DACO

DAHF400G120SB2

IGBT Power Module
1200V / 400A

Preliminary

HDA-10662

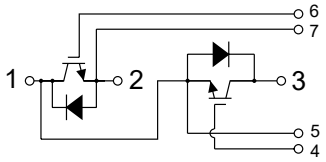
Features

- 62mm Fast Switching / Trench Field Stop IGBT Technology
- Low Switching Losses
- Super Fast Diodes
- High Short Circuit Capability

Applications

- Welder / Power Supply
- UPS / Inverter
- Industrial Motor Drive

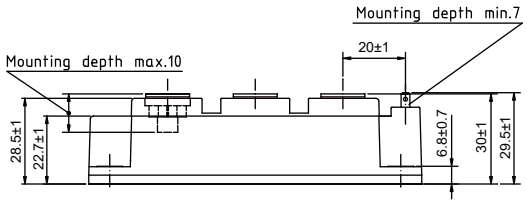
Circuit Diagram Headline

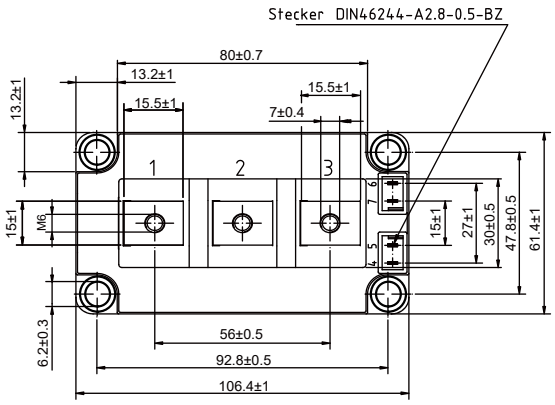


Maximum Ratings (T_C= 25℃)

Item		Symbol	Rated Value	Unit
Collector-Emitter Voltage	T_{VJ} = 25℃	V_{CES}	1200	V
Gate-Emitter Peak Voltage		V_{GES}	±20	V
Continuous DC Collector Current	T_H = 85℃ $T_{VJ\ max.}$ = 175℃	$I_{C,nom.}$	400	A
Repetitive Peak Collector Current	tp =1ms	I_{CRM}	800	A
Total Power Dissipation		P_{tot}	2100	W
Isolation Voltage	RMS, f=50Hz, t=1min	V_{iso}	3000	V
Max. Junction Temperature		$T_{VJ\ max.}$	175	℃
Temperature Under Switching Conditions		$T_{VJ\ op}$	−40～+150	℃
Storage Temperature		T_{stg}	−40～+125	℃
Mounting Torque	Module Base to Heatsink (M6)		3～6	N.m
	Busbar to Terminal (M6)		2.5～5	

Package Outlines





Dimensions in mm (1 mm = 0.0394")

■ Electrical Characteristics

Characteristics	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Collector-emitter saturation voltage	$V_{CE\ sat}$	I_C =400A, V_{GE} =15V	T_{vj} =25℃		1.80	2.10	V
		I_C =400A, V_{GE} =15V	T_{vj} =125℃		2.10		
Gate threshold voltage	V_{GEth}	I_C =5.3mA, V_{CE} =V_{GE}, T_{vj} =25℃		4.9	5.4	5.9	V
Gate charge	Q_G	Ic =400A, V_{CE} =600V,V_{GE} =15V			857		nC
Internal gate resistor	R_{Gint}	T_{vj} =25℃			1.0		Ω
Input capacitance	C_{ies}	f = 100KHz, T_{vj} =25℃, V_{CE} =25V, V_{GE} =0V			49		nF
Output capacitance	C_{oes}	f = 100KHz, T_{vj} =25℃, V_{CE} =25V, V_{GE} =0V			1.5		nF
Reverse transfer capacitance	C_{res}	f = 100KHz, T_{vj} =25℃, V_{CE} =25V, V_{GE} =0V			0.232		nF
Collector-emitter cut-off current	I_{CES}	V_{CE} =1200V, V_{GE} =0V, T_{vj} =25℃				5	mA
Gate-emitter leakage current	I_{GES}	V_{CE} =0V, V_{GE} =20V, T_{vj} =25℃				400	nA
Turn-on delay time, inductive load	$t_{d\ on}$	I_C =400A, V_{CE} =600V	T_{vj} =25℃		286		ns
		V_{GE} = ±15V	T_{vj} =125℃		295		
		$R_{G(on)}$ =1.8Ω, $R_{G(off)}$ =1.8Ω	T_{vj} =150℃		295		
Rise time, inductive load	t_r	I_C =400A, V_{CE} =600V	T_{vj} =25℃		63		ns
		V_{GE} = ±15V	T_{vj} =125℃		59		
		$R_{G(on)}$ =1.8Ω, $R_{G(off)}$ =1.8Ω	T_{vj} =150℃		64		
Turn-off delay time, inductive load	$t_{d\ off}$	I_C =400A, V_{CE} =600V	T_{vj} =25℃		255		ns
		V_{GE} = ±15V	T_{vj} =125℃		290		
		$R_{G(on)}$ =1.8Ω, $R_{G(off)}$ =1.8Ω	T_{vj} =150℃		294		
Fall time, inductive load	t_f	I_C =400A, V_{CE} =600V	T_{vj} =25℃		80		ns
		V_{GE} = ±15V	T_{vj} =125℃		107		
		$R_{G(on)}$ =1.8Ω, $R_{G(off)}$ =1.8Ω	T_{vj} =150℃		132		
Turn-on energy loss per pulse	E_{on}	I_C =400A, V_{CE} =600V	T_{vj} =25℃		10		mJ
		V_{GE} = ±15V	T_{vj} =125℃		19		
		$R_{G(on)}$ =1.8Ω, $R_{G(off)}$ =1.8Ω	T_{vj} =150℃		20		
Turn-off energy loss per pulse	E_{off}	I_C =400A, V_{CE} =600V	T_{vj} =25℃		33		mJ
		V_{GE} = ±15V	T_{vj} =125℃		40		
		$R_{G(on)}$ =1.8Ω, $R_{G(off)}$ =1.8Ω	T_{vj} =150℃		39		
SC data	I_{SC}	V_{GE} ≤15V, V_{CC} =800V	t_P ≤10μs, T_{vj} =150℃		1800		A
		V_{CEmax} =V_{CES} - L_{sCE} ·di/dt					
Thermal resistance, junction to case	R_{thJC}	per IGBT				0.07	℃/W

■ Diode Ratings & Characteristics

Symbol	Test Conditions	Value	Unit
V_{RRM}	T_{vj} =25°C	1200	V
I_F		400	A
I_{FRM}	t_P =1ms	800	A
I^2t	V_R =0V, t_P =10ms, T_{vj} =125°C	34000	A^2s
	V_R =0V, t_P =10ms, T_{vj} =150°C	32000	

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
V_F	I_F =400A, V_{GE} =0V	T_{vj} =25°C		2.2	2.35	V
	I_F =400A, V_{GE} =0V	T_{vj} =125°C		1.9		
I_{RRM}	I_F =400A, -di$_F$/dt =4900A/μs	T_{vj} =25°C		240		A
	V_R =600V	T_{vj} =125°C		384		
	V_{GE} = ±15V	T_{vj} =150°C		424		
Qrr	I_F =400A, -di$_F$/dt =4900A/μs	T_{vj} =25°C		22540		nC
	V_R =600V	T_{vj} =125°C		54140		
	V_{GE} = ±15V	T_{vj} =150°C		65370		
Erec	I_F =400A, -di$_F$/dt =4900A/μs	T_{vj} =25°C		12140		uJ
	V_R =600V	T_{vj} =125°C		27240		
	V_{GE} = ±15V	T_{vj} =150°C		32910		
Trr	I_F =400A, -di$_F$/dt =4900A/μs, V_R =600V, V_{GE} = ±15V, T_{vj} =25°C			221		ns
R_{thJC}	per diode				0.12	°C/W
$T_{vj\ op}$			-40		150	°C

■ Module Ratings & Characteristics

Characteristics	Symbol	Test Conditions	Value	Unit
Material of module baseplate			Cu	
Internal isolation		basic insulation (class 1, IEC 61140)	Al_2O_3	
Creepage distance		terminal to heatsink	29	mm
		terminal to terminal	23	
Clearance		terminal to heatsink	23	mm
		terminal to terminal	11	
Comperative tracking index	CTI		>400	

Typical Characteristics

Preliminary Data

Fig.1 Output characteristic IGBT,Inverter (typical)

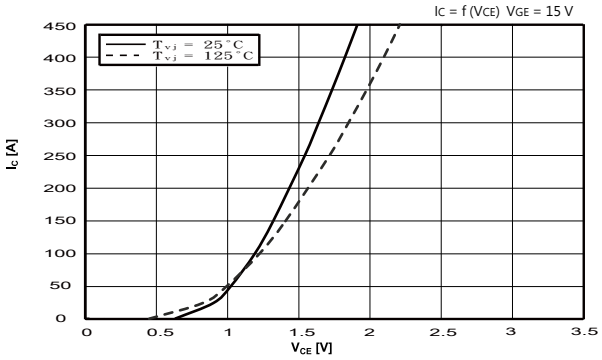


Fig.2 Output characteristic IGBT,Inverter (typical)

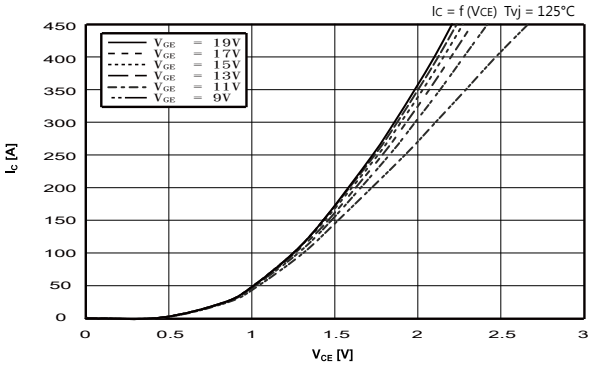


Fig.3 Transfer characteristic IGBT,Inverter (typical)

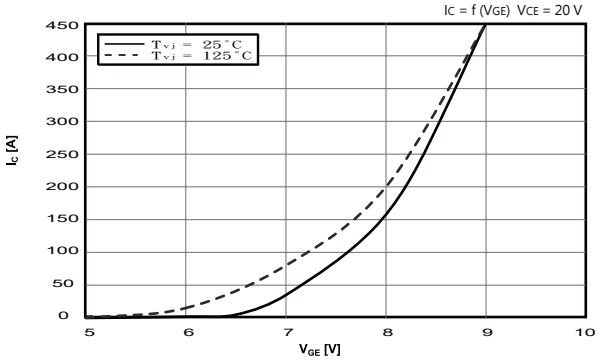


Fig.4 Switching losses IGBT,Inverter (typical)

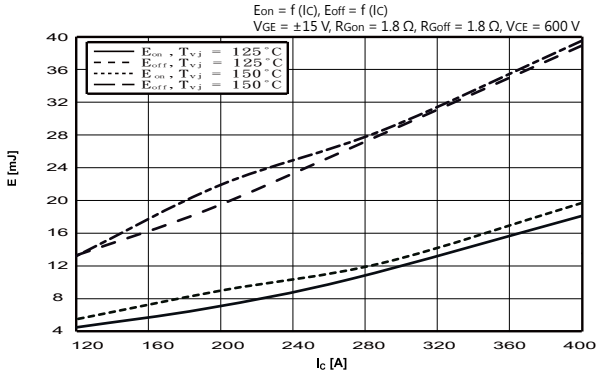


Fig.5 Switching losses IGBT,Inverter (typical)

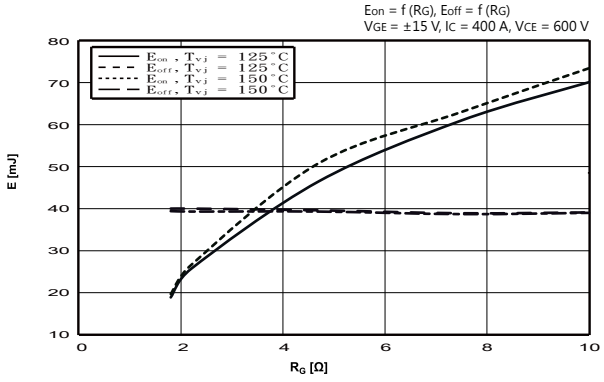


Fig.6 Transient thermal impedance IGBT,Inverter

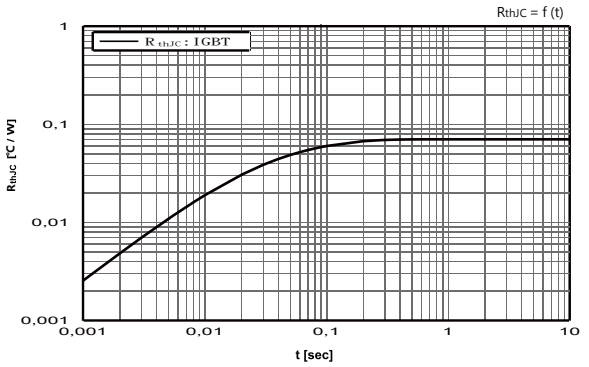


Fig.7 Reverse bias safe operating area IGBT,Inverter (RBSOA)

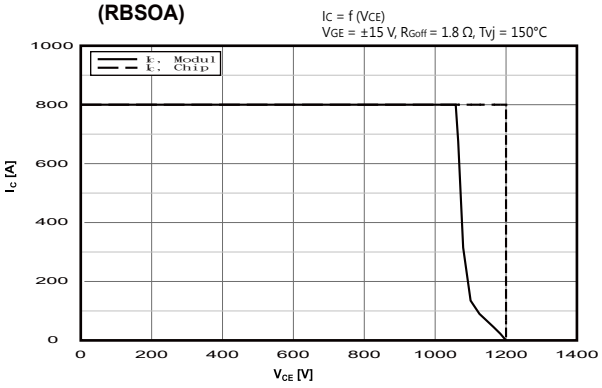
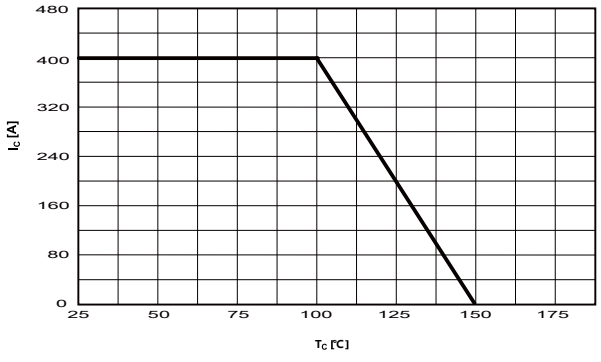


Fig.8 Output characteristic IGBT,Inverter (typical)



Typical Characteristics

Preliminary Data

Fig.9 Gate Charge Characteristics(typical)

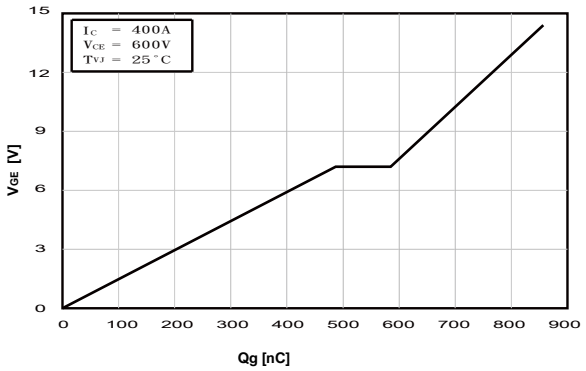


Fig.10 Forward characteristic of Diode, Inverter (typical)

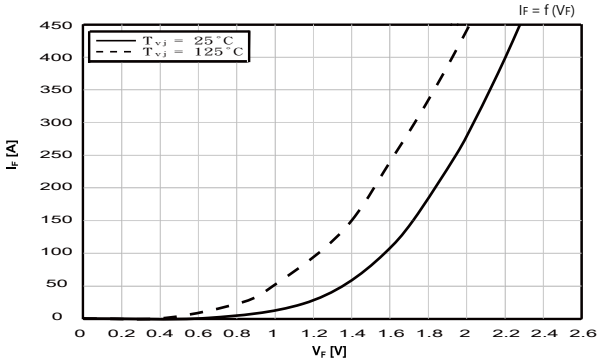


Fig.11 Switching losses Diode, Inverter (typical)

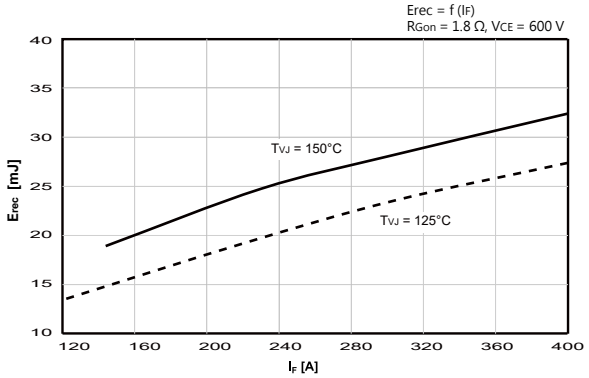


Fig.12 Switching losses Diode, Inverter (typical)

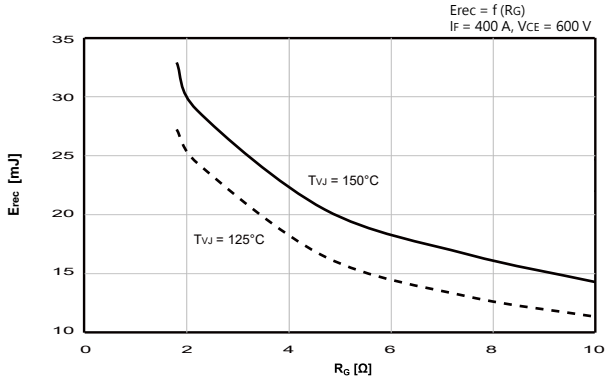
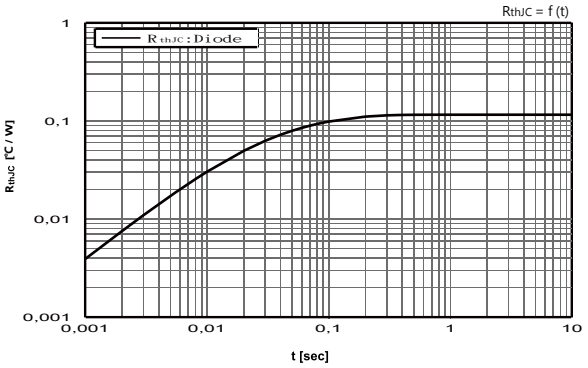


Fig.13 Transient thermal impedance Diode, Inverter



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