技术信息 / Technical Information

IGBT-模块
IGBT-modules

FF1200R17KE3_B2

初步数据
Preliminary Data

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_{vj} = 25°C	V_{CES}	1700	V
连续集电极直流电流 Continuous DC collector current	T_C = 80°C, $T_{vj\,max}$ = 150°C T_C = 25°C, $T_{vj\,max}$ = 150°C	$I_{C\,nom}$ I_C	1200 1700	A A
集电极重复峰值电流 Repetitive peak collector current	t_P = 1 ms	I_{CRM}	2400	A
总功率损耗 Total power dissipation	T_C = 25°C, $T_{vj\,max}$ = 150°C	P_{tot}	6,60	kW
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 = 1200 A, V_{GE} = 15 V I_C = 1200 A, V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C	$V_{CE\,sat}$		2,00 2,40	2,45	V V
栅极阈值电压 Gate threshold voltage	I_C = 48,0 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	5,2	5,8	6,4	V
栅极电荷 Gate charge	V_{GE} = -15 V ... +15 V		Q_G		14,0		µC
内部栅极电阻 Internal gate resistor	T_{vj} = 25°C		R_{Gint}		1,6		Ω
输入电容 Input capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		110		nF
反向传输电容 Reverse transfer capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{res}		3,50		nF
集电极-发射极截止电流 Collector-emitter cut-off current	V_{CE} = 1700 V, V_{GE} = 0 V, T_{vj} = 25°C		I_{CES}			5,0	mA
栅极-发射极漏电流 Gate-emitter leakage current	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25°C		I_{GES}			400	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	I_C = 1200 A, V_{CE} = 900 V V_{GE} = ±15 V R_{Gon} = 1,2 Ω	T_{vj} = 25°C T_{vj} = 125°C	$t_{d\,on}$		0,74 0,80		µs µs
上升时间(电感负载) Rise time, inductive load	I_C = 1200 A, V_{CE} = 900 V V_{GE} = ±15 V R_{Gon} = 1,2 Ω	T_{vj} = 25°C T_{vj} = 125°C	t_r		0,20 0,25		µs µs
关断延迟时间(电感负载) Turn-off delay time, inductive load	I_C = 1200 A, V_{CE} = 900 V V_{GE} = ±15 V R_{Goff} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C	$t_{d\,off}$		1,45 1,80		µs µs
下降时间(电感负载) Fall time, inductive load	I_C = 1200 A, V_{CE} = 900 V V_{GE} = ±15 V R_{Goff} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C	t_f		0,18 0,30		µs µs
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	I_C = 1200 A, V_{CE} = 900 V, L_S = 50 nH V_{GE} = ±15 V R_{Gon} = 1,2 Ω	T_{vj} = 25°C T_{vj} = 125°C	E_{on}		240 350		mJ mJ
关断损耗能量 (每脉冲) Turn-off energy loss per pulse	I_C = 1200 A, V_{CE} = 900 V, L_S = 50 nH V_{GE} = ±15 V R_{Goff} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C	E_{off}		305 445		mJ mJ
短路数据 SC data	$V_{GE} \leq$ 15 V, V_{CC} = 1000 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	$t_P \leq$ 10 µs, T_{vj} = 125°C	I_{SC}		4800		A
结 - 外壳热阻 Thermal resistance, junction to case	每个 IGBT / per IGBT		R_{thJC}			19,0	K/kW
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个 IGBT / per IGBT λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)		R_{thCH}		23,0		K/kW
在开关状态下温度 Temperature under switching conditions			$T_{vj\,op}$	-40		125	°C

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初步数据
Preliminary Data

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_{vj} = 25°C	V_{RRM}	1700	V
连续正向直流电流 Continuous DC forward current		I_F	1200	A
正向重复峰值电流 Repetitive peak forward current	t_P = 1 ms	I_{FRM}	2400	A
I2t-值 I^2t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C	I^2t	240	kA^2s

特征值 / Characteristic Values

				min.	typ.	max.	
正向电压 Forward voltage	I_F = 1200 A, V_{GE} = 0 V I_F = 1200 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C	V_F		1,80 1,90	2,20	V V
反向恢复峰值电流 Peak reverse recovery current	I_F = 1200 A, - di_F/dt = 7000 A/µs (T_{vj}=125°C) V_R = 900 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C	I_{RM}		1150 1250		A A
恢复电荷 Recovered charge	I_F = 1200 A, - di_F/dt = 7000 A/µs (T_{vj}=125°C) V_R = 900 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C	Q_r		305 510		µC µC
反向恢复损耗(每脉冲) Reverse recovery energy	I_F = 1200 A, - di_F/dt = 7000 A/µs (T_{vj}=125°C) V_R = 900 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C	E_{rec}		190 340		mJ mJ
结 - 外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode		R_{thJC}			42,0	K/kW
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个二极管 / per diode λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)		R_{thCH}		52,0		K/kW
在开关状态下温度 Temperature under switching conditions			$T_{vj\ op}$	-40		125	°C

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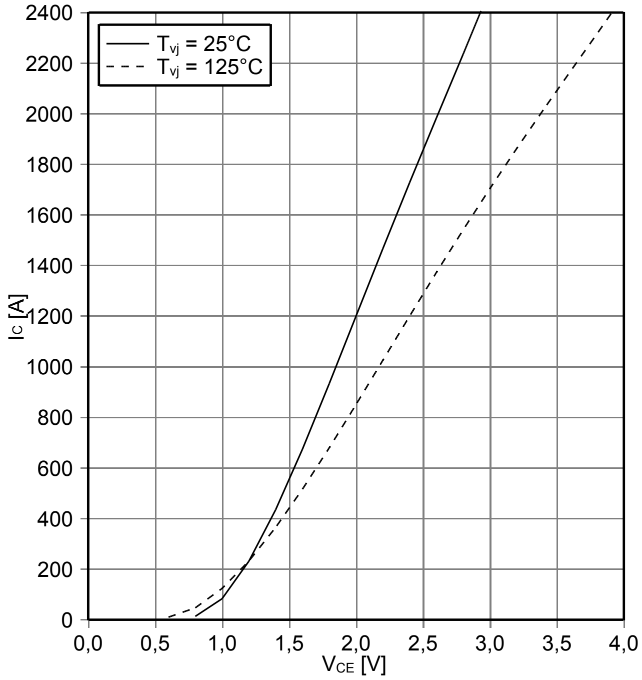
初步数据
Preliminary Data

模块 / Module

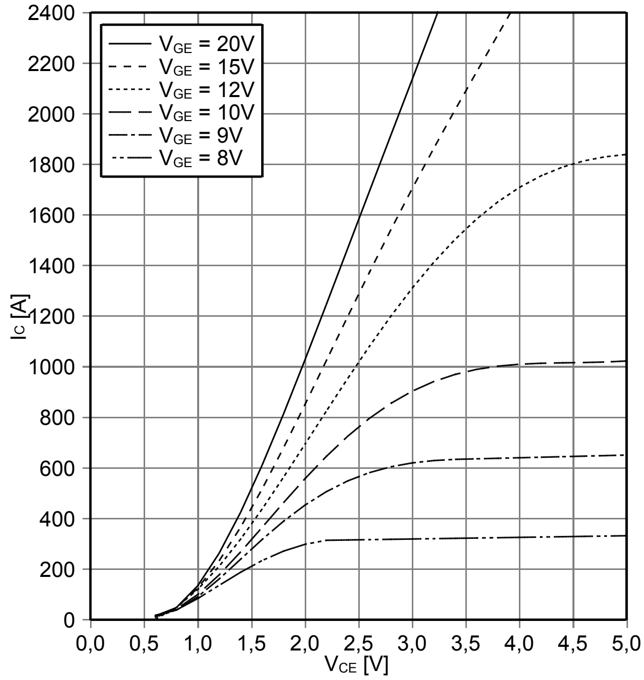
绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}		4,0		kV
模块基板材料 Material of module baseplate				AlSiC		
内部绝缘 Internal isolation	基本绝缘 (class 1, IEC 61140) basic insulation (class 1, IEC 61140)			AlN		
爬电距离 Creepage distance	端子- 散热片 / terminal to heatsink 端子- 端子 / terminal to terminal			15,0 15,0		mm
电气间隙 Clearance	端子- 散热片 / terminal to heatsink 端子- 端子 / terminal to terminal			10,0 10,0		mm
相对电痕指数 Comperative tracking index		CTI		> 250		
			min.	typ.	max.	
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个模块 / per module λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)	R_{thCH}		8,00		K/kW
杂散电感,模块 Stray inductance module		L_{sCE}		20		nH
模块引线电阻,端子-芯片 Module lead resistance, terminals - chip	T_C = 25°C, 每个开关 / per switch	$R_{CC'+EE'}$		0,37		mΩ
储存温度 Storage temperature		T_{stg}	-40		125	°C
模块安装的安装扭距 Mounting torque for modul mounting	螺丝 M6 根据相应的应用手册进行安装 Screw M6 - Mounting according to valid application note	M	4,25	-	5,75	Nm
端子联接扭距 Terminal connection torque	螺丝 M4 根据相应的应用手册进行安装 Screw M4 - Mounting according to valid application note 螺丝 M8 根据相应的应用手册进行安装 Screw M8 - Mounting according to valid application note	M	1,8 8,0	- -	2,1 10	Nm Nm
重量 Weight		G		1050		g

初步数据
Preliminary Data

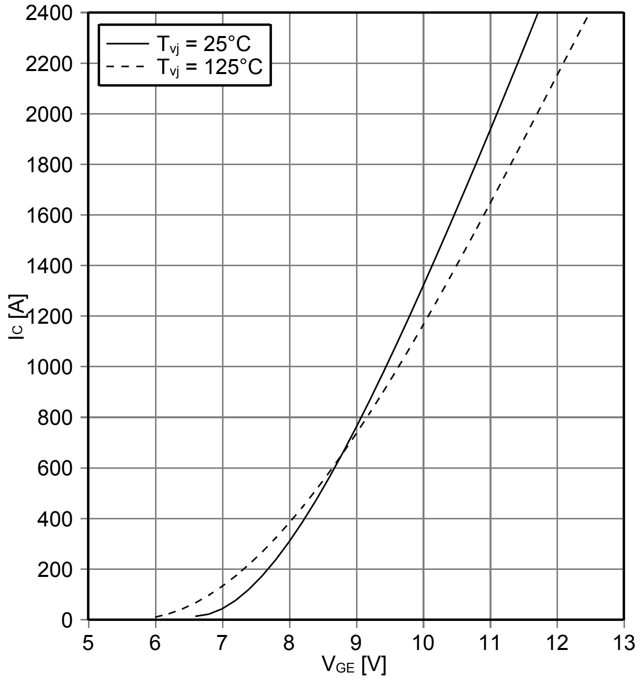
输出特性 IGBT, 逆变器 （典型)
output characteristic IGBT,Inverter (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15$ V



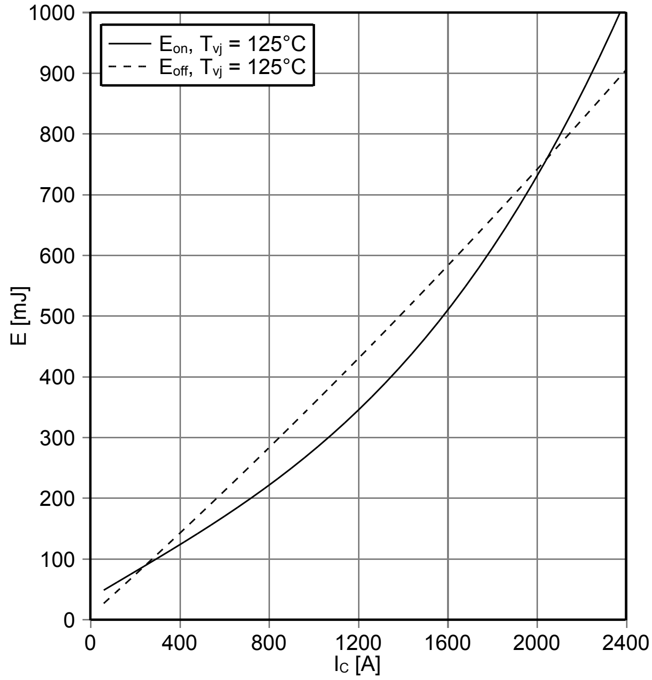
输出特性 IGBT, 逆变器 （典型)
output characteristic IGBT,Inverter (typical)
$I_C = f(V_{CE})$
$T_{vj} = 125°C$



传输特性 IGBT, 逆变器 (典型)
transfer characteristic IGBT,Inverter (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20$ V



开关损耗 IGBT, 逆变器 （典型)
switching losses IGBT,Inverter (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
$V_{GE} = \pm 15$ V, $R_{Gon} = 1.2\ \Omega$, $R_{Goff} = 1.5\ \Omega$, $V_{CE} = 900$ V



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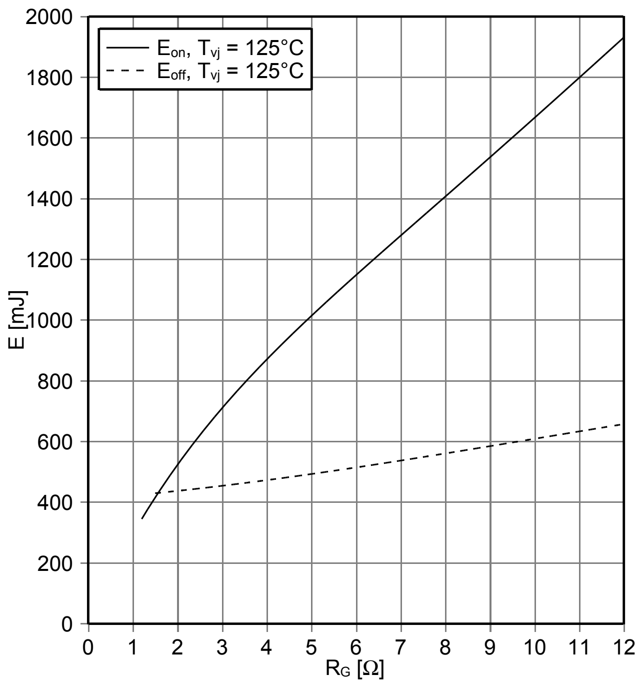
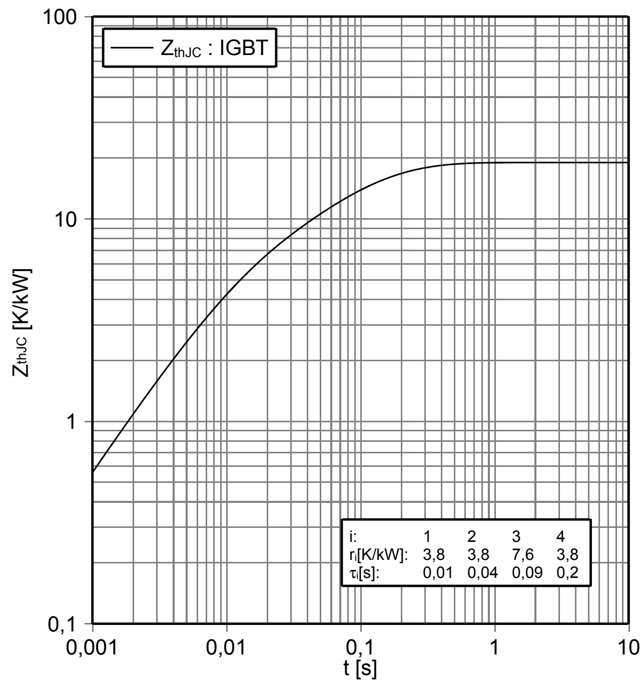
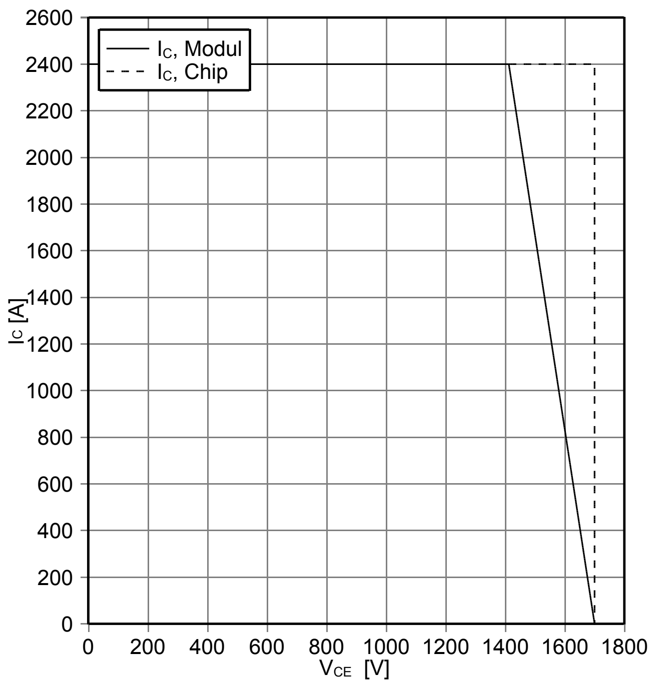
开关损耗 IGBT, 逆变器 （典型)
switching losses IGBT,Inverter (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$V_{GE} = \pm 15$ V, $I_C = 1200$ A, $V_{CE} = 900$ V



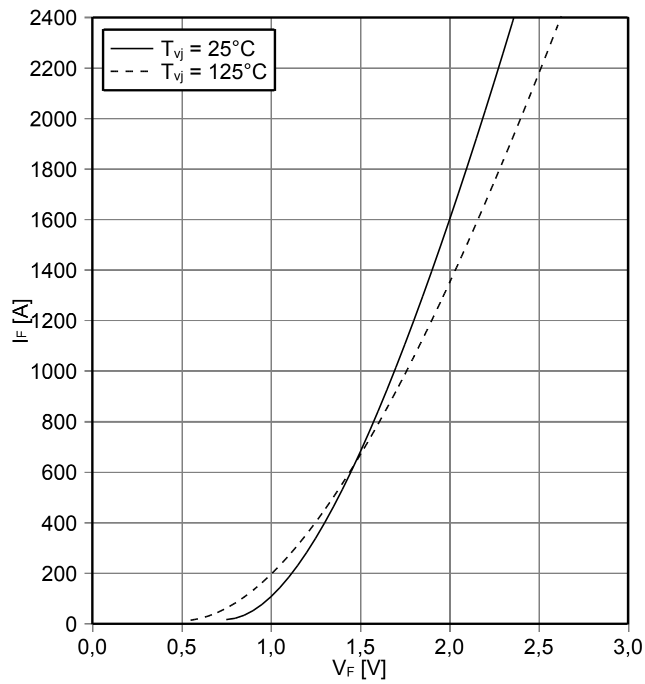
瞬态热阻抗 IGBT, 逆变器
transient thermal impedance IGBT,Inverter
$Z_{thJC} = f(t)$



反偏安全工作区 IGBT, 逆变器 （RBSOA）
reverse bias safe operating area IGBT,Inverter (RBSOA)
$I_C = f(V_{CE})$
$V_{GE} = \pm 15$ V, $R_{Goff} = 1.5\ \Omega$, $T_{vj} = 125°C$



正向偏压特性 二极管,逆变器 （典型)
forward characteristic of Diode, Inverter (typical)
$I_F = f(V_F)$



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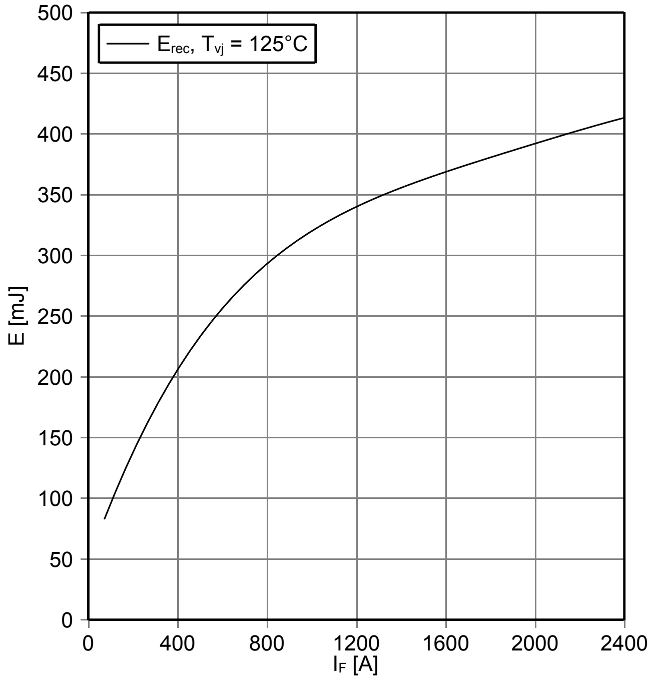
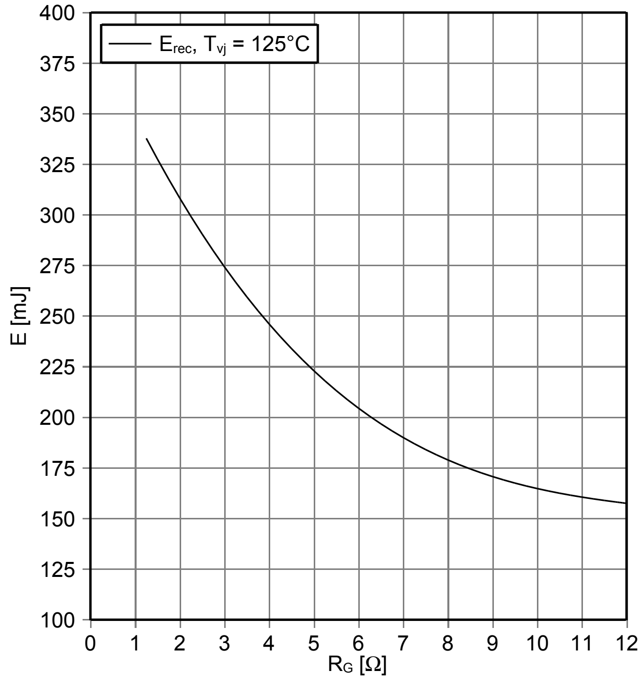
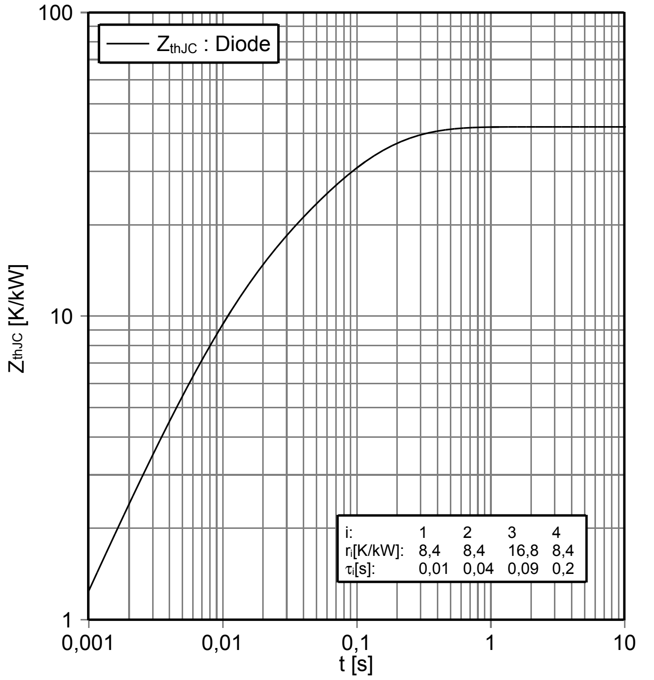
开关损耗 二极管,逆变器 （典型)
switching losses Diode, Inverter (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 1.2\ \Omega$, $V_{CE} = 900$ V



开关损耗 二极管,逆变器 （典型)
switching losses Diode, Inverter (typical)
$E_{rec} = f(R_G)$
$I_F = 1200$ A, $V_{CE} = 900$ V



瞬态热阻抗 二极管,逆变器
transient thermal impedance Diode, Inverter
$Z_{thJC} = f(t)$



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初步数据
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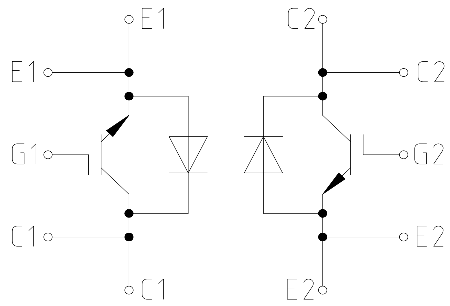
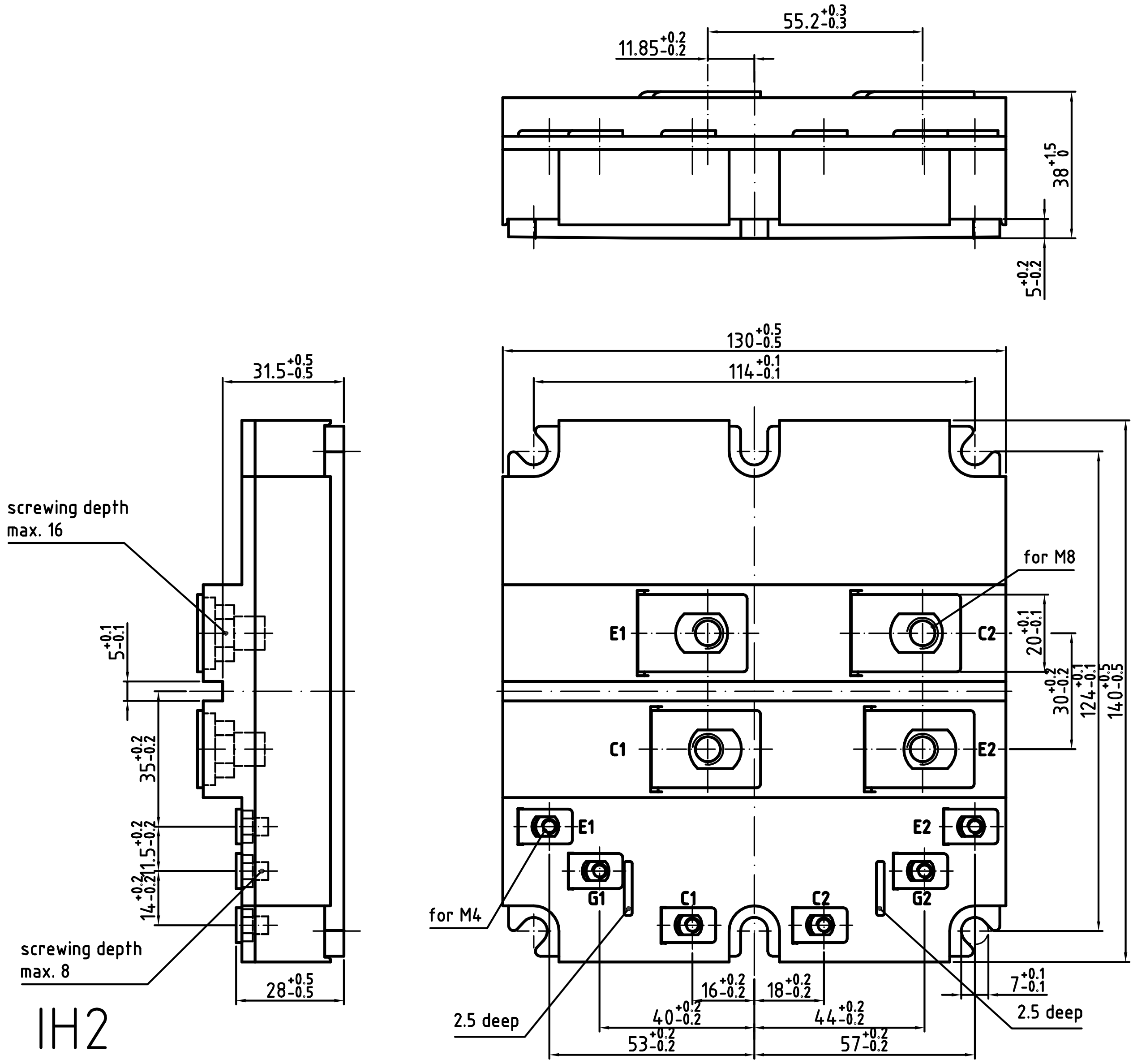
接线图 / circuit_diagram_headline



封装尺寸 / package outlines



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- to establish joint measures of an ongoing product survey, and that we may make delivery depended on the realization of any such measures.

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