

1200V 40A FieldStop Trench IGBT

Features

- FieldStop Trench Technology, Positive temperature coefficient
- $V_{CE(sat)}=2.0V@I_C=40A$
- $t_{tr}=60ns$ (typ.)
- High Speed Switching & Low Power Loss
- High Input Impedance

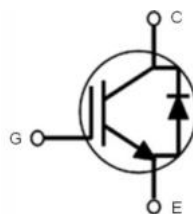
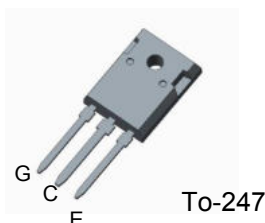
Applications

- PFC, UPS, Inverter,Welder

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, 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	$T_C=25^\circ C$	80	A
		$T_C=100^\circ C$	40	A
I_{CM}	Pulsed Collector Current	160	A	
I_F	Diode Continuous Forward Current	$T_C=100^\circ C$	30	A
I_{FM}	Diode Maximum Forward Current	240	A	
P_D	Maximum Power Dissipation	$T_C=25^\circ C$	416	W
		$T_C=100^\circ C$	167	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	0.30	$^\circ C/W$
$R_{th(J-C)}$ (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 @ $T_C=25^\circ\text{C}$ 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	$I_C=50A, V_{GE}=15V$	-	2.0	2.4	V
		$I_C=50A, V_{GE}=15V, T_C=150^\circ\text{C}$	-	2.5	-	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{CE}=V_{GE}, I_C=1mA$	4.0	5.0	6.0	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 @ $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	$I_F=30A$	-	3.2	3.5	V
		$I_F=30A, T_C=150^\circ\text{C}$	-	2.5	-	V
t_{rr}	Diode Reverse Recovery Time	$I_F=30A, di/dt=-200A/\mu s$	-	60	-	ns
I_{rr}	Diode Peak Reverse Recovery Current		-	7.8	-	A
Q_{rr}	Diode Reverse Recovery Charge		-	200	-	nC

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$I_C=40A, V_{CC}=600V, V_{GE}=15V, R_G=7\Omega$ Inductive Load, $T_C=25^\circ\text{C}$	-	24	-	ns
t_r	Rising Time		-	22	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	180	-	ns
t_f	Falling Time		-	30	-	ns
E_{on}	Turn-on Switching Loss		-	0.997	-	mJ
E_{off}	Turn-off Switching Loss		-	1.581	-	mJ
E_{ts}	Total Switching Loss		-	2.578	-	mJ
$t_{d(on)}$	Turn-on Delay Time	$I_C=40A, V_{CC}=600V, V_{GE}=15V, R_G=7\Omega$ Inductive Load, $T_C=125^\circ\text{C}$	-	25	-	ns
t_r	Rising Time		-	27	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	200	-	ns
t_f	Falling Time		-	98	-	ns
E_{on}	Turn-on Switching Loss		-	0.25	-	mJ
E_{off}	Turn-off Switching Loss		-	2.504	-	mJ
E_{ts}	Total Switching Loss		-	2.754	-	mJ
C_{ies}	Input Capacitance	$V_{GE}=0V, V_{CE}=30V, f=1.0MHz$	-	6030	-	pF
C_{res}	Reverse Transfer Capacitance		-	107	-	pF
C_{oes}	Output Capacitance		-	206	-	pF
Q_g	Total Gate Charge	$I_C=50A, V_{CC}=600V, V_{GE}=15V$	-	370	-	nC
Q_{ge}	Gate to Emitter Charge		-	60	-	nC
Q_{gc}	Gate to Collector Charge		-	132	-	nC
t_{sc}	Short Circuit Withstand Time	$V_{CC}=600V, V_{GE}=15V$	10	-	-	us

Typical Performance Characteristics

Fig. 1. Typical Output Characteristics

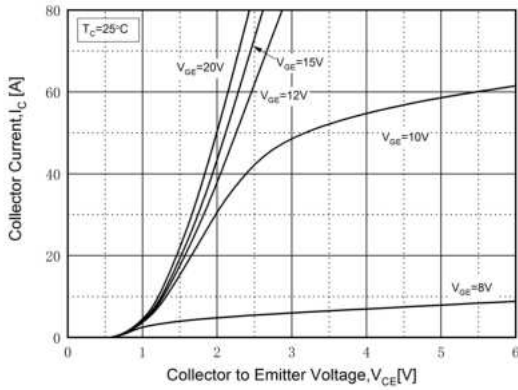


Fig. 2. Typical Saturation Voltage Characteristics

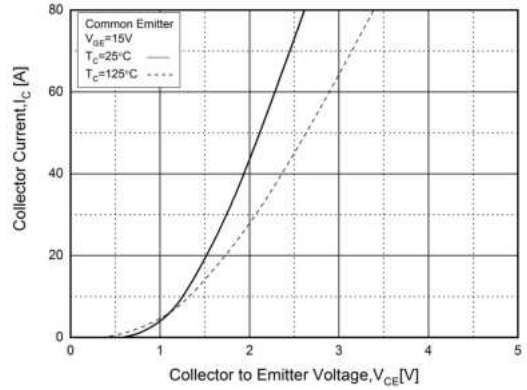


Fig. 3. Typical Saturation Voltage vs. T_C

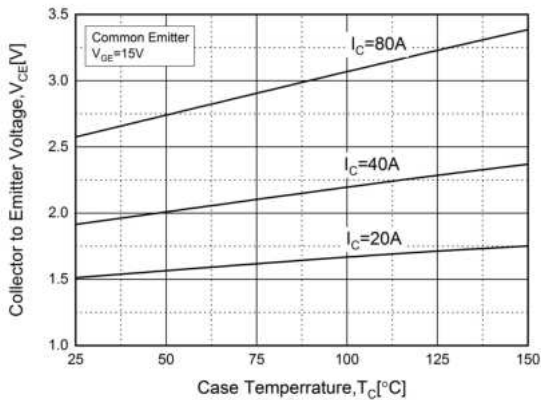


Fig. 4. Diode Forward Characteristics

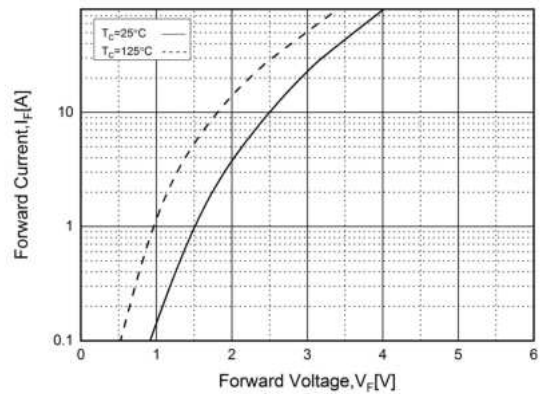


Fig. 5. Typical Capacitance Characteristics

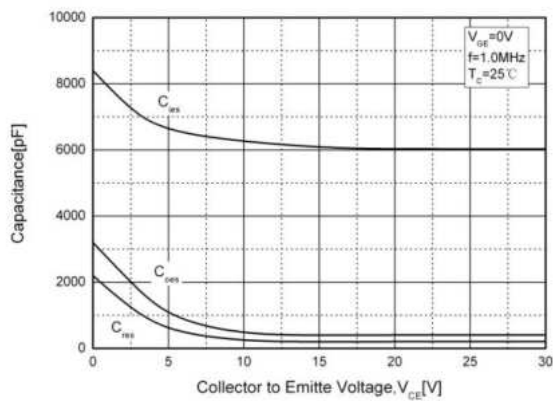
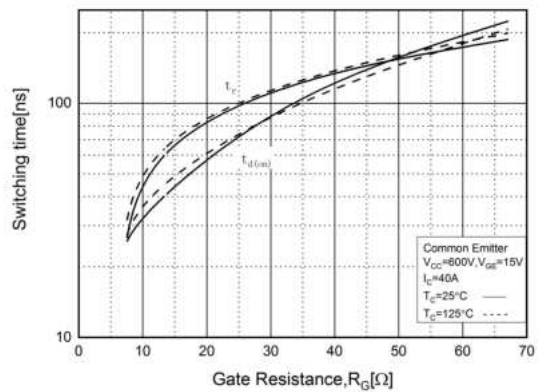


Fig. 6. Turn-on Characteristics vs. R_G



Typical Performance Characteristics

Fig. 7. Turn-off Characteristics vs. R_G

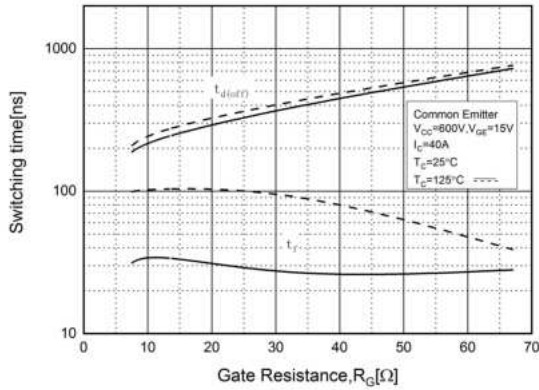


Fig. 8. Switching Loss vs. R_G

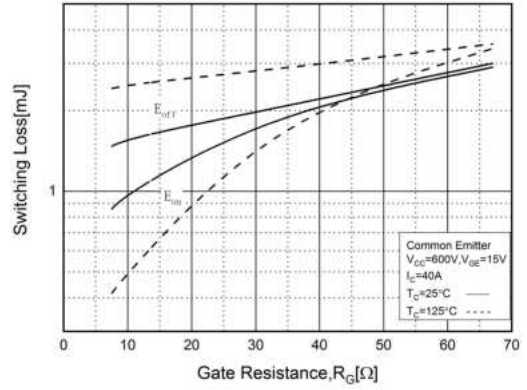


Fig. 9. Turn-on Characteristics vs. I_C

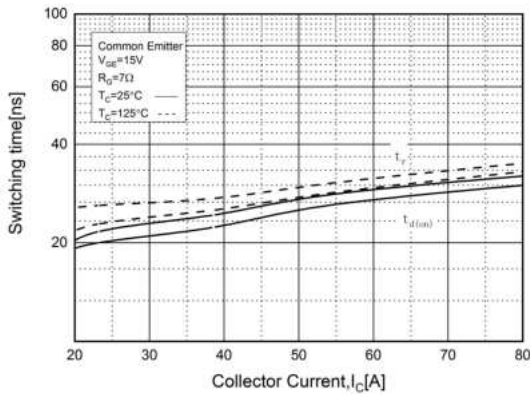


Fig. 10. Turn-off Characteristics vs. I_C

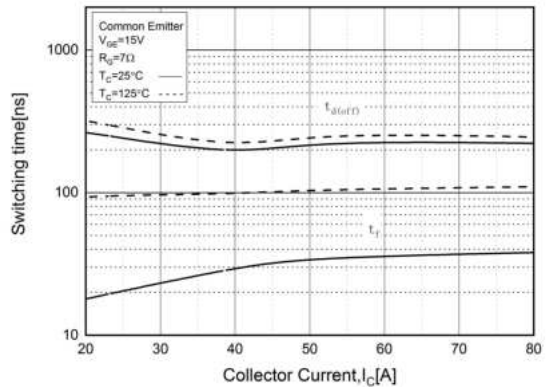
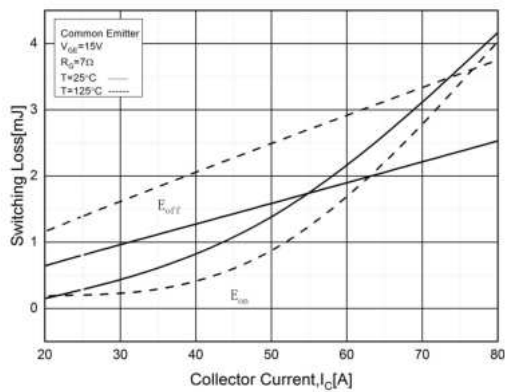


Fig. 11. Switching Loss vs. I_C



Package Dimensions

TO-247

(Dimensions in Millimeters)

