

#### ➤ 产品外观 / Appearance

*Preliminary*



$V_{CES} = 1200V$

$I_{C\ nom} = 450A / I_{CRM} = 900A$

#### ➤ 特性 / Features

- |            |                                    |
|------------|------------------------------------|
| A. 端子超声波焊接 | A. Ultrasonic Welding of Terminal  |
| B. 铜线键合工艺  | B. Copper Wire Bonding             |
| C. 高强度陶瓷基板 | C. High Strength Ceramic Substrate |
| D. 高可靠性模块  | D. High Reliability Module         |

#### ➤ 用途 / Applications

- |           |                           |
|-----------|---------------------------|
| A. 电动汽车应用 | A. Automotive Application |
| B. 电机传动   | B. Motor Drives           |
| C. 风力发电机  | C. Wind Turbines          |

#### ➤ 相关信息 / Related Information

条形码 / Barcode Code



二维码 / DMX – Code



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# CBE450M120A1P

## IGBT, 制动-斩波器 / IGBT, Brake-Chopper



### 最大额定值 / Maximum Rated Values

集电极-发射极电压 Collector-emitter voltage	$T_j = 25^\circ\text{C}$	$V_{CES}$	1200	V
连续集电极直流电流 Continuous DC collector current	$T_C = 100^\circ\text{C}, T_{j\text{max}} = 175^\circ\text{C}$	$I_{C\text{nom}}$	450	A
集电极重复峰值电流 Repetitive peak collector current	$t_p = 1\text{ ms}$	$I_{CRM}$	900	A
栅极-发射极峰值电压 Gate-emitter peak voltage		$V_{GES}$	+/-20	V

### 特征值 / Characteristic Values

			Min.	Typ.	Max.	
集电极-发射极饱和电压 Collector-emitter saturation voltage	$I_C = 450\text{ A}, V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$	$V_{CE\text{sat}}$	1.7 1.9 1.9	2.1	V
栅极阈值电压 Gate threshold voltage	$I_C = 5.7\text{ mA}, V_{CE} = V_{GE}, T_j = 25^\circ\text{C}$		$V_{GEth}$	5.0	5.5	6.8
栅极电荷/Gate charge	$V_{GE} = -15\text{ V} \dots +15\text{ V}$		$Q_G$	2.5		$\mu\text{C}$
内部栅极电阻 Internal gate resistor	$T_j = 25^\circ\text{C}$		$R_{Gint}$	1.7		$\Omega$
输入电容/Input capacitance	$f = 1\text{ MHz}, T_j = 25^\circ\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{ies}$	37.8		nF
反向传输电容 Reverse transfer capacitance			$C_{res}$	1.35		nF
集电极-发射极截止电流 Collector-emitter cut-off current	$V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}, T_j = 25^\circ\text{C}$		$I_{CES}$		3.0	mA
栅极-发射极漏电流 Gate-emitter leakage current	$V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_j = 25^\circ\text{C}$		$I_{GES}$		400	nA
开通延迟时间/Turn-on delay time	$I_C = 450\text{ A}, V_{CE} = 600\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_G = 1.0\ \Omega$ Inductive Load	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$	$t_{d\text{on}}$	182 205 207		ns
上升时间/Rise time		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$	$t_r$	121 127 128		ns
关断延迟时间/Turn-off delay time		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$	$t_{d\text{off}}$	453 514 529		ns
下降时间/Fall time		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$	$t_f$	150 182 193		ns
开通损耗能量/Turn-on energy loss	Turn-off( $T_j = 150^\circ\text{C}$ ): $dv/dt = 4100\text{ V}/\mu\text{s}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$	$E_{on}$	12.8 17.5 19.1		mJ
关断损耗能量/Turn-off energy loss		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$	$E_{off}$	42.4 54.6 56.2		mJ
短路数据/SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 800\text{ V}$ $t_p \leq 10\mu\text{s}, T_j = 150^\circ\text{C}$		$I_{SC}$	1800		A
结 - 外壳热阻 Thermal resistance, junction to case	每个 IGBT / per IGBT		$R_{thJC}$		0.06	K/W
在开关状态下温度 Temperature under switching			$T_{j\text{op}}$	-40	150	$^\circ\text{C}$

# CBE450M120A1P

二极管, 斩波器 / Diode, Chopper  
 负温度系数热敏电阻 / NTC-Thermistor



## 二极管, 斩波器 / Diode, Chopper

### 最大额定值 / Maximum Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	$T_j = 25^\circ\text{C}$	$V_{RRM}$	1200	V
连续正向直流电流 Continuous DC forward current		$I_F$	450	A
正向重复峰值电流 Repetitive peak forward current	$t_p = 1\text{ ms}$	$I_{FRM}$	900	A

### 特征值 / Characteristic Values

			Min.	Typ.	Max.	
正向电压/Forward voltage	$I_F = 450\text{ A}, V_{GE} = 0\text{ V}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$	$V_F$	1.9 1.9 1.9	2.1	V
反向恢复峰值电流 Peak reverse recovery current		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$	$I_{RM}$	267 307 324		A
恢复电荷/Recovered charge	$I_F = 450\text{ A}, V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$ $-di_F/dt = 3000\text{ A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$	$Q_r$	31.8 50.6 59.7		$\mu\text{C}$
反向恢复损耗 Reverse recovery energy		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$	$E_{rec}$	15.4 24.2 28.5		mJ
结 - 外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode		$R_{thJC}$		0.11	k/W
在开关状态下温度 Temperature under switching			$T_{jop}$	-40	150	$^\circ\text{C}$

## 负温度系数热敏电阻 / NTC-Thermistor

### 特征值 / Characteristic Values

			Min.	Typ.	Max.	
额定阻值/Rated resistance	$T_C = 25^\circ\text{C}$	$R_{25}$		5.00		k $\Omega$
阻值误差/Deviation of R100	$T_C = 100^\circ\text{C}, R_{100} = 465\ \Omega$	$\Delta R/R$	-5		5	%
功率损耗/Power dissipation	$T_C = 25^\circ\text{C}$	$P_{25}$			10.0	mW
B 值/B - value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15\text{K}))]$	$B_{25/50}$		3380		K
B 值/B - value	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298.15\text{K}))]$	$B_{25/80}$		3468		K
B 值/B - value	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298.15\text{K}))]$	$B_{25/100}$		3523		K

# CBE450M120A1P

## 反向二极管 / Diode, Reverse



### 最大额定值 / Maximum Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	$T_j = 25^\circ\text{C}$	$V_{RRM}$	1200	V
连续正向直流电流 Continuous DC forward current		$I_F$	225	A
正向重复峰值电流 Repetitive peak forward current	$t_p = 1\text{ ms}$	$I_{FRM}$	450	A

### 特征值 / Characteristic Values

			Min.	Typ.	Max.	
正向电压/Forward voltage	$I_F = 450\text{ A}, V_{GE} = 0\text{ V}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$	$V_F$	2.0 2.0 2.0	2.4	V
反向恢复峰值电流 Peak reverse recovery current		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$	$I_{RM}$	143 184 187		A
恢复电荷/Recovered charge	$I_F = 225\text{ A}, V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$ $-di_F/dt = 3000\text{ A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$	$Q_r$	12.8 29.8 33.0		$\mu\text{C}$
反向恢复损耗 Reverse recovery energy		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$	$E_{rec}$	5.0 13.3 14.4		mJ
结 - 外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode		$R_{thJC}$		0.16	K/W
在开关状态下温度 Temperature under switching			$T_{jop}$	-40	150	$^\circ\text{C}$

# CBE450M120A1P

## 模块 / Module



绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V <sub>ISOL</sub>	2.5	kV
模块基板材料 Material of module baseplate			Cu	
内部绝缘/Internal isolation	基本绝缘 (class 1, IEC61140) Basic insulation (class 1, IEC61140)		Al <sub>2</sub> O <sub>3</sub>	
爬电距离/Creepage distance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal		14.5 13.0	mm
电气间隙/Clearance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal		12.5 10.0	mm
相对电痕指数 Comperative tracking index		CTI	> 200	

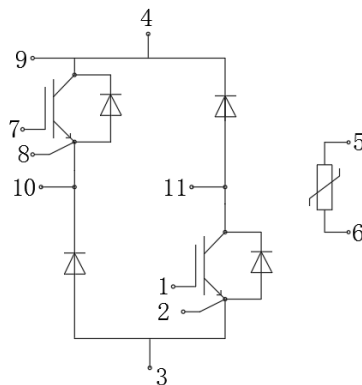
			Min.	Typ.	Max.	
杂散电感, 模块 Stray inductance module		L <sub>sCE</sub>		20		nH
模块引线电阻 Module lead resistance	T <sub>c</sub> = 25°C, 每个开关 / per switch	R <sub>CC'+EE</sub>		1.02		mΩ
储存温度/Storage temperature		T <sub>stg</sub>	-40		125	°C
模块安装的安装扭距 / Mounting torque for module mounting	螺丝 M5 / Screw M5	M	3.00		6.00	Nm
端子联接扭距 Terminal connection torque	螺丝 M6 / Screw M6	M	3.0		6.0	Nm
重量/Weight		G		345		g

# CBE450M120A1P

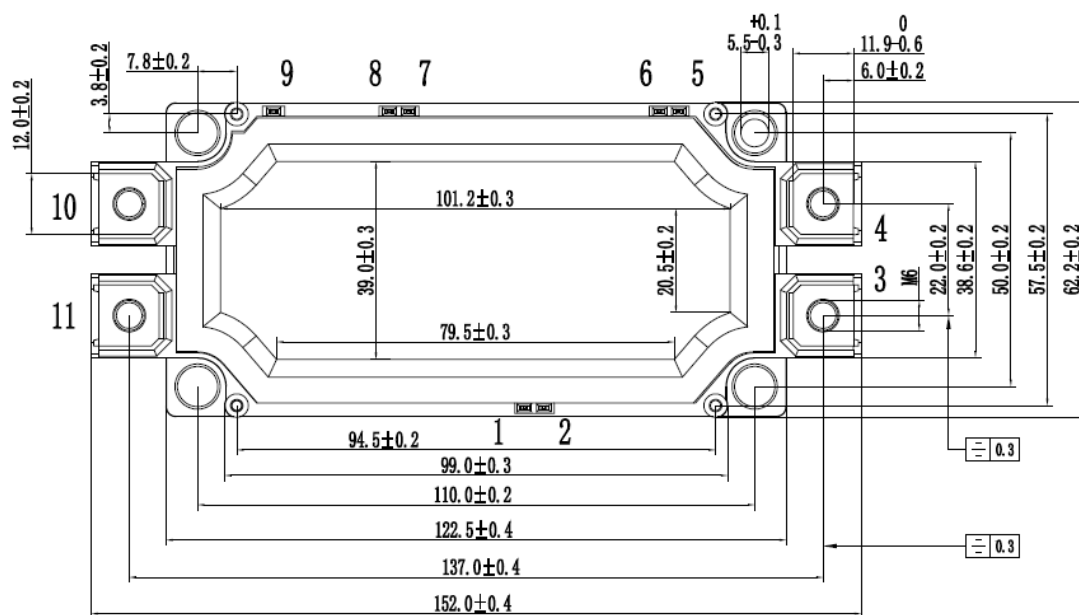
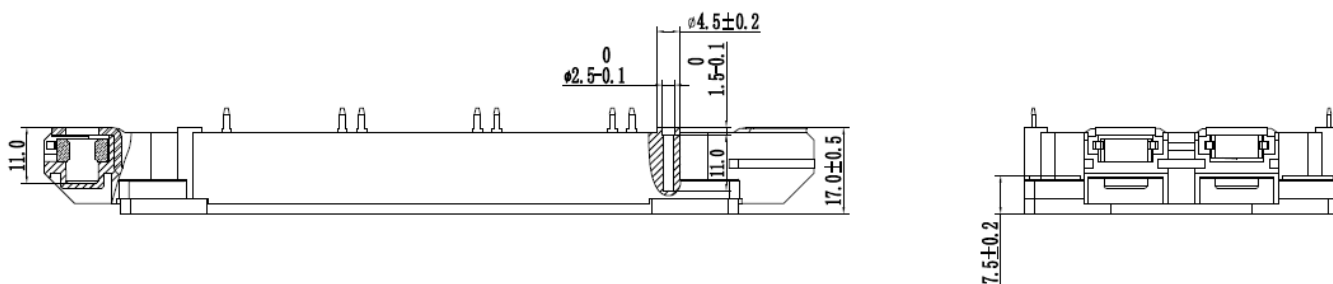


## 封装 / Package

## 接线图 / Circuit Diagram



## 封装尺寸 / Package outlines

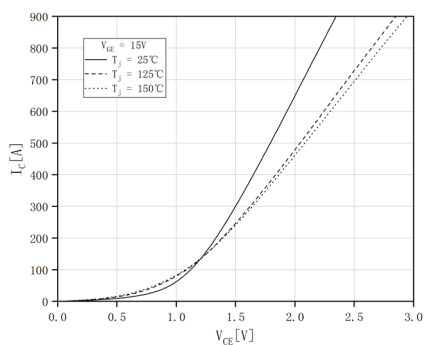


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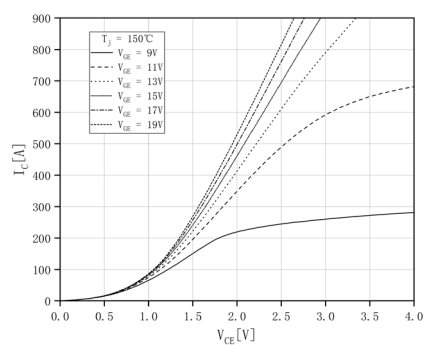
## 性能 / Performance



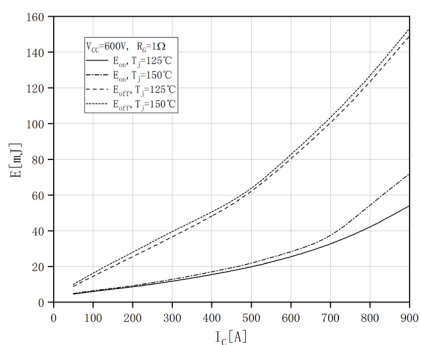
输出特性 IGBT, 制动-斩波器 (典型)  
output characteristic IGBT, Chopper (typical)



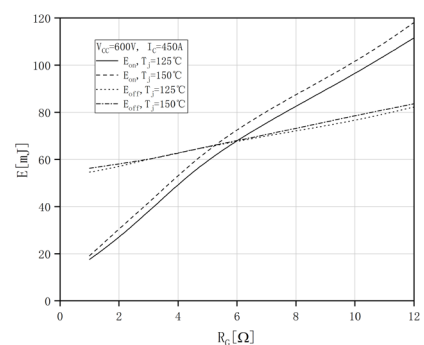
输出特性 IGBT, 制动-斩波器 (典型)  
output characteristic IGBT, Chopper (typical)



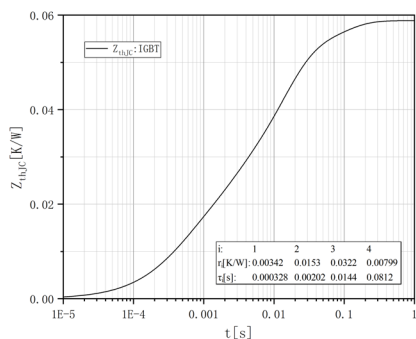
开关损耗 IGBT, 制动-斩波器 (典型)  
switching losses IGBT, Chopper (typical)



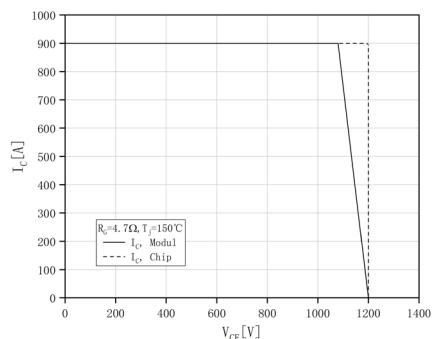
开关损耗 IGBT, 制动-斩波器 (典型)  
switching losses IGBT, Chopper (typical)



瞬态热阻抗 IGBT, 制动-斩波器  
transient thermal impedance IGBT, Chopper



反偏安全工作区 IGBT, 制动-斩波器 (RBSOA)  
Reverse bias safe operating area IGBT, Chopper (RBSOA)

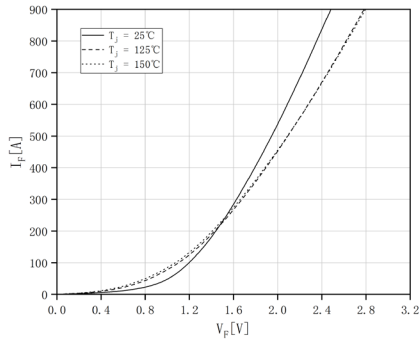


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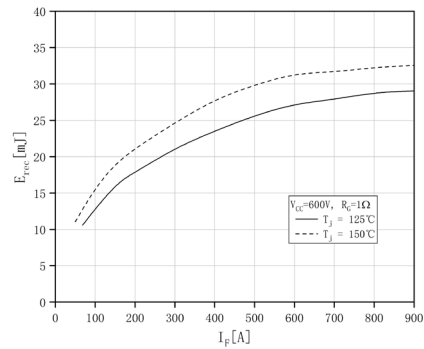
## 性能 / Performance



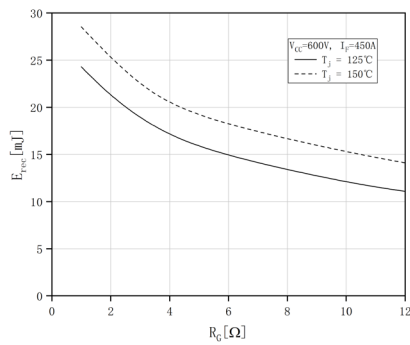
正向偏压特性 二极管,制动-斩波器 (典型)  
forward characteristic of Diode, Chopper(typical)



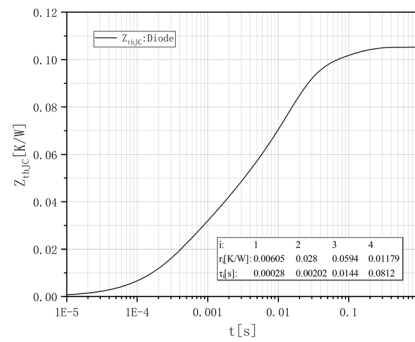
开关损耗 二极管, 制动-斩波器 (典型)  
switching losses Diode, Chopper(typical)



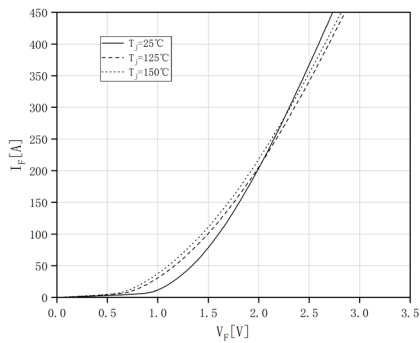
开关损耗 二极管, 制动-斩波器 (典型)  
switching losses Diode, Chopper(typical)



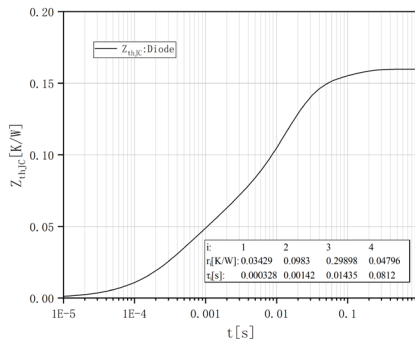
瞬态热阻抗 二极管, 制动-斩波器  
transient thermal impedance Diode, Chopper



正向偏压特性 反向二极管 (典型)  
forward characteristic of Diode, Reverse(typical)



瞬态热阻抗 反向二极管  
transient thermal impedance Diode, Reverse





# CBE450M120A1P

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