HCG500FF170A2RE1

1700V/500A Half Bridge IGBT Module

Description

The HCG500FF170A2RE1 offer lower losses and higher energy for soft switching applications.

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Features

- 1700V500 A, V_{CE} (sat)(typ.) = 1.8V
- Lower losses and higher energy
- Excellent short - circuit capability
- 62mm half bridge module

Applications

- Motor drive
- Inverter
- Power supply
- Wind Turbines

Circuit diagram

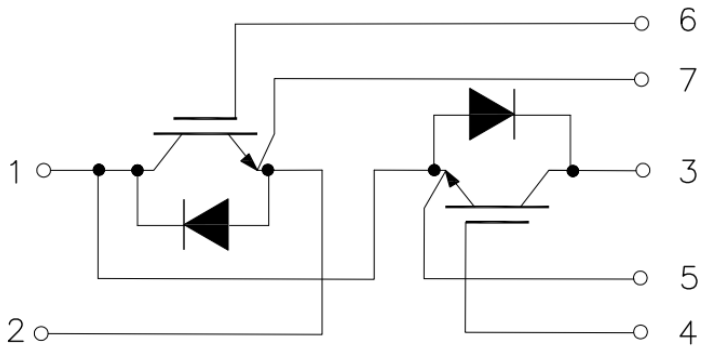

Figure 1. Out drawing & circuit diagram for HCG500FF170A2RE1

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Pin Configuration and Marking Information

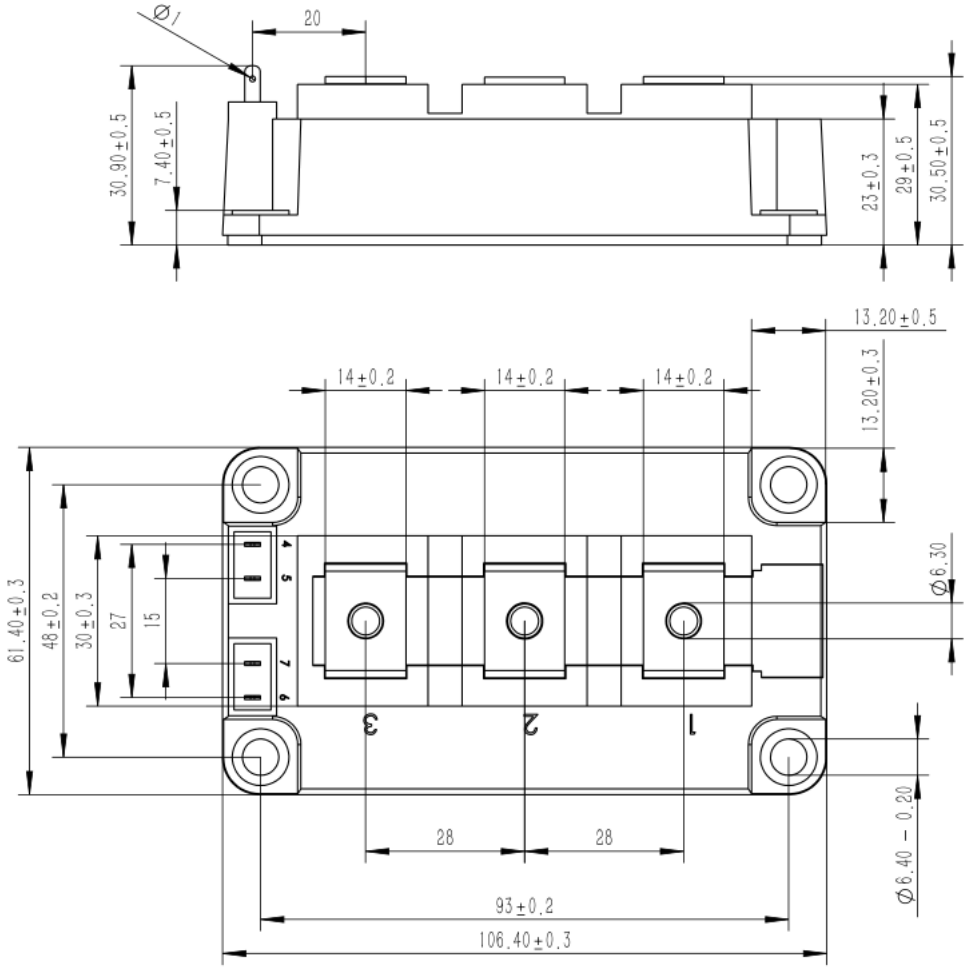

Figure 2. Pin configuration

Module

Parameter	Conditions	Value	Unit
Isolation Voltage	RMS, f = 50Hz, t =1min	4.0	KV
Material of module baseplate	-	Cu	-
Creepage distance	terminal to heatsink terminal to terminal	47 26	mm
Clearance	terminal to heatsink terminal to terminal	29 14	mm
CTI	-	>200	-
Module lead resistance, terminals – chip	T_C =25°C	0.8	mΩ
Mounting torque for module mounting	M6	3 to 6	Nm
Weight	-	315	g

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

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-Emitter Voltage	G-E Short	1700	V
V_{GES}	Gate-Emitter Voltage	C-E Short	±20V	V
I_C	DC Continuous Collector Current	T_C =80°C	500	A
I_{CM}	Pulse Collector Current	t_p =1ms, Note1	1000	A
P_C	Maximum Power Dissipation	T_C =25°C, T_j =150°C(IGBT)	1645	W
I_F	Diode forward Current	-	500	A
I_{FRM}	Repetitive peak forward Current	t_p =1ms, Note1	1000	A
I^2t	I^2t-value	V_R =0V, t_p =10ms, T_j =125°C (Diode)	20000	A^2s
T_{jmax}	Max junction temperature	-	175	°C
T_{jop}	Operating junction temperature	-	-40 to 150	°C
T_{stg}	Storage temperature	-	-40 to 125	°C

Note1: Pulse width limited by maximum junction temperature

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

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C =500A, V_{GE} =15V	T_j =25°C	-	1.8	-	V
			T_j =125°C	-	2.2	-	V
			T_j =150°C	-	2.3	-	V
$V_{GE(th)}$	Gate-Emitter threshold Voltage	I_C =24mA, V_{CE} = V_{GE}		5.2	5.8	6.4	V
Q_G	Gate charge	V_{GE} = -15V to +15V		-	4.2	-	uC
R_{Gint}	Internal gate resistor	f=1M, Vpp=1V	T_j =25°C	-	2.55	-	Ω
C_{ies}	Input Capacitance	V_{CE} =25V, V_{GE} =0V, f =1MHz	T_j =25°C	-	33	-	nF
C_{oes}	Output Capacitance			-	1.2	-	nF
C_{res}	Reverse transfer Capacitance			-	0.5	-	nF
I_{CES}	Collector- Emitter Cut off Current	V_{CE} =1700V, 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	-	-	1.2	uA
$t_{d(on)}$	Turn-on delay time	V_{CC} =900V, I_C = 500A, V_{GE} =+15V/-8V, R_{Gon} = R_{Goff} =1 Ω, Inductive load	T_j =25°C	-	240	-	ns
			T_j =150°C	-	244	-	
t_r	Rise time		T_j =25°C	-	84	-	ns
			T_j =150°C	-	102	-	
$t_{d(off)}$	Turn-off delay time		T_j =25°C	-	546	-	ns
			T_j =150°C	-	656	-	
t_f	Fall time		T_j =25°C	-	368	-	ns
			T_j=150°C	-	536	-	
E_{on}	Turn-on power dissipation		T_j =25°C	-	114	-	mJ
			T_j =150°C	-	177	-	

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E_{off}	Turn-off power dissipation		T_j=25°C	-	103	-	mJ
			T_j=150°C	-	138	-	
I_{SC}	SC data	V_{GE}<15V V_{CC}=1000V	T_j=150°C t_p<10us	-	2000	-	A
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (IGBT)			-	0.075	-	°C /W
$R_{th(c-s)}$	Thermal Resistance, Case to sink (Conductive Grease applied)			-	0.025	-	°C /W

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 =500A, V_{GE} =0V	T_j=25°C	-	1.82	-	V
			T_j=150°C	-	1.86	-	
t_{rr}	Diode Reverse Recovery Time	(Switch side) V_{CC}=900V, I_C=500A V_{GE}=+15V/-8V R_{Gon}= R_{Goff}=1 Ω (FRD side) V_{rr}=900V, I_F=500A V_{GE}=+15V/-8V Inductive load switching operation	T_j=25°C		264		ns
			T_j=150°C		546		
I_{RM}	Peak reverse recovery Current		T_j=25°C	-	865	-	A
			T_j=150°C	-	742	-	
Q_{rr}	Recovered charge		T_j=25°C	-	132	-	uC
			T_j=150°C	-	155	-	
E_{rr}	Reverse recovered energy		T_j=25°C	-	79.2	-	mJ
			T_j=150°C	-	74.1	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (Diode)			-	0.075	-	°C/W
$R_{th(c-s)}$	Thermal Resistance, Case to sink (Conductive Grease applied)			-	0.025	-	°C/W

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Test Conditions

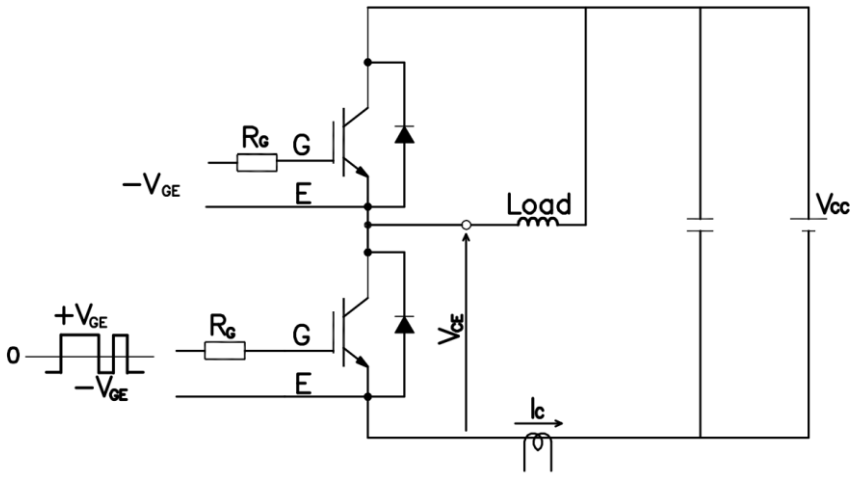

Figure 3. Switching time measure circuit

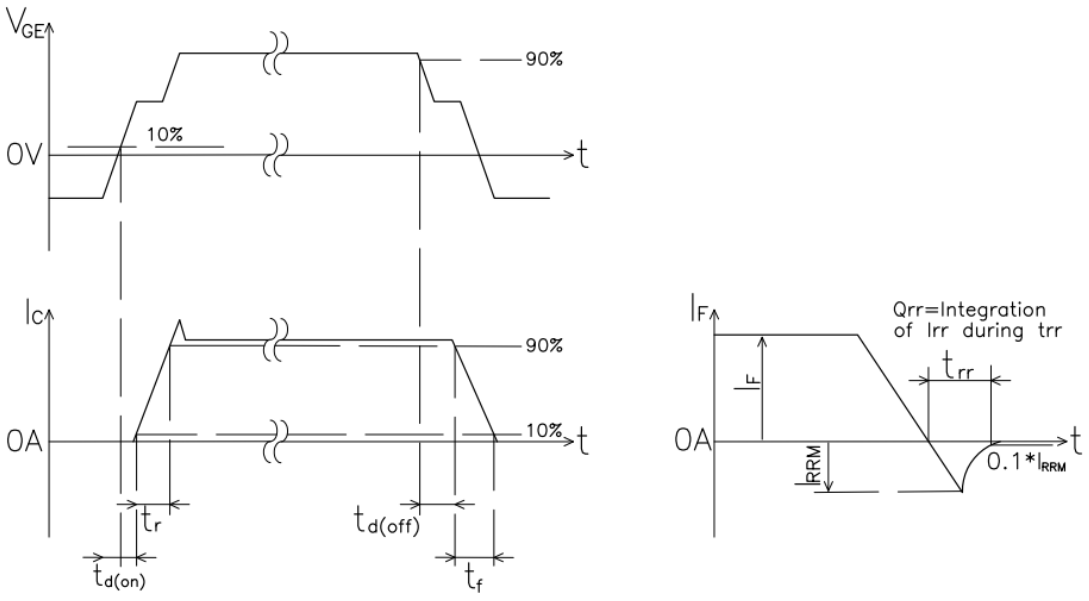

Figure 4. Switching time definition

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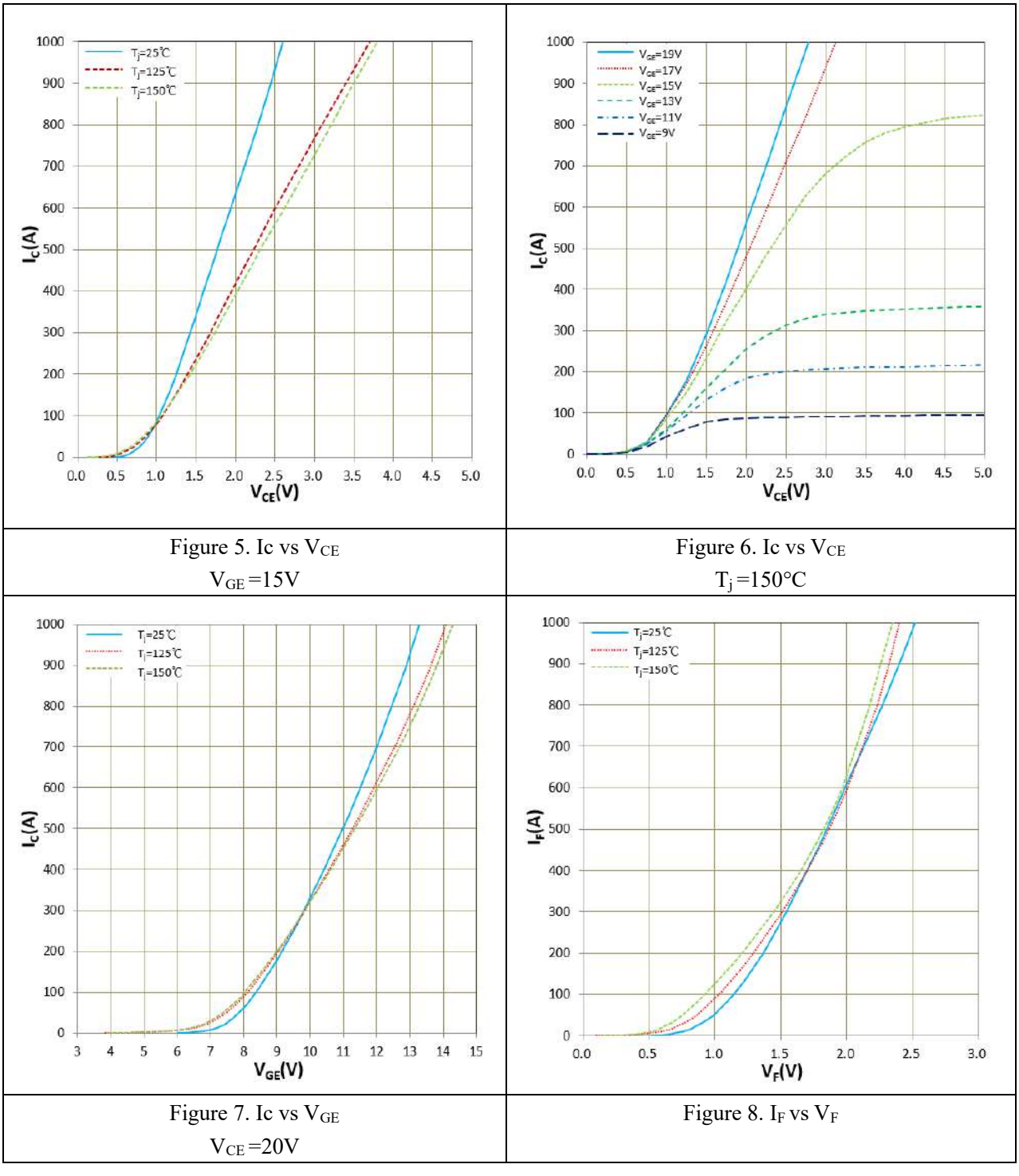

Figure 5. Ic vs V_{CE}
V_{GE} =15V

Figure 6. Ic vs V_{CE}
T_j =150°C

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

Figure 8. I_F vs V_F

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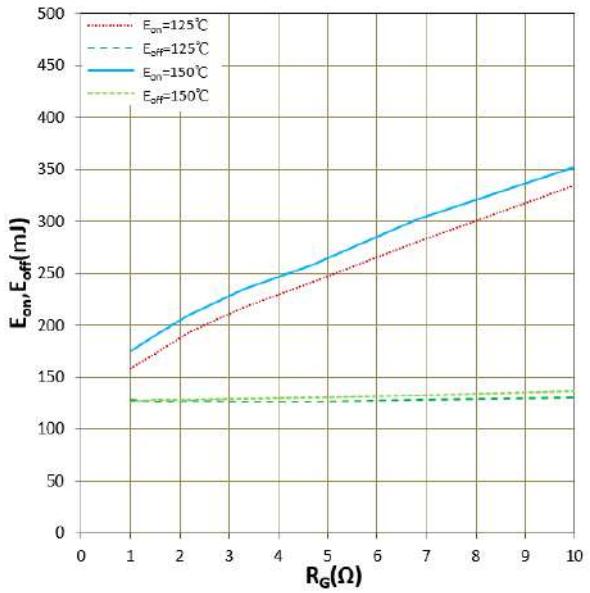

Figure 9. E_{on}, E_{off} vs R_G(Typ)
V_{CC} =900V, V_{GE} =+15V/-8V, I_C = 500A
Inductive Load

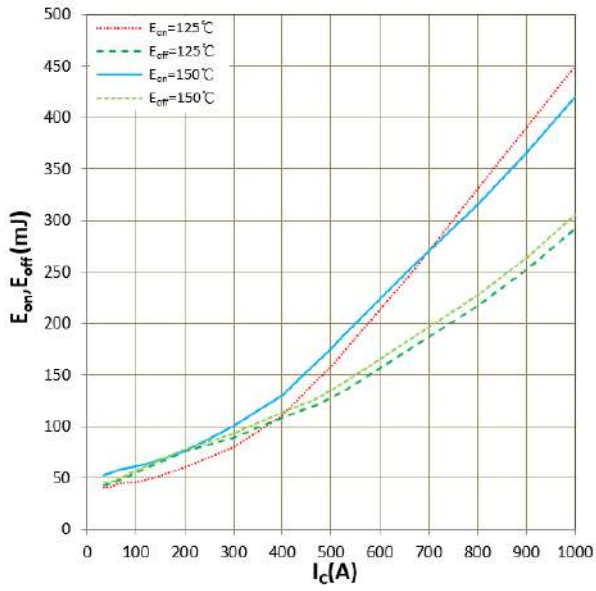

Figure 10 E_{on}, E_{off} vs Ic(Typ)
V_{CC}=900V, V_{GE} =+15V/-8V, R_{Gon} = R_{Goff} =1Ω
Inductive Load

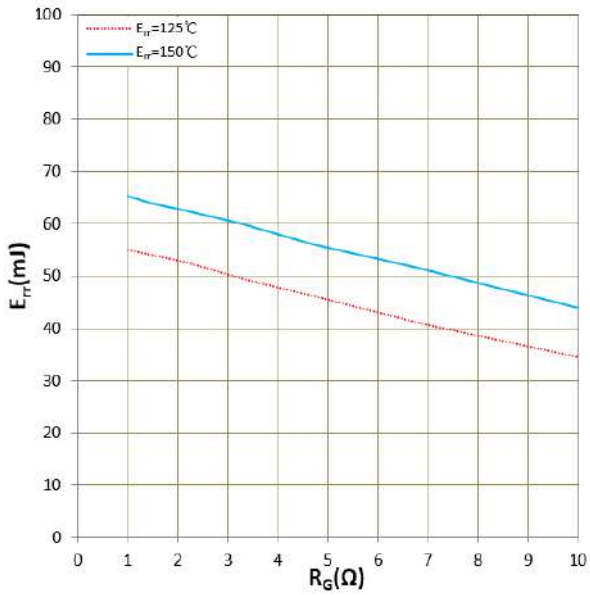

Figure 11. Err vs R_G(Typ)
V_{CC} =900V, V_{GE} =+15V/-8V, I_F =500A
Inductive Load

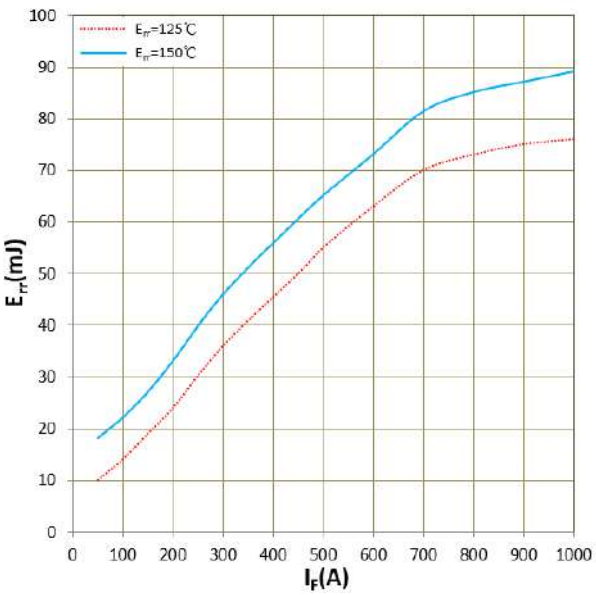

Figure 12. E_{rr} vs I_F(Typ)
V_{CC} =900V, V_{GE} =+15V/-8V, R_{Gon} = R_{Goff} =1Ω
Inductive Load

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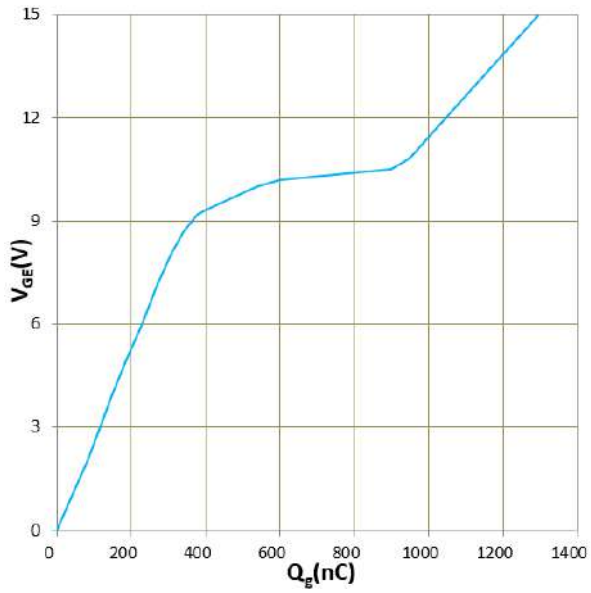

Figure 13. Gate charge

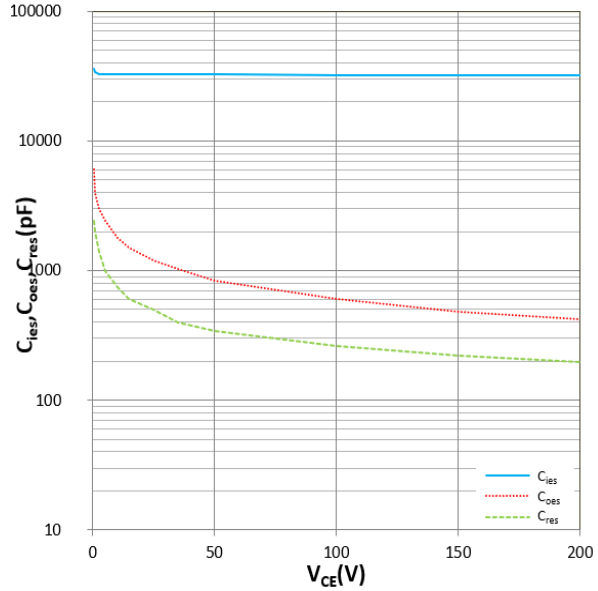

Figure 14. C_{ies}, C_{oes}, C_{res} vs V_{CE}
T_j =25°C, f =1MHz

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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.

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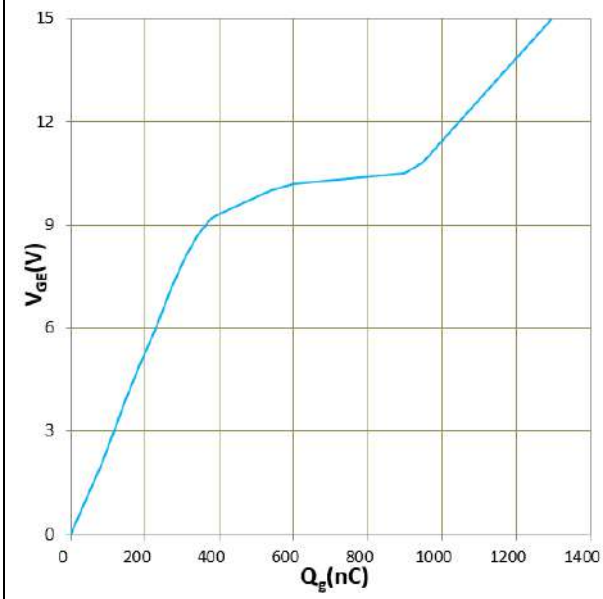

Figure 13. Gate charge

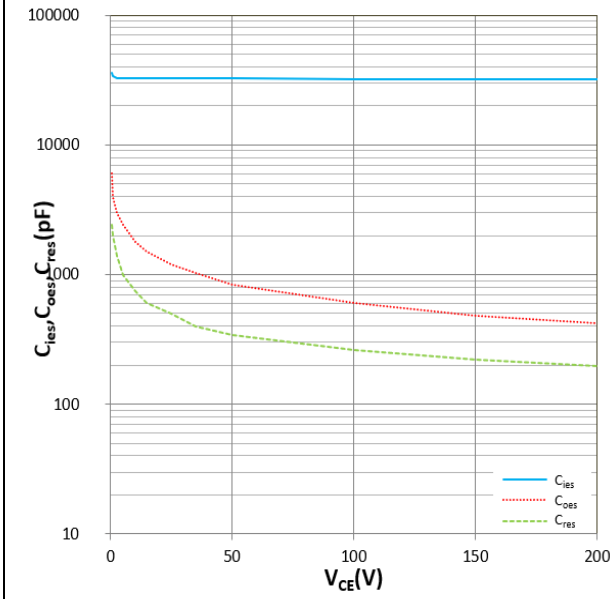

Figure 14. C_{ies}, C_{oes}, C_{res} vs V_{CE}
T_j =25°C, f =1MHz

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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	
B1： Easy 1B	B1A	B1B…
B2： Easy 2B…	B3： Easy 3B…	
D1： Flow0	D2： Flow1	D3： Flow2
E0 : E0	E1： Econo 2…	E2： E2
E3： ED3	E4 : E4	E5 : ED3S
E6 : EPM2	E7 : EPM3	E8 : EconoPIM3
E9 : ED3H	F0 : F0	P2 : EPM2

Feature :A: Special Code Nil: Standard

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