

➤ 产品外观 / Appearance



$V_{CES} = 1200V$

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

➤ 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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2E450M120A1P

IGBT, 逆变器 / IGBT, Inverter



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	$I_C = 5.7\text{ mA}, V_{CE} = V_{GE}, T_j = 25^\circ\text{C}$	$V_{G\text{eth}}$	5.0	5.5	6.8	V	
栅极电荷/Gate charge	$V_{GE} = -15\text{ V} \dots +15\text{ V}$	Q_G		2.5	μC		
内部栅极电阻 Internal gate resistor	$T_j = 25^\circ\text{C}$	$R_{G\text{int}}$		1.7	Ω		
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		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$	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	$^\circ\text{C}$	

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二极管, 逆变器 / Diode, Inverter

负温度系数热敏电阻 / NTC-Thermistor



二极管, 逆变器 / Diode, Inverter

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		μC
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			$T_{j\text{op}}$	-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 Ω
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

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模块 / Module



绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}	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)		ZTA	
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	

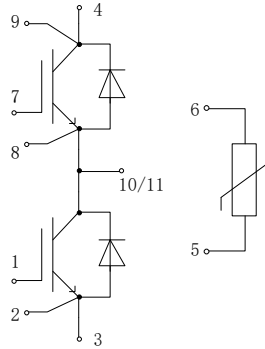
			Min.	Typ.	Max.	
杂散电感, 模块 Stray inductance module		L_{SCE}		20		nH
模块引线电阻 Module lead resistance	$T_c = 25^\circ\text{C}$, 每个开关 / per switch	$R_{CC'+EE}$		1.02		m Ω
储存温度/Storage temperature		T_{stg}	-40		125	$^\circ\text{C}$
模块安装的安装扭距 / Mounting torque for module mounting	螺丝 M5 / Screw M5	M	3.00		6.00	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

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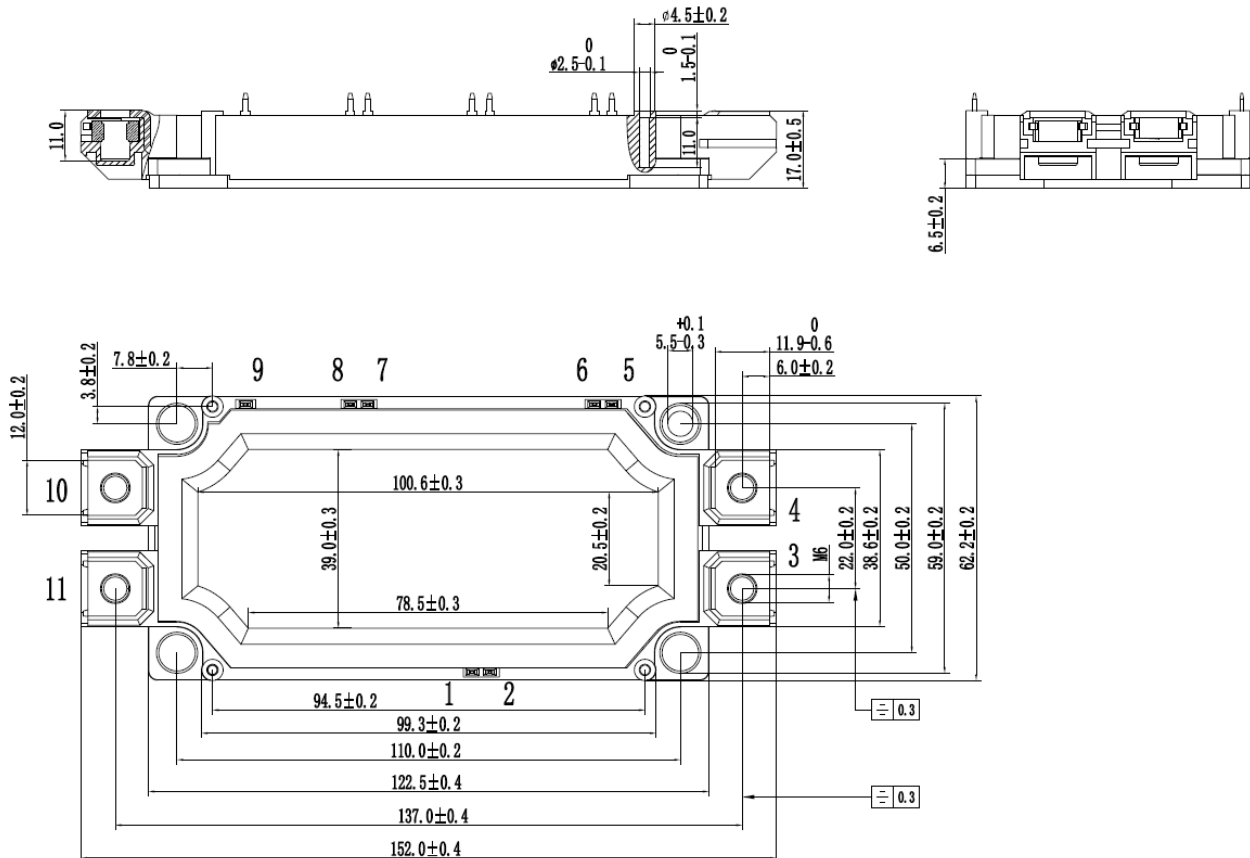
封装 / Package



接线图 / Circuit Diagram



封装尺寸 / Package outlines

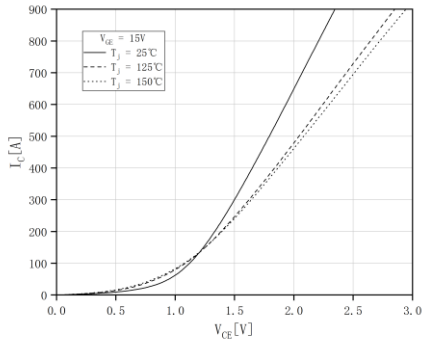


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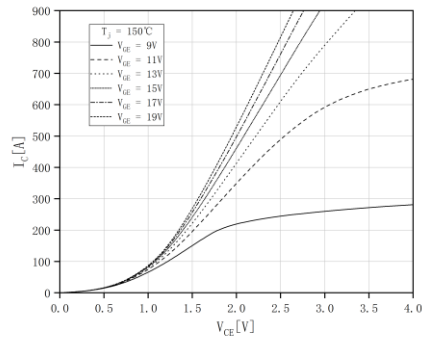
性能 / Performance



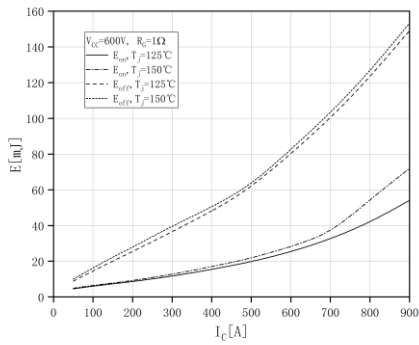
输出特性 IGBT, 逆变器 (典型)
output characteristic IGBT, Inverter (typical)



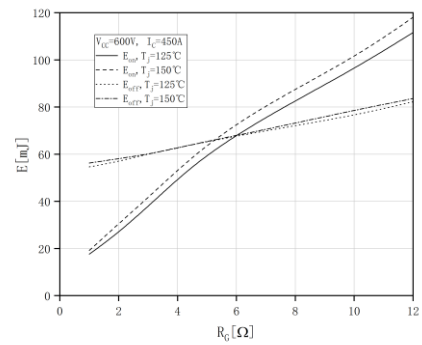
输出特性 IGBT, 逆变器 (典型)
output characteristic IGBT, Inverter (typical)



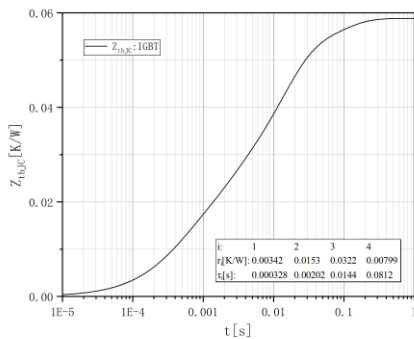
开关损耗 IGBT, 逆变器 (典型)
switching losses IGBT, Inverter (typical)



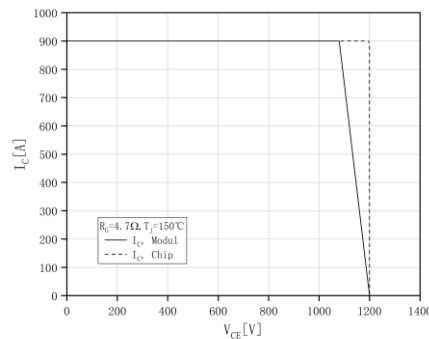
开关损耗 IGBT, 逆变器 (典型)
switching losses IGBT, Inverter (typical)



瞬态热阻抗 IGBT, 逆变器
transient thermal impedance IGBT, Inverter



反偏安全工作区 IGBT, 逆变器 (RBSOA)
Reverse bias safe operating area IGBT, Inverter (RBSOA)

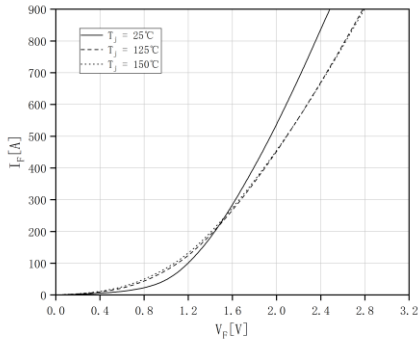


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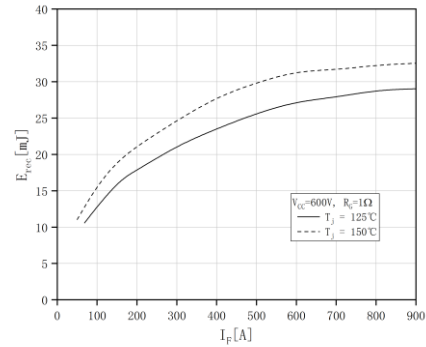
性能 / Performance



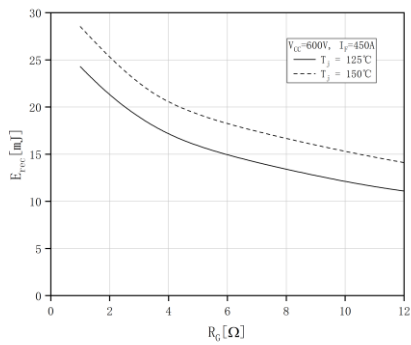
正向偏压特性 二极管,逆变器 (典型)
forward characteristic of Diode, Inverter(typical)



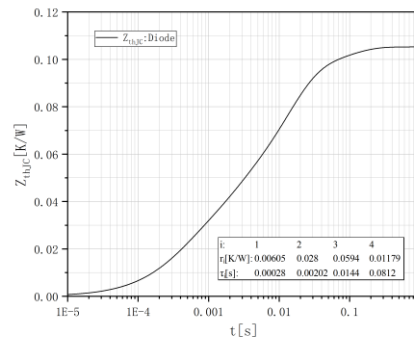
开关损耗 二极管, 逆变器 (典型)
switching losses Diode, Inverter(typical)



开关损耗 二极管, 逆变器 (典型)
switching losses Diode, Inverter(typical)



瞬态热阻抗 二极管, 逆变器
transient thermal impedance Diode, Inverter



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使用条件及条款

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