

IGBT Power Module 1200V/150A

Features

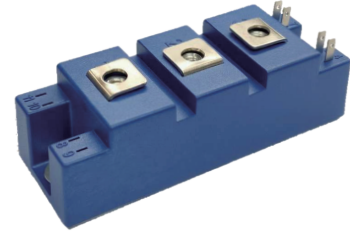
- ◆ 34mm Fast Switching Trench / Field Stop IGBT Technology
- ◆ Low Switching Losses
- ◆ Super Fast Diodes
- ◆ High Short Circuit Capability

Applications

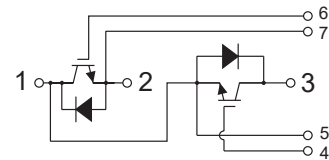
- ◆ Welder / Power Supply
- ◆ UPS / Inverter
- ◆ Industrial Motor Drive

Maximum Ratings (T_C=25°C)

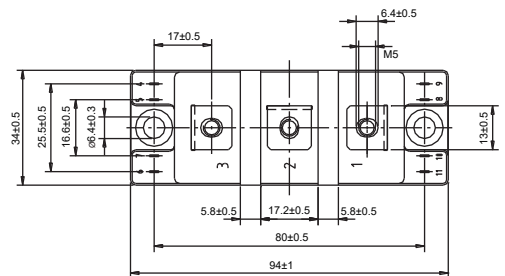
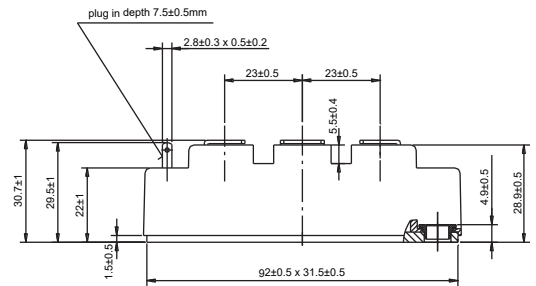
Item	Symbol	Rated Value	Unit
Collector-Emitter Voltage	T _{VJ} = 25°C V _{CES}	1200	V
Gate-Emitter Peak Voltage	V _{GES}	±20	V
Continuous DC Collector Current	T _C = 100°C I _{C,nom.}	150	A
Repetitive Peak Collector Current	t _p = 1ms I _{CRM}	300	A
Total Power Dissipation	P _{tot}	790	W
Isolation Voltage	RMS, f=60Hz, t=1min V _{iso}	2500	V
Continuous DC Forward Current	I _F	150	A
Repetitive Peak Forward Current	t _p = 1ms I _{FRM}	300	A
Temperature under switching conditions	T _{VJ op}	-40~+150	°C
Storage Temperature	T _{stg}	-40~+125	°C
Mounting Torque	Module Base to Heatsink (M6)	3~5	N.m
	Busbar to Terminal (M5)	2.5~5	

HD-9434


Circuit Diagram Headline



Package Outlines



Dimensions in mm (1 mm = 0.0394")

■ Electrical Characteristics ($T_{vj} = 25^{\circ}\text{C}$)

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Collector-emitter saturation voltage	$V_{CE\ sat}$	$I_C = 150\text{A}, V_{GE} = 15\text{V}$ $I_C = 150\text{A}, V_{GE} = 15\text{V}$		1.8 2.2	2.15	V
Gate threshold voltage	V_{GEth}	$I_C = 5.3\text{mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$	5.6	6.2	6.7	V
Gate charge	Q_G	$I_C = 150\text{A}, V_{CE} = 600\text{V}, V_{GE} = 15\text{V}$		800		nC
Internal gate resistor	R_{Gint}	$T_{vj} = 25^{\circ}\text{C}$		1.98		W
Input capacitance	C_{ies}	$f = 100\text{KHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{V}, V_{GE} = 0\text{V}$		14.02		nF
Output capacitance	C_{oes}	$f = 100\text{KHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{V}, V_{GE} = 0\text{V}$		0.66		nF
Reverse transfer capacitance	C_{res}	$f = 100\text{KHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{V}, V_{GE} = 0\text{V}$		0.165		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 1200\text{V}, V_{GE} = 0\text{V}, T_{vj} = 25^{\circ}\text{C}$			1	mA
Gate-emitter leakage current	I_{GES}	$V_{CE} = 0\text{V}, V_{GE} = 20\text{V}, T_{vj} = 25^{\circ}\text{C}$			100	nA
Turn-on delay time, inductive load	$t_{d\ on}$	$I_C = 150\text{A}, V_{CE} = 600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{G(on)} = 1.0\Omega, R_{G(off)} = 1.0\Omega$		165.6 181 180.6		ns
Rise time, inductive load	t_r	$I_C = 150\text{A}, V_{CE} = 600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{G(on)} = 1.0\Omega, R_{G(off)} = 1.0\Omega$		68.4 90 97.4		ns
Turn-off delay time, inductive load	$t_{d\ off}$	$I_C = 150\text{A}, V_{CE} = 600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{G(on)} = 1.0\Omega, R_{G(off)} = 1.0\Omega$		265.6 306 318.6		ns
Fall time, inductive load	t_f	$I_C = 150\text{A}, V_{CE} = 600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{G(on)} = 1.0\Omega, R_{G(off)} = 1.0\Omega$		46.4 86 88.4		ns
Turn-on energy loss per pulse	E_{on}	$I_C = 150\text{A}, V_{CE} = 600\text{V},$ $V_{GE} = \pm 15\text{V}, (T_{vj} = 150^{\circ}\text{C})$ $R_{G(on)} = 1.0\Omega, R_{G(off)} = 1.0\Omega$		13.6 25.7 30.4		mJ
Turn-off energy loss per pulse	E_{off}	$I_C = 150\text{A}, V_{CE} = 600\text{V}$ $V_{GE} = \pm 15\text{V}, (T_{vj} = 150^{\circ}\text{C})$ $R_{G(on)} = 1.0\Omega, R_{G(off)} = 1.0\Omega$		9.53 15 16.3		mJ
SC data	I_{SC}	$V_{GE} = 15\text{V}, V_{CC} = 800\text{V}$ $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$		$t_p = 10\mu\text{s},$ $T_{vj} = 150^{\circ}\text{C}$	600	A
Thermal resistance, junction to case	R_{thJC}	per IGBT			0.19	$^{\circ}\text{C}/\text{W}$
Thermal resistance, case to heatsink	R_{thCH}	per IGBT		0.081		$^{\circ}\text{C}/\text{W}$
External gate resistance	R_{Gext}	$T_{vj} = 25^{\circ}\text{C}$	1.0			W

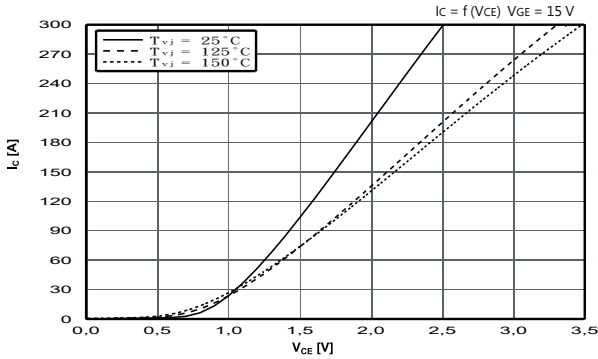
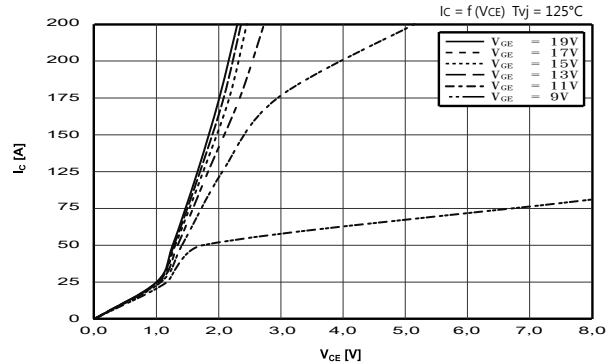
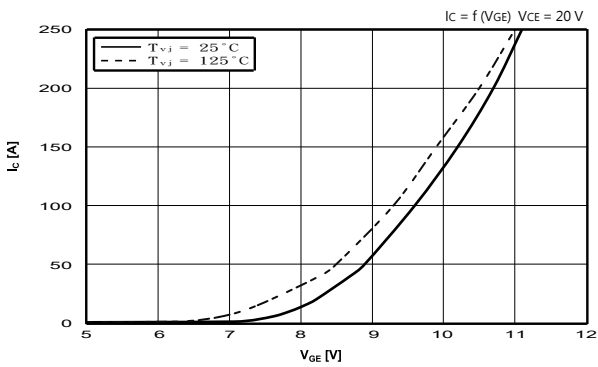
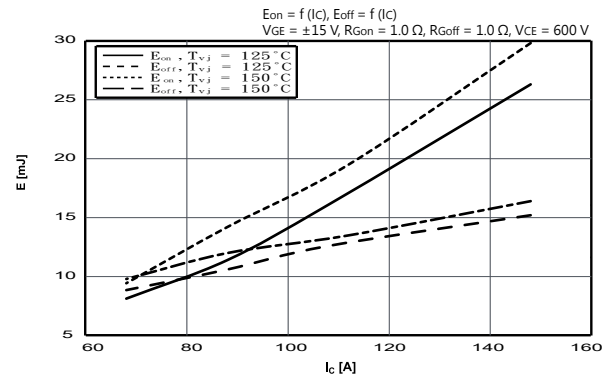
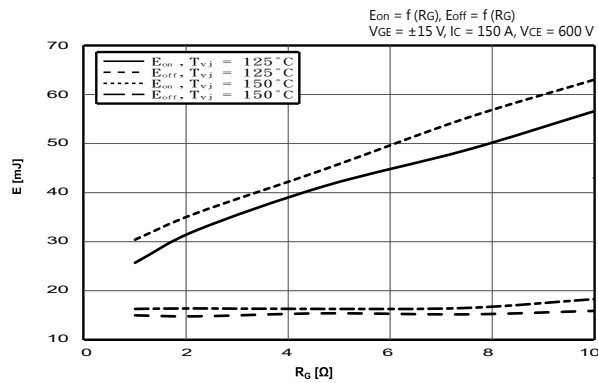
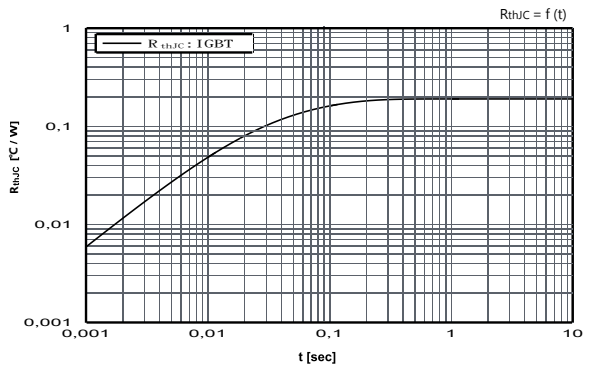
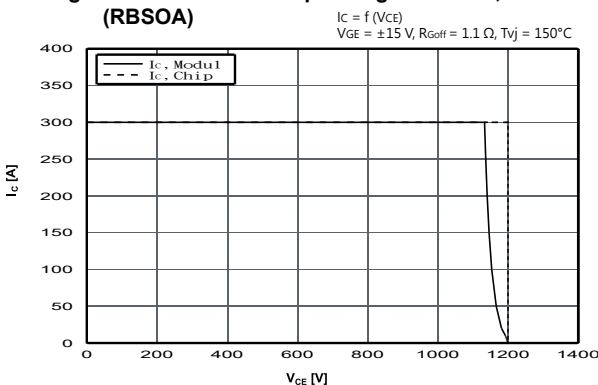
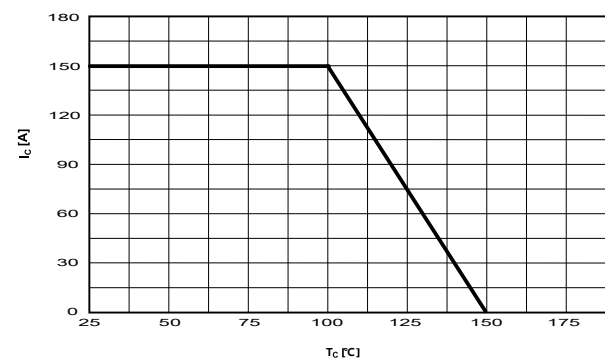
■ Diode Ratings & Characteristics

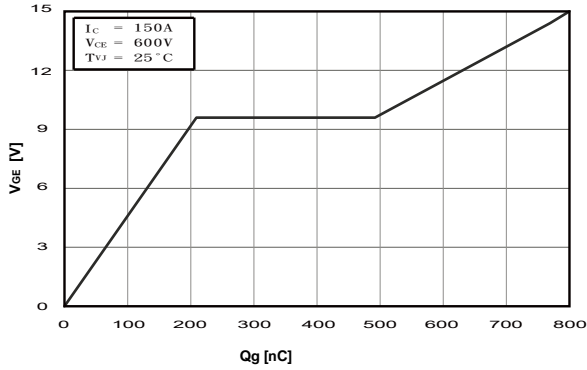
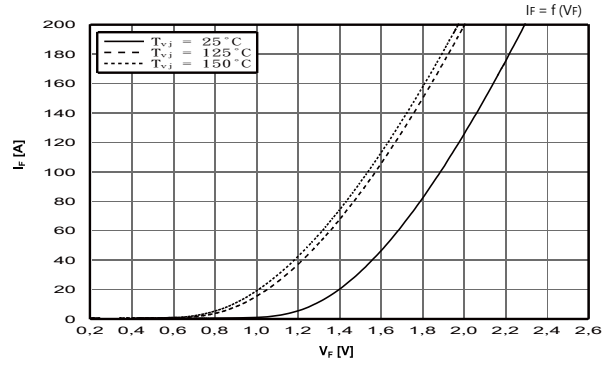
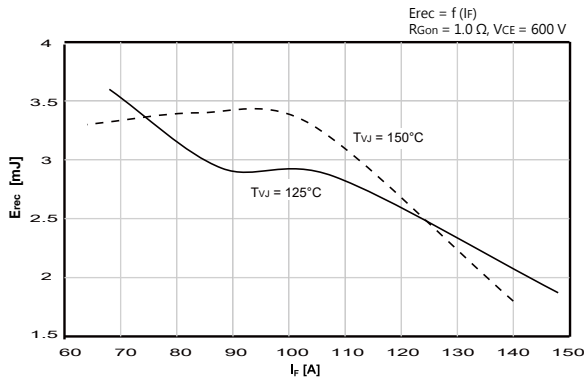
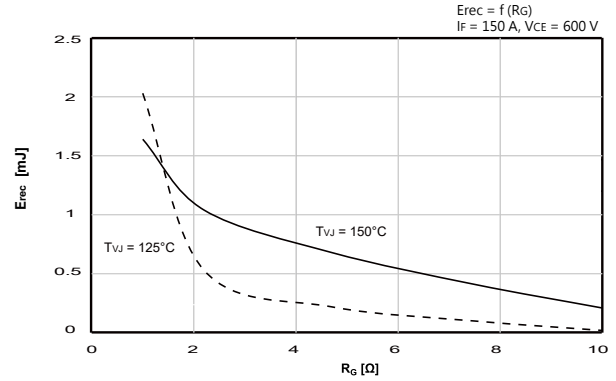
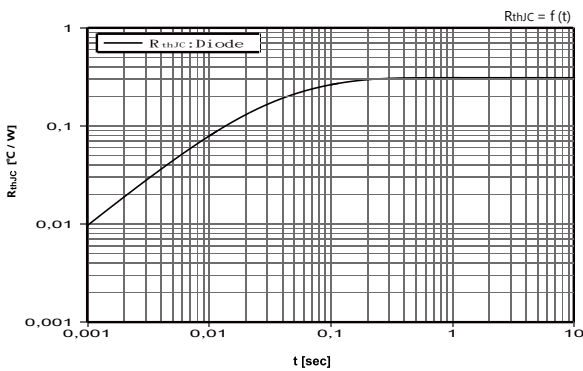
Symbol	Test Conditions	Value	Unit
V_{RRM}	$T_{vj} = 25^{\circ}C$	1200	V
I_F		150	A
I_{FRM}	$t_p = 1ms$	300	A
I^2t	$V_R = 0V, t_p = 10ms, T_{vj} = 125^{\circ}C$	4100	A^2s
	$V_R = 0V, t_p = 10ms, T_{vj} = 150^{\circ}C$	4000	

Symbol	Test Conditions	Min.	Typ.	Max.	Unit
V_F	$I_F = 150A, V_{GE} = 0V$ $T_{vj} = 25^{\circ}C$		2.1	2.5	V
	$I_F = 150A, V_{GE} = 0V$ $T_{vj} = 125^{\circ}C$		1.85		
I_{RRM}	$I_F = 150A, -di_F/dt = 1300A/\mu s (T_{vj} = 150^{\circ}C)$ $T_{vj} = 25^{\circ}C$		64	A	
	$V_R = 600V$ $T_{vj} = 125^{\circ}C$		86		
	$V_{GE} = \pm 15V$ $T_{vj} = 150^{\circ}C$		84		
Qrr	$I_F = 150A, -di_F/dt = 1300A/\mu s (T_{vj} = 150^{\circ}C)$ $T_{vj} = 25^{\circ}C$		3.61	μC	
	$V_R = 600V$ $T_{vj} = 125^{\circ}C$		12.19		
	$V_{GE} = \pm 15V$ $T_{vj} = 150^{\circ}C$		11.36		
Erec	$I_F = 150A, -di_F/dt = 1300A/\mu s (T_{vj} = 150^{\circ}C)$ $T_{vj} = 25^{\circ}C$		0.86	mJ	
	$V_R = 600V$ $T_{vj} = 125^{\circ}C$		2.03		
	$V_{GE} = \pm 15V$ $T_{vj} = 150^{\circ}C$		1.64		
Trr	$I_F = 150A, -di_F/dt = 1300A/\mu s, V_R = 600V, V_{GE} = \pm 15V,$ $T_{vj} = 25^{\circ}C$		93	ns	
R_{thJC}	per diode			0.31	$^{\circ}C/W$
R_{thCH}	per diode		0.13		$^{\circ}C/W$
$T_{vj op}$		-40		150	$^{\circ}C$

■ Module Ratings & Characteristics

Characteristics	Symbol	Test Conditions	Value	Unit
Material of module baseplate			Cu	
Internal isolation		basic insulation (class 1, IEC 61140)	Al_2O_3	
Creepage distance		terminal to heatsink	17	mm
		terminal to terminal	20	
Clearance		terminal to heatsink	17	mm
		terminal to terminal	9.5	
Comperative tracking index	CTI		>200	

Typical Characteristics
Preliminary Data
Fig.1 Output characteristic IGBT, Inverter (typical)

Fig.2 Output characteristic IGBT, Inverter (typical)

Fig.3 Transfer characteristic IGBT, Inverter (typical)

Fig.4 Switching losses IGBT, Inverter (typical)

Fig.5 Switching losses IGBT, Inverter (typical)

Fig.6 Transient thermal impedance IGBT, Inverter

Fig.7 Reverse bias safe operating area IGBT, Inverter (RBSOA)

Fig.8 Output characteristic IGBT, Inverter (typical)


Typical Characteristics
Preliminary Data
Fig.9 Gate Charge Characteristics(typical)

Fig.10 Forward characteristic of Diode, Inverter (typical)

Fig.11 Switching losses Diode, Inverter (typical)

Fig.12 Switching losses Diode, Inverter (typical)

Fig.13 Transient thermal impedance Diode, Inverter


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