

HCG600FL120E3F1

1200V / 600A E3 (size similar to Easy 3 with Cu Baseplate)

Features

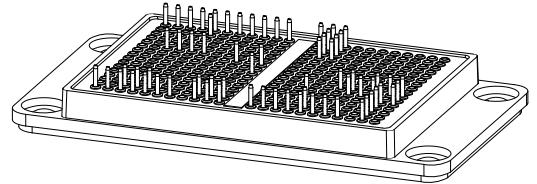
- Neutral Point Clamped Three-Level Inverter Module
- Low Inductive Layout
- Solderable Pins

Benefits

- Higher System Efficiency
- Reduced Cooling Requirements
- Low Conduction Losses Over Temperature

Applications

- Energy storage applications
- Three-level applications
- High-frequency switching application
- Solar applications



HCG600FL120E3F1

1200V / 600A E3 (size similar to Easy 3 with Cu Baseplate)

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

Parameter	Symbol	Value	Unit
IGBT (Q1, Q4)			
Collector-Emitter Voltage	V_{CES}	1200	V
Gate-Emitter Voltage	V_{GE}	± 25	V
Positive Transient Gate-emitter Voltage (Tpulse = 5 s, D < 0.10)		30	
Continuous Collector Current	I_C	600	A
Pulsed Collector Current	I_{CP}	1200	A
IGBT (Q2, Q3)			
Collector-Emitter Voltage	V_{CES}	750	V
Gate-Emitter Voltage	V_{GE}	± 25	V
Positive Transient Gate-emitter Voltage (Tpulse = 5 s, D < 0.10)		30	
Continuous Collector Current	I_C	400	A
Pulsed Collector Current	I_{CP}	800	A
DIODE (D1)			
Peak Repetitive Reverse Voltage	V_{RRM}	1200	V
Continuous Forward Current	I_F	300	A
Repetitive Peak Forward Current	I_{FRM}	600	A
DIODE (D4)			
Peak Repetitive Reverse Voltage	V_{RRM}	1200	V
Continuous Forward Current	I_F	400	A
Repetitive Peak Forward Current	I_{FRM}	800	A
DIODE (D2,D3)			
Peak Repetitive Reverse Voltage	V_{RRM}	750	V
Continuous Forward Current	I_F	100	A
Repetitive Peak Forward Current	I_{FRM}	200	A
DIODE (D5,D6)			
Peak Repetitive Reverse Voltage	V_{RRM}	750	V
Continuous Forward Current	I_F	500	A
Repetitive Peak Forward Current	I_{FRM}	1000	A
INSULATION PROPERTIES			
Isolation Test Voltage, t = 1 s, 50 Hz	Viso	4000	V _{RMS}
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

HCG600FL120E3F1

1200V / 600A E3 (size similar to Easy 3 with Cu Baseplate)

Table 2 Characteristics Values

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
IGBT (Q1, Q4)							
Collector–Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} = 15 V, I _C = 600 A	T _J = 25℃	-	1.80	-	V
		V _{GE} = 15 V, I _C = 600 A	T _J = 150℃	-	2.35	-	
Gate–Emitter Threshold Voltage	V _{GE(TH)}	V _{GE} = V _{CE} , I _C = 9 mA	T _J = 25℃	-	5.50	-	V
Total Gate Charge	Q _g	V _{GE} = -7/+15 V, V _{CE} = 600 V	T _J = 25℃	-	3.49	-	μC
Gate-Source Leakage Current	I _{GES}	V _{GE} = ±25 V, V _{CE} = 0 V	T _J = 25℃	-100	-	100	nA
Collector–Emitter Voltage	V _{(BR)CES}	V _{GE} = 0 V	T _J = 25℃	1200	-	-	V
Collector–Emitter Cutoff Current	I _{CES}	V _{CE} = 1200 V, V _{GE} = 0 V	T _J = 25℃	-	-	100	μA
Input Capacitance	C _{iss}	V _{GE} = 0 V, V _{CE} = 30 V, f = 100 KHz	T _J = 25℃	-	66.4	-	nF
Output Capacitance	C _{oss}		T _J = 25℃	-	1.77	-	
Reverse Transfer Capacitance	C _{rss}		T _J = 25℃	-	0.19	-	
Turn-on Delay Time(inductive load)	t _{d on}	V _{GE} = -7 V / +15 V, V _{DC+} =470 V, V _{DC-} =470 V, I _C = 300 A, R _{Gon} = 2.0 Ω, R _{Goff} = 0.5 Ω	T _J = 25℃	-	50	-	ns
Rise Time (inductive load)	t _r		T _J = 150℃	-	100	-	
			T _J = 25℃	-	40	-	
			T _J = 150℃	-	50	-	
			T _J = 25℃	-	150	-	
Turn-off Delay Time(inductive load)	t _{d off}		T _J = 150℃	-	225	-	
Fall Time (inductive load)	t _f		T _J = 25℃	-	160	-	mJ
Turn-on Switching Loss	E _{on}		T _J = 150℃	-	230	-	
			T _J = 25℃	-	10.92	-	
Turn-off Switching Loss	E _{off}		T _J = 150℃	-	17.10	-	
			T _J = 25℃	-	12.66	-	
Thermal Resistance – Chip-to–Case	R _{thJC}		Per IGBT	T _J = 150℃	-	19.36	-
		T _J = 25℃		-	0.063	-	

HCG600FL120E3F1

1200V / 600A E3 (size similar to Easy 3 with Cu Baseplate)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
DIODE (D5,D6)							
Diode Forward Voltage	V _F	I _F = 500 A	T _J = 25℃	-	1.84	-	V
		I _F = 500 A	T _J = 150℃	-	1.98	-	
Reverse Recovery Time	T _{RR}	V _{GE} = -7 V / +15 V , V _{DC+} =470 V , V _{DC-} =470 V , I _C = 300 A , R _{Gon} = 2.0 Ω , R _{Goff} = 0.5 Ω	T _J = 25℃	-	160	-	ns
			T _J = 150℃	-	245	-	
Reverse Recovery Charge	Q _{RR}		T _J = 25℃	-	15.6	-	μC
			T _J = 150℃	-	38.0	-	
Peak Reverse Recovery Current	I _{RRM}		T _J = 25℃	-	250	-	A
			T _J = 150℃	-	315	-	
Reverse Recovery Energy	E _{REC}		T _J = 25℃	-	5.50	-	mJ
			T _J = 150℃	-	10.98	-	
Thermal Resistance – Chip-to-Case	R _{thJC}	Per diode		-	0.135	-	°C/W
IGBT (Q3)							
Collector-Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} = 15 V , I _C = 400 A	T _J = 25℃	-	1.50	-	V
		V _{GE} = 15 V , I _C = 400 A	T _J = 150℃	-	1.73	-	
Gate-Emitter Threshold Voltage	V _{GE(TH)}	V _{GE} = V _{CE} , I _C = 9 mA	T _J = 25℃	-	4.10	-	V
Total Gate Charge	Q _g	V _{GE} = -7/+15 V , V _{CE} = 600 V	T _J = 25℃	-	0.96	-	μC
Gate-Source Leakage Current	I _{GES}	V _{GE} = ±25 V , V _{CE} = 0 V	T _J = 25℃	-100	-	100	nA
Collector-Emitter Voltage	V _{(BR)CES}	V _{GE} = 0 V I _C = 250uA	T _J = 25℃	750	-	-	V
Collector-Emitter Cutoff Current	I _{CES}	V _{CE} = 750 V , V _{GE} = 0 V	T _J = 25℃	-	-	100	μA
Input Capacitance	C _{iss}	V _{GE} = 0 V , V _{CE} = 30 V , f = 100KHz	T _J = 25℃	-	14	-	nF
Output Capacitance	C _{oss}		T _J = 25℃	-	0.79	-	
Reverse Transfer Capacitance	C _{rss}		T _J = 25℃	-	0.10	-	
Turn-on Delay Time(inductive load)	t _{d on}	V _{GE} = -7 V / +15 V , V _{DC+} =470 V , V _{DC-} =470 V , I _C = 300 A , R _{Gon} = 10 Ω , R _{Goff} = 36 Ω	T _J = 25℃	-	35	-	ns
			T _J = 150℃	-	68	-	
Rise Time (inductive load)	t _r		T _J = 25℃	-	30	-	
			T _J = 150℃	-	46	-	
Turn-off Delay Time(inductive load)	t _{d off}		T _J = 25℃	-	980	-	
			T _J = 150℃	-	1550	-	

HCG600FL120E3F1

1200V / 600A E3 (size similar to Easy 3 with Cu Baseplate)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Fall Time (inductive load)	t_f	$V_{GE} = -7\text{ V} / +15\text{ V}$, $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$, $I_C = 300\text{ A}$, $R_{Gon} = 10\ \Omega$, $R_{Goff} = 36\ \Omega$	$T_J = 25^{\circ}\text{C}$	-	45	-	ns
			$T_J = 150^{\circ}\text{C}$	-	53	-	
Turn-on Switching Loss	E_{on}		$T_J = 25^{\circ}\text{C}$	-	6.50	-	mJ
			$T_J = 150^{\circ}\text{C}$	-	9.20	-	
Turn-off Switching Loss	E_{off}		$T_J = 25^{\circ}\text{C}$	-	12.61	-	
			$T_J = 150^{\circ}\text{C}$	-	15.00	-	
Thermal Resistance – Chip-to-Case	R_{thJC}	Per IGBT		-	0.140	-	$^{\circ}\text{C/W}$

INVERSE DIODE (D1)

Diode Forward Voltage	V_F	$I_F = 300\text{ A}$	$T_j = 25^\circ\text{C}$	-	1.81	-	V
		$I_F = 300\text{ A}$	$T_j = 150^\circ\text{C}$	-	1.94	-	
Reverse Recovery Time	T_{RR}	$V_{GE} = -7\text{ V} / +15\text{ V}$, $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$, $I_C = 300\text{ A}$, $R_{Gon} = 10\ \Omega$, $R_{Goff} = 36\ \Omega$	$T_j = 25^\circ\text{C}$	-	85	-	ns
			$T_j = 150^\circ\text{C}$	-	343	-	
Reverse Recovery Charge	Q_{RR}		$T_j = 25^\circ\text{C}$	-	14.2	-	μC
			$T_j = 150^\circ\text{C}$	-	39.3	-	
Peak Reverse Recovery Current	I_{RRM}		$T_j = 25^\circ\text{C}$	-	289	-	A
			$T_j = 150^\circ\text{C}$	-	376	-	
Reverse Recovery Energy	E_{REC}		$T_j = 25^\circ\text{C}$	-	6.0	-	mJ
			$T_j = 150^\circ\text{C}$	-	17.0	-	
Thermal Resistance – Chip-to-Case	R_{thJC}	Per diode	-	0.119	-	-	$^\circ\text{C/W}$

IGBT (Q2)

Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE} = 15\text{ V}$, $I_C = 400\text{ A}$	$T_j = 25^\circ\text{C}$	-	1.50	-	V
		$V_{GE} = 15\text{ V}$, $I_C = 400\text{ A}$	$T_j = 150^\circ\text{C}$	-	1.73	-	
Gate-Emitter Threshold Voltage	$V_{GE(TH)}$	$V_{GE} = V_{CE}$, $I_C = 9\text{ mA}$	$T_j = 25^\circ\text{C}$	-	4.10	-	V
Total Gate Charge	Q_g	$V_{GE} = -7/+15\text{ V}$, $V_{CE} = 600\text{ V}$	$T_j = 25^\circ\text{C}$	-	0.96	-	μC
Gate-Source Leakage Current	I_{GES}	$V_{GE} = \pm 25\text{ V}$, $V_{CE} = 0\text{ V}$	$T_j = 25^\circ\text{C}$	-100	-	100	nA
Collector-Emitter Voltage	$V_{(BR)CES}$	$V_{GE} = 0\text{ V}$, $I_C = 250\mu\text{A}$	$T_j = 25^\circ\text{C}$	750	-	-	V
Collector-Emitter Cutoff Current	I_{CES}	$V_{CE} = 750\text{ V}$, $V_{GE} = 0\text{ V}$	$T_j = 25^\circ\text{C}$	-	-	100	μA
Input Capacitance	C_{iss}	$V_{GE} = 0\text{ V}$, $V_{CE} = 30\text{ V}$, $f = 100\text{ KHz}$	$T_j = 25^\circ\text{C}$	-	14	-	nF
Output Capacitance	C_{oss}		$T_j = 25^\circ\text{C}$	-	0.79	-	
Reverse Transfer Capacitance	C_{rss}		$T_j = 25^\circ\text{C}$	-	0.10	-	

HCG600FL120E3F1

1200V / 600A E3 (size similar to Easy 3 with Cu Baseplate)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Turn-on Delay Time(inductive load)	$t_{d\ on}$	$V_{GE} = -7\ V / +15\ V$, $V_{DC+} = 470\ V$, $V_{DC-} = 470\ V$, $I_C = 300\ A$, $R_{Gon} = 10\ \Omega$, $R_{Goff} = 36\ \Omega$	$T_J = 25^{\circ}C$	-	100	-	ns
			$T_J = 150^{\circ}C$	-	115	-	
Rise Time (inductive load)	t_r		$T_J = 25^{\circ}C$	-	89	-	
			$T_J = 150^{\circ}C$	-	105	-	
Turn-off Delay Time(inductive load)	$t_{d\ off}$		$T_J = 25^{\circ}C$	-	1050	-	ns
			$T_J = 150^{\circ}C$	-	1480	-	
Fall Time (inductive load)	t_f		$T_J = 25^{\circ}C$	-	45	-	
			$T_J = 150^{\circ}C$	-	98	-	
Turn-on Switching Loss	E_{on}		$T_J = 25^{\circ}C$	-	4.26	-	mJ
			$T_J = 150^{\circ}C$	-	6.55	-	
Turn-off Switching Loss	E_{off}		$T_J = 25^{\circ}C$	-	13.2	-	
			$T_J = 150^{\circ}C$	-	15.1	-	
Thermal Resistance – Chip-to-Case	R_{thJC}	Per IGBT		-	0.140	-	$^{\circ}C/W$

INVERSE DIODE (D4)

Diode Forward Voltage	V _F	I _F = 400 A	T _J = 25°C	-	1.89	-	V
		I _F = 400 A	T _J = 150°C	-	2.00	-	
Reverse Recovery Time	T _{RR}	V _{GE} = -7 V / +15 V, V _{DC+} =470 V, V _{DC-} =470 V, I _C = 300 A, R _{Gon} = 10 Ω, R _{Goff} = 36 Ω	T _J = 25°C	-	90	-	ns
			T _J = 150°C	-	300	-	
Reverse Recovery Charge	Q _{RR}		T _J = 25°C	-	15.4	-	μC
			T _J = 150°C	-	45.2	-	
Peak Reverse Recovery Current	I _{RRM}		T _J = 25°C	-	280	-	A
			T _J = 150°C	-	360	-	
Reverse Recovery Energy	E _{REC}		T _J = 25°C	-	8.07	-	mJ
			T _J = 150°C	-	22.0	-	
Thermal Resistance – Chip-to-Case	R _{thJC}	Per diode		-	0.102	-	°C/W

INVERSE DIODE (D2,D3)

Diode Forward Voltage	V_F	$I_F = 100\ A$	$T_j = 25^{\circ}C$	-	1.62	-	V
		$I_F = 100\ A$	$T_j = 150^{\circ}C$	-	1.68	-	

HCG600FL120E3F1

1200V / 600A E3 (size similar to Easy 3 with Cu Baseplate)

Table 3 NTC-Thermistor

Parameter	Symbol	Min	Typ.	Max	Unit	Conditions
Rated resistance	R_{25}	-	5	-	k Ω	$T_C = 25^{\circ}\text{C}$
Deviation of R100	$\Delta R/R$	-5	-	5	%	$T_C = 100^{\circ}\text{C}$, $R_{100} = 493 \Omega$
B-value	$B_{25/50}$	-	3375	-	K	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15K))]$

Table 4 Module Characteristics

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Mounting Torque Screw:M5	M		3.0	-	5.0	N.m
Creepage Distance		terminal to heatsink		16.2		
Clearance		terminal to heatsink		15.2		
CTI				≥ 600		
Flatness of base plate					0.3	mm

HCG600FL120E3F1

1200V / 600A E3 (size similar to Easy 3 with Cu Baseplate)

Typical Characteristics

Fig.1 Typical output characteristics IGBT
 $V_{GE} = 15\text{ V}$ (Q1, Q4)

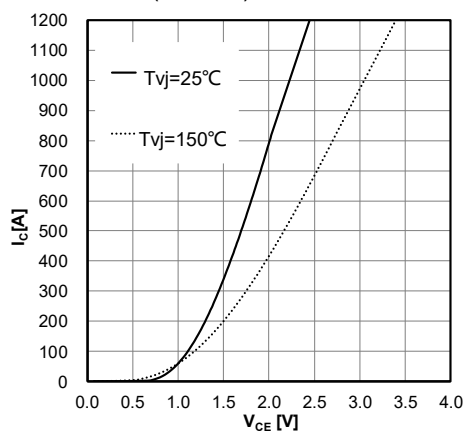


Fig.2 Typical output characteristics IGBT
 $T_{vj} = 150^{\circ}\text{C}$ (Q1, Q4)

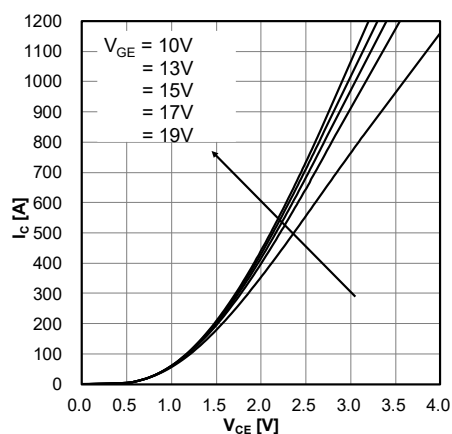


Fig.3 Typical output characteristics IGBT
 $V_{GE} = 15\text{ V}$ (Q2, Q3)

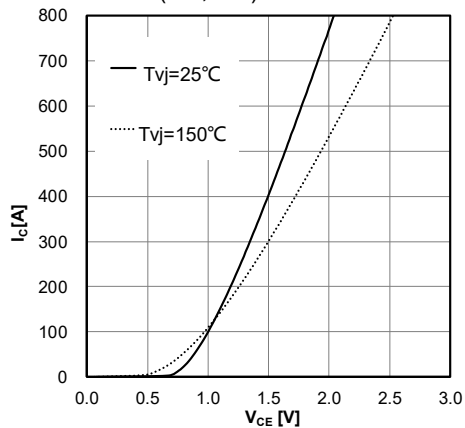


Fig.4 Typical output characteristics IGBT
 $T_{vj} = 150^{\circ}\text{C}$ (Q2, Q3)

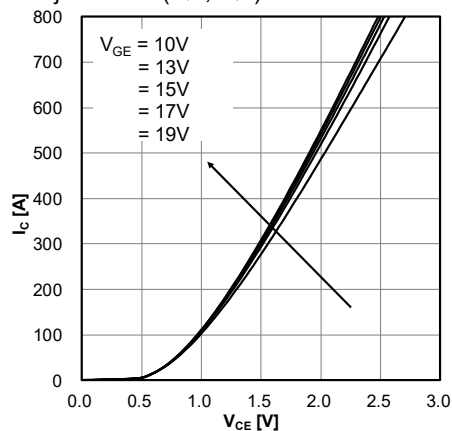


Fig.5 Typical Output Characteristic, IGBT
 $I_c = f(V_{GE})$
 $V_{CE} = 20\text{ V}$ (Q1, Q4)

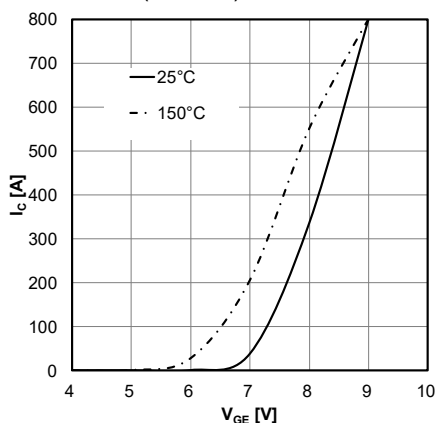
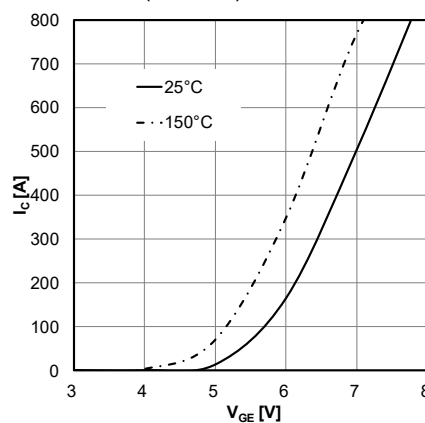


Fig.6 Typical Output Characteristic, IGBT
 $I_c = f(V_{GE})$
 $V_{CE} = 20\text{ V}$ (Q2, Q3)



HCG600FL120E3F1

1200V / 600A E3 (size similar to Easy 3 with Cu Baseplate)

Typical Characteristics

Fig.7 Diode forward characteristics (D1)

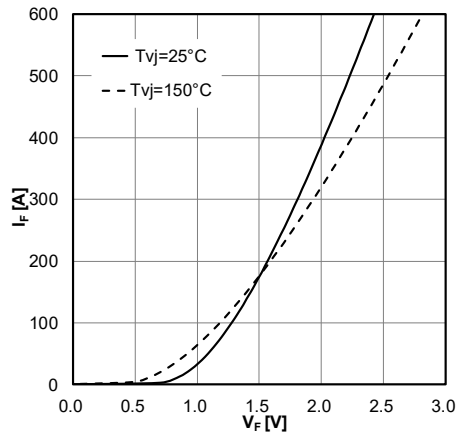


Fig.8 Diode forward characteristics (D2, D3)

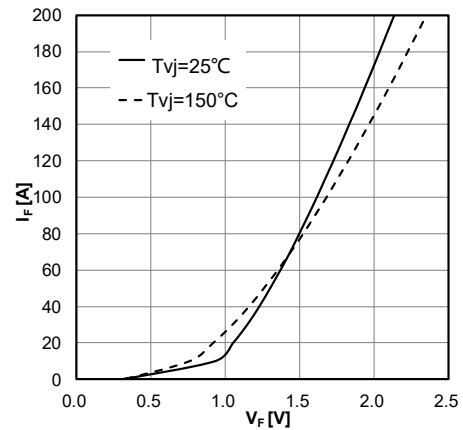


Fig.9 Diode forward characteristics (D4)

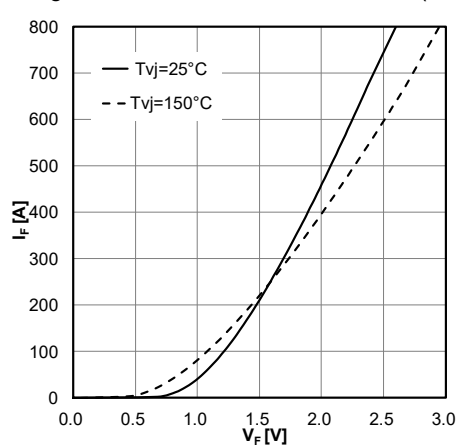


Fig.10 Diode forward characteristics (D5, D6)

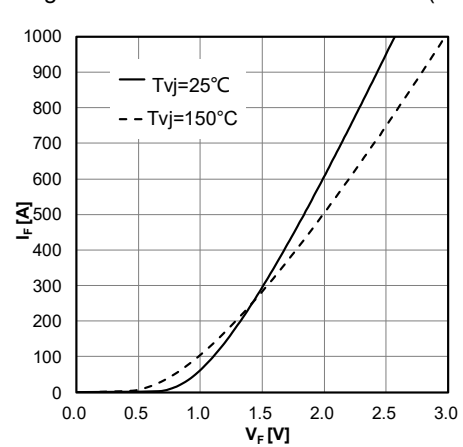


Fig.11 Capacity characteristic
 $C = f(V_{CE})$, $V_{GE} = 0\text{ V}$, $T_{vj} = 25^{\circ}\text{C}$, $f = 100\text{ KHz}$
 (Q1, Q4)

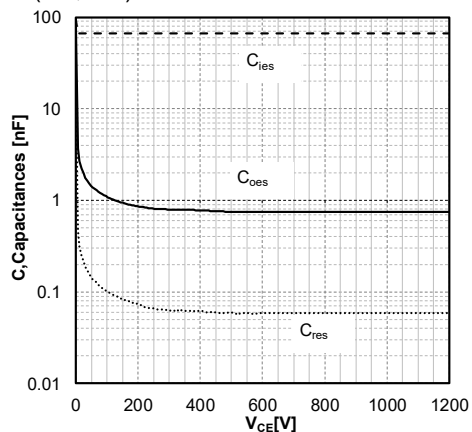
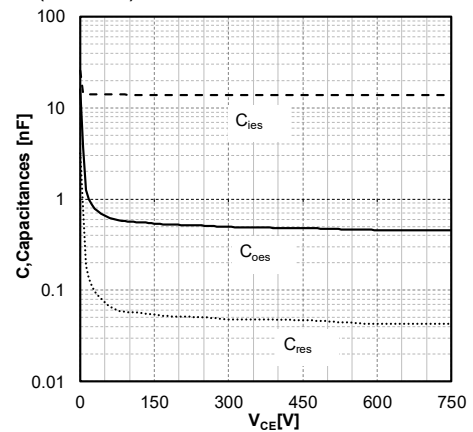


Fig.12 Capacity characteristic
 $C = f(V_{CE})$, $V_{GE} = 0\text{ V}$, $T_{vj} = 25^{\circ}\text{C}$, $f = 100\text{ KHz}$
 (Q2, Q3)



HCG600FL120E3F1

1200V / 600A E3 (size similar to Easy 3 with Cu Baseplate)

Typical Characteristics

Q1 || D5 or Q4 || D6

Fig.13 Switching losses IGBT, (typical)

$E_{on} = f(I_c)$, $E_{off} = f(I_c)$,
 $V_{GE} = +15\text{ V} / -7\text{ V}$, $R_{Gon} = 2.0\ \Omega$, $R_{Goff} = 0.5\ \Omega$,
 $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$

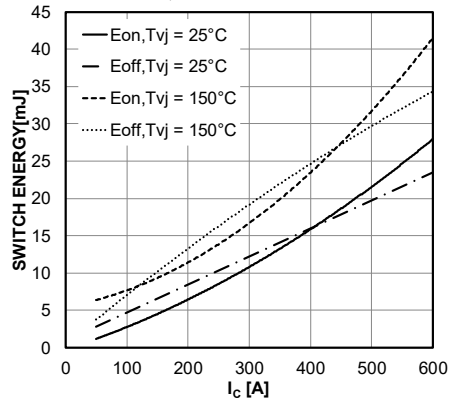


Fig.14 Switching losses Diode, (typical)

$E_{REC} = f(I_F)$,
 $V_{GE} = +15\text{ V} / -7\text{ V}$, $R_{Gon} = 2.0\ \Omega$, $R_{Goff} = 0.5\ \Omega$,
 $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$

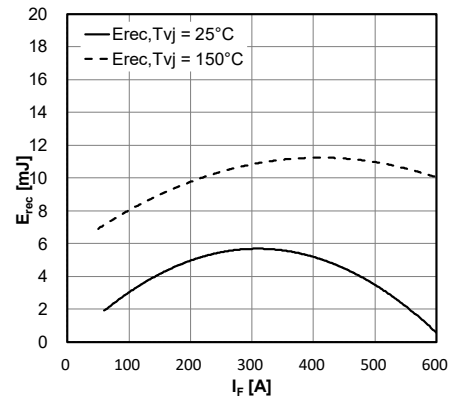


Fig.15 Switching losses IGBT, (typical)

$E_{on} = f(R_G)$, $E_{off} = f(R_G)$,
 $V_{GE} = +15\text{ V} / -7\text{ V}$, $I_c = 300\text{ A}$,
 $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$

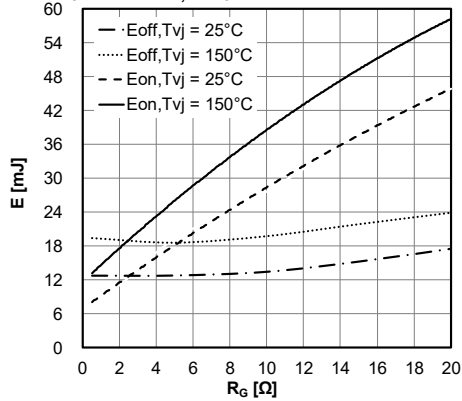
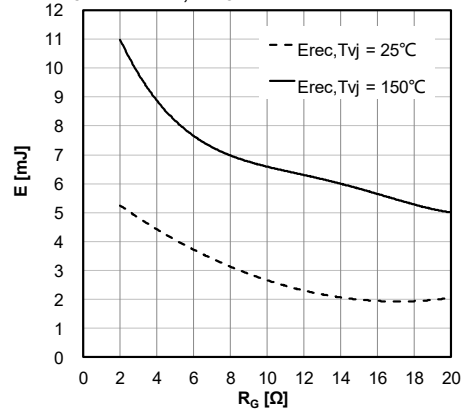


Fig.16 Switching losses Diode, (typical)

$E_{REC} = f(R_G)$,
 $V_{GE} = +15\text{ V} / -7\text{ V}$, $I_F = 300\text{ A}$,
 $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$



Q3 || D1

Fig.17 Switching losses IGBT, (typical)

$E_{on} = f(I_c)$,
 $V_{GE} = +15\text{ V} / -7\text{ V}$, $R_{Gon} = 10\ \Omega$, $R_{Goff} = 36\ \Omega$,
 $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$

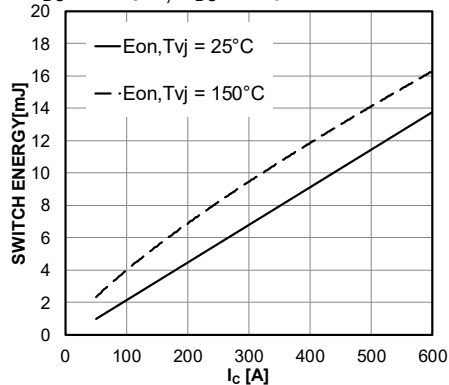
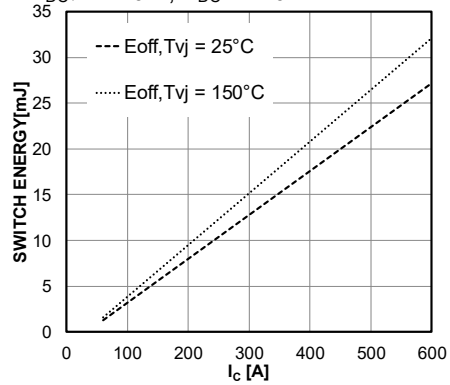


Fig.18 Switching losses IGBT, (typical)

$E_{off} = f(I_c)$,
 $V_{GE} = +15\text{ V} / -7\text{ V}$, $R_{Gon} = 10\ \Omega$, $R_{Goff} = 36\ \Omega$,
 $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$



HCG600FL120E3F1

1200V / 600A E3 (size similar to Easy 3 with Cu Baseplate)

Typical Characteristics

Fig.19 Switching losses Diode, (typical)

$E_{REC} = f(I_F)$,
 $V_{GE} = +15\text{ V} / -7\text{ V}$, $R_{Gon} = 10\ \Omega$, $R_{Goff} = 36\ \Omega$,
 $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$

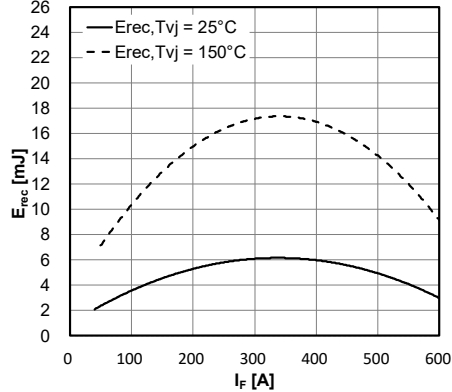


Fig.20 Switching losses IGBT, (typical)

$E_{on} = f(R_G)$,
 $V_{GE} = +15\text{ V} / -7\text{ V}$, $I_C = 300\text{ A}$,
 $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$

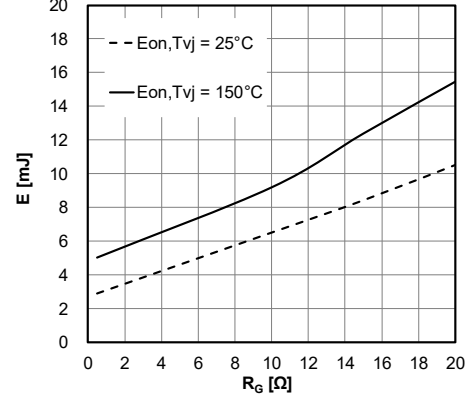


Fig.21 Switching losses IGBT, (typical)

$E_{off} = f(R_G)$,
 $V_{GE} = +15\text{ V} / -7\text{ V}$, $I_C = 300\text{ A}$,
 $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$

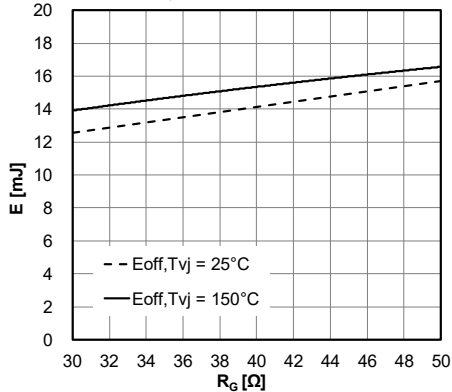
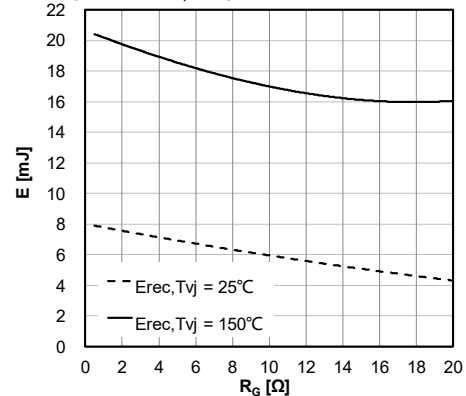


Fig.22 Switching losses Diode, (typical)

$E_{REC} = f(R_G)$,
 $V_{GE} = +15\text{ V} / -7\text{ V}$, $I_F = 300\text{ A}$,
 $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$



Q2 || D4

Fig.23 Switching losses IGBT, (typical)

$E_{on} = f(I_C)$,
 $V_{GE} = +15\text{ V} / -7\text{ V}$, $R_{Gon} = 10\ \Omega$, $R_{Goff} = 36\ \Omega$,
 $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$

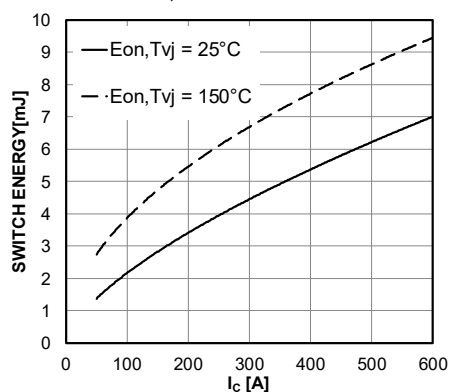
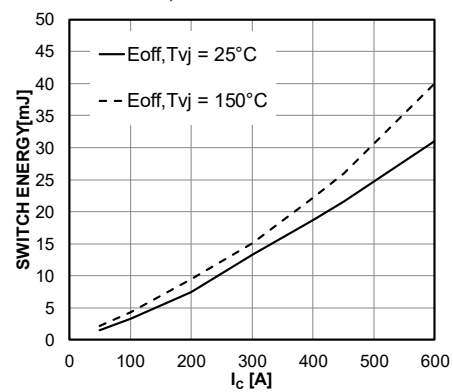


Fig.24 Switching losses IGBT, (typical)

$E_{off} = f(I_C)$,
 $V_{GE} = +15\text{ V} / -7\text{ V}$, $R_{Gon} = 10\ \Omega$, $R_{Goff} = 36\ \Omega$,
 $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$



HCG600FL120E3F1

1200V / 600A E3 (size similar to Easy 3 with Cu Baseplate)

Typical Characteristics

Fig.25 Switching losses Diode, (typical)

$E_{REC} = f(I_F)$,
 $V_{GE} = +15\text{ V} / -7\text{ V}$, $R_{Gon} = 10\ \Omega$, $R_{Goff} = 36\ \Omega$,
 $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$

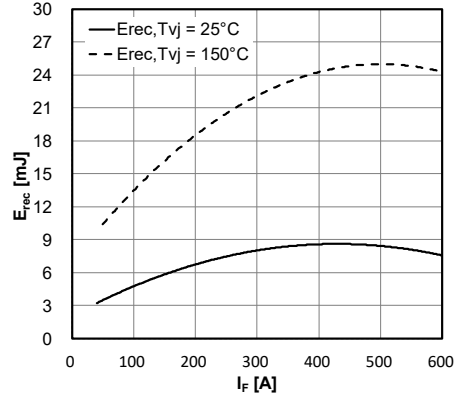


Fig.26 Switching losses IGBT, (typical)

$E_{off} = f(R_G)$,
 $V_{GE} = +15\text{ V} / -7\text{ V}$, $I_C = 300\text{ A}$,
 $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$

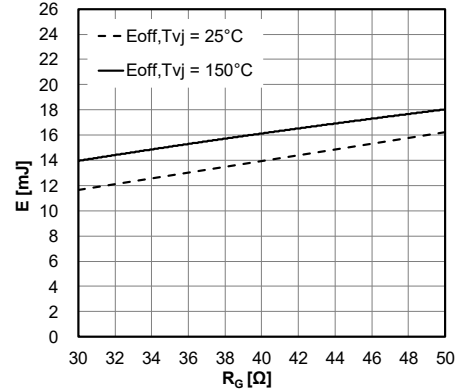


Fig.27 Switching losses IGBT, (typical)

$E_{on} = f(R_G)$,
 $V_{GE} = +15\text{ V} / -7\text{ V}$, $I_C = 300\text{ A}$,
 $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$

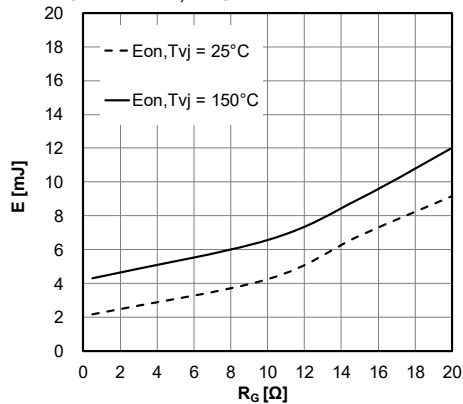


Fig.28 Switching losses Diode, (typical)

$E_{REC} = f(R_G)$,
 $V_{GE} = +15\text{ V} / -7\text{ V}$, $I_F = 300\text{ A}$,
 $V_{DC+} = 470\text{ V}$, $V_{DC-} = 470\text{ V}$

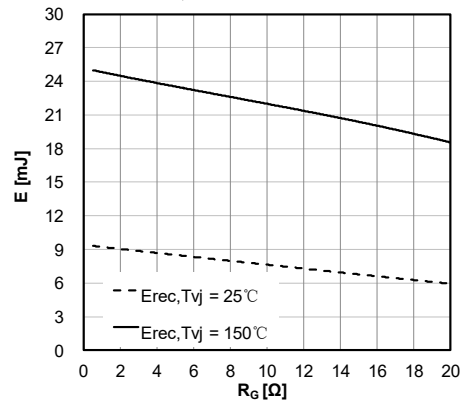


Fig.29 Transient thermal impedance IGBT,
 $Z_{thJC} = f(t)$ (Q1, Q4)

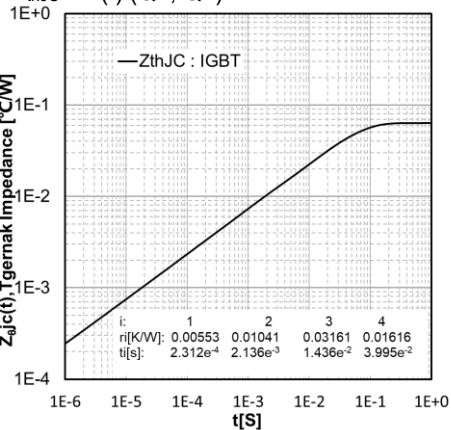
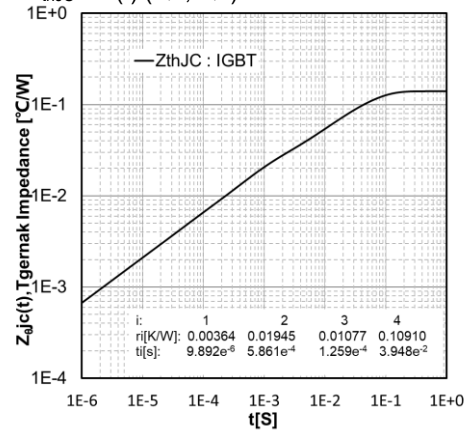


Fig.30 Transient thermal impedance IGBT,
 $Z_{thJC} = f(t)$ (Q2, Q3)



HCG600FL120E3F1

1200V / 600A E3 (size similar to Easy 3 with Cu Baseplate)

Typical Characteristics

Fig.31 Transient thermal impedance Diode,
 $Z_{thJC} = f(t)$ (D1)

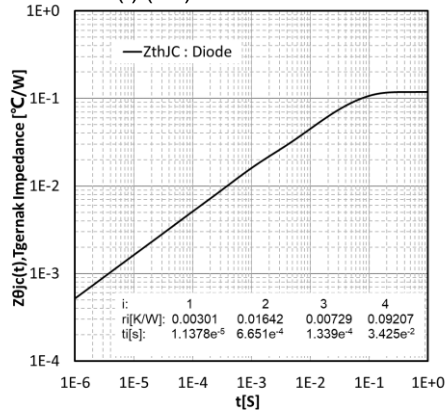


Fig.32 Transient thermal impedance Diode,
 $Z_{thJC} = f(t)$ (D4)

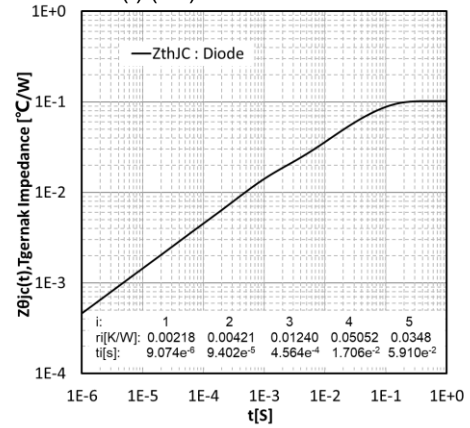


Fig.33 Transient thermal impedance Diode,
 $Z_{thJC} = f(t)$ (D5, D6)

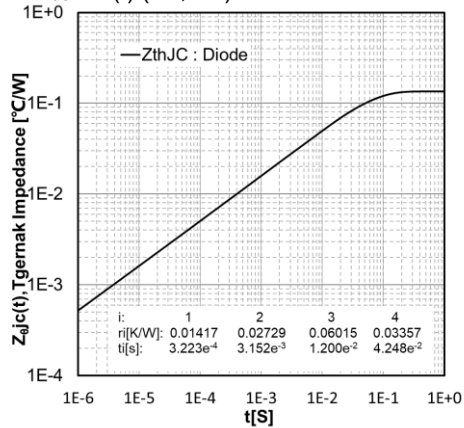
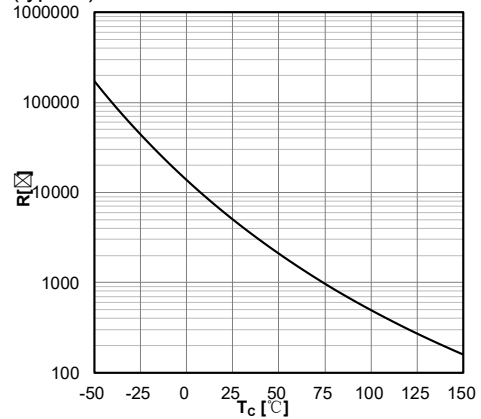


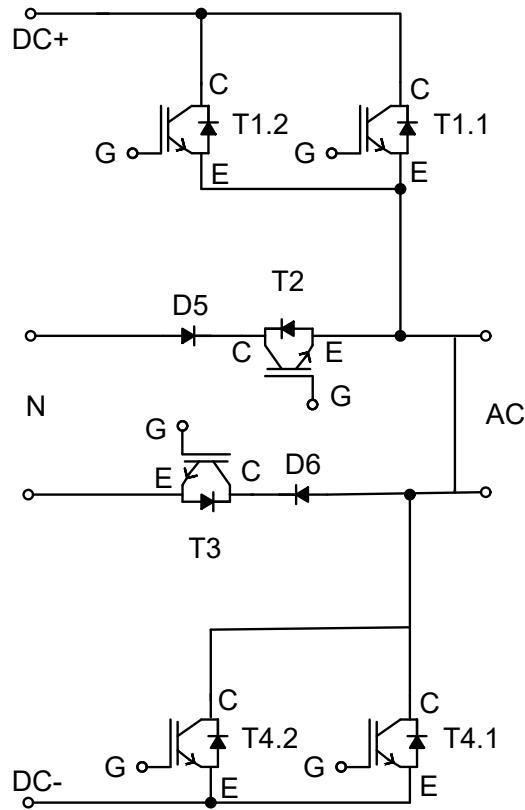
Fig.34 NTC-Thermistor-temperature characteristic
(typical)



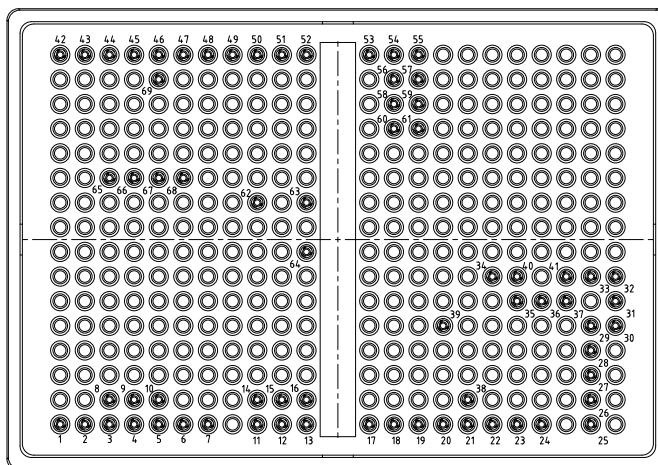
HCG600FL120E3F1

1200V / 600A E3 (size similar to Easy 3 with Cu Baseplate)

Circuit Diagram



Pin Connections



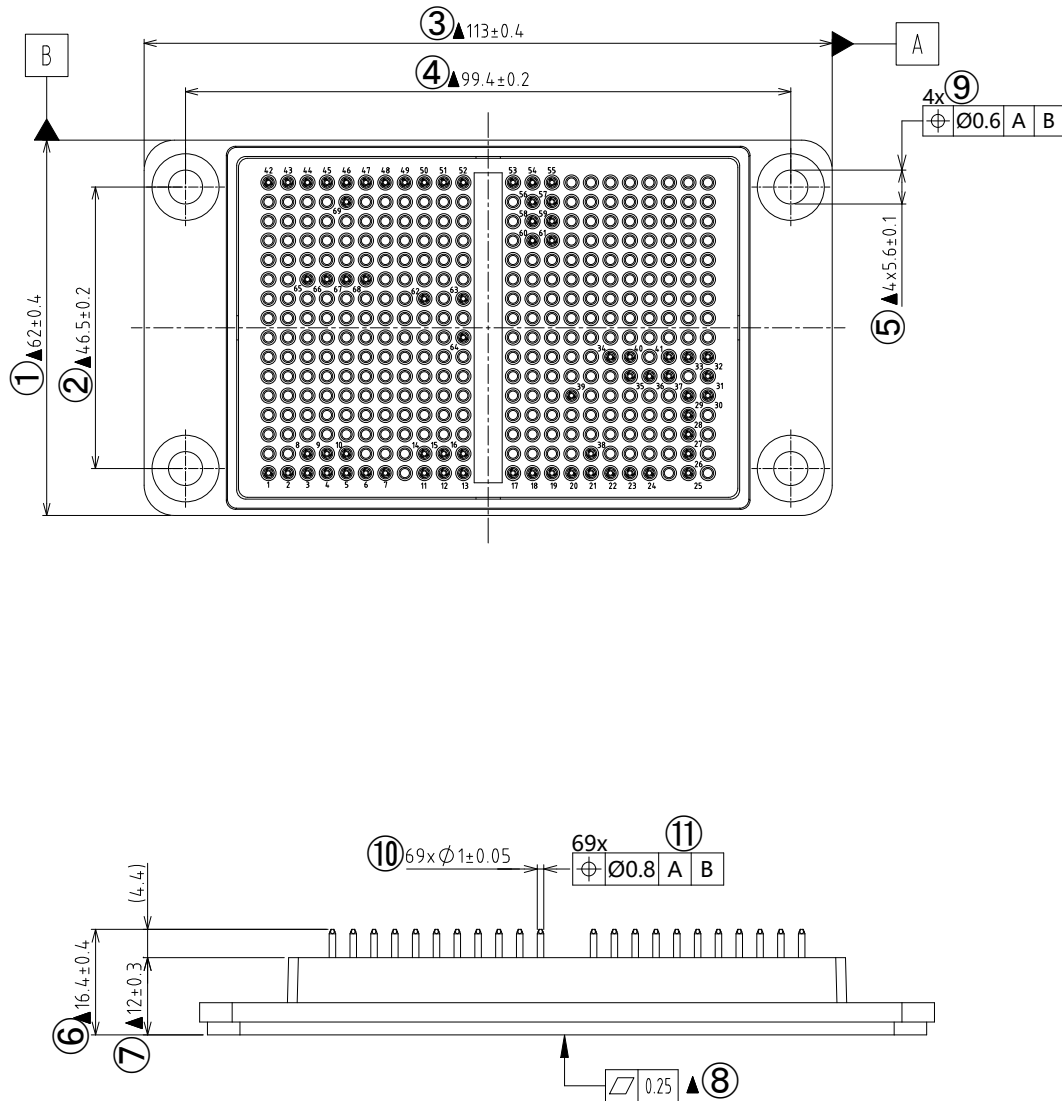
PIN 脚定义:

1~10	DC+
11~24	N
25~37	DC-
38	G3
39	C3
40	G4.2
41	G4.1
42~61	AC
62	C2
63	T1
64	T2
65	E1.2
66	G1.2
67	G1.1
68	E1.1
69	G2

HCG600FL120E3F1

1200V / 600A E3 (size similar to Easy 3 with Cu Baseplate)

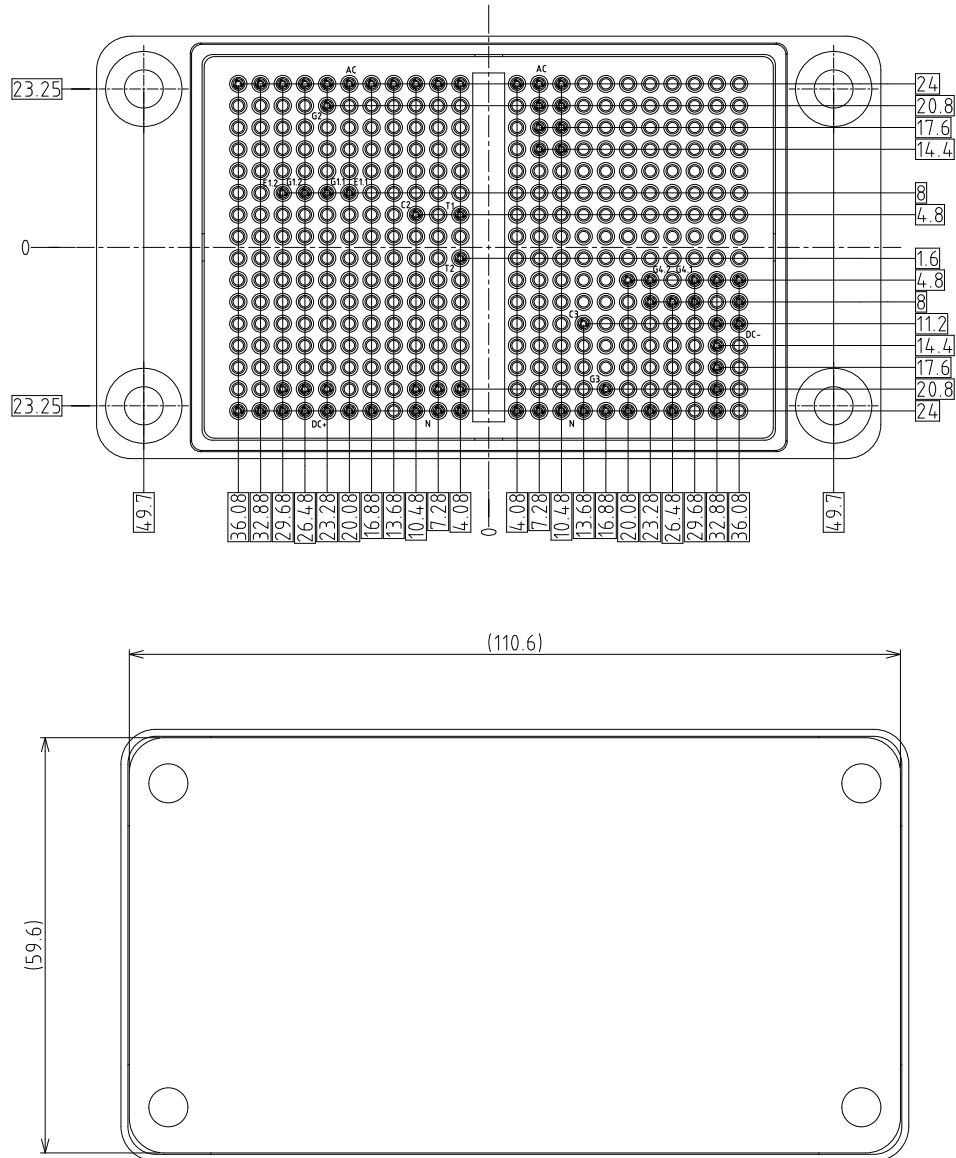
Package Outlines



HCG600FL120E3F1

1200V / 600A E3 (size similar to Easy 3 with Cu Baseplate)

Package Outlines



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



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.