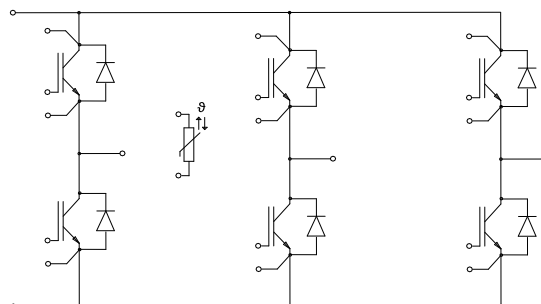
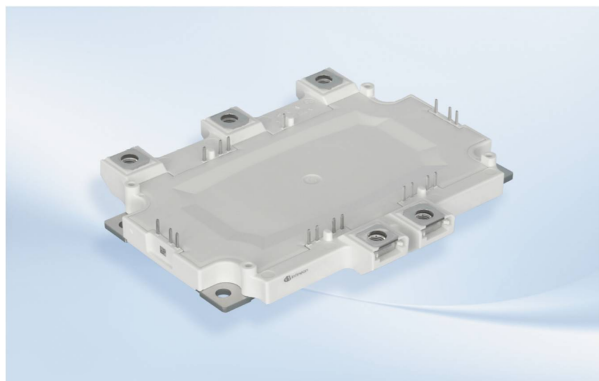


HybridPACK™1 模块 采用第三代沟槽栅/场终止IGBT3和第三代发射极控制二极管 带有温度检测NTC  
HybridPACK™1 module with Trench/Fieldstop IGBT3 and Emitter Controlled 3 diode and NTC



$V_{CES} = 650V$   
 $I_{C\ nom} = 200A / I_{CRM} = 400A$

### 典型应用

- 汽车应用
- 混合动力汽车
- 商业性农用车辆
- 电机传动

### Typical Applications

- Automotive Applications
- Hybrid Electrical Vehicles (H)EV
- Commercial Agriculture Vehicles
- Motor Drives

### 电气特性

- 低开关损耗
- 低  $V_{CEsat}$
- 沟槽栅IGBT3
- $T_{vj\ op} = 150^{\circ}C$
- $V_{CEsat}$  带正温度系数

### Electrical Features

- Low Switching Losses
- Low  $V_{CEsat}$
- Trench IGBT 3
- $T_{vj\ op} = 150^{\circ}C$
- $V_{CEsat}$  with positive Temperature Coefficient

### 机械特性

- 2.5 kV 交流 1分钟 绝缘
- 低热阻的三氧化二铝 (  $Al_2O_3$  衬底
- 高机械坚固性
- 集成NTC温度传感器
- 铜基板
- 符合RoHS
- 标封装

### Mechanical Features

- 2.5 kV AC 1min Insulation
- $Al_2O_3$  Substrate with Low Thermal Resistance
- High mechanical robustness
- Integrated NTC temperature sensor
- Copper Base Plate
- RoHS compliant
- Standard Housing

## Module Label Code

### Barcode Code 128



### DMX - Code



### Content of the Code

Content of the Code	Digit
Module Serial Number	1 - 5
Module Material Number	6 - 11
Production Order Number	12 - 19
Datecode (Production Year)	20 - 21
Datecode (Production Week)	22 - 23

prepared by: JZ	date of publication: 2013-11-05	
approved by: LB	revision: 3.1	UL approved (E83335)

**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	$T_{vj} = 25^{\circ}\text{C}$	$V_{CES}$	650	V
连续集电极直流电流 Continuous DC collector current	$T_C = 65^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	$I_{C\text{nom}}$ $I_C$	200 250	A A
集电极重复峰值电流 Repetitive peak collector current	$t_P = 1\text{ ms}$	$I_{CRM}$	400	A
总功率损耗 Total power dissipation	$T_C = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	$P_{\text{tot}}$	790	W
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	$I_C = 200\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 200\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 200\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{CE\text{sat}}$	1,45 1,60 1,70	1,90	V V V	
栅极阈值电压 Gate threshold voltage	$I_C = 3,20\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		$V_{GEth}$	4,9	5,8	6,5	V
栅极电荷 Gate charge	$V_{GE} = -15\text{ V} \dots +15\text{ V}$		$Q_G$	2,15			$\mu\text{C}$
内部栅极电阻 Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		$R_{Gint}$	1,0			$\Omega$
输入电容 Input capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{ies}$	13,0			nF
反向传输电容 Reverse transfer capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		$C_{res}$	0,38			nF
集电极-发射极截止电流 Collector-emitter cut-off current	$V_{CE} = 650\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$		$I_{CES}$			1,0	mA
栅极-发射极漏电流 Gate-emitter leakage current	$V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_{vj} = 25^{\circ}\text{C}$		$I_{GES}$			400	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	$I_C = 200\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 3,6\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{don}$	0,05 0,06 0,06			$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
上升时间(电感负载) Rise time, inductive load	$I_C = 200\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Gon} = 3,6\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_r$	0,05 0,05 0,06			$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
关断延迟时间(电感负载) Turn-off delay time, inductive load	$I_C = 200\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 3,6\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{doff}$	0,36 0,38 0,39			$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
下降时间(电感负载) Fall time, inductive load	$I_C = 200\text{ A}, V_{CE} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{Goff} = 3,6\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_f$	0,05 0,09 0,10			$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
开通损耗能量(每脉冲) Turn-on energy loss per pulse	$I_C = 200\text{ A}, V_{CE} = 300\text{ V}, L_S = 25\text{ nH}$ $V_{GE} = \pm 15\text{ V}, di/dt = 4200\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Gon} = 3,6\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{on}$	2,25 2,90 3,20			mJ mJ mJ
关断损耗能量(每脉冲) Turn-off energy loss per pulse	$I_C = 200\text{ A}, V_{CE} = 300\text{ V}, L_S = 25\text{ nH}$ $V_{GE} = \pm 15\text{ V}, du/dt = 3500\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Goff} = 3,6\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$E_{off}$	5,50 7,20 7,50			mJ mJ mJ
短路数据 SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 360\text{ V}$ $V_{CE\text{max}} = V_{CES} - L_{SCE} \cdot di/dt$	$t_P \leq 8\ \mu\text{s}, T_{vj} = 25^{\circ}\text{C}$ $t_P \leq 6\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$	$I_{SC}$	1400 1000			A A
结 - 外壳热阻 Thermal resistance, junction to case	每个 IGBT / per IGBT		$R_{thJC}$			0,19	K/W
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个 IGBT / per IGBT $\lambda_{\text{Paste}} = 1\text{ W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1\text{ W}/(\text{m}\cdot\text{K})$		$R_{thCH}$	0,085			K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\text{op}}$	-40		150	$^{\circ}\text{C}$

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