

## 62mm Half Bridge IGBT Module

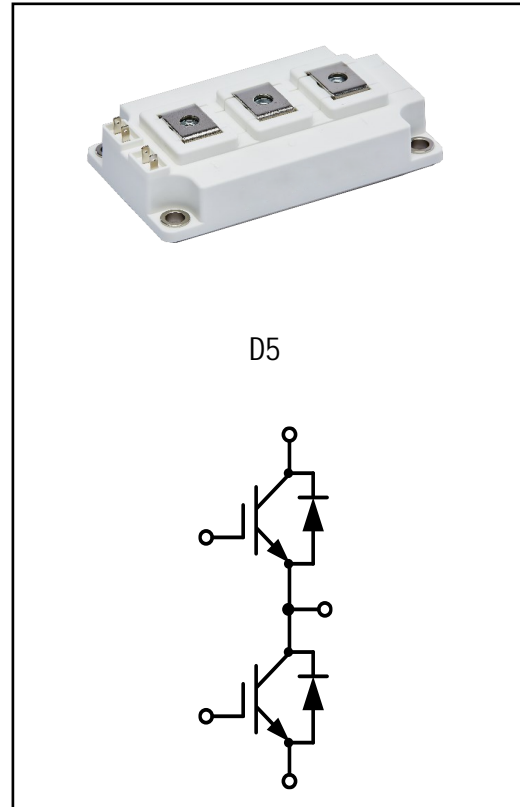
$V_{CES} = 1200V$ ,  $I_{C\ nom} = 200A$  /  $I_{CRM} = 400A$

### Electrical characteristics :

- 1200V Trench /Field Stop process
- Low switching losses
- $V_{cesat}$  has a positive temperature coefficient

### Applications:

- Variable Frequency Drive
- UPS
- Servo drive
- inverter



## IGBT, Inverter

### Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Collector-Emitter voltage	$T_{vj} = 25^{\circ}C$	$V_{CES}$	1200	V
Continuous DC collector current	$T_c = 100^{\circ}C$ , $T_{vj\ max} = 175^{\circ}C$	$I_{C\ nom}$	200	A
Repetitive peak collector current	$t_p = 1\ ms$	$I_{CRM}$	400	A
Gate emitter voltage		$V_{GE}$	$\pm 20$	V

## Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Collector-Emitter saturation voltage	$V_{GE}=15V, I_C=200A$	$T_{vj}=25^{\circ}C$		2.02	2.6	V
	$V_{GE}=15V, I_C=200A$	$T_{vj}=125^{\circ}C$		2.36		
	$V_{GE}=15V, I_C=200A$	$T_{vj}=150^{\circ}C$		2.44		
Gate-Emitter threshold voltage	$I_C=8mA, V_{GE}=V_{CE}$	$T_{vj}=25^{\circ}C$	$V_{GE(th)}$	5.2	5.8	6.4
Gate charge	$V_{GE}=-15V...+15V$		$Q_G$		1.04	$\mu C$
Internal gate resistor			$R_{Gint}$		3.70	$\Omega$
Input capacitance	$f=100KHz, V_{CE}=25V, V_{GE}=0V$	$T_{vj}=25^{\circ}C$	$C_{ies}$		11.69	nF
Reverse transfer capacitance			$C_{res}$		0.49	nF
Collector-emitter cut-off current	$V_{CE}=1200V, V_{GE}=0V$	$T_{vj}=25^{\circ}C$	$I_{CES}$		2	mA
Gate-emitter leakage current	$V_{CE}=0V, V_{GE}=20V$	$T_{vj}=25^{\circ}C$	$I_{GES}$		200	nA
Turn-on delay time	$I_C=200A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=6.8\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$	$t_{d\ on}$		170	
		$T_{vj}=125^{\circ}C$			173	
		$T_{vj}=150^{\circ}C$			179	
Rise time	$I_C=200A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=6.8\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$	$t_r$		69	ns
		$T_{vj}=125^{\circ}C$			71	
		$T_{vj}=150^{\circ}C$			72	
Turn-off delay time	$I_C=200A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=6.8\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$	$t_{d\ off}$		324	
		$T_{vj}=125^{\circ}C$			377	
		$T_{vj}=150^{\circ}C$			395	
Fall time	$I_C=200A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=6.8\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$	$t_f$		38	
		$T_{vj}=125^{\circ}C$			83	
		$T_{vj}=150^{\circ}C$			99	
Turn-on energy loss per pulse	$I_C=200A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=6.8\Omega$ $di/dt = 2100A/\mu s$ ( $T_{vj} = 150^{\circ}C$ ) (inductive load)	$T_{vj}=25^{\circ}C$	$E_{on}$		24.11	mJ
		$T_{vj}=125^{\circ}C$			31.54	
		$T_{vj}=150^{\circ}C$			33.55	
Turn-off energy loss per pulse	$I_C=200A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=6.8\Omega$ $dv/dt = 5500V/\mu s$ ( $T_{vj} = 150^{\circ}C$ ) (inductive load)	$T_{vj}=25^{\circ}C$	$E_{off}$		7.86	
		$T_{vj}=125^{\circ}C$			11.23	
		$T_{vj}=150^{\circ}C$			12.73	
SC data	$V_{GE}\leq 15V, V_{ce}=800V$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt$ $t_p\leq 10\mu s, T_{vj}=150^{\circ}C$		$I_{sc}$		800	A
Temperature under switching conditions			$T_{vj\ op}$	-40	150	$^{\circ}C$

## Diode, Inverter

### Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Repetitive peak reverse voltage	$T_{vj}=25^{\circ}\text{C}$	$V_{RRM}$	1200	V
Continuous DC forward current		$I_F$	200	A
Repetitive peak forward current	$t_p=1\text{ms}$	$I_{FRM}$	400	A
$I^2t$ -value	$t_p=10\text{ms}$ , $\sin 180^{\circ}$ , $T_j=125^{\circ}\text{C}$	$I^2t$	7000	$\text{A}^2\text{S}$

### Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Forward voltage	$I_F=200\text{A}$ , $V_{GE}=0\text{V}$ $T_{vj}=25^{\circ}\text{C}$	$V_F$		2.16	2.8	V
	$I_F=200\text{A}$ , $V_{GE}=0\text{V}$ $T_{vj}=125^{\circ}\text{C}$		2.11			
	$I_F=200\text{A}$ , $V_{GE}=0\text{V}$ $T_{vj}=150^{\circ}\text{C}$		2.02			
Peak reverse recovery current	$I_F=200\text{A}$ , $-di_F/dt=2100\text{A}/\mu\text{s}$ ( $T_{vj}=150^{\circ}\text{C}$ ) $V_R=600\text{V}$ , $V_{GE}=-15\text{V}$ $T_{vj}=25^{\circ}\text{C}$	$I_{RM}$		57	A	
	$T_{vj}=125^{\circ}\text{C}$		77			
	$T_{vj}=150^{\circ}\text{C}$		83			
Recovered charge	$I_F=200\text{A}$ , $-di_F/dt=2100\text{A}/\mu\text{s}$ ( $T_{vj}=150^{\circ}\text{C}$ ) $V_R=600\text{V}$ , $V_{GE}=-15\text{V}$ $T_{vj}=25^{\circ}\text{C}$	$Q_r$		9.99	$\mu\text{C}$	
	$T_{vj}=125^{\circ}\text{C}$		22.24			
	$T_{vj}=150^{\circ}\text{C}$		24.81			
Reverse recovered energy	$I_F=200\text{A}$ , $-di_F/dt=2100\text{A}/\mu\text{s}$ ( $T_{vj}=150^{\circ}\text{C}$ ) $V_R=600\text{V}$ , $V_{GE}=-15\text{V}$ $T_{vj}=25^{\circ}\text{C}$	$E_{rec}$		2.70	mJ	
	$T_{vj}=125^{\circ}\text{C}$		6.74			
	$T_{vj}=150^{\circ}\text{C}$		7.54			
Temperature under switching conditions		$T_{vj\text{ op}}$	-40		150	$^{\circ}\text{C}$

## Module

Parameter	Conditions	Symbol	Value	Unit
Isolation test voltage	RMS, $f=50\text{Hz}$ , $t=1\text{min}$	$V_{ISOL}$	4000	V
Internal isolation			$\text{Al}_2\text{O}_3$	
Storage temperature		$T_{stg}$	-40	125 $^{\circ}\text{C}$
Mounting torque for modul mounting		M	3.0	6.0 Nm
Weight		W	324	g

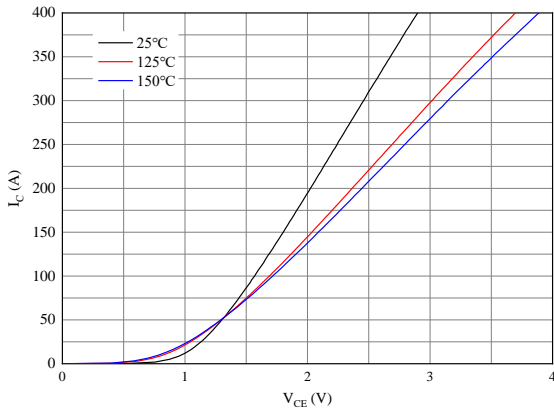


Fig 1. Typical output characteristics ( $V_{GE}=15V$ )

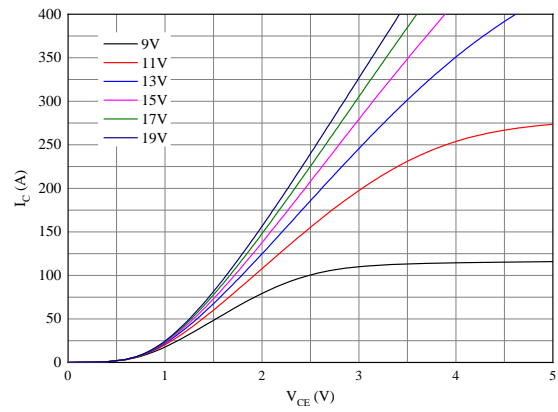


Fig 2. Typical output characteristics ( $T_{vj}=150^{\circ}C$ )

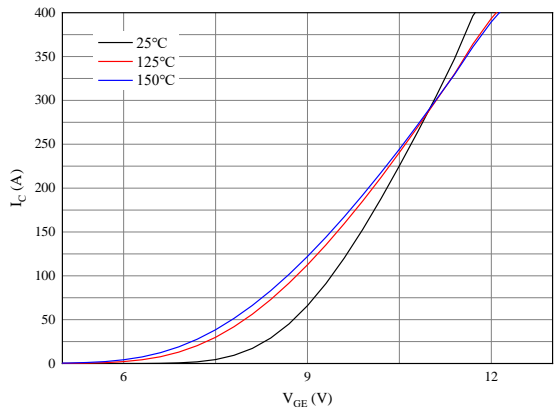


Fig 3. Typical transfer characteristic ( $V_{CE}=20V$ )

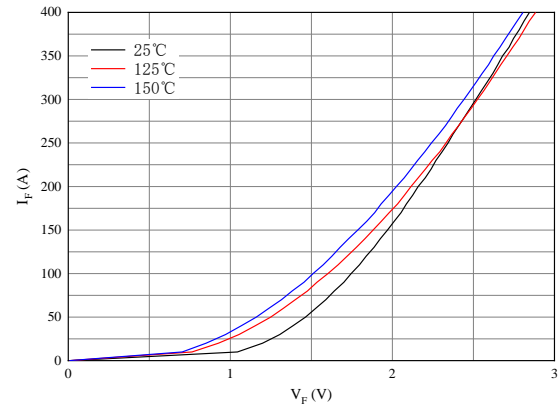


Fig 4. Forward characteristic of Diode

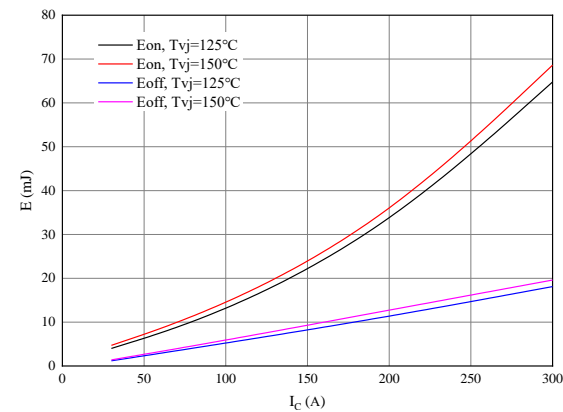


Fig 5. Switching losses of IGBT  
 $V_{GE}=\pm 15V$ ,  $R_{Gon}=6.8\Omega$ ,  $R_{Goff}=6.8\Omega$ ,  $V_{CE}=600V$

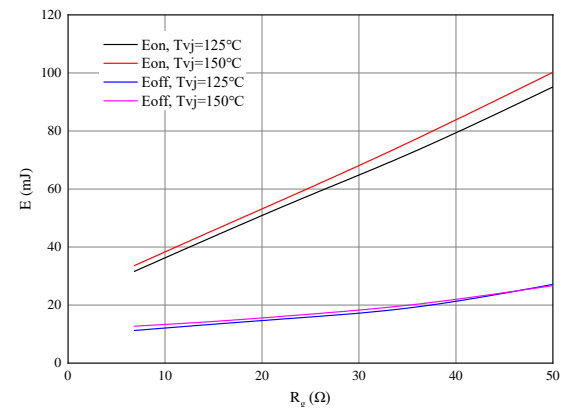
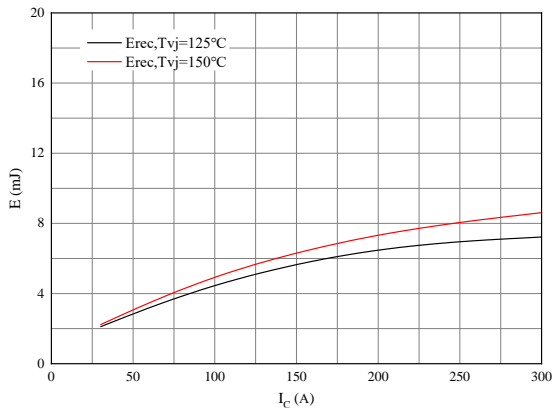
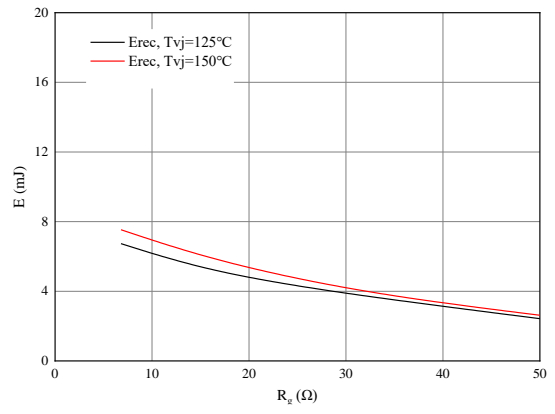


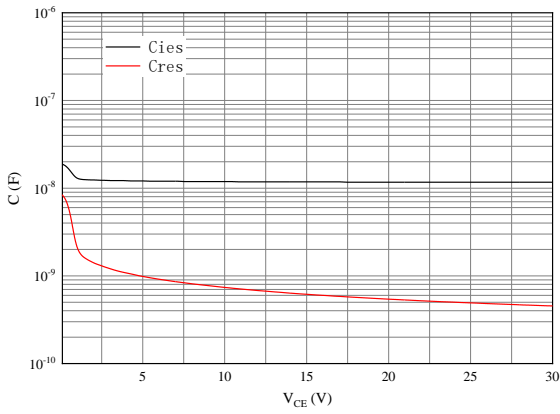
Fig 6. Switching losses of IGBT  
 $V_{GE}=\pm 15V$ ,  $I_C=200A$ ,  $V_{CE}=600V$



**Fig 7. Switching losses of Diode**  
 $R_{Gon}=6.8\ \Omega$ ,  $V_{CE}=600\text{V}$

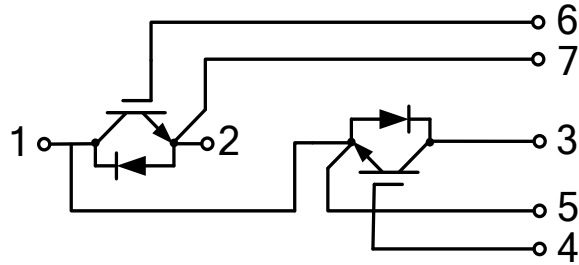


**Fig 8. Switching losses of Diode**  
 $I_F=200\text{A}$ ,  $V_{CE}=600\text{V}$



**Fig 9. Capacitance characteristic**

**Circuit diagram**



**Package outlines**

