

34mm Module with Trench IGBT and Fast recovery diode.

Feature

- 200A/650V, $V_{CE(sat)}(typ.) = 1.9V@150A$
- 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}		± 20	V
Collector current	I_C	$T_{vj}=25^{\circ}C$	300	A
		$T_{vj}=100^{\circ}C$	200	A
Pulsed collector current	I_{CM}	$t_p=1ms$	400	A
Short circuit current	I_{sc}	$V_{GE} \leq 15V, V_{CC}=300V, t_p=10\mu s$ $V_{CEmax}=V_{CES}-L_{sCE} \cdot di/dt$	1110	A
Maximum power dissipation	P_D	$T_c=25^{\circ}C, T_{vj}=150^{\circ}C$	695	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}	$V_{GE}=0V, I_C=250\mu A$	650			V
Collector -emitter leakage current	I_{CES}	$V_{CE}=650V, V_{GE}=0V$			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	$V_{CE(sat)}$	$V_{GE}=15V, I_C=200A, T_{vj}=25^{\circ}C$		1.90		V
		$V_{GE}=15V, I_C=200A, T_{vj}=125^{\circ}C$		2.20		V
Integrated gate resistor	R_{Gint}	$f=1M; V_{pp}=1V$		tbd.		Ω
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	$t_{d(on)}$	$V_{CC}=300V$		106		ns
Rise time	t_r	$V_{GE}=\pm 15V$		45		ns
Turn-off delay time	$t_{d(off)}$	$I_C=200A$		460		ns
Fall time	t_f	$R_G=5\Omega$		51		ns
Turn-on energy loss per pulse	E_{on}	Inductive Load		4.20		mJ
Turn-off energy loss per pulse	E_{off}	$T_{vj}=25^{\circ}C$		9.00		mJ
Turn-on delay time	$t_{d(on)}$	$V_{CC}=300V$		120		ns
Rise time	t_r	$V_{GE}=\pm 15V$		68		ns
Turn-off delay time	$t_{d(off)}$	$I_C=200A$		510		ns
Fall time	t_f	$R_G=5\Omega$		70		ns
Turn-on energy loss per pulse	E_{on}	Inductive Load		5.10		mJ
Turn-off energy loss per pulse	E_{off}	$T_{vj}=125^{\circ}C$		11.3		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}	$T_{vj}=25^{\circ}\text{C}$	650	V
Diode continuous forward current	I_F	$T_{vj}=25^{\circ}\text{C}$	210	A
		$T_{vj}=100^{\circ}\text{C}$	150	A
Diode maximum forward current	I_{FM}	$t_p=1\text{ms}, T_{vj}=25^{\circ}\text{C}$	400	A

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

Items	Symbol	Conditions	Min.	typ.	Max.	Units
Diode forward voltage	V_F	$I_F=200\text{A}, T_{vj}=25^{\circ}\text{C}$		1.45		V
		$I_F=200\text{A}, T_{vj}=125^{\circ}\text{C}$		1.66		V
Diode reverse recovery time	t_{rr}	$V_{CE}=300\text{V}$		tbd.		ns
Diode peak reverse recovery current	I_{rr}	$I_F=200\text{A}$		140		A
Diode reverse recovery charge	Q_{rr}	$dI_F/dt=-6000\text{A}/\mu\text{s}$		9.0		μC
Reverse recovery energy	E_{rec}	$T_{vj}=25^{\circ}\text{C}$		2.40		mJ
Diode reverse recovery time	t_{rr}	$V_{CE}=300\text{V}$		tbd.		ns
Diode peak reverse recovery current	I_{rr}	$I_F=200\text{A}$		160		A
Diode reverse recovery charge	Q_{rr}	$dI_F/dt=-6000\text{A}/\mu\text{s}$		16.0		μC
Reverse recovery energy	E_{rec}	$T_{vj}=125^{\circ}\text{C}$		4.20		mJ

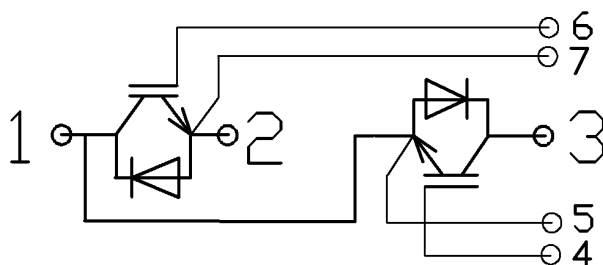
Thermal Characteristics

Items	Symbol	Min.	typ.	Max.	Units
Thermal resistance, junction to case for IGBT	$R_{th\ j-c}$			0.18	$^{\circ}\text{C}/\text{W}$
Thermal resistance, junction to case for Diode	$R_{th\ j-c}$			0.36	$^{\circ}\text{C}/\text{W}$
Thermal resistance, case to sink	$R_{th\ C-S}$		0.05		$^{\circ}\text{C}/\text{W}$

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	$^{\circ}\text{C}$
Weight of Module	W_t			160		g

Internal Circuit:



Representative Characteristics

Fig 1. Output characteristic IGBT

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

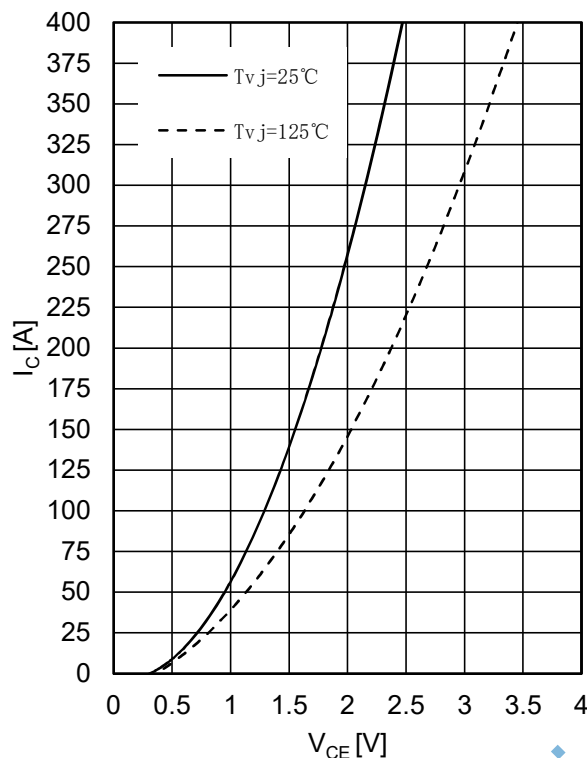


Fig 2. Transfer characteristic IGBT

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

$$V_{CE} = 20V$$

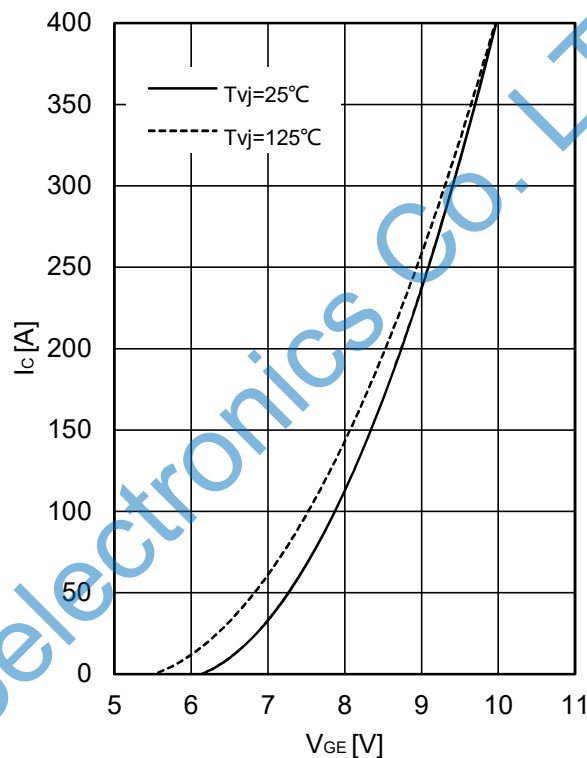


Fig 3. Switching losses IGBT

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

$$V_{GE} = \pm 15V, I_C = 200A, V_{CE} = 300V$$

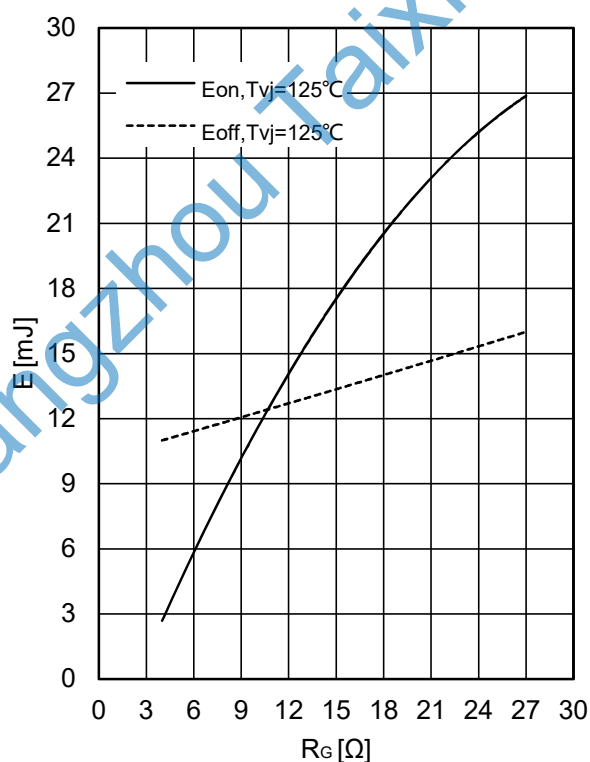


Fig 4. Switching losses IGBT

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

$$V_{GE} = \pm 15V, R_G = 5\Omega, V_{CE} = 300V$$

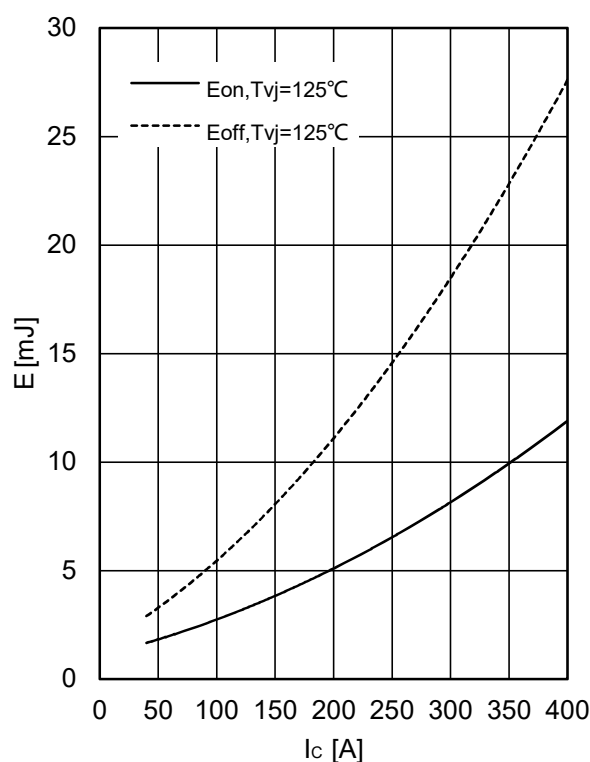


Fig 7. Reverse bias safe operating area IGBT,

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

$$V_{GE} = \pm 15V, R_{Goff} = 5\Omega, T_{vj} = 125^\circ C$$

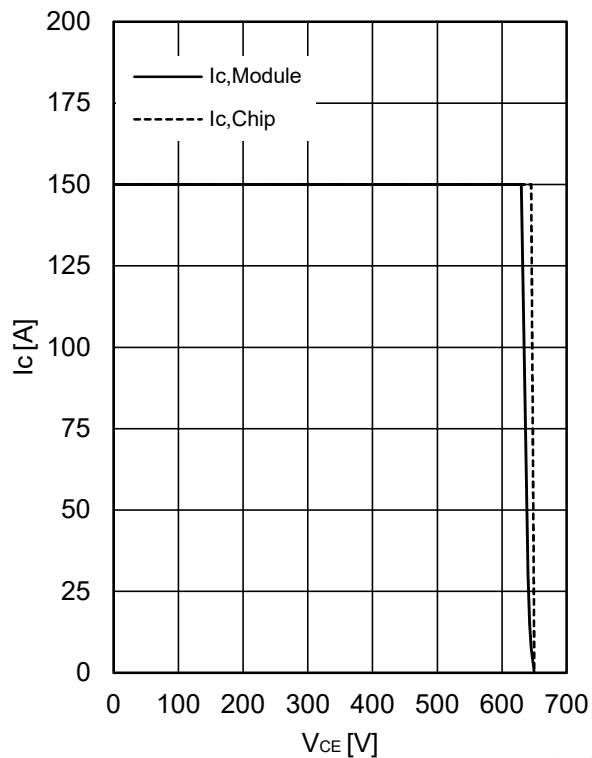
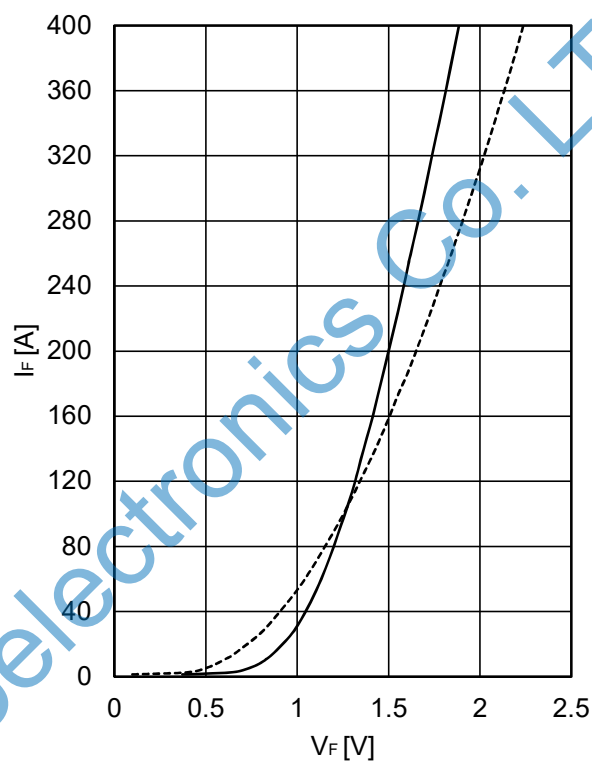


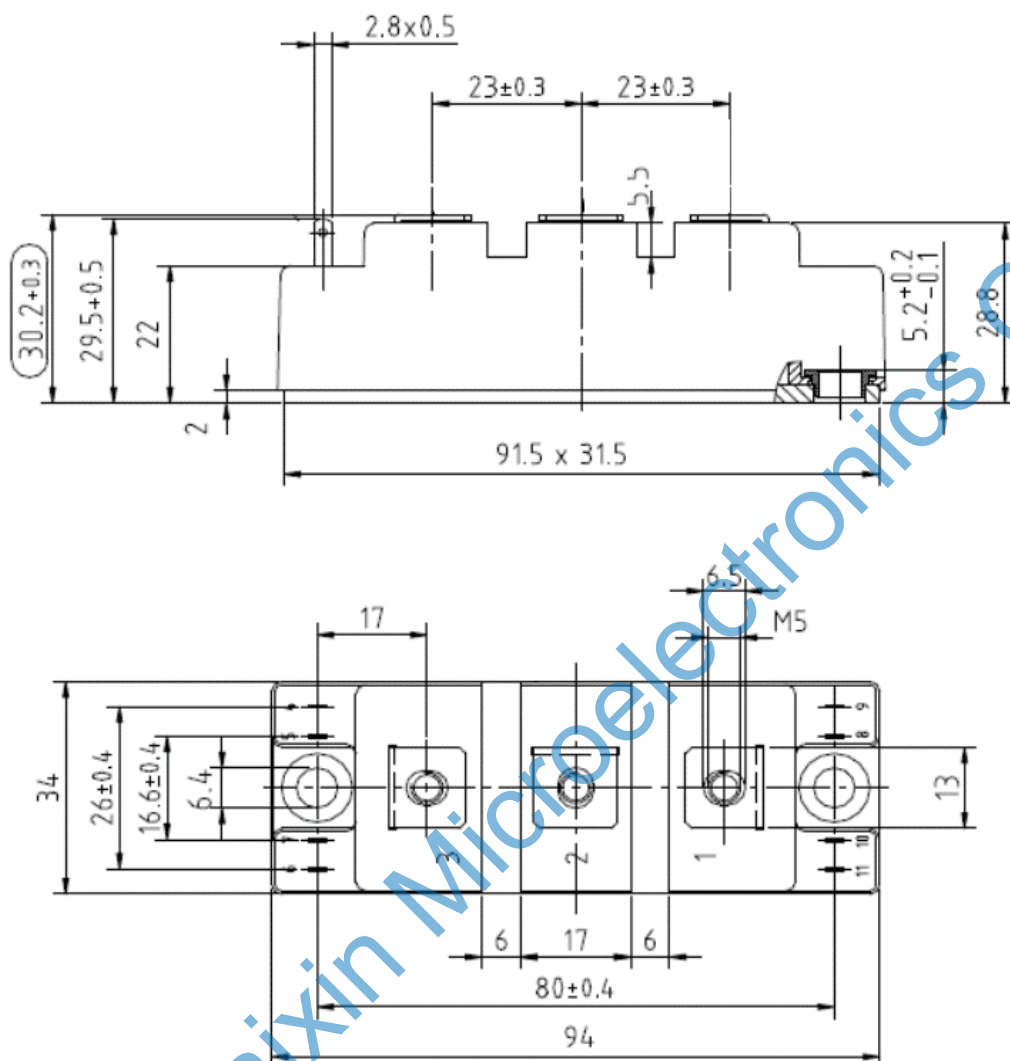
Fig 8. Forward characteristic of Diode

$$I_F = f(V_F)$$



Package Dimensions

Dimensions in Millimeters



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