

**High speed IGBT in Trench and Fieldstop Technology****■ Applications**

- Motor Drives
- AC and DC Servo Drives
- Three-level Application
- Uninterrupted Power Supply Systems
- EV

■ Features

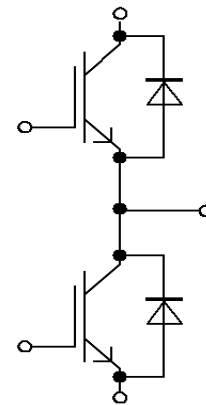
- 1200V 150A, $V_{CE(sat)} = 1.7V @ 25^{\circ}C$
- High RBSOA Capability
- Trench/FS Technology
- Low Reverse-recovery Losses
- High SC Capability

■ Product Summary

V_{CES}	1200	V
I_C	150	A
$V_{CE(sat)}, Typ @ 15V$	1.7	V



Typical Appearance



Equivalent circuit

Marking	Package	Packaging	Min. package quantity
MMA150HF120T7	34mm	Box-packed	8





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

Parameter	Symbol	Ratings	Unit
Collector-Emitter voltage	V_{CES}	1200	V
DC collector current, limited by T_{jmax} TC=25°C TC=100°C	I_C	240 150	A
Pulsed Collector Current	I_{CP}	300	A
Diode forward current, limited by T_{jmax} TC=25°C TC=100°C	I_F	240 150	A
Diode Pulsed current, t_p limited by T_{jmax}	$I_{F\ Pulse}$	300	A
Continuous Gate-emitter voltage	V_{GE}	±30	V
Short Circuit Withstand Time($V_{CC} \leq 600V$, $V_{GE} = 15V$)	T_{SC}	10	μs
Temperature under switching conditions	T_{vj}	-40-150	°C
Storage Temperature	T_{stg}	-40-125	°C

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	$R_{\theta JC}$	0.3	°C/W
Thermal Resistance, Per Diodes Junction to Case	$R_{\theta JC}$	0.4	°C/W

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





■ Electrical Characteristics (Tc=25°C unless otherwise noted)

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
Static Characteristics							
Drain-Source Breakdown Voltage	BV_{CES}	$V_{GE}=0V, I_C=200\mu A$		1200	-	-	V
Zero gate voltage collector current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V$		-	-	200	μA
Gate-emitter leakage current	I_{GES}	$V_{GE}=\pm 20V, V_{CE}=0V$		-	-	± 200	nA
Gate-emitter threshold voltage	$V_{GE(TH)}$	$V_{CE}=10V, I_C=150mA$		6.2	6.7	7.2	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=150A$		-	1.7	2.2	V
			$T_J=125^{\circ}C$	-	2.1	-	V
Dynamic Characteristics							
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1.0MHz$		-	40	-	nF
Reverse Transfer Capacitance	C_{res}			-	0.19	-	nF
Gate charge	Q_G	$V_{CE}=600V, V_{GE}=15V$		-	1450	-	nC
Internal Gate Resister	R_G			-	2.8	-	Ω





■ Switching Characteristic, Inductive Load, at $T_j=25^{\circ}\text{C}$

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
IGBT Switching Characteristics						
Turn-On Delay Time	t _{d(on)}	V _{CC} = 600V I _C = 150A V _{GE} = 15V R _G = 10Ω Inductive load	-	0.35	-	us
Turn-On Rise Time	t _r		-	0.12	-	us
Turn-Off Delay Time	t _{d(off)}		-	0.4	-	us
Turn-Off Fall Time	t _f		-	0.15	-	us
Turn-on energy	E _{on}		-	14.1	-	mJ
Turn-off energy	E _{off}		-	8.9	-	mJ
Diode Characteristics						
Diode forward voltage	V _F	I _F =150A	-	2.15	2.7	mA
Reverse Recovery Charge	Q _{rr}	I _F = 150A, V _R = 600V, diF/dt= 1200A/us	-	4.5	-	uC
Reverse Recovery Energy	E _{rec}		-	0.58	-	mJ



**■ IGBT Module**

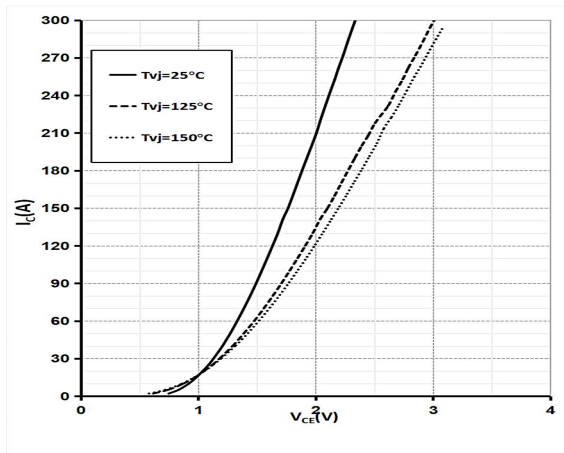
Parameter	Symbol	Test Condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, $f = 50\text{Hz}$, $t = 1 \text{ min}$	4	kV
Material of Module Base plat			Cu	
Internal Isolation			Al_2O_3	
Power Terminal Screw	d_{Creep}	Terminal to terminal	20.1	mm
Clearance	d_{Clear}	Terminal to terminal	9.5	mm
Comparative 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	$R_{CC'+EE}$	$T_C = 25^\circ\text{C}$, Per switch	-	0.66	-	m Ω
Mounting Torque for Module Mounting	M	Screw M5	3	-	5	Nm
Weight of Module	G		-	156	-	g

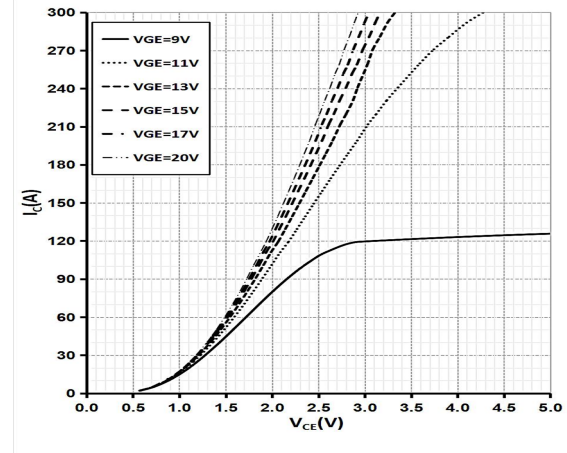




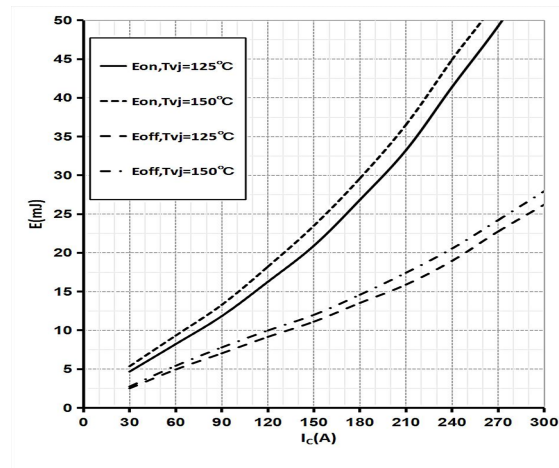
■ Characteristics Curves



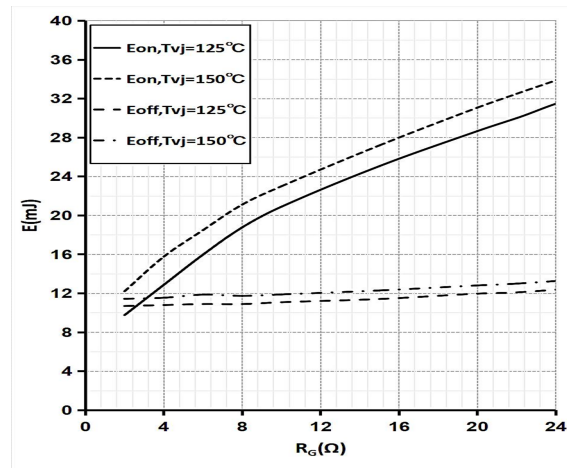
Output Characteristics, IGBT ($I_C = f(V_{CE}), V_{GE} = 15V$)



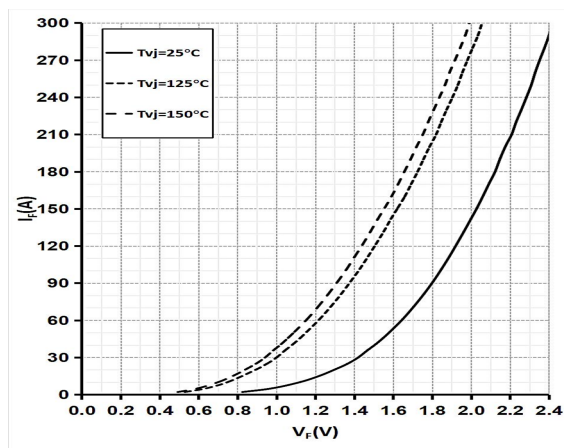
Output Characteristics, IGBT ($T_{vj} = 150^\circ C$)



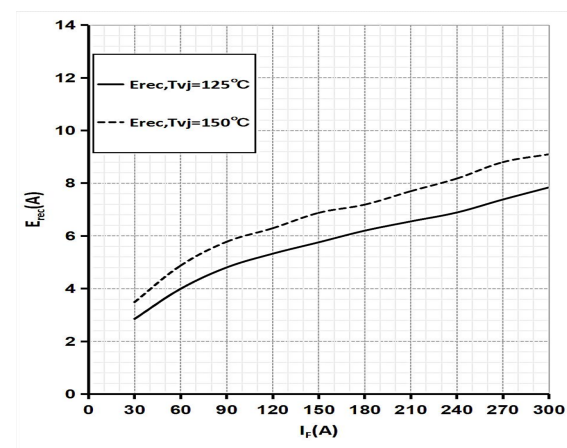
Switching losses (typical), IGBT ($E = f(I_C)$)
 $R_{Goff} = 10\Omega, R_{Gon} = 10\Omega, V_{GE} = \pm 15V, V_{CC} = 600V$



Switching losses (typical), IGBT ($E = f(R_G), V_{GE} = 15V, I_C = 150A, V_{CC} = 600V$)



Forward characteristic (typical), Diode

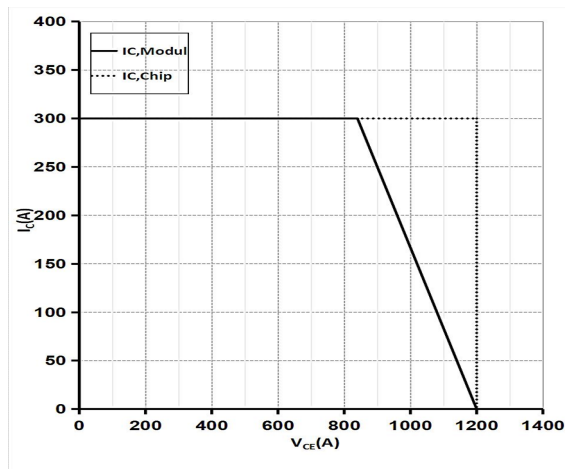


Switching losses (typical), Diode





■ Characteristics Curves



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



