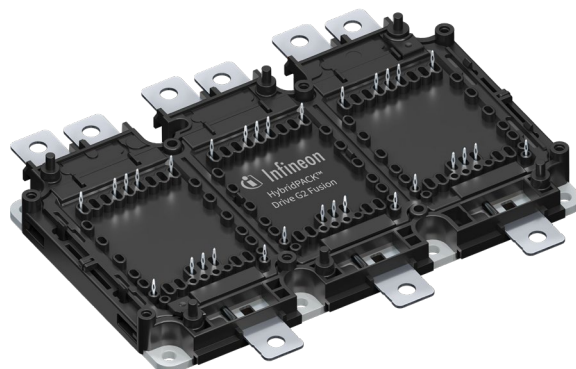


最终数据手册

英飞凌配备 Si/SiC Fusion Switch 的 HybridPACK™ Drive G2 模块

特性

- 电气特性
 - 阻断电压 750 V
 - 额定电流 980 A / 重复峰值电流 1960 A
 - Fusion Switch – EDT3 IGBT/二极管 & CoolSiC™ Gen2 MOSFET
 - 针对同时栅极驱动进行了优化
 - 高 I^2t 稳健性
 - 低导通损耗
 - 低开关损耗
 - 低杂散电感设计
 - $T_{vj,op} = 175^\circ\text{C}$
 - 集成片上温度传感器
- 机械特性
 - 4.25 kV DC 1 s 绝缘
 - 高爬电距离和电气间隙
 - 紧凑型设计
 - 高功率密度
 - 直冷式 PinFin 底板
 - 高性能 Si_3N_4 陶瓷
 - PCB 和冷却器装配的安装指导
 - PressFIT 压接技术
 - 符合 RoHS 标准，无铅
 - UL 94 V0 模块框架



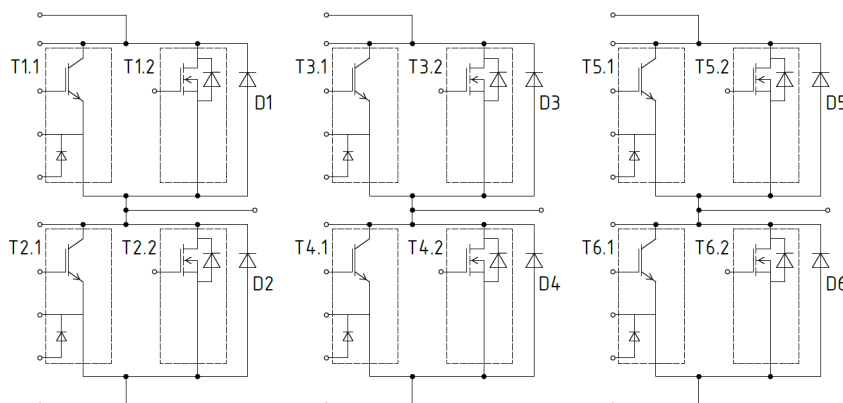
潜在应用

- 汽车应用
- 混合动力汽车 (H)EV
- 电机驱动
- 商用、建筑和农用车辆 (CAV)

产品验证

- 符合 AQG 324 标准，发布号：03.1/2021

描述



本数据手册的原文使用英文撰写。为方便起见，英飞凌提供了译文；由于翻译过程中可能使用了自动化工具，英飞凌不保证译文的准确性。为确认准确性，请务必访问 infineon.com 参考最新的英文版本（控制文档）。

目录

	描述	1
	特性	1
	潜在应用	1
	产品验证	1
	目录	2
1	封装	3
2	混合型晶体管 IGBT + MOSFET)	4
3	聚变二极管	5
4	IGBT、逆变器	7
5	MOSFET逆变器	8
6	温度传感器	9
7	特性图	10
8	电路图	18
9	封装外形	19
10	模块标签代码	22
	修订记录	23
	免责声明	24

1 封装

1 封装

表 1 绝缘配合

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, $f = 0$ Hz, $t = 1$ sec	4.25	kV
Material of module baseplate			Cu+Ni ¹⁾	
Internal insulation		basic insulation (class 1, IEC 61140)	Si_3N_4	
Creepage distance	d_{creep}	terminal to heatsink	9.0	mm
Creepage distance	d_{creep}	terminal to terminal	9.0	mm
Clearance	d_{clear}	terminal to heatsink	4.5	mm
Clearance	d_{clear}	terminal to terminal	4.5	mm
Comparative tracking index	CTI		> 175	

1) 镀镍铜底板

表 2 最大额定值

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Maximum RMS module terminal current	$I_{t,rms}$		800			A
Heat-staking dome temperature ¹⁾	T_{HS}	$t_{steking} < 10s$			280	°C

1) 热熔组装参考应用手册 AN-G2-ASSEMBLY。

表 3 特征值

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Pressure drop in cooling circuit	Δp	50% water / 50% ethylene glycol, $\Delta V / \Delta t = 10 \text{ dm}^3/\text{min}$, $T_f = 65 \text{ °C}$		76 ¹⁾		mbar
Maximum pressure in cooling circuit	p	$T_{baseplate} < 40 \text{ °C}$ (relative pressure)			3.0	bar
		$T_{baseplate} \geq 40 \text{ °C}$ (relative pressure)			2.5	
Stray inductance module	$L_{s,CE}$			N/A ²⁾		nH
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	$T_f = 25 \text{ °C}$, per switch		0.60		mΩ
Storage temperature	T_{stg}		-40		125	°C
Mounting torque for module mounting ³⁾	M	Screw M4 baseplate to heatsink	1.8	2.0	2.2	Nm
		Screw EJOT Delta PCB to frame	0.45	0.50	0.55	
Weight	G			760		g

1) 冷却器设计和流动方向参考应用笔记 AN-G2-ASSEMBLY。

2 融合型晶体管 (IGBT + MOSFET)

- 2) Fusion 交换机的 $L_{S,CE}$ 不适用。请参阅 SOA/RBOSA 图。
 3) 螺丝类型和扭矩参考应用笔记 AN-G2-ASSEMBLY。

2 融合型晶体管 (IGBT + MOSFET)

表4 最大额定值

Parameter	Symbol	Note or test condition		Values	Unit
Blocking voltage	V_{CES}		$T_{vj} = 25\text{ °C}$	750 ¹⁾	V
Implemented current	I_{CN}			980	A
Continuous DC current	$I_{C,nom}$	$T_f = 65\text{ °C}, T_{vj,max} = 175\text{ °C}$		600	A
Repetitive peak current	I_{CRM}	verified by design, t_p limited by $T_{vj,max}$		1960	A
Gate-emitter voltage, max. static voltage	V_{GE}			-6/19	V
Gate-emitter voltage, max. transient voltage	V_{GE}	Duty Cycle < 1 % (first transient maximum peak)		-10/23	V

1) 780 V (瞬态关断过冲)

表 5 建议值

Parameter	Symbol	Note or test condition	Values	Unit
On-state gate voltage	$V_{GE(on)}$		15...18 ¹⁾	V
Off-state gate voltage	$V_{GE(off)}$		-5 ¹⁾	V

1) MOSFET 和 IGBT 的栅极必须短路 ($V_{ge} = V_{gs}$)

表 6 特征值

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Output characteristic	$V_{CE,sat}$	$I_C = 600\text{ A}, V_{GE} = 18\text{ V}$	$T_{vj} = 25\text{ °C}$		1.06	1.30	V
			$T_{vj} = 125\text{ °C}$		1.17		
			$T_{vj} = 175\text{ °C}$		1.25		
Output characteristic	$V_{CE,sat}$	$I_C = 980\text{ A}, V_{GE} = 18\text{ V}$	$T_{vj} = 25\text{ °C}$		1.35		V
			$T_{vj} = 125\text{ °C}$		1.56		
			$T_{vj} = 175\text{ °C}$		1.71		
Gate charge	Q_G	$V_{CE} = 400\text{ V}, V_{GE} = -5/18\text{ V}$			1.95		μC
Output capacitance	C_{oes}	$f = 0.1\text{ MHz}, V_{CE} = 400\text{ V}, V_{GE} = 0\text{ V}$			1.2		nF
Collector-emitter leakage current	I_{CEX}	$V_{CE} = 750\text{ V}, V_{GE} = -5\text{ V}$				42	μA

(表格续下页.....)

表6 (续) 特征值

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Turn-on delay time, inductive load	$t_{d,on}$	$I_C = 600\text{ A}$, $V_{CE} = 400\text{ V}$, $V_{GE} = -5/18\text{ V}$, $R_{G,on} = 1.5\ \Omega$	$T_{vj} = 25\text{ °C}$	66.4		ns
			$T_{vj} = 125\text{ °C}$	62.3		
			$T_{vj} = 175\text{ °C}$	61.0		
Rise time, inductive load	t_r	$I_C = 600\text{ A}$, $V_{CE} = 400\text{ V}$, $V_{GE} = -5/18\text{ V}$, $R_{G,on} = 1.5\ \Omega$	$T_{vj} = 25\text{ °C}$	55.6		ns
			$T_{vj} = 125\text{ °C}$	57.2		
			$T_{vj} = 175\text{ °C}$	58.9		
Turn-off delay time, inductive load	$t_{d,off}$	$I_C = 600\text{ A}$, $V_{CE} = 400\text{ V}$, $V_{GE} = -5/18\text{ V}$, $R_{G,off} = 1.5\ \Omega$	$T_{vj} = 25\text{ °C}$	330		ns
			$T_{vj} = 125\text{ °C}$	384		
			$T_{vj} = 175\text{ °C}$	412		
Fall time, inductive load	t_f	$I_C = 600\text{ A}$, $V_{CE} = 400\text{ V}$, $V_{GE} = -5/18\text{ V}$, $R_{G,off} = 1.5\ \Omega$	$T_{vj} = 25\text{ °C}$	76.8		ns
			$T_{vj} = 125\text{ °C}$	153		
			$T_{vj} = 175\text{ °C}$	180		
Turn-on energy loss per pulse	E_{on}	$I_C = 600\text{ A}$, $V_{CE} = 400\text{ V}$, $L_\sigma = 6.5\text{ nH}$, $V_{GE} = -5/18\text{ V}$, $R_{G,on} = 1.5\ \Omega$	$T_{vj} = 25\text{ °C}$, $di/dt = 8790\text{ A}/\mu\text{s}$	4.4		mJ
			$T_{vj} = 125\text{ °C}$, $di/dt = 8620\text{ A}/\mu\text{s}$	5.6		
			$T_{vj} = 175\text{ °C}$, $di/dt = 8320\text{ A}/\mu\text{s}$	6.9		
Turn-off energy loss per pulse	E_{off}	$I_C = 600\text{ A}$, $V_{CE} = 400\text{ V}$, $L_\sigma = 6.5\text{ nH}$, $V_{GE} = -5/18\text{ V}$, $R_{G,off} = 1.5\ \Omega$	$T_{vj} = 25\text{ °C}$, $dv/dt = 7920\text{ V}/\mu\text{s}$	22.7		mJ
			$T_{vj} = 125\text{ °C}$, $dv/dt = 5830\text{ V}/\mu\text{s}$	29.5		
			$T_{vj} = 175\text{ °C}$, $dv/dt = 5120\text{ V}/\mu\text{s}$	31.6		
SC data	I_{SC}	$V_{CC} = 470\text{ V}$, $V_{GE} = -5/18\text{ V}$, $V_{CEmax} = V_{CES} - L_{s,CE} \cdot di/dt$	$T_{vj} = 25\text{ °C}$, $t_P = 1.5\ \mu\text{s}$	10000		A
			$T_{vj} = 175\text{ °C}$, $t_P = 1.5\ \mu\text{s}$	6100		

3 聚变二极管

表 7 最大额定值

Parameter	Symbol	Note or test condition	Values	Unit
Repetitive peak reverse voltage	V_{RRM}	$T_{vj} = 25\text{ °C}$	750 ¹⁾	V

(表格续下页.....)

表 7 (续) 最大额定值

Parameter	Symbol	Note or test condition		Values	Unit
Implemented forward current	I_{FN}			980	A
Continuous DC forward current	$I_{F,nom}$			600	A
I^2t - value	I^2t	$V_R = 0\text{ V}$, $t_P = 10\text{ ms}$	$T_{vj} = 175\text{ °C}$	14500 ²⁾	A ² s

1) 780 V (瞬态关断过冲)

2) 当 $V_{ge} = V_{gs} = 18\text{ V}$ 时, 负载电流既可在正向流动方向, 也可在负向流动方向施加。

表 8 特征值

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 600\text{ A}$, $V_{GE} = 18\text{ V}$	$T_{vj} = 25\text{ °C}$		1.54	1.95	V
			$T_{vj} = 125\text{ °C}$		1.74		
			$T_{vj} = 175\text{ °C}$		1.83		
Forward voltage	V_F	$I_F = 980\text{ A}$, $V_{GE} = 18\text{ V}$	$T_{vj} = 25\text{ °C}$		2.10		V
			$T_{vj} = 125\text{ °C}$		2.43		
			$T_{vj} = 175\text{ °C}$		2.56		
Peak reverse recovery current	I_{rm}	$I_F = 600\text{ A}$, $V_{GE} = -5/18\text{ V}$	$T_{vj} = 25\text{ °C}$		256		A
			$T_{vj} = 125\text{ °C}$		317		
			$T_{vj} = 175\text{ °C}$		350		
Recovered charge	Q_r	$I_F = 600\text{ A}$, $V_{GE} = -5/18\text{ V}$	$T_{vj} = 25\text{ °C}$		9.7		μC
			$T_{vj} = 125\text{ °C}$		18.0		
			$T_{vj} = 175\text{ °C}$		23.7		
Reverse recovery energy	E_{rec}	$I_F = 600\text{ A}$, $V_{GE} = -5/18\text{ V}$, $R_G = 1.5\text{ }\Omega$	$T_{vj} = 25\text{ °C}$, $-di_F/dt = 12.6\text{ kA}/\mu\text{s}$		3.51		mJ
			$T_{vj} = 125\text{ °C}$, $-di_F/dt = 11.7\text{ kA}/\mu\text{s}$		6.50		
			$T_{vj} = 175\text{ °C}$, $-di_F/dt = 11.1\text{ A}/\mu\text{s}$		8.42		
Thermal resistance, junction to cooling fluid ¹⁾	$R_{th,j-f}$	50% water / 50% ethylene glycol, $\Delta V/\Delta t = 10\text{ dm}^3/\text{min}$, $T_f = 65\text{ °C}$, only Si diode			0.296		K/W
Standard deviation of thermal resistance, junction to cooling fluid ¹⁾	$\sigma_{Rth,j-f}$	50% water / 50% ethylene glycol, $\Delta V/\Delta t = 10\text{ dm}^3/\text{min}$, $T_f = 65\text{ °C}$, only Si diode			11		K/kW
Temperature under switching conditions	$T_{vj,op}$		continuous operation	-40		175	°C

1) 冷却器设计和流动方向参考应用手册 AN-G2-ASSEMBLY。EoL 标准见 AQG324，通过特性验证。

4 IGBT、逆变器

表9 最大额定值

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CES}		$T_{vj} = 25\text{ °C}$	750 ¹⁾	V
Repetitive peak collector current	I_{CRM}	verified by design, t_p limited by $T_{vj,max}$		1150 ²⁾	A
Gate-emitter peak voltage	V_{GES}			-10/23	V

1) 780 V (瞬态关断过冲)

2) 如果 IGBT 与 MOSFET 的栅极短路，则可忽略此情况：此时请参阅“熔断型晶体管 (IGBT + MOSFET)”部分。

表 10 特征值

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE,sat}$	$I_C = 300\text{ A}$, $V_{GE} = 18\text{ V}$	$T_{vj} = 25\text{ °C}$		1.20	1.33	V
			$T_{vj} = 125\text{ °C}$		1.25		
			$T_{vj} = 175\text{ °C}$		1.28		
Gate threshold voltage	$V_{GE,th}$	$I_C = 5.16\text{ mA}$, $V_{CE} = V_{GE}$	$T_{vj} = 25\text{ °C}$	5.05	5.85	6.6	V
Gate charge	Q_G	$V_{CE} = 400\text{ V}$, $V_{GE} = -5/18\text{ V}$			1.50		μC
Internal gate resistor	$R_{G,int}$		$T_{vj} = 25\text{ °C}$		2.0		Ω
Input capacitance	C_{ies}	$f = 0.1\text{ MHz}$, $V_{CE} = 400\text{ V}$, $V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$		24		nF
Reverse transfer capacitance	C_{res}	$f = 0.1\text{ MHz}$, $V_{CE} = 400\text{ V}$, $V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$		0.036		nF
Gate-emitter leakage current	I_{GES}		$T_{vj} = 25\text{ °C}$			100	nA
Thermal resistance, junction to cooling fluid ¹⁾	$R_{th,j-f}$	50% water / 50% ethylene glycol, $\Delta V/\Delta t = 10\text{ dm}^3/\text{min}$, $T_f = 65\text{ °C}$			0.156		K/W
Standard deviation of thermal resistance, junction to cooling fluid ¹⁾	$\sigma_{Rth,j-f}$	50% water / 50% ethylene glycol, $\Delta V/\Delta t = 10\text{ dm}^3/\text{min}$, $T_f = 65\text{ °C}$			5.0		K/kW
Temperature under switching conditions	$T_{vj,op}$		continuous operation	-40		175	$^{\circ}\text{C}$

1) 冷却器设计和流动方向参考应用笔记AN-G2-ASSEMBLY。EoL 标准见 AQG324，通过特性验证。

5 MOSFET逆变器

表 11 最大额定值

Parameter	Symbol	Note or test condition	Values	Unit
Drain-source voltage	V_{DS}	$T_{vj} = 25\text{ °C}$	750 ¹⁾	V
Pulsed drain current	$I_{D,pulse}$	verified by design, t_p limited by $T_{vj,max}$	400 ²⁾	A
Gate-source voltage, max. static voltage	V_{GS}		-6/19	V
Gate-source voltage, max. transient voltage	V_{GS}	Duty Cycle < 1 % (first transient maximum peak)	-10/23	V

1) 780 V (瞬态关断过冲)

2) 如果 IGBT 与 MOSFET 的栅极短路, 则可忽略此情况: 此时请参阅“熔断型晶体管 (IGBT + MOSFET)”部分。

表12 特征值

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Drain-source on-resistance	$R_{DS,on}$	$I_D = 186\text{ A}$, $V_{GS} = 18\text{ V}$	$T_{vj} = 25\text{ °C}$		3.77	5.15	mΩ
			$T_{vj} = 125\text{ °C}$		5.00		
			$T_{vj} = 175\text{ °C}$		6.08		
Gate threshold voltage	$V_{GS,th}$	$I_D = 60\text{ mA}$, $V_{GS} = V_{DS}$, (tested after 1ms pulse at $V_{GS} = +20\text{ V}$)	$T_{vj} = 25\text{ °C}$	3.20 ¹⁾	4.00	4.55	V
Total gate charge	Q_G	$V_{DS} = 400\text{ V}$, $V_{GS} = -5/18\text{ V}$			0.470		μC
Internal gate resistor	$R_{G,int}$		$T_{vj} = 25\text{ °C}$		1.7		Ω
Input capacitance	C_{iss}	$f = 0.1\text{ MHz}$, $V_{DS} = 400\text{ V}$, $V_{GS} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$		11		nF
Reverse transfer capacitance	C_{rss}	$f = 0.1\text{ MHz}$, $V_{DS} = 400\text{ V}$, $V_{GS} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$		0.059		nF
Gate-source leakage current	I_{GSS}	$V_{GS} = 20\text{ V}$, $V_{DS} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$			400	nA
Thermal resistance, junction to cooling fluid ²⁾	$R_{th,j-f}$	50% water / 50% ethylene glycol, $\Delta V/\Delta t = 10\text{ dm}^3/\text{min}$, $T_f = 65\text{ °C}$			0.264		K/W
Standard deviation of thermal resistance, junction to cooling fluid ²⁾	$\sigma_{Rth,j-f}$	50% water / 50% ethylene glycol, $\Delta V/\Delta t = 10\text{ dm}^3/\text{min}$, $T_f = 65\text{ °C}$			7.8		K/kW
Temperature under switching conditions	$T_{vj,op}$		continuous operation	-40		175	°C

1) 运行时间为0小时。在逆变器运行期间, 该值可能会因 T_{vj} 、 $V_{GS}(off)$ 以及整个使用寿命期间的开关频率 f_{sw} 而有所降低。对 V_{GS} 进行最终评估, $th\text{ Min.}$ 具体数值取决于客户的应用场景, 请联系英飞凌销售办事处, 以获取英飞凌提供的必要技术支持。

2) 冷却器设计和流动方向参考应用笔记AN-G2-ASSEMBLY。EoL 标准见 AQG324, 通过特性验证。

6 温度传感器

表13 特征值

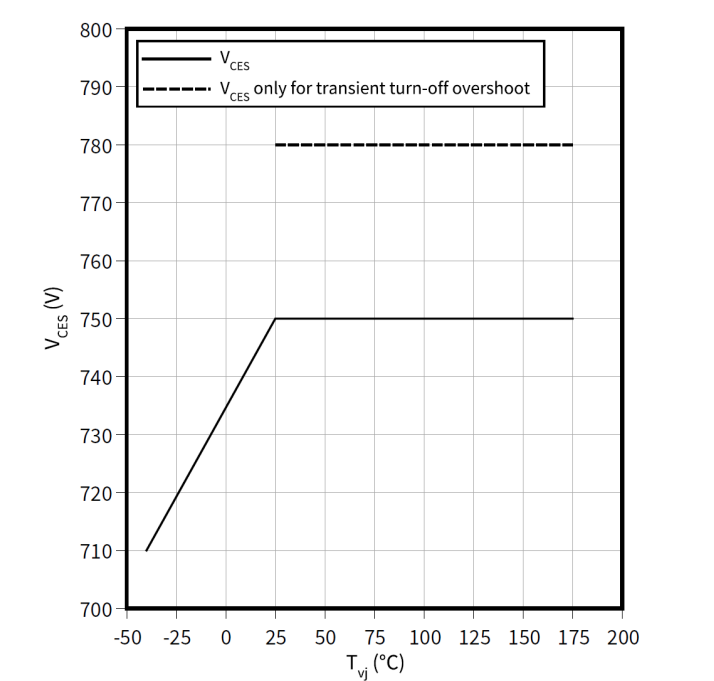
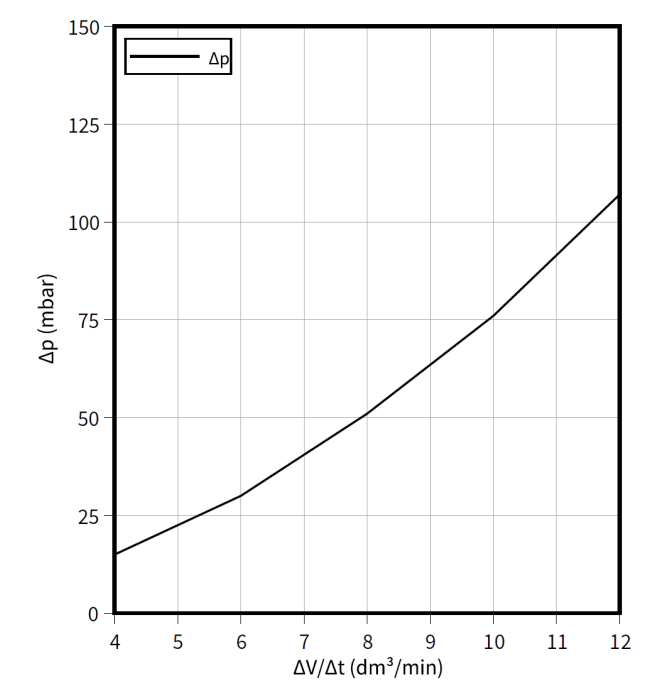
Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Transient sense current	I_{TS}					10	mA
Continuous sense current	I_{TS}					1	mA
Forward voltage	V_{TS}		$I_{TS} = 0.2 \text{ mA},$ $T_{vj} = 25 \text{ }^{\circ}\text{C}$	2.230	2.280	2.320	V
Temperature coefficient (TCR)	TC_{TS}	$I_{TS} = 0.2 \text{ mA}$			-5.50		mV/K

7 特性图

7 特性图

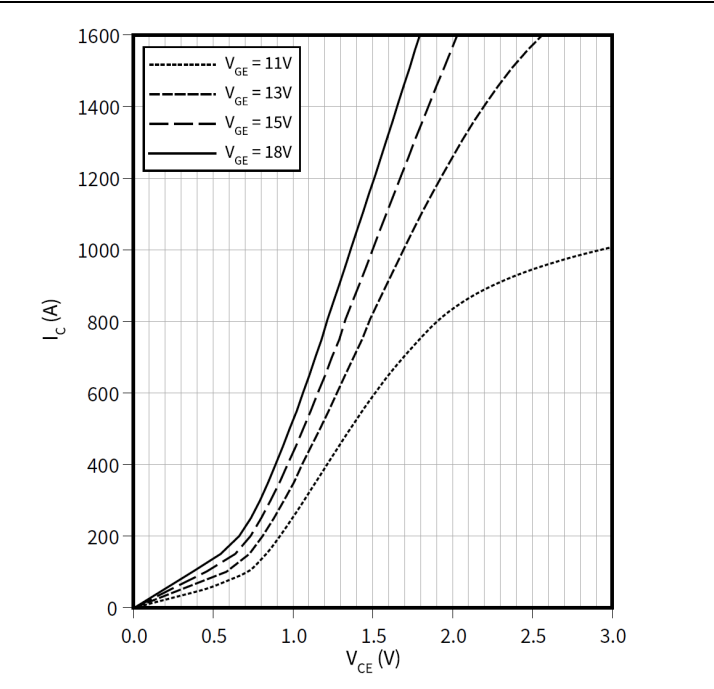
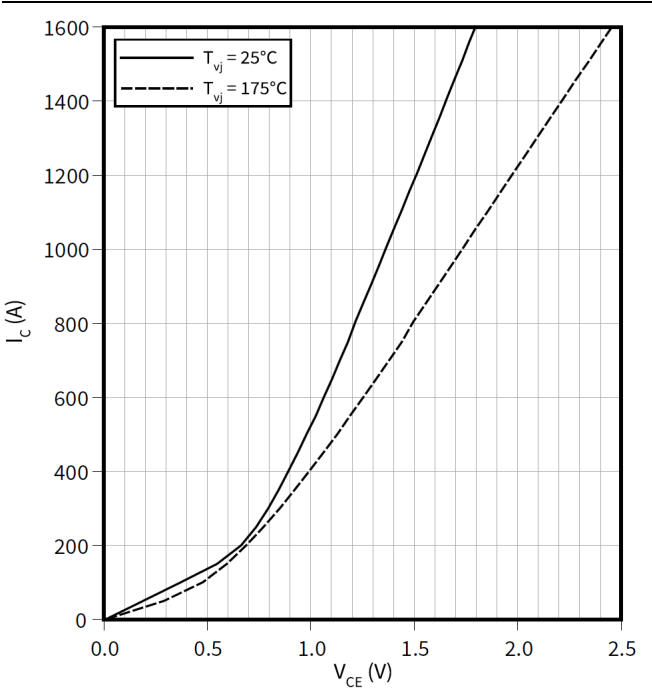
Pressure drop in cooling circuit (typical), Package
 $\Delta p = f(\Delta V / \Delta t)$
 $T_f = 65\text{ }^{\circ}\text{C}$, 50% water / 50% ethylene glycol

Maximum allowed blocking voltage, Fusion transistor (IGBT + MOSFET)
 $V_{CES} = f(T_{vj})$
Verified by characterization / design, not by test.



Output characteristic (typical), Fusion transistor (IGBT + MOSFET)
 $I_C = f(V_{CE})$
 $V_{GE} = 18\text{ V}$

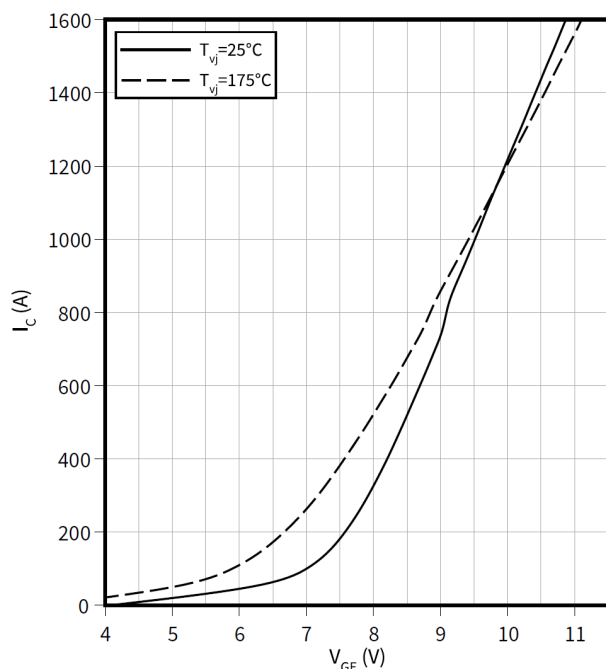
Output characteristic (typical), Fusion transistor (IGBT + MOSFET)
 $I_C = f(V_{CE})$
 $T_{vj} = 25\text{ }^{\circ}\text{C}$



Transfer characteristic (typical), Fusion transistor (IGBT + MOSFET)

$$I_C = f(V_{GE})$$

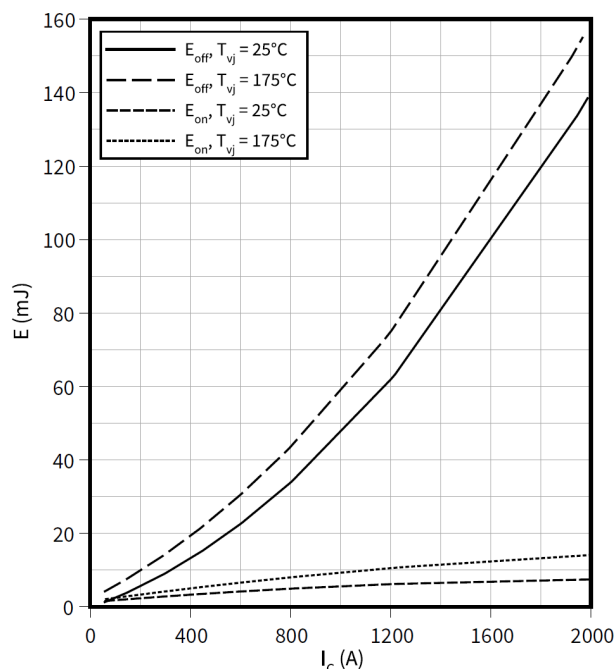
$V_{CE} = 20 \text{ V}$



Switching losses (typical), Fusion transistor (IGBT + MOSFET)

$$E = f(I_C)$$

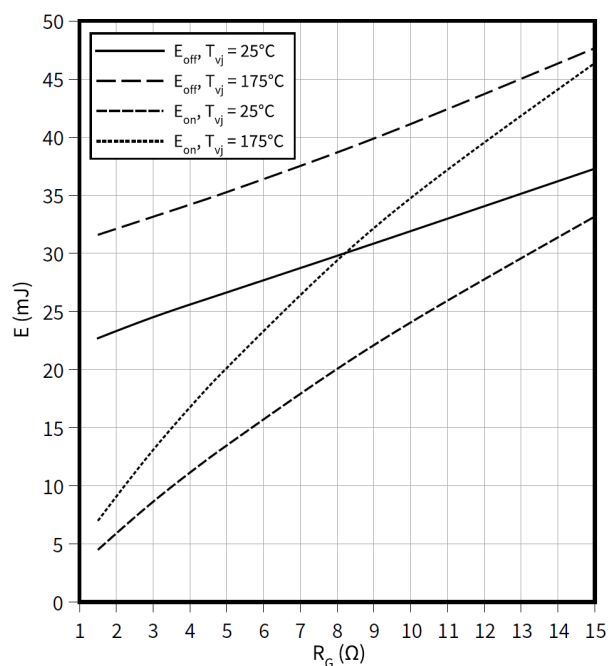
$V_{GE} = -5/18 \text{ V}$, $R_{G,off} = 1.5 \Omega$, $R_{G,on} = 1.5 \Omega$, $V_{CE} = 400 \text{ V}$



Switching losses (typical), Fusion transistor (IGBT + MOSFET)

$$E = f(R_G)$$

$V_{GE} = -5/18 \text{ V}$, $V_{CE} = 400 \text{ V}$, $I_C = 600 \text{ A}$

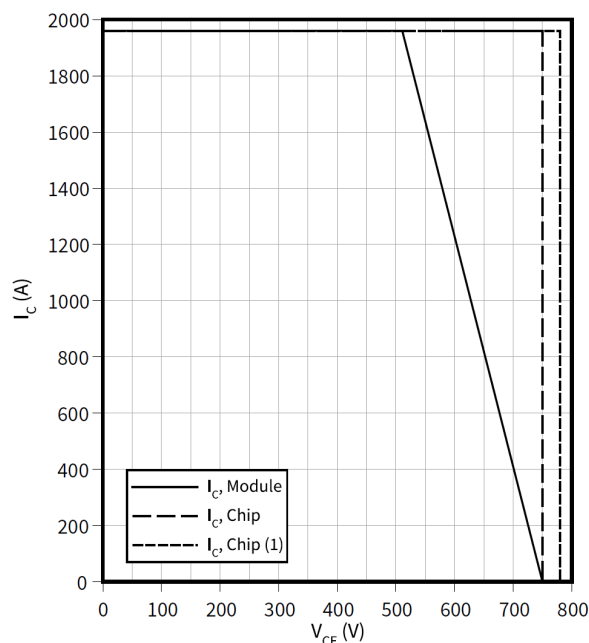


Reverse bias safe operating area (RBSOA), Fusion transistor (IGBT + MOSFET)

$$I_C = f(V_{CE})$$

$T_{vj} = 175 \text{ °C}$, $R_{G,off} = 1.5 \Omega$, $V_{GE} = -5/18 \text{ V}$

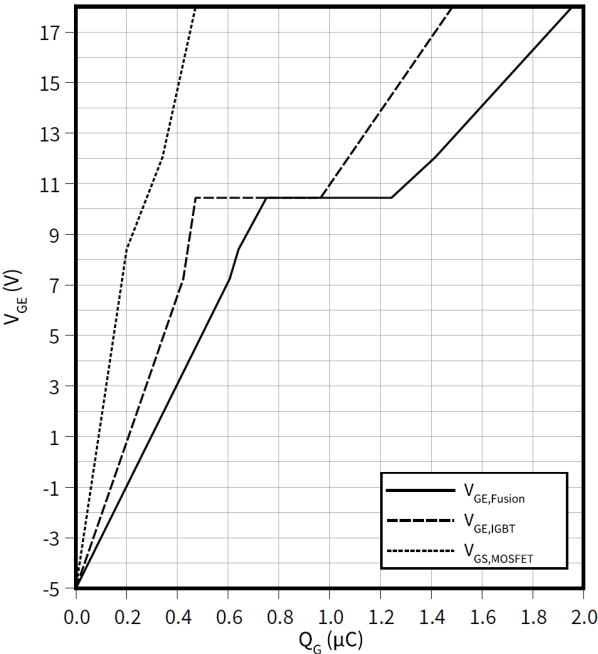
(1) only for transient overshoot



7 特性图

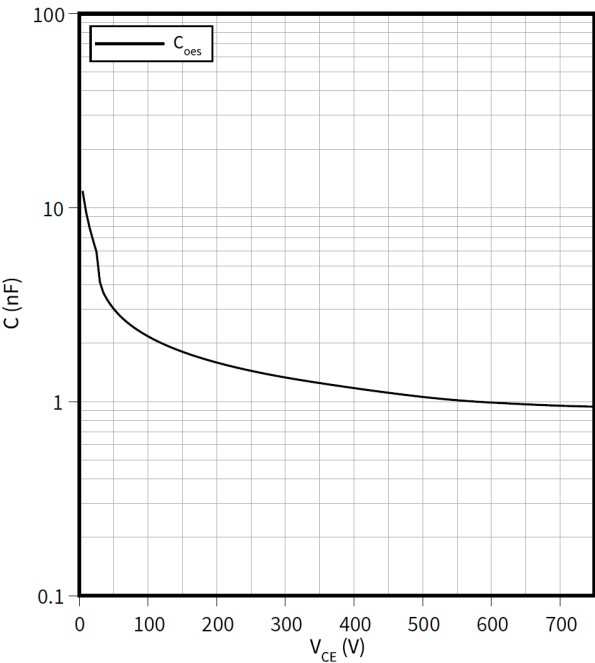
Gate charge characteristic (typical), Fusion transistor (IGBT + MOSFET)

$V_{GE} = f(Q_G)$
 $T_{vj} = 25\text{ }^{\circ}\text{C}$, $V_{CE} = 400\text{ V}$



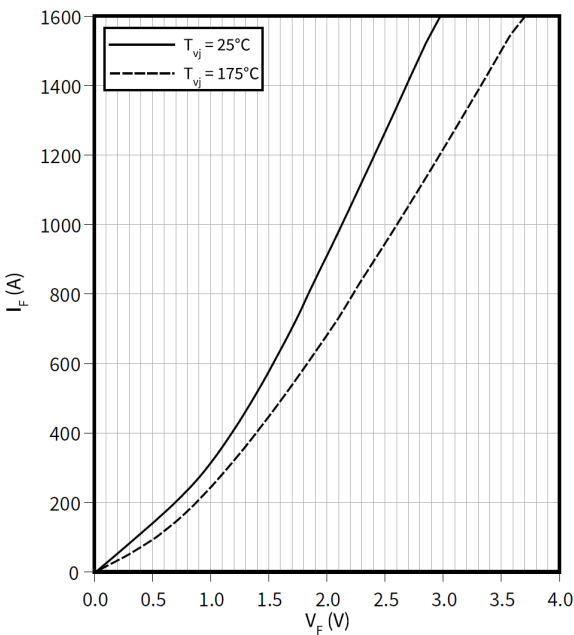
Capacity characteristic (typical) Fusion transistor, Fusion transistor (IGBT + MOSFET)

$C = f(V_{CE})$
 $V_{GE} = 0\text{ V}$, $T_{vj} = 25\text{ }^{\circ}\text{C}$, $f = 0.1\text{ MHz}$



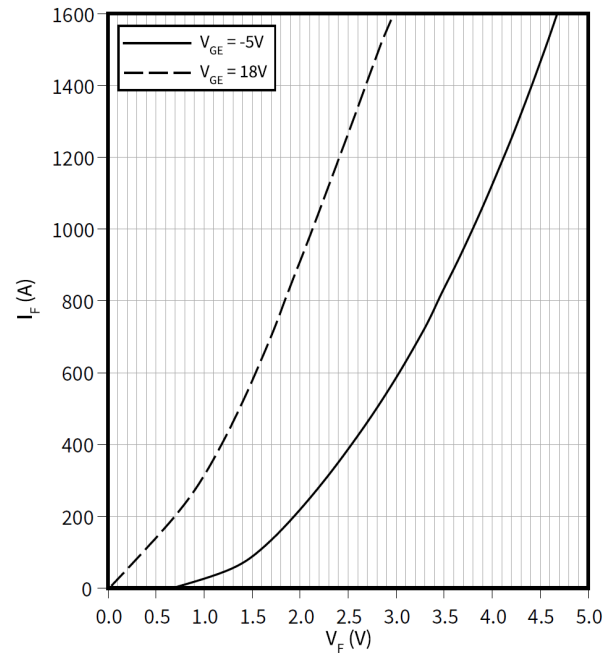
Forward characteristic (typical), Fusion diode

$I_F = f(V_F)$
 $V_{GE} = 18\text{ V}$



Forward characteristic (typical), Fusion diode

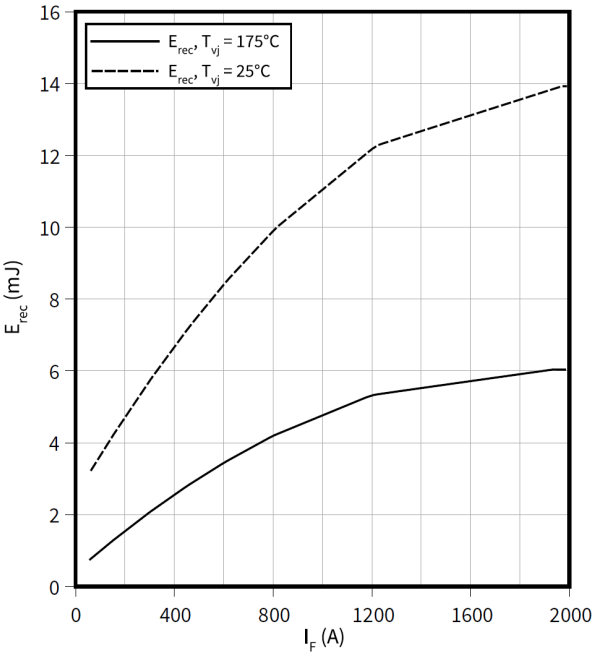
$I_F = f(V_F)$
 $T_{vj} = 25\text{ }^{\circ}\text{C}$



7 特性图

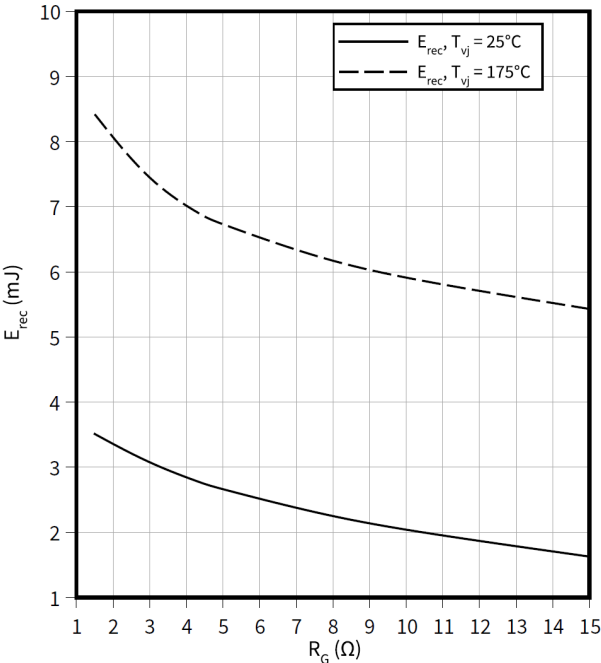
Switching losses (typical), Fusion diode

$E_{rec} = f(I_F)$
 $V_{CE} = 400\text{ V}$, $V_{GE} = -5/18\text{ V}$, $R_G = 1.5\ \Omega$



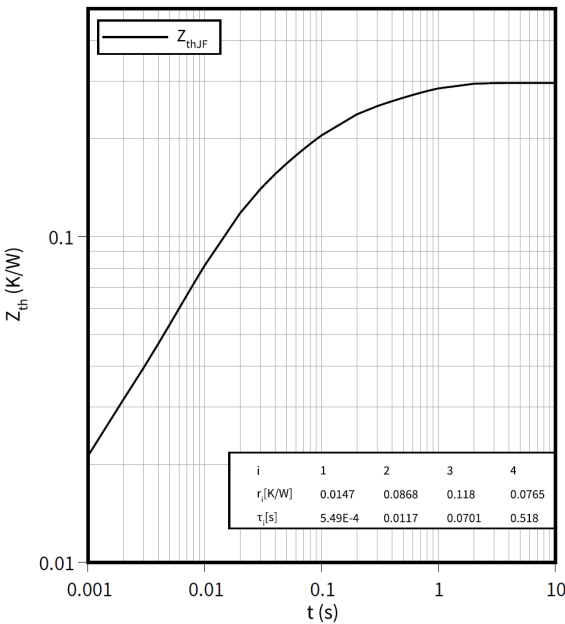
Switching losses (typical), Fusion diode

$E_{rec} = f(R_G)$
 $V_{CE} = 400\text{ V}$, $V_{GE} = -5/18\text{ V}$, $I_F = 600\text{ A}$



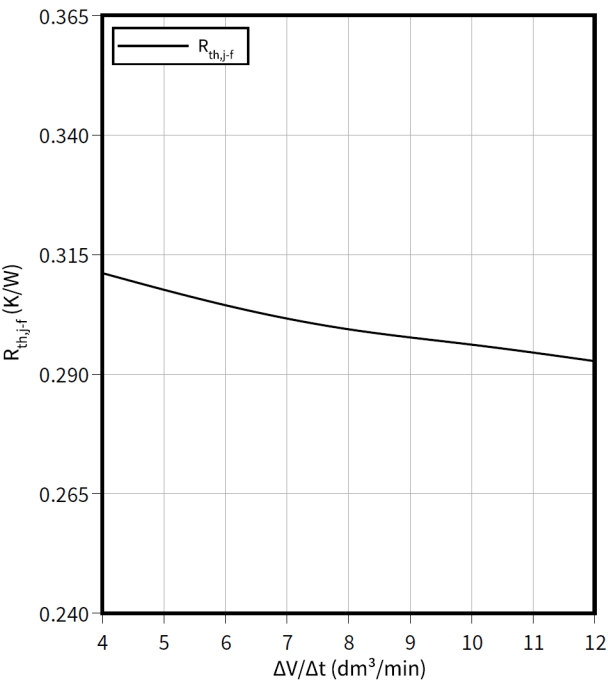
Transient thermal impedance (typical), Fusion diode

$Z_{th} = f(t)$
 $\Delta V/\Delta t = 10\text{ dm}^3/\text{min}$, 50% water/50% ethylene glycol,
 $T_f = 65^\circ\text{C}$

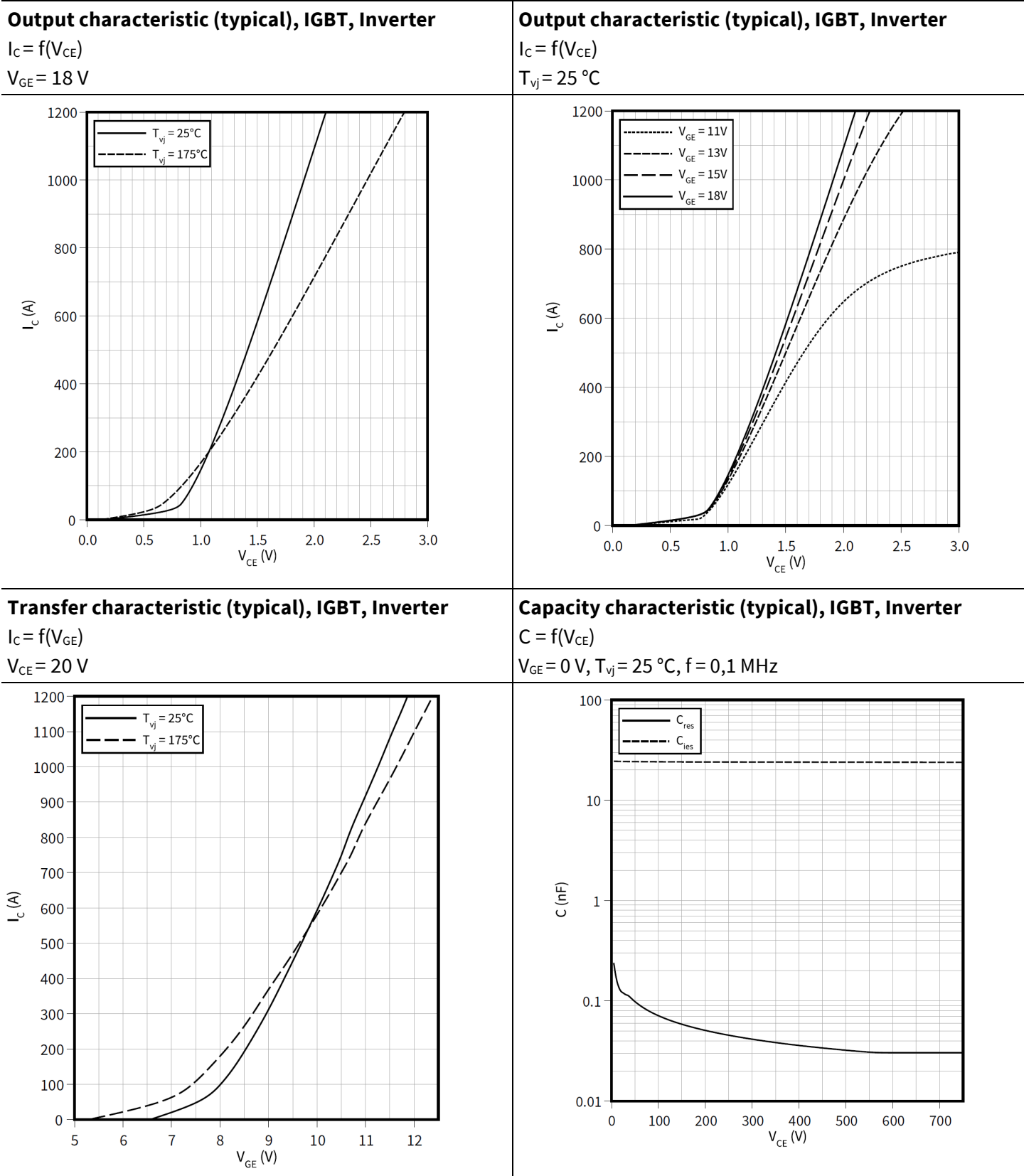


Thermal resistance (typical), Fusion diode

$R_{th,j-f} = f(\Delta V/\Delta t)$
 $T_f = 65^\circ\text{C}$, 50% water / 50% ethylene glycol



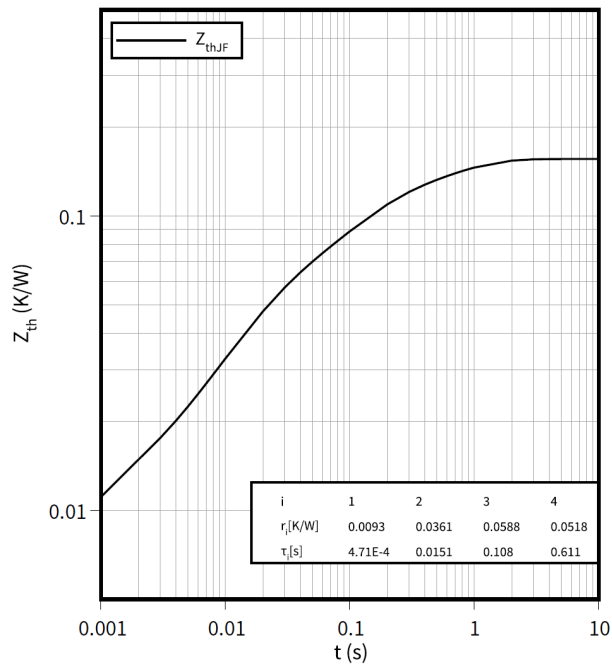
7 特性图



7 特性图

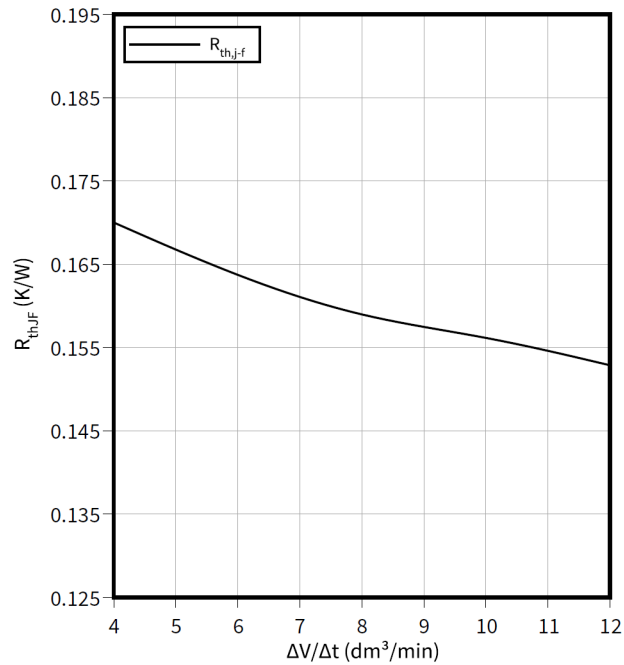
Transient thermal impedance (typical), IGBT, Inverter

$Z_{th} = f(t)$
 $\Delta V/\Delta t = 10 \text{ dm}^3/\text{min}$, $T_f = 65^\circ\text{C}$,
50% water / 50% ethylene glycol



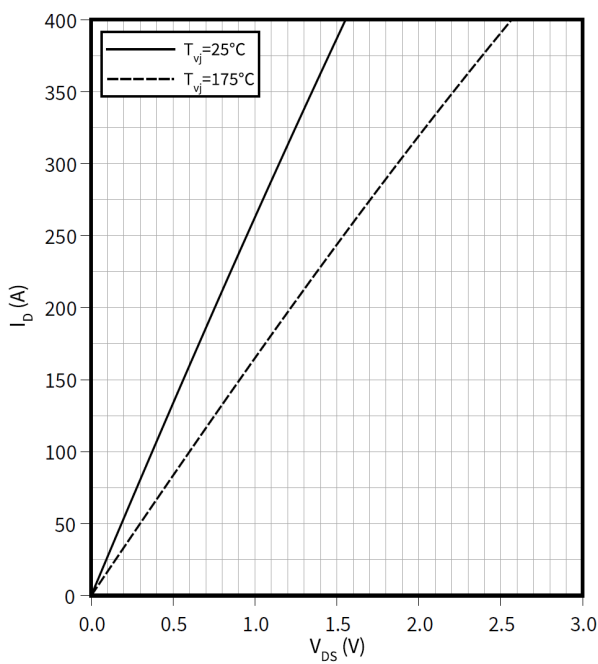
Thermal resistance (typical), IGBT, Inverter

$R_{thJF} = f(\Delta V/\Delta t)$
 $T_f = 65^\circ\text{C}$, 50% water / 50% ethylene glycol



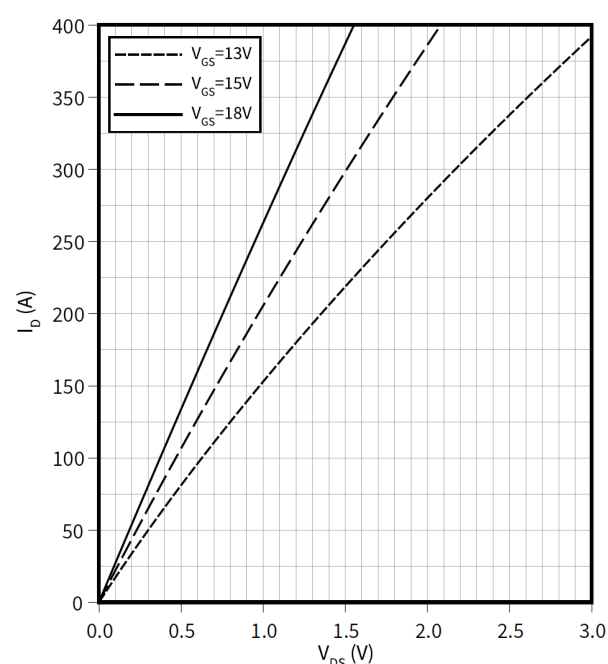
Output characteristic (typical), MOSFET Inverter

$I_D = f(V_{DS})$
 $V_{GS} = 18 \text{ V}$



Output characteristic (typical), MOSFET Inverter

$I_D = f(V_{DS})$
 $T_{vj} = 25^\circ\text{C}$

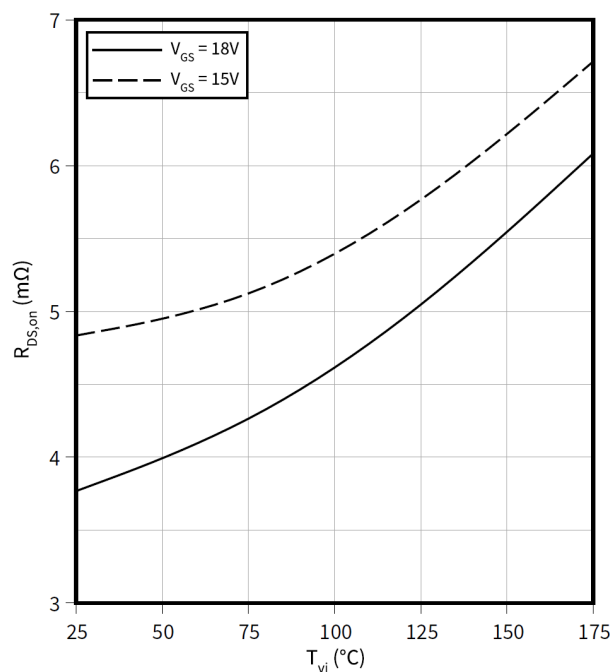


7 特性图

Drain-source on-resistance (typical), MOSFET Inverter

$$R_{DS,on} = f(T_{vj})$$

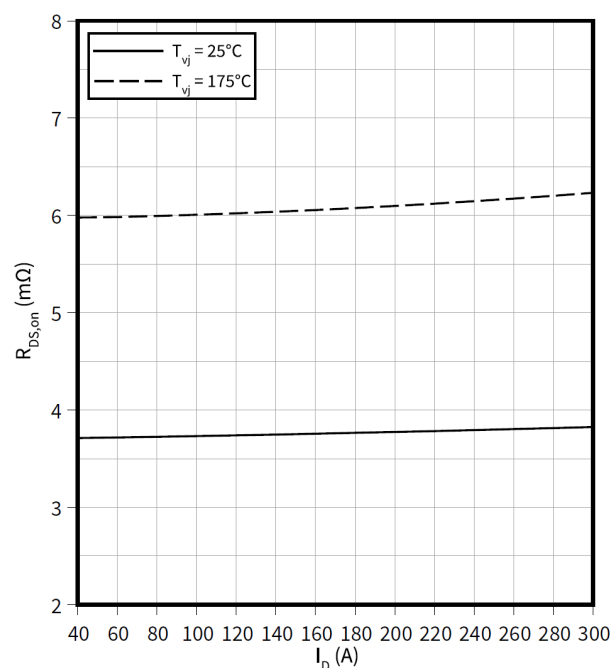
$$I_D = 186 \text{ A}$$



Drain-source on-resistance (typical), MOSFET Inverter

$$R_{DS,on} = f(I_D)$$

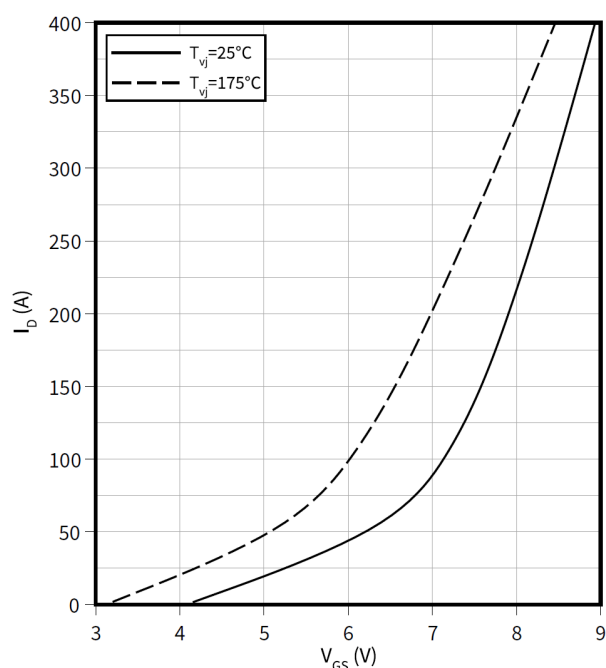
$$V_{GS} = 18 \text{ V}$$



Transfer characteristic (typical), MOSFET Inverter

$$I_D = f(V_{GS})$$

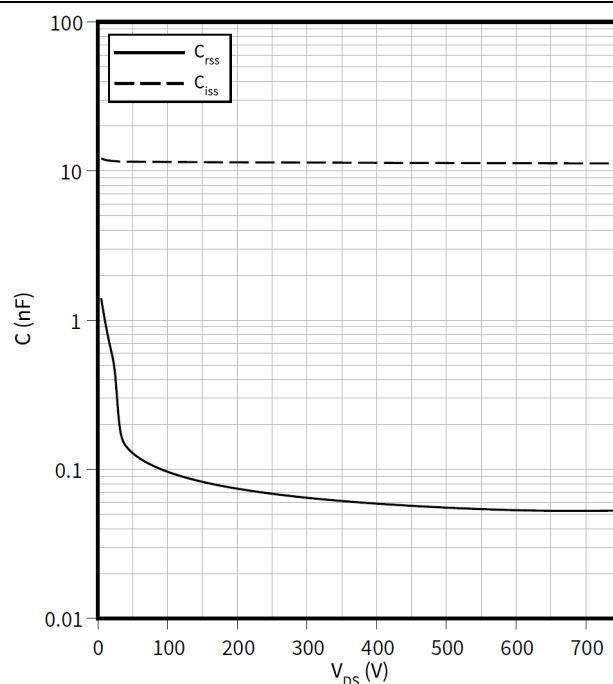
$$V_{DS} = 20 \text{ V}$$



Capacity characteristic (typical), MOSFET Inverter

$$C = f(V_{DS})$$

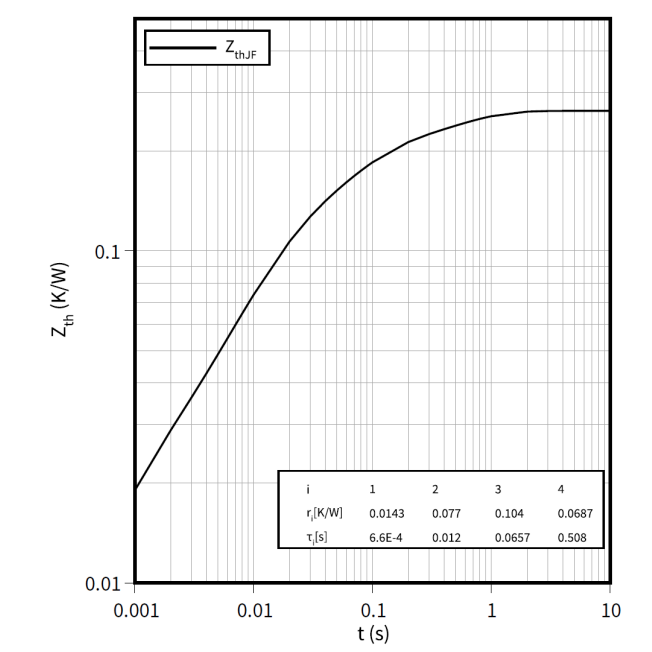
$$f = 0.1 \text{ MHz}, V_{GS} = 0 \text{ V}, T_{vj} = 25^\circ\text{C}$$



7 特性图

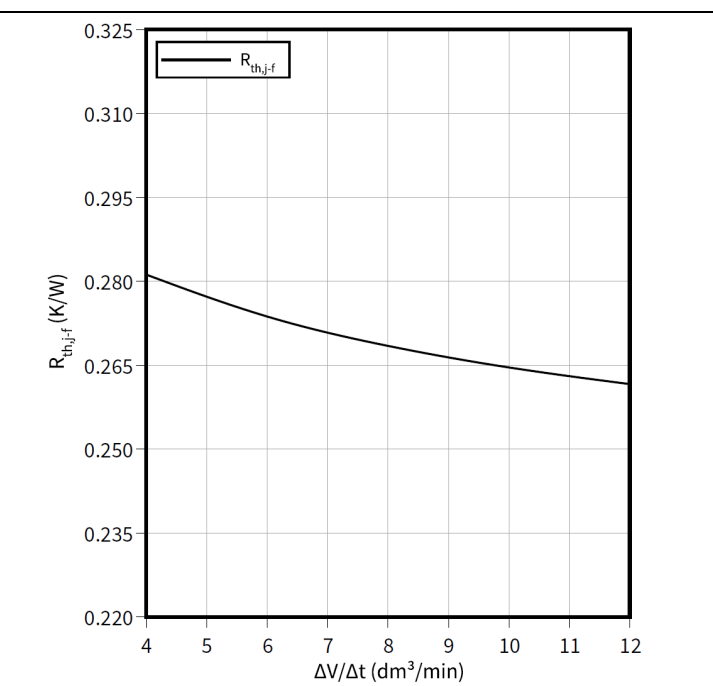
Transient thermal impedance (typical), MOSFET Inverter

$Z_{th} = f(t)$
 $\Delta V/\Delta t = 10 \text{ dm}^3/\text{min}$, $T_f = 65 \text{ }^\circ\text{C}$,
50% water / 50% ethylene glycol



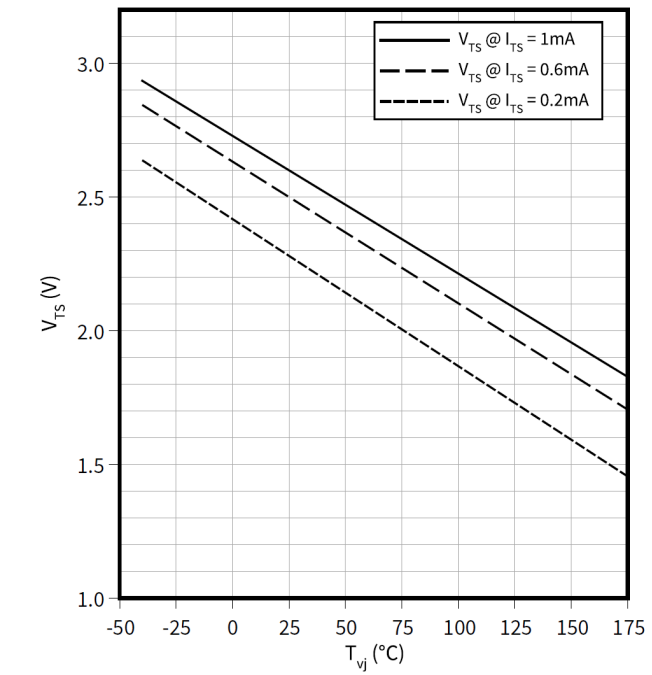
Thermal resistance (typical), MOSFET Inverter

$R_{th,j-f} = f(\Delta V/\Delta t)$
50% water / 50% ethylene glycol , $T_f = 65 \text{ }^\circ\text{C}$



Temperature characteristic (typical), Temperature sensor

$V_{TS} = f(T_{vj})$
 $I_{TS} = 0.2 \text{ mA}$



8 电路图

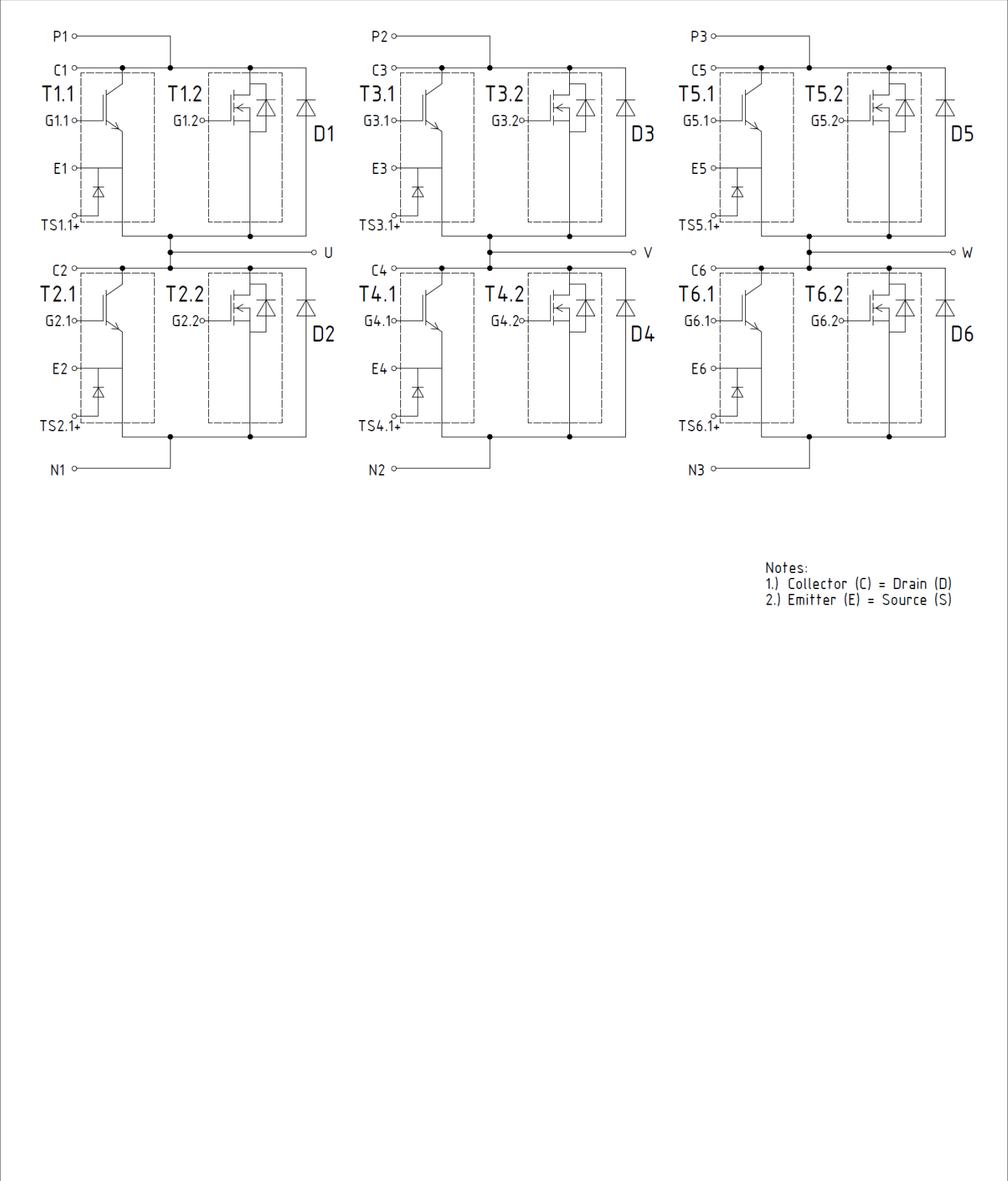


图 1



9 封装外形

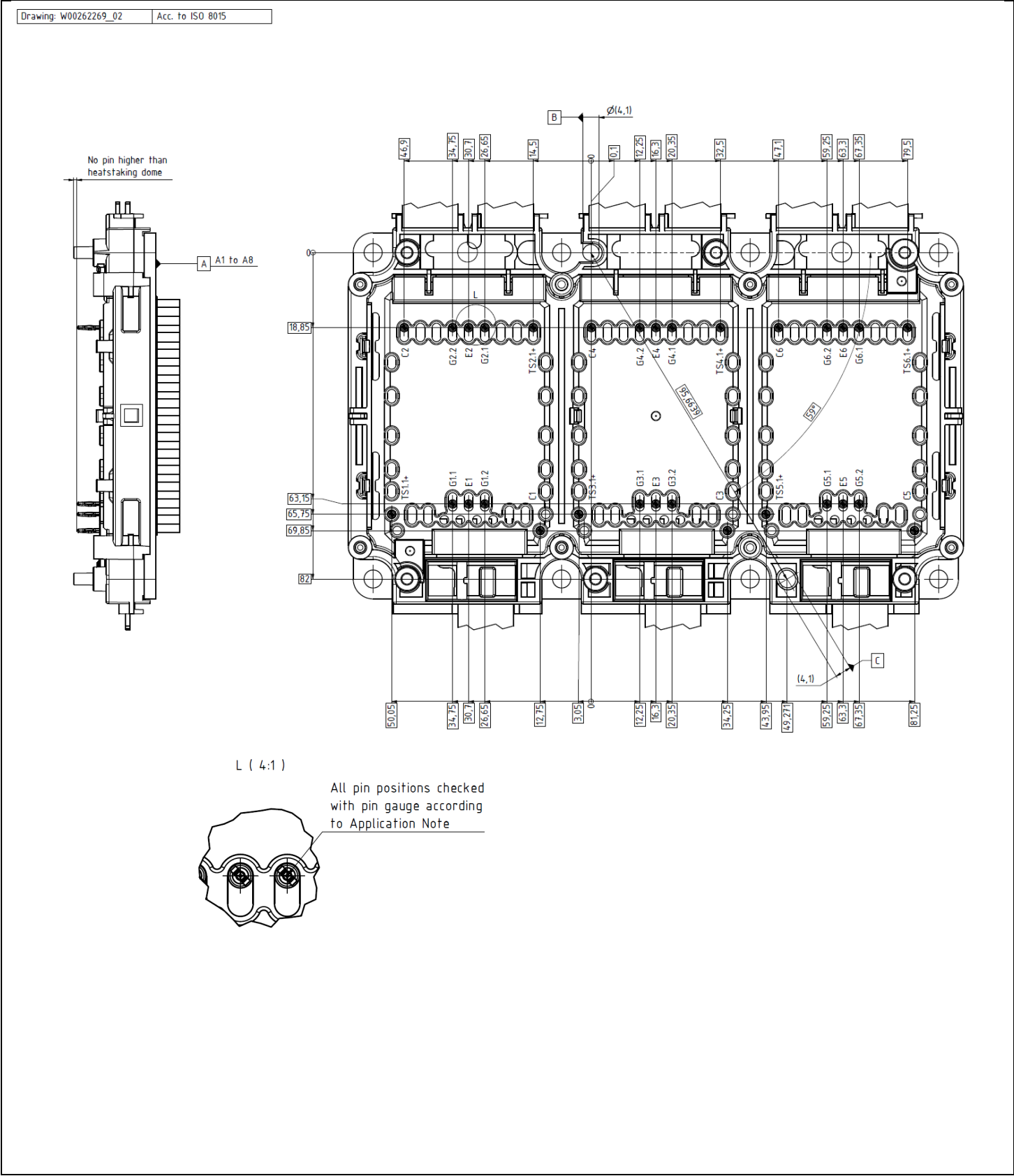
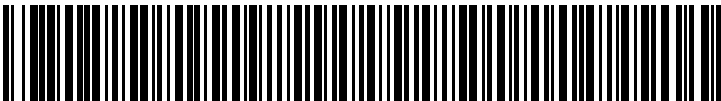


图 4

模块标签代码

模块标签代码				
Code format	Data Matrix		Barcode Code128	
Encoding	ASCII text		Code Set A	
Symbol size	16x16		23 digits	
Standard	IEC24720 and IEC16022		IEC8859-1	
Code content	<i>Content</i> Module serial number Module material number Production order number Date code (production year) Date code (production week)	<i>Digit</i> 1 – 5 6 - 11 12 - 19 20 – 21 22 – 23	<i>Example</i> 71549 142846 55054991 15 30	
Example	 71549142846550549911530  71549142846550549911530			

Packing label code				
Code format	Barcode Code128			
Encoding	Code Set A			
Symbol size	34 digits			
Standard	IEC8859-1			
Code content	<i>Content</i> Backend Construction Production Lot Number Serial Number Date code Box Quantity	<i>Identifier</i> X 1T S 9D Q	<i>Digit</i> 2 – 9 12 – 19 21 – 25 28 – 31 33 – 34	<i>Example</i> 95056609 2X0003E0 754389 1139 15
Example	 X950566091T2X0003E0S754389D1139Q15			

图 5



修订记录

修订记录

Document revision	Date of release	Description of changes
0.10	2024-08-19	Initial version
0.20	2025-07-07	Target datasheet
0.30	2025-09-19	Preliminary datasheet
1.00	2026-02-19	Final datasheet

Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

Edition 2026-02-19

Published by
Infineon Technologies AG
81726 Munich, Germany

© 2026 Infineon Technologies AG
All Rights Reserved.

Do you have a question about
any aspect of this document?
Email: erratum@infineon.com

Document reference
IFX-ABK585-004

Important notice

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

Warnings

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.



免责声明

请注意，本文件的原文使用英文撰写，为方便客户浏览英飞凌提供了中文译文。该中文译文仅供参考，并不可作为任何论点之依据。

由于翻译过程中可能使用了自动化程序，以及语言翻译和转换过程中的差异，最后的中文译文与最新的英文版本原文含义可能存在不尽相同之处。

因此，我们同时提供该中文译文版本的最新英文原文供您阅读，请参见 <http://www.infineon.com>

英文原文和中文译文版本之间若存有任何歧异，以最新的英文版本为准，并且仅认可英文版本为正式文件。

您如果使用本文件，即表示您同意并理解上述说明。英飞凌不对因翻译过程中可能存在的任何不完整或不准确信息而产生的任何直接或间接损失或损害负责。英飞凌不承担中文译文版本的完整性和准确性责任。如果您不同意上述说明，请不要使用本文件。

Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

版本 2026-09-29

Infineon Technologies AG 出版，
德国 Neubiberg 85579

版权 © 2026 Infineon Technologies AG
及其关联公司。
保留所有权利。

Do you have a question about this
document?

Email:

erratum@infineon.com

重要通知

Infineon Technologies AG 及其关联公司（以下简称“英飞凌”）销售或提供和交付的产品（可能也包括样品，且可能由硬件或软件或两者组成）（以下简称“产品”），应遵守客户与英飞凌签订的框架供应合同或其他书面协议的条款和条件，如无上述合同或其他书面协议，则应遵守适用的英飞凌销售条件。只有在英飞凌明确书面同意的情况下，客户的一般条款和条件或对适用的英飞凌销售条件的偏离才对英飞凌具有约束力。

为避免疑义，英飞凌不承担不侵犯第三方权利的所有保证和默示保证，例如对特定用途/目的的适用性或适销性的保证。

英飞凌对与样品、应用或客户对任何产品的具体使用有关的任何信息或本文件中给出的任何示例或典型值概不负责。

本文件中包含的数据仅供具有技术资格和技能的客户代表使用。客户有责任评估产品对预期应用和客户特定用途的适用性，并在预期应用和客户特定用途中验证本文件中包含的所有相关技术数据。客户有责任正确设计、编程和测试预期应用的功能性和安全性，并遵守与其使用相关的法律要求。

除非英飞凌另行明确批准，否则产品不得用于任何因产品故障或使用产品的任何后果可合理预期会导致人身伤害的应用。但是，上述规定并不妨碍客户在英飞凌明确设计和销售的使用领域中使用任何产品，但是客户对应用负有全部责任。

英飞凌明确保留根据适用法律，如《德国版权法》（UrhG）第 44b 条，将其内容用于商业资料和数据勘探（TDM）的权利。

如果产品包含安全功能：

由于任何计算设备都不可能绝对安全，尽管产品采取了安全措施，但英飞凌不保证产品不会被入侵、数据不会被盗或遗失，或不会发生其他漏洞（以下简称“安全漏洞”），英飞凌对任何安全漏洞不承担任何责任。

如果本文件包含或引用软件：

根据美国、德国和世界其他国家的知识产权法律和条约，该软件归英飞凌所有。英飞凌保留所有权利。因此，您只能按照软件附带的软件授权协议的规定使用本软件。

如果没有适用的软件授权协议，英飞凌特此授予您个人的、非排他性的、不可转让的软件知识产权授权（无权转授权）：(a) 对于以源代码形式提供的软件，仅在贵组织内部修改和复制该软件用于英飞凌硬件产品；及 (b) 对于以二进制代码 (binary code) 形式对外向终端用户分发该软件，仅得用于英飞凌硬件产品。禁止对本软件进行任何其他使用、复制、修改、翻译或编译。有关产品、技术、交货条款和条件以及价格的详细信息，请联系离您最近的英飞凌办公室或访问 <https://www.infineon.com>。