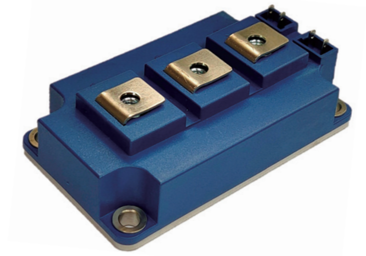
DACO SEMICONDUCTOR CO., LTD.

DAHF300G120SB

IGBT Power Module
1200V / 300A

Preliminary

HDA-10662



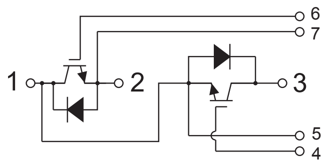
Features

- 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

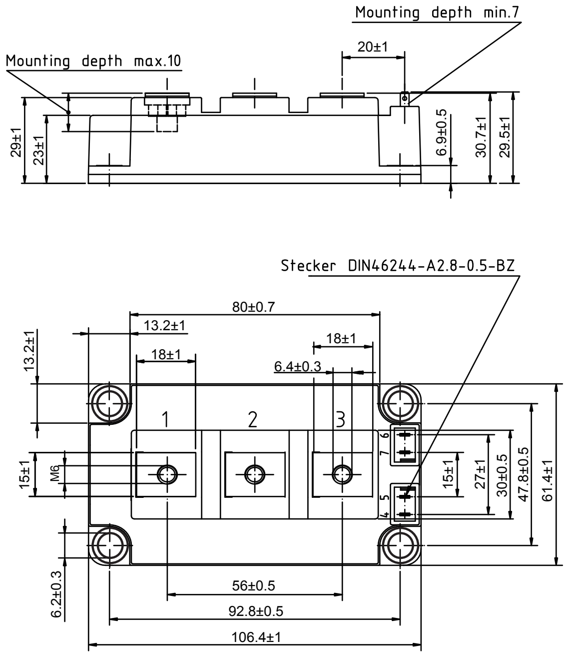
Circuit Diagram Headline



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_C = 80℃ T_C = 25℃	$I_{C,nom.}$ I_C	300 450	A
Repetitive Peak Collector Current	tp =1ms	I_{CRM}	600	A
Total Power Dissipation		P_{tot}	1600	W
Isolation Voltage	RMS, f=50Hz, t=1min	V_{iso}	2500	V
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 =300A, V_{GE} =15V	T_{vj}=25°C		1.90	2.15	V
		I_C =300A, V_{GE} =15V	T_{vj}=125°C		2.00		
		I_C =300A, V_{GE} =15V	T_{vj}=150°C		2.05		
Gate threshold voltage	V_{GEth}	I_C =11.5mA, V_{CE} =V_{GE}, T_{vj} =25°C		5.2	5.8	6.4	V
Gate charge	Q_G	V_{GE}= -15 V... +15 V			3.6		μC
Input capacitance	C_{ies}	f = 1MHz, T_{vj} =25°C, V_{CE} =25V, V_{GE} =0V			52		nF
Output capacitance	C_{oes}	f = 1MHz, T_{vj} =25°C, V_{CE} =25V, V_{GE} =0V			1.3		nF
Reverse transfer capacitance	C_{res}	f = 1MHz, T_{vj} =25°C, V_{CE} =25V, V_{GE} =0V			0.7		nF
Collector-emitter cut-off current	I_{CES}	V_{CE} =1200V, V_{GE} =0V, T_{vj} =25°C				5	mA
Gate-emitter leakage current	I_{GES}	V_{CE} =0V, V_{GE} =20V, T_{vj} =25°C				400	nA
Turn-on delay time, inductive load	$t_{d\ on}$	I_C =300A, V_{CE} =600V	T_{vj}=25°C		0.24		μs
		V_{GE} = ±15V	T_{vj}=125°C		0.31		
		R_{Gon} =1.3Ω	T_{vj}=150°C		0.32		
Rise time, inductive load	t_r	I_C =300A, V_{CE} =600V	T_{vj}=25°C		0.08		μs
		V_{GE} = ±15V	T_{vj}=125°C		0.075		
		R_{Gon} =1.3Ω	T_{vj}=150°C		0.08		
Turn-off delay time, inductive load	$t_{d\ off}$	I_C =300A, V_{CE} =600V	T_{vj}=25°C		0.40		μs
		V_{GE} = ±15V	T_{vj}=125°C		0.43		
		R_{Goff} =1.3Ω	T_{vj}=150°C		0.45		
Fall time, inductive load	t_f	I_C =300A, V_{CE} =600V	T_{vj}=25°C		0.08		μs
		V_{GE} = ±15V	T_{vj}=125°C		0.13		
		R_{Goff} =1.3Ω	T_{vj}=150°C		0.15		
Turn-on energy loss per pulse	E_{on}	I_C =300A, V_{CE} =600V, L_S =30nH	T_{vj}=25°C		14.5		mJ
		V_{GE} = ±15V, di/dt =6000A/μs (T_{vj} =150°C)	T_{vj}=125°C		23.0		
		R_{Gon} =1.3Ω	T_{vj}=150°C		28.0		
Turn-off energy loss per pulse	E_{off}	I_C =300A, V_{CE} =600V, L_S =30nH	T_{vj}=25°C		24.5		mJ
		V_{GE} = ±15V, du/dt =4500V/μs (T_{vj} =150°C)	T_{vj}=125°C		34.5		
		R_{Goff} =1.3Ω	T_{vj}=150°C		37.5		
SC data	I_{SC}	V_{GE} ≤15V, V_{CC} =900V V_{CEmax} =V_{CES} - L_{sCE} ·di/dt	t_P ≤10μs, T_{vj}=125°C		1200		A
Thermal resistance, junction to case	R_{thJC}	per IGBT				0.093	°C/W
Thermal resistance, case to heatsink	R_{thCH}	per IGBT			0.032		°C/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		300	A
Repetitive peak forward current	I_{FRM}	t_P =1ms	600	A
I²t - value	I²t	V_R =0V, t_P =10ms, T_{vj} =125°C	19000	A²s
		V_R =0V, t_P =10ms, T_{vj} =150°C	18000	

Characteristics	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Forward voltage	V_F	I_F =300A, V_{GE} =0V	T_{vj} =25°C		1.9	2.35	V
		I_F =300A, V_{GE} =0V	T_{vj} =125°C		1.9		
		I_F =300A, V_{GE} =0V	T_{vj} =150°C		1.9		
Peak reverse recovery current	I_{RM}	I_F =300A, -di_F/dt =6000A/μs (T_{vj}=150°C)	T_{vj} =25°C		164		A
		V_R =600V	T_{vj} =125°C		228		
		V_{GE} = -15V	T_{vj} =150°C		238		
Recovered charge	Qr	I_F =300A, -di_F/dt =6000A/μs (T_{vj}=150°C)	T_{vj} =25°C		25		μC
		V_R =600V	T_{vj} =125°C		42		
		V_{GE} = -15V	T_{vj} =150°C		61		
Reverse recovery energy	Erec	I_F =300A, -di_F/dt =6000A/μs (T_{vj}=150°C)	T_{vj} =25°C		14.8		mJ
		V_R =600V	T_{vj} =125°C		28		
		V_{GE} = -15V	T_{vj} =150°C		30.5		
Reverse Recovery Time	Trr	I_F =300A, -di_F/dt =6000A/μs, V_R =600V, V_{GE} = -15V, T_{vj}=25°C			246		ns
Thermal resistance, junction to case	R_{thJC}	per diode				0.15	°C/W
Thermal resistance, case to heatsink	R_{thCH}	per diode			0.052		°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)

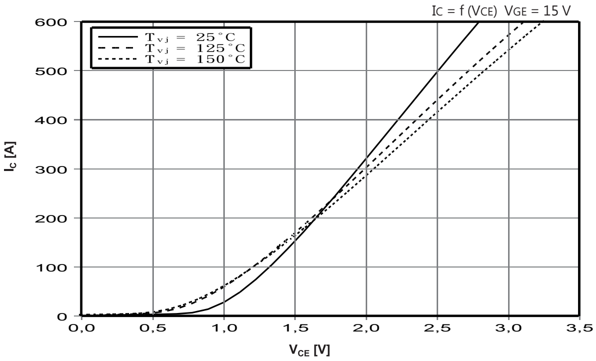


Fig.2 Output characteristic IGBT,Inverter (typical)

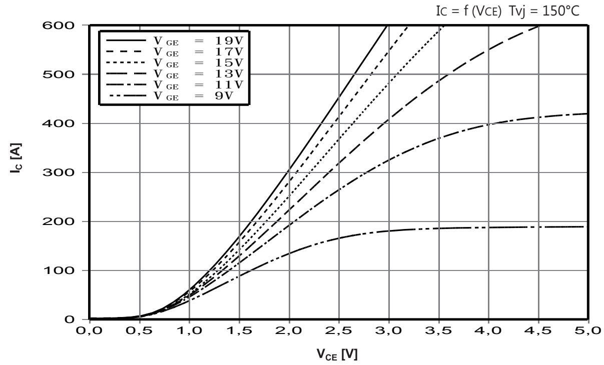


Fig.3 Transfer characteristic IGBT,Inverter (typical)

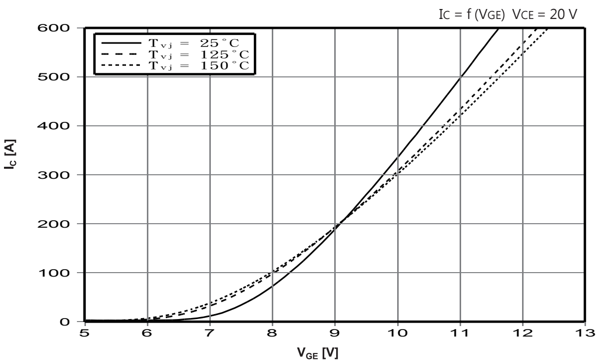


Fig.4 Switching losses IGBT,Inverter (typical)

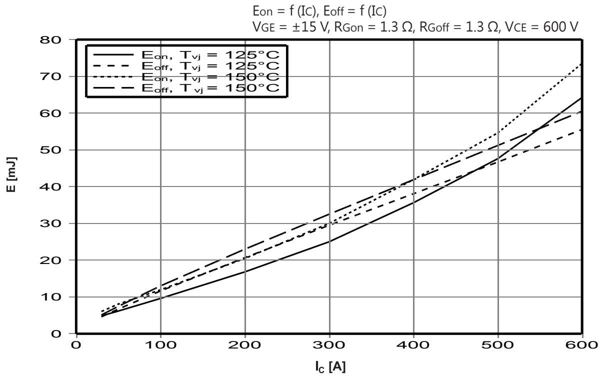


Fig.5 Switching losses IGBT,Inverter (typical)

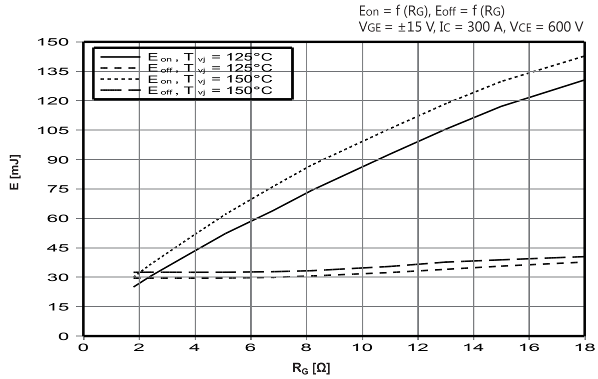


Fig.6 Transient thermal impedance IGBT,Inverter

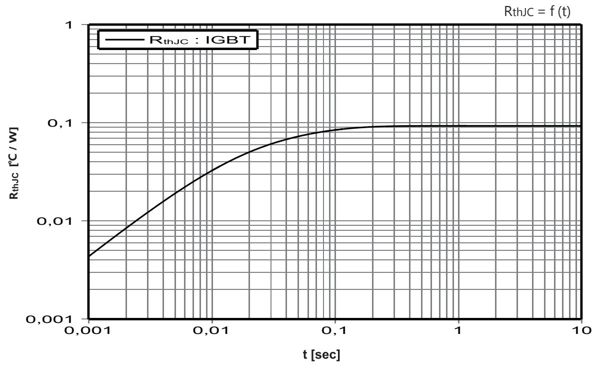


Fig.7 Reverse bias safe operating area IGBT,Inverter (RBSOA)

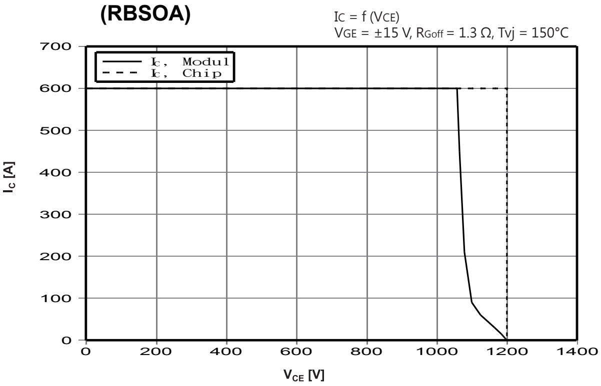
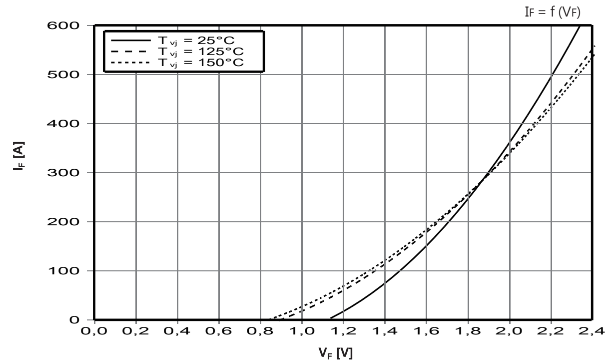


Fig.8 Forward characteristic of Diode, Inverter (typical)



Typical Characteristics **Preliminary Data**

Fig.9 Switching losses Diode, Inverter (typical)

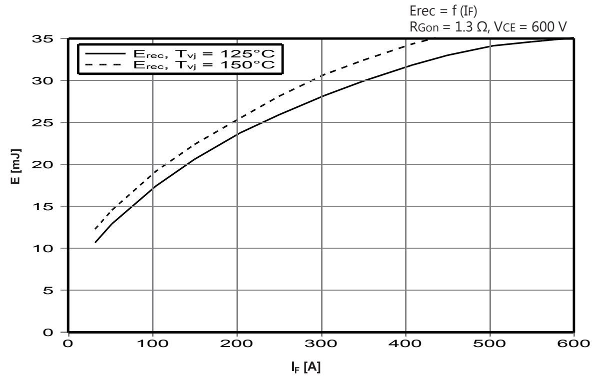


Fig.10 Switching losses Diode, Inverter (typical)

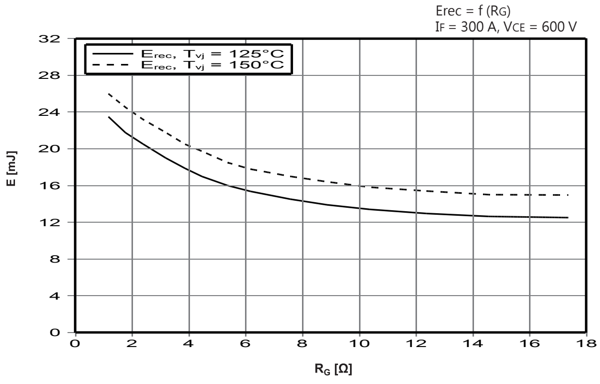
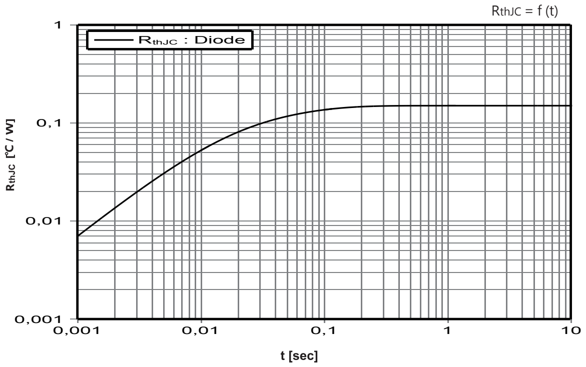


Fig.11 Transient thermal impedance Diode, Inverter



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