

FEATURES

- V_{CEsat} with positive temperature coefficient
- Low V_{cesat}
- Low switching losses
- Low inductance case
- Isolated copper baseplate using DBC technology

Preliminary Data

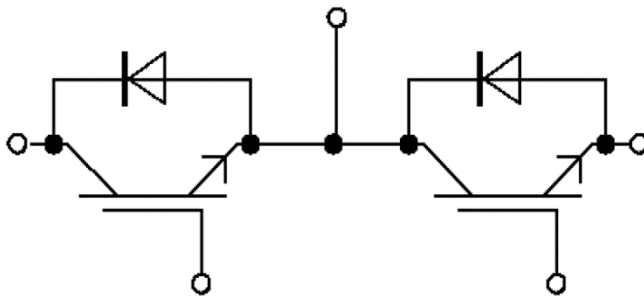
$V_{CES} = 1200V$

$I_{C\ nom} = 200A / I_{CRM} = 400A$

APPLICATION

- Welding Machine
- UPS
- Others

Equivalent Circuit Schematic



IGBT, Inverter Maximum Rated Values

Parameter	Conditions	Symbol	Values	Units
Collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{CES}	1200	V
Continuous DC collector current	$T_c = 95^{\circ}\text{C}$, $T_{vj} \text{ max} = 175^{\circ}\text{C}$	I_c	200	A
Repetitive peak collector current	$t_p = 1 \text{ ms}$	I_{CRM}	400	A
Total power dissipation	$T_c = 25^{\circ}\text{C}$, $T_{vj} \text{ max} = 175^{\circ}\text{C}$	P_{tot}	1071	W
Gate-emitter peak voltage		V_{GES}	± 20	V

Characteristic Values

Parameter	Conditions	Symbol	Values			Units
			Min.	Typ.	Max.	
Collector-emitter saturation voltage	$I_c = 200\text{A}$, $V_{GE} = 15 \text{ V}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	V_{CESat}		1.85 2.10 2.25	2.4	V
Gate threshold voltage	$I_c = 3 \text{ mA}$, $V_{CE} = V_{GE}$ $T_{vj} = 25^{\circ}\text{C}$	V_{Geth}	5.1	5.7	6.2	V
Gate charge	$V_{GE} = -15 / 15 \text{ V}$	Q_G		0.9		μC
Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$	R_{Gint}		2.1		Ω
Input capacitance	$f = 1 \text{ MHz}$, $T_{vj} = 25^{\circ}\text{C}$, $V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$	C_{ies}		35.16		nF
Reverse transfer capacitance		C_{res}		1.29		nF
Collector-emitter cut-off current	$V_{CE} = 1200 \text{ V}$, $V_{GE} = 0 \text{ V}$, $T_{vj} = 25^{\circ}\text{C}$	I_{CES}			1.0	mA
Gate-emitter leakage current	$V_{CE} = 0 \text{ V}$, $V_{GE} = 20 \text{ V}$, $T_{vj} = 25^{\circ}\text{C}$	I_{GES}			400	nA
Turn-on delay time, inductive load	$I_c = 200\text{A}$, $V_{CE} = 600\text{V}$, $T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\text{V}$ $T_{vj} = 125^{\circ}\text{C}$ $R_g = 5.1\Omega$ $T_{vj} = 150^{\circ}\text{C}$	t_{don}		0.16		μs
Rise time, inductive load		t_r		0.094		μs
Turn-off delay time, inductive load		t_{doff}		0.35		μs
Fall time, inductive load		t_f		0.096		μs
Turn-on energy loss per pulse		E_{on}		10.7 26.1 29.4		mJ
Turn-off energy loss per pulse		E_{off}		10.8 12.8 13.2		mJ

Thermal resistance, junction to case	per IGBT	R_{thJC}			0.14	K/W
Thermal resistance, case to heatsink	per IGBT $\lambda_{paste}=1 \text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease}=1 \text{ W}/(\text{m}\cdot\text{K})$	R_{thCH}		0.035		K/W
Temperature under switching conditions		$T_{vj \text{ op}}$	-40		150	°C

Diode, Inverter Maximum Rated Values

Parameter	Conditions	Symbol	Values	Units
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

Characteristic Values

Parameter	Conditions	Symbol	Values			Units
			Min.	Typ.	Max.	
Forward voltage	$I_F = 200 \text{ A}, V_{GE} = 0 \text{ V}$ $T_{vj} = 25^\circ\text{C}$	V_F		1.76		V
Peak reverse recovery current	$I_F = 200 \text{ A},$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}$ $R_g = 5.1 \Omega$ $T_{vj} = 25^\circ\text{C}$	I_{RR}		50.7		A
Recovered charge		Q_{RR}		16.5		μC
Reverse recovery energy		E_{rec}		2.51		mJ
Thermal resistance, junction to case	per diode	R_{thJC}			0.21	K/W
Thermal resistance, case to heatsink	per diode $\lambda_{paste} = 1 \text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$	R_{thCH}		0.06		K/W
Temperature under switching conditions		$T_{vj \text{ op}}$	-40		150	°C

Module

Maximum Rated Values

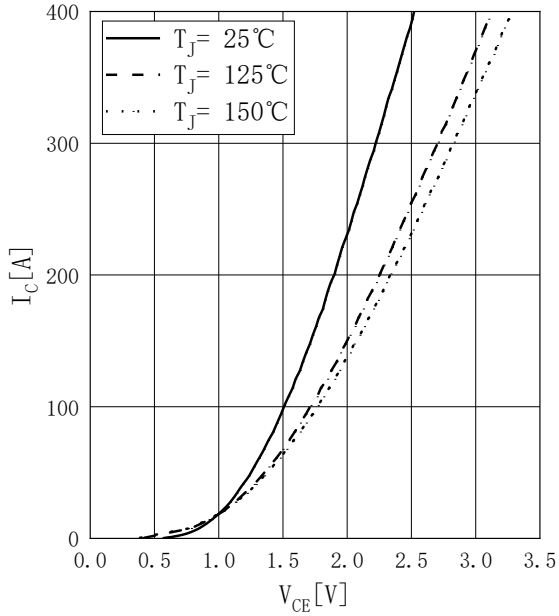
Parameter	Conditions	Symbol	Values	Units
Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V _{ISOL}	2.5	kV
Internal isolation	basic insulation (class 1, IEC 61140)		Al ₂ O ₃	
Creepage distance	terminal to heatsink terminal to terminal		29	mm
			23	
Clearance	terminal to heatsink terminal to terminal		23	mm
			11	
Comperative tracking index		CTI	>400	

Characteristic Values

Parameter	Conditions	Symbol	Values			Units
			Min.	Typ.	Max.	
Stray inductance module and fixture		L _{sCE}		20		nH
Module lead resistance, terminals - chip	TC = 25°C, per switch	R _{CC+EE}		0.7		mΩ
Storage temperature		T _{stg}	-40		125	°C
Mounting force per clamp		F	3		6	N
Weight		G		345		g

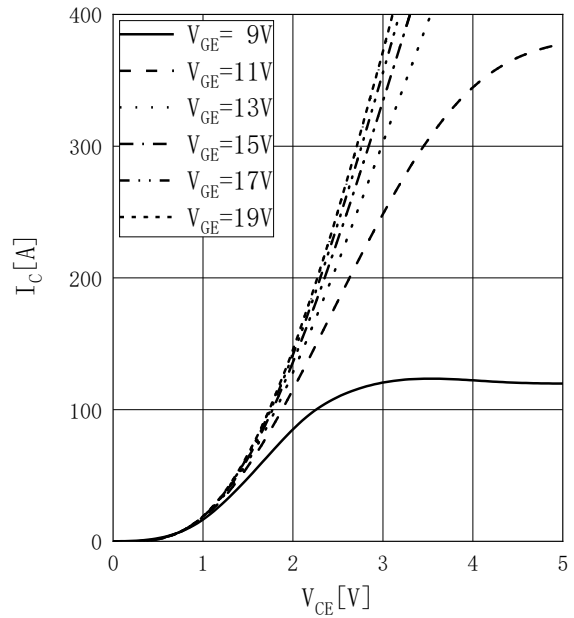
Output characteristic IGBT, Inverter (typical)

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



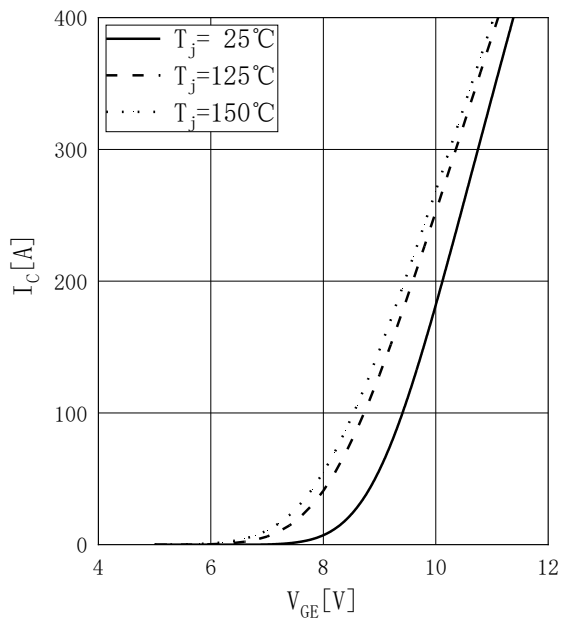
Output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$
 $T_J = 150^\circ C$



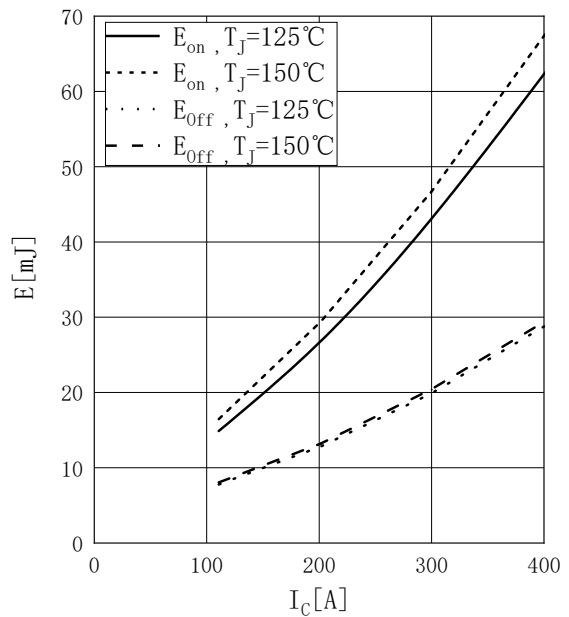
Transfer characteristic IGBT, Inverter (typical)

$I_C = f(V_{GE})$
 $V_{CE} = 20V$



Switching losses IGBT, Inverter (typical)

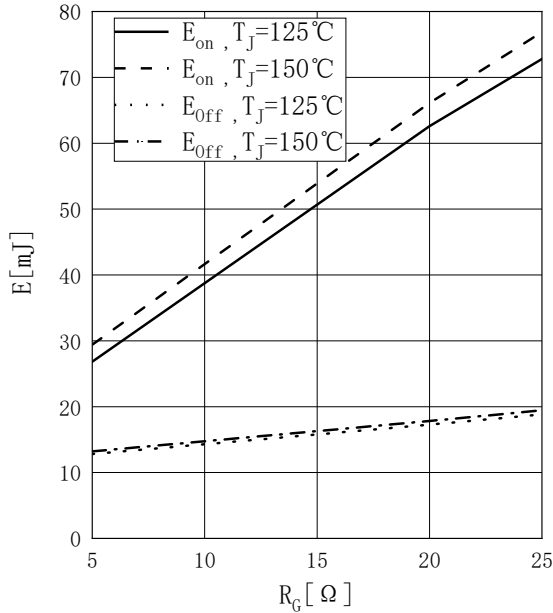
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15V$, $R_{Gon} = 5.1\Omega$, $R_{Goff} = 5.1\Omega$, $V_{CE} = 600V$



Switching losses IGBT, Inverter (typical)

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

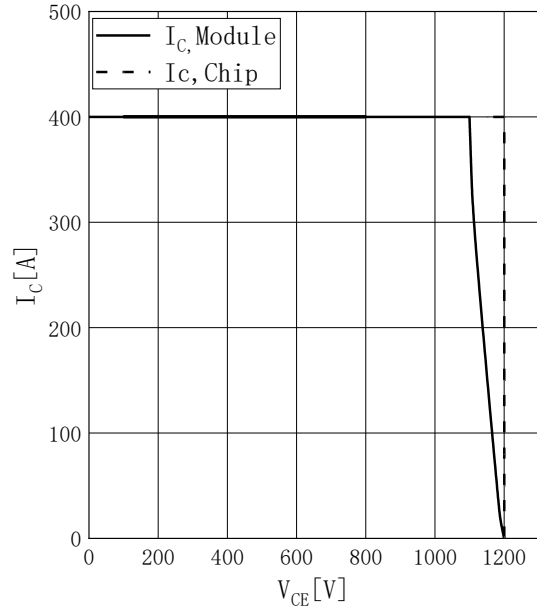
$$V_{GE}=\pm 15V, I_C=200A, V_{CE}=600V$$



Reverse bias safe operating area IGBT, Inverter (RBSOA)

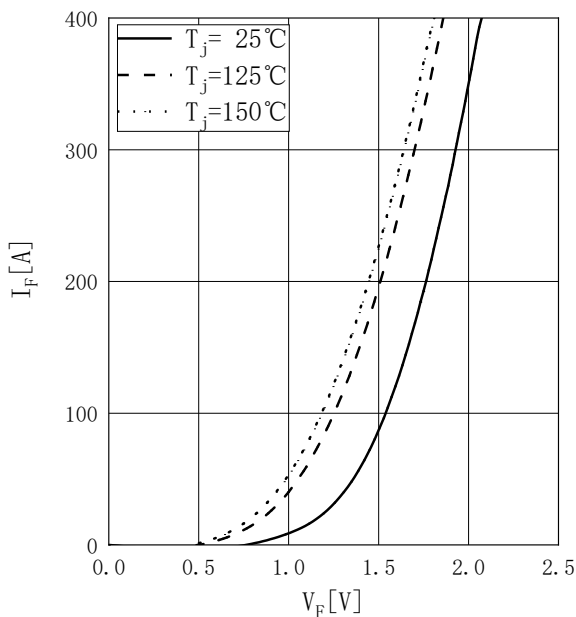
$$I_C=f(V_{CE}),$$

$$V_{GE}=\pm 15V, R_{Goff}=5.1\Omega, T_J=150^\circ C$$



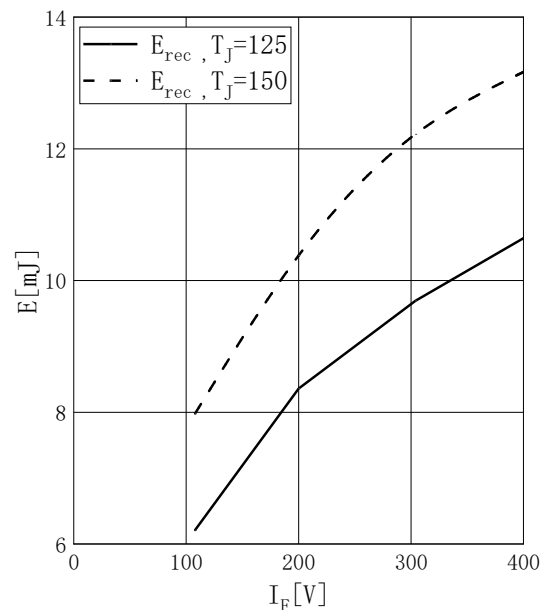
Forward characteristic of Diode, Inverter (typical) Switching losses Diode, Inverter (typical)

$$I_F=f(V_F)$$



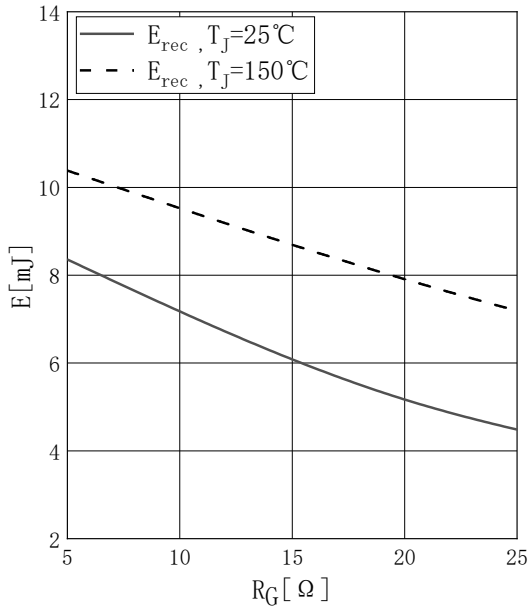
$$E_{rec}=f(I_F)$$

$$R_{Gon}=5.1\Omega, V_{CE}=600V$$

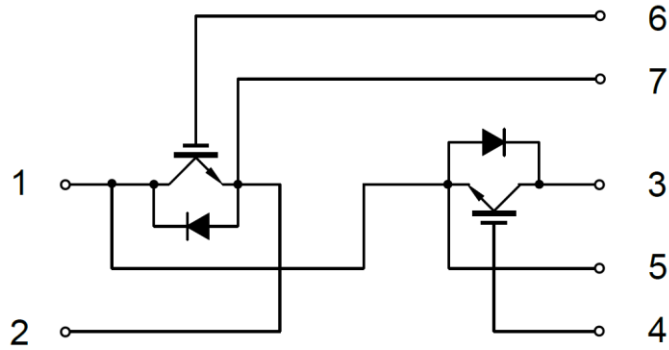


Switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$
 $I_F = 200A, V_{CE} = 600V$



Circuit diagram



Package outlines (mm)

