

34mm Module with NPT IGBT and Fast recovery diode.

#### Feature

- 150A/600V,  $V_{CE(sat)(typ.)} = 1.9V@150A$
- Low loss
- Excellent short circuit ruggedness

#### Applications

- Inverter welding
- Inductive heating
- Uninterrupted Power Supply(UPS)

#### Appearance



#### Maximum Ratings of IGBT ( $T_{vj}=25^{\circ}C$ unless otherwise noted )

Items	Symbol	Conditions	Maximum Rating	Units
Collector-emitter voltage	$V_{CES}$		650	V
Gate-emitter voltage	$V_{GES}$		$\pm 20$	V
Collector current	$I_C$	$T_{vj}=25^{\circ}C$	210	A
		$T_{vj}=100^{\circ}C$	150	A
Pulsed collector current	$I_{CM}$	$t_p=1ms$	300	A
Short circuit current	$I_{sc}$	$V_{GE} \leq 15V, V_{CC}=300V, t_p=10\mu s$ $V_{CEmax}=V_{CES}-L_s \cdot di/dt$	1350	A
Maximum power dissipation	$P_D$	$T_c=25^{\circ}C, T_{vj}=150^{\circ}C$	576	W

#### Electrical Characteristics of IGBT ( $T_{vj}=25^{\circ}C$ unless otherwise noted )

Items	Symbol	Conditions	Min.	typ.	Max.	Units
Collector-emitter breakdown voltage	$V_{CES}$	$V_{GE}=0V, I_C=250\mu A$	600			V
Collector -emitter leakage current	$I_{CES}$	$V_{CE}=600V, V_{GE}=0V$			5.0	mA
Gate leakage current, forward	$I_{GES}$	$V_{GE}=30V, V_{CE}=0V$			400	nA
		$V_{GE}=-30V, V_{CE}=0V$			-400	nA
Gate threshold voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=1.5mA$	3.5		5.70	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=150A, T_{vj}=25^{\circ}C$		1.90		V
		$V_{GE}=15V, I_C=150A, T_{vj}=125^{\circ}C$		2.20		V
Integrated gate resistor	$R_{Gint}$	$f=1M; V_{pp}=1V$		tb.		$\Omega$
Input capacitance	$C_{ies}$	$V_{CE}=25V$		8.60		nF
Output capacitance	$C_{oes}$	$V_{GE}=0V$		0.70		nF
Reverse transfer capacitance	$C_{res}$	$f=1MHz$		0.32		nF
Total gate charge	$Q_g$	$V_{CC}=300V, V_{GE}=15V, I_C=150A$		0.54		nC
Turn-on delay time	$t_{d(on)}$	$V_{CC}=300V$		302		ns
Rise time	$t_r$	$V_{GE}=\pm 15V$		110		ns
Turn-off delay time	$t_{d(off)}$	$I_C=150A$		298		ns
Fall time	$t_f$	$R_G=10\Omega$		89		ns
Turn-on energy loss per pulse	$E_{on}$	Inductive Load		2.77		mJ
Turn-off energy loss per pulse	$E_{off}$	$T_{vj}=25^{\circ}C$		3.12		mJ
Turn-on delay time	$t_{d(on)}$	$V_{CC}=300V$		319		ns
Rise time	$t_r$	$V_{GE}=\pm 15V$		114		ns
Turn-off delay time	$t_{d(off)}$	$I_C=150A$		312		ns
Fall time	$t_f$	$R_G=10\Omega$		111		ns
Turn-on energy loss per pulse	$E_{on}$	Inductive Load		2.98		mJ
Turn-off energy loss per pulse	$E_{off}$	$T_{vj}=125^{\circ}C$		4.27		mJ
Temperature under switching conditions	$T_{vj op}$		-55		150	$^{\circ}C$

#### Maximum Ratings of Diode

Items	Symbol	Conditions	Maximum Rating	Units
Repetitive peak reverse voltage	$V_{RRM}$	$T_{vj}=25^{\circ}C$	650	V
Diode continuous forward current	$I_F$	$T_{vj}=25^{\circ}C$	210	A
		$T_{vj}=100^{\circ}C$	150	A
Diode maximum forward current	$I_{FM}$	$t_p=1ms, T_{vj}=25^{\circ}C$	400	A

#### Electrical Characteristics of Diode ( $T_{vj}=25^{\circ}C$ unless otherwise noted)

Items	Symbol	Conditions	Min.	typ.	Max.	Units
Diode forward voltage	$V_F$	$I_F=150A, T_{vj}=25^{\circ}C$		1.35		V
		$I_F=150A, T_{vj}=125^{\circ}C$		1.33		V
Diode reverse recovery time	$t_{rr}$	$V_{CE}=300V$		tbd.		ns
Diode peak reverse recovery current	$I_{rr}$	$I_F=150A$		90		A
Diode reverse recovery charge	$Q_{rr}$	$dI_F/dt=-4400A/\mu s$		6.4		$\mu C$
Reverse recovery energy	$E_{rec}$	$T_{vj}=25^{\circ}C$		1.4		mJ
Diode reverse recovery time	$t_{rr}$	$V_{CE}=300V$		tbd.		ns
Diode peak reverse recovery current	$I_{rr}$	$I_F=150A$		100		A
Diode reverse recovery charge	$Q_{rr}$	$dI_F/dt=-4400A/\mu s$		9.1		$\mu C$
Reverse recovery energy	$E_{rec}$	$T_{vj}=125^{\circ}C$		2.16		mJ

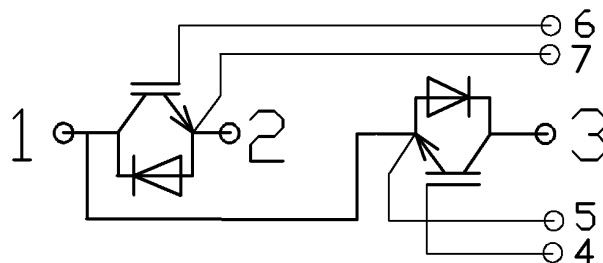
#### Thermal Characteristics

Items	Symbol	Min.	typ.	Max.	Units
Thermal resistance, junction to case for IGBT	$R_{thj-c}$			0.22	$^{\circ}C/W$
Thermal resistance, junction to case for Diode	$R_{thj-c}$			0.36	$^{\circ}C/W$
Thermal resistance, case to sink	$R_{thc-s}$		0.05		$^{\circ}C/W$

#### Module Characteristics

Items	Symbol	Conditions	Min.	typ.	Max.	Units
Material of module baseplate				Cu		
Internal isolation		terminal to terminal		$Al_2O_3$		
Isolation test voltage	$V_{isol}$	RMS, $f = 50\text{ Hz}$ , $t = 1\text{ min.}$	2.5			kV
Stray inductance module	$L_{sCE}$			30		nH
Mounting torque for modul mounting	M	Screw M6	3.0		5.0	Nm
Terminal connection torque	M	Screw M5	4.0		6.0	Nm
Storage temperature range	$T_{STG}$		-55		150	$^{\circ}C$
Weight of Module	$W_t$			160		g

#### Internal Circuit:



### Representative Characteristics

Fig 1. Output characteristic IGBT

$$I_C = f(V_{CE}), V_{GE} = 15V$$

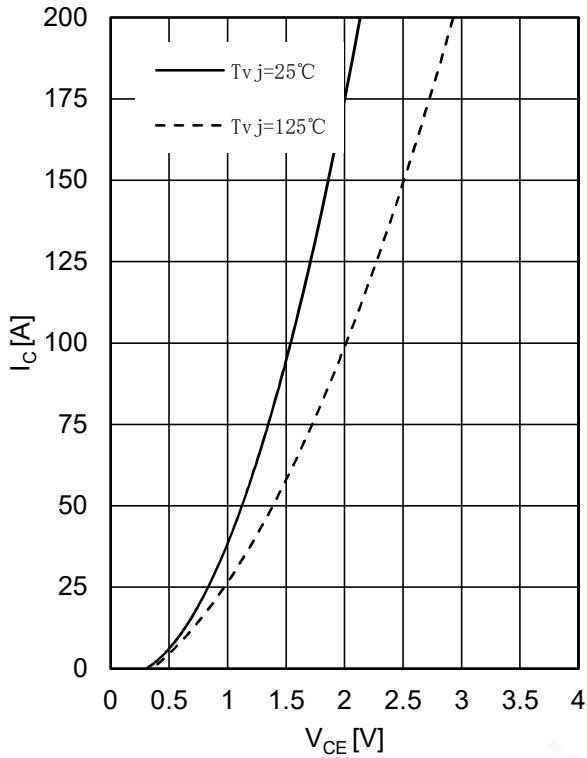


Fig 2. Transfer characteristic IGBT

$$I_C = f(V_{GE})$$

$$V_{CE} = 20V$$

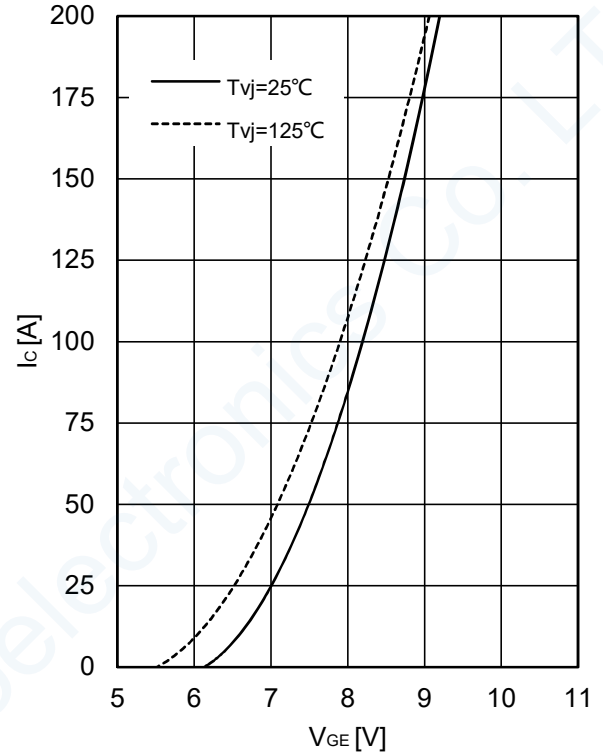


Fig 3. Switching losses IGBT

$$E_{on} = f(R_G), E_{off} = f(R_G)$$

$$V_{GE} = \pm 15V, I_C = 150A, V_{CE} = 300V$$

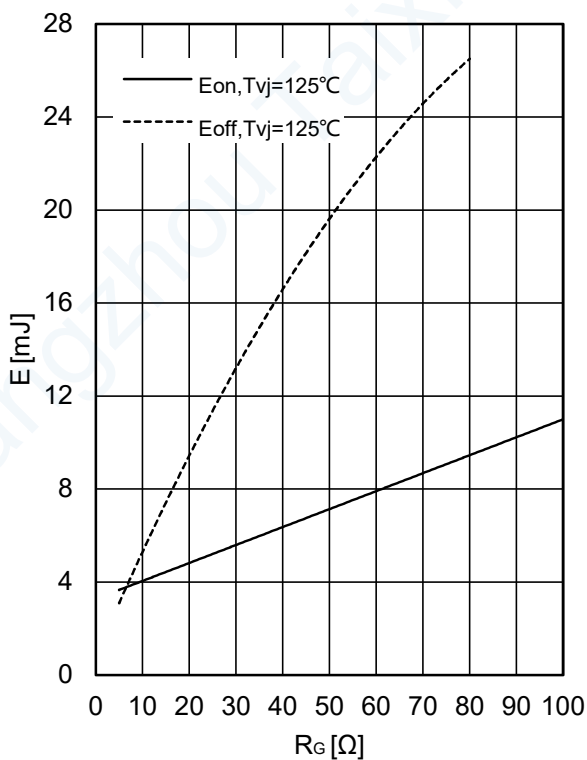


Fig 4. Switching losses IGBT

$$E_{on} = f(I_C), E_{off} = f(I_C)$$

$$V_{GE} = \pm 15V, R_G = 10\Omega, V_{CE} = 300V$$

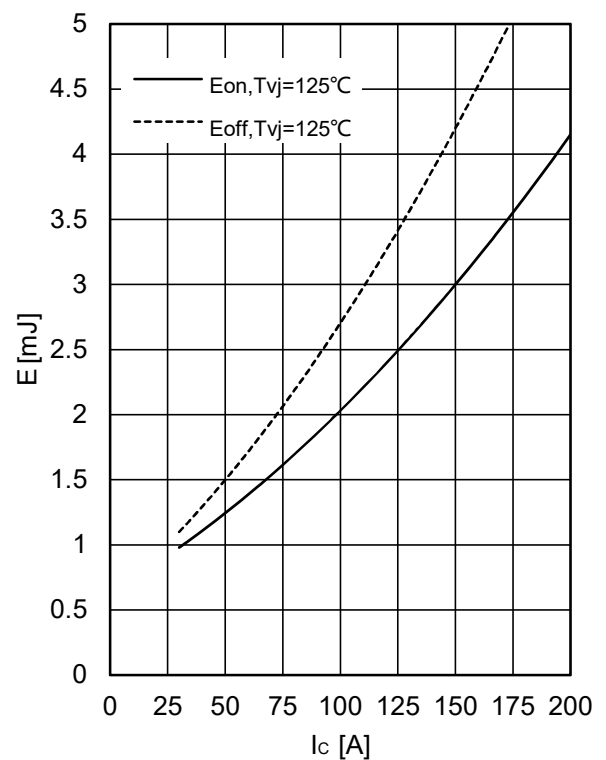


Fig 7. Reverse bias safe operating area IGBT,

$$I_C = f(V_{CE})$$

$$V_{GE} = \pm 15V, R_{Goff} = 2.2\Omega, T_{vj} = 125^\circ C$$

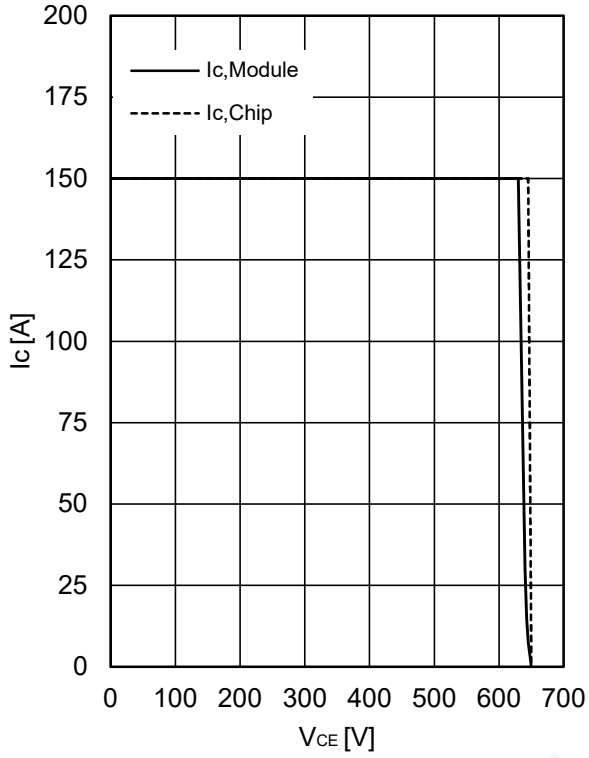
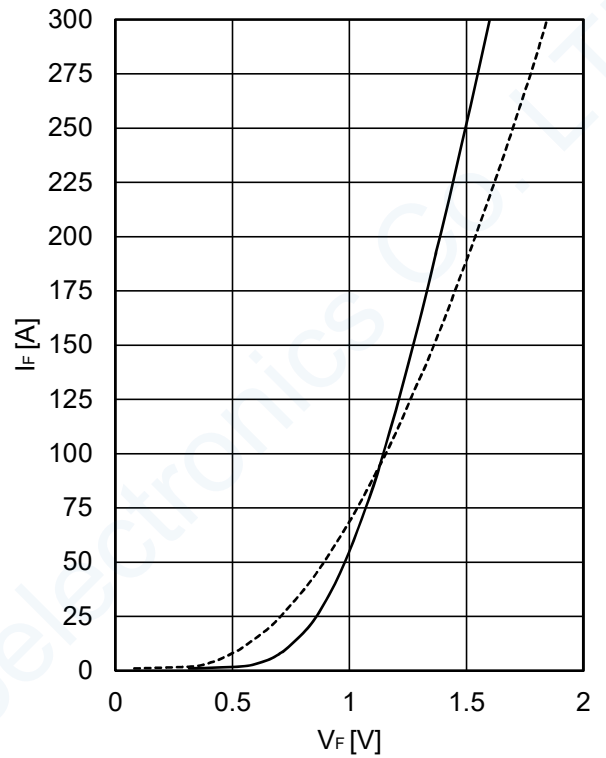


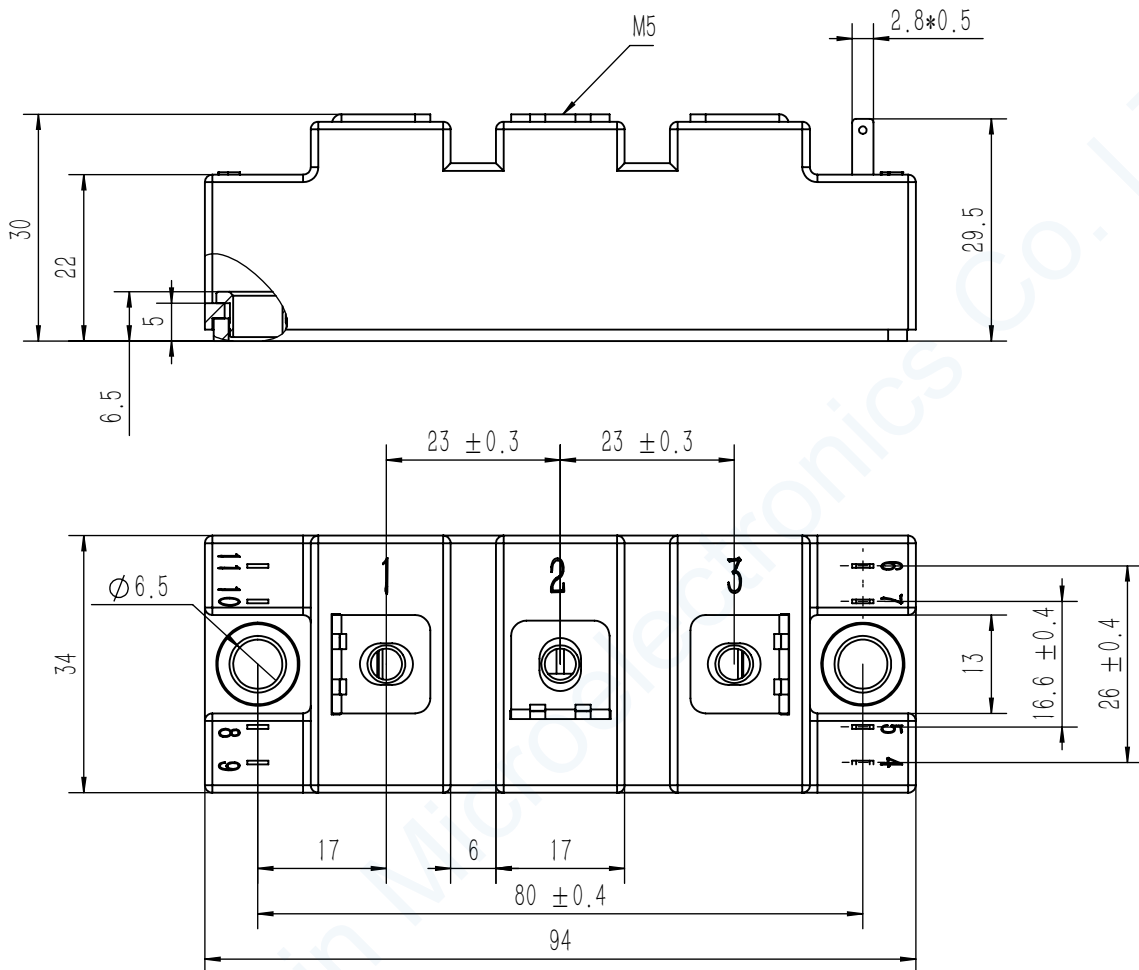
Fig 8. Forward characteristic of Diode

$$I_F = f(V_F)$$



#### Package Dimensions

Dimensions in Millimeters



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