LGM400HF65C3T1

650V/400A 2 in one-package

FEATURES

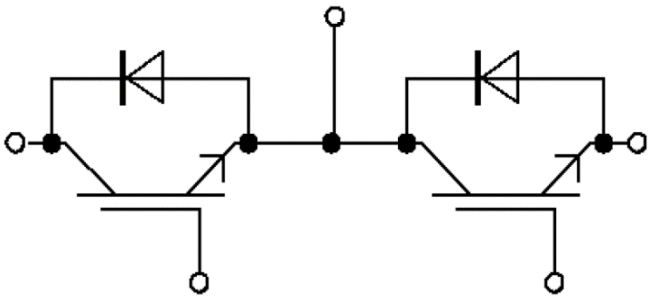
- V_{CEsat} with positive temperature coefficient
- Low Vcesat
- Low switching losses
- Low inductance case
- Isolated copper baseplate using DBC technology

Preliminary Data
VCES = 650V
IC nom = 400A / ICRM = 800A

APPLICATION

- Welding Machine
- UPS
- Motor Drives

Equivalent Circuit Schematic



IGBT, Inverter

Maximum Rated Values

Parameter	Conditions	Symbol	Values	Units
Collector-emitter voltage	Tvj = 25°C	V_{CES}	650	V
Continuous DC collector current	Tc = 70°C, Tvj max = 175°C	I_C	400	A
Repetitive peak collector current	t_P = 1 ms	I_{CRM}	800	A
Total power dissipation	TC = 25°C, Tvj max = 175°C	P_{tot}	1250	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 = 400A, V_{GE} = 15 V Tvj = 25°C Tvj = 150°C	V_{CEsat}		1.56 1.85		V
Gate threshold voltage	I_C = 1.5 mA, V_{CE} = V_{GE} Tvj = 25°C	V_{GEth}		5.8		V
Gate charge	V_{GE} = -15 / 15 V	Q_G		4.2		µC
Input capacitance	f = 1 MHz, Tvj = 25°C, V_{CE} = 25 V, V_{GE} = 0 V	C_{ies}		24		nF
Reverse transfer capacitance		C_{res}		0.81		nF
Collector-emitter cut-off current	V_{CE} = 1200 V, V_{GE} = 0 V, Tvj = 25°C	I_{CES}			1.0	mA
Gate-emitter leakage current	V_{CE} = 0 V, V_{GE} = 20 V, Tvj = 25°C	I_{GES}			400	nA
Turn-on delay time, inductive load	I_C = 400A, V_{CE} = 300 V V_{GE} = -15 / 15 V , RG = 22Ω Di/dt (on) =1000A/us Dv/dt (off) =2900A/us Tvj = 25°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}			0.12	K/W
Thermal resistance, case to heatsink	per IGBT λ_{Paste}=1 W/(m·K) /λ_{grease}=1 W/(m·K)	R_{thCH}		0.03		K/W
Temperature under switching conditions		$T_{vj\ op}$	-40		150	°C

Diode, Inverter
Maximum Rated Values

Parameter	Conditions	Symbol	Values	Units
Repetitive peak reverse voltage	Tvj = 25°C	V_{RRM}	650	V
Continuous DC forward current		I_F	400	A
Repetitive peak forward current	t_P = 1 ms	I_{FRM}	800	A

Characteristic Values

Parameter	Conditions	Symbol	Values			Units
			Min.	Typ.	Max.	
Forward voltage	I_F = 400 A, V_{GE} = 0 V Tvj = 25°C	V_F		1.76		V
Peak reverse recovery current	I_F = 400 A, V_R = 300 V, VGE = -15 V RG = 22Ω Tvj = 25°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}			0.16	K/W
Thermal resistance, case to heatsink	per diode l_{Paste} = 1 W/(m·K) / l_{grease} = 1 W/(m·K)	R_{thCH}		0.05		K/W
Temperature under switching conditions		$T_{vj\ op}$	-40		150	°C

NTC-Thermistor
Characteristic Values

Parameter	Conditions	Symbol	Values			Units
			Min.	Typ.	Max.	
Rate resistance	T_{NTC}=25℃	R_{25}		5		KΩ
Deviation of R100	T_{NTC}=100℃	ΔR/R	-5		5	%
Power dissipation	T_{NTC}=25℃	P_{25}			18	mW

Module

Maximum Rated Values

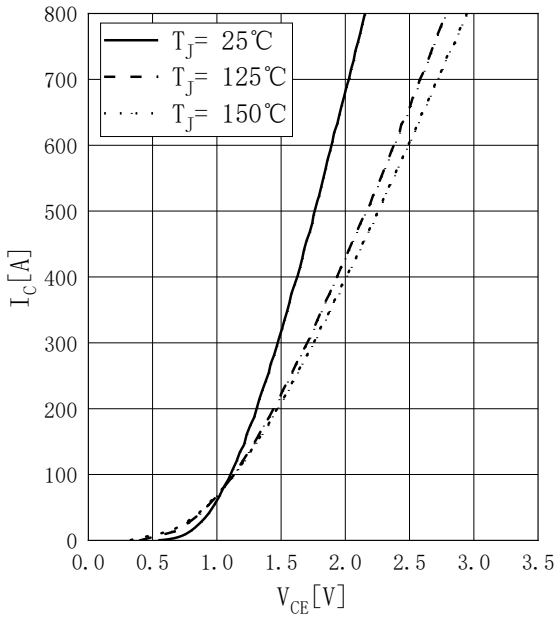
Parameter	Conditions	Symbol	Values	Units
Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}	3.5	kV
Internal isolation	basic insulation (class 1, IEC 61140)		AI_2O_3	
Creepage distance	terminal to heatsink terminal to terminal		15.0 13.0	mm
Clearance	terminal to heatsink terminal to terminal		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
Mountig force per clamp		F	3		6	N
Weight		G		345		g

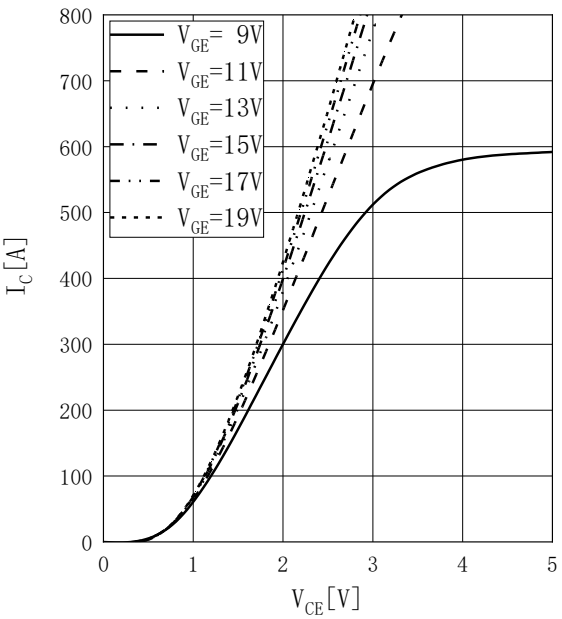
OutputcharacteristicIGBT,Inverter(typical)

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



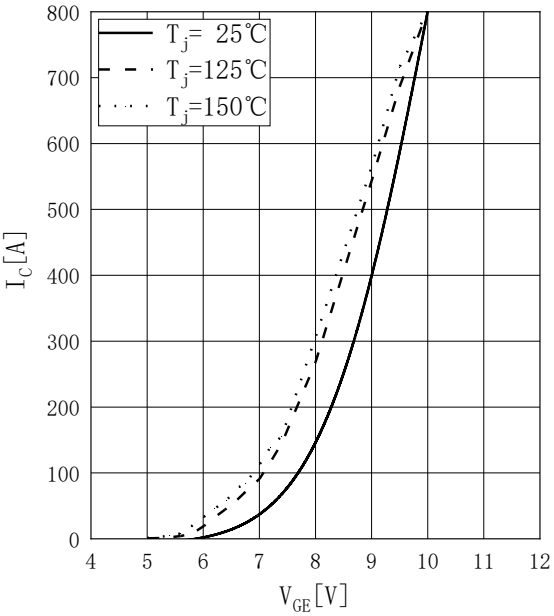
OutputcharacteristicIGBT,Inverter(typical)

$I_C=f(V_{CE})$
$T_J=150℃$



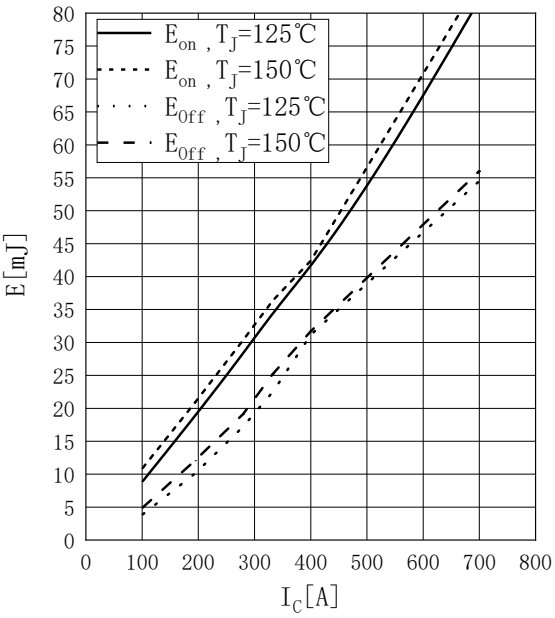
TansfercharacteristicIGBT,Inverter(typical)

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



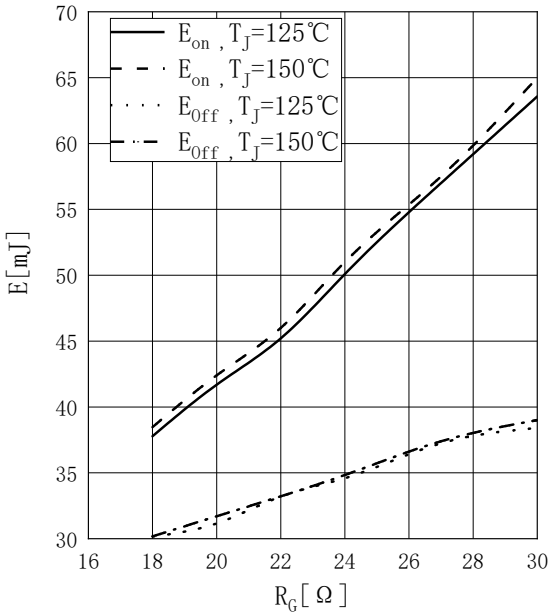
Switching losses IGBT , Inverter(typical)

$E_{on}=f(I_C)$, $E_{off}=f(I_C)$
$V_{GE}=\pm15V, R_{Gon}=20\Omega, R_{Goff}=20\Omega, V_{CE}=400V$



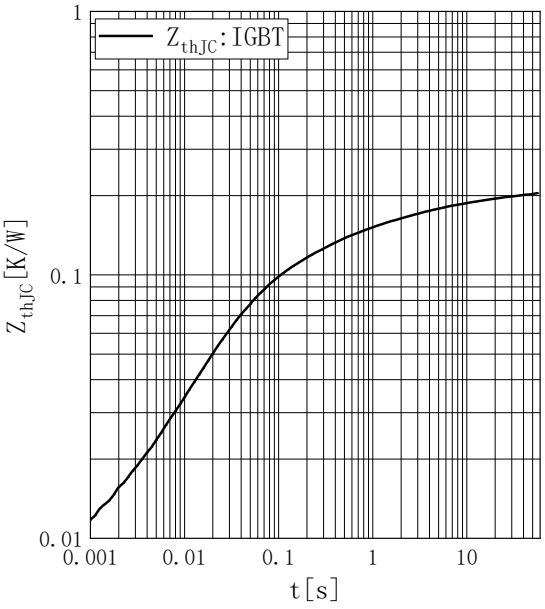
Switching losses IGBT , Inverter(typical)

$E_{on}=f(R_G)$, $E_{off}=f(R_G)$
$V_{GE}=\pm15V, I_C=400A, V_{CE}=400V$



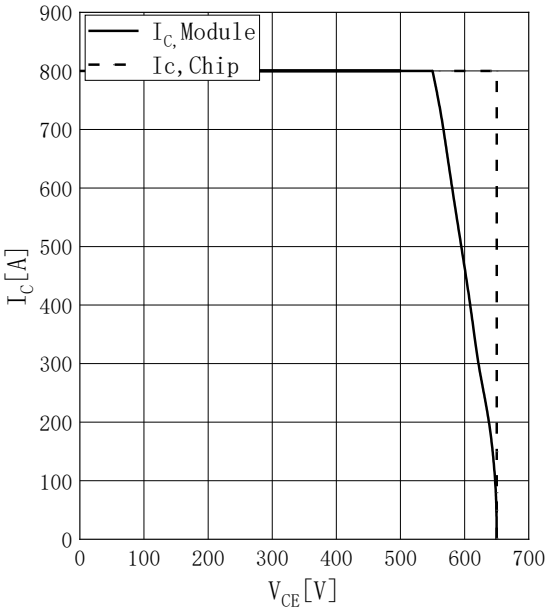
Transient thermal impedance IGBT, Inverter

$Z_{thJC}=f(t)$

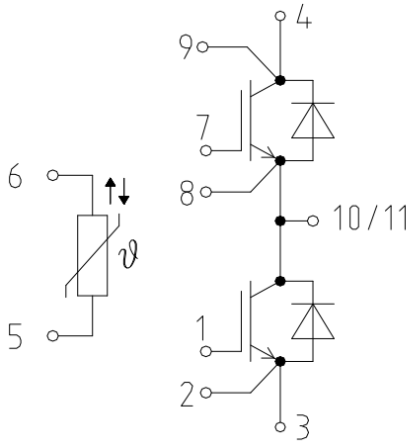


ReversebiassafeoperatingareaIGBT,Inverter (RBSOA)

$I_C=f(V_{CE})$,
$V_{GE}=\pm15V, R_{Goff}=20\Omega, T_J=150℃$



Circuit diagram



Package outlines (mm)