

FEATURES

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

Preliminary Data

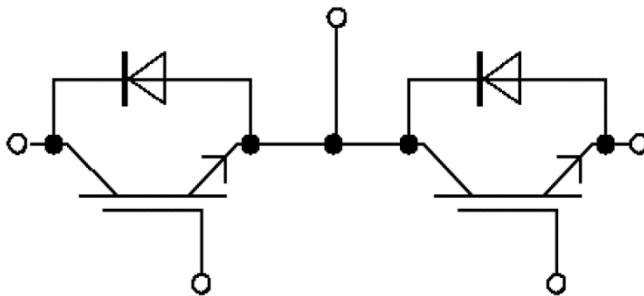
$V_{CES} = 650V$

$I_C \text{ nom} = 600A / I_{CRM} = 1200A$

APPLICATION

- Welding Machine
- UPS
- Motor Drives

Equivalent Circuit Schematic



IGBT, Inverter Maximum Rated Values

Parameter	Conditions	Symbol	Values	Units
Collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{CES}	650	V
Continuous DC collector current	$T_c = 70^{\circ}\text{C}$, $T_{vj} \text{ max} = 175^{\circ}\text{C}$	I_c	600	A
Repetitive peak collector current	$t_p = 1 \text{ ms}$	I_{CRM}	1200	A
Total power dissipation	$T_c = 25^{\circ}\text{C}$, $T_{vj} \text{ max} = 175^{\circ}\text{C}$	P_{tot}	1764	W
Gate-emitter peak voltage		V_{GES}	± 20	V

Characteristic Values

Parameter	Conditions	Symbol	Values			Units
			Min.	Typ.	Max.	
Collector-emitter saturation voltage	$I_c = 400\text{A}$, $V_{GE} = 15 \text{ V}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	V_{CESat}		1.65 1.82		V
Gate threshold voltage	$I_c = 1.5 \text{ mA}$, $V_{CE} = V_{GE}$ $T_{vj} = 25^{\circ}\text{C}$	V_{GEth}		5.8		V
Gate charge	$V_{GE} = -15 / 15 \text{ V}$	Q_G		4.2		μC
Input capacitance	$f = 1 \text{ MHz}$, $T_{vj} = 25^{\circ}\text{C}$, $V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$	C_{ies}		16		nF
Reverse transfer capacitance		C_{res}		0.72		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	$I_c = 400\text{A}$, $V_{CE} = 300 \text{ V}$ $V_{GE} = -15 / 15 \text{ V}$, $R_G = 22\Omega$ $di/dt \text{ (on)} = 1000\text{A}/\mu\text{s}$ $Dv/dt \text{ (off)} = 2900\text{A}/\mu\text{s}$ $T_{vj} = 25^{\circ}\text{C}$	$t_{d on}$		0.36		μs
Rise time, inductive load		t_r		0.35		μs
Turn-off delay time, inductive load		$t_{d off}$		0.65		μs
Fall time, inductive load		t_f		0.13		μs
Turn-on energy loss per pulse		E_{on}		21		mJ
Turn-off energy loss per pulse		E_{off}		27		mJ
Thermal resistance, junction to case		per IGBT	R_{thJC}			0.085
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}		0.03		K/W
Temperature under switching conditions		$T_{vj op}$	-40		150	$^{\circ}\text{C}$

Diode, Inverter

Maximum Rated Values

Parameter	Conditions	Symbol	Values	Units
Repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{RRM}	650	V
Continuous DC forward current		I_F	600	A
Repetitive peak forward current	$t_p = 1\text{ ms}$	I_{FRM}	1200	A

Characteristic Values

Parameter	Conditions	Symbol	Values			Units
			Min.	Typ.	Max.	
Forward voltage	$I_F = 400\text{ A}$, $V_{GE} = 0\text{ V}$ $T_{vj} = 25^{\circ}\text{C}$	V_F		1.76		V
Peak reverse recovery current	$I_F = 400\text{ A}$, $V_R = 300\text{ V}$, $V_{GE} = -15\text{ V}$ $RG = 22\Omega$ $T_{vj} = 25^{\circ}\text{C}$	I_{RR}		107		A
Recovered charge		Q_{RR}		70		μC
Reverse recovery energy		E_{rec}		10.1		mJ
Thermal resistance, junction to case	per diode	R_{thJC}			0.14	K/W
Thermal resistance, case to heatsink	per diode $I_{paste} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $I_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$	R_{thCH}		0.05		K/W
Temperature under switching conditions		$T_{vj\ op}$	-40		150	$^{\circ}\text{C}$

NTC-Thermistor

Characteristic Values

Parameter	Conditions	Symbol	Values			Units
			Min.	Typ.	Max.	
Rate resistance	$T_{NTC} = 25^{\circ}\text{C}$	R_{25}		5		$\text{K}\Omega$
Deviation of R100	$T_{NTC} = 100^{\circ}\text{C}$	$\Delta R/R$	-5		5	%
Power dissipation	$T_{NTC} = 25^{\circ}\text{C}$	P_{25}			18	mW

Module

Maximum Rated Values

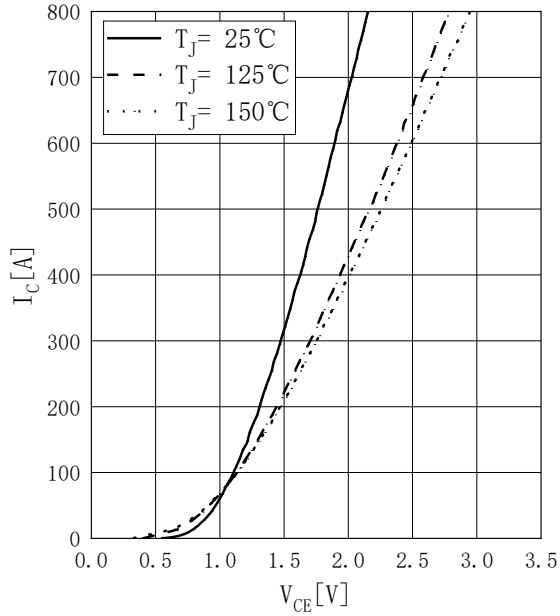
Parameter	Conditions	Symbol	Values	Units
Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V _{ISOL}	3.5	kV
Internal isolation	basic insulation (class 1, IEC 61140)		Al ₂ O ₃	
Creepage distance	terminal to heatsink terminal to terminal		15.0 13.0	mm
Clearance	terminal to heatsink terminal to terminal		12.5 10.0	mm
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}		1.0		mΩ
Storage temperature		T _{stg}	-40		125	°C
Mounting force per clamp		F	3		6	N
Weight		G		345		g

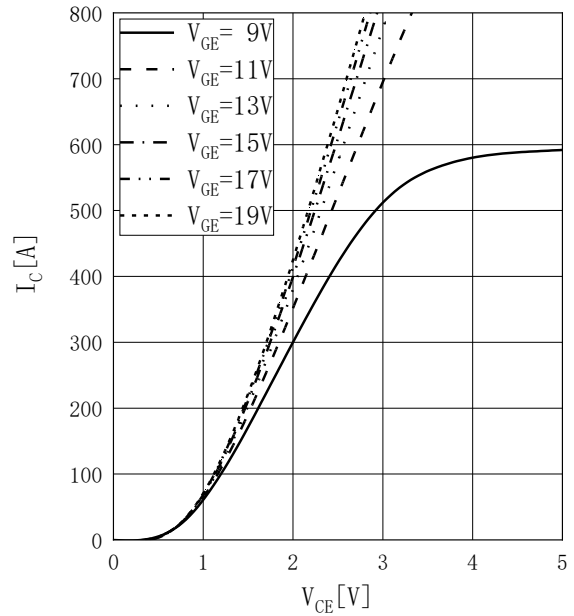
Output characteristic IGBT, Inverter (typical)

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



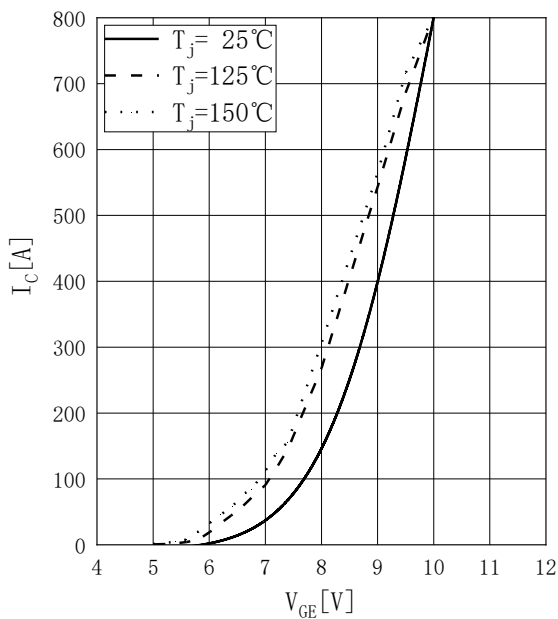
Output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$
 $T_1 = 150^\circ C$



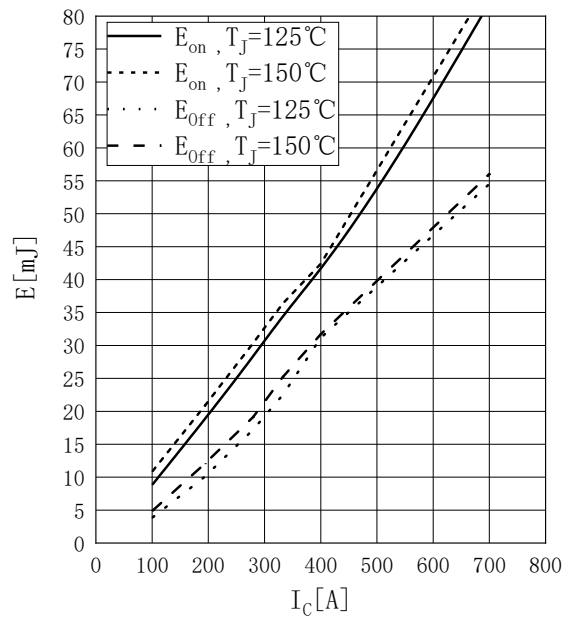
Transfer characteristic IGBT, Inverter (typical)

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



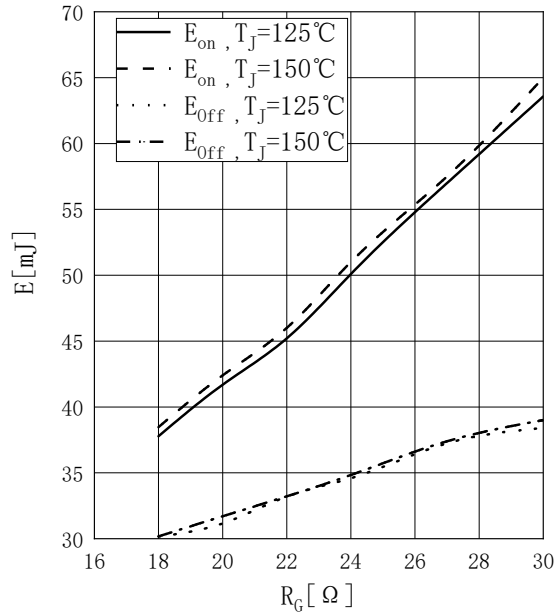
Switching losses IGBT, Inverter (typical)

$E_{on} = f(I_C), E_{off} = f(I_C)$
 $V_{GE} = \pm 15V, R_{Gon} = 20\Omega, R_{Goff} = 20\Omega, V_{CE} = 400V$



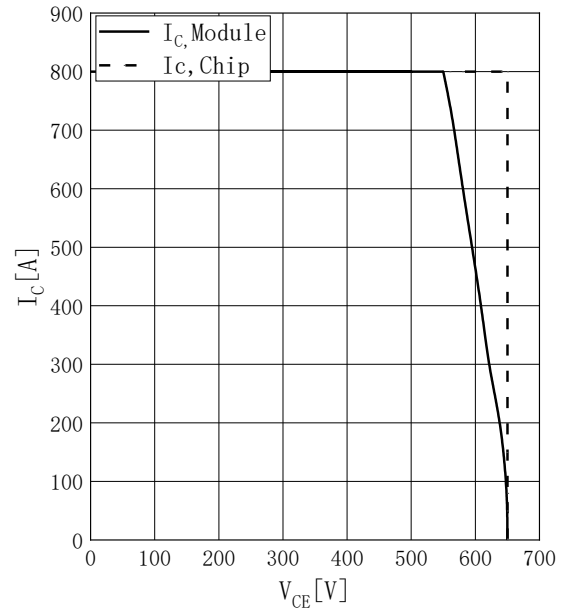
Switching losses IGBT , Inverter(typical)

$E_{on}=f(R_G), E_{off}=f(R_G)$
 $V_{GE}=\pm 15V, I_C=400A, V_{CE}=400V$

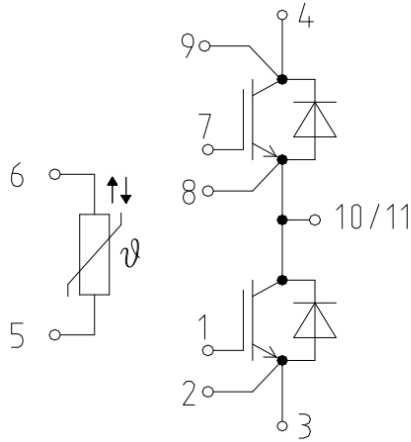


ReversebiassafeoperatingareaIGBT,Inverter (RBSOA)

$I_C=f(V_{CE}),$
 $V_{GE}=\pm 15V, R_{Goff}=20\Omega, T_J=150^\circ C$



Circuit diagram



Package outlines (mm)

