HUAJING

SEMICONDUCTOR

IGBT

HF300H170

Molding Type Module

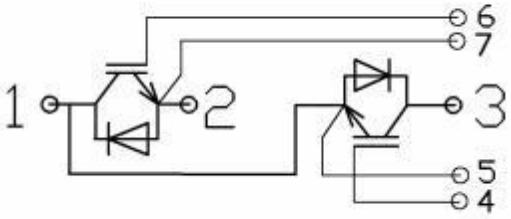
1700V/300A 2 in one-package

General Description

HUAJING IGBT Power Module provides ultra low conduction loss as well as short circuit ruggedness. They are designed for the applications such as AC inverters.

Features

- Low $V_{CE(sat)}$ trench IGBT technology
- Low switching losses
- 10μs short circuit capability
- $V_{CE(sat)}$ with positive temperature coefficient
- Low inductance case
- Fast & soft reverse recovery anti-parallel FWD
- Isolated copper baseplate using DBC technology



Equivalent Circuit Schematic

Typical Applications

- AC inverter drives mains 575-750V AC
- Public transport (auxiliary syst.)

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Description	HF300H170	Units
V_{CES}	Collector-Emitter Voltage	1700	V

Symbol	Description	HF300H170	Units
V_{GES}	Gate-Emitter Voltage	±20	V
I_C	Collector Current @ T_C=25℃	550	A
	@ T_C=80℃	300	
$I_{CM(1)}$	Pulsed Collector Current t_p=1ms	600	A
I_F	Diode Continuous Forward Current	300	A
I_{FM}	Diode Maximum Forward Current	600	A
P_D	Maximum Power Dissipation @ T_j= 175℃	2083	W
T_{SC}	Short Circuit Withstand Time @ T_j=125℃	10	μs
T_{jmax}	Maximum Junction Temperature	175	℃
T_{STG}	Storage Temperature Range	-40 to +125	℃
I^2t-value,Diode	V_R=0V,t=10ms,T_j=125℃	14500	A^2s
V_{ISO}	Isolation Voltage RMS,f=50Hz,t=1min	4000	V
Mounting Torque	Power Terminal Screw:M6	2.5 to 5.0	N.m
	Mounting Screw:M6	3.0 to 5.0	N.m

Notes:

(1) Repetitive rating: Pulse width limited by max. junction temperature

Electrical Characteristics of IGBT T_C=25℃ unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{CES}	Collector-Emitter Breakdown Voltage	V_{GE}=0V, I_C=4.0mA, T_j=25℃	1700			V
I_{CES}	Collector Cut-Off Current	V_{CE}=V_{CES},V_{GE}=0V, T_j=25℃			3.0	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=V_{GES},V_{CE}=0V, T_j=25℃			400	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C= 12.0mA,V_{CE}=V_{GE}, T_j=25℃	5.2	5.8	6.4	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C=300A,V_{GE}=15V, T_j=25℃		2.0		V
		I_C=300A,V_{GE}=15V, T_j= 125℃		2.4		

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=300A, R_G=4.7Ω,V_{GE}= ±15 V, T_j=25℃		281		ns
t_r	Rise Time			82		ns
$t_{d(off)}$	Turn-Off Delay Time			801		ns

t_f	Fall Time	V_{CC}=900V,I_C=300A, R_G=4.7Ω,V_{GE}= ±15 V, T_j=25℃		121		ns
E_{on}	Turn-On Switching Loss			70		mJ
E_{off}	Turn-Off Switching Loss			65		mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC}=900V,I_C=300A, R_G=4.7Ω,V_{GE}= ±15 V, T_j= 125℃		303		ns
t_r	Rise Time			103		ns
$t_{d(off)}$	Turn-Off Delay Time			1002		ns
t_f	Fall Time			203		ns
E_{on}	Turn-On Switching Loss			105		mJ
E_{off}	Turn-Off Switching Loss			94		mJ
C_{ies}	Input Capacitance	V_{CE}=25V,f=1MHz, V_{GE}=0V		27.0		nF
C_{oes}	Output Capacitance			1.1		nF
C_{res}	Reverse Transfer Capacitance			0.9		nF
I_{SC}	SC Data	t_{SC}≤10μs,V_{GE}=15V, T_j=125℃,V_{CC}= 1000V, V_{CEM}≤1700V		1200		A
R_{Gint}	Internal Gate Resistance			2.5		Ω
L_{CE}	Stray Inductance				20	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip	T_C=25℃		0.35		mΩ

Electrical Characteristics of DIODE T_C=25℃ unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=300A	T_j=25℃		1.8		V
			T_j= 125℃		1.9		
Q_r	Diode Reverse Recovery Charge	I_F=300A, V_R=900 V, di/dt=-3600A/μs, V_{GE}=- 15V	T_j=25℃		77		μC
			T_j= 125℃		131		
I_{RM}	Diode Peak Reverse Recovery Current		T_j=25℃		351		A
			T_j= 125℃		383		
E_{rec}	Reverse Recovery Energy		T_j=25℃		40		mJ
			T_j= 125℃		72		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case (IGBT Part, per 1/2 Module)		0.072	K/W
$R_{\theta JC}$	Junction-to-Case (DIODE Part, per 1/2 Module)		0.13	K/W
$R_{\theta JC}$	Case-to-Sink (Conductive grease applied)	0.035		K/W
Weight	Weight of Module	300		g

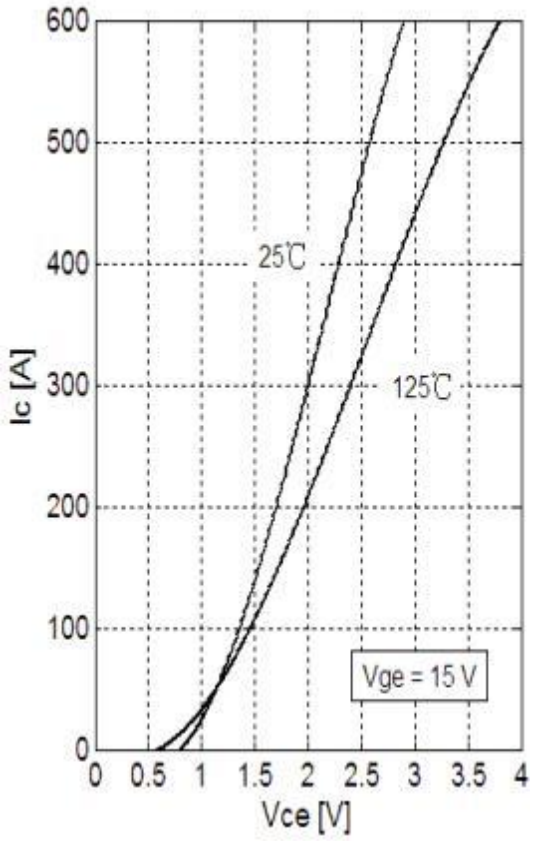


Fig 1 . IGBT Typical Output Characteristics

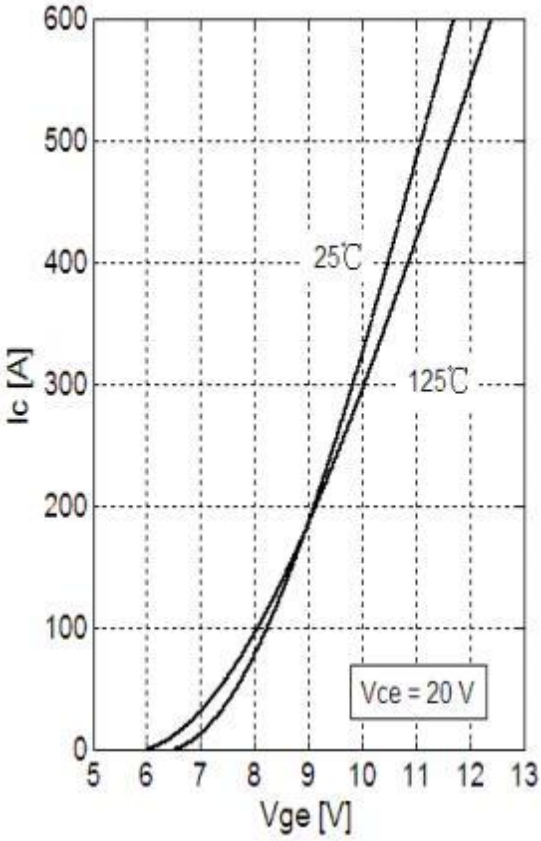


Fig 2 . IGBT Typical Transfer Characteristics

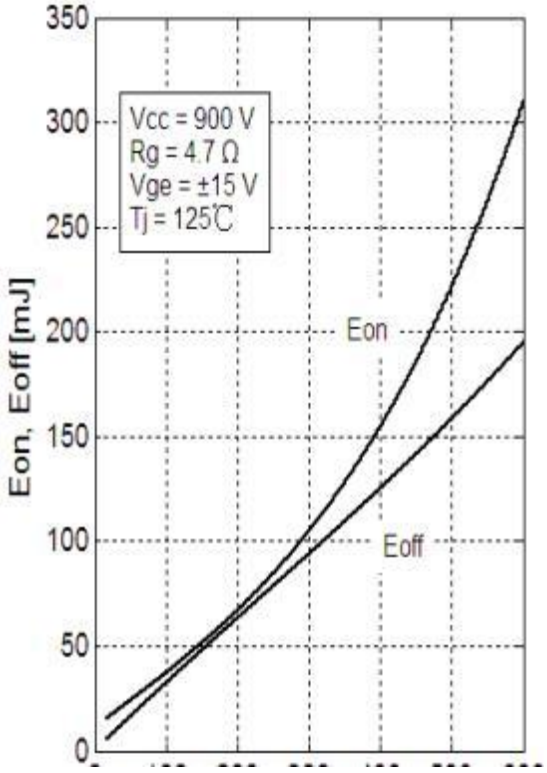


Fig 3. IGBT Switching Loss vs. Collector Current

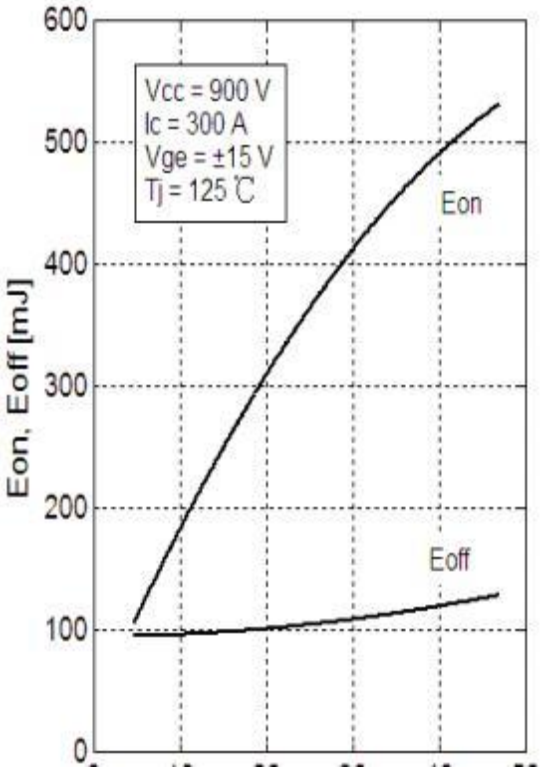


Fig 4. IGBT Switching Loss vs. Gate Resistor

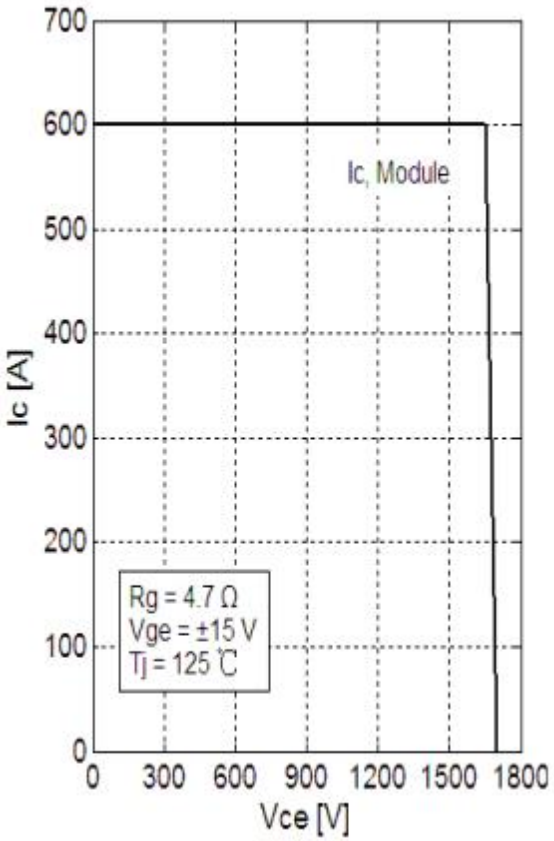


Fig 5. RBSOA

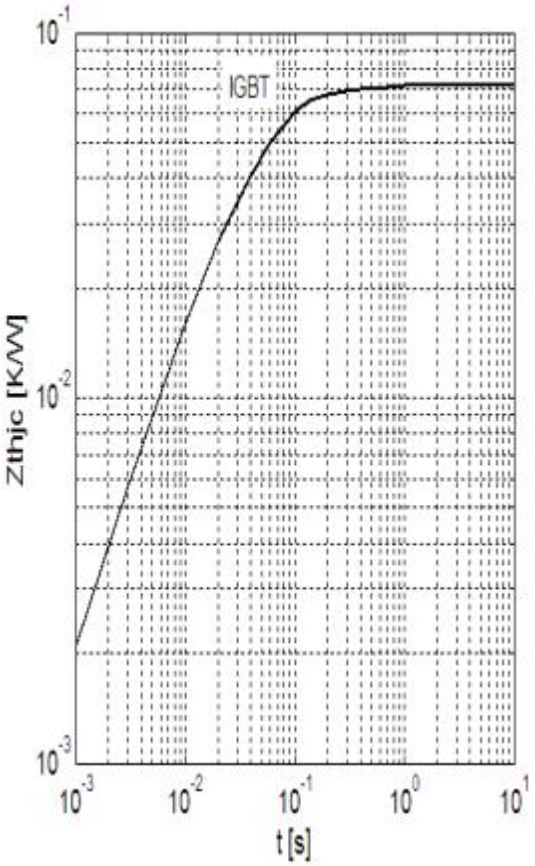


Fig 6. IGBT Transient Thermal Impedance

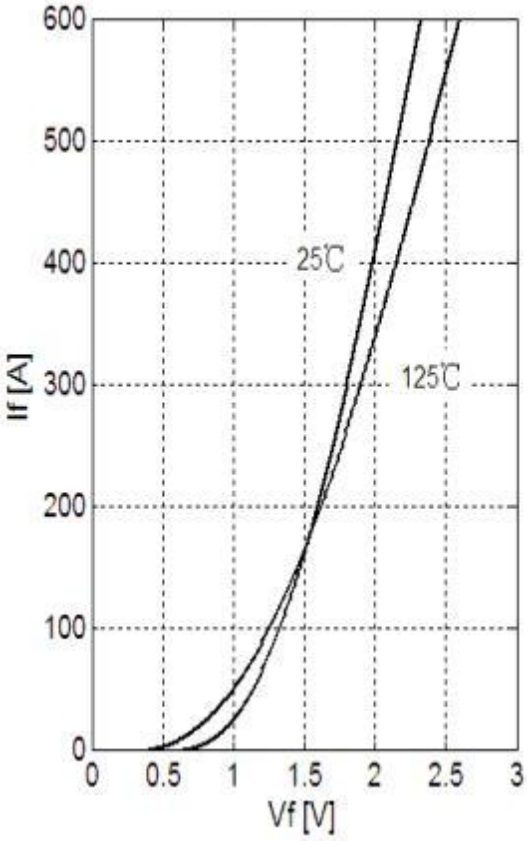


Fig 7. Forward Characteristics of Diode

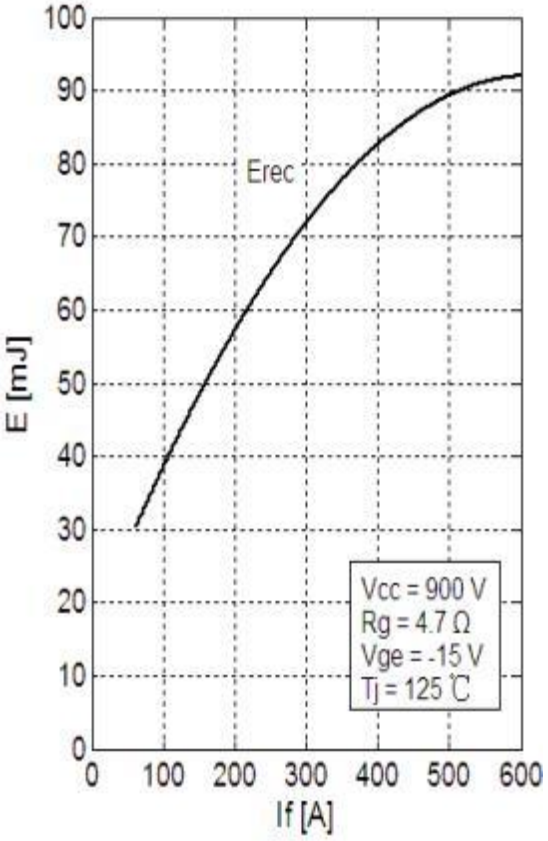


Fig 8. Diode Switching Loss vs. Collector Current

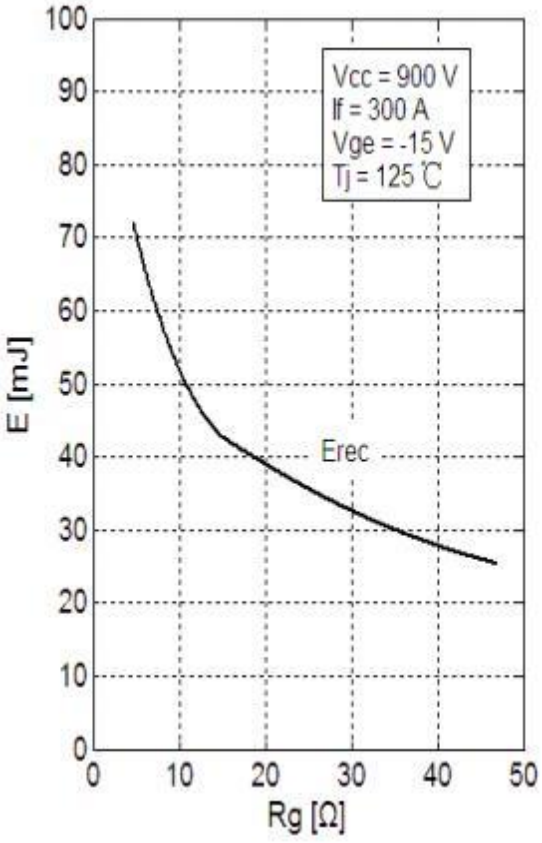


Fig9. Diode Switching Loss vs. Gate Resistor

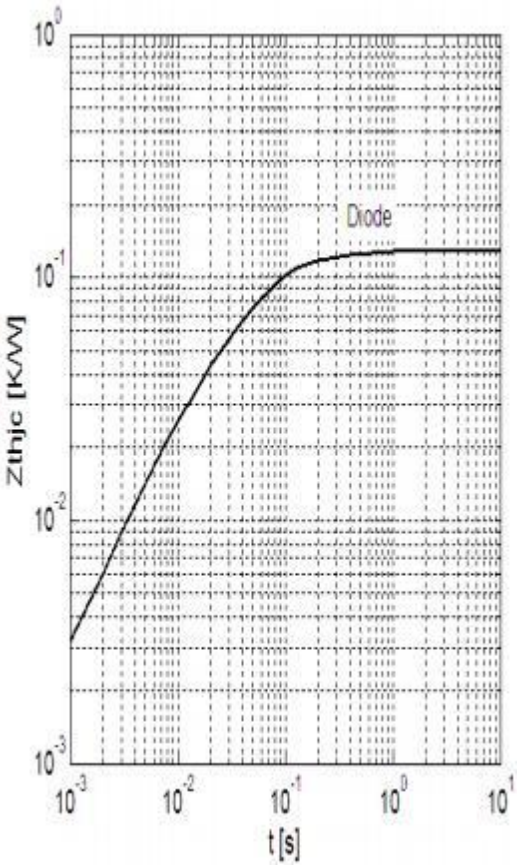


Fig 10. Diode Transient Thermal Impedance

Package Dimension

Dimensions in Millimeters