HCH900FH120D3ME7

1200V/900A Half Bridge SiC Hybrid Modules

Description

The HCH900FH120D3ME7 is a Half Bridge SiC Hybrid Power Module. It integrates high performance IGBT chips and SiC SBD designed for the applications such as High Power Switching Application and Motor control.

Features

- Blocking voltage : 1200V
- Low saturation voltage $V_{CE(sat)}$
- Low Switching Losses
- Low Thermal Resistance
- Thermistor inside

Applications

- High Power Switching Applications
- Motor Drives
- Solar inverter Systems
- Uninterrupted Power Supply

Circuit diagram

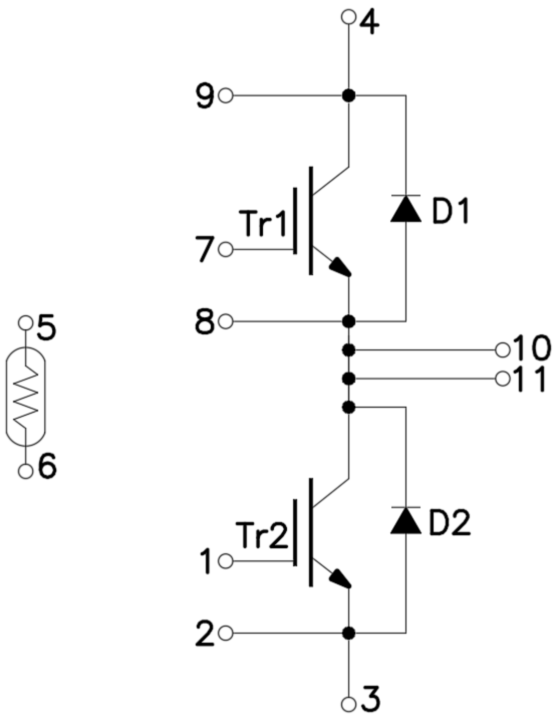

Figure1. Out drawing & circuit diagram for HCH900FH120D3ME7

HCH900FH120D3ME7

1200V/900A Half Bridge SiC Hybrid Modules

Pin Configuration and Marking Information

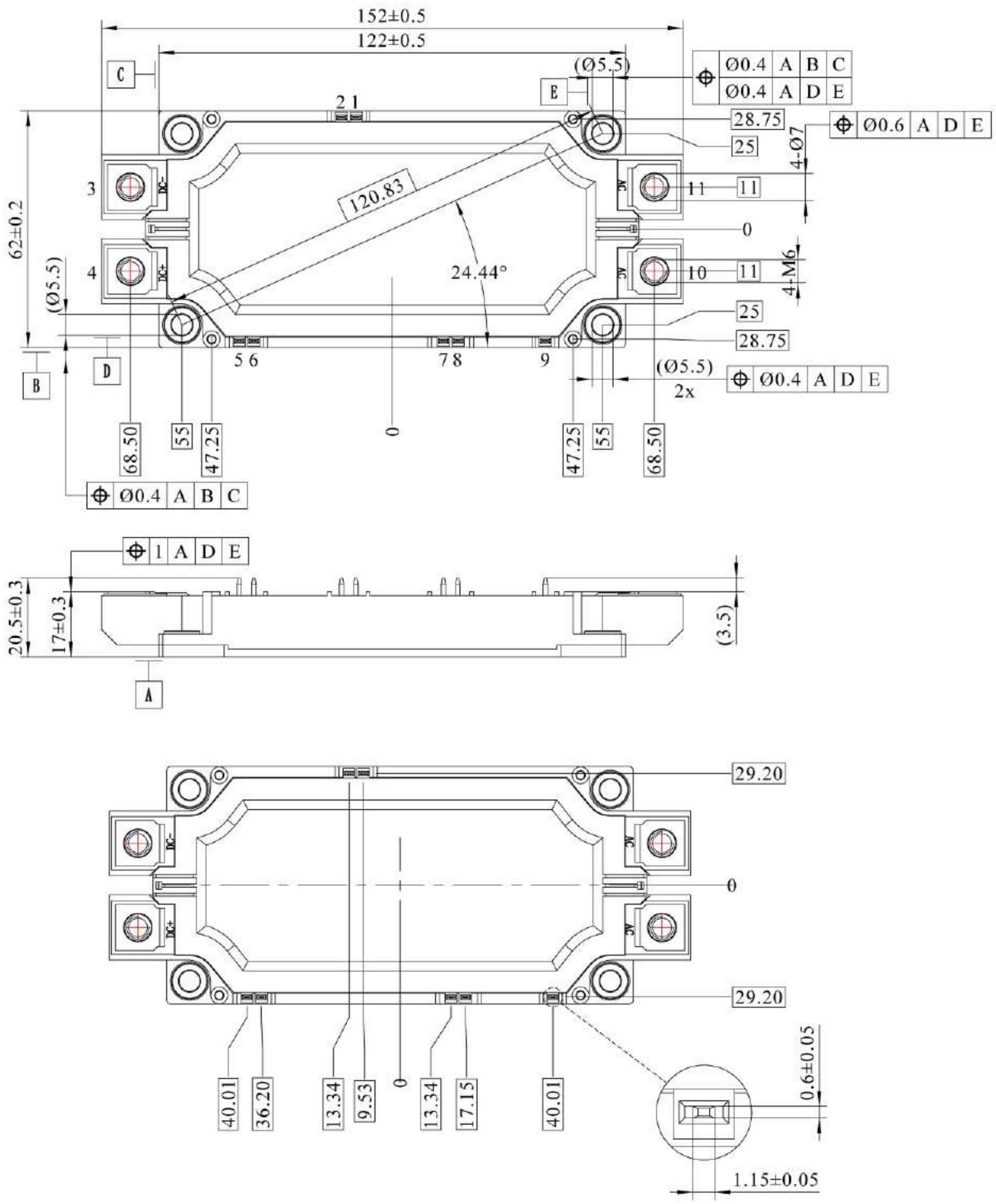

Figure 2. Pin configuration

HCH900FH120D3ME7

1200V/900A Half Bridge SiC Hybrid Modules

Module

Parameter	Condition	Value	Unit
Isolation Voltage	RMS, f = 50Hz, t =1min	3.4	kV
Material of module baseplate	-	Cu	-
Creepage distance	terminal to heatsink terminal to terminal	14.5 13	mm
Clearance	terminal to heatsink terminal to terminal	12.5 10	mm
CTI	-	>400	-
Module lead resistance, terminals – chip	T_C =25°C	0.8	mΩ
Mounting torque for module mounting	M5, M6	3 to 6	Nm
Weight	-	350	g

Maximum Ratings (T_j =25°C unless otherwise specified)

Symbol	Parameter	Condition	Ratings	Unit
V_{CES}	Collector-Emitter Voltage	G-E Short	1200	V
V_{GES}	Gate-Emitter Voltage	C-E Short	±20	V
I_C	DC Continuous Collector Current	T_C =75°C , T_j =150°C	900	A
I_{CM}	Pulse Collector Current	t_p =1ms, Note1	1800	A
P_C	Maximum Power Dissipation	T_C =25°C, T_j =150°C(IGBT)	3125	W
I_F	Diode Forward Current	-	900	A
I_{FRM}	Repetitive peak forward Current	t_p =1ms, Note1	1800	A
T_{vjop}	Operating junction temperature	Note2	-40 to 175	°C
T_{stg}	Storage temperature	-	-40 to 125	°C

Note1: Pulse width limited by maximum junction temperature

Note2: T_{vjop} > 150°C is only allowed for operation at overload conditions

NTC characteristics

Symbol	Parameter	Condition	Value			Unit
			Min.	Typ.	Max.	
R_{25}	Resistance	T_C =25°C	-	5	-	kΩ
R/R	Deviation of R_{100}	T_C =100°C, R_{100} =493⊠	-5	-	5	%
P_{25}	Power dissipation	T_C =25°C	-	-	20	mW
$B_{25/50}$	B-value	R2 = R25 exp [$B_{25/50}$(1/T2 - 1/(298,15 K))]	-	3375	-	K
$B_{25/80}$	B-value	R2 = R25 exp [$B_{25/80}$(1/T2 - 1/(298,15 K))]	-	3411	-	K
$B_{25/100}$	B-value	R2 = R25 exp [$B_{25/100}$(1/T2 - 1/(298,15 K))]	-	3433	-	K

HCH900FH120D3ME7

1200V/900A Half Bridge SiC Hybrid Modules

IGBT Electrical characteristics (T_j=25°C unless otherwise specified, chip)

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max.	
$V_{CE(sat)}$ (Chip)	Collector-Emitter Saturation Voltage	I_C=900A V_{GE}=15V	T_j=25°C	-	1.72	2.06	V
			T_j=125°C	-	2.00	-	
			T_j=150°C	-	2.10	-	
			T_j=175°C	-	2.18	-	
$V_{GE(th)}$	Gate-Emitter threshold Voltage	I_C=25mA, V_{CE}=V_{GE}		5.0	-	6.5	V
Q_G	Gate charge	V_{GE}= -15V to +15V		-	7.6	-	uC
R_{Gint}	Internal gate resistor	-	T_j=25°C	-	0.5	-	Ω
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V f=1MHz	T_j=25°C	-	133.8	-	nF
C_{oes}	Output Capacitance			-	4.35	-	nF
C_{res}	Reverse transfer Capacitance			-	1.18	-	nF
I_{CES}	Collector- Emitter Cut off Current	V_{CE}=1200V, V_{GE}=0V	T_j=25°C	-	-	1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE} = 20V, V_{CE}=0V	T_j=25°C	-	-	1.5	uA
$t_{d(on)}$	Turn-on delay time	V_{CC}=600V I_C= 900A V_{GE}=+15V/-8V R_g=2.0⊠ Inductive load	T_j=25°C	-	412	-	ns
			T_j=150°C	-	423	-	
t_r	Rise time		T_j=25°C	-	112	-	ns
			T_j=150°C	-	126	-	
$t_{d(off)}$	Turn-off delay time		T_j=25°C	-	638	-	ns
			T_j=150°C	-	820	-	
t_f	Fall time		T_j=25°C	-	142	-	ns
			T_j=150°C	-	146	-	
E_{on}	Turn-on power dissipation		T_j=25°C	-	46.1	-	mJ
			T_j=150°C	-	65.4	-	
E_{off}	Turn-off power dissipation		T_j=25°C	-	95.1	-	mJ
			T_j=150°C	-	104.6	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (IGBT)			-	0.040	-	K/W
$R_{th(c-s)}$	Thermal Resistance, Case to sink (Conductive Grease applied), Note1			-	0.015	-	K/W

Note1: Assumes Thermal Conductivity of grease is 2.8W/m·K and thickness is 50um.

HCH900FH120D3ME7

1200V/900A Half Bridge SiC Hybrid Modules

SiC SBD Electrical characteristics (T_j =25°C unless otherwise specified, chip)

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max.	
V_F	Diode Forward Voltage	I_F =900A V_{GE} =0V	T_j=25°C	-	1.85	-	V
			T_j=125°C	-	2.60	-	
			T_j=150°C	-	2.90	-	
			T_j=175°C	-	3.10	-	
T_{rr}	Reverse recovery time	V_{CC}=600V I_C=900A V_{GE}=+15/-8V R_g=2.0Ω Inductive load switching operation	T_j=25°C	-	36	-	ns
			T_j=150°C	-	33	-	
I_{RM}	Peak reverse recovery Current		T_j=25°C	-	110	-	A
			T_j=150°C	-	73	-	
Q_{rr}	Reverse recovery charge		T_j=25°C	-	2.51	-	uC
			T_j=150°C	-	1.44	-	
E_{rr}	Reverse recovered energy		T_j=25°C	-	0.62	-	mJ
			T_j=150°C	-	0.27	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (Diode)			-	0.070	-	K/W
$R_{th(c-s)}$	Thermal Resistance, Case to sink (Conductive Grease applied) , Note1			-	0.025	-	K/W

Note1: Assumes Thermal Conductivity of grease is 2.8W/m·K and thickness is 50um.

Test Conditions

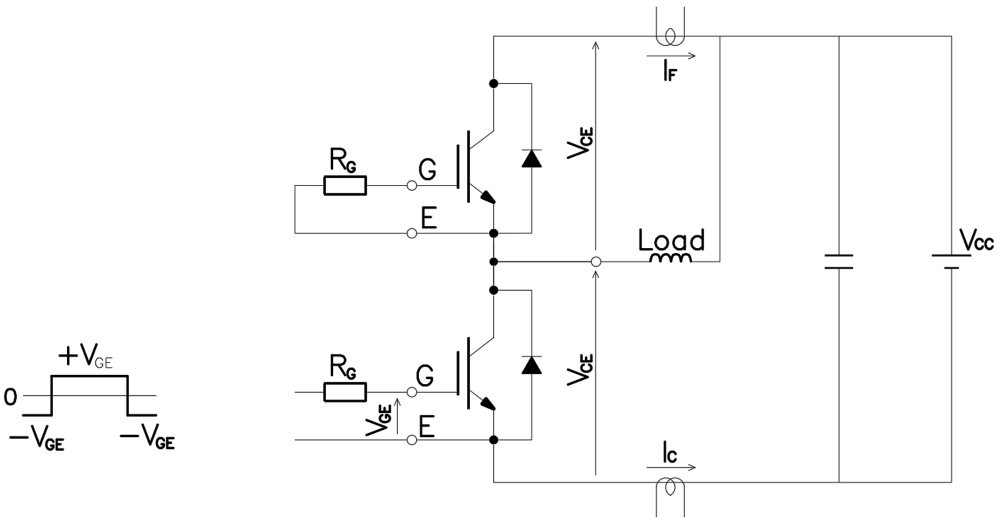

Figure 3. Switching time measure circuit

HCH900FH120D3ME7

1200V/900A Half Bridge SiC Hybrid Modules

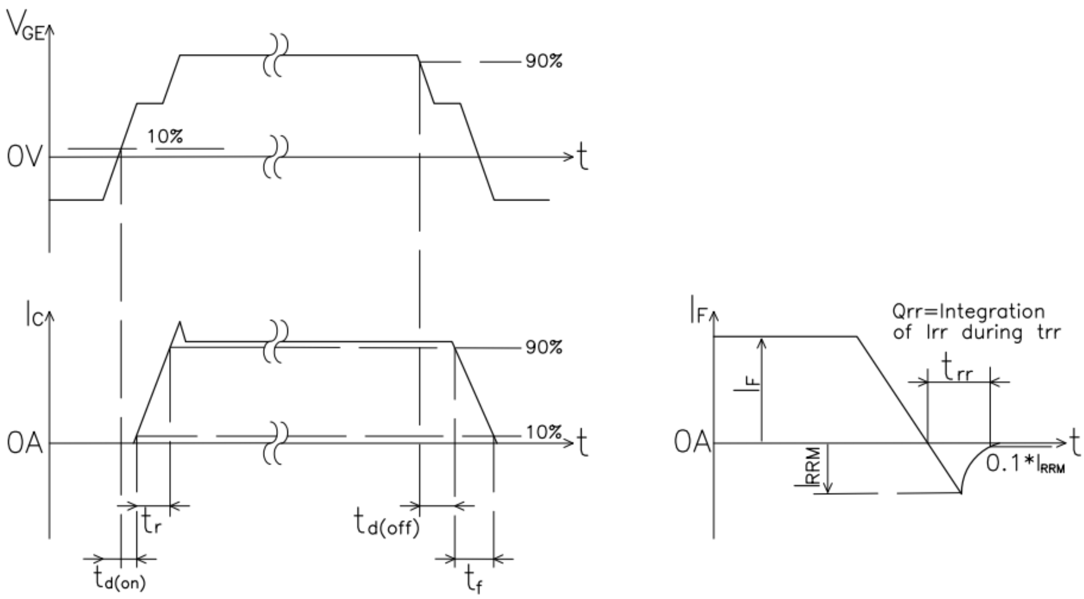

Figure 4. Switching time definition

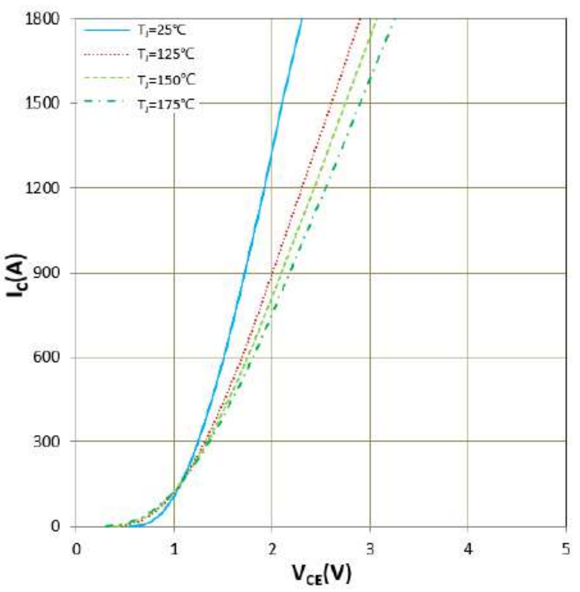	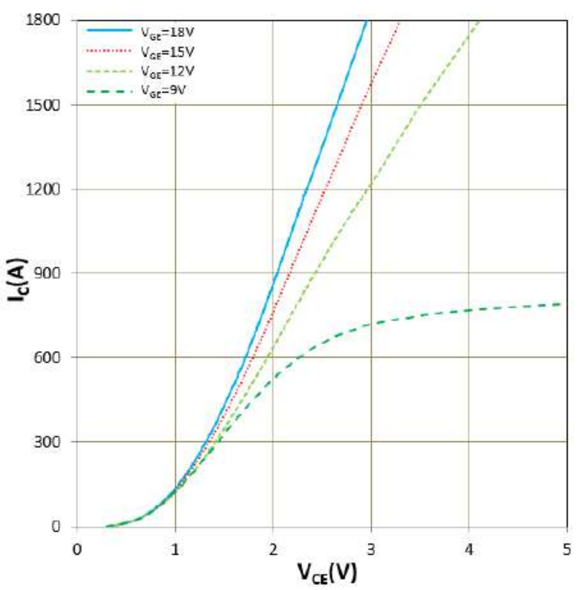
Figure 5. Ic vs V_{CE} V_{GE} =15V	Figure 6. Ic vs V_{CE} T_j =175°C

HCH900FH120D3ME7

1200V/900A Half Bridge SiC Hybrid Modules

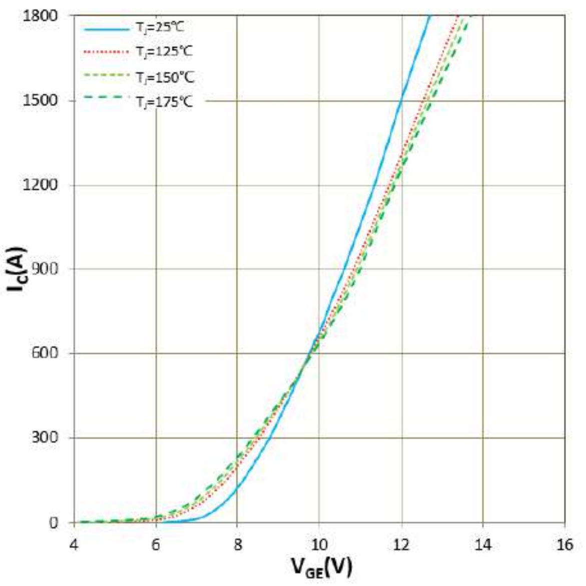

Figure 7. Ic vs V_{GE}
V_{CE}=20V

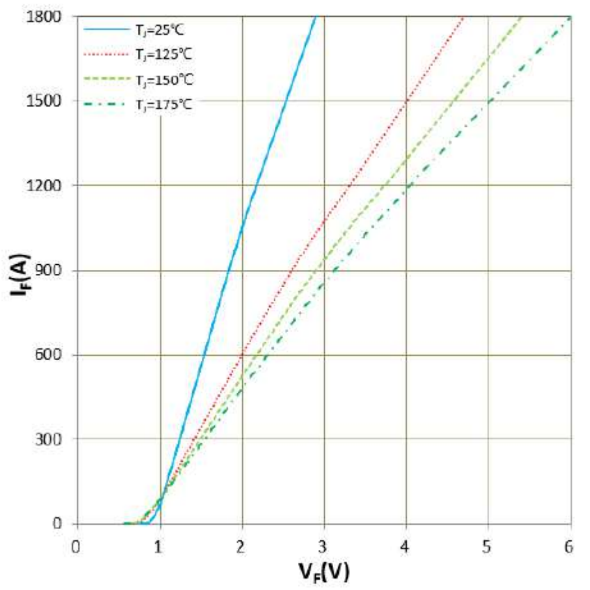

Figure 8. I_F vs V_F

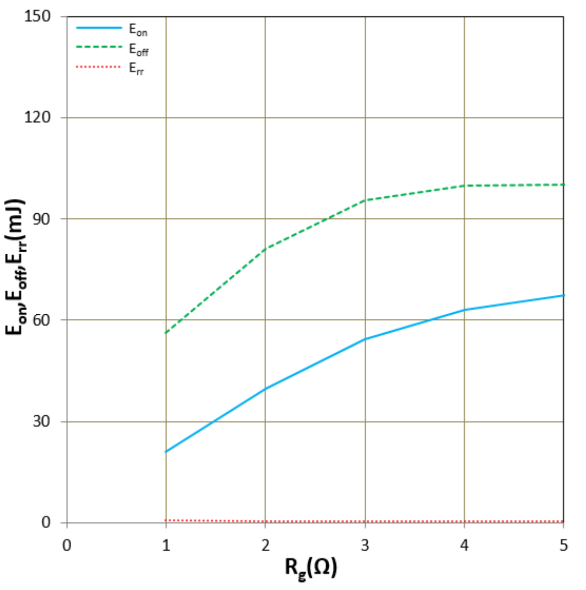

Figure 9. E_{on}, E_{off}, E_{rr} vs R_g (Typ)
V_{CC}=600V, V_{GE}=+15V/-8V, I_C=900A, T_j=25°C
Inductive Load

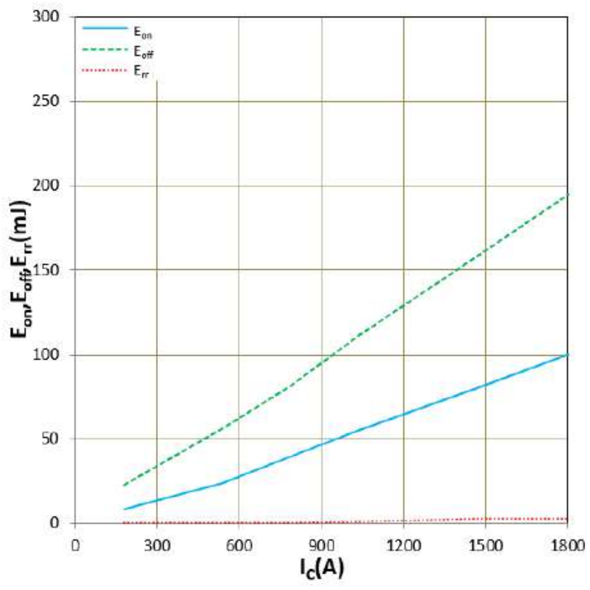

Figure 10. E_{on}, E_{off}, E_{rr} vs Ic (Typ)
V_{CC}=600V, V_{GE}=+15V/-8V, R_g=2.0Ω, T_j=25°C
Inductive Load

HCH900FH120D3ME7

1200V/900A Half Bridge SiC Hybrid Modules

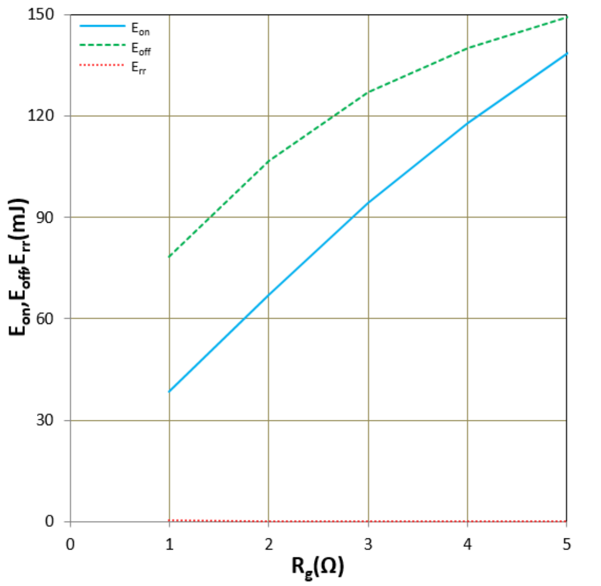

Figure 11. E_{on}, E_{off}, E_{rr} vs R_g (Typ)
V_{CC} =600V, V_{GE} =+15V/-8V, I_C =900A, T_j =150°C
Inductive Load

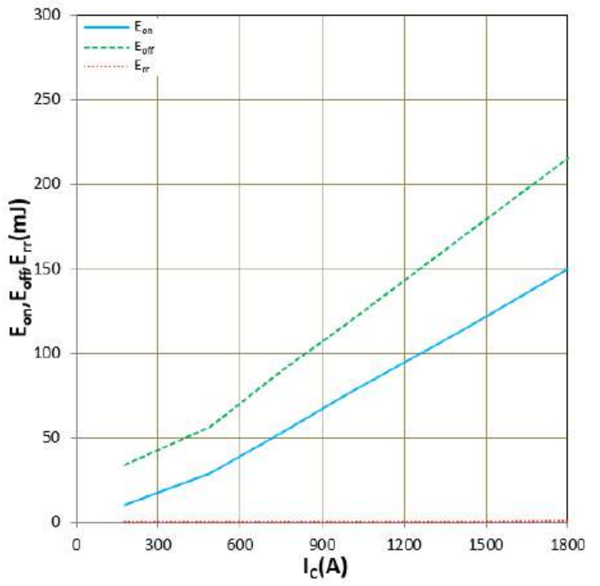

Figure 12. E_{on}, E_{off}, E_{rr} vs Ic (Typ)
V_{CC} =600V, V_{GE} =+15V/-8V, R_g =2.0Ω, T_j =150°C
Inductive Load

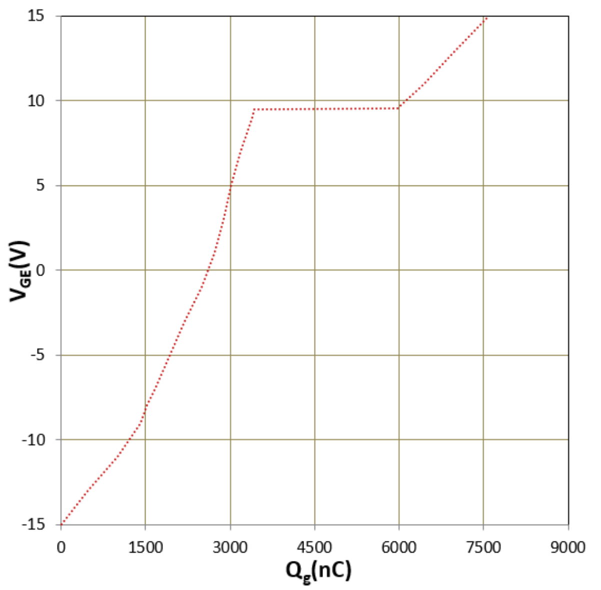

Figure 13. Gate charge
V_{CC} =600V, I_C =900A, T_j =25°C

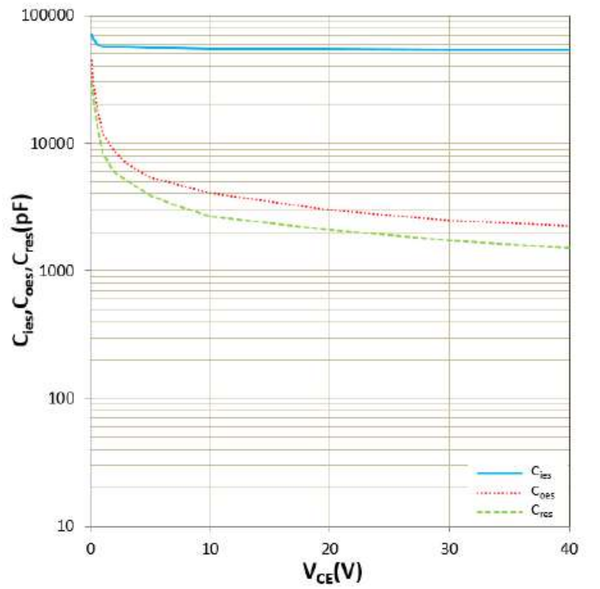

Figure 14. C_{ies}, C_{oes}, C_{res} vs V_{CE}
T_j =25°C, f =1MHz

HCH900FH120D3ME7

1200V/900A Half Bridge SiC Hybrid Modules

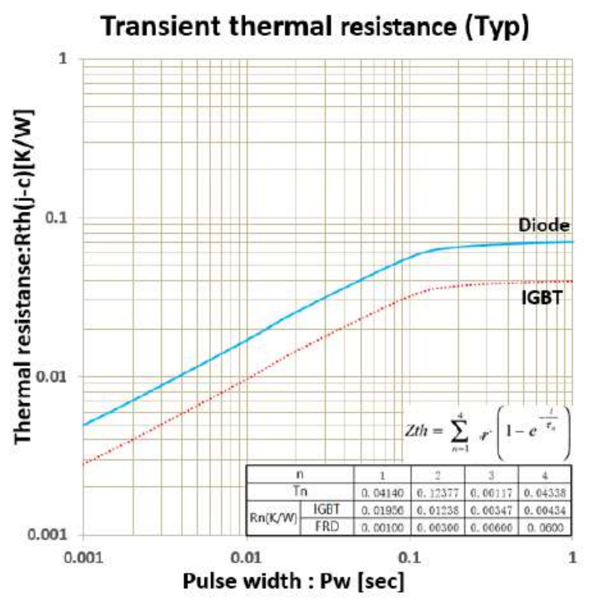

Figure 15. transient thermal impedance IGBT/Diode

IMPORTANT NOTICE：

This product data sheet describes the characteristics of this product for which a warranty is granted. Any such warranty is granted exclusively under the terms and conditions of the supply agreement. There will be no guarantee or of any kind for the product and its characteristics.

The data contained in this document is exclusively intended for technically trained staff. You and your technical departments will have to evaluate the product's suitability for the intended application and the completeness of the product data concerning such application.

Due to technical requirements, our product may contain dangerous substances. For information on the types in question, please contact the sales staff responsible for you.

Changes to this product data sheet are reserved.

Please contact the sales staff (sales@hiitio.com) for further information on the product, technology, delivery terms, conditions and prices.

Revision History

Document Version	Description of Changes
RevX.0.1	Released

Zhejiang HIITIO New Energy Co., Ltd

ADD : NO.1125 Zhixing Road,Qiaonan District, Xiaoshan Economic and Technological Development Zone,Hangzhou,Zhejiang

TEL :400-667-9977