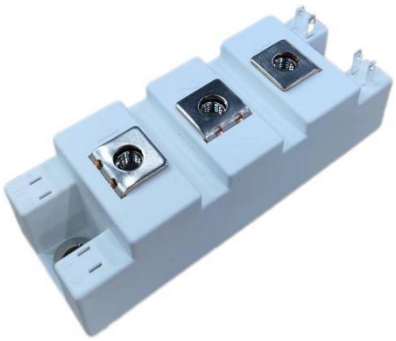
1200V 150A CoolFAST™ IGBT7 Power Module

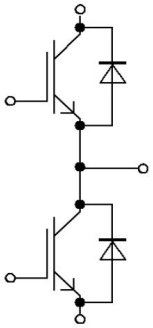
Electrical Features:

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



Applications:

- Motor Drives
- Solar Applications
- UPS Systems
- Commercial Electric Vehicles
- Wind Turbines



Equivalent circuit

Mechanical Features:

- High Power and Thermal Cycling Capability
- Maximum Junction Temperature 175℃
- High Power Density
- PressFIT Contact Technology
- Isolated Base Plate

Maximum Ratings and Characteristics

Absolute Maximum Ratings at Tc= 25°C (unless otherwise specified)

Items	Symbols	Values	Units	Remarks
Collector-Emitter voltage	V_{CES}	1200	V	
Gate-Emitter voltage	V_{GES}	±30	V	
DC Collector Current	I_C	150	A	T_C= 100°C
Pulsed Collector Current	I_{CP}	300	A	Note *1
Diode Forward Current	I_F	150	A	
Repetitive Peak Forward Current	I_{FRM}	300	A	
Operating Junction Temperature	T_{vj}	-40 ~ +150	°C	
Storage Temperature	T_{stg}	-40 ~ +125	°C	

Note *1 : Pulse width limited by T_{vjmax}.

Electrical characteristics (unless otherwise specified)

IGBT, Inverter

Description	Symbols	Conditions		Values			Unit
				Min	Typ	Max	
Zero Gate Voltage Collector Current	I_{CES}	V_{CE}= 1200V, V_{GE}= 0V T_{vj}= 25°C				200	μA
Gate-Emitter Leakage Current	I_{GES}	V_{CE}= 0V, V= 20V, T_{vj}= 25°C				±300	nA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	V_{CE}= V_{GE}, I_C= 150mA		6.2	6.7	7.2	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}= 15V I_C= 150A	T_{vj}= 25°C		1.7	2.2	V
			T_{vj}= 125°C		2.1		
			T_{vj}= 150°C		2.2		
Input Capacitance	C_{ies}	V_{CE}= 25V, V_{GE}= 0V f= 1MHz			40		nF
Reverse Transfer Capacitance	C_{res}				0.19		nF
Gate Charge	Q_G	V_{CC}= 600V, V_{GE}= 15V			1450		nC
Internal Gate Resistor	R_{Gint}	T_{vj}= 25°C			2.8		Ω
Turn-On Delay Time, Inductive load	$t_{d(on)}$	V_{CC}= 600V I_C= 150A V_{GE}= 15V R_G= 10Ω	T_{vj}= 25°C		0.36		μs
			T_{vj}= 125°C		0.39		
			T_{vj}= 150°C		0.40		
Rise Time, Inductive load	t_r		T_{vj}= 25°C		0.13		μs
			T_{vj}= 125°C		0.15		
			T_{vj}= 150°C		0.16		
Turn-Off Delay Time, Inductive load	$t_{d(off)}$		T_{vj}= 25°C		0.40		μs
			T_{vj}= 125°C		0.44		
			T_{vj}= 150°C		0.45		
Fall Time, Inductive load	t_f		T_{vj}= 25°C		0.14		μs
			T_{vj}= 125°C		0.23		
			T_{vj}= 150°C		0.25		
Turn-On Energy	E_{on}		T_{vj}= 25°C		14.1		mJ
			T_{vj}= 125°C		20.9		
			T_{vj}= 150°C		23.5		
Turn-Off Energy	E_{off}		T_{vj}= 25°C		8.9		mJ
			T_{vj}= 125°C		11.1		
			T_{vj}= 150°C		12.0		
SC Data	I_{SC}	V_{CC}= 600V R_G= 20Ω V_{GE}≤ 15V V_{CEmax}=V_{CE}-L_{SCE}*di/dt	t_P≤ 10μs T_{vj}= 150°C		600		A

Diode, Inverter

Description	Symbols	Conditions		Values			Unit
				Min	Typ	Max	
Forward Voltage	V_F	I_F= 150A, V_{GE}= 0V	T_{vj}= 25°C		2.04	2.7	V
			T_{vj}= 125°C		1.62		
			T_{vj}= 150°C		1.56		
Recovery Charge	Q_r	I_F= 150A,V_R= 600V -di_F/dt= 1200A/us V_{GE}= -15V	T_{vj}= 25°C		5.07		µC
			T_{vj}= 125°C		15.99		
			T_{vj}= 150°C		19.33		
Reverse Recovery Energy	E_{rec}	I_F= 150A, V_R= 600V -di_F/dt=1200A/us V_{GE}= -15V	T_{vj}= 25°C		1.88		mJ
			T_{vj}= 125°C		5.76		
			T_{vj}= 150°C		6.89		

Thermal resistance

Items	Symbols	Values			Unit
		Min	Typ	Max	
Thermal Resistance, Per IGBT Junction to Case	$R_{th(j-c)}$			0.3	K/W
Thermal Resistance, Per Diodes Junction to Case	$R_{th(j-c)}$			0.4	

Module

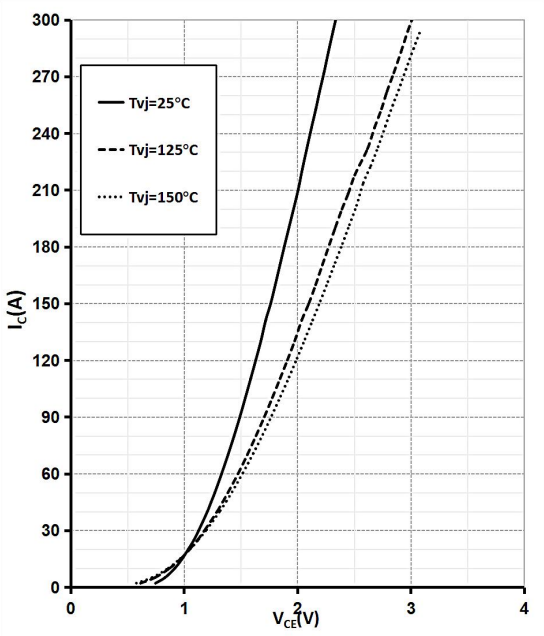
Description	Symbols	Conditions	Values	Unit
Isolation Test Voltage	V_{ISOL}	RMS, f =50Hz, t= 1min	4.0	KV
Material of Module Base plat			Cu	
Internal Isolation			Al_2O_3	
Creepage Distance	d_{Creep}	Terminal to terminal	20.1	mm
Clearance	d_{Clear}	Terminal to terminal	9.5	mm
Comparative Tracking Index	CTI		200	

Description	Symbols	Conditions	Values			Unit
			Min	Typ	Max	
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	3.0		5.0	Nm
Weight	G			156		g

Output characteristic (typical), IGBT, Inverter

$I_C = f(V_{CE})$

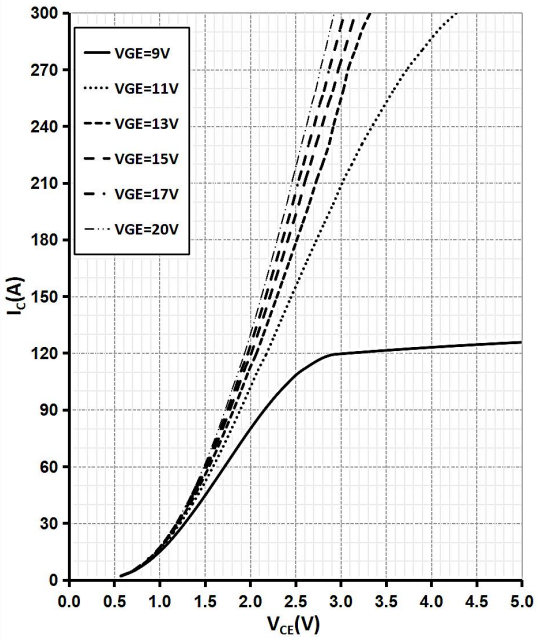
V_{GE}= 15V



Output characteristic (typical), IGBT, Inverter

$I_C = f(V_{CE})$

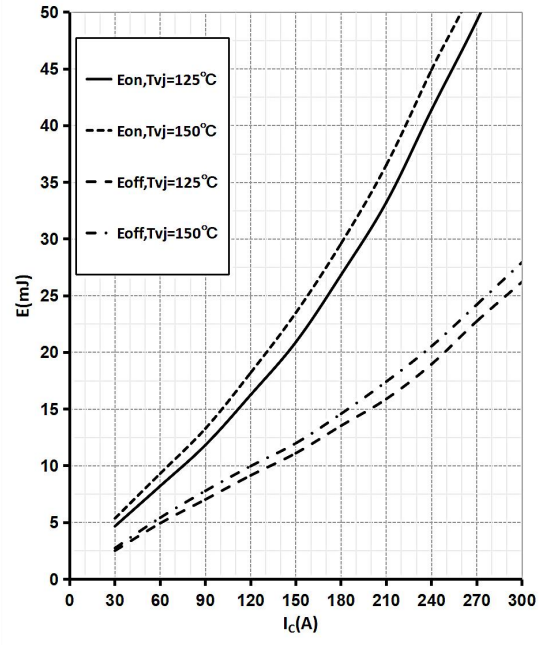
T_{vj}= 150°C



Switching losses (typical), IGBT, Inverter

$E = f(I_C)$

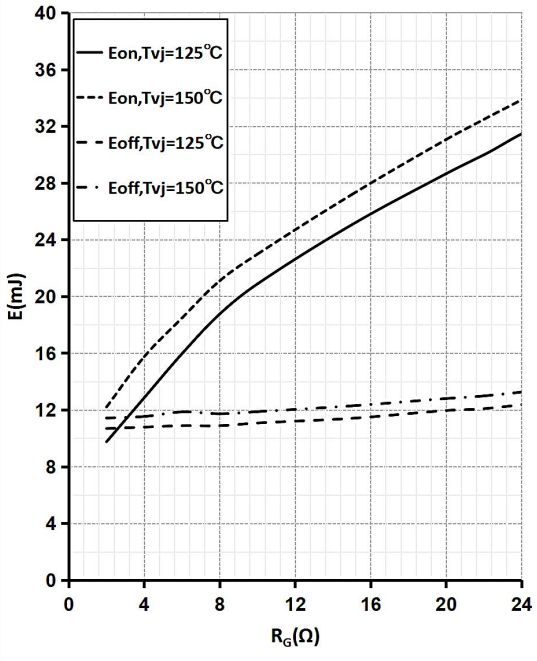
R_{Goff}= 10Ω, R_{Gon}=10Ω, V_{GE}= ±15V, V_{CC}= 600V



Switching losses (typical), IGBT, Inverter

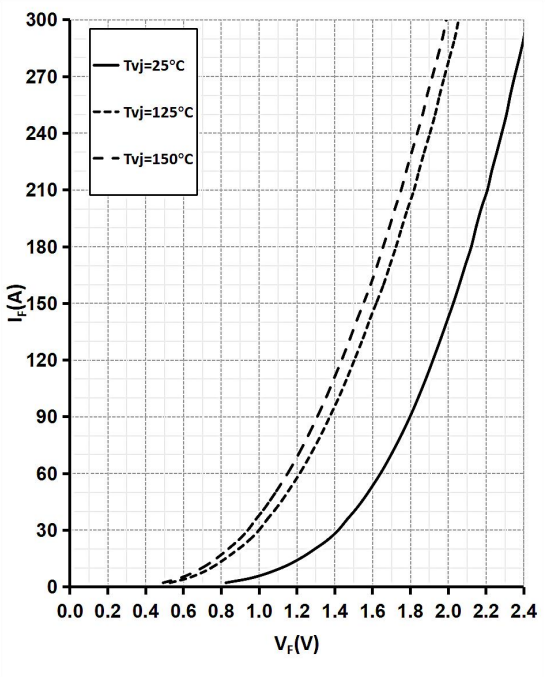
$E = f(R_G)$

V_{GE}= 15V, I_C= 150A, V_{CC}= 600V



Forward characteristic (typical), Diode, Inverter

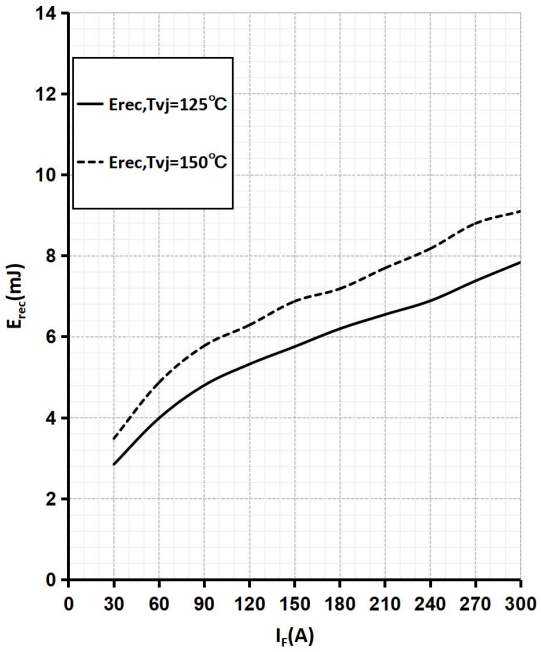
$I_F = f(V_f)$



Switching losses (typical), Diode, Inverter

$E_{rec} = f(I_F)$

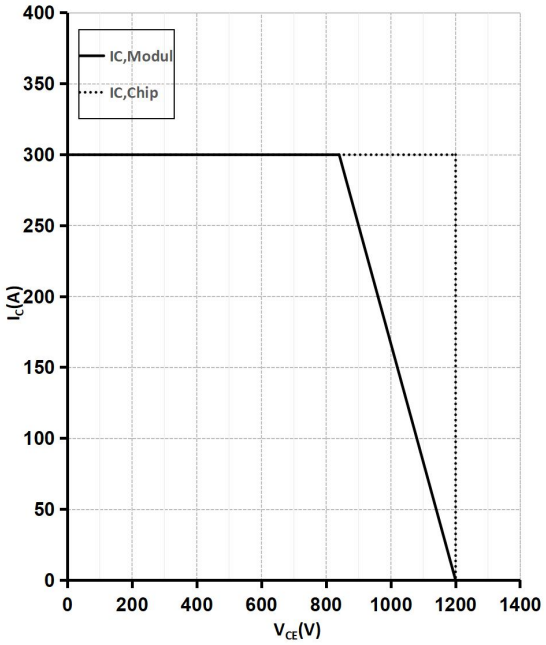
R_{Gon}= 10Ω, V_{CC}= 600V



Reverse bias safe operating area (RBSOA), IGBT, Inverter

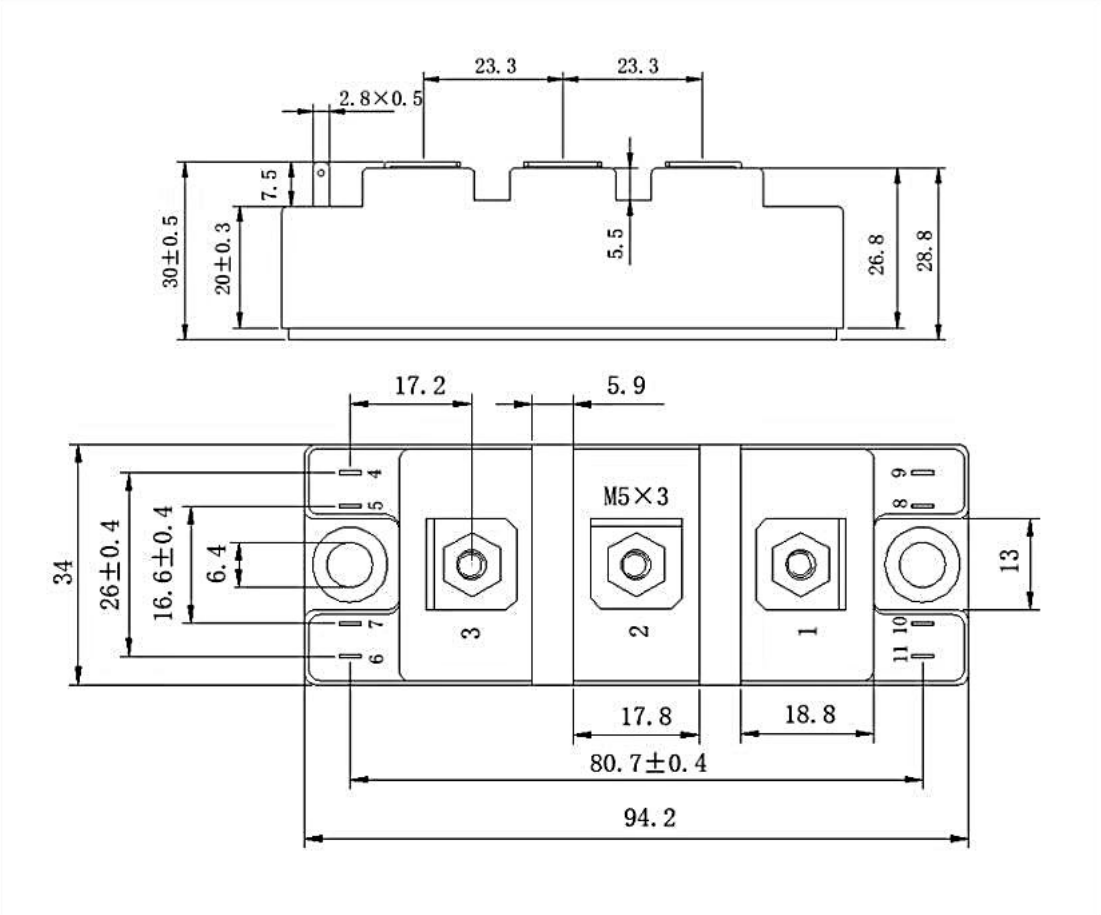
$I_C = f(V_{CE})$

R_{Goff}= 10Ω, V_{GE}= ±15V, T_{vj}= 150°C

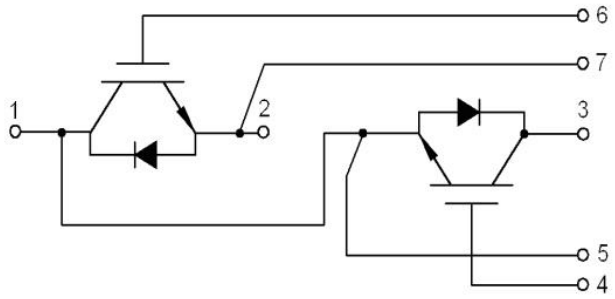


Package Dimension

Dimensions in Millimeters



Internal Circuit



Revision History

Revision	Date	Subjects (major changes since last revision)
0.1	2023-04-10	Preliminary version
1.0	2023-11-23	MP version

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