HCG900FH120D3H1L

1200V/900A Half Bridge IGBT Module

Description

The **HCG900FH120D3H1L** is a Half Bridge IGBT PowerModule. It integrates high performance IGBT chips designed for the applications such as High Power supply andMotor control

Features

- Blocking voltage1200V
- Low saturation Voltage $V_{CE(sat)}$
- Low Switching Losses
- Direct Cooled Pin Fin Base Plate
- Thermistor inside

Applications

- High Power Switching Applications
- Motor Drives
- Solar inverter Systems
- Wind Turbin

Circuit diagram

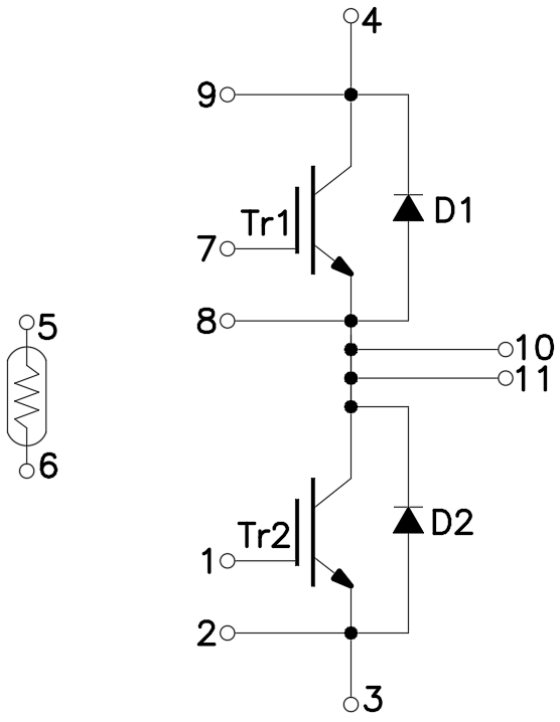

Figure 1. Out drawing & circuit diagram for HCG900FH120D3H1L

HCG900FH120D3H1L

1200V/900A Half Bridge IGBT Module

Pin Configuration and Marking Information

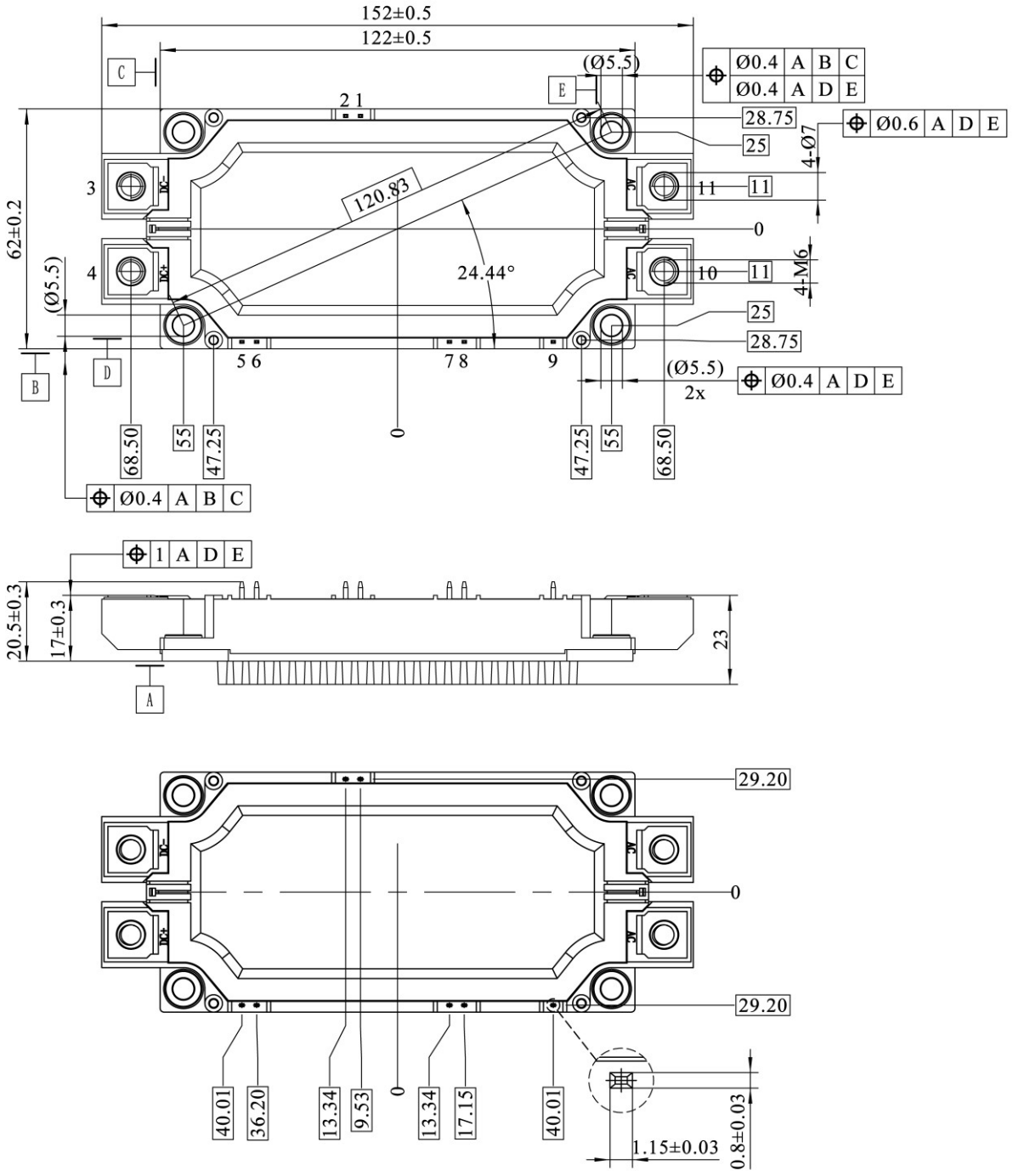

Figure 2. Pin configuration

HCG900FH120D3H1L

1200V/900A Half Bridge IGBT Module

Module

Parameter	Conditions	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	15 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	m☒
Mounting torque for module mounting	M5, M6	3 to 6	Nm
Weight	-	430	g

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

Symbol	Parameter	Conditions	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_f =55°C	900	A
I_{CM}	Pulse Collector Current	t_p =1ms, Note1	1800	A
P_C	Maximum Power Dissipation	T_f =25°C, T_{jmax} =175°C(IGBT)	2500	W
I_F	Diode Forward Current	-	900	A
I_{FRM}	Repetitive peak forward Current	t_p =1ms, Note1	1800	A
I^2t	I^2t-value	V_R =0V, t_p =10ms, T_j =125°C(Diode)	40000	A^2s
I^2t	I^2t-value	V_R =0V, t_p =10ms, T_j =150°C(Diode)	37500	A^2s
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	-	k
R/R	Deviation of R100	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

HCG900FH120D3H1L

1200V/900A Half Bridge IGBT Module

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	-	1.75	2.10	V
			T_j =125°C	-	2.09	-	
			T_j =175°C	-	2.63	-	
$V_{GE(th)}$	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	-	
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 =1.0Ω, Inductive load	T_j =25°C	-	255	-	ns
			T_j =125°C	-	228	-	
			T_j =175°C	-	282	-	
t_r	Rise time		T_j =25°C	-	78	-	ns
			T_j =125°C	-	88	-	
			T_j =175°C	-	96	-	
$t_{d(off)}$	Turn-off delay time		T_j =25°C	-	579	-	ns
			T_j =125°C	-	624	-	
			T_j =175°C	-	646	-	
t_f	Fall time		T_j =25°C	-	150	-	ns
			T_j=125°C	-	186	-	
			T_j =175°C	-	204	-	
E_{on}	Turn-on power dissipation		T_j =25°C	-	23.06	-	mJ
			T_j =125°C	-	34.99	-	
			T_j =175°C	-	47.26	-	
E_{off}	Turn-off power dissipation		T_j =25°C	-	109.2	-	mJ
			T_j =125°C	-	124.1	-	
			T_j =175°C	-	132.8	-	
$R_{th(j-f)}$	Thermal Resistance, Junction to cooling fluid, ΔV/Δt =10dm³/min, T_f =65°C			-	0.05	-	°C/W

HCG900FH120D3H1L

1200V/900A Half Bridge IGBT Module

Freewheeling Diode 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	-	1.77	2.10	V
			T_j=125°C	-	1.74	-	
			T_j=175°C	-	2.02	-	
t_{rr}	Reverse recovery time	(Switch side) V_{CC} =600V I_C =900A V_{GE} =+15V/-8V R_G =1.0Ω (FRD side) V_{rr} =600V I_F =900A V_{GE} =-8V Inductive load switching operation	T_j=25°C	-	0.56	-	us
			T_j=125°C	-	0.85	-	
			T_j=175°C	-	0.97	-	
I_{RM}	Peak reverse recovery Current		T_j=25°C	-	608	-	A
			T_j=125°C	-	725	-	
			T_j=175°C	-	792	-	
Q_{rr}	Recovered charge		T_j=25°C	-	131.1	-	uC
			T_j=125°C	-	213.9	-	
			T_j=175°C	-	263.6	-	
E_{rr}	Reverse recovered energy		T_j=25°C	-	70.56	-	mJ
			T_j=125°C	-	111.4	-	
			T_j=175°C	-	134.2	-	
$R_{th(c-f)}$	Thermal Resistance, Junction to cooling fluid, $\Delta V/\Delta t$ =10dm³/min, T_f =65°C			-	0.07	-	°C/W

Test Conditions

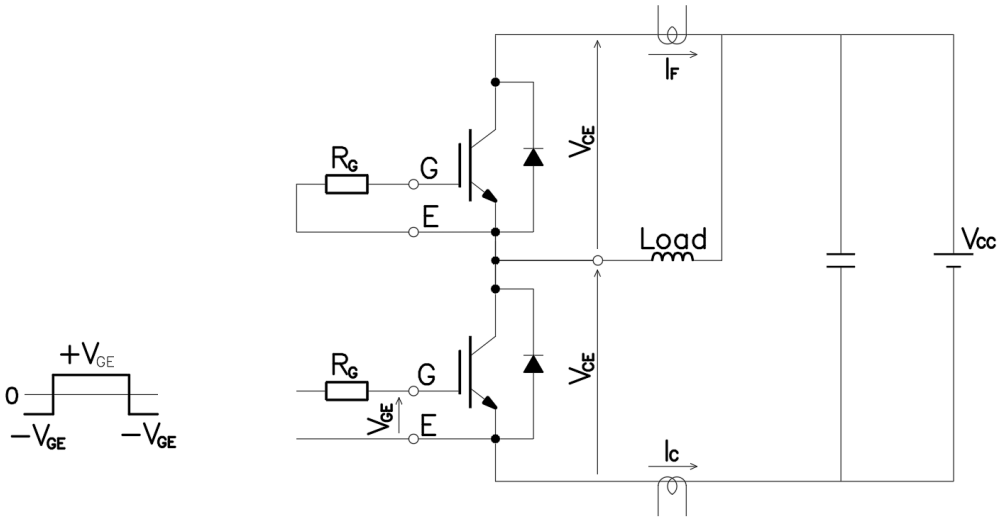

Figure 3. Switching time measure circuit

HCG900FH120D3H1L

1200V/900A Half Bridge IGBT Module

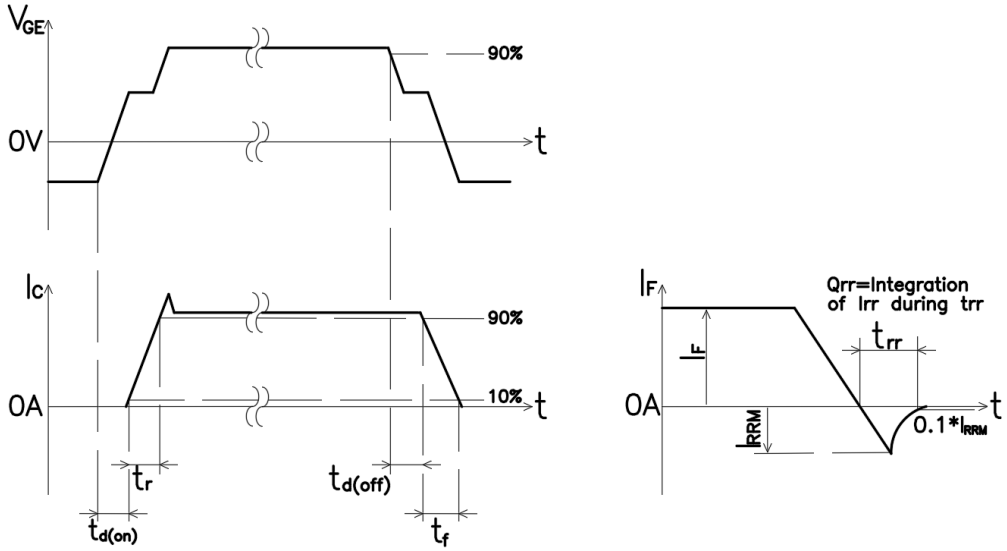

Figure 4. Switching time definition

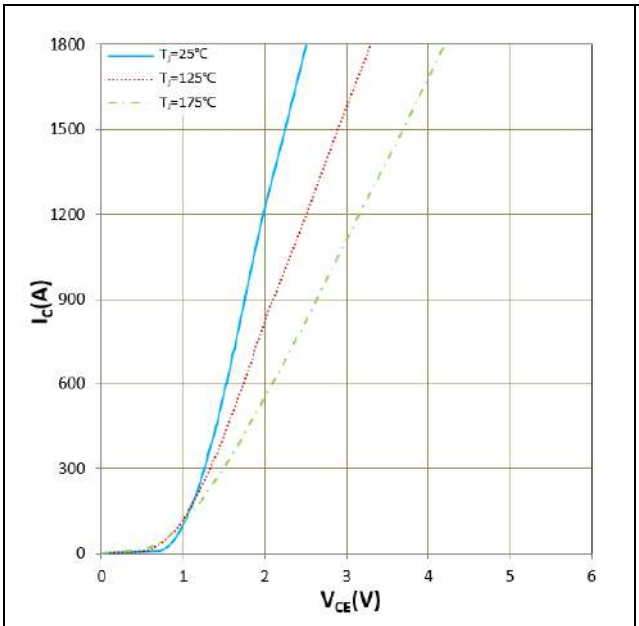

Figure 5. Ic vs V_{CE}
V_{GE}=15V

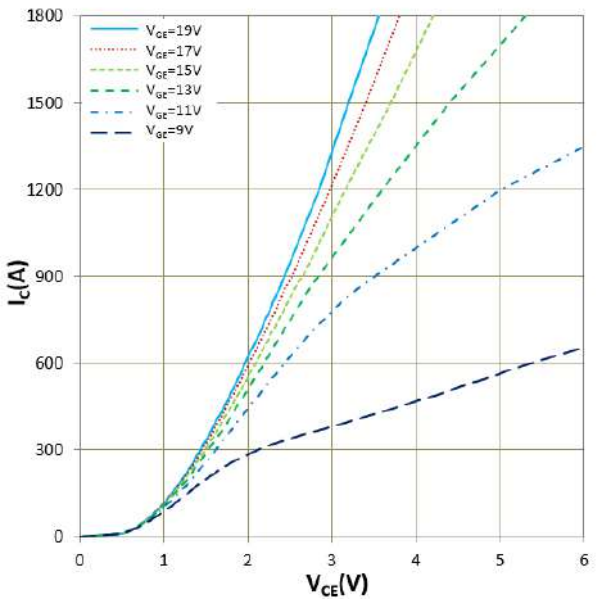

Figure 6. Ic vs V_{CE}
T_j=175°C

HCG900FH120D3H1L

1200V/900A Half Bridge IGBT Module

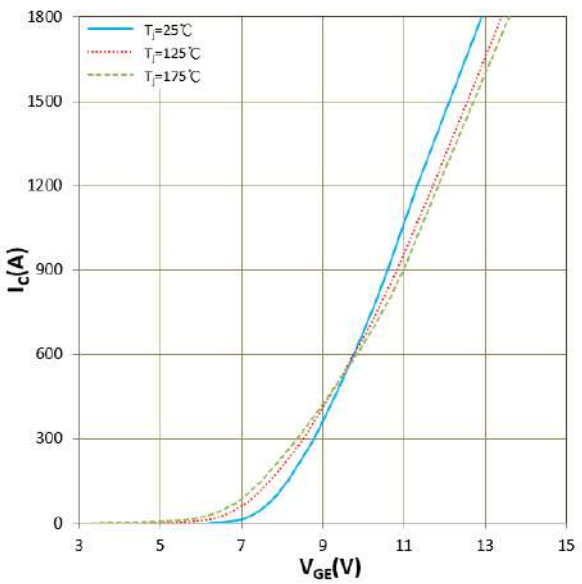

Figure 7. Ic vs V_{GE}
V_{CE} =20V

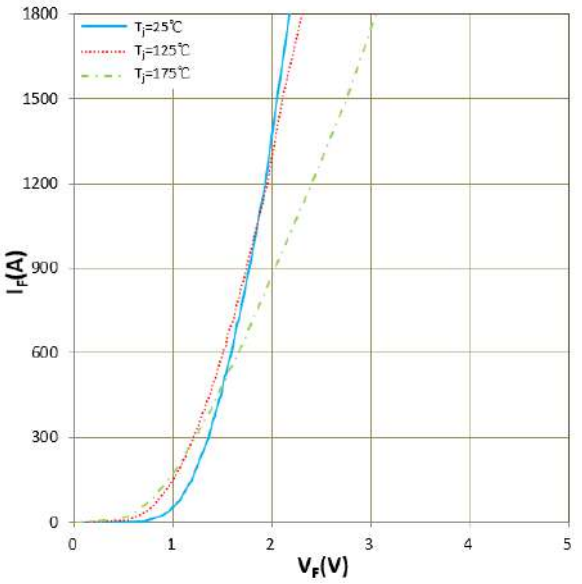

Figure 8. I_F vs V_F

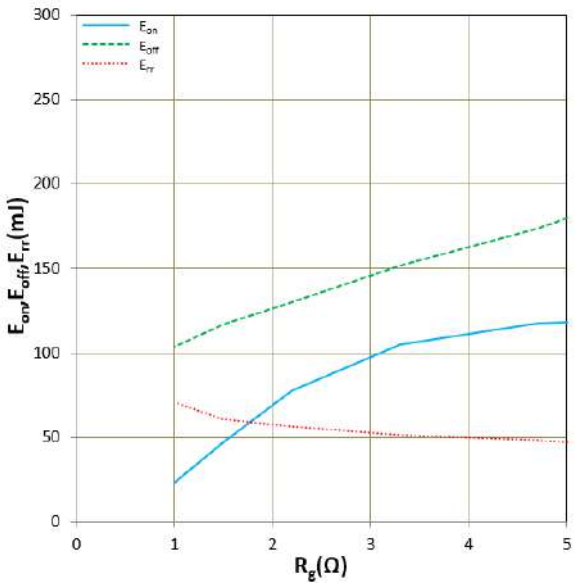

Figure 9. E_{on}, E_{off}, E_{rr} vs R_g(Typ)
V_{CC} =600V, V_{GE} =+15V/-8V, I_C =900A, T_j =25°C
Inductive Load

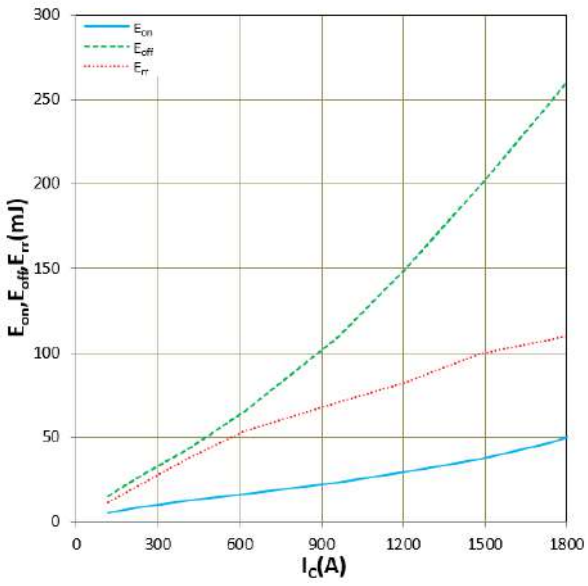

Figure 10. E_{on}, E_{off}, E_{rr} vs Ic(Typ)
V_{CC}=600V, V_{GE} =+15V/-8V, R_g =1.0Ω, T_j =25°C
Inductive Load

HCG900FH120D3H1L

1200V/900A Half Bridge IGBT Module

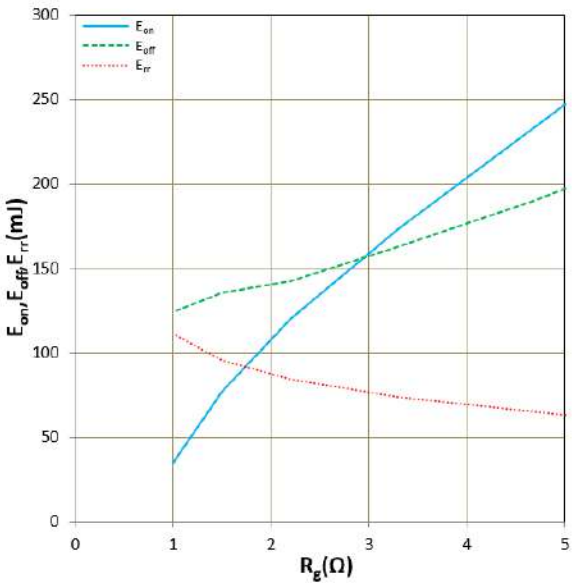

Figure 11. E_{on}, E_{off}, E_{rr} vs R_g(Typ)
V_{CC} =600V, V_{GE} =+15V/-8V, I_C =900A, T_j =125°C
Inductive Load

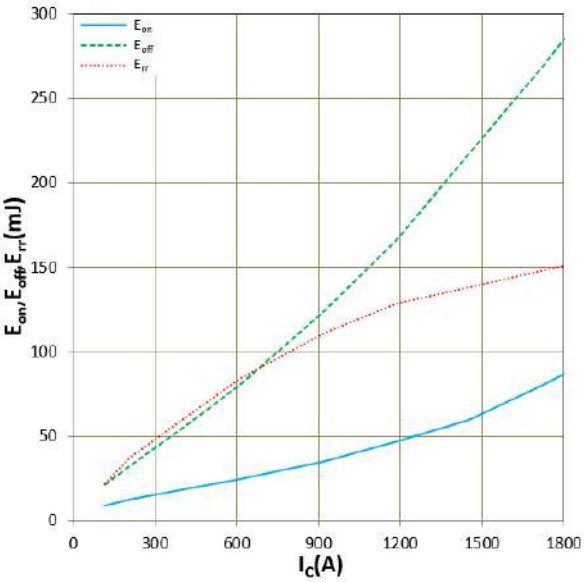

Figure 12. E_{on}, E_{off}, E_{rr} vs Ic(Typ)
V_{CC}=600V, V_{GE} =+15V/-8V, R_g =1.0Ω, T_j =125°C
Inductive Load

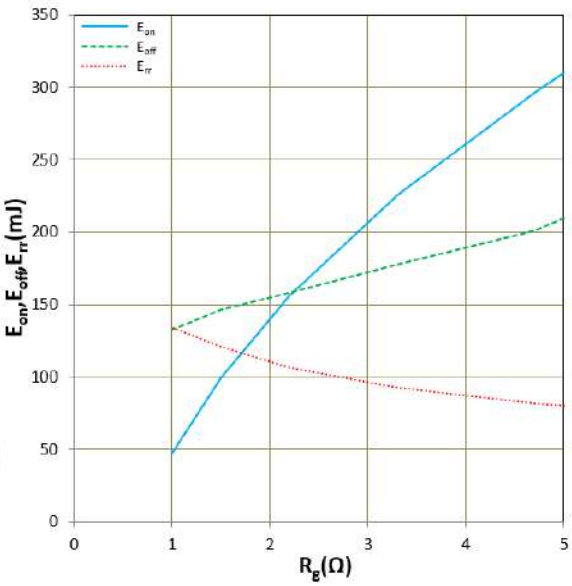

Figure 13. E_{on}, E_{off}, E_{rr} vs R_g(Typ)
V_{CC} =600V, V_{GE} =+15V/-8V, I_C =900A, T_j =175°C
Inductive Load

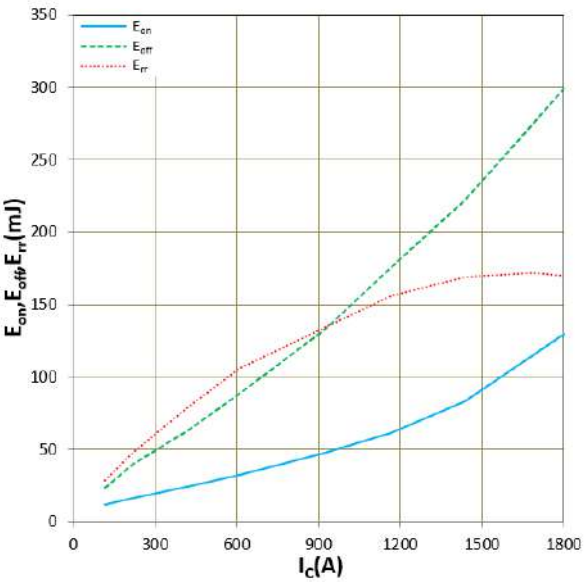

Figure 14. E_{on}, E_{off}, E_{rr} vs Ic(Typ)
V_{CC}=600V, V_{GE} =+15V/-8V, R_g =1.0Ω, T_j =175°C
Inductive Load

HCG900FH120D3H1L

1200V/900A Half Bridge IGBT Module

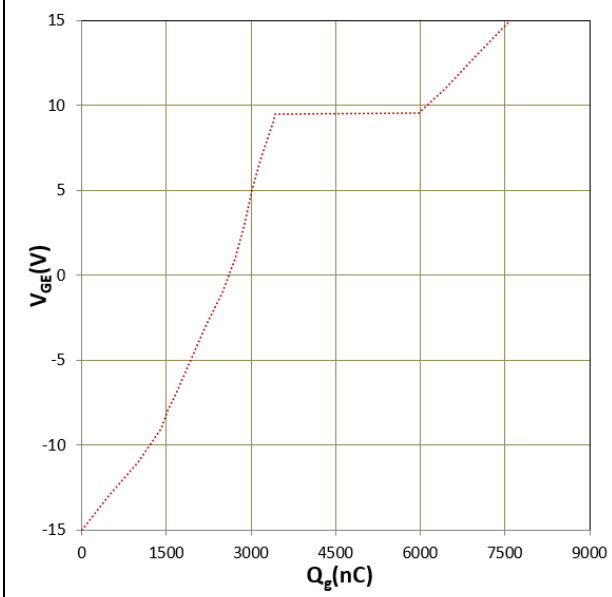

Figure 15. Gate charge
V_{CC} =600V, I_C =900A, T_j =25°C

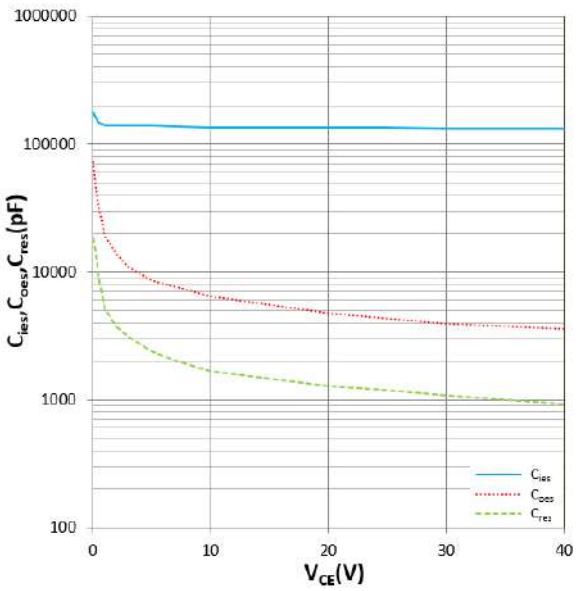

Figure 16. C_{ies}, C_{oes}, C_{res} vs V_{CE}
T_j =25°C, f =1MHz

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 (Email: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