

HCG150FF170M3E1

1700V / 150A P3 (size similar to Econo Pim3 with Cu Baseplate)

Typical Applications

- Auxiliary Inverters
- Motor Drives
- Servo Drives

Electrical Features

- Low Switching Losses
- LOW V_{CEsat}
- $T_{vj op} = 150^{\circ}C$



Mechanical Features

- Al_2O_3 Substrate with Low Thermal Resistance
- High Power and Thermal Cycling Capability
- Integrated NTC temperature sensor
- Copper Base Plate
- Solder Contact Technology
- Standard Housing

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Table 1 Absolute maximum Ratings (Ta = 25°C)

Parameter	Symbol	Value	Unit
IGBT, Inverter			
Collector-Emitter Voltage	V_{CES}	1700	V
Gate-Emitter Voltage	V_{GE}	±20	V
Continuous Collector Current	I_C	150	A
Pulsed Collector Current	I_{CP}	300	A
Diode, Inverter			
Peak Repetitive Reverse Voltage	V_{RRM}	1700	V
Continuous Forward Current	I_F	150	A
Repetitive Peak Forward Current	I_{FRM}	300	A
Diode, Rectifier			
Peak Repetitive Reverse Voltage	V_{RRM}	1800	V
Maximum RMS forward current per chip	I_{FRMSM}	120	A
Maximum RMS current at rectifier output	I_{RMSM}	240	A
Recommended Temperature			
Storage Temperature	T_{stg}	-40 to +125	°C
Operating Temperature	T_{vjop}	-40 to +150	°C
Junction Temperature	T_j	-40 to +175	°C

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Table 2 Characteristics Values

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
IGBT, Inverter							
Collector–Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} = 15 V, I _C = 150 A	T _J = 25°C	-	1.80	-	V
		V _{GE} = 15 V, I _C = 150 A	T _J = 150°C	-	2.28	-	
Gate–Emitter Threshold Voltage	V _{GE(TH)}	V _{GE} = V _{CE} , I _C = 150 mA	T _J = 25°C	-	6.50	-	V
Total Gate Charge	Q _g	V _{GE} = ±15 V, V _{CE} = 900 V	T _J = 25°C	-	TBD	-	μC
Gate-Source Leakage Current	I _{GES}	V _{GE} = ±20 V, V _{CE} = 0 V	T _J = 25°C	-100	-	100	nA
Collector–Emitter Voltage	V _{(BR)CES}	V _{GE} = 0 V I _C = 0.25 mA	T _J = 25°C	1700	-	-	V
Collector–Emitter Cutoff Current	I _{CES}	V _{CE} = 1700 V, V _{GE} = 0 V	T _J = 25°C	-	-	1	mA
Input Capacitance	C _{iss}	V _{GE} = 0 V, V _{CE} = 20 V, f = 1 MHz	T _J = 25°C	-	19.1	-	nF
Output Capacitance	C _{oss}		T _J = 25°C	-	4.80	-	
Reverse Transfer Capacitance	C _{rss}		T _J = 25°C	-	0.14	-	
Turn-on Delay Time(inductive load)	t _{d on}	V _{GE} = -15 V / +15 V V _{CE} = 900 V I _C = 150 A R _{Gon} = 10 Ω R _{Goff} = 10 Ω	T _J = 25°C	-	280	-	ns
			T _J = 175°C	-	205	-	
Rise Time (inductive load)	t _r		T _J = 25°C	-	55	-	
			T _J = 175°C	-	53	-	
Turn-off Delay Time(inductive load)	t _{d off}		T _J = 25°C	-	500	-	ns
			T _J = 175°C	-	550	-	
Fall Time (inductive load)	t _f		T _J = 25°C	-	530	-	ns
			T _J = 175°C	-	730	-	
Turn-on Switching Loss	E _{on}		T _J = 25°C	-	72.4	-	mJ
			T _J = 175°C	-	109	-	
Turn-off Switching Loss	E _{off}		T _J = 25°C	-	31.7	-	
			T _J = 175°C	-	42.1	-	
Thermal Resistance – Chip-to–Case	R _{thJC}	Inverter IGBT		-	0.21	-	°C / W
Diode, Inverter							
Diode Forward Voltage	V _F	I _F = 150 A	T _J = 25°C	-	1.82	-	V
		I _F = 150 A	T _J = 150°C	-	1.94	-	

HCG150FF170M3E1

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Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Reverse Recovery Time	T _{RR}	V _{GE} = -15 V / +15 V V _{CE} = 900 V I _C = 150 A R _{Gon} = 10 Ω R _{Goff} = 10 Ω	T _j = 25°C	-	250	-	ns
			T _j = 175°C	-	445	-	
Reverse Recovery Charge	Q _{RR}		T _j = 25°C	-	24	-	μC
			T _j = 175°C	-	230	-	
Peak Reverse Recovery Current	I _{RRM}		T _j = 25°C	-	195	-	A
			T _j = 175°C	-	232	-	
Reverse Recovery Energy	E _{RR}		T _j = 25°C	-	3.25	-	mJ
			T _j = 175°C	-	6.58	-	
Thermal Resistance – Chip-to-Case	R _{thJC}	Inverter FWD		-	0.30	-	°C / W

Diode, Rectifier

Diode Forward Voltage	V_F	$I_F = 150\text{ A}$	$T_j = 25^\circ\text{C}$	-	1.12	-	V
		$I_F = 150\text{ A}$	$T_j = 150^\circ\text{C}$	-	1.07	-	
Thermal Resistance – Chip-to-Case	R_{thJC}	Converter Diode	-	0.18	-	-	$^\circ\text{C} / \text{W}$

Table 3 NTC-Thermistor

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Rated resistance	R25	$T_C = 25^\circ\text{C}$	-	5	-	k Ω
Deviation of R100	$\Delta R/R$	$T_C = 100^\circ\text{C}$, 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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Characteristics Diagrams

Fig.1 Typical Output Characteristic, IGBT, Inverter

$$I_C = f(V_{CE})$$

$$V_{GE} = 15V$$

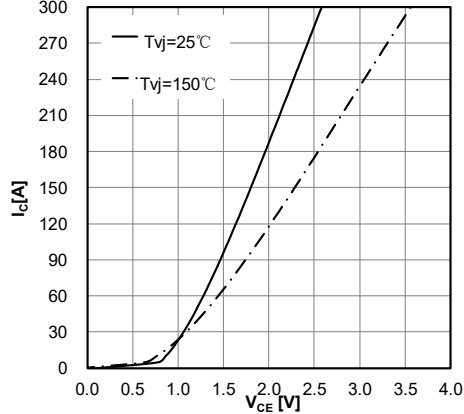


Fig.2 Typical Output Characteristic, IGBT, Inverter

$$I_C = f(V_{CE})$$

$$T_{vj} = 150^{\circ}C$$

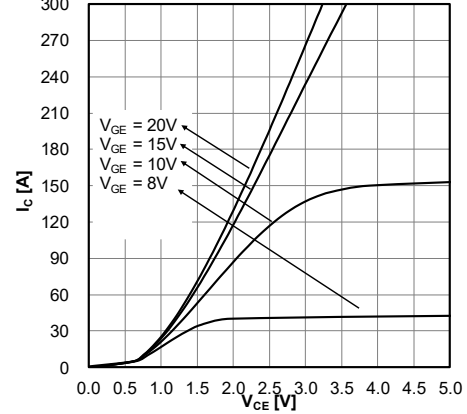


Fig.3 Capacity characteristic, IGBT, Inverter

$$C = f(V_{CE})$$

$$f = 100 \text{ KHz}, V_{GE} = 0V, T_{vj} = 25^{\circ}C$$

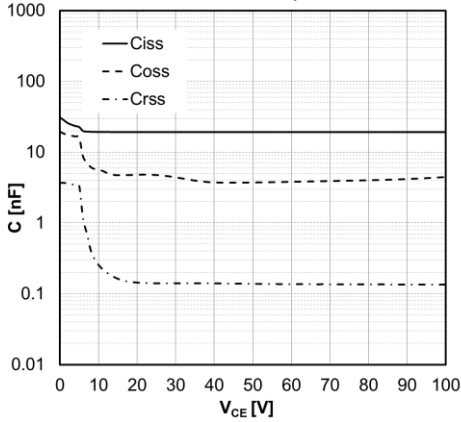


Fig.4 Switching losses, IGBT, Inverter

$$E = f(I_C)$$

$$R_{Goff} = 10 \Omega, R_{Gon} = 10 \Omega, V_{CE} = 900V, V_{GE} = \pm 15V$$

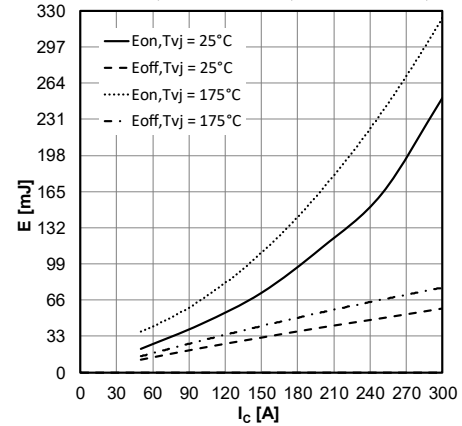


Fig.5 Switching losses, IGBT, Inverter

$$E = f(R_G)$$

$$I_C = 150A, V_{CE} = 900V, V_{GE} = \pm 15V$$

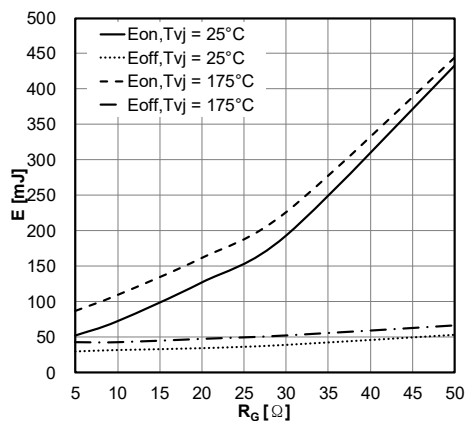
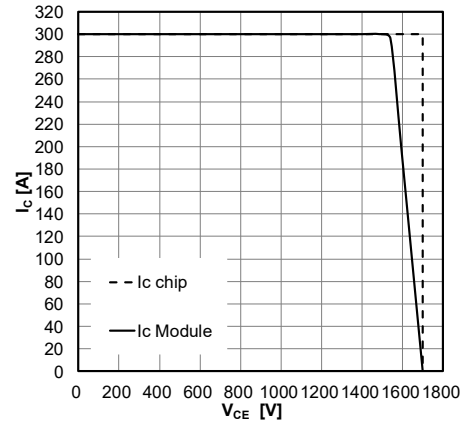


Fig.6 Reverse bias safe operating area (RBSOA), IGBT, Inverter

$$I_C = f(V_{CE})$$

$$R_{Goff} = 10 \Omega, V_{GE} = \pm 15V, T_{vj} = 175^{\circ}C$$



HCG150FF170M3E1

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Characteristics Diagrams

Fig.7 Forward characteristic, Diode, Inverter
 $I_F = f(V_F)$

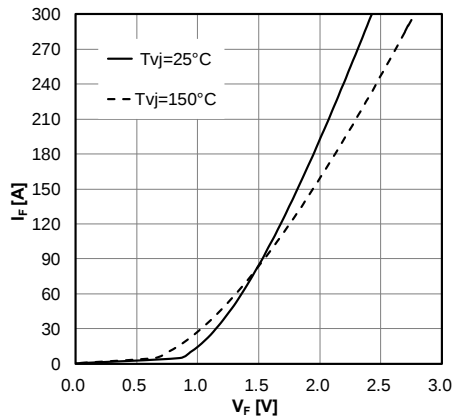


Fig.8 Switching losses, Diode, Inverter
 $E_{rec} = f(I_F)$
 $V_{CE} = 900V$, $R_{Goff} = 10\Omega$, $R_{Gon} = 10\Omega$, $V_{GE} = \pm 15V$

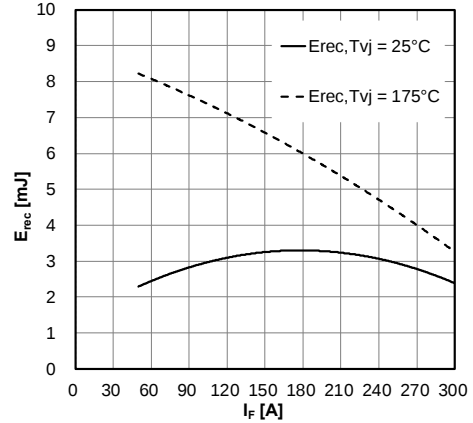


Fig.9 Switching losses, Diode, Inverter
 $E_{rec} = f(R_G)$
 $V_{CE} = 900V$, $I_F = 150A$

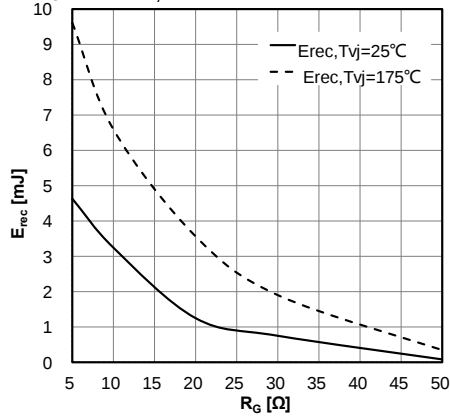


Fig.10 Forward characteristic of Diode, Rectifier (typical)
 $I_F = f(V_F)$

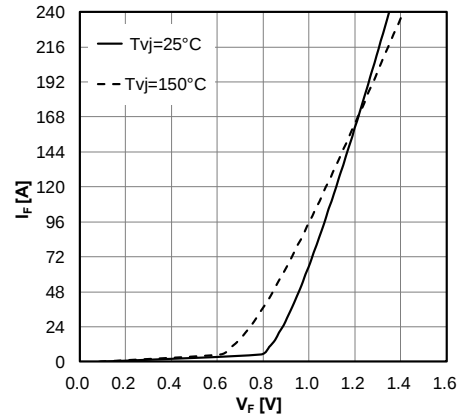
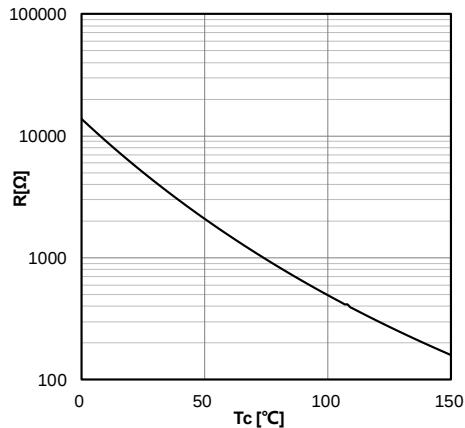


Fig.11 Temperature characteristic, NTC - Thermistor

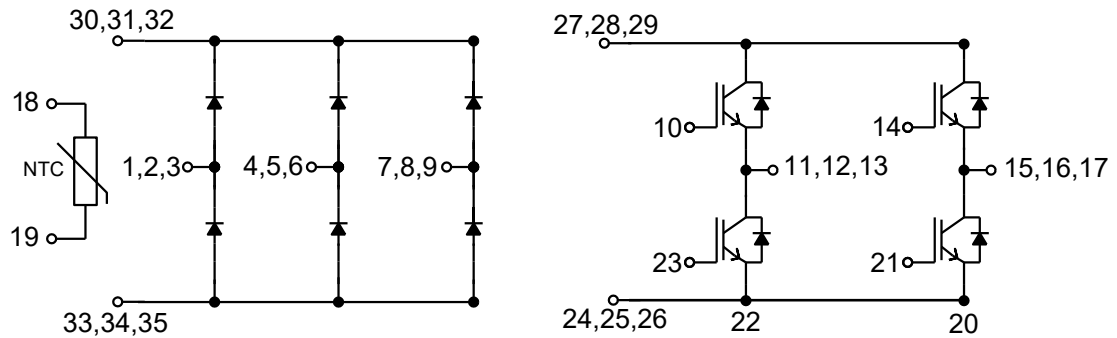


HCG150FF170M3E1

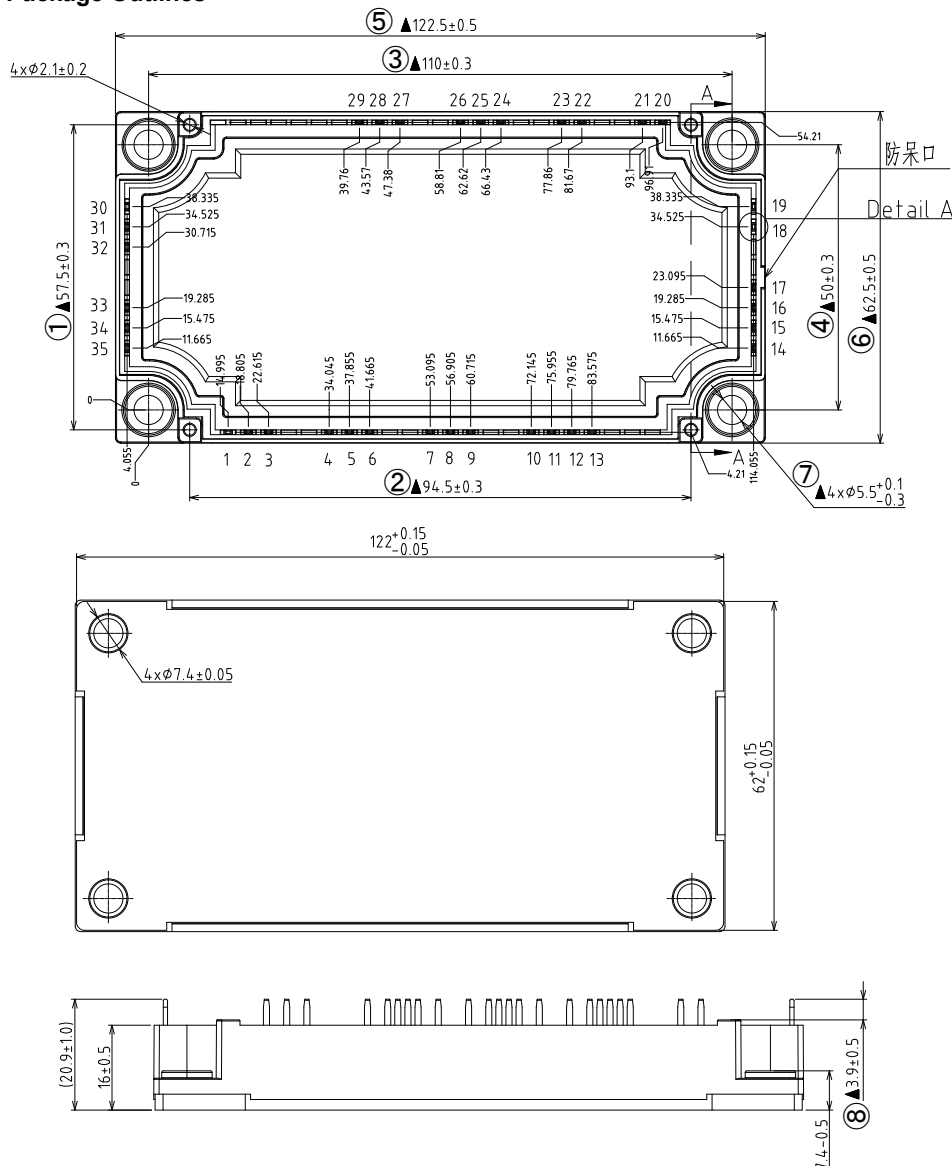
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Package Information

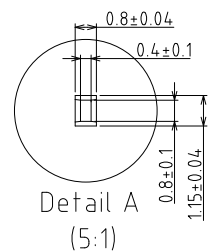
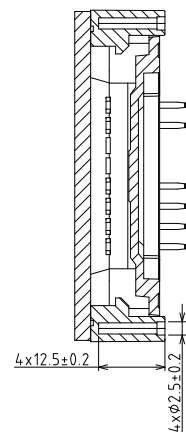
Circuit Diagram



Package Outlines



SECTION A-A



Revision History

Document Version	Description of Changes
RevX.0.1	Released

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