

## 62mm Half Bridge IGBT Module

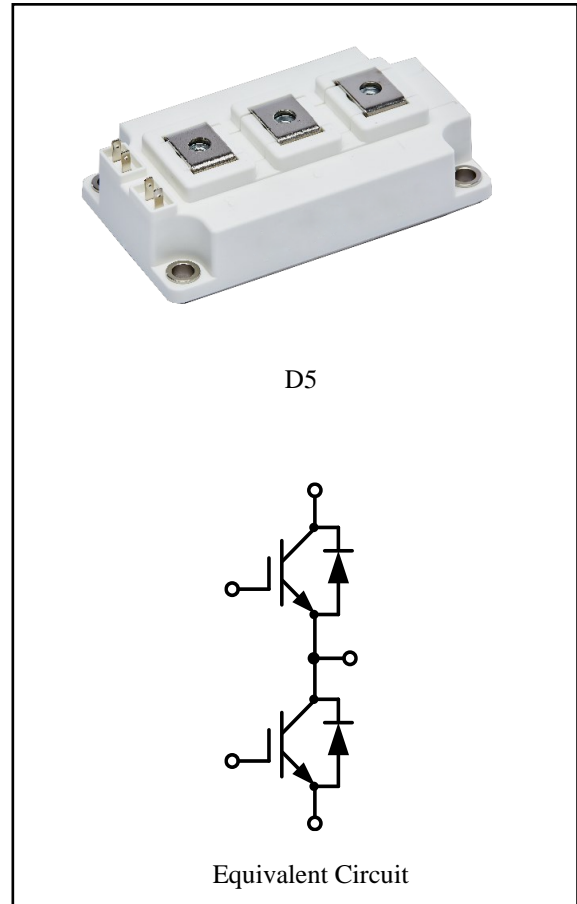
$V_{CES}=1200V$ ,  $I_{C\ nom}=450A$  /  $I_{CRM}=900A$

### 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	$T_C=100^{\circ}C$ , $T_{vj\ max}=175^{\circ}C$	$I_{C\ nom}$	450	A
Repetitive peak collector current	$t_p=1\ ms$	$I_{CRM}$	900	A
Total power dissipation	$T_C = 25^{\circ}C$ , $T_{vj\ max} = 175^{\circ}C$	$P_{tot}$	2400	W
Gate emitter voltage		$V_{GE}$	$\pm 20$	V

**Characteristic Values**

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Collector-Emitter saturation voltage	$V_{GE}=15V, I_C=450A$ $T_{vj}=25^{\circ}C$ $V_{GE}=15V, I_C=450A$ $T_{vj}=125^{\circ}C$ $V_{GE}=15V, I_C=450A$ $T_{vj}=150^{\circ}C$	$V_{CEsat}$		2.15 2.72 2.86	2.55	V
Gate-Emitter threshold voltage	$I_C=17mA, V_{GE}=V_{CE}$ $T_{vj}=25^{\circ}C$	$V_{GE(th)}$	5.20	5.80	6.40	
Gate charge	$V_{GE}=-15V...+15V$	$Q_G$		2.20		$\mu C$
Internal gate resistor		$R_{Gint}$		2.10		$\Omega$
Input capacitance	$f=1MHz, V_{CE}=25V, V_{GE}=0V$ $T_{vj}=25^{\circ}C$	$C_{ies}$		31.10		nF
Reverse transfer capacitance		$C_{res}$			1.10	
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	$I_C=450A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=1\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$	$t_{don}$		160 180 185		ns
Rise time	$I_C=450A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=1\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$	$t_r$		60 65 70		
Turn-off delay time	$I_C=450A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=1\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$	$t_{doff}$		270 300 310		
Fall time	$I_C=450A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=1\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$	$t_f$		200 210 250		
Turn-on energy loss per pulse	$I_C=450A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=1\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$	$E_{on}$		16.70 28.60 35.90		
Turn-off energy loss per pulse	$I_C=450A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=1\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$	$E_{off}$		40.90 44.70 48.30		
SC data	$V_{GE}\leq 15V, V_{cc}=800V$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt$ $t_p\leq 10\mu s, T_{vj}=150^{\circ}C$	$I_{sc}$		1600		A
Thermal resistance, junction to case	per IGBT	$R_{thJC}$			0.062	K/W
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		$I_F$	450	A
Repetitive peak forward current	$t_p=1\text{ms}$	$I_{FRM}$	900	A
$I^2t$ -value	$t_p=10\text{ms}$ , $\sin 180^{\circ}$ , $T_j=125^{\circ}\text{C}$	$I^2t$	6000	$\text{A}^2\text{s}$

### Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Forward voltage	$I_F=450\text{A}$ , $V_{GE}=0\text{V}$ $T_{vj}=25^{\circ}\text{C}$	$V_F$		2.38	2.80	V
	$I_F=450\text{A}$ , $V_{GE}=0\text{V}$ $T_{vj}=125^{\circ}\text{C}$		2.55			
	$I_F=450\text{A}$ , $V_{GE}=0\text{V}$ $T_{vj}=150^{\circ}\text{C}$		2.47			
Peak reverse recovery current	$I_F=450\text{A}$ $T_{vj}=25^{\circ}\text{C}$	$I_{RM}$		285	A	
	$-di_F/dt=5300\text{A}/\mu\text{s}$ ( $T_{vj}=150^{\circ}\text{C}$ ) $T_{vj}=125^{\circ}\text{C}$		315			
	$V_R=600\text{V}$ , $V_{GE}=-15\text{V}$ $T_{vj}=150^{\circ}\text{C}$		325			
Recovered charge	$I_F=450\text{A}$ $T_{vj}=25^{\circ}\text{C}$	$Q_F$		29.0	$\mu\text{C}$	
	$-di_F/dt=5300\text{A}/\mu\text{s}$ ( $T_{vj}=150^{\circ}\text{C}$ ) $T_{vj}=125^{\circ}\text{C}$		42.0			
	$V_R=600\text{V}$ , $V_{GE}=-15\text{V}$ $T_{vj}=150^{\circ}\text{C}$		60.0			
Reverse recovered energy	$I_F=450\text{A}$ $T_{vj}=25^{\circ}\text{C}$	$E_{rec}$		15.0	mJ	
	$-di_F/dt=5300\text{A}/\mu\text{s}$ ( $T_{vj}=150^{\circ}\text{C}$ ) $T_{vj}=125^{\circ}\text{C}$		20.0			
	$V_R=600\text{V}$ , $V_{GE}=-15\text{V}$ $T_{vj}=150^{\circ}\text{C}$		27.0			
Thermal resistance, junction to case	per diode	$R_{thJC}$			0.11	K/W
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	317	g

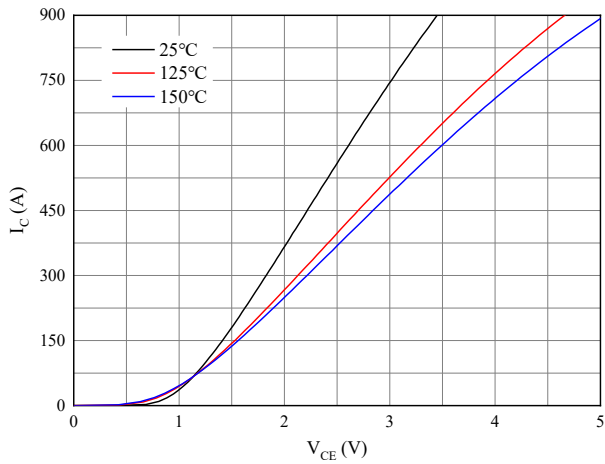


Fig 1. Typical output characteristics ( $V_{GE}=15V$ )

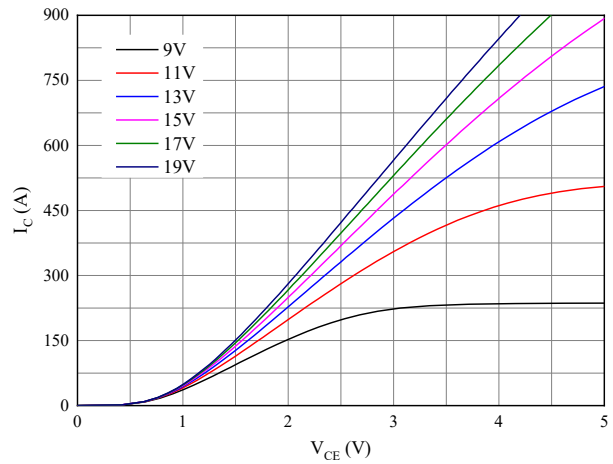


Fig 2. Typical output characteristics ( $T_{vj}=150^{\circ}C$ )

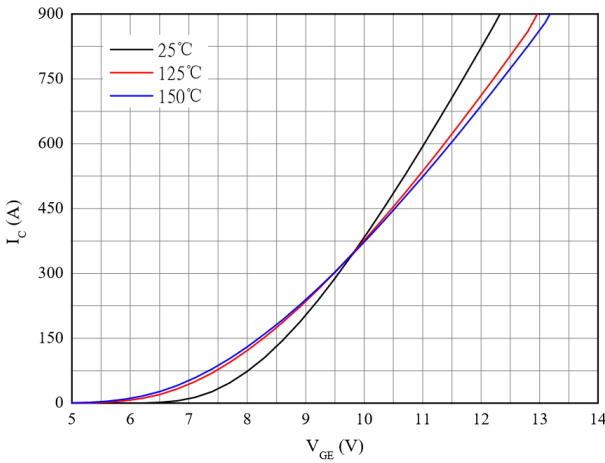


Fig 3. Typical transfer characteristic ( $V_{CE}=20V$ )

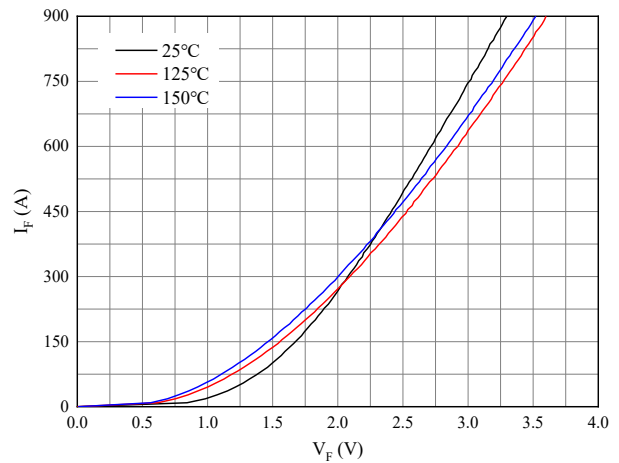


Fig 4. Forward characteristic of Diode

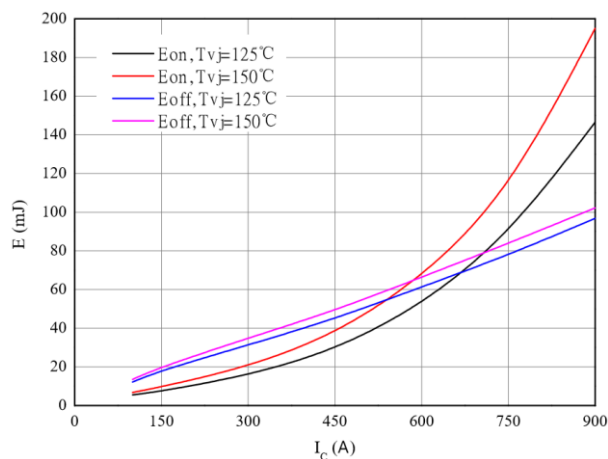


Fig 5. Switching losses of IGBT  
 $V_{GE}=\pm 15V, R_{Gon}=1\Omega, R_{Goff}=1\Omega, V_{CE}=600V$

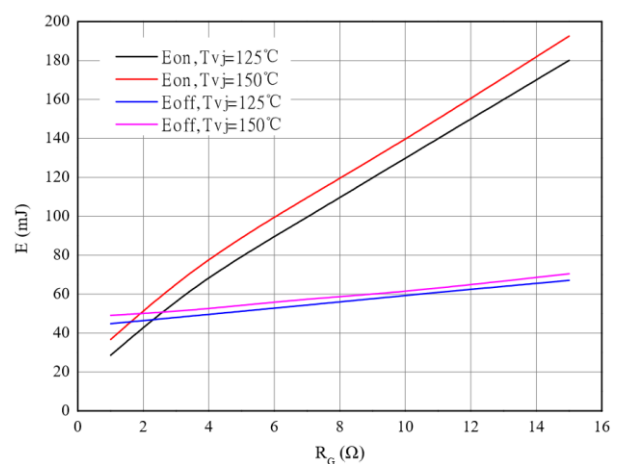
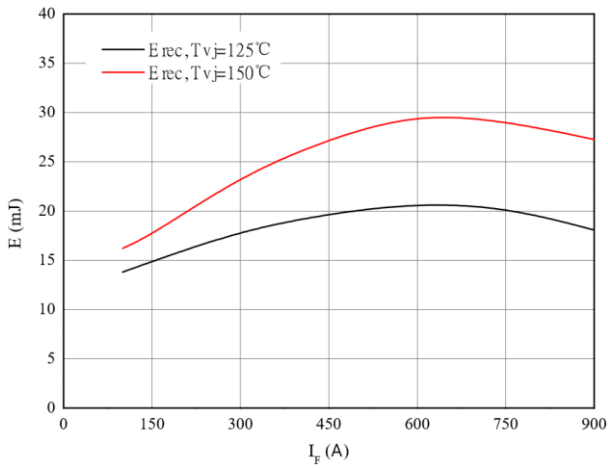
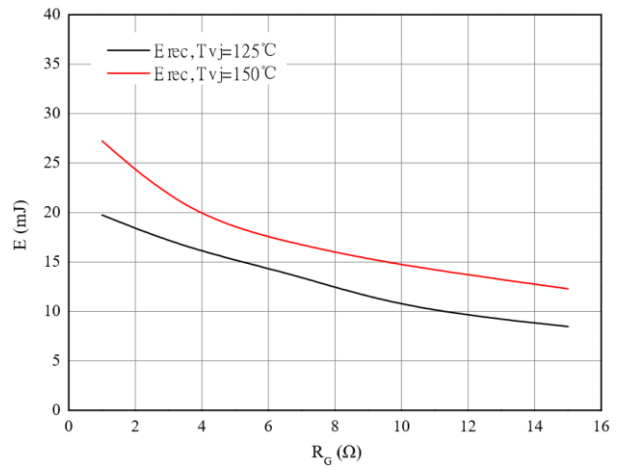


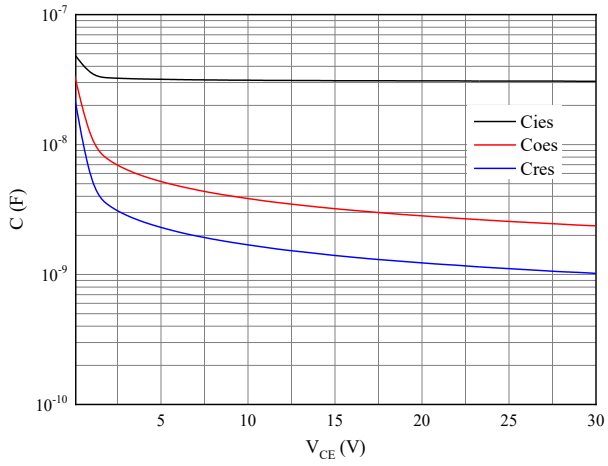
Fig 6. Switching losses of IGBT  
 $V_{GE}=\pm 15V, I_C=450A, V_{CE}=600V$



**Fig 7. Switching losses of Diode**  
 $R_{Gon}=1\Omega, V_{CE}=600V$

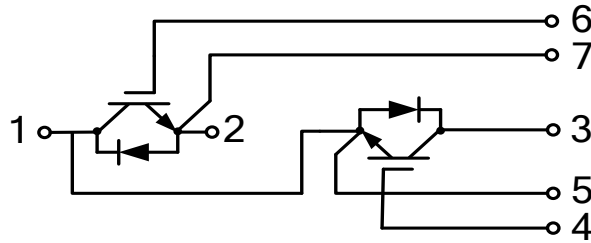


**Fig 8. Switching losses of Diode**  
 $I_F=450A, V_{CE}=600V$



**Fig 9. Capacitance characteristic**

**Circuit diagram**



**Package outlines**

