DACO®

DAHF450G120SB2

IGBT Power Module
1200V / 450A

Preliminary

Features

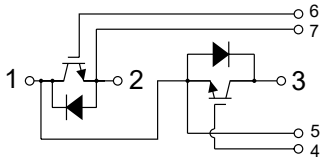
- 62mm Fast Switching / Trench Field Stop IGBT Technology
- Low Switching Losses
- Super Fast Diodes
- High Short Circuit Capability

Applications

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

HDA-10662

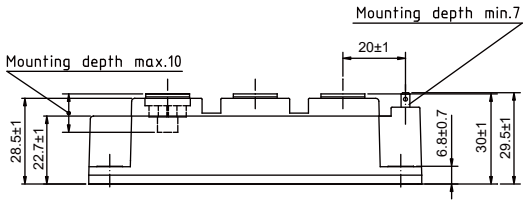
Circuit Diagram Headline

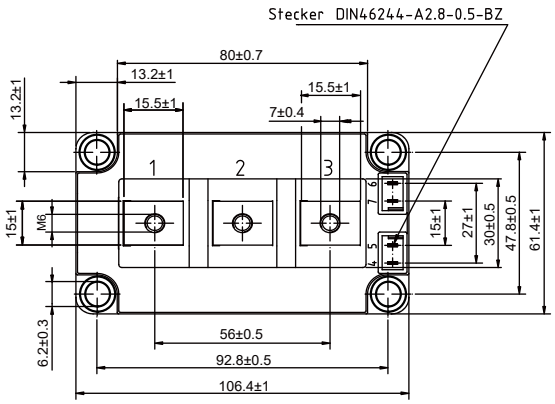


Maximum Ratings (T_C= 25℃)

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_C = 100℃,$T_{VJ\ max.}$ = 175℃ T_C = 25℃,$T_{VJ\ max.}$ = 175℃	$I_{C,nom.}$ I_C	450 520	A
Repetitive Peak Collector Current	tp =1ms	I_{CRM}	900	A
Total Power Dissipation		P_{tot}	2400	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 =450A, V_{GE} =15V	T_{vj} =25℃		1.90	2.20	V
		I_C =450A, V_{GE} =15V	T_{vj} =125℃		2.35		
Gate threshold voltage	V_{GEth}	I_C =5.3mA, V_{CE} =V_{GE}, T_{vj} =25℃		5.4	5.9	6.5	V
Gate charge	Q_G	Ic =450A, V_{CE} =600V,V_{GE} =15V			1714		nC
Internal gate resistor	R_{Gint}	T_{vj} =25°C			1.2		Ω
Input capacitance	C_{ies}	f = 100KHz, T_{vj} =25℃, V_{CE} =25V, V_{GE} =0V			41		nF
Output capacitance	C_{oes}	f = 100KHz, T_{vj} =25℃, V_{CE} =25V, V_{GE} =0V			1.89		nF
Reverse transfer capacitance	C_{res}	f = 100KHz, T_{vj} =25℃, V_{CE} =25V, V_{GE} =0V			0.385		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 =450A, V_{CE} =600V	T_{vj} =25℃		270		ns
		V_{GE} = ±15V	T_{vj} =125℃		294		
		$R_{G(on)}$ =0.5Ω, $R_{G(off)}$ =0.5Ω	T_{vj} =150℃		288		
Rise time, inductive load	t_r	I_C =450A, V_{CE} =600V	T_{vj} =25℃		82		ns
		V_{GE} = ±15V	T_{vj} =125℃		92		
		$R_{G(on)}$ =0.5Ω, $R_{G(off)}$ =0.5Ω	T_{vj} =150℃		95		
Turn-off delay time, inductive load	$t_{d\ off}$	I_C =450A, V_{CE} =600V	T_{vj} =25℃		367		ns
		V_{GE} = ±15V	T_{vj} =125℃		412		
		$R_{G(on)}$ =0.5Ω, $R_{G(off)}$ =0.5Ω	T_{vj} =150℃		417		
Fall time, inductive load	t_f	I_C =450A, V_{CE} =600V	T_{vj} =25℃		47		ns
		V_{GE} = ±15V	T_{vj} =125℃		68		
		$R_{G(on)}$ =0.5Ω, $R_{G(off)}$ =0.5Ω	T_{vj} =150℃		80		
Turn-on energy loss per pulse	E_{on}	I_C =450A, V_{CE} =600V	T_{vj} =25℃		14		mJ
		V_{GE} = ±15V	T_{vj} =125℃		28		
		$R_{G(on)}$ =0.5Ω, $R_{G(off)}$ =0.5Ω	T_{vj} =150℃		31		
Turn-off energy loss per pulse	E_{off}	I_C =450A, V_{CE} =600V	T_{vj} =25℃		34		mJ
		V_{GE} = ±15V	T_{vj} =125℃		41		
		$R_{G(on)}$ =0.5Ω, $R_{G(off)}$ =0.5Ω	T_{vj} =150℃		43		
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				0.062	℃/W
Thermal resistance, case to heatsink	R_{thCH}	per IGBT			0.031		℃/W

■ Diode Ratings & Characteristics

Characteristics	Symbol	Test Conditions	Value	Unit
Repetitive peak reverse voltage	V_{RRM}	T_{vj} =25°C	1200	V
Continuous DC forward current	I_F		450	A
Repetitive peak forward current	I_{FRM}	t_P =1ms	900	A
I^2t - value	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	

Characteristics	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Forward voltage	V_F	I_F =450A, V_{GE} =0V	T_{vj} =25°C		2.1	2.3	V
		I_F =450A, V_{GE} =0V	T_{vj} =125°C		1.8		
Peak reverse recovery current	I_{RRM}	I_F =450A, -di_F/dt =4300A/µs	T_{vj} =25°C		256		A
		V_R =600V	T_{vj} =125°C		376		
		VGE = ±15V	T_{vj} =150°C		408		
Recovered charge	Qrr	I_F =450A, -di_F/dt =4300A/µs	T_{vj} =25°C		19280		nC
		V_R =600V	T_{vj} =125°C		57180		
		VGE = ±15V	T_{vj} =150°C		67250		
Reverse recovery energy	Erec	I_F =450A, -di_F/dt =4300A/µs	T_{vj} =25°C		9.5		mJ
		V_R =600V	T_{vj} =125°C		25.9		
		VGE = ±15V	T_{vj} =150°C		30		
Reverse Recovery Time	Trr	I_F =450A, -di_F/dt =4300A/µs, V_R =600V, VGE = ±15V T_{vj}=25°C			125		ns
Thermal resistance, junction to case	R_{thJC}	per diode				0.11	°C/W
Thermal resistance, case to heatsink	R_{thCH}	per diode			0.055		°C/W
Temperature under switching conditions	$T_{vj\ op}$			-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)

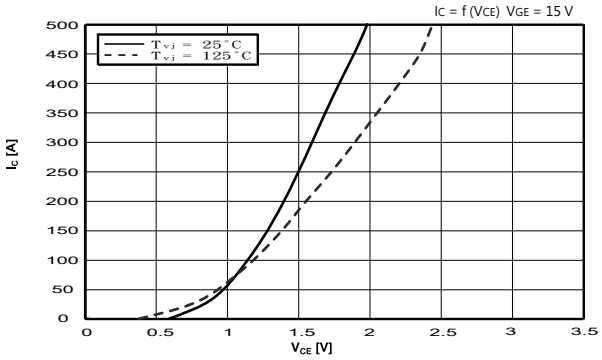


Fig.2 Output characteristic IGBT,Inverter (typical)

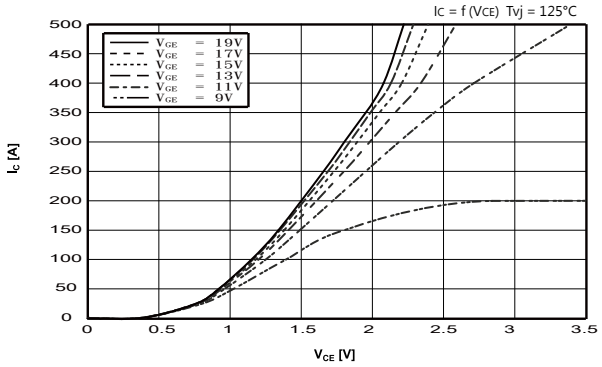


Fig.3 Transfer characteristic IGBT,Inverter (typical)

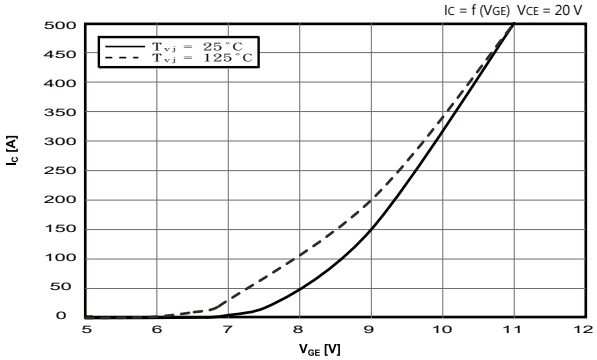


Fig.4 Switching losses IGBT,Inverter (typical)

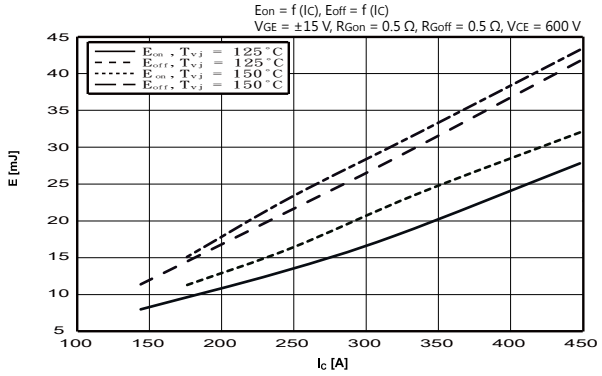


Fig.5 Switching losses IGBT,Inverter (typical)

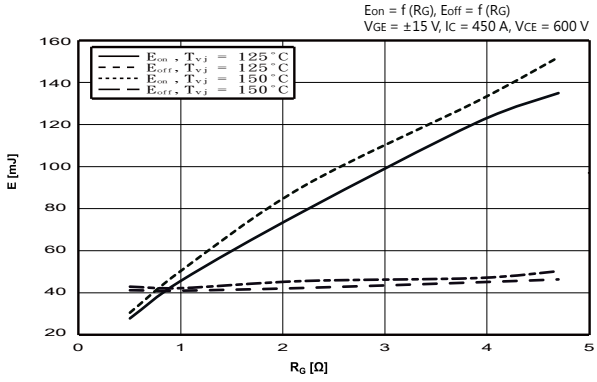


Fig.6 Transient thermal impedance IGBT,Inverter

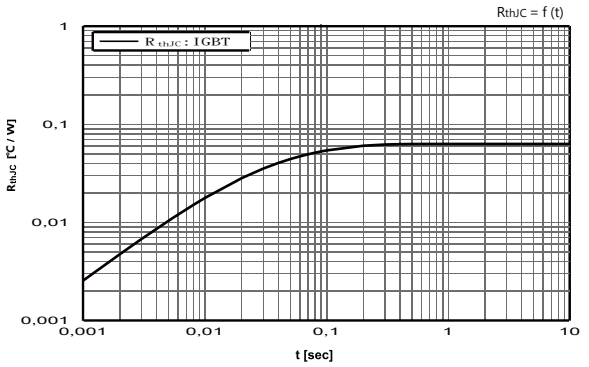


Fig.7 Reverse bias safe operating area IGBT,Inverter (RBSOA)

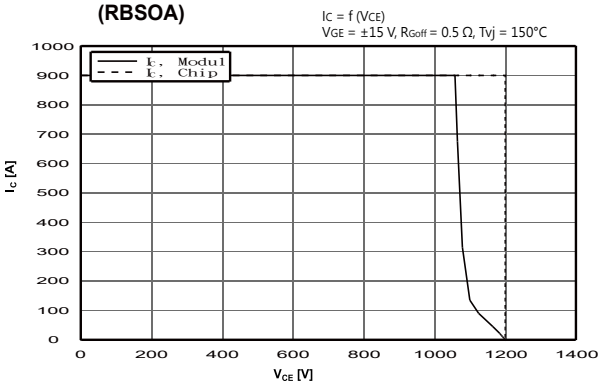
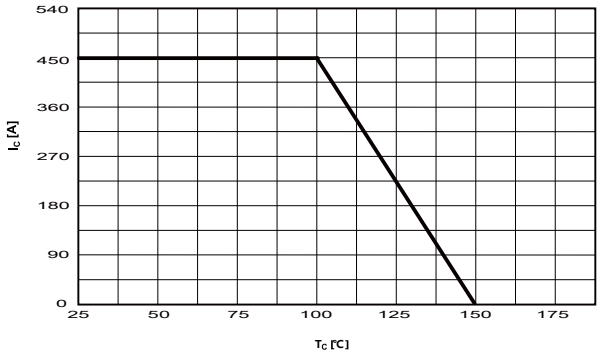


Fig.8 Output characteristic IGBT,Inverter (typical)



Typical Characteristics

Preliminary Data

Fig.9 Gate Charge Characteristics(typical)

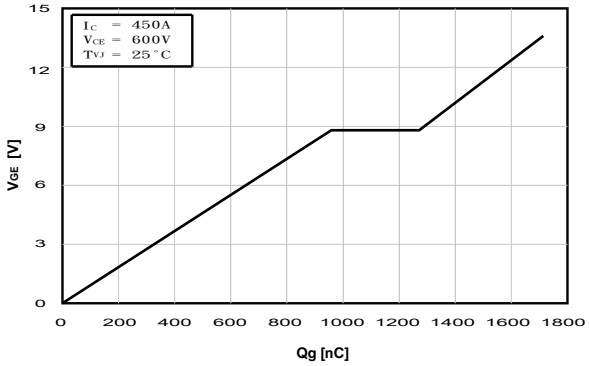


Fig.10 Forward characteristic of Diode, Inverter (typical)

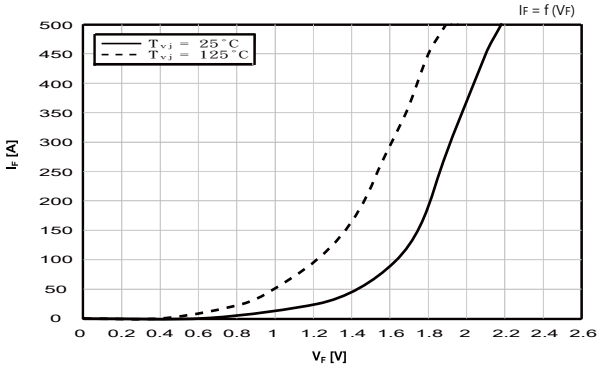


Fig.11 Switching losses Diode, Inverter (typical)

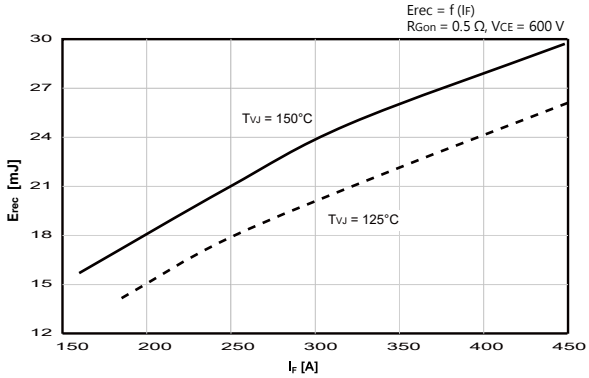


Fig.12 Switching losses Diode, Inverter (typical)

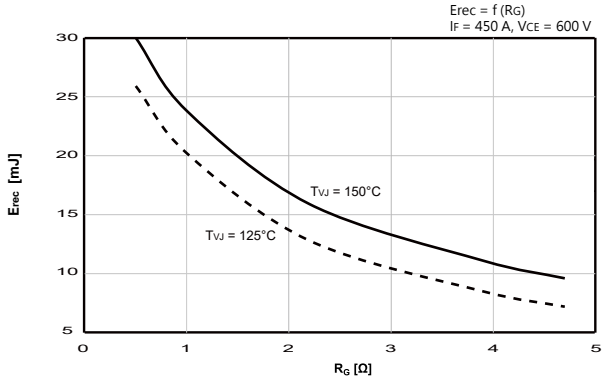
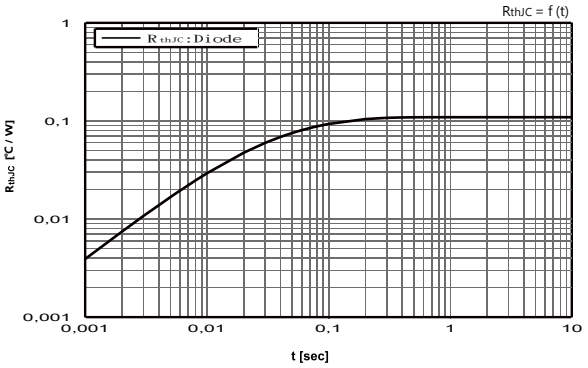


Fig.13 Transient thermal impedance Diode, Inverter



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