

HCG600FH170D3E1

1700V / 600A D3 (size similar to Econo Dual with Cu Baseplate)

Features

- Low $V_{CE(SAT)}$
- Low inductance module structure
- Solder pin terminals

Applications

- Inverter for motor drives AC and DC servo drives
- Uninterruptible power supply systems
- Wind turbines
- PV power conditioning systems



Table 1 Key Performance and Package Parameters

Type	V_{CE}	I_C ($T_C = 90^\circ\text{C}$)	$V_{CE(SAT)}$ ($T_{vj} = 25^\circ\text{C}$, $I_C = 600\text{A}$, $V_{GE} = 15\text{V}$)	T_{vjmax}	Package
IGBT	1700V	600A	1.68V	175°C	D3

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Table 2 Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector emitter voltage	V_{CE}	$T_{vj} = 25^{\circ}\text{C}$	1700	V
Continuous DC collector current	I_{CDC}	$T_C = 90^{\circ}\text{C}$	600	A
Repetitive peak collector current	I_{CRM}	$T_p=1\text{ms}$	1200	
Continuous DC forward current	I_F		600	A
Repetitive peak forward current	I_{FRM}	$T_p=1\text{ms}$	1200	A
Gate source voltage	V_{GE}	$T_{vj} = 25^{\circ}\text{C}$	± 20	V
Junction temperature	T_{vj}		-40 to +175	$^{\circ}\text{C}$
Storage temperature	T_{stg}		-40 to +125	
Operating virtual junction temperature	T_{vjop}		150	$^{\circ}\text{C}$

Table 3 Thermal Resistance

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
IGBT Thermal resistance junction - case	R_{thJC}	Per IGBT	-	0.039	-	$^{\circ}\text{C} / \text{W}$
Diode Thermal resistance junction - case	R_{thJC}	Per diode	-	0.057	-	$^{\circ}\text{C} / \text{W}$

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Table 4 Static Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector emitter voltage	$V_{(BR)CES}$	$T_{vj} = 25^{\circ}\text{C}$	1700	-	-	V
Collector emitter saturation voltage	V_{CEsat} (chip)	$V_{GE} = 15\text{V}, I_C = 600\text{A},$ $T_{vj} = 25^{\circ}\text{C}$	-	1.68	-	V
		$V_{GE} = 15\text{V}, I_C = 600\text{A},$ $T_{vj} = 175^{\circ}\text{C}$	-	2.16	-	
Diode forward voltage	V_F (chip)	$V_{GE} = 0\text{V}, I_C = 600\text{A},$ $T_{vj} = 25^{\circ}\text{C}$	-	1.79	-	V
		$V_{GE} = 0\text{V}, I_C = 600\text{A},$ $T_{vj} = 175^{\circ}\text{C}$	-	1.89	-	
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 24\text{mA}$	-	6.07	-	V
Zero gate voltage collector current	I_{CES}	$V_{CE} = 1200\text{V}, V_{GE} = 0\text{V},$ $T_{vj} = 25^{\circ}\text{C}$	-	-	100	μA
Gate-emitter leakage current	I_{GES}	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$	-	-	100	nA
Input capacitance	C_{ies}	$V_{GE} = 0\text{V},$ $V_{CE} = 25\text{V},$ $f = 100\text{kHz}$	-	79.2	-	nF
Output capacitance	C_{oes}		-	2.93	-	
Reverse transfer capacitance	C_{res}		-	0.39	-	
Gate input resistance	R_G	$f = 1\text{M Hz}$	-	1.66	-	Ω
Gate charge	Q_G	$V_{GE} = -15\text{V to } 15\text{V},$ $V_{CE} = 900\text{V}$	-	3.01	-	μC

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Table 5 Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Turn-on delay time	t_{don}	$T_{vj} = 25^{\circ}\text{C}$, $V_{CC} = 900\text{V}$, $I_C = 600\text{A}$, $V_{GE} = -15/15\text{V}$, $R_{G(on)} = 1\Omega, R_{G(off)} = 1\Omega$	-	410	-	ns
Rise time	t_r		-	75	-	
Turn-off delay time	t_{doff}		-	500	-	
Fall time	t_f		-	380	-	
Turn-on energy	E_{on}		-	102.8	-	mJ
Turn-off energy	E_{off}		-	115.5	-	
Total switching energy	E_{ts}		-	218.3	-	
Turn-on delay time	t_{don}	$T_{vj} = 175^{\circ}\text{C}$, $V_{CC} = 900\text{V}$, $I_C = 600\text{A}$, $V_{GE} = -15/15\text{V}$, $R_{G(on)} = 1\Omega, R_{G(off)} = 1\Omega$	-	440	-	ns
Rise time	t_r		-	100	-	
Turn-off delay time	t_{doff}		-	560	-	
Fall time	t_f		-	600	-	
Turn-on energy	E_{on}		-	197.6	-	mJ
Turn-off energy	E_{off}		-	156.5	-	
Total switching energy	E_{ts}		-	354.1	-	
Short circuit current	I_{SC}	$T_{vj} = 175^{\circ}\text{C}$, $V_{CC} = 1000\text{V}$, $V_{GE} = 15\text{V}$, $V_{CEmax} = V_{CES} - L_{sCE} * di/dt$ $T_P \leq 6\text{ us}$	-	3200	-	A

Table 6 Diode Recovery Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse recovery time	T_{rr}	$T_{vj} = 25^{\circ}\text{C}$, $V_{CC} = 900\text{V}$, $I_C = 600\text{A}$, $V_{GE} = -15/15\text{V}$, $R_{G(on)} = 1\Omega, R_{G(off)} = 1\Omega$	-	230	-	ns
Peak reverse recovery current	I_{rrm}		-	750	-	A
Reverse recovery charge	Q_{rr}		-	100	-	μC
Reverse recovery energy	E_{rec}		-	49.7	-	mJ
Reverse recovery time	T_{rr}	$T_{vj} = 175^{\circ}\text{C}$, $V_{CC} = 900\text{V}$, $I_C = 600\text{A}$, $V_{GE} = -15/15\text{V}$, $R_{G(on)} = 1\Omega, R_{G(off)} = 1\Omega$	-	370	-	ns
Peak reverse recovery current	I_{rrm}		-	706	-	A
Reverse recovery charge	Q_{rr}		-	130	-	μC
Reverse recovery energy	E_{rec}		-	52.2	-	mJ

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Table 7 Module Characteristics

Parameter	Symbol	Conditions	Value	Typ
Isolation test voltage	V_{ISOL}	RMS, f = 50 Hz, t = 1min	4.0	kV
Material of module baseplate			Cu+Ni	
Internal isolation		Basic insulation	Al_2O_3	
Mounting torque of screws to heat sink	M_s	M5	3.0-6.0	N·m
Mounting torque of screws to terminals	M_t	M6	3.0-6.0	N·m
Comperative tracking index	CTI		>175	

Table 8 NTC-Thermistor

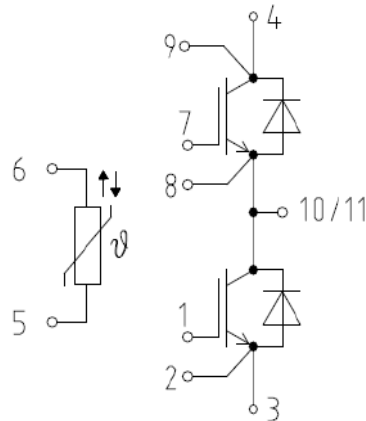
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Rated resistance	R25	TC = 25°C	-	5	-	kΩ
Deviation of R100	$\Delta R/R$	TC = 100°C, R100 = 493 Ω	-5	-	5	%
B-value	B25/50	$R_2 = R_{25} \exp[B_{25/50}(1/T_2 - 1/(298,15K))]$	-	3375	-	K

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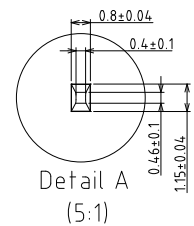
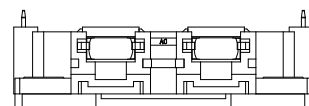
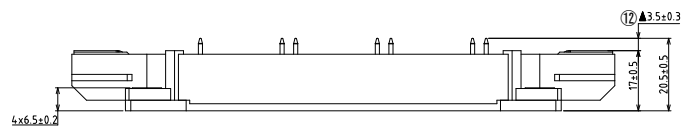
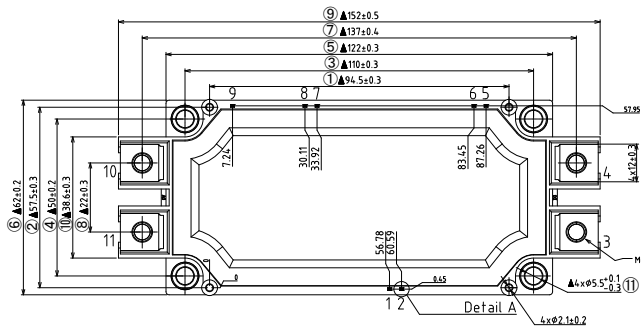
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Package Information

Circuit Diagram



Package Outlines



Revision History

Document Version	Description of Changes
RevX.0.1	Released

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