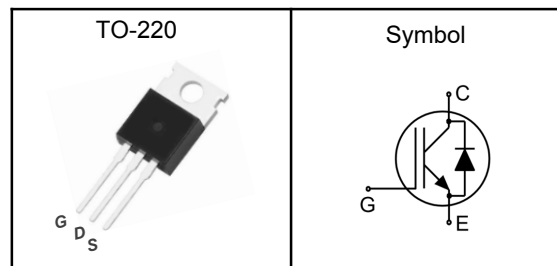


600V/20A Field Stop Trench IGBT
Features

- Trench FS II Technology
- Very low $V_{CE(sat)}$
- High speed switching
- ROHS Compliant

Applications

- Inverter welding machine
- Motor drives
- UPS

Pin Description


V_{CES}	600	V
$V_{CE(sat)-Typ}$	1.7	V
I_C	20	A

Absolute Maximum Ratings ($T_C=25^\circ\text{C}$, Unless Otherwise Noted)

Parameter	Symbol	Rating	Units
Collector-Emitter Voltage	V_{CES}	600	V
Gate- Emitter Voltage	V_{GES}	± 30	V
Collector Current ¹	$T_C=25^\circ\text{C}$ I_C	40	A
Collector Current ¹	$T_C=100^\circ\text{C}$ I_C	20	A
Pulsed Collector Current ²	I_{CM}	60	A
Diode Continuous Forward Current	$T_C=25^\circ\text{C}$ I_F	40	A
Diode Continuous Forward Current	$T_C=100^\circ\text{C}$ I_F	20	A
Diode Pulsed Forward Current	I_{FM}	60	A
Power Dissipation	$T_C=25^\circ\text{C}$ P_D	135	W
Power Dissipation	$T_C=100^\circ\text{C}$ P_D	54	W
Storage Temperature Range	T_{STG}	-55 to 150	$^\circ\text{C}$
Operating Junction Temperature Range	T_J	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	---	62	$^\circ\text{C/W}$
Thermal Resistance Junction to case for IGBT	$R_{\theta JC}$	---	0.92	$^\circ\text{C/W}$
Thermal Resistance Junction to case for Diode	$R_{\theta JCD}$	---	1.92	$^\circ\text{C/W}$



600V/20A Field Stop Trench IGBT

Electrical Characteristics (T_J=25°C, unless otherwise noted)

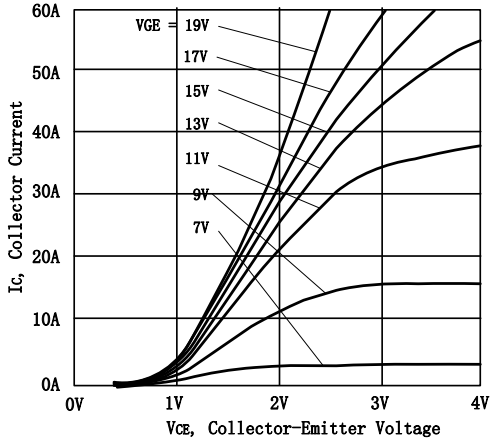
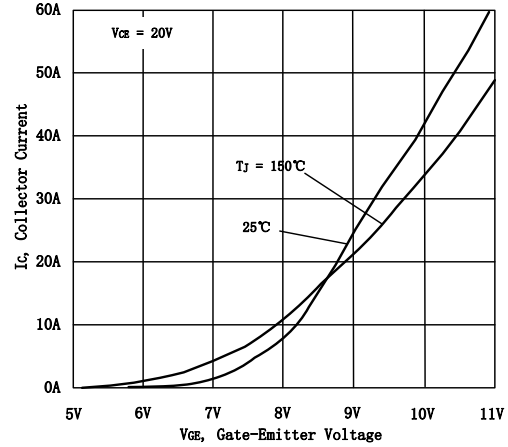
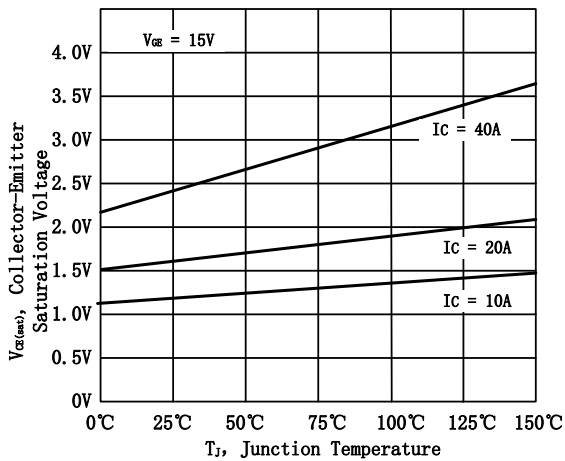
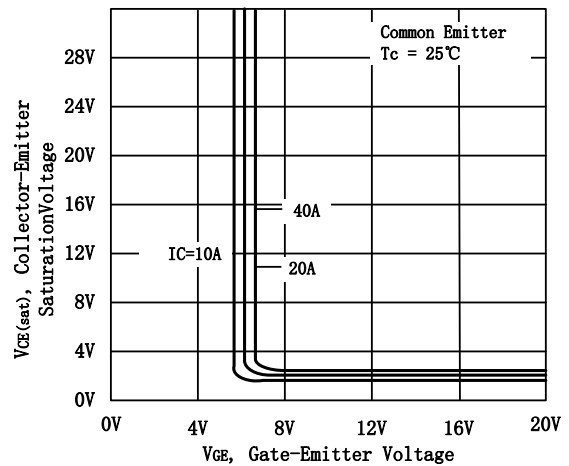
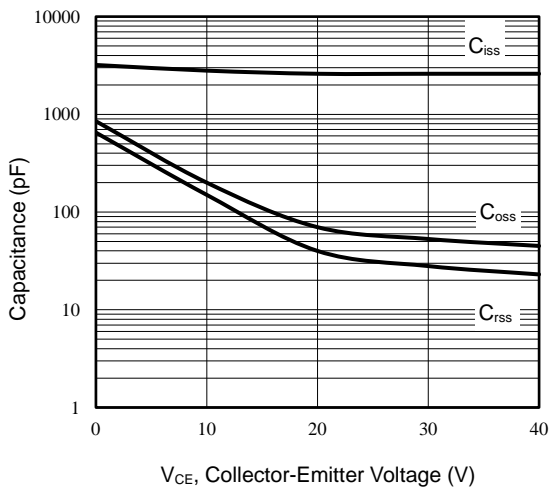
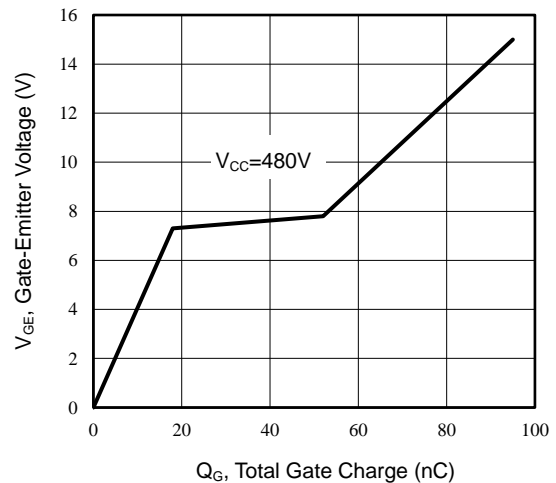
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector-Emitter Breakdown Voltage	V _{(BR)CES}	V _{GE} =0V, I _D =1mA	600	---	---	V
Collector-Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} =15V, I _C =15A, T _J =25°C	---	1.7	1.9	V
		V _{GE} =15V, I _C =15A, T _J =100°C	---	1.9	---	V
Gate Threshold Voltage	V _{GE(th)}	V _{CE} =V _{GE} , I _C =1mA	4	---	6	V
Collector-Emitter Leakage Current	I _{CES}	V _{CE} =600V, V _{GE} =0V, T _J =25°C	---	---	0.04	mA
		V _{CE} =600V, V _{GE} =0V, T _J =150°C	---	---	1	mA
Gate to Emitter Leakage Current	I _{GES}	V _{GE} =±30V, V _{CE} =0V	---	---	±100	nA
Total Gate Charge	Q _g	V _{CC} =480V, V _{GE} =15V, I _C =20A	---	97	---	nC
Gate to Emitter Charge	Q _{ge}		---	17	---	nC
Gate to Collector Charge	Q _{gc}		---	35	---	nC
Turn-On Delay Time	t _{d(ON)}	V _{CE} =400V, V _{GE} =0/15V, R _G =25Ω, I _C =10A, T _J =25°C Inductive Load	---	18	---	ns
Rise Time	t _r		---	16	---	
Turn-Off Delay Time	t _{d(off)}		---	160	---	
Fall Time	t _f		---	15	---	mJ
Turn-On Switching Loss	E _{on}		---	0.45	---	
Turn-Off Switching Loss	E _{off}		---	0.16	---	
Total Switching Loss	E _{ts}	---	0.58	---		
Input Capacitance	C _{ies}	V _{CE} =25V, V _{GE} =0V, f=1MHz	---	2580	---	pF
Output Capacitance	C _{oes}		---	48	---	
Reverse Transfer Capacitance	C _{res}		---	26	---	

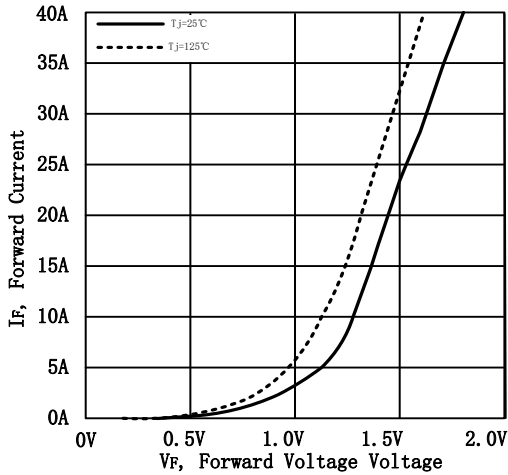
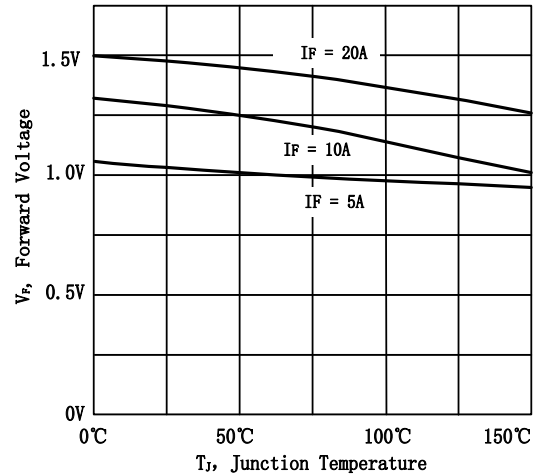
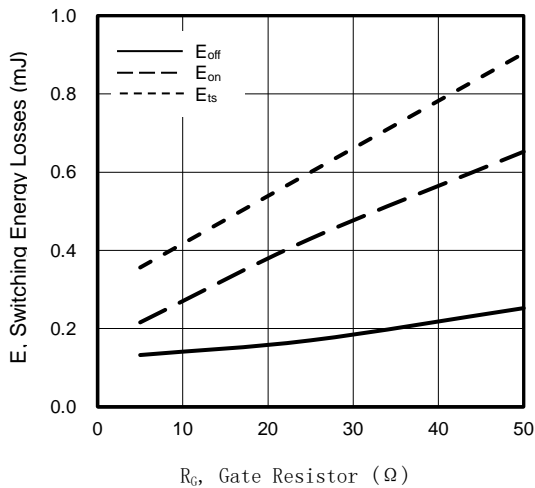
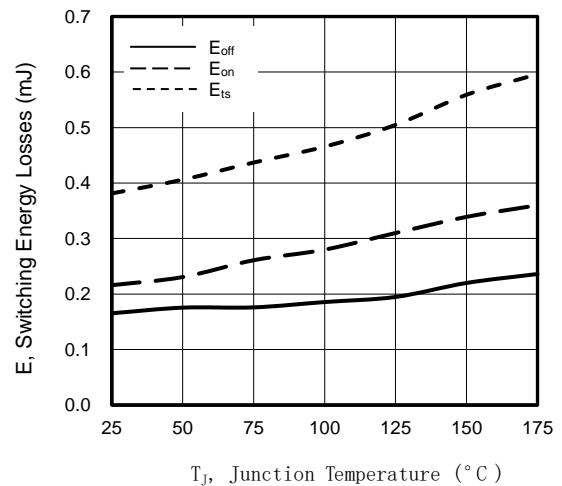
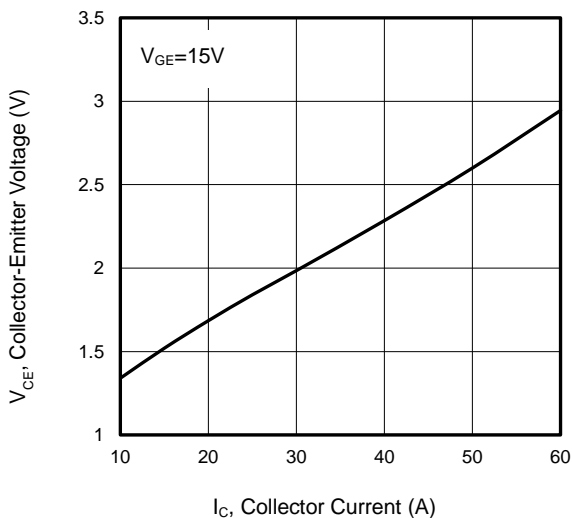
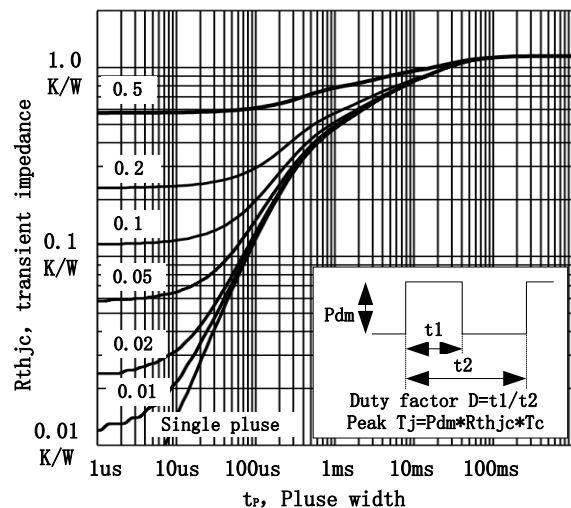
Drain-Source Diode Characteristics

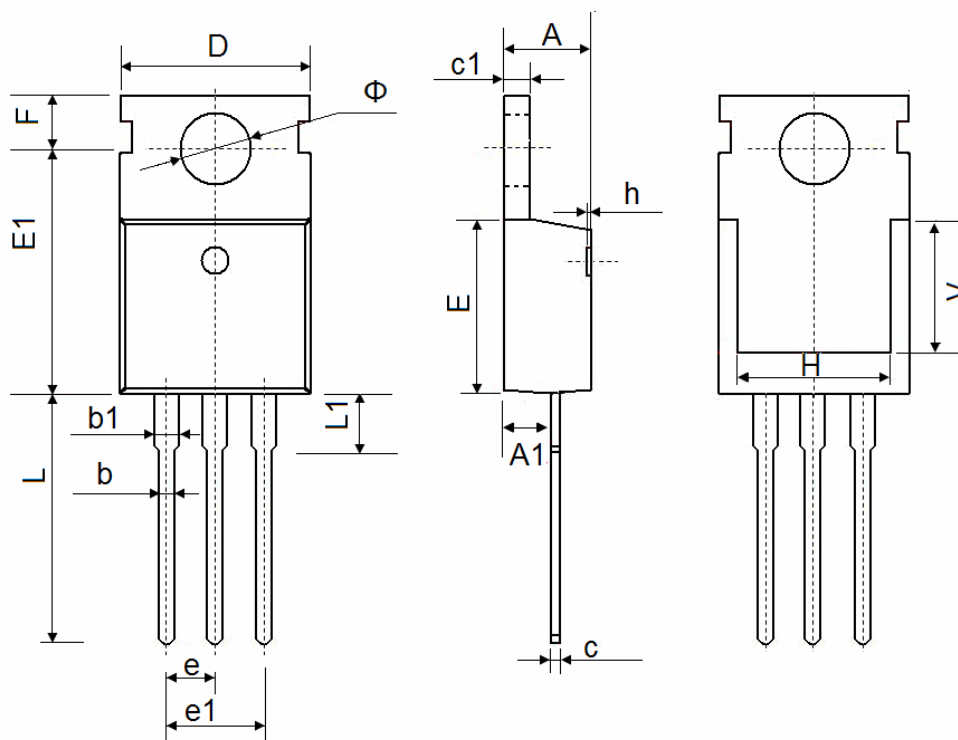
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	V _F	V _{GE} =0V, I _F =20A, T _J =25°C	---	1.4	1.7	V
Reverse Recovery Time	t _{rr}	I _F =20A, V _{CC} =400V, di/dt=200A/μs, T _J =25°C	---	182	---	nS
Reverse Recovery Charge	Q _{rr}		---	0.5	---	uC
Diode Peak Reverse Recovery Current	I _{rrm}		---	5.3	---	A

Note:

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%

600V/20A Field Stop Trench IGBT
Typical Characteristics
Figure 1 Output Characteristics

Figure 2 Transfer Characteristics

Figure 3 V_{CEsat} vs. Case Temperature

Figure 4 Saturation Voltage vs. VGE

Figure 5 Capacitance Characteristics

Figure 6 Gate charge waveform


600V/20A Field Stop Trench IGBT
Figure 7 Forward Characteristics

Figure 8 V_F vs. temperature

Figure 9 Typical Switching Times as a Function of Gate Resistor

Figure 10 Typical Switching Times as a Function of Junction Temperature

Figure 11 Typical Collector-emitter Saturation Voltage as a function of Collector Current

Figure 12 Transient Thermal Impedance


600V/20A Field Stop Trench IGBT
TO-220 Package Outline Data


Symbol	Dimensions In Millimeters	
	Min.	Max.
A	4.350	4.650
A1	2.250	2.550
b	0.710	0.910
b1	1.170	1.400
c	0.330	0.650
c1	1.200	1.400
D	9.910	10.250
E	8.9500	9.750
E1	12.650	12.950
e	2.540 TYP.	
e1	4.980	5.180
F	2.650	2.950
H	7.900	8.100
h	0.000	0.300
L	12.700	13.500
L1	2.850	3.250
V	7.500 REF.	
Φ	3.400	3.800