HCH100FS120E6H1

1200V/100A 6 Units SiC Hybrid Module

Description

The HCH100FS120E6H1 offer lower losses and higher energy for application such as motor drive、inverter and soft switching applications.

Features

- 1200V100 A,VCE(sat)(typ.) =1.40V
- Lower losses and higher energy
- Excellent short-circuit capability
- Zero Reverse Recovery from SiC Diodes

Applications

- Motor drive
- Inverter
- Welding machines
- UPS

Circuit diagram

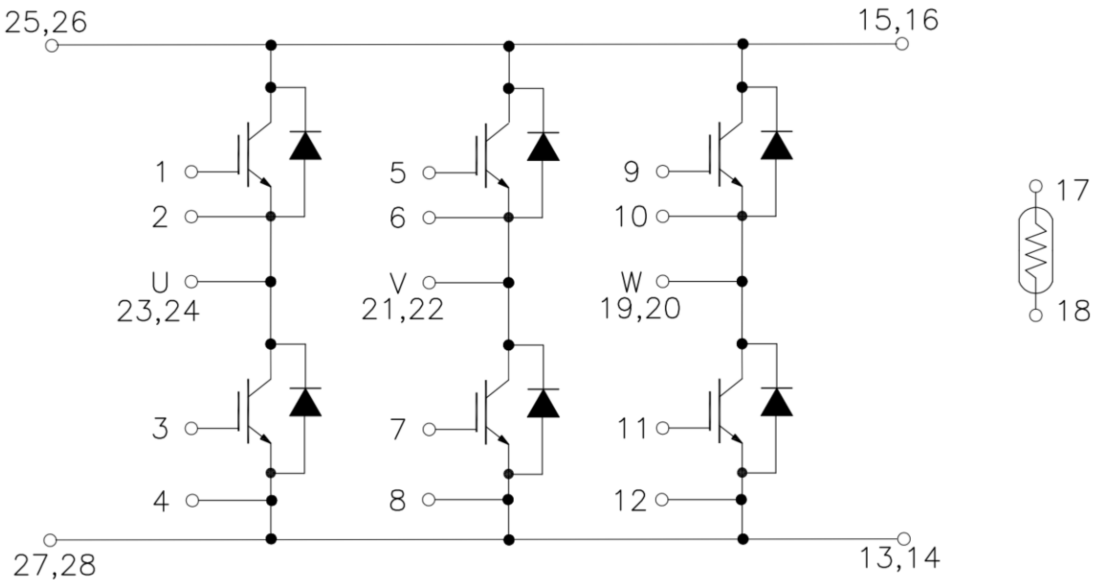

Figure 1. Out drawing & circuit diagram for HCH100FS120E6H1

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Pin Configuration and Marking Information

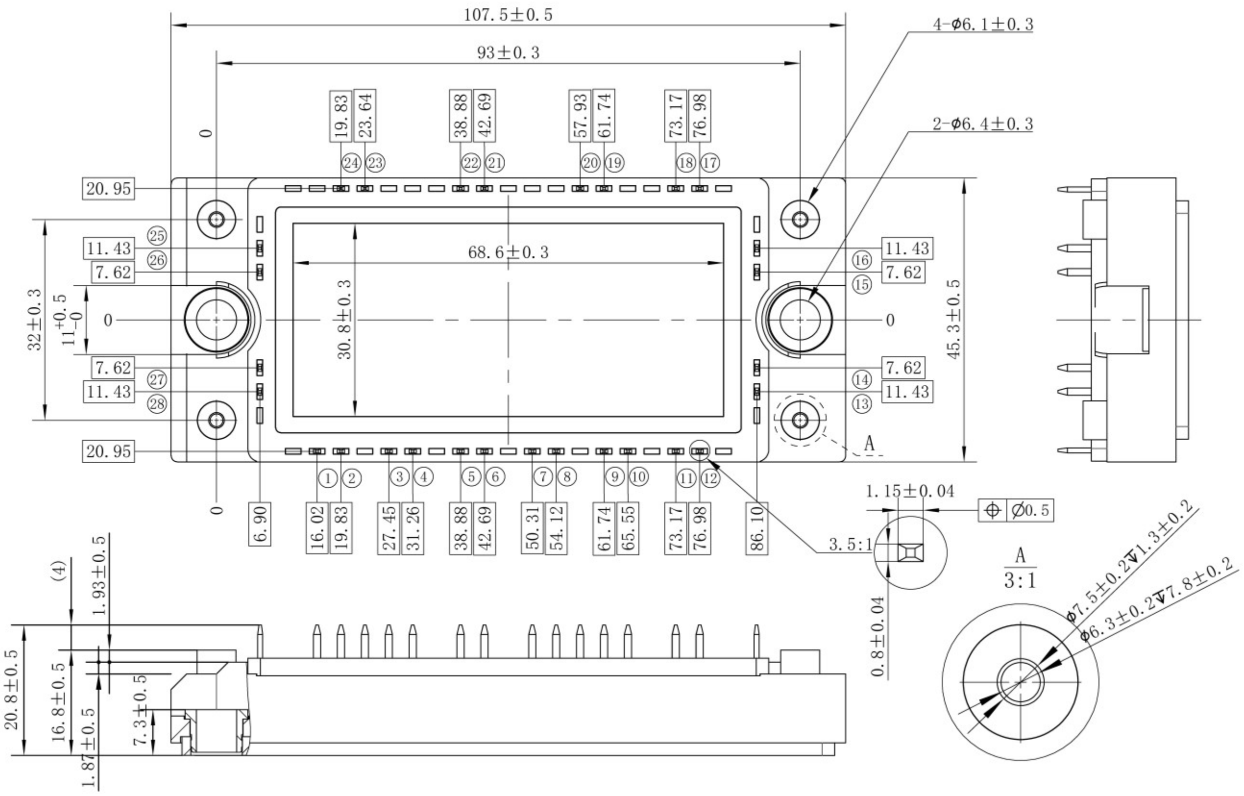

Figure 2. Pin configuration

Module

Parameter	Conditions	Value	Unit
Isolation Voltage	RMS, f = 50Hz, t =1min	2.5	KV
CTI	-	>200	-
Module lead resistance, terminals – chip	T_C =25°C	0.8	mΩ
Mounting torque for module mounting	M5	3.5	Nm
Weight	-	175	g

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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	±20V	V
I_C	DC Continuous Collector Current	T_C =120°C, T_{vjop} =150°C(IGBT)	100	A
I_{CM}	Pulse Collector Current	t_p =1ms, Note1	200	A
P_C	Maximum Power Dissipation	T_C =25°C, T_{vjop} =150°C(IGBT)	625	W
I_F	Diode forward Current	-	100	A
I_{FRM}	Repetitive peak forward Current	t_p =1ms, Note1	200	A
t_{sc}	Short Circuit Withstand Time	V_{GE} =15V, V_{CE} =600V	10	µs
T_{jmax}	Max junction temperature	-	175	°C
T_{vjop}	Operating junction temperature	-	-40 to 150	°C
T_{stg}	Storage temperature	-	-40 to 125	°C

Note1: Pulse width limited by maximum junction temperature

NTC characteristics

Symbol	Parameter	Condition	Value			Unit
			Min.	Typ.	Max.	
R_{25}	Resistance	T_C =25°C	-	5	-	kΩ
R/R	Deviation of R100	T_C =100°C, R_{100} =493 Ω	-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

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

Symbol	Item	Condition		Value Min.	Value Typ.	Value Max.	Unit
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C =100A V_{GE} =15V	T_j =25°C	-	1.30	-	V
			T_j =125°C	-	1.42	-	V
			T_j =150°C	-	1.45	-	V
			T_j =175°C	-	1.50	-	V
$V_{GE(th)}$	Gate-Emitter threshold Voltage	I_C =5.7mA, V_{CE} = V_{GE}		5.0	5.8	6.5	V
Q_G	Gate charge	V_{GE} = -15V to +15V		-	1728	-	nC
R_{Gint}	Internal gate resistor	-	T_j =25°C	-	2.1	-	Ω
C_{ies}	Input Capacitance	V_{CE} =25V V_{GE} =0V f =1MHz	T_j =25°C	-	21.6	-	nF
C_{oes}	Output Capacitance			-	0.59	-	nF
C_{res}	Reverse transfer Capacitance			-	0.17	-	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	μA
$t_{d(on)}$	Turn-on delay time	V_{CC} =600V I_C =100A V_{GE} =+15V/-8V R_{Gon} = R_{Goff} =4.7Ω Inductive load	T_j =25°C	-	212	-	ns
			T_j =125°C	-	210	-	
			T_j =150°C	-	209	-	
t_r	Rise time		T_j =25°C	-	22	-	ns
			T_j =125°C	-	33	-	
			T_j =150°C	-	37	-	
$t_{d(off)}$	Turn-off delay time		T_j =25°C	-	457	-	ns
			T_j =125°C	-	532	-	
			T_j =150°C	-	549	-	
t_f	Fall time		T_j =25°C	-	216	-	ns
			T_j =125°C	-	348	-	
			T_j =150°C	-	401	-	
E_{on}	Turn-on power dissipation		T_j =25°C	-	3.99	-	mJ
			T_j =125°C	-	5.34	-	
			T_j =150°C	-	5.70	-	
E_{off}	Turn-off power dissipation		T_j =25°C	-	10.21	-	mJ
			T_j =125°C	-	14.23	-	
			T_j =150°C	-	15.27	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (IGBT)			-	0.20	-	K/W
$R_{th(c-s)}$	Thermal Resistance, Case to sink (Conductive Grease applied)			-	0.05	-	K/W

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

Symbol	Item	Condition		Value Min.	Value Typ.	Value Max.	Unit
V_F	Diode Forward Voltage	I_F =100A, V_{GE} =0V	T_j =25°C	-	1.65	-	V
			T_j =125°C	-	2.15	-	
			T_j =150°C	-	2.35	-	
			T_j =175°C	-	2.55	-	
t_{rr}	Diode Reverse Recovery Time	(Switch side) V_{CC} =600V, I_C =100A V_{GE} =+15V/-8V R_{Gon} = R_{Goff} =4.7 Ω (SiC SBD side) V_{rr} =600V, I_F =100A V_{GE} =-8V Inductive load switching operation	T_j =25°C		22	-	ns
			T_j =125°C	-	33	-	
			T_j =150°C		32		
Q_{rr}	Recovered charge		T_j=25°C	-	0.597	-	μC
			T_j =125°C	-	0.444	-	
			T_j =150°C	-	0.464	-	
E_{rr}	Reverse recovered energy		T_j =25°C	-	0.195	-	mJ
			T_j =125°C	-	0.114	-	
			T_j =150°C	-	0.104	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (SiC SBD)			-	0.45	-	K/W
$R_{th(c-s)}$	Thermal Resistance, Case to sink (Conductive Grease applied)			-	0.05	-	K/W

Test Conditions

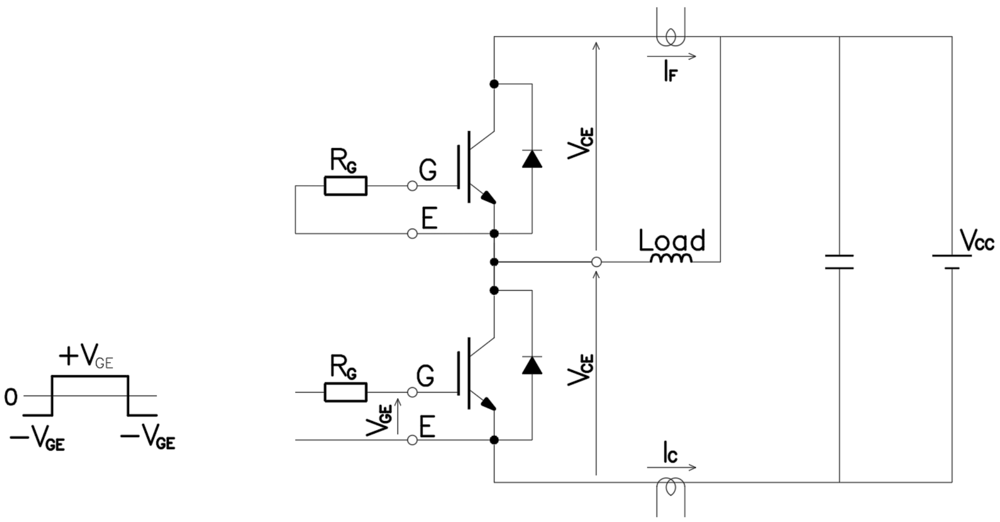

Figure 3. Switching time measure circuit

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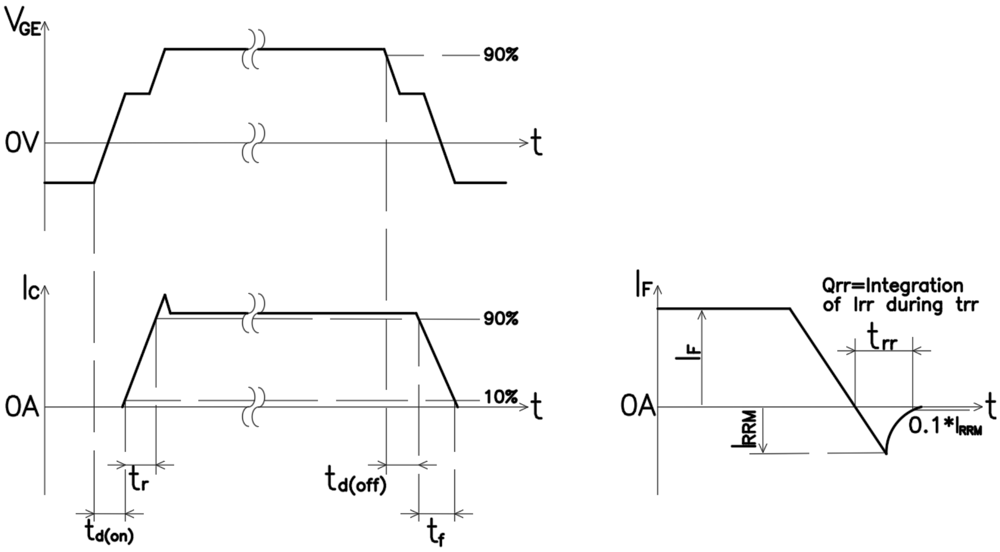

Figure 4. Switching time definition

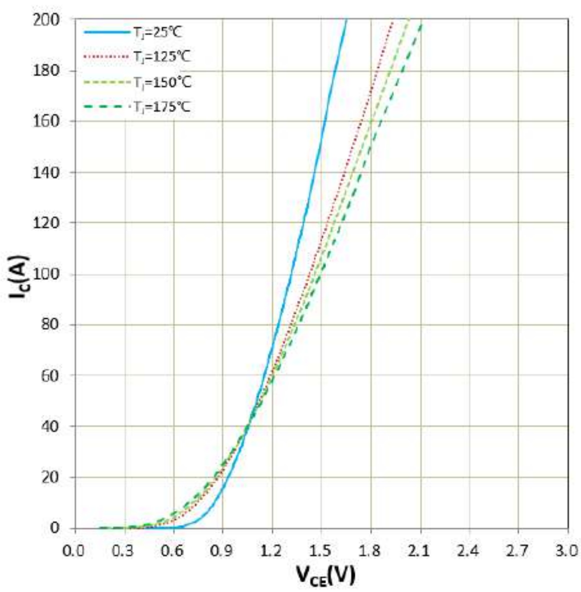

Figure 5. Ic vs V_{CE}

V_{GE} =15V

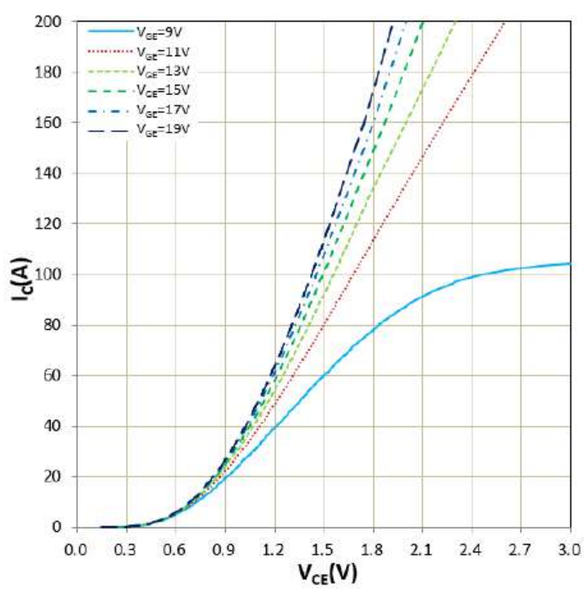

Figure 6. Ic vs V_{CE}

T_j =175°C

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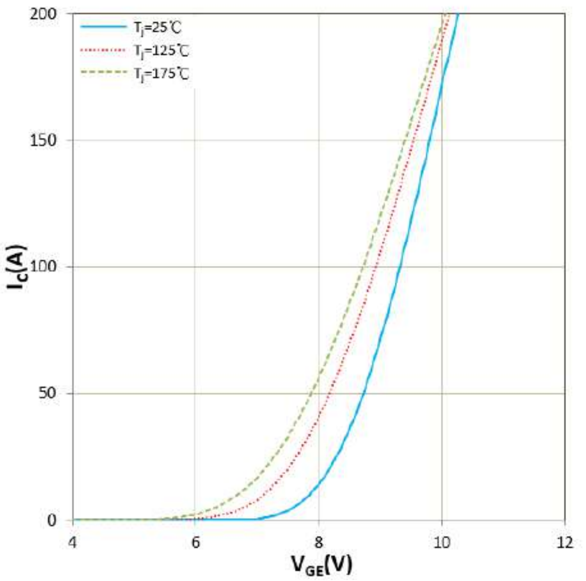

Figure 7. Ic vs V_{GE}

V_{CE} =20V

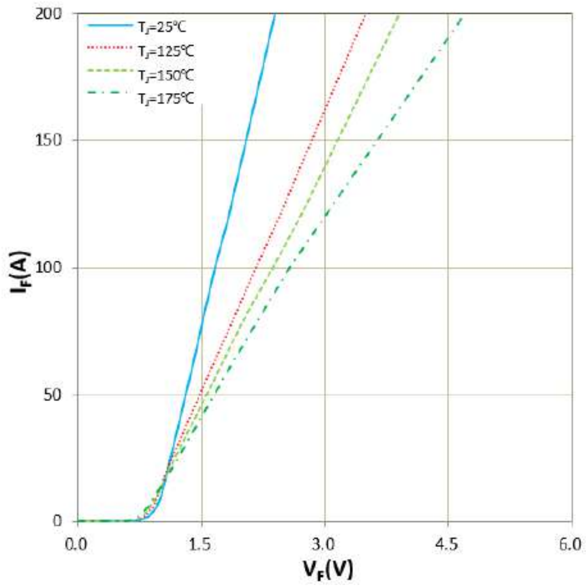

Figure 8. I_F vs V_F

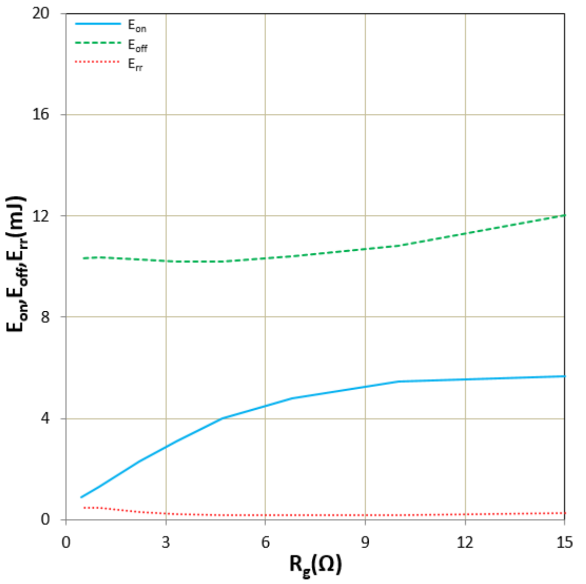

Figure 9. E_{on}, E_{off}, E_{rr} vs R_g(Typ)

V_{CC} =600V, V_{GE} =+15V/-8V, I_C =100A, T_j =25°C

Inductive Load

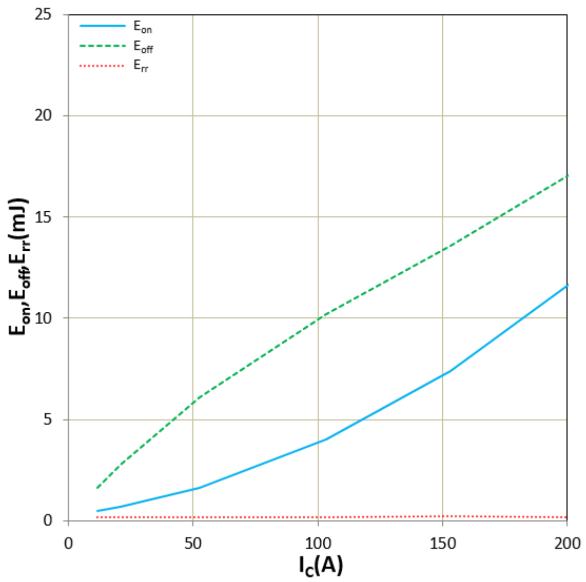

Figure 10. E_{on}, E_{off}, E_{rr} vs Ic(Typ)

V_{CC}=600V, V_{GE} =+15V/-8V, R_g =4.7Ω, T_j =25°C

Inductive Load

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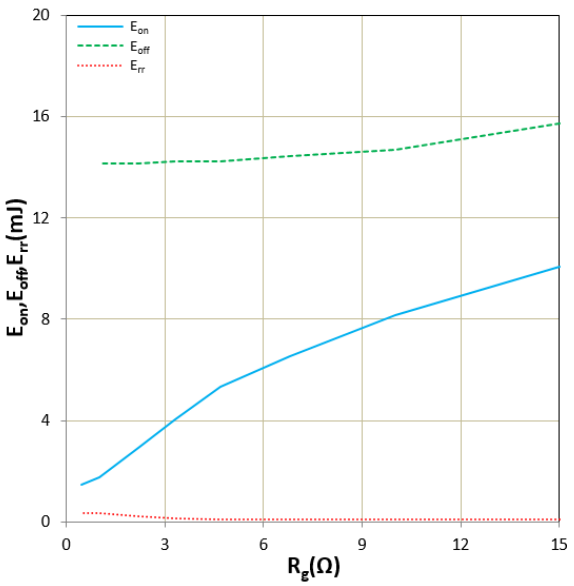

Figure 11. E_{on}, E_{off}, E_{rr} vs R_g(Typ)
V_{CC} =600V, V_{GE} =+15V/-8V, I_C =100A, T_j =125°C
Inductive Load

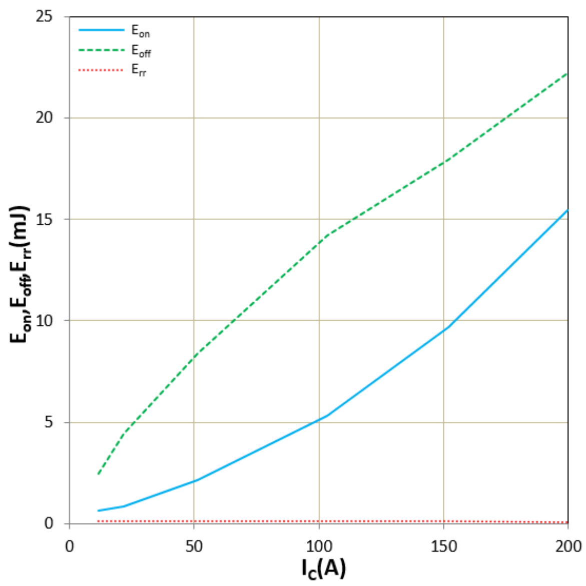

Figure 12. E_{on}, E_{off}, E_{rr} vs Ic(Typ)
V_{CC}=600V, V_{GE} =+15V/-8V, R_g =4.7Ω, T_j =125°C
Inductive Load

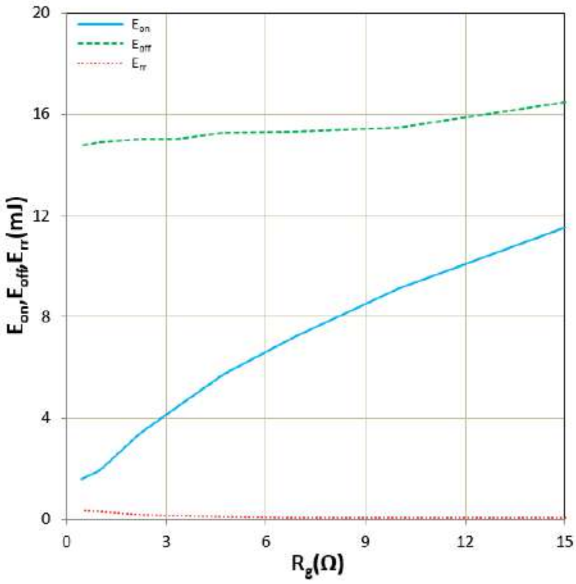

Figure 13. E_{on}, E_{off}, E_{rr} vs R_g(Typ)
V_{CC} =600V, V_{GE} =+15V/-8V, I_C =100A, T_j =150°C
Inductive Load

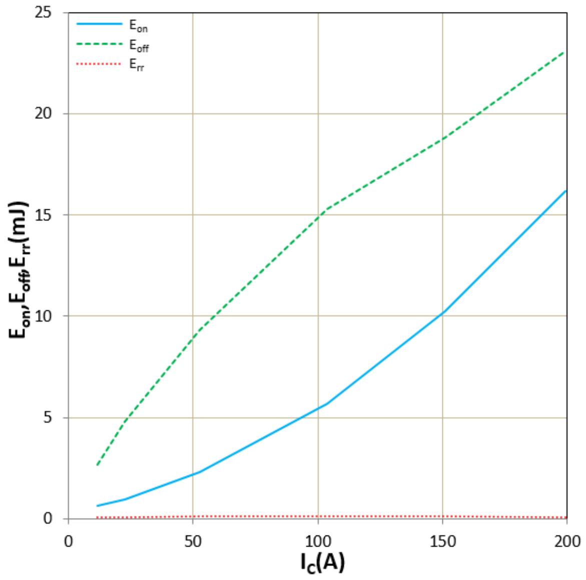

Figure 14. E_{on}, E_{off}, E_{rr} vs Ic(Typ)
V_{CC}=600V, V_{GE} =+15V/-8V, R_g =4.7Ω, T_j =150°C
Inductive Load

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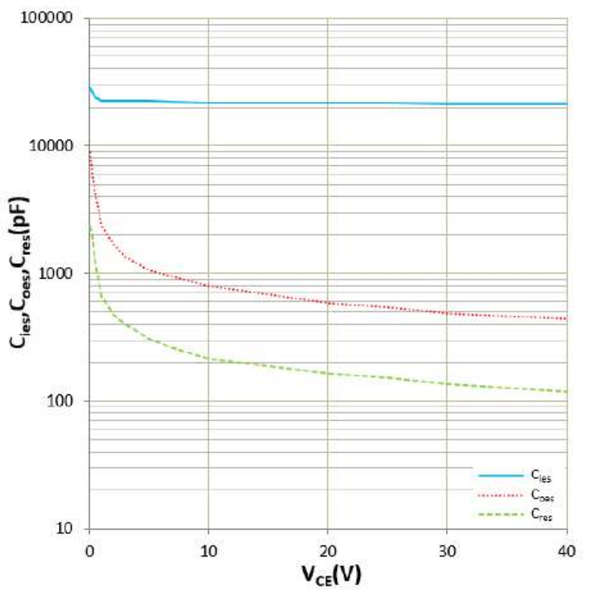	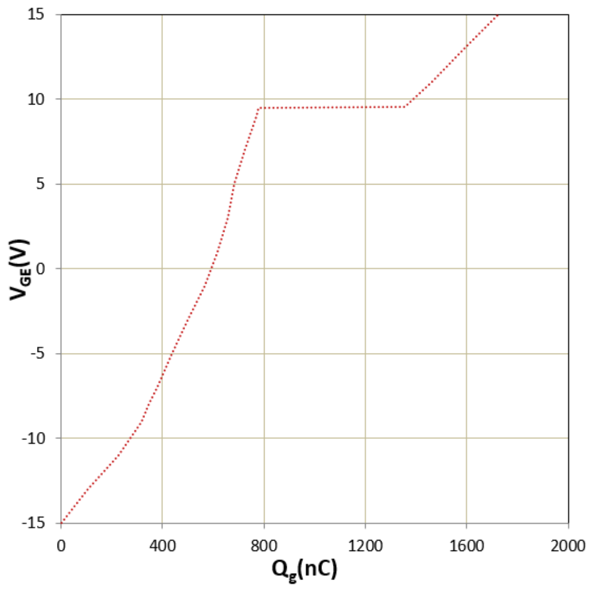
Figure 15. C_{ies}， C_{oes}， C_{res} vs V_{CE} T_j=25°C, f =1MHz	Figure 16. Gate charge T_j=25°C
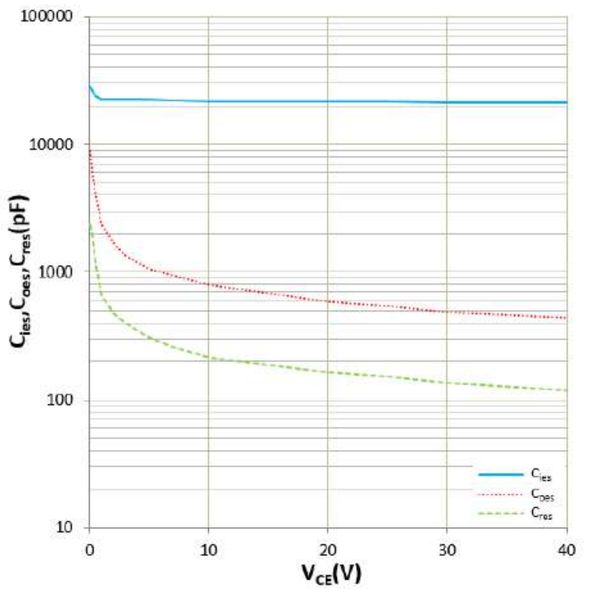	
Figure 17. Transient thermal resistance	

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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.

Instruction note

Naming rules for power module product models（Industrial module）

Product Model

HC	G	100	FF	120	E3	A

Hecheng Code

Module type G : IGBT module
D : FRD module
S : SiC module
H : Si/SiC hybrid

Current level (A) 50~900

Topology structure FZ : A switch unit FF : Half bridge
FS : Three phase F4 : H Bridge
F3L : Three level DF : Boost Circuit
FD : Braking Circuit
FP : Rectification+Inverter+Control move
AL : ANPC CL : Chopper

Voltage level (x10)（V） 650~2200

Packaging form+features（A...Z） A1: 34 mm A2: 62 mm
D0: Flow0 D1: Flow1 D2: Flow2
E1: Easy 1B E2: Easy 2B
E3: Econo Dual E4 : E4 E5 : ED3S
E6 : EconoPIM2 E7 : EconoPIM3
E9 : ED3H
F0 : F0

Feature :A: Special Code Nil: Standard

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