DACO SEMICONDUCTOR CO., LTD.

DAHN100G120SA

IGBT Power Module
1200V / 100A

Preliminary

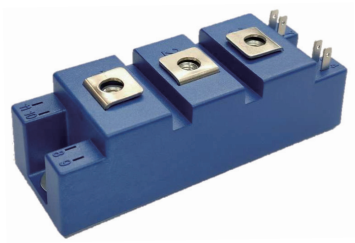
Features

- 34mm Fast Switching IGBT Trench Technology
- Low Switching Loss
- Super Fast Diodes
- High Short Circuit Capability

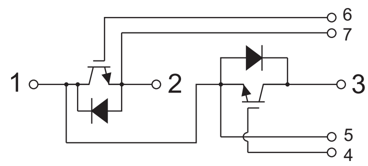
Applications

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

HD-9434



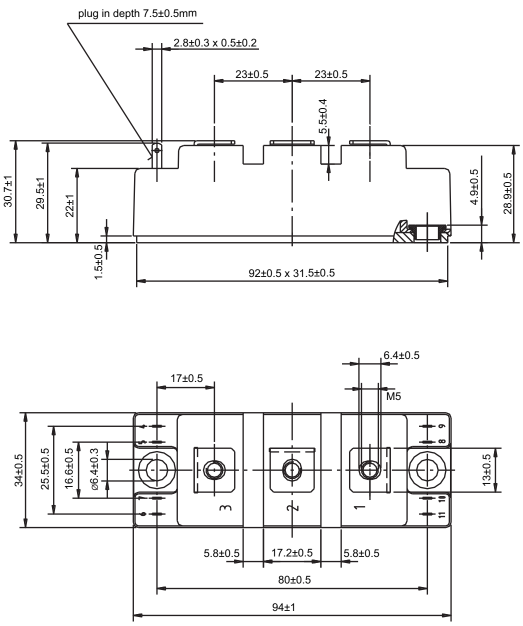
Circuit Diagram Headline



Maximum Ratings (T_C= 25℃)

Item		Symbol	Rated Value	Unit
Collector-Emitter Voltage		V_{CES}	1200	V
Gate-Emitter Peak Voltage		V_{GES}	±20	V
DC-Collector Current	T_C = 100℃	$I_{C,nom.}$	100	A
Repetitive Peak Collector Current	tp =1ms	I_{CRM}	200	A
Total Power Dissipation		P_{tot}	555	W
Isolation Voltage	RMS, f=50Hz, t=1min	V_{iso}	3000	V
DC Forward Current		I_F	100	A
Repetitive Peak Forward. Current	tp =1ms	I_{FRM}	200	A
Temperature under switching conditions		$T_{vj\ op}$	−40～+150	℃
Storage Temperature Range		T_{stg}	−40～+125	℃
Mounting Torque	Module Base to Heatsink		3～5	N.m
	Busbar to Terminal		2.5～5	

Package Outlines



Dimensions in mm (1 mm = 0.0394")

Preliminary Data

■ Electrical Characteristics

Characteristics	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Collector-emitter saturation voltage	$V_{CE\ sat}$	I_C =100A, V_{GE} =15V	T_{vj} =25°C		1.9	2.35	V
		I_C =100A, V_{GE} =15V	T_{vj} =125°C		2.2		
		I_C =100A, V_{GE} =15V	T_{vj} =150°C		2.25		
Gate threshold voltage	V_{GEth}	I_C =3.8mA, 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			1.3		µC
Internal gate resistor	R_{Gint}	T_{vj} =25°C			1.3		Ω
Input capacitance	C_{ies}	f = 1MHz, T_{vj} =25°C, V_{CE} =25V, V_{GE} =0V			18.4		nF
Output Capacitance	C_{oes}	f = 1MHz, T_{vj} =25°C, V_{CE} =25V, V_{GE} =0V			0.72		nF
Reverse transfer capacitance	C_{res}	f = 1MHz, T_{vj} =25°C, V_{CE} =25V, V_{GE} =0V			0.42		nF
Collector-emitter cut-off current	I_{CES}	V_{CE} =1200V, V_{GE} =0V, T_{vj} =25°C				1	mA
Gate-emitter leakage current	I_{GES}	V_{CE} =0V, V_{GE} =20V, T_{vj} =25°C				100	nA
Turn-on delay time, inductive load	$t_{d\ on}$	I_C =100A, V_{CE} =600V	T_{vj} =25°C		0.15		µs
		V_{GE} = ±15V	T_{vj} =125°C		0.17		
		R_{Gon} =1.6Ω	T_{vj} =150°C		0.17		
Rise time, inductive load	t_r	I_C =100A, V_{CE} =600V	T_{vj} =25°C		0.03		µs
		V_{GE} = ±15V	T_{vj} =125°C		0.04		
		R_{Gon} =1.6Ω	T_{vj} =150°C		0.045		
Turn-off delay time, inductive load	$t_{d\ off}$	I_C =100A, V_{CE} =600V	T_{vj} =25°C		0.22		µs
		V_{GE} = ±15V	T_{vj} =125°C		0.3		
		R_{Goff} =1.6Ω	T_{vj} =150°C		0.32		
Fall time, inductive load	t_f	I_C =100A, V_{CE} =600V	T_{vj} =25°C		0.05		µs
		V_{GE} = ±15V	T_{vj} =125°C		0.085		
		R_{Goff} =1.6Ω	T_{vj} =150°C		0.095		
Turn-on energy loss per pulse	E_{on}	I_C =100A, V_{CE} =600V, L_S =30nH	T_{vj} =25°C		3.15		mJ
		V_{GE} = ±15V, di/dt =2800A/µs (T_{vj} =150°C)	T_{vj} =125°C		6.15		
		R_{Gon} =1.6Ω	T_{vj} =150°C		7.15		
Turn-off energy loss per pulse	E_{off}	I_C =100A, V_{CE} =600V, L_S =30nH	T_{vj} =25°C		5.1		mJ
		V_{GE} = ±15V, du/dt =3600V/µs (T_{vj} =150°C)	T_{vj} =125°C		8.1		
		R_{Goff} =1.6Ω	T_{vj} =150°C		9.1		
SC data	I_{SC}	V_{GE} ≤15V, V_{CC} =800V V_{CEmax} =V_{CES} - L_{sCE} ·di/dt	t_P ≤10µs, T_{vj} =150°C		400		A
Thermal resistance, junction to case	R_{thJC}	per IGBT				0.27	°C/W
Thermal resistance, case to heatsink	R_{thCH}	per IGBT			0.078		°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		100	A
Repetitive peak forward current	I_{FRM}	t_P =1ms	200	A
I²t - value	I²t	V_R =0V, t_P =10ms, T_{vj} =125°C V_R =0V, t_P =10ms, T_{vj} =150°C	1900 1800	A²s

Characteristics	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Forward voltage	V_F	I_F =100A, V_{GE} =0V	T_{vj} =25°C		1.9	2.35	V
		I_F =100A, V_{GE} =0V	T_{vj} =125°C		1.8		
		I_F =100A, V_{GE} =0V	T_{vj} =150°C		1.8		
Peak reverse recovery current	I_{RM}	I_F =100A, -di_F/dt =2800A/μs (T_{vj}=150°C)	T_{vj} =25°C		100		A
		V_R =600V	T_{vj} =125°C		105		
		V_{GE} = -15V	T_{vj} =150°C		110		
Recovered charge	Qr	I_F =100A, -di_F/dt =2800A/μs (T_{vj}=150°C)	T_{vj} =25°C		8.4		μC
		V_R =600V	T_{vj} =125°C		15.4		
		V_{GE} = -15V	T_{vj} =150°C		17.4		
Reverse recovery energy	Erec	I_F =100A, -di_F/dt =2800A/μs (T_{vj}=150°C)	T_{vj} =25°C		5.29		mJ
		V_R =600V	T_{vj} =125°C		7.79		
		V_{GE} = -15V	T_{vj} =150°C		8.79		
Reverse Recovery Time	Trr	I_F =100A, -di_F/dt =2800A/μs, V_R =600V, V_{GE} = -15V, T_{vj}=25°C			113		ns
Thermal resistance, junction to case	R_{thJC}	per diode				0.48	°C/W
Thermal resistance, case to heatsink	R_{thCH}	per diode			0.14		°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 terminal to terminal	17 20	mm
Clearance		terminal to heatsink terminal to terminal	17 9.5	mm
Comperative tracking index	CTI		>200	

Typical Characteristics

Preliminary Data

Fig.1 Output characteristic IGBT,Inverter (typical)

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

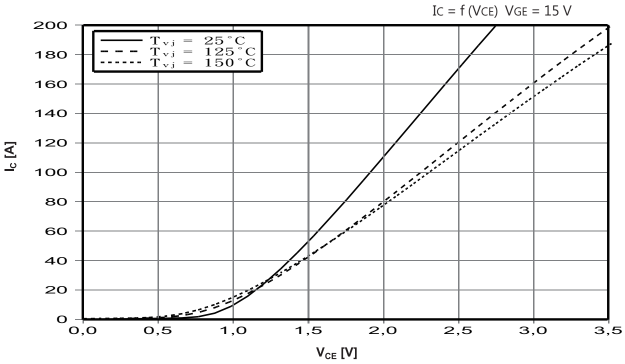


Fig.2 Output characteristic IGBT,Inverter (typical)

I_C = f (V_{CE}) Tvj = 150°C

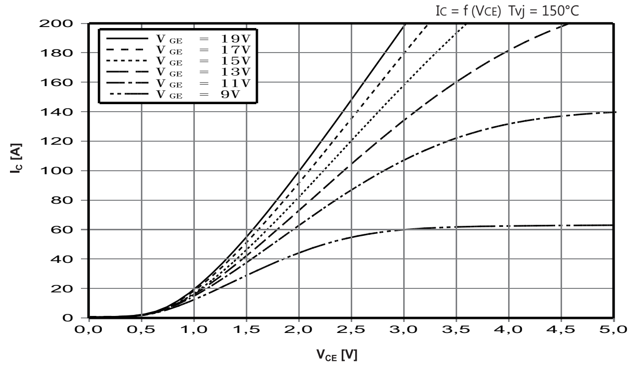


Fig.3 Transfer characteristic IGBT,Inverter (typical)

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

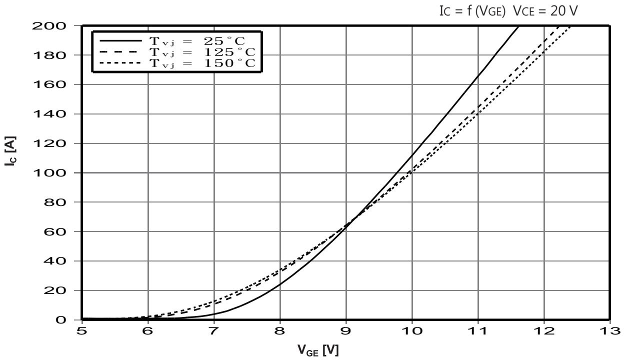


Fig.4 Switching losses IGBT,Inverter (typical)

E_{on} = f (I_C), E_{off} = f (I_C)
V_{GE} = ±15 V, R_{Gon} = 1.6 Ω, R_{Goff} = 1.6 Ω, V_{CE} = 600 V

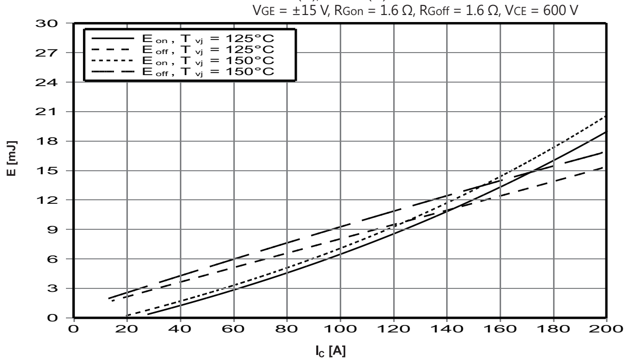


Fig.5 Switching losses IGBT,Inverter (typical)

E_{on} = f (R_G), E_{off} = f (R_G)
V_{GE} = ±15 V, I_C = 100 A, V_{CE} = 600 V

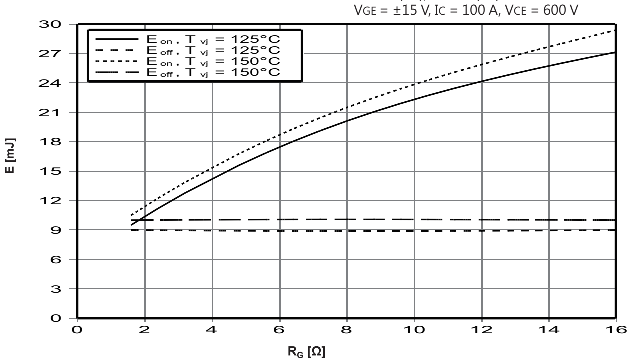


Fig.6 Transient thermal impedance IGBT,Inverter

R_{thJC} = f (t)

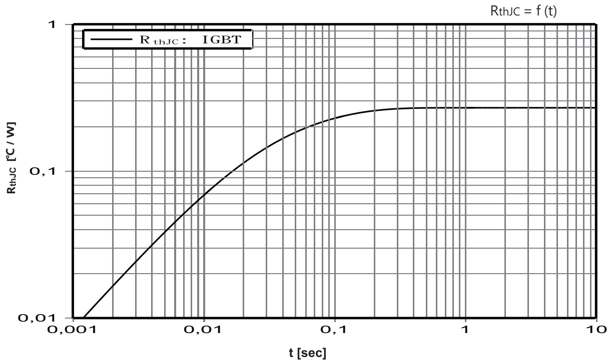


Fig.7 Reverse bias safe operating area IGBT,Inverter (RBSOA)

I_C = f (V_{CE})
V_{GE} = ±15 V, R_{Goff} = 1.6 Ω, Tvj = 150°C

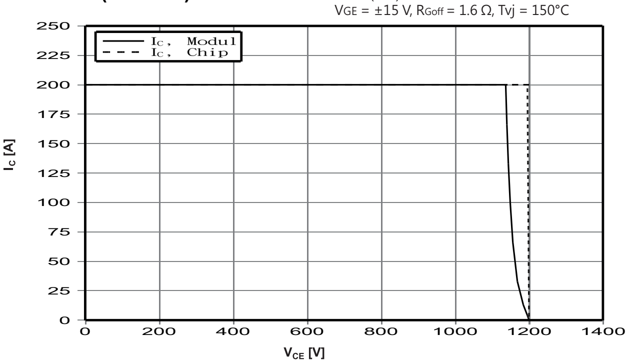


Fig.8 Forward characteristic of Diode, Inverter (typical)

I_F = f (V_F)

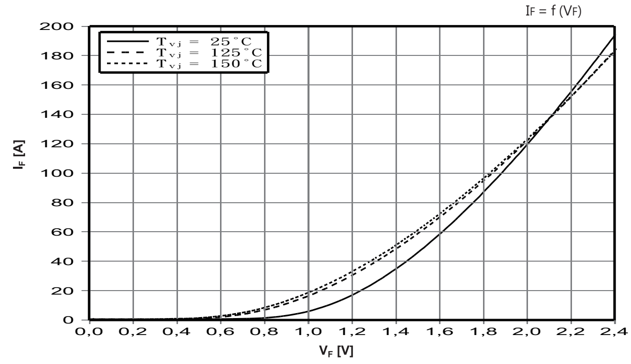


Fig.9 Switching losses Diode, Inverter (typical)

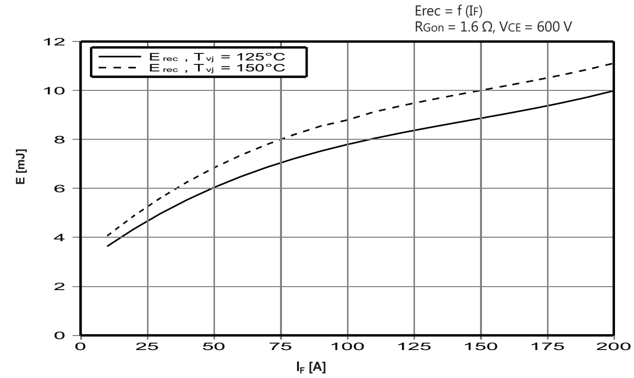


Fig.10 Switching losses Diode, Inverter (typical)

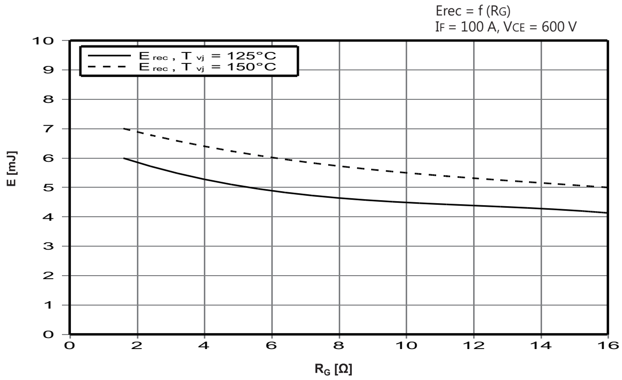
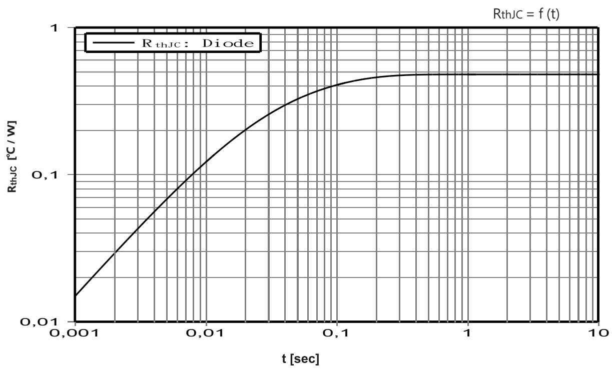


Fig.11 Transient thermal impedance Diode, Inverter



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