

HCG500FH170A2RE1

1700V/500A Half Bridge IGBT Module

Description

The HCG500FH170A2RE1 offer lower losses and higher energy for soft switching applications.



Features

- 1700V/500 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

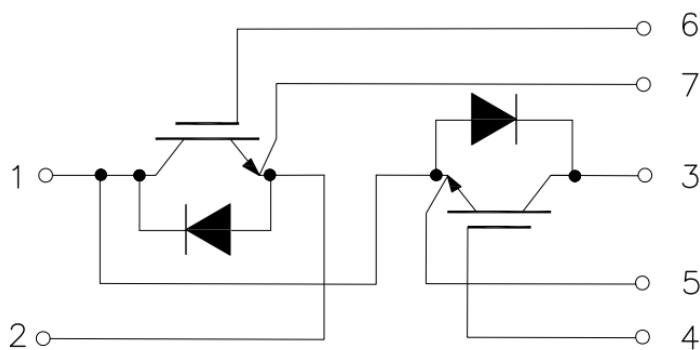


Figure 1. Out drawing & circuit diagram for HCG500FH170A2RE1

HCG500FH170A2RE1

1700V/500A Half Bridge IGBT Module

Pin Configuration and Marking Information

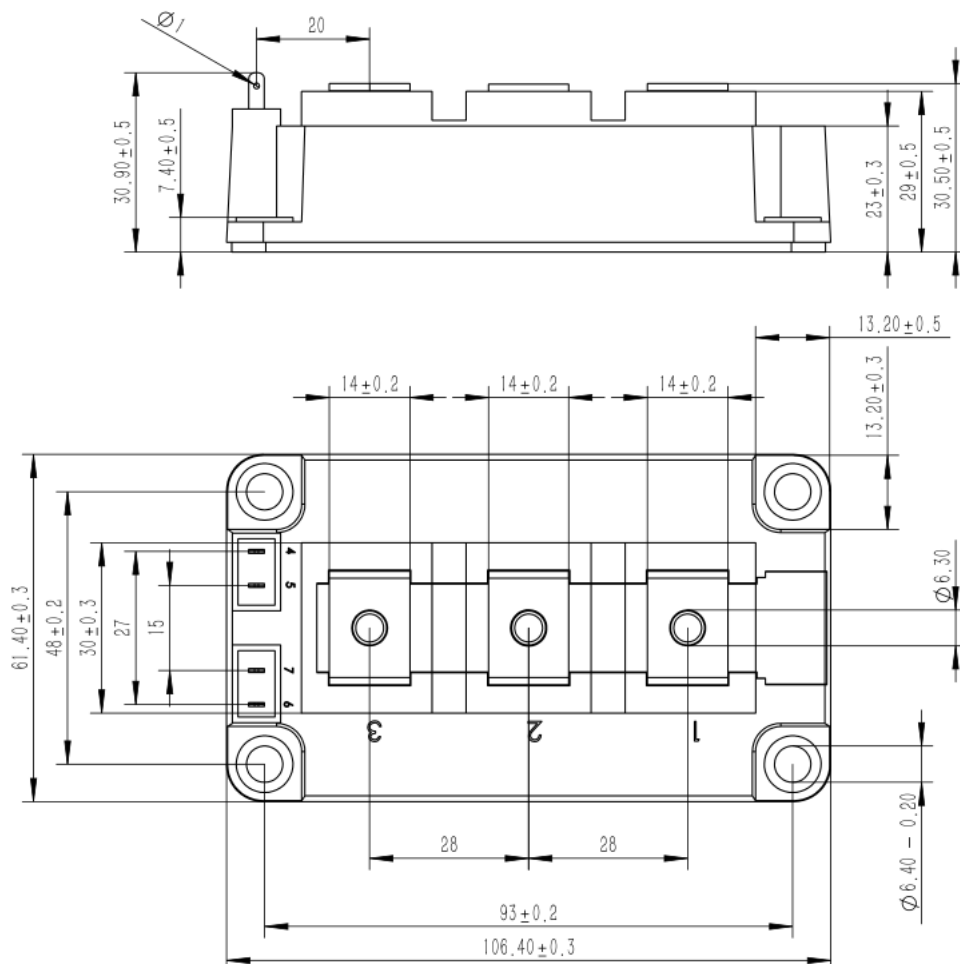


Figure 2. Pin configuration

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

HCG500FH170A2RE1

1700V/500A Half Bridge IGBT Module

Maximum Ratings (IGBT, $T_j=25^{\circ}\text{C}$ 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	$\pm 20\text{V}$	V
I_C	DC Continuous Collector Current	$T_C=80^{\circ}\text{C}$	500	A
I_{CM}	Pulse Collector Current	$t_p=1\text{ms}$, Note1	1000	A
P_C	Maximum Power Dissipation	$T_C=25^{\circ}\text{C}$, $T_j=150^{\circ}\text{C}$ (IGBT)	1645	W
I_F	Diode forward Current	-	500	A
I_{FRM}	Repetitive peak forward Current	$t_p=1\text{ms}$, Note1	1000	A
I^2t	I^2t -value	$V_R=0\text{V}$, $t_p=10\text{ms}$, $T_j=125^{\circ}\text{C}$ (Diode)	20000	A^2s
T_{jmax}	Max junction temperature	-	175	$^{\circ}\text{C}$
T_{jop}	Operating junction temperature	-	-40 to 150	$^{\circ}\text{C}$
T_{stg}	Storage temperature	-	-40 to 125	$^{\circ}\text{C}$

Note1: Pulse width limited by maximum junction temperature

IGBT Electrical characteristics ($T_j=25^{\circ}\text{C}$ 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, V _{pp} =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	-	

HCG500FH170A2RE1

1700V/500A Half Bridge IGBT Module

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	T _j =25°C		264		ns
			T _j =150°C		546		
I _{RM}	Peak reverse recovery Current	V _{GE} =+15V/-8V R _{Gon} = R _{Goff} =1 Ω	T _j =25°C	-	865	-	A
			T _j =150°C	-	742	-	
Q _{rr}	Recovered charge	(FRD side) V _{rr} =900V, I _F =500A	T _j =25°C	-	132	-	uC
			T _j =150°C	-	155	-	
E _{rr}	Reverse recovered energy	V _{GE} =+15V/-8V Inductive load switching operation	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

HCG500FH170A2RE1

1700V/500A Half Bridge IGBT Module

Test Conditions

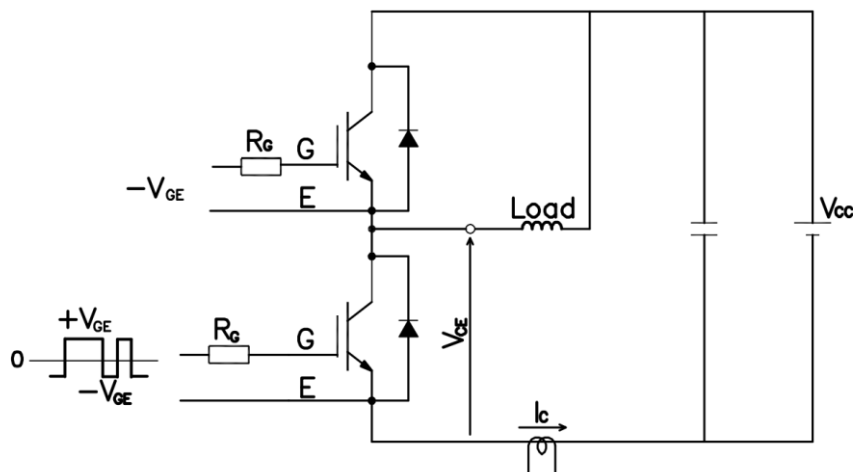


Figure 3. Switching time measure circuit

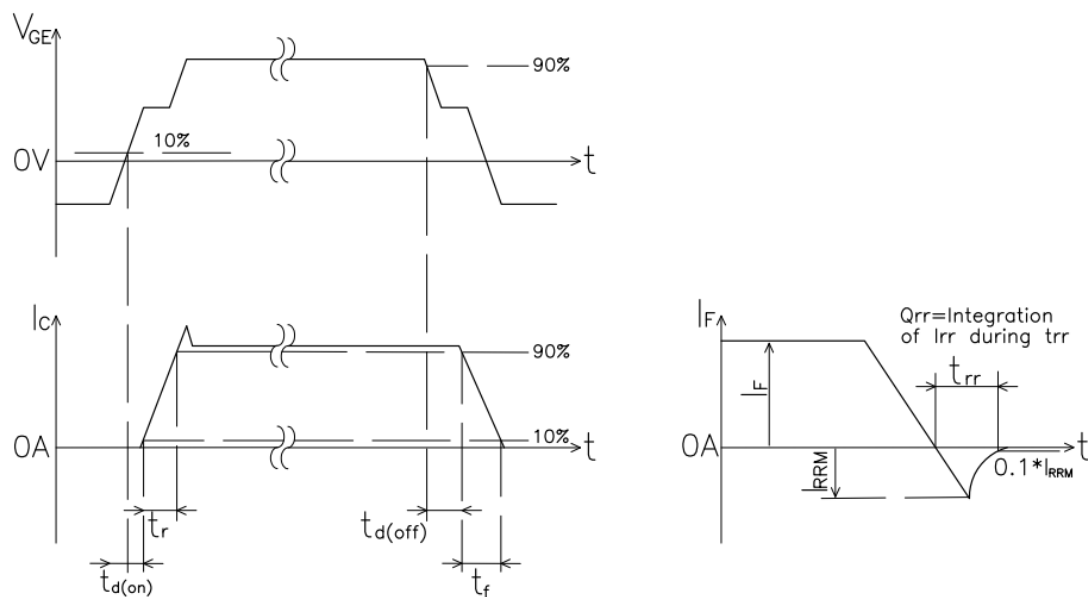


Figure 4. Switching time definition

HCG500FH170A2RE1

1700V/500A Half Bridge IGBT Module

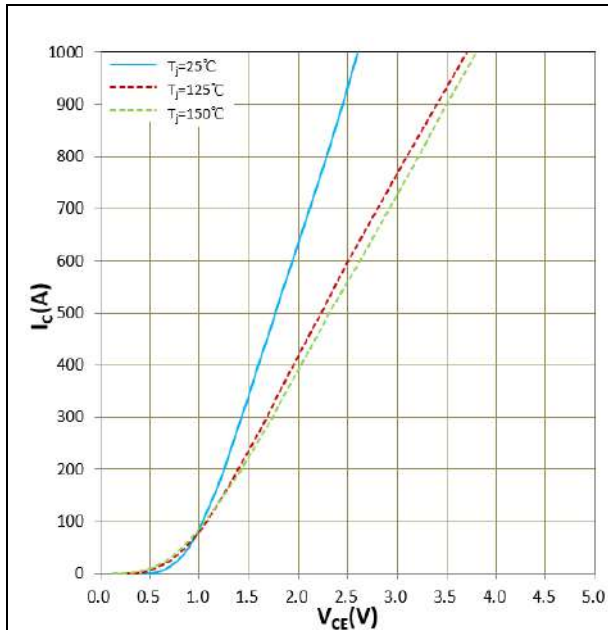


Figure 5. I_c vs V_{ce}
 $V_{ge}=15\text{V}$

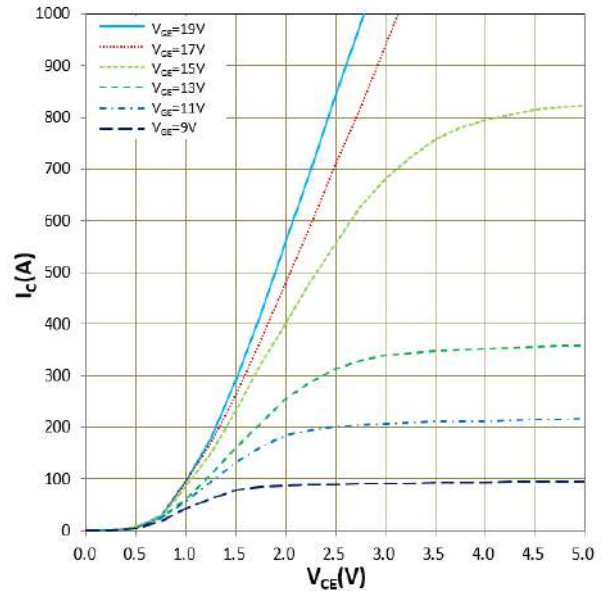


Figure 6. I_c vs V_{ce}
 $T_j=150^\circ\text{C}$

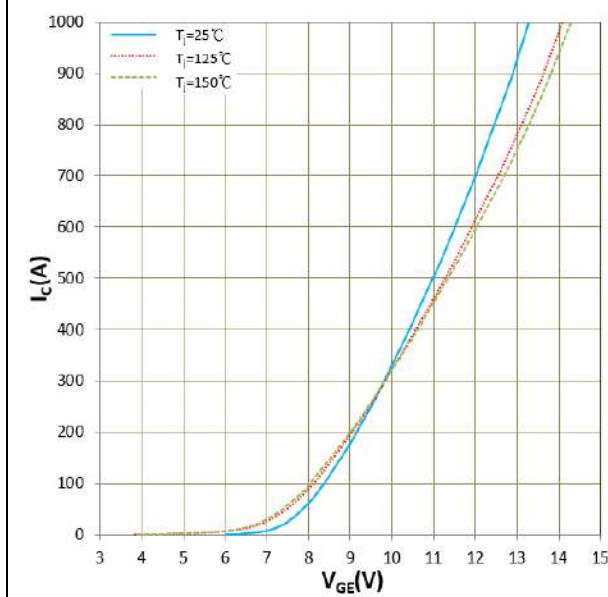


Figure 7. I_c vs V_{ge}
 $V_{ce}=20\text{V}$

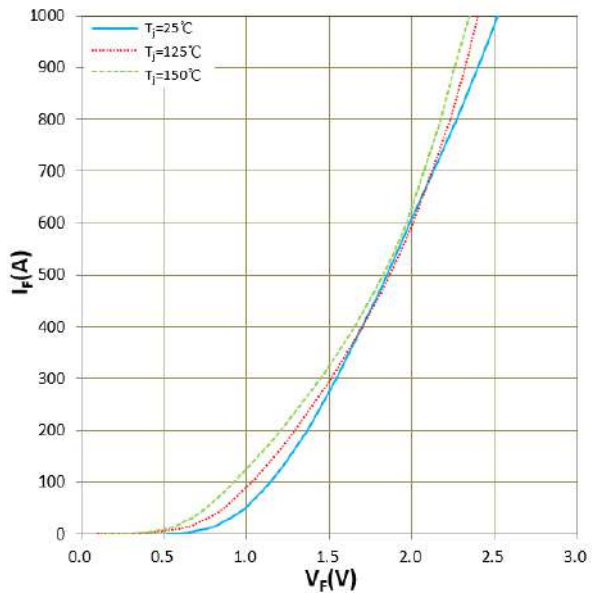


Figure 8. I_F vs V_F

HCG500FH170A2RE1

1700V/500A Half Bridge IGBT Module

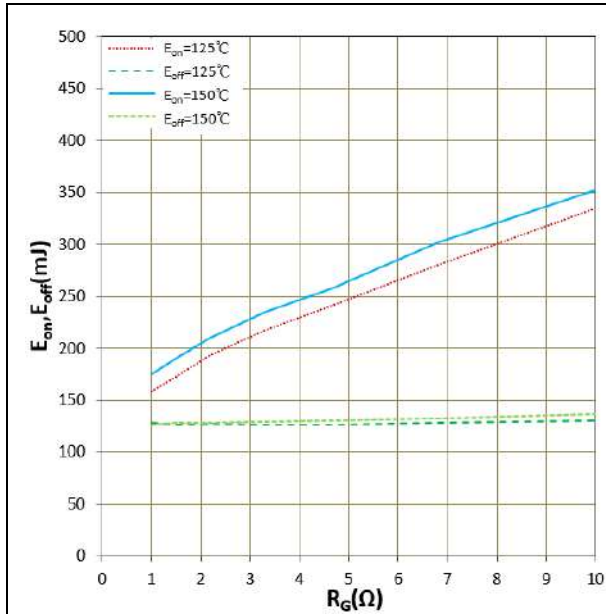


Figure 9. E_{on} , E_{off} vs R_G (Typ)
 $V_{CC}=900V$, $V_{GE}=+15V/-8V$, $I_C = 500A$
Inductive Load

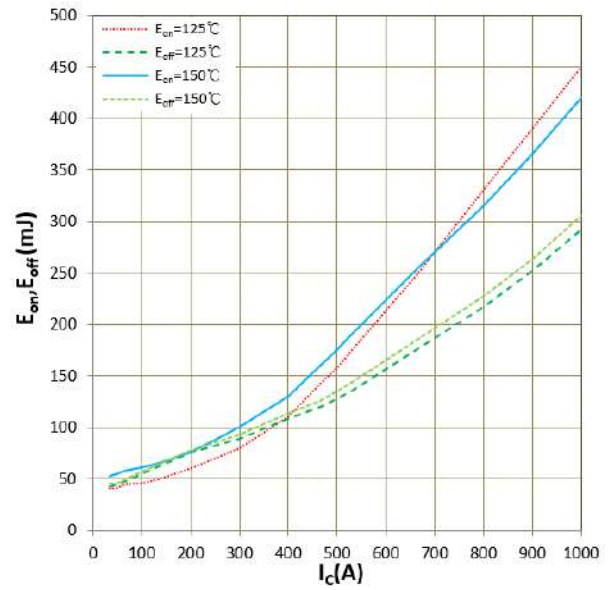


Figure 10 E_{on} , E_{off} vs I_c (Typ)
 $V_{CC}=900V$, $V_{GE}=+15V/-8V$, $R_{Gon} = R_{Goff}=1\Omega$
Inductive Load

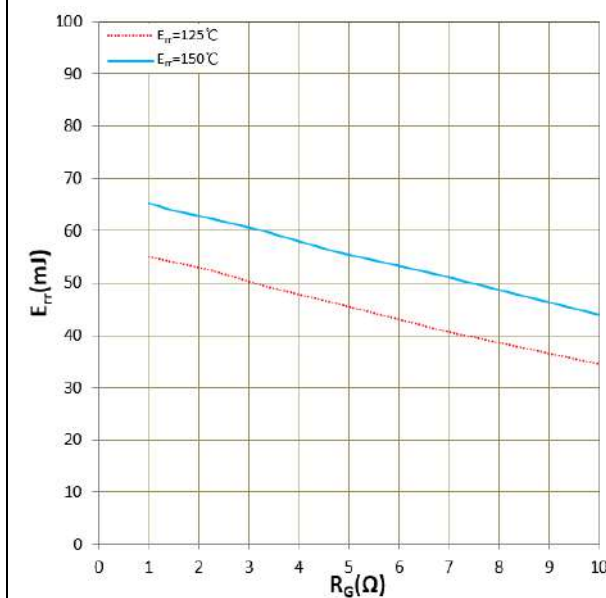


Figure 11. E_{rr} vs R_G (Typ)
 $V_{CC}=900V$, $V_{GE}=+15V/-8V$, $I_F=500A$
Inductive Load

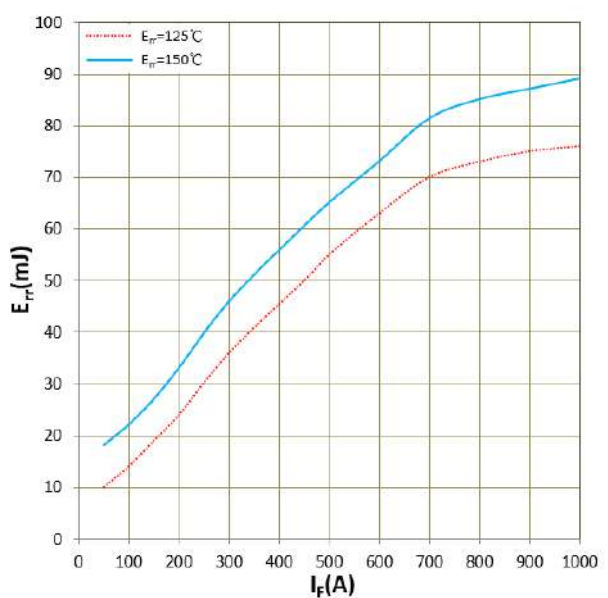


Figure 12. E_{rr} vs I_F (Typ)
 $V_{CC}=900V$, $V_{GE}=+15V/-8V$, $R_{Gon} = R_{Goff}=1\Omega$
Inductive Load

HCG500FH170A2RE1

1700V/500A Half Bridge IGBT Module

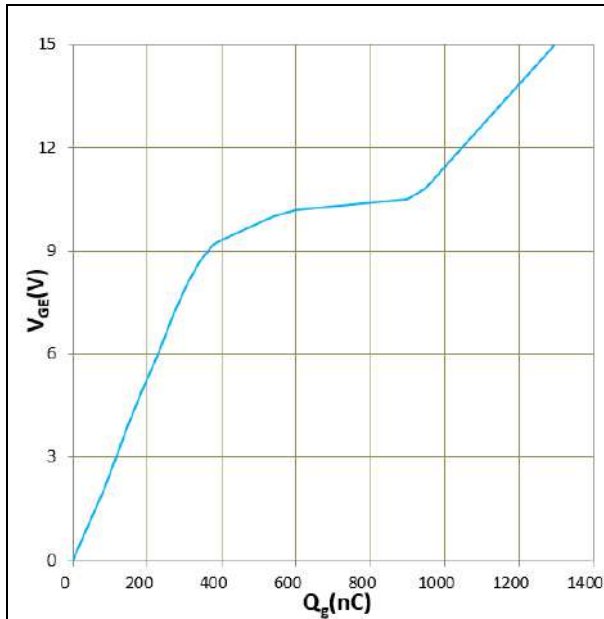


Figure 13. Gate charge

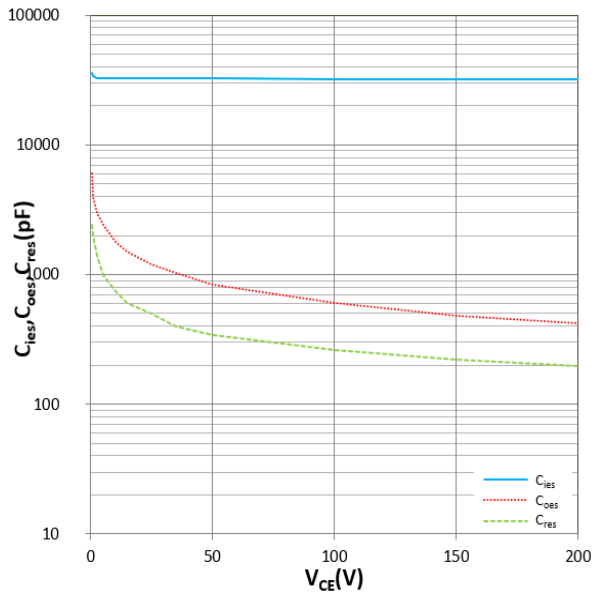


Figure 14. C_{ies} , C_{oes} , C_{res} VS V_{CE}

$T_j = 25^\circ\text{C}$, $f = 1\text{MHz}$

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. □

HCG500FH170A2RE1

1700V/500A Half Bridge IGBT Module

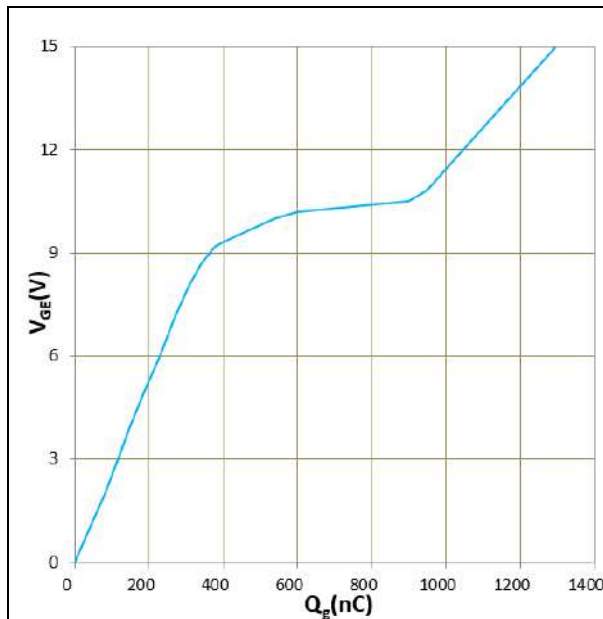


Figure 13. Gate charge

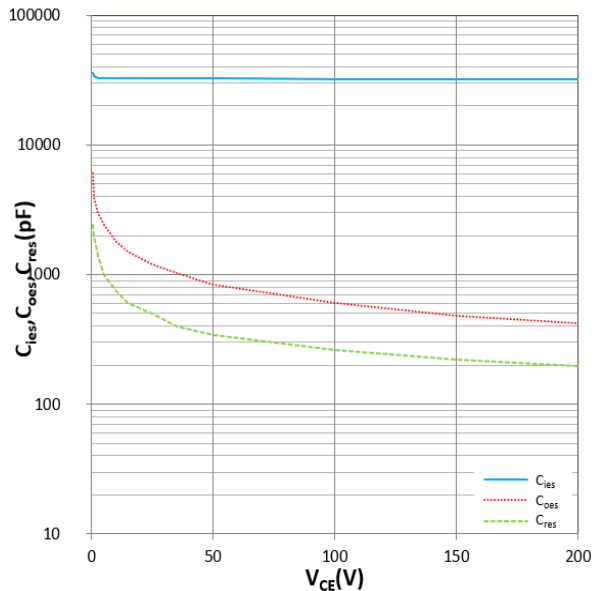


Figure 14. C_{ies} , C_{oes} , C_{res} vs V_{CE}

$T_j = 25^\circ\text{C}$, $f = 1\text{MHz}$

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

