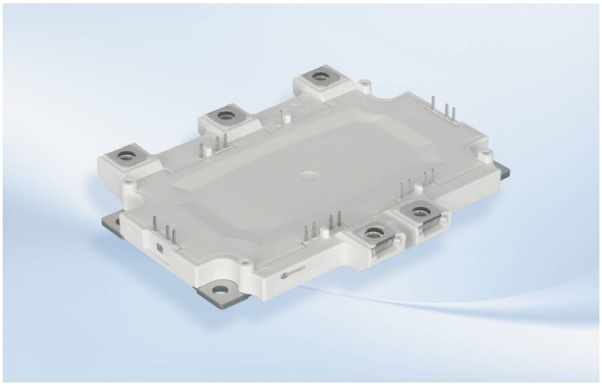
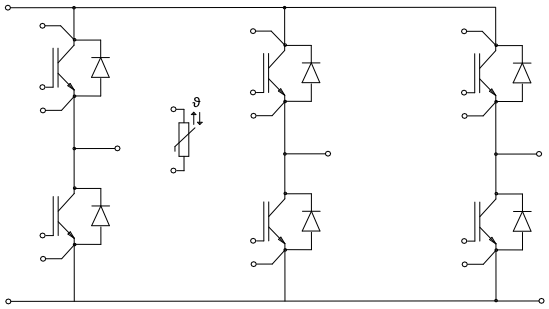
技术信息 / Technical Information

IGBT-模块
IGBT-Module

FS215R04A1E3D

HybridPACK™1 模块 采用第三代沟槽栅/场终止IGBT和HE型发射机控制二极管 带有温度检测NTC
HybridPACK™1 module with Trench/Fieldstop IGBT3 and Emitter Controlled HE diode and NTC





V_{CES} = 400V
$I_{C\ nom}$ = 215A / I_{CRM} = 430A

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}
- $T_{vj\ op}$ = 150°C
- 沟槽栅IGBT3
- V_{CEsat} 带正温度系数
- 增大的二极管针对反馈运行模式

Electrical Features
- Low Switching Losses
- Low V_{CEsat}
- $T_{vj\ op}$ = 150°C
- Trench IGBT 3
- V_{CEsat} with positive Temperature Coefficient
- Enlarged Diode for regenerative operation

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

Sample
00000123456000000000000

DMX - 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: WJ	date of publication: 2014-05-15	
approved by: LB	revision: 3.0	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°C	V_{CES}	400	V
连续集电极直流电流 Continuous DC collector current	T_C = 85°C, $T_{vj\,max}$ = 175°C T_C = 25°C, $T_{vj\,max}$ = 175°C	$I_{C\,nom}$ I_C	215 290	A A
集电极重复峰值电流 Repetitive peak collector current	t_P = 1 ms	I_{CRM}	430	A
总功率损耗 Total power dissipation	T_C = 25°C, $T_{vj\,max}$ = 175°C	P_{tot}	715	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 = 215 A, V_{GE} = 15 V I_C = 215 A, V_{GE} = 15 V I_C = 215 A, V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$V_{CE\,sat}$		1,30 1,40 1,45	1,70	V V V
栅极阈值电压 Gate threshold voltage	I_C = 3,20 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	5,0	5,8	6,5	V
栅极电荷 Gate charge	V_{GE} = -15 V ... +15 V		Q_G		1,85		µC
内部栅极电阻 Internal gate resistor	T_{vj} = 25°C		R_{Gint}		1,0		Ω
输入电容 Input capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		12,5		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}		0,45		nF
集电极-发射极截止电流 Collector-emitter cut-off current	V_{CE} = 400 V, V_{GE} = 0 V, T_{vj} = 25°C		I_{CES}			1,0	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 = 215 A, V_{CE} = 120 V V_{GE} = ±15 V R_{Gon} = 1,8 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,on}$		0,06 0,07 0,07		µs µs µs
上升时间(电感负载) Rise time, inductive load	I_C = 215 A, V_{CE} = 120 V V_{GE} = ±15 V R_{Gon} = 1,8 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_r		0,07 0,08 0,08		µs µs µs
关断延迟时间(电感负载) Turn-off delay time, inductive load	I_C = 215 A, V_{CE} = 120 V V_{GE} = ±15 V R_{Goff} = 1,8 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,off}$		0,25 0,27 0,28		µs µs µs
下降时间(电感负载) Fall time, inductive load	I_C = 215 A, V_{CE} = 120 V V_{GE} = ±15 V R_{Goff} = 1,8 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_f		0,04 0,06 0,06		µs µs µs
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	I_C = 215 A, V_{CE} = 120 V, L_S = 25 nH V_{GE} = ±15 V, di/dt = 2100 A/µs (T_{vj} = 150°C) R_{Gon} = 1,8 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{on}		0,35 0,55 0,65		mJ mJ mJ
关断损耗能量 (每脉冲) Turn-off energy loss per pulse	I_C = 215 A, V_{CE} = 120 V, L_S = 25 nH V_{GE} = ±15 V, du/dt = 1200 V/µs (T_{vj} = 150°C) R_{Goff} = 1,8 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{off}		3,00 3,65 3,75		mJ mJ mJ
短路数据 SC data	V_{GE} ≤ 15 V, V_{CC} = 200 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	t_P ≤ 8 µs, T_{vj} = 25°C t_P ≤ 6 µs, T_{vj} = 150°C	I_{SC}		1600 1300		A A
结 - 外壳热阻 Thermal resistance, junction to case	每个 IGBT / per IGBT		R_{thJC}			0,21	K/W
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}		0,085		K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\,op}$	-40		150	°C