

1200V 40A FieldStop Trench IGBT

Features

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

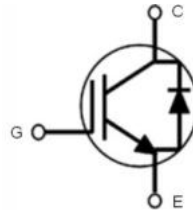
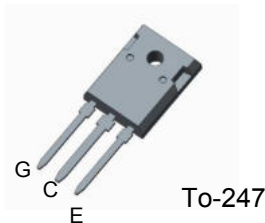
Applications

- 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℃	80	A
		T _C =100℃	40	A
I _{CM}	Pulsed Collector Current		160	A
I _F	Diode Continuous Forward Current	T _C =100℃	30	A
I _{FM}	Diode Maximum Forward Current		240	A
P _D	Maximum Power Dissipation	T _C =25℃	416	W
		T _C =100℃	167	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	0.30	$^{\circ}C/W$
$R_{th(J-C)}(Diode)$	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 °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°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 °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°C	-	2.5	-	V
t _{rr}	Diode Reverse Recovery Time	I _F =30A, di/dt=-200A/us	-	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 °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 =7Ω Inductive Load, T _C =25°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 =7Ω Inductive Load, T _C =125°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
tsc	Short Circuit Withstand Time	V _{CC} =600V, V _{GE} =15V	10	-	-	us

Typical Performance Characteristics

Fig. 1. Typical Output Characteristics

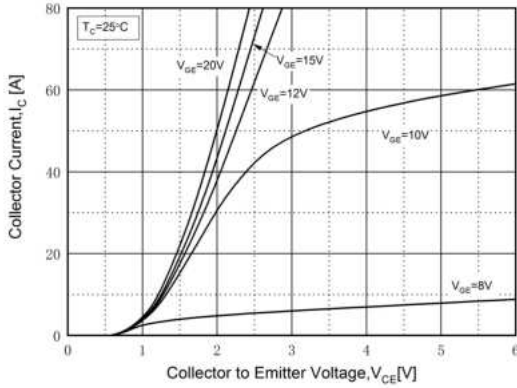


Fig. 2. Typical Saturation Voltage Characteristics

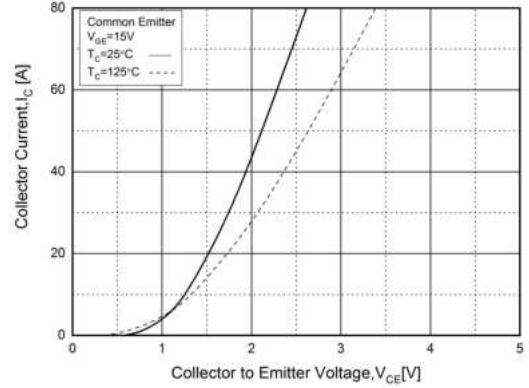


Fig. 3. Typical Saturation Voltage vs. T_C

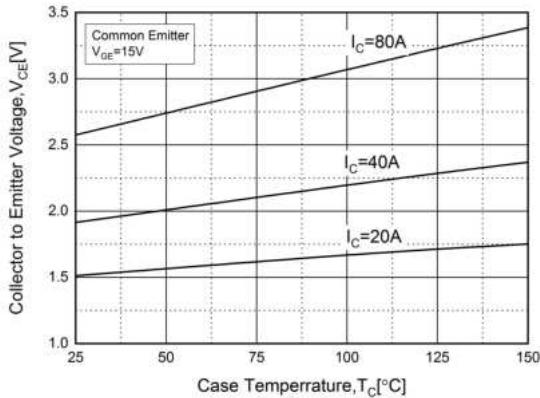


Fig. 4. Diode Forward Characteristics

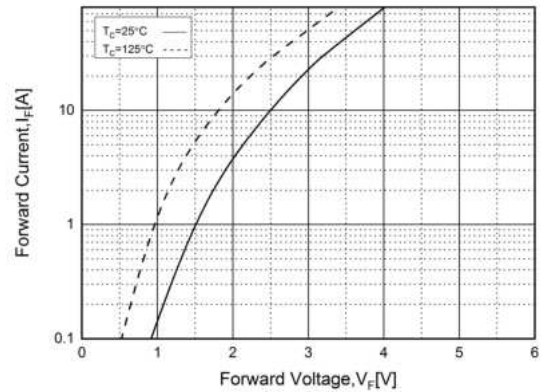


Fig. 5. Typical Capacitance Characteristics

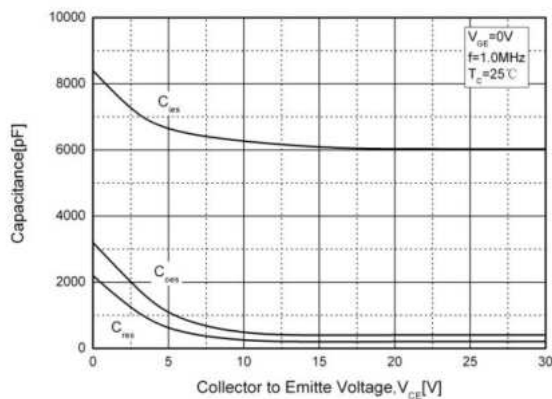
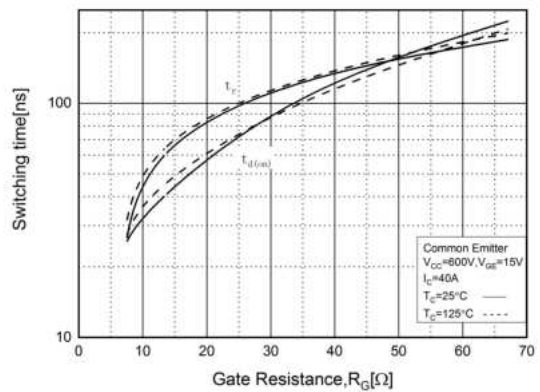


Fig. 6. Turn-on Characteristics vs. R_G



Typical Performance Characteristics

Fig. 7. Turn-off Characteristics vs. R_G

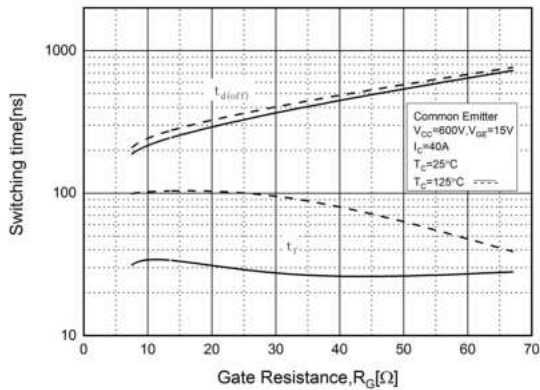


Fig. 8. Switching Loss vs. R_G

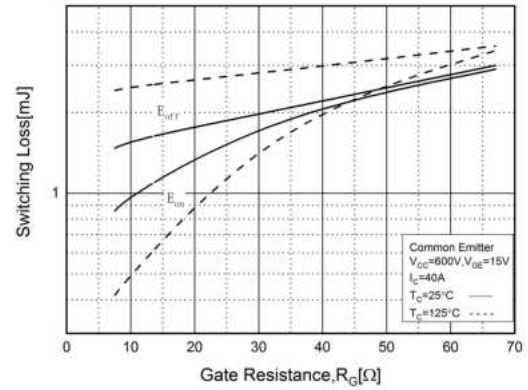


Fig. 9. Turn-on Characteristics vs. I_C

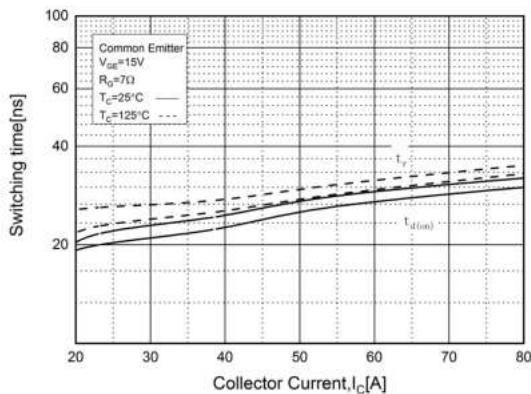


Fig. 10. Turn-off Characteristics vs. I_C

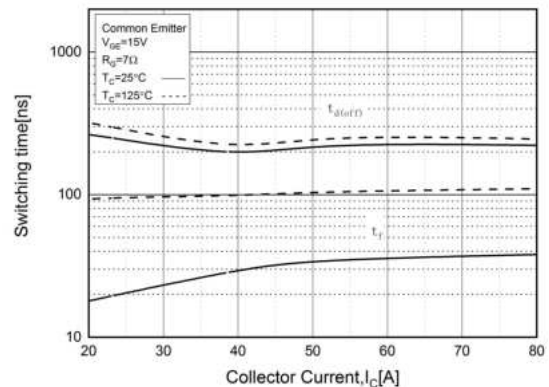
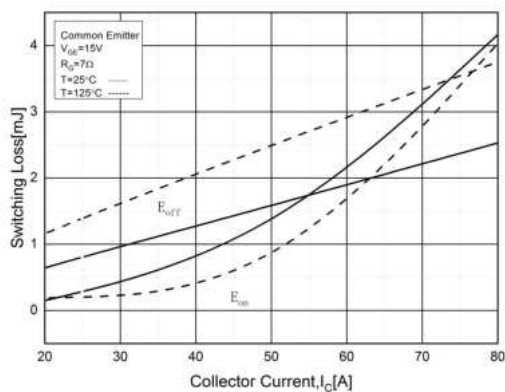


Fig. 11. Switching Loss vs. I_C



Package Dimensions

TO-247

(Dimensions in Millimeters)

