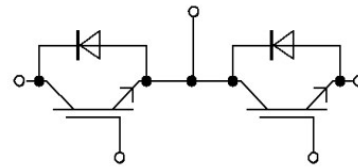


K package: 1200V 300A IGBT module



Equivalent Circuit Schematic

Features:

- 1200V 300A, $V_{CE(sat)} = 1.65V$
- Trench FS Technology
- High RBSOA capability
- Low switching losses

产品特性:

- 1200V 300A, $V_{CE(sat)} = 1.65V$
- 沟槽栅场终止 IGBT
- 高 RBSOA 性能
- 低开关断损耗

Typical Applications:

- High Power Converters
- Motor Drives
- Uninterrupted Power Supply
- Photovoltaic

典型应用:

- 大功率变流器
- 电机传动
- 不间断电源
- 光伏

IGBT, Inverter / IGBT, 逆变部分

Maximum Rated Values / 最大标称参数

Collector-emitter Voltage 集电极-发射极电压	$T_{vj}=25^{\circ}\text{C}$	V_{CES}	1200	V
Continuous DC collector current 集电极连续直流电流		$I_{C\text{ nom}}$	300	A
	$T_C=80^{\circ}\text{C}, T_{vj\text{ max}}=175^{\circ}\text{C}$	I_C	440	A
Repetitive Peak collector current 集电极可重复峰值电流	$I_{CRM}=2 \times I_{C\text{ nom}}$	I_{CRM}	600	A
Total power dissipation 总功率损耗	$T_C=25^{\circ}\text{C}, T_{vj\text{ max}}=175^{\circ}\text{C}$	P_{tot}	1875	W
Gate-emitter peak voltage 门极-发射极峰值电压		V_{GES}	± 20	V

Characteristic Values / 性能参数

				min.	typ.	max.	
Collector-emitter saturation Voltage 集电极-发射极饱和和压降	$I_C=300\text{A}, V_{GE}=15\text{V}$	$T_{vj}=25^{\circ}\text{C}$	V_{CESat}	1.65	1.95	V	
	$I_C=300\text{A}, V_{GE}=15\text{V}$	$T_{vj}=125^{\circ}\text{C}$		1.80			
	$I_C=300\text{A}, V_{GE}=15\text{V}$	$T_{vj}=150^{\circ}\text{C}$		1.85			
Gate Threshold Voltage 门极阈值电压	$V_{GE} = -15\text{ V} \dots +15\text{ V}$		V_{GEth}	5.0	5.5	7.0	V
Gate Charge 门极电荷	$V_{CC}=600\text{V}, V_{GE}=15\text{V}, I_C=300\text{A}, T_{vj}=25^{\circ}\text{C}$		Q_G		1.86		μC
Internal Gate Resistor 内置门极电阻	$T_{vj}=25^{\circ}\text{C}$		R_{Gint}		2.5		Ω
Input Capacitance 输入电容	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}$ $f = 1\text{MHz}$		C_{ies}		25.2		nF
Reverse Transfer Capacitance 反向传输电容			C_{res}		0.90		nF
Collector-emitter Cutoff Current 集电极-发射极关断漏电流	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_{vj}=25^{\circ}\text{C}$		I_{CES}			5	mA
Gate-emitter Leakage Current 门极-发射极漏电流	$V_{CE}=0\text{V}, V_{GE}=\pm 20\text{V}, T_{vj}=25^{\circ}\text{C}$		I_{GES}			± 400	nA
Turn-on Delay Time, Inductive Load 开通延迟时间, 感性负载	$I_C=300\text{A}, V_{CE}=600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Gon}=3.3\Omega$	$T_{vj}=25^{\circ}\text{C}$	t_{don}		180	ns	
		$T_{vj}=125^{\circ}\text{C}$			180		
		$T_{vj}=150^{\circ}\text{C}$			185		
Rise Time, Inductive Load 上升时间, 感性负载	$I_C=300\text{A}, V_{CE}=600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Gon}=3.3\Omega$	$T_{vj}=25^{\circ}\text{C}$	t_r		50	ns	
		$T_{vj}=125^{\circ}\text{C}$			55		
		$T_{vj}=150^{\circ}\text{C}$			55		
Turn-off Delay Time, Inductive Load 关断延迟时间, 感性负载	$I_C=300\text{A}, V_{CE}=600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Goff}=3.3\Omega$	$T_{vj}=25^{\circ}\text{C}$	t_{doff}		520	ns	
		$T_{vj}=125^{\circ}\text{C}$			585		
		$T_{vj}=150^{\circ}\text{C}$			595		
Fall Time, Inductive Load 下降时间, 感性负载	$I_C=300\text{A}, V_{CE}=600\text{V}$ $V_{GE} = \pm 15\text{V}$ $R_{Goff}=3.3\Omega$	$T_{vj}=25^{\circ}\text{C}$	t_f		80	ns	
		$T_{vj}=125^{\circ}\text{C}$			180		
		$T_{vj}=150^{\circ}\text{C}$			200		
Turn-on energy loss per pulse 开通损耗	$I_C=300\text{A}, V_{CE}=600\text{V}$ $L_o=80\text{nH}, V_{GE} = \pm 15\text{V}$ $R_{Gon}=3.3\Omega$	$T_{vj}=25^{\circ}\text{C}$	E_{on}		11.5	mJ	
		$T_{vj}=125^{\circ}\text{C}$			20.5		
		$T_{vj}=150^{\circ}\text{C}$			25.0		
Turn-off energy loss per pulse 关断损耗	$I_C=300\text{A}, V_{CE}=600\text{V},$ $L_o=80\text{nH}, V_{GE}=\pm 15\text{V}$ $V_{GE} = \pm, R_{Goff}=3.3\Omega$	$T_{vj}=25^{\circ}\text{C}$	E_{off}		26.5	mJ	
		$T_{vj}=125^{\circ}\text{C}$			33.0		
		$T_{vj}=150^{\circ}\text{C}$			34.0		

SC Data 短路耐量	$V_{CE}=600V, V_{GE}=15V/-8V,$ $T_{vj}=150^{\circ}C$	t_{psc}		10		μs
Thermal Resistance, Junction to Case 结-壳热阻	Per IGBT/单个 IGBT	R_{thJC}		0.080		K/W
Temperature under switching conditions 工作温度		$T_{vj\ op}$	-40		150	$^{\circ}C$

Diode, Inverter / 二极管, 逆变部分 Maximum Rated Values / 最大标称参数

Repetitive peak reverse voltage 可重复反向峰值电压	$T_{vj}=25^{\circ}C$	V_{RRM}		1200		V
Continuous DC Forward Current 可连续正向直流电流		I_F		300		A
Repetitive Peak Forward Current 可重复正向峰值电流	$I_{CRM}=2 \times I_{Fnom}$	I_{FRM}		600		A

Characteristic Values / 性能参数

				min.	typ.	max.	
Forward Voltage 正向通态压降	$I_F=300A, V_{GE}=0V$ $I_F=300A, V_{GE}=0V$ $I_F=300A, V_{GE}=0V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	V_F		1.90 1.85 1.85	2.40	V
Peak Reverse Recovery Current 反向恢复峰值电流	$I_F=300A, V_R=600V$ $-di_F/dt=5100A/\mu s,$ $V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	I_{RM}		235 295 310		A
Recovery Charge 反向恢复电荷	$I_F=300A, V_R=600V$ $-di_F/dt=5100A/\mu s,$ $V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	Q_R		15.0 30.0 33.0		μC
Reverse Recovery Energy 反向恢复损耗	$I_F=300A, V_R=600V$ $-di_F/dt=5100A/\mu s,$ $V_{GE}=-15V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	E_{rec}		9.50 17.5 19.5		mJ
Thermal Resistance, Junction to Case 结-壳热阻	Per Diode / 单个 Diode		R_{thJC}		0.138		K/W
Temperature under switching conditions 工作温度			$T_{vj\ op}$	-40		150	$^{\circ}C$

Module / 模块

Isolation Test Voltage 绝缘测试电压	RMS, f=50Hz, t=1min	V _{ISOL}	3.0	KV
Material of Module Baseplate 模块底板材料			Cu	
Internal Isolation 内部绝缘	基本绝缘 (class 1, IEC 61140) Basic insulation (class1,IEC 61140)		Al ₂ O ₃	
Creepage Distance 爬电距离	端子-散热片 terminal to heatsink 端子-端子 terminal to terminal		29.0 23.0	mm
Clearance 电气间隙	端子-散热片 terminal to heatsink 端子-端子 terminal to terminal		23.0 11.0	mm
Comparative Tracking Index 相对漏电起痕指数		CTI	>400	

min. typ. max.

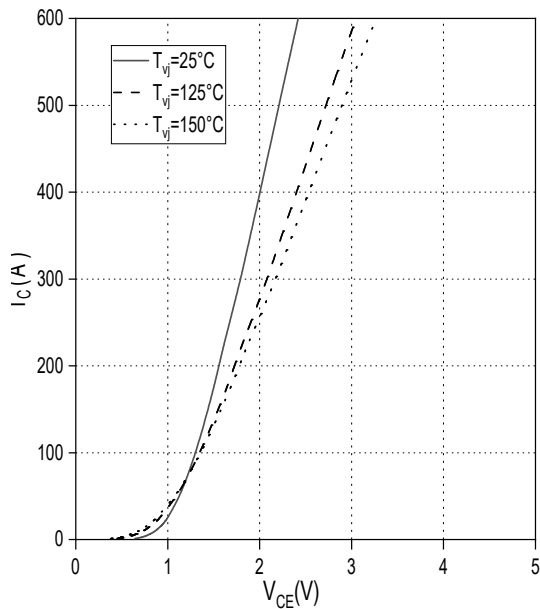
Thermal resistance, case to heatsink 外壳-散热器热阻	每个模块/per module $\lambda_{\text{Paste}} = 1W/(m \cdot K) / \lambda_{\text{grease}} = 1W/(m \cdot K)$	R _{thCH}	0.01		K/W
Stray Inductance Module 模块杂散电感		L _{sCE}	20		nH
Module Lead Resistance, Terminals-Chip 模块引脚电阻, 端子-芯片	T _C =25°C,每个开关 per switch	R _{CC'+EE'}	0.70		mΩ
Storage Temperature 贮存温度		T _{stg}	-40	125	°C
Modul Mounting torque 模块安装扭距	M6	M	3.0	6.0	Nm
Terminal Mounting torque 端子安装扭距	M6	M	2.5	5.0	Nm
Weight 重量		G	320		g

输出特性 IGBT, 逆变器(典型值)

Output characteristic IGBT Inverter (typical)

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

$V_{GE} = 15V$

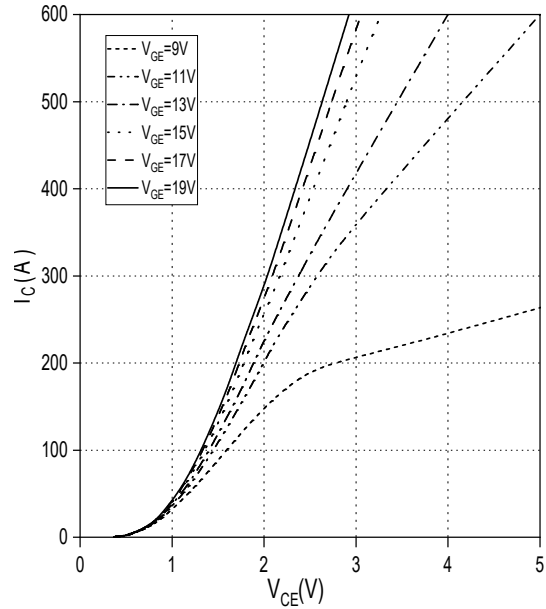


输出特性 IGBT, 逆变器(典型值)

output characteristic IGBT Inverter (typical)

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

$T_{vj} = 150^{\circ}C$

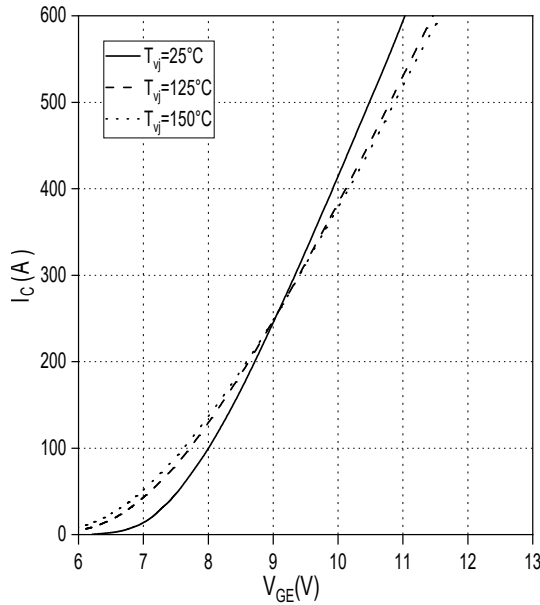


传输特性 IGBT, 逆变器 (典型值)

Transfer characteristic IGBT, Inverter (typical)

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

$V_{CE} = 20V$

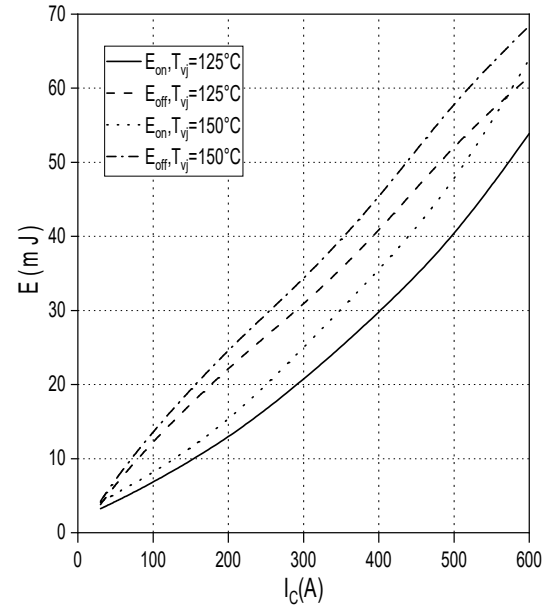


开关损耗 IGBT, 逆变器 (典型值)

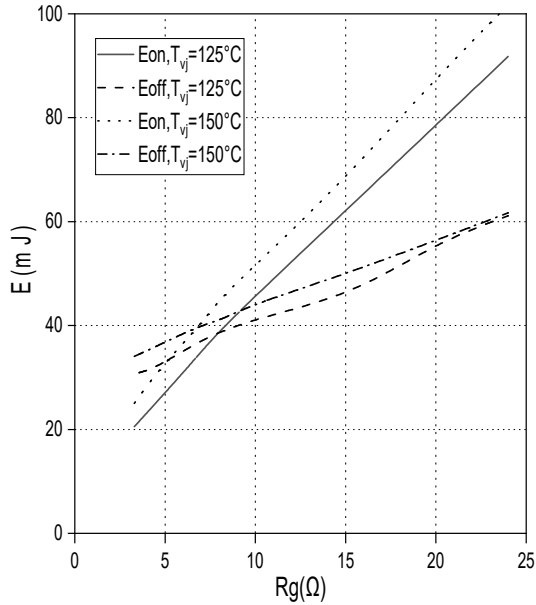
switching losses IGBT, Inverter (typical)

$E_{on} = f(I_C), E_{off} = f(I_C), V_{GE} = \pm 15V$,

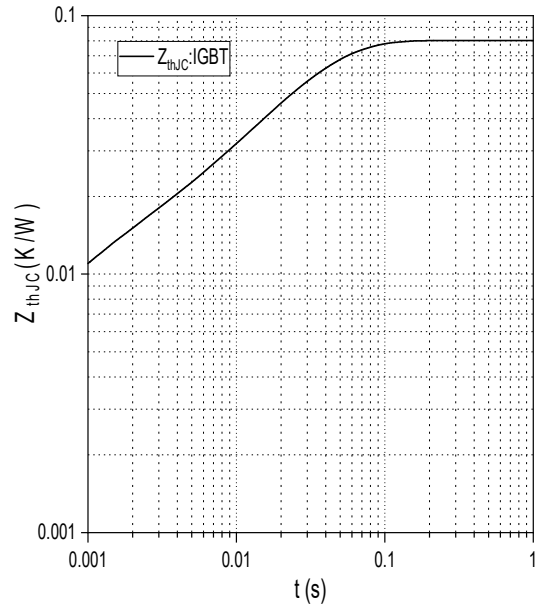
$R_{Gon} = 3.3\Omega, R_{Goff} = 3.3\Omega, V_{CE} = 600V$



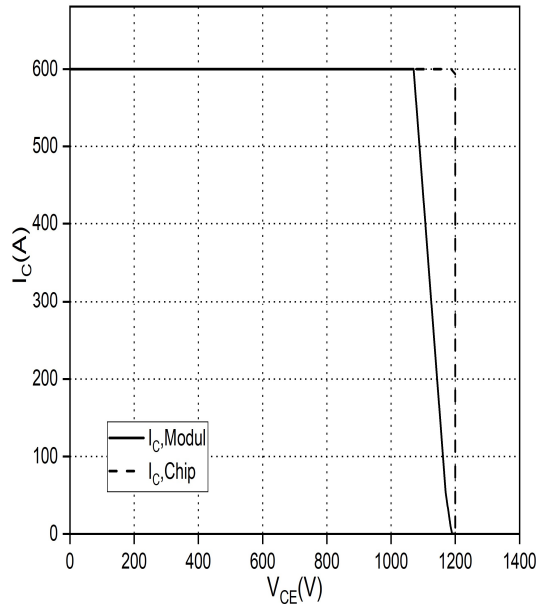
开关损耗 IGBT, 逆变器 (典型值)
Switching losses IGBT, Inverter (typical)
 $V_{GE} = \pm 15V, I_C = 300A, V_{CE} = 600V$



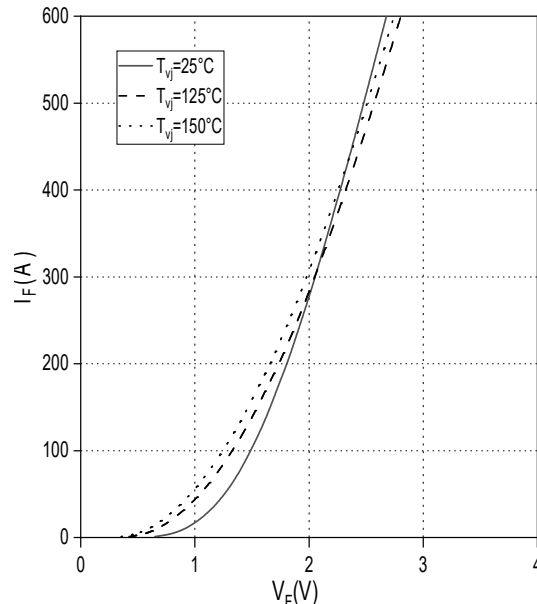
瞬态热阻抗 IGBT, 逆变器
transient thermal impedance IGBT, Inverter
 $Z_{thJC} = f(t)$



反偏安全工作区 IGBT, 逆变器(RBSOA)
Reverse bias safe operating area IGBT, Inverter (RBSOA) $I_C = f(V_{CE})$
 $V_{GE} = \pm 15V, R_{Goff} = 3.3\Omega, T_{vj} = 150^\circ C$

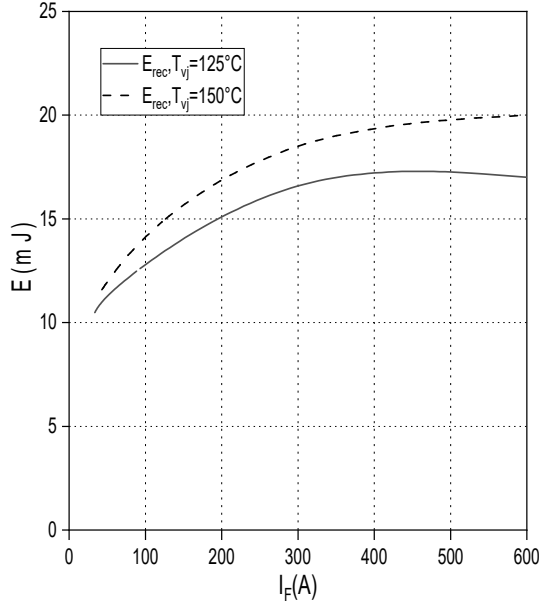


正向偏压特性二极管, 逆变器 (典型值)
forward characteristic of Diode, Inverter (typical)
 $I_F = f(V_F)$



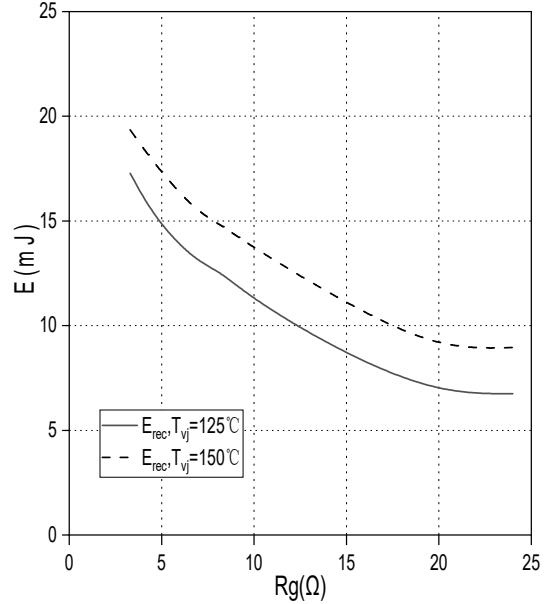
开关损耗二极管,逆变器 开关损耗 (典型值)
Switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$
 $R_{Gon} = 3.3\Omega, V_{CE} = 600V$



二极管,逆变器 (典型值)
switching losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$
 $I_F = 300A, V_{CE} = 600V$



瞬态热阻抗二极管,逆变器
transient thermal impedance Diode, Inverter

$Z_{thJC} = f(t)$

