

62mm Half Bridge IGBT Module

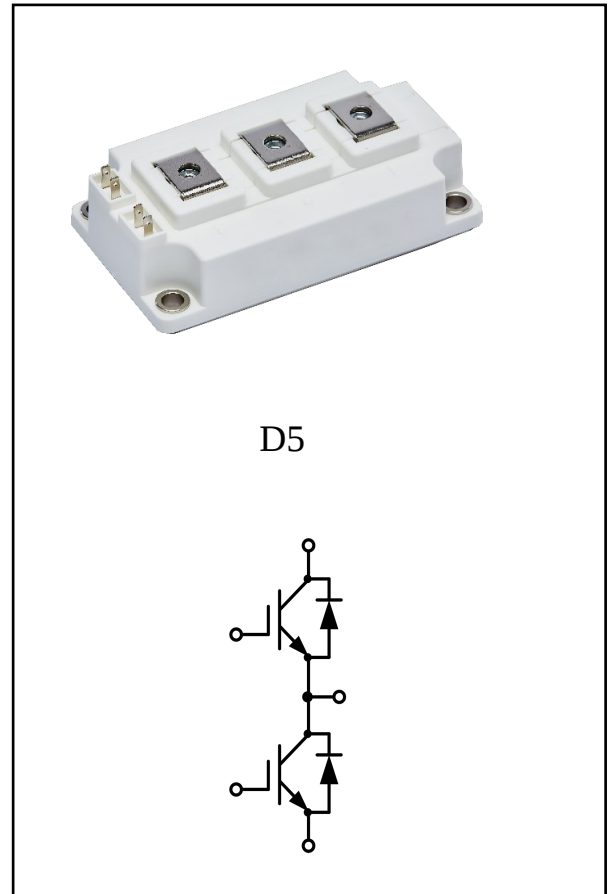
$V_{CES}=1200V$, $I_{C\text{nom}}=200A$ / $I_{CRM}=400A$

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	$T_C=100^{\circ}C$, $T_{vj\text{max}}=175^{\circ}C$	$I_{C\text{nom}}$	200	A
Repetitive peak collector current	$t_p=1\text{ ms}$	I_{CRM}	400	A
Gate emitter voltage		V_{GE}	± 20	V

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Collector-Emitter saturation voltage	$V_{GE}=15V, I_C=200A$ $T_{vj}=25^{\circ}C$ $V_{GE}=15V, I_C=200A$ $T_{vj}=125^{\circ}C$ $V_{GE}=15V, I_C=200A$ $T_{vj}=150^{\circ}C$	V_{CEsat}		1.84 2.10 2.15	2.20	V
Gate-Emitter threshold voltage	$I_C=7.6mA, V_{GE}=V_{CE}$ $T_{vj}=25^{\circ}C$	$V_{GE(th)}$	5.3	5.9	6.5	
Gate charge	$V_{GE}=-15V \dots +15V$	Q_G		1.58		μC
Internal gate resistor		R_{Gint}		3.65		Ω
Input capacitance	$f=1MHz, V_{CE}=25V, V_{GE}=0V$ $T_{vj}=25^{\circ}C$	C_{ies}		17.33		nF
Reverse transfer capacitance	$f=1MHz, V_{CE}=25V, V_{GE}=0V$ $T_{vj}=25^{\circ}C$	C_{res}		0.70		nF
Collector-emitter cut-off current	$V_{CE}=1200V, V_{GE}=0V$ $T_{vj}=25^{\circ}C$	I_{CES}			1	mA
Gate-emitter leakage current	$V_{CE}=0V, V_{GE}=20V$ $T_{vj}=25^{\circ}C$	I_{GES}			200	nA
Turn-on delay time	$I_C=200A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=2.5\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$	t_{don}		211 227 225		ns
Rise time	$I_C=200A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=2.5\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$	t_r		102 104 112		
Turn-off delay time	$I_C=200A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=2.5\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$	t_{doff}		361 417 433		
Fall time	$I_C=200A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=2.5\Omega$ $T_{vj}=125^{\circ}C$ (inductive load) $T_{vj}=150^{\circ}C$	t_f		99 134 185		
Turn-on energy loss per pulse	$I_C=200A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=2.5\Omega$ $T_{vj}=125^{\circ}C$ $di/dt=1500A/\mu s(T_{vj}=150^{\circ}C)$ $T_{vj}=150^{\circ}C$ (inductive load)	E_{on}		19.97 26.44 27.89		mJ
Turn-off energy loss per pulse	$I_C=200A, V_{CE}=600V$ $T_{vj}=25^{\circ}C$ $V_{GE}=\pm 15V, R_G=2.5\Omega$ $T_{vj}=125^{\circ}C$ $du/dt=4500V/\mu s(T_{vj}=150^{\circ}C)$ $T_{vj}=150^{\circ}C$ (inductive load)	E_{off}		13.08 17.99 18.75		
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}		1264		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	10937	A^2S

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Forward voltage	$I_F=200\text{A}$, $V_{GE}=0\text{V}$ $T_{vj}=25^{\circ}\text{C}$ $I_F=200\text{A}$, $V_{GE}=0\text{V}$ $T_{vj}=125^{\circ}\text{C}$ $I_F=200\text{A}$, $V_{GE}=0\text{V}$ $T_{vj}=150^{\circ}\text{C}$	V_F		2.42 2.55 2.43	2.90	V
Peak reverse recovery current	$I_F=200\text{A}$, $T_{vj}=25^{\circ}\text{C}$ $-di_F/dt=1500\text{A}/\mu\text{s}$ ($T_{vj}=150^{\circ}\text{C}$) $T_{vj}=125^{\circ}\text{C}$ $V_R=600\text{V}$, $V_{GE}=-15\text{V}$ $T_{vj}=150^{\circ}\text{C}$	I_{RM}		90 115 128		A
Recovered charge	$I_F=200\text{A}$, $T_{vj}=25^{\circ}\text{C}$ $-di_F/dt=1500\text{A}/\mu\text{s}$ ($T_{vj}=150^{\circ}\text{C}$) $T_{vj}=125^{\circ}\text{C}$ $V_R=600\text{V}$, $V_{GE}=-15\text{V}$ $T_{vj}=150^{\circ}\text{C}$	Q_r		9.19 19.91 24.39		μC
Reverse recovered energy	$I_F=200\text{A}$, $T_{vj}=25^{\circ}\text{C}$ $-di_F/dt=1500\text{A}/\mu\text{s}$ ($T_{vj}=150^{\circ}\text{C}$) $T_{vj}=125^{\circ}\text{C}$ $V_R=600\text{V}$, $V_{GE}=-15\text{V}$ $T_{vj}=150^{\circ}\text{C}$	E_{rec}		3.15 7.56 9.32		mJ
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			Al_2O_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

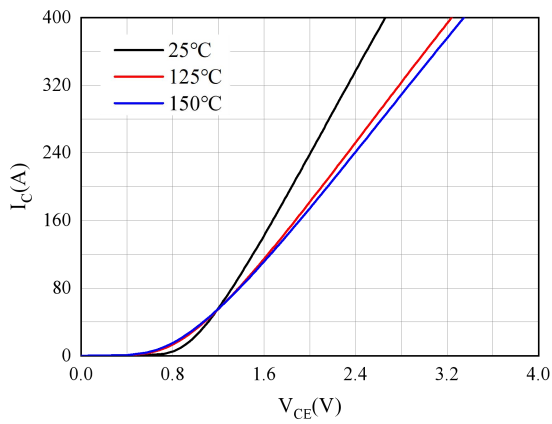


Fig 1. Typical output characteristics ($V_{GE}=15V$)

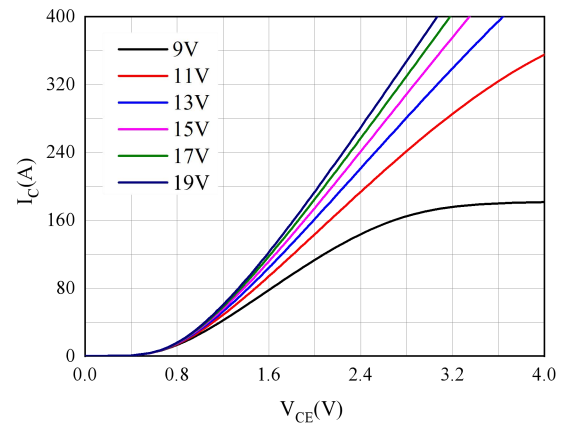


Fig2. Typical output characteristics ($T_{vj}=150^{\circ}C$)

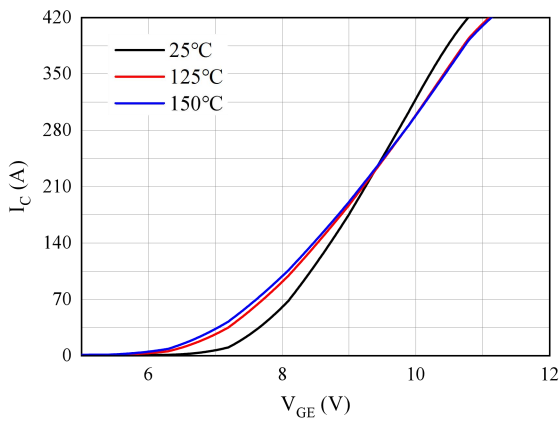


Fig 3. Typical transfer characteristic ($V_{CE}=20V$)

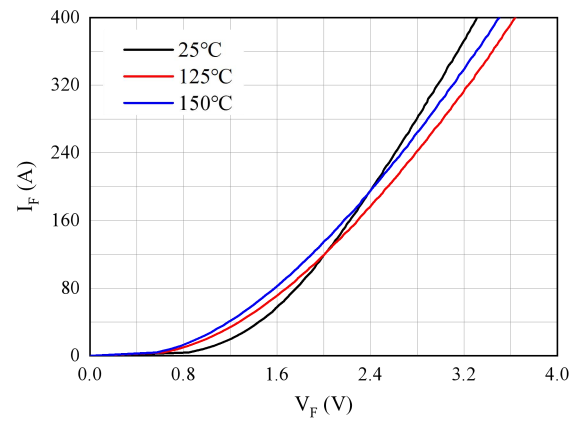


Fig 4. Forward characteristic of Diode

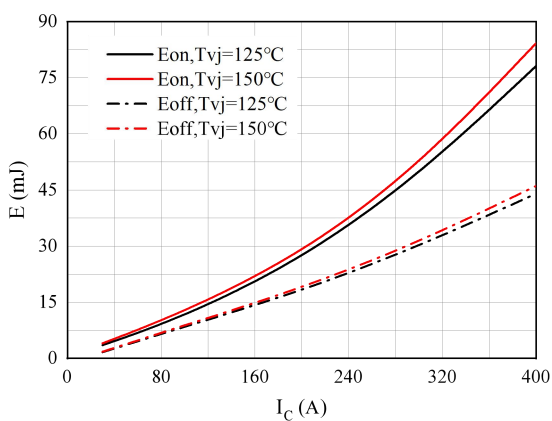


Fig 5. Switching losses of IGBT
 $V_{GE}=\pm 15V$, $R_{Gon}=2.5\Omega$, $R_{Goff}=2.5\Omega$, $V_{CE}=600V$

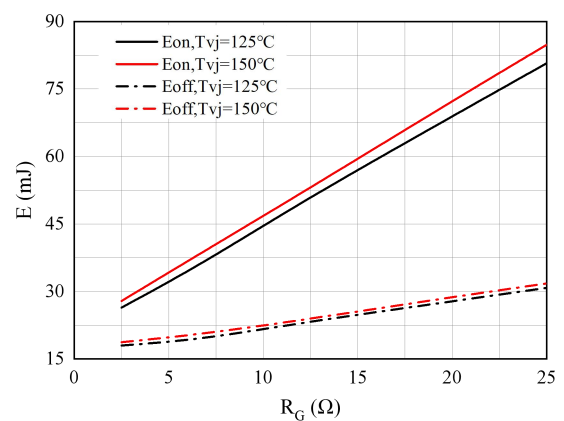


Fig 6. Switching losses of IGBT
 $V_{GE}=\pm 15V$, $I_C=200A$, $V_{CE}=600V$

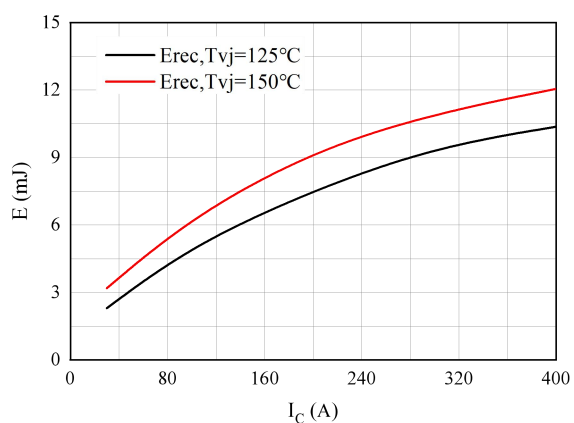


Fig 7. Switching losses of Diode
 $R_{Gon}=2.5\Omega$, $V_{CE}=600V$

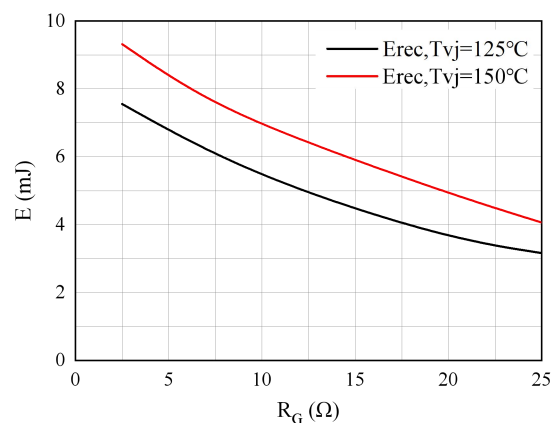


Fig 8. Switching losses of Diode
 $I_F=200A$, $V_{CE}=600V$

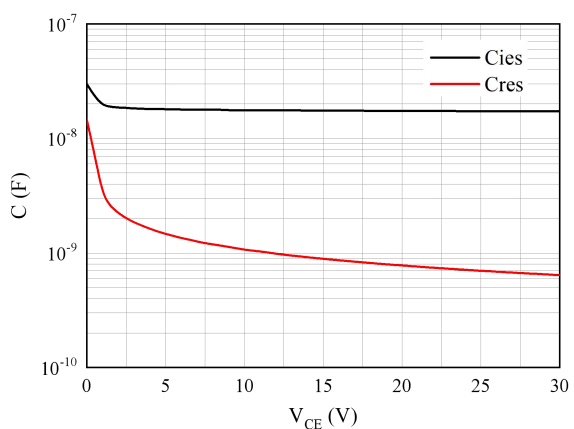
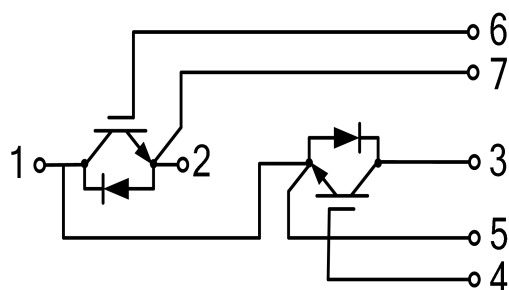


Fig 9. Capacitance characteristic

Circuit diagram



Package outlines

