ
C_{ies}	Input Capacitance	V_{GE}=0V, V_{CE}=25V, f=1.0MHz	-	1685	-	pF
C_{res}	Reverse Transfer Capacitance		-	74	-	pF
C_{oes}	Output Capacitance		-	48	-	pF
Q_g	Total Gate Charge	I_C=40A, V_{CE}=325V V_{GE}=15V	-	161	-	nC
Q_{ge}	Gate to Emitter Charge		-	40	-	nC
Q_{gc}	Gate to Collector Charge		-	48	-	nC
tsc	Short Circuit With stand Time	V_{CC}=325V,V_{GE}=15V	-	10	-	us

Typical Performance Characteristics

Fig. 1. Typical Output Characteristics

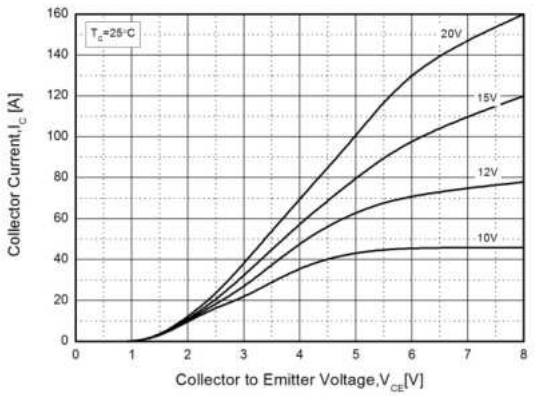


Fig. 2. Typical Saturation Voltage Characteristics

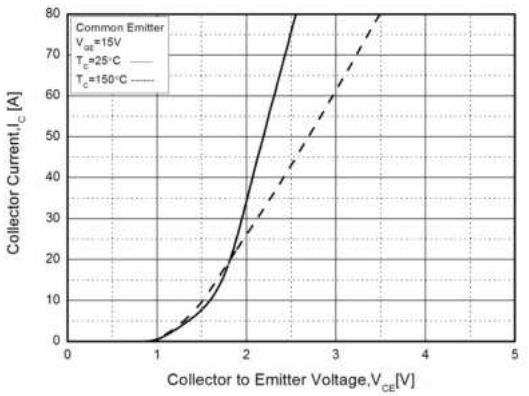


Fig. 3. Typical Saturation Voltage vs. T_C

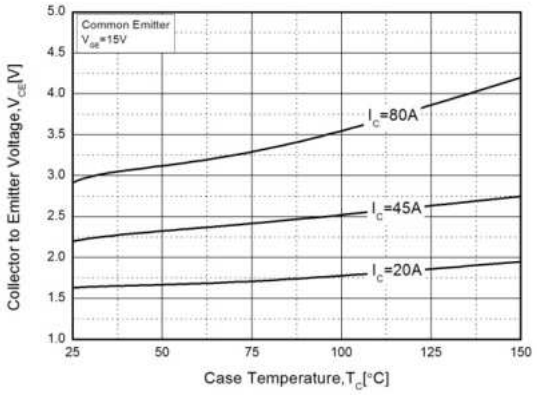


Fig. 4. Diode Forward Characteristics

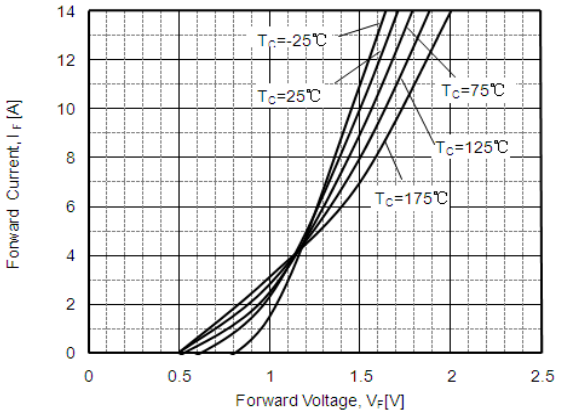


Fig. 5. Typical Capacitance Characteristics

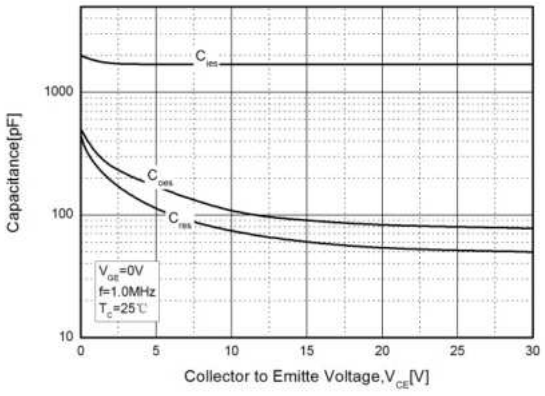
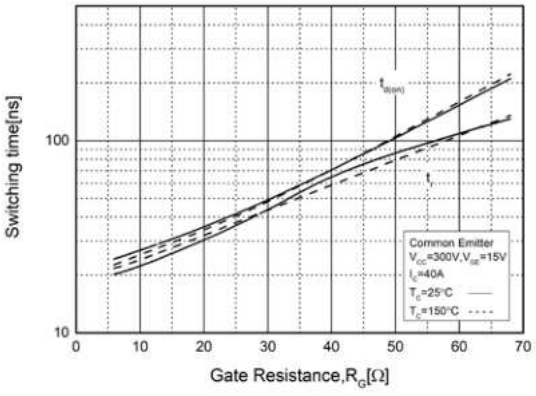


Fig. 6. Turn-on Characteristics vs. R_G



Typical Performance Characteristics

Fig. 7. Turn-off Characteristics vs. R_G

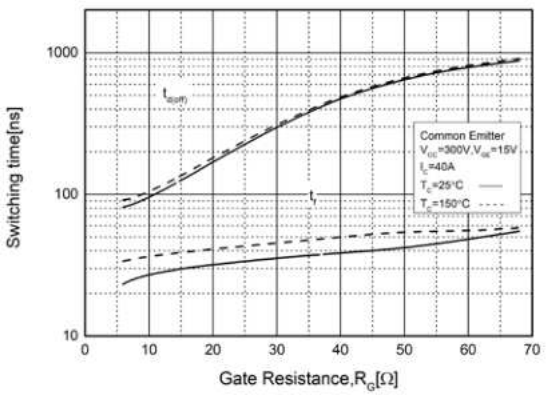


Fig. 8. Switching Loss vs. R_G

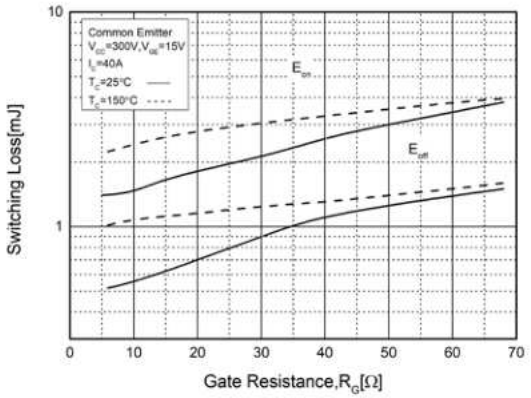


Fig. 9. Turn-on Characteristics vs. I_C

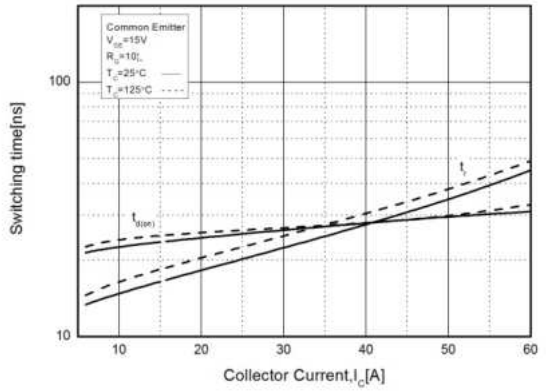


Fig. 10. Turn-off Characteristics vs. I_C

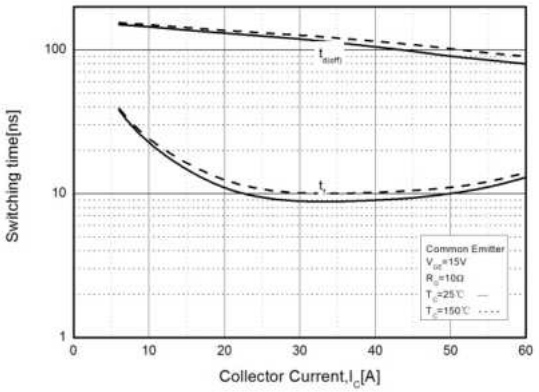
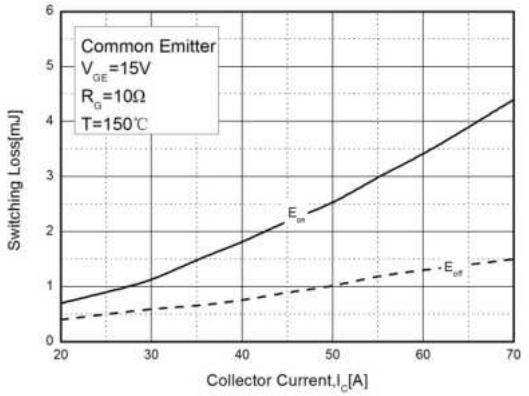


Fig. 11. Switching Loss vs. I_C



Package Dimensions

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(Dimensions in Millimeters)