High speed IGBT in Trench and Fieldstop Technology

Applications

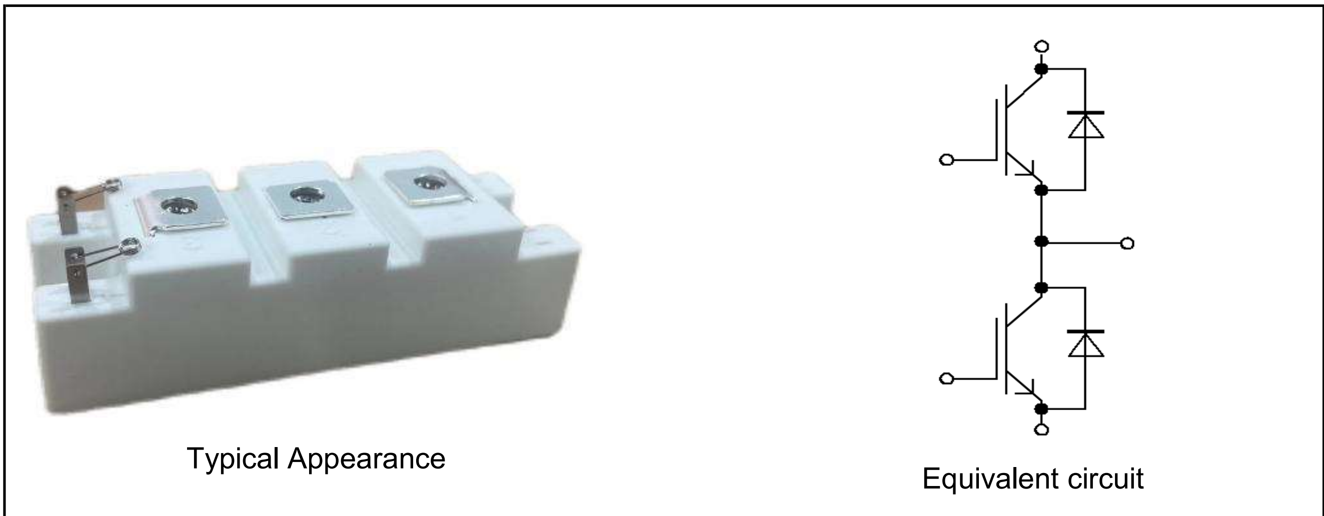
- Motor Drives
- Solar Applications
- UPS Systems
- HighPowerConverters

Features

- 1200V 100A, $V_{CE(sat)}$ =1.7V@25°C
- High RBSOA Capability
- Trench/FS Technology
- Low Reverse-recovery Losses
- High SC Capability

Product Summary

V_{CES}	1200	V
I_C	100	A
$V_{CE(sat),Typ}$@15V	1.7	V



Typical Appearance

Equivalent circuit

Marking	Package	Packaging	Min. package quantity
MMA100HF120T7	34mm	Box-packed	8

■ Absolute Maximum Ratings（Tc=25℃ unless otherwise noted)

Parameter	Symbol	Ratings	Unit
Collector-Emitter voltage	V_{CES}	1200	V
DC collector current，limited by T_{jmax} TC=25℃ TC=100℃	I_C	200 100	A
Pulsed Collector Current	I_{CP}	200	A
Diode forward current，limited by T_{jmax} TC=25℃ TC=100℃	I_F	200 100	A
Diode Pulsed current，tp limited by T_{jmax}	$I_{F\ Pulse}$	200	A
Continuous Gate-emitter voltage	V_{GE}	±30	V
Short Circuit Withstand Time(V_{CC}≤ 600V, V_{GE}= 15V)	T_{SC}	10	uS
Temperature under switching conditions	T_{vj}	-40-150	℃
Storage Temperature	T_{stg}	-40-125	℃

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

■ Thermal Characteristics

Parameter	Symbol	Max	Unit
Thermal Resistance, Per IGBT Junction to Case	$R_{\theta JC}$	0.15	℃/W
Thermal Resistance, Per Diodes Junction to Case	$R_{\theta JC}$	0.25	℃/W

Note：This transistor is sensitive to electrostatic discharge and should be handled with care.

■ Electrical Characteristics（Tc=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
Static Characteristics							
Drain-Source Breakdown Voltage	BV_{CES}	V_{GE}=0V,I_C=200uA		1200	-	-	V
Zero gate voltage collector current	I_{CES}	V_{CE}=1200V,V_{GE}=0V		-	-	200	uA
Gate-emitter leakage current	I_{GES}	V_{GE}=±20V,V_{CE}=0V		-	-	±300	nA
Gate-emitter threshold voltage	$V_{GE(TH)}$	V_{CE}=10V,I_C=100mA		6.2	6.7	7.2	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE}=15V,I_C=100A		-	1.7	2.1	V
			Tj=125°C	-	2.08	-	V
Dynamic Characteristics							
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE}=0V, f=1.0MHz		-	25	-	nF
Reverse Transfer Capacitance	C_{res}			-	0.13	-	nF
Gate charge	Q_G	V_{CE}=600V,V_{GE} = 15V		-	950	-	nC
Internal Gate Resister	R_G			-	3	-	Ω

■ Switching Characteristic, Inductive Load, at T_j=25℃

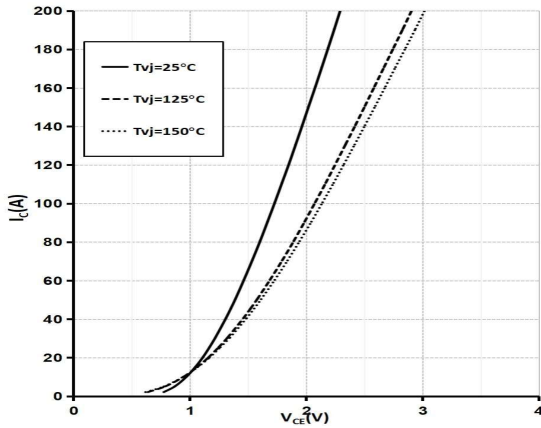
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
IGBT Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	V_{CC}= 600V I_C= 100A V_{GE}= 15V R_G= 5Ω Inductive load	-	0.2	-	us
Turn-On Rise Time	t_r		-	0.09	-	us
Turn-Off Delay Time	$t_{d(off)}$		-	0.23	-	us
Turn-Off Fall Time	t_f		-	0.15	-	us
Turn-on energy	E_{on}		-	6.38	-	mJ
Turn-off energy	E_{off}		-	5.26	-	mJ
Diode Characteristics						
Diode forward voltage	V_F	I_F=100A	-	2	2.5	mA
Reverse Recovery Charge	Q_{rr}	I_F= 100A, V_R= 600V, -diF/dt= 1200A/us	-	4.35	-	uC
Reverse Recovery Energy	E_{rec}		-	1.81	-	mJ

■ IGBT Module

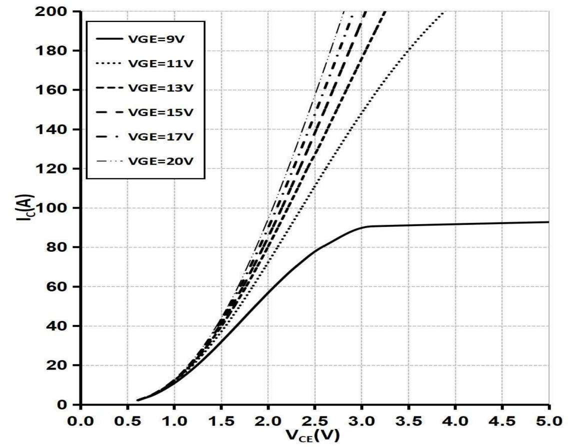
Parameter	Symbol	Test Condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, f = 50Hz, t = 1 min	4	kV
Material of Module Base plat			Cu	
Internal Isolation			Al_2O_3	
Power Terminal Screw	d_{Creep}	Terminal to terminal	20.1	mm
Clearance	d_{Clear}	Terminal to terminal	9.5	mm
Comparative Tracking Index	CTI		200	

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Stray inductance module	L_{sCE}		-	29.2	-	nH
Module Lead Resistance, Terminals-Chip	$R_{CC'+EE}$	T_C= 25°C，Per switch	-	0.66	-	mΩ
Mounting Torque for Module Mounting	M	Screw M5	3	-	5	Nm
Weight of Module	G		-	156	-	g

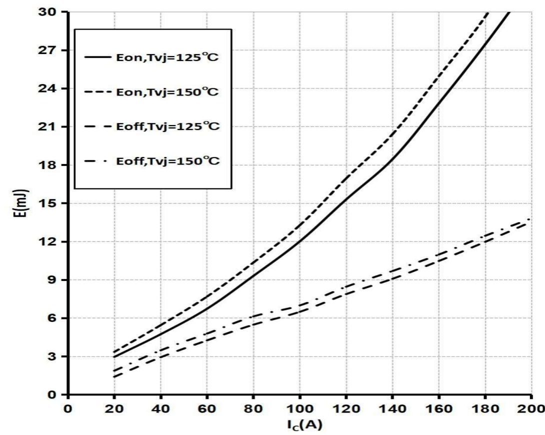
■ Characteristics Curves



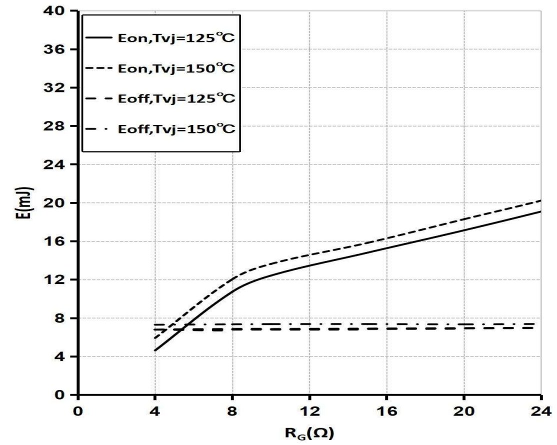
Output Characteritsics ,IGBT(I_C= f(V_{CE}),V_{GE}= 15V)



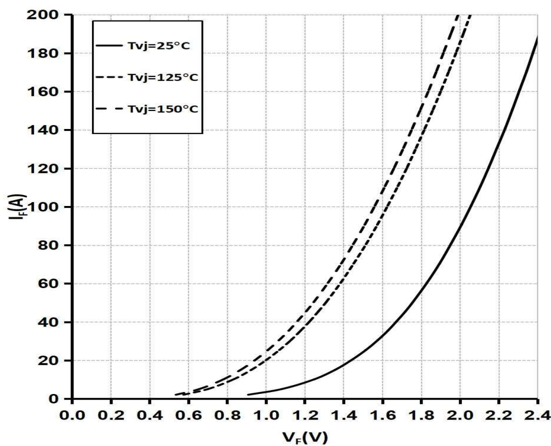
Output Characteritsics ,IGBT(Tvj=150℃)



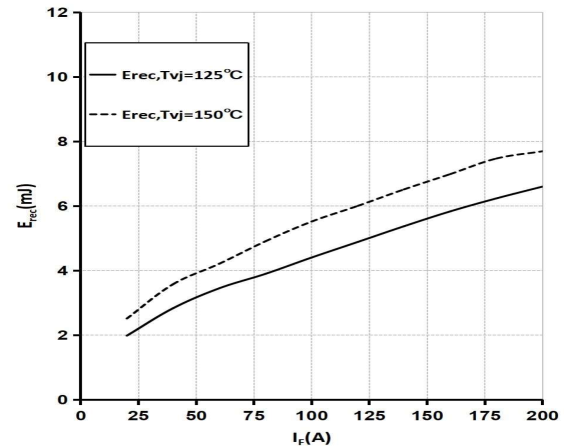
Switching losses (typical), IGBT(E= f(I_C)
R_{Goff}= 10Ω, R_{Gon}=10Ω, V_{GE}= ±15V, V_{CC}= 600V)



Switching losses (typical), IGBT(E=
f(R_G),V_{GE}=15V, I_C= 100A, V_{CC}= 600V)

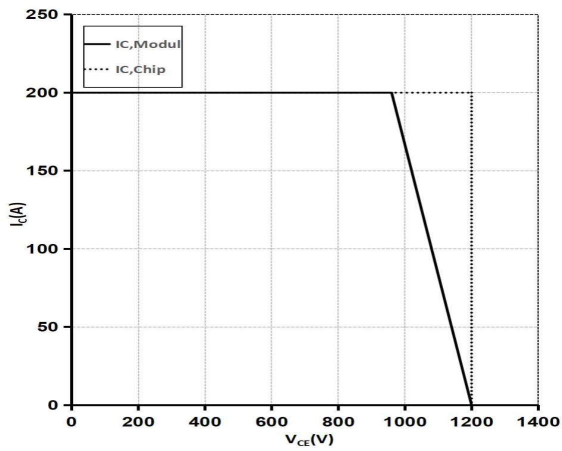


Forward characteristic (typical), Diode



Switching losses (typical), Diode

■ Characteristics Curves

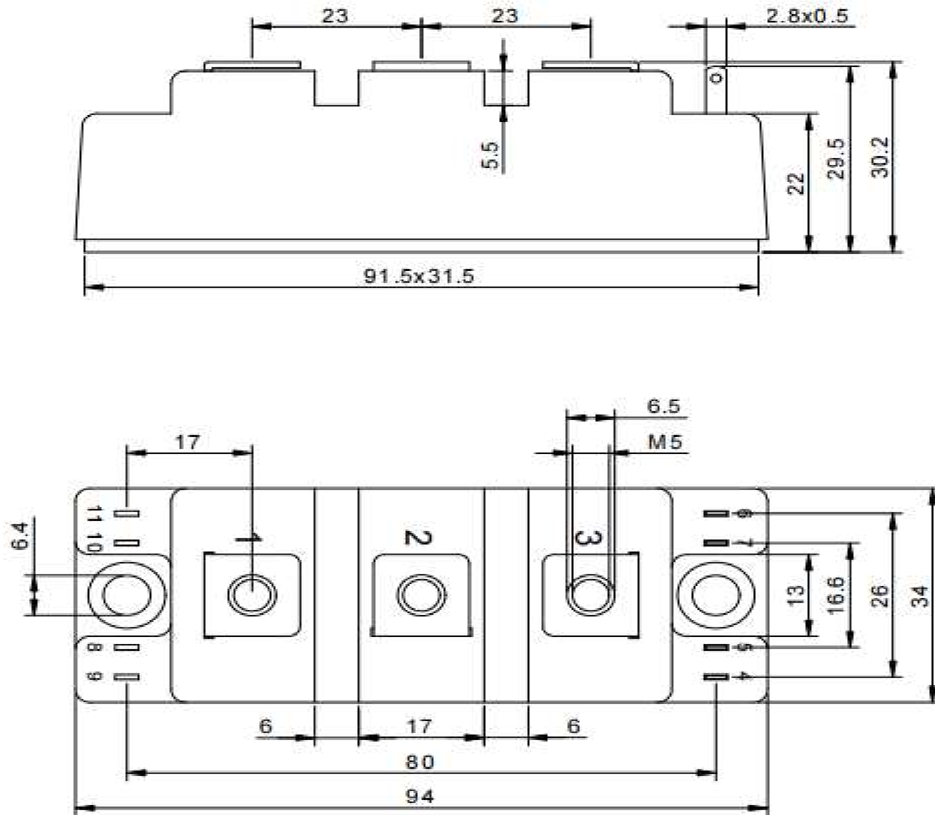


Reverse bias safe operating area (RBSOA), IGBT(I_C= f(V_{CE}),R_{Goff}= 10Ω, V_{GE}= ±15V, Tvj= 150°C)

■ Package Dimension

Unit：mm

Dimensions in Millimeters



Circuit diagram headline