DACO®

DAHF150G065SA

IGBT Power Module
650V/150A

Preliminary

HD-9434

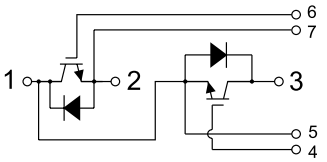
Features

- 34mm 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

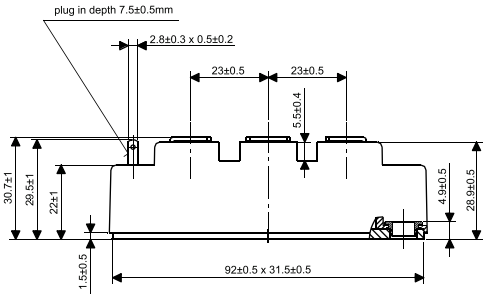
Circuit Diagram Headline

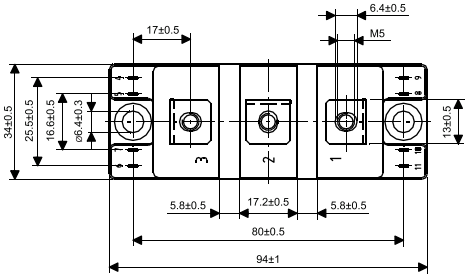


Maximum Ratings (T_C= 25℃)

Item		Symbol	Rated Value	Unit
Collector-Emitter Voltage	T_{VJ} = 25℃	V_{CES}	650	V
Gate-Emitter Peak Voltage		V_{GES}	±20	V
Continuous DC Collector Current	T_C = 100℃	$I_{C,nom.}$	150	A
Repetitive Peak Collector Current	tp =1ms	I_{CRM}	300	A
Total Power Dissipation	T_C = 100℃ T_{VJ} max. = 175℃	P_{tot}	430	W
Isolation Voltage	RMS, f=50Hz, t=1min	V_{iso}	3000	V
Continuous DC Forward Current		I_F	150	A
Repetitive Peak Forward Current	tp =1ms	I_{FRM}	300	A
Temperature under switching conditions		$T_{VJ\ op}$	−40～+150	℃
Storage Temperature		T_{stg}	−40～+125	℃
Mounting Torque	Module Base to Heatsink (M6)		3～5	N.m
	Busbar to Terminal (M5)		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 =150A, V_{GE} =15V, T_{vj} =25°C	-	1.65	1.8	V
		I_C =150A, V_{GE} =15V, T_{vj} =125°C	-	1.75	-	
Gate threshold voltage	V_{GEth}	I_C =1.5mA, V_{CE} =V_{GE}, T_{vj} =25°C	5.0	5.8	6.5	V
Gate charge	Q_G	V_{GE}= -15 V... +15 V	-	1.12	-	µC
Internal Gate Resistance	$R_{G(int)}$	V_{GE}= -15 V... +15 V	-	3.3	-	Ω
Input capacitance	C_{ies}	f = 100KHz, T_{vj} =25°C, V_{CE} =25V, V_{GE} =0V	-	9.41	-	nF
Output capacitance	C_{oes}	f = 100KHz, T_{vj} =25°C, V_{CE} =25V, V_{GE} =0V	-	759	-	pF
Reverse transfer capacitance	C_{res}	f = 100KHz, T_{vj} =25°C, V_{CE} =25V, V_{GE} =0V	-	406	-	
Collector-emitter cut-off current	I_{CES}	V_{CE} =650V, 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	-	-	400	nA
Turn-on delay time, inductive load	$t_{d\ on}$	I_C =150A, V_{CE} =325V, V_{GE} = ±15V, R_{Gon} =4.7Ω, T_{vj} =25°C	-	200	-	ns
		I_C =150A, V_{CE} =325V, V_{GE} = ±15V, R_{Gon} =4.7Ω, T_{vj} =125°C		208		
		I_C =150A, V_{CE} =325V, V_{GE} = ±15V, R_{Gon} =4.7Ω, T_{vj} =150°C		210		
Rise time, inductive load	t_r	I_C =150A, V_{CE} =325V, V_{GE} = ±15V, R_{Gon} =4.7Ω, T_{vj} =25°C	-	79	-	ns
		I_C =150A, V_{CE} =325V, V_{GE} = ±15V, R_{Gon} =4.7Ω, T_{vj} =125°C		82		
		I_C =150A, V_{CE} =325V, V_{GE} = ±15V, R_{Gon} =4.7Ω, T_{vj} =150°C		84		
Turn-off delay time, inductive load	$t_{d\ off}$	I_C =150A, V_{CE} =325V, V_{GE} = ±15V, R_{Goff} =4.7Ω, T_{vj} =25°C	-	264	-	ns
		I_C =150A, V_{CE} =325V, V_{GE} = ±15V, R_{Goff} =4.7Ω, T_{vj} =125°C		290		
		I_C =150A, V_{CE} =325V, V_{GE} = ±15V, R_{Goff} =4.7Ω, T_{vj} =150°C		294		
Fall time, inductive load	t_f	I_C =150A, V_{CE} =325V, V_{GE} = ±15V, R_{Goff} =4.7Ω, T_{vj} =25°C	-	61	-	ns
		I_C =150A, V_{CE} =325V, V_{GE} = ±15V, R_{Goff} =4.7Ω, T_{vj} =125°C		136		
		I_C =150A, V_{CE} =325V, V_{GE} = ±15V, R_{Goff} =4.7Ω, T_{vj} =150°C		137		
Turn-on energy loss per pulse	E_{on}	I_C =150A, V_{CE} =325V, V_{GE} = ±15V, R_{Gon} =4.7Ω, T_{vj} =25°C	-	3.7	-	mJ
		I_C =150A, V_{CE} =325V, V_{GE} = ±15V, R_{Gon} =4.7Ω, T_{vj} =125°C		5.35		
		I_C =150A, V_{CE} =325V, V_{GE} = ±15V, R_{Gon} =4.7Ω, T_{vj} =150°C		6.02		
Turn-off energy loss per pulse	E_{off}	I_C =150A, V_{CE} =325V, L_S =85nH, V_{GE} = ±15V, R_{Goff} =4.7Ω, T_{vj} =25°C	-	5.67	-	mJ
		I_C =150A, V_{CE} =325V, L_S =85nH, V_{GE} = ±15V, R_{Goff} =4.7Ω, T_{vj} =125°C		7.03		
		I_C =150A, V_{CE} =325V, L_S =85nH, V_{GE} = ±15V, R_{Goff} =4.7Ω, T_{vj} =150°C		7.18		
SC data	I_{SC}	$V_{GE} \leq$ 15V, V_{CC} =325V, V_{CEmax} =V_{CES} - L_{sCE} ·di/dt, $t_P \leq$ 10µs, T_{vj} =125°C	-	500	-	A
Thermal resistance, junction to case	R_{thJC}	per IGBT	-	-	0.35	°C/W
Thermal resistance, case to heatsink	R_{thCH}	per IGBT	-	0.14	-	°C/W

■ Diode Ratings & Characteristics

Characteristics	Symbol	Test Conditions	Value	Unit
Repetitive peak reverse voltage	V_{RRM}	T_{vj} =25°C	650	V
Continuous DC forward current	I_F		150	A
Repetitive peak forward current	I_{FRM}	t_P =1ms	300	A
I²t - value	I²t	V_R =0V, t_P =10ms, T_{vj} =125°C	1750	A²s

Characteristics	Symbol	Test Conditions		Min.	Typ.	Max.	Unit
Forward voltage	V_F	I_F =150A, V_{GE} =0V	T_{vj} =25°C T_{vj} =125°C		1.55 1.5	1.65	V
Peak reverse recovery current	I_{RM}	I_F =150A, -di$_F$/dt =2200A/µs (T_{vj}=25°C) V_R =325V, V_{GE} = -15V	T_{vj} =25°C T_{vj} =125°C		92 152		A
Recovered charge	Qr	I_F =150A, -di$_F$/dt =2200A/µs (T_{vj}=25°C) V_R =325V, V_{GE} = -15V	T_{vj} =25°C T_{vj} =125°C		4.51 1.10		µc
Reverse recovery energy	Erec	I_F =150A, -di$_F$/dt =2200A/µs (T_{vj}=25°C) V_R =325V V_{GE} = -15V	T_{vj} =25°C T_{vj} =125°C Tvj =150°C		1.25 2.91 3.34		mJ
Thermal resistance, junction to case	R_{thJC}	per diode				0.60	°C/W
Thermal resistance, case to heatsink	R_{thCH}	per diode			0.245		°C/W
Temperature under switching conditions	$T_{vj\ op}$			-40		125	°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	

Fig.1 Output characteristic IGBT,Inverter (typical)

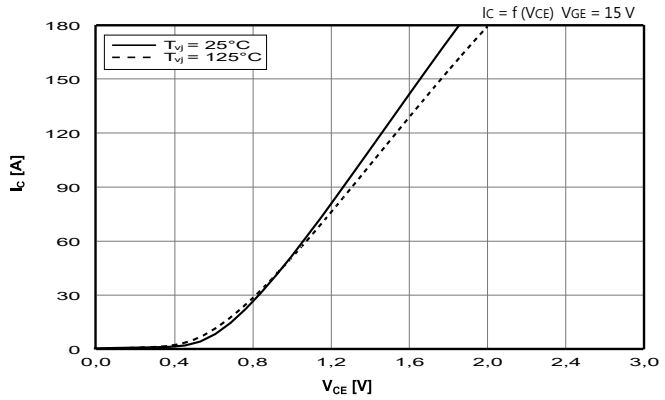


Fig.2 Transfer characteristic IGBT,Inverter (typical)

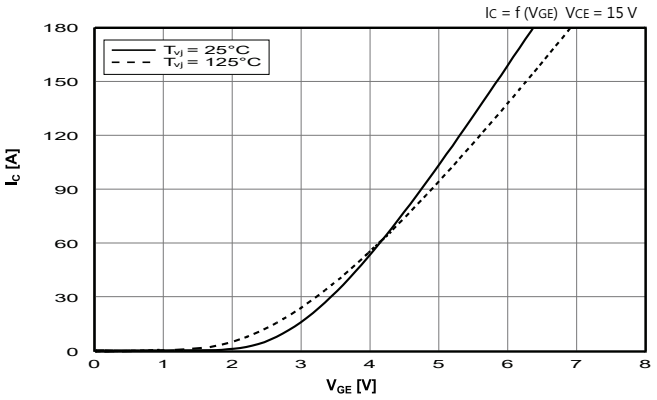


Fig.3 Switching losses IGBT,Inverter (typical)

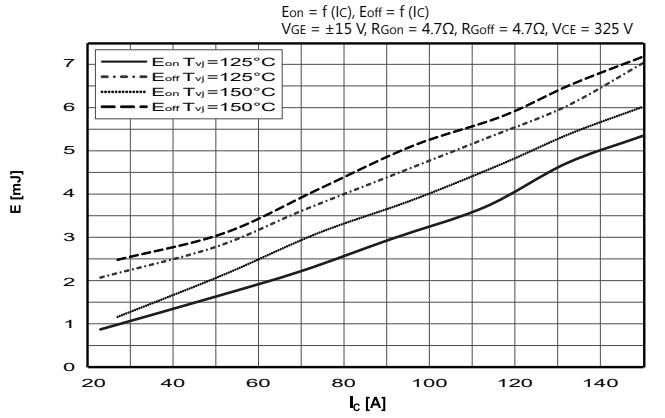


Fig.4 Switching losses IGBT,Inverter (typical)

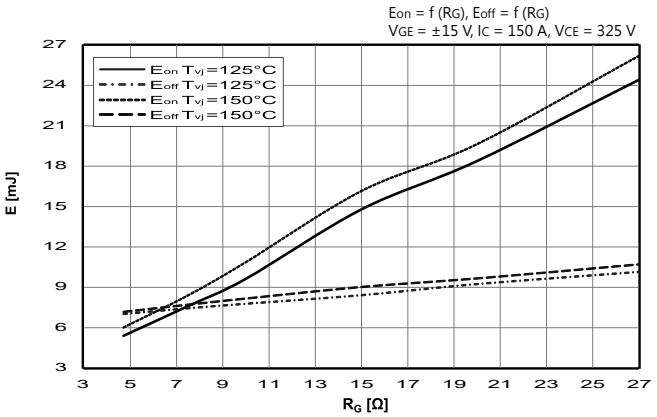


Fig.5 Transient thermal impedance IGBT,Inverter

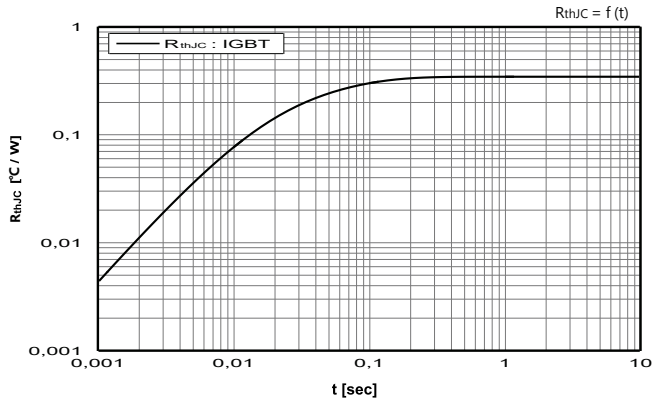


Fig.6 Reverse bias safe operating area IGBT,Inverter (RBSOA)

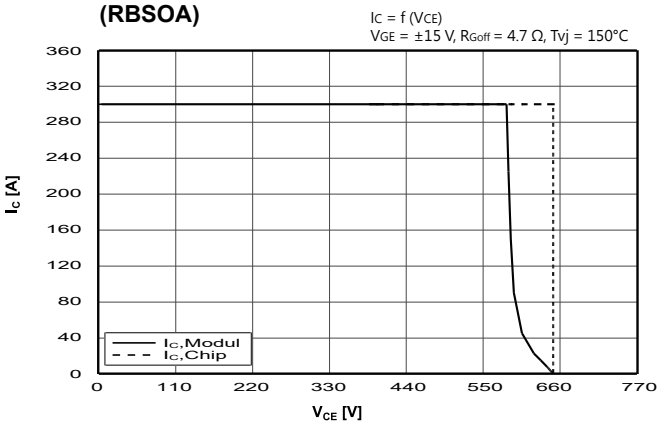


Fig.7 Forward characteristic of Diode, Inverter (typical)

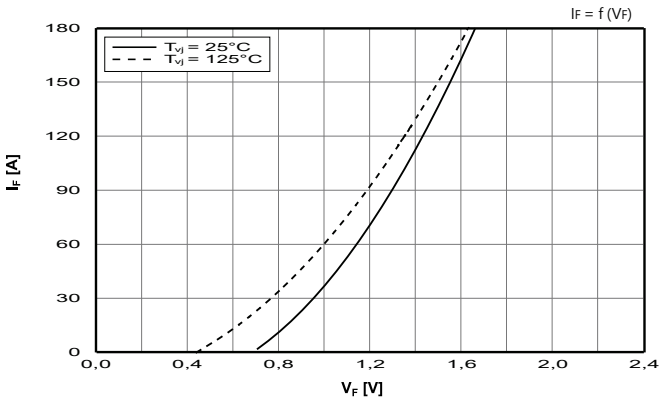


Fig.8 Switching losses Diode, Inverter (typical)

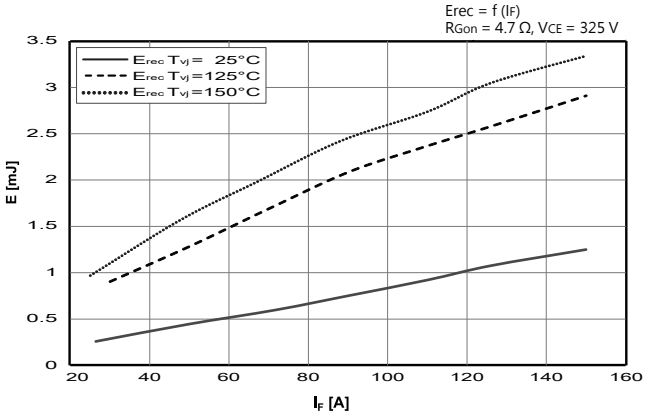


Fig.11 Switching losses Diode, Inverter (typical)

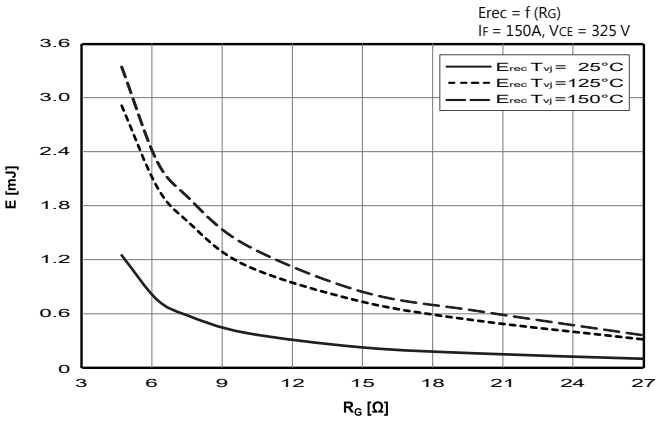
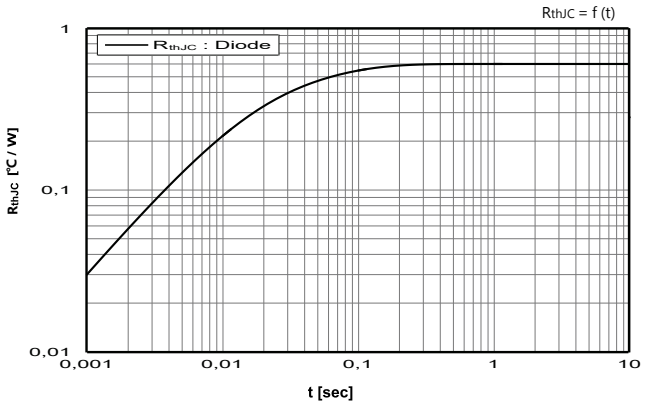


Fig.12 Transient thermal impedance Diode, Inverter



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