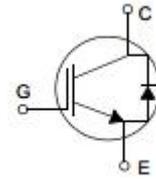


IGBT

Features

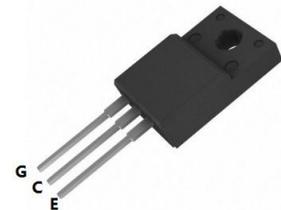
- 650V 20A, $V_{CE(sat)(typ.)} = 1.80\text{ V}@20\text{A}$
- Field Stop IGBT Technology.
- 10 μs Short Circuit Capability.
- Square RBSOA.
- Positive VCE (on) Temperature Coefficient.



TO-220F

Benefits

- High Efficiency for Motor Control.
- Rugged Performance.
- Excellent Current Sharing in Parallel Operation



Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate-Emitter Voltage	± 30	V
I_C	Continuous Collector Current ($T_C=25\text{ }^\circ\text{C}$)	40	A
	Continuous Collector Current ($T_C=100\text{ }^\circ\text{C}$)	20	A
I_{CM}	Pulsed Collector Current (Note 1)	80	A
I_F	Diode Continuous Forward Current ($T_C=100\text{ }^\circ\text{C}$)	20	A
I_{FM}	Diode Maximum Forward Current (Note 1)	80	A
t_{sc}	Short Circuit Withstand Time	10	us
I_{sc}	Short Circuit Current	150	A
P_D	Maximum Power Dissipation ($T_C=25\text{ }^\circ\text{C}$)	37	W
P_D	Maximum Power Dissipation ($T_C=100\text{ }^\circ\text{C}$)	15	W
T_J	Operating Junction Temperature Range	-55 to +150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to +150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{th\text{-}j\text{-}c}$	Thermal Resistance, Junction to case for IGBT	3.6	$^\circ\text{C}/\text{W}$
$R_{th\text{-}j\text{-}c}$	Thermal Resistance, Junction to case for Diode	4.3	$^\circ\text{C}/\text{W}$
$R_{th\text{-}j\text{-}a}$	Thermal Resistance, Junction to Ambient	80	$^\circ\text{C}/\text{W}$

Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{CES}	Collector-Emitter Breakdown Voltage	$V_{GE}=0V, I_C=250\mu A$	650	-	-	V
I_{CES}	Collector-Emitter Leakage Current	$V_{CE}=650V, V_{GE}=0V$	-	-	250	μA
I_{GES}	Gate Leakage Current, Forward	$V_{GE}=30V, V_{CE}=0V$	-	-	100	nA
	Gate Leakage Current, Reverse	$V_{GE}=-30V, V_{CE}=0V$	-	-	-100	nA
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE}=V_{CE}, I_C=250\mu A$	4.0	-	5.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=15V, I_C=20A$	-	1.80		V
Q_g	Total Gate Charge	$V_{CC}=480V$ $V_{GE}=15V$ $I_C=20A$	-	60		nC
Q_{ge}	Gate-Emitter Charge		-	8		nC
Q_{gc}	Gate-Collector Charge		-	38		nC
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=400V$ $V_{GE}=15V$ $I_C=20A$ $R_G=10\Omega$ Inductive Load $T_C=25^\circ\text{C}$	-	14	-	ns
t_r	Turn-on Rise Time		-	20	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	117	-	ns
t_f	Turn-off Fall Time		-	78	-	ns
E_{on}	Turn-on Switching Loss		-	0.50	-	mJ
E_{off}	Turn-off Switching Loss		-	0.79	-	mJ
C_{ies}	Input Capacitance	$V_{CE}=25V$	-	778	-	pF
C_{oes}	Output Capacitance	$V_{GE}=0V$	-	90	-	pF
C_{res}	Reverse Transfer Capacitance	$f=1\text{MHz}$	-	33	-	pF
R_{Gint}	Integrated gate resistor	$f=1\text{MHz}; V_{pp}=1V$		2.45		Ω

Electrical Characteristics of Diode ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	$I_F=20A$	-	2.3		V
t_{rr}	Diode Reverse Recovery Time	$V_{CE}=400V$	-	42		ns
I_{rrm}	Diode peak Reverse Recovery Current	$I_F=20A$	-	7.6		A
Q_{rr}	Diode Reverse Recovery Charge	$dI_F/dt=500A/\mu s$	-	186		nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature