

HCG900FF120E3ME7N

1200V/900A Half Bridge IGBT Module

Description

The HCG900FF120E3ME7N is a Half Bridge IGBT Power Module. It integrates high performance IGBT chips designed for the applications such as High Power supply and Motor control.

Features

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



Applications

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

Circuit diagram

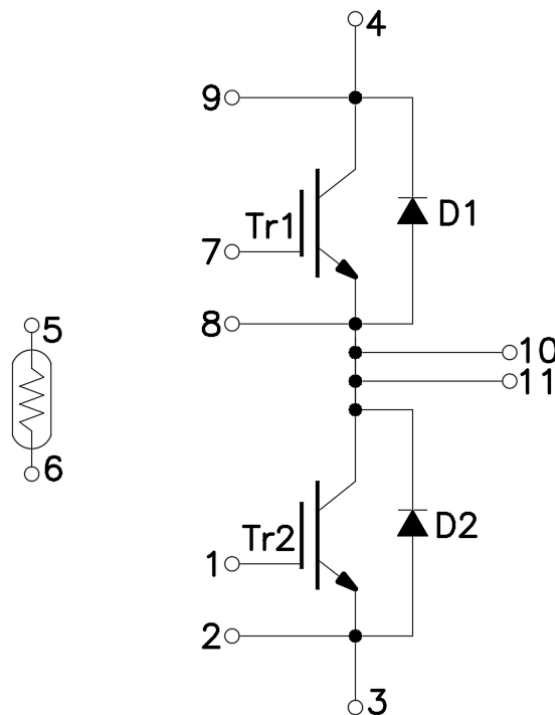


Figure 1. Out drawing & circuit diagram for HCG900FF120E3ME7N

HCG900FF120E3ME7N

1200V/900A Half Bridge IGBT Module

Pin Configuration and Marking Information

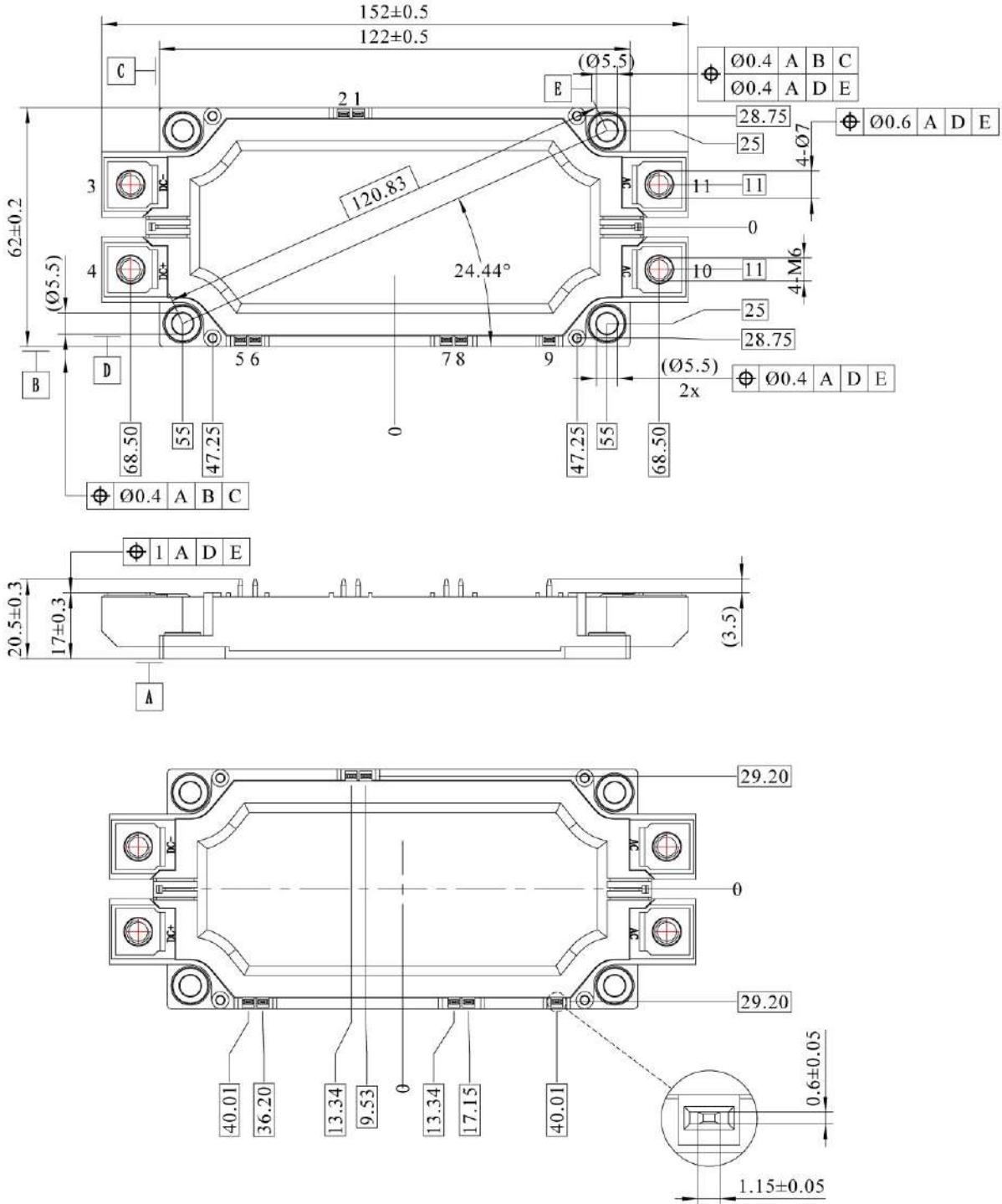


Figure 2. Pin configuration

HCG900FF120E3ME7N

1200V/900A Half Bridge IGBT Module

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 =100°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)	5000	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
$\frac{\Delta R}{R}$	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	R ₂ = R ₂₅ exp [B _{25/50} (1/T ₂ - 1/(298,15 K))]	-	3375	-	K
B _{25/80}	B-value	R ₂ = R ₂₅ exp [B _{25/80} (1/T ₂ - 1/(298,15 K))]	-	3411	-	K
B _{25/100}	B-value	R ₂ = R ₂₅ exp [B _{25/100} (1/T ₂ - 1/(298,15 K))]	-	3433	-	K

HCG900FF120E3ME7N

1200V/900A Half Bridge IGBT Module

IGBT Electrical characteristics ($T_j=25^\circ\text{C}$ unless otherwise specified, chip)

Symbol	Item	Condition	Value			Unit	
			Min.	Typ.	Max.		
$V_{CE(sat)}$ (Chip)	Collector-Emitter Saturation Voltage	$I_C=900\text{A}$ $V_{GE}=15\text{V}$	$T_j=25^\circ\text{C}$	-	1.72	2.06	V
			$T_j=125^\circ\text{C}$	-	2.00	-	
			$T_j=150^\circ\text{C}$	-	2.10	-	
			$T_j=175^\circ\text{C}$	-	2.18	-	
$V_{GE(th)}$	Gate-Emitter threshold Voltage	$I_C=25\text{mA}$, $V_{CE}=V_{GE}$	5.0	-	6.5	V	
Q_G	Gate charge	$V_{GE} = -15\text{V to } +15\text{V}$	-	7.6	-	μC	
R_{Gint}	Internal gate resistor	-	$T_j=25^\circ\text{C}$	-	0.5	Ω	
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$ $f=1\text{MHz}$	$T_j=25^\circ\text{C}$	-	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	$V_{CE}=1200\text{V}$, $V_{GE}=0\text{V}$	$T_j=25^\circ\text{C}$	-	-	1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE} = 20\text{V}$, $V_{CE}=0\text{V}$	$T_j=25^\circ\text{C}$	-	-	1.5	μA
$t_{d(on)}$	Turn-on delay time	$V_{CC}=600\text{V}$ $I_C=900\text{A}$ $V_{GE}=+15\text{V}/-8\text{V}$ $R_g=1.0\mu\text{s}$ Inductive load	$T_j=25^\circ\text{C}$	-	289	-	ns
			$T_j=150^\circ\text{C}$	-	325	-	
t_r	Rise time		$T_j=25^\circ\text{C}$	-	110	-	ns
			$T_j=150^\circ\text{C}$	-	138	-	
$t_{d(off)}$	Turn-off delay time		$T_j=25^\circ\text{C}$	-	483	-	ns
			$T_j=150^\circ\text{C}$	-	548	-	
t_f	Fall time		$T_j=25^\circ\text{C}$	-	163	-	ns
			$T_j=150^\circ\text{C}$	-	292	-	
E_{on}	Turn-on power dissipation		$T_j=25^\circ\text{C}$	-	64.24	-	mJ
			$T_j=150^\circ\text{C}$	-	92.36	-	
E_{off}	Turn-off power dissipation	$T_j=25^\circ\text{C}$	-	89.56	-	mJ	
		$T_j=150^\circ\text{C}$	-	114.98	-		
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (IGBT)			-	0.025	-	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 $2.8\text{W/m}\cdot\text{K}$ and thickness is $50\mu\text{m}$.

HCG900FF120E3ME7N

1200V/900A Half Bridge IGBT Module

Freewheeling Diode Electrical characteristics ($T_j=25^\circ\text{C}$ unless otherwise specified, chip)

Symbol	Item	Condition	Value			Unit	
			Min.	Typ.	Max.		
V_F	Diode Forward Voltage	$I_F=900\text{A}$ $V_{GE}=0\text{V}$	$T_j=25^\circ\text{C}$	-	1.69	2.03	V
			$T_j=125^\circ\text{C}$	-	1.58	-	
			$T_j=150^\circ\text{C}$	-	1.55	-	
			$T_j=175^\circ\text{C}$	-	1.50	-	
T_{rr}	Reverse recovery time	$V_{CC}=600\text{V}$	$T_j=25^\circ\text{C}$	-	685	-	ns
			$T_j=150^\circ\text{C}$	-	864	-	
I_{RM}	Peak reverse recovery Current	$I_F=900\text{A}$ $V_{GE}=+15/-8\text{V}$	$T_j=25^\circ\text{C}$	-	565	-	A
			$T_j=150^\circ\text{C}$	-	609	-	
Q_{rr}	Reverse recovery charge	$R_g=1.0\Omega$ Inductive load	$T_j=25^\circ\text{C}$	-	0.161	-	uC
			$T_j=150^\circ\text{C}$	-	0.242	-	
E_{rr}	Reverse recovered energy	switching operation	$T_j=25^\circ\text{C}$	-	75.50	-	mJ
			$T_j=150^\circ\text{C}$	-	112.32	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (Diode)		-	0.045	-	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 $2.8\text{W/m}\cdot\text{K}$ and thickness is $50\mu\text{m}$.

Test Conditions

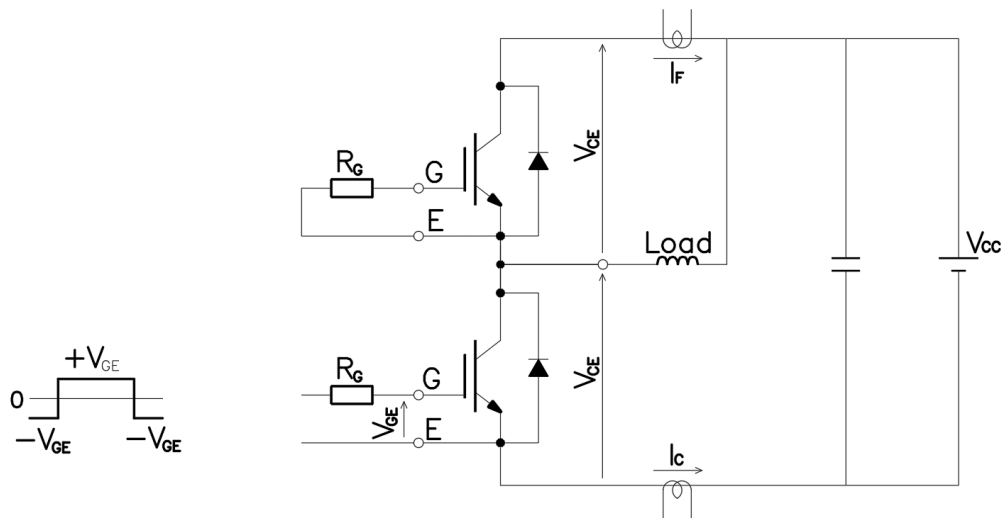


Figure 3. Switching time measure circuit

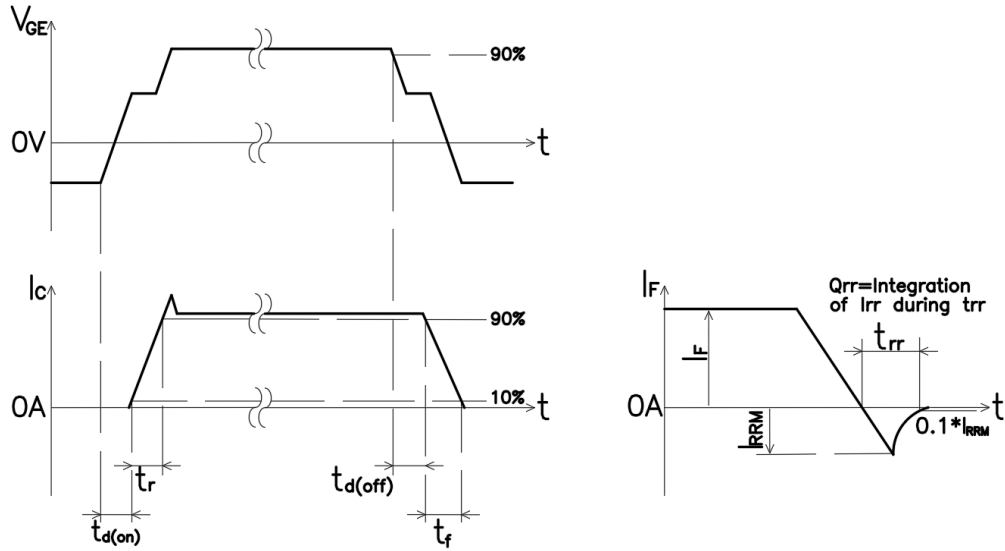
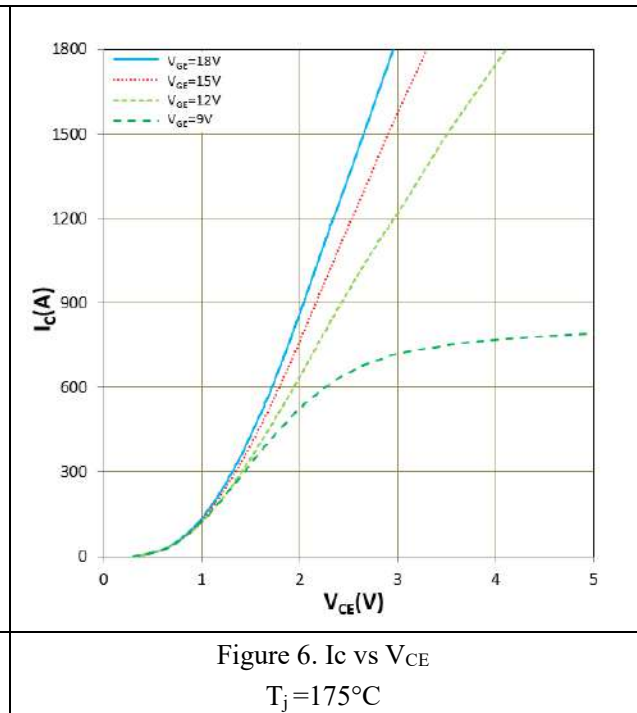
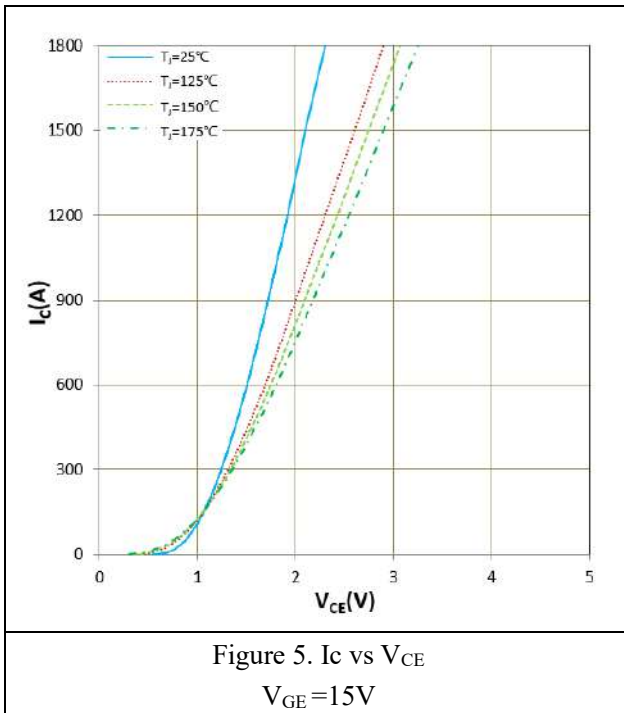
HCG900FF120E3ME7N
1200V/900A Half Bridge IGBT Module


Figure 4. Switching time definition



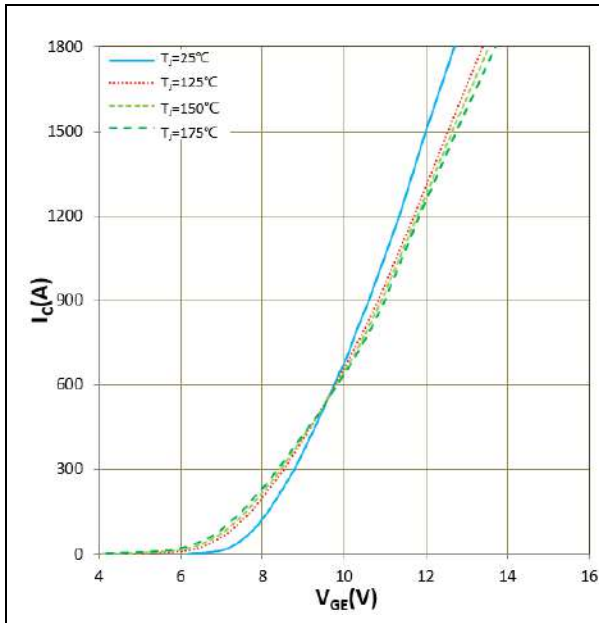
HCG900FF120E3ME7N
1200V/900A Half Bridge IGBT Module


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

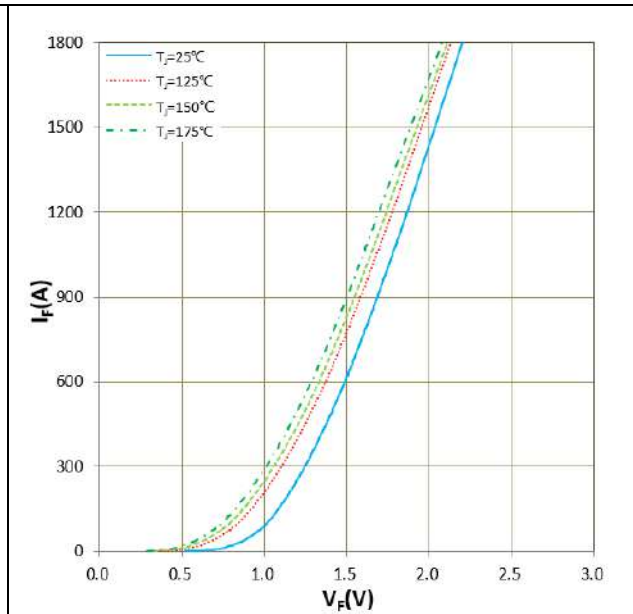


Figure 8. I_F vs V_F

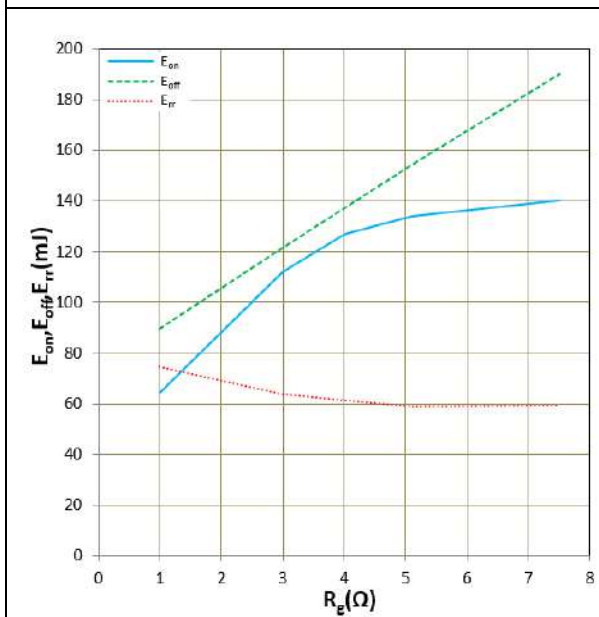


Figure 9. E_{on} , E_{off} , E_{tr} vs R_g (Typ)
 $V_{CC}=600V$, $V_{GE}=+15V/-8V$, $I_c=900A$, $T_j=25^\circ C$
Inductive Load

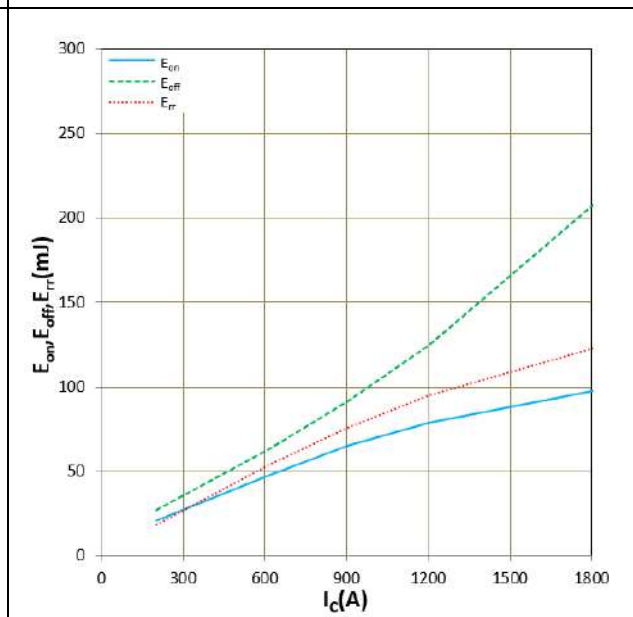


Figure 10. E_{on} , E_{off} , E_{tr} vs I_c (Typ)
 $V_{CC}=600V$, $V_{GE}=+15V/-8V$, $R_g=1.0\Omega$, $T_j=25^\circ C$
Inductive Load

HCG900FF120E3ME7N

1200V/900A Half Bridge IGBT Module

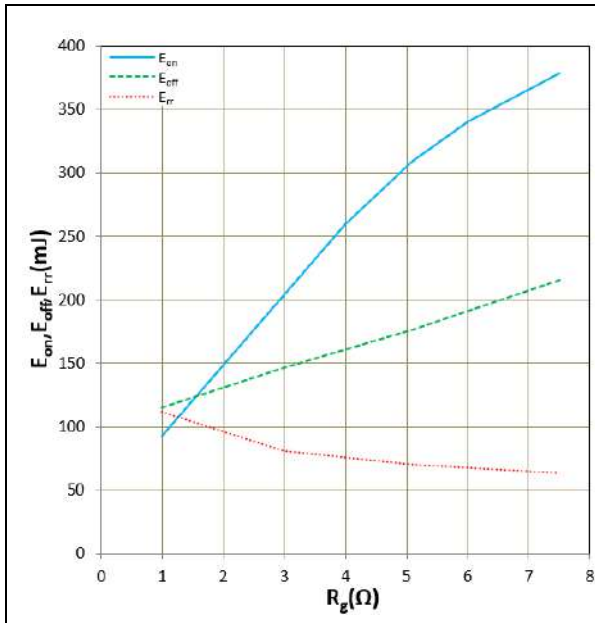


Figure 11. E_{on} , E_{off} , E_{rr} vs R_g (Typ)
 $V_{CC}=600V$, $V_{GE}=+15V/-8V$, $I_C=900A$, $T_j=150^\circ C$
 Inductive Load

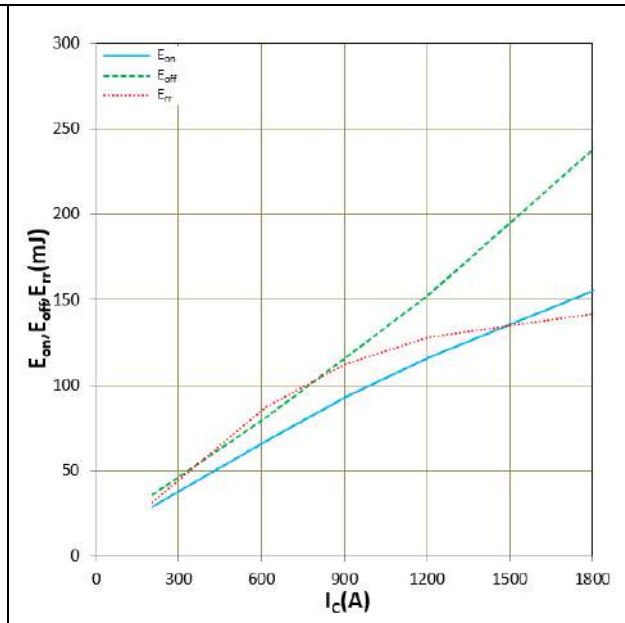


Figure 12. E_{on} , E_{off} , E_{rr} vs I_c (Typ)
 $V_{CC}=600V$, $V_{GE}=+15V/-8V$, $R_g=1.0\Omega$, $T_j=150^\circ C$
 Inductive Load

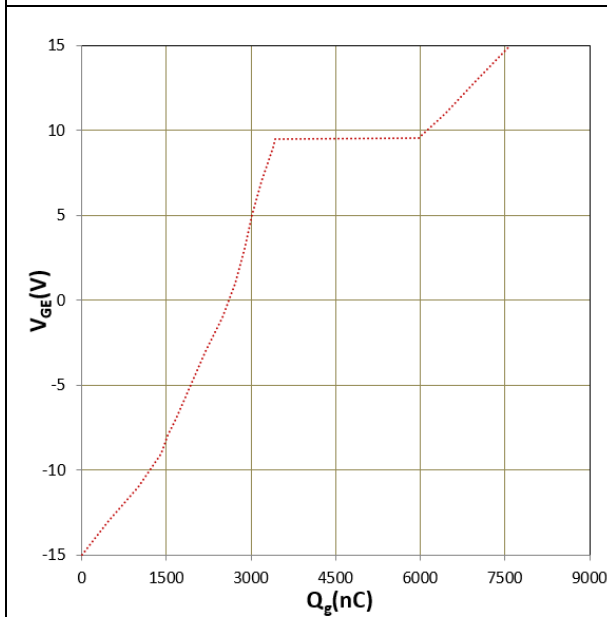


Figure 13. Gate charge
 $V_{CC}=600V$, $I_C=900A$, $T_j=25^\circ C$

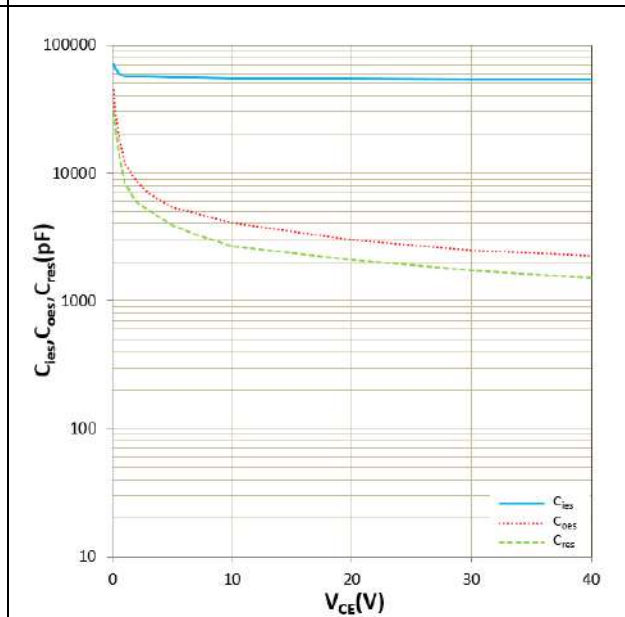
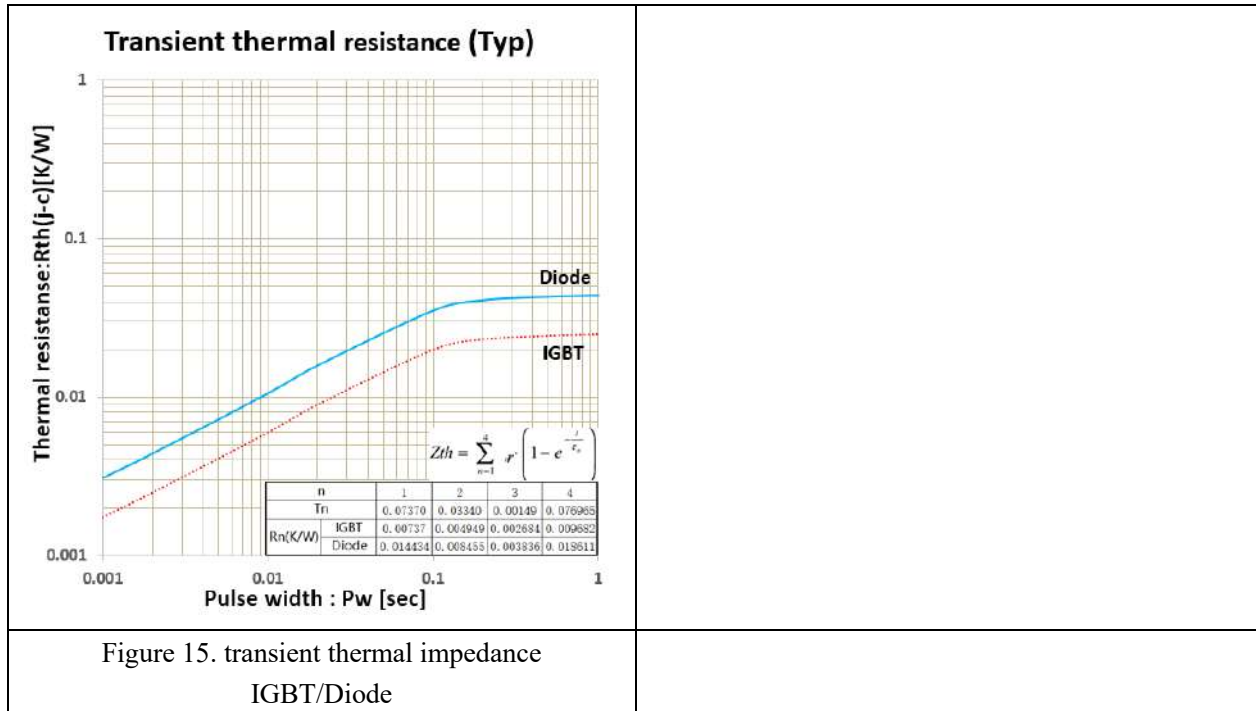


Figure 14. C_{ies} , C_{oes} , C_{res} vs V_{CE}
 $T_j=25^\circ C$, $f=1MHz$

HCG900FF120E3ME7N
1200V/900A Half Bridge IGBT Module

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	300	FF	1700	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 : FS : Three phase F4 : H Bridge F3L : Three level DF : Bo 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	B3: Easy 3B...	B1B...			
	B2: Easy 2B...		D2: Flow1	D3: Flow2			
	D1: Flow0	E1: Econo 2...		: E2			
	E0 : E0	E4 : E4		E5 : ED3S			
	E3 : ED3	E7 : EPM3		E8 : EconoPIM3			
	E6 : EPM2	F0 : F0		P2 : EPM2			
	E9 : ED3H						
Feature :A: Special Code							

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

