

## XNG450B24KC2S5

### ■ 特点/Features

- ◆ 低 Vcesat/ Low Vcesat
- ◆ 高可靠性和功率密度/High reliability and Power density
- ◆ 低开关损耗/Low switching loss

### ■ 应用领域/Applications

- ◆ UPS 系统/UPS Systems
- ◆ 风力发电机/Wind Tuebines
- ◆ 电机传动/Motor Drives



### ■ 关键性能和封装信息/Key Performance and Package Parameters

Type	V <sub>CE</sub>	I <sub>C</sub>	V <sub>CEsat</sub> , T <sub>vj</sub> =25°C	T <sub>vjmax</sub>	Package
XNG450B24KC2S5	1200V	450A	1.79V	175°C	C2

■ IGBT-逆变器/IGBT-Inverter

最大额定值/Maximum Rated Values

符号 symbol	参数 Parameter	条件 Condition	值 Value	单位 Unit
$V_{CES}$	Collector-to-Emitter Voltage 集电极 - 发射极电压	$T_{vj}=25\text{ }^{\circ}\text{C}$	1200	V
$I_{C\ nom}$	Continuous DC collector current 连续集电极直流电流	$T_C = 100^{\circ}\text{C}, T_{vj\ max}=175\text{ }^{\circ}\text{C}$	450	A
$I_{CRM}$	Repetitive peak collector current 集电极重复峰值电流	$t_p=1\text{ms}$	900	A
$P_{total}$	Total power dissipation 总功率损耗	$T_C = 25^{\circ}\text{C}, T_{vj\ max}=175\text{ }^{\circ}\text{C}$	2400	W
$V_{GES}$	Gate-Emitter peak voltage 栅极 - 发射极峰值电压		+/- 20	V

静态电气参数/Static Electrical Characteristic

符号 symbol	参数 Parameter	测试条件 Test Condition	值 Value			单位 Unit
			Min. 最小	Typ. 典型	Max. 最大	
$V_{CE(sat)}$	Collector-Emitter Saturation voltage 集电极 - 发射极饱和电压	$V_{GE}=15\text{V},$ $I_C=450\text{A}, T_{vj}=25^{\circ}\text{C}$	—	1.79	—	V
		$V_{GE}=15\text{V},$ $I_C=450\text{A}, T_{vj}=150^{\circ}\text{C}$	—	2.07	—	V
$V_{GE(th)}$	Gate threshold voltage 门极开启阈值电压	$V_{GE}= V_{CE}, I_c = 17\text{mA}$	5	5.5	6.0	V
$C_{iss}$	Input capacitance 输入电容	$V_{GE} = 0\text{V}$ $V_{CE}= 25\text{V}$ $T_{vj}=25^{\circ}\text{C}$ $f = 1\text{MHz}$	—	32	—	nF
$C_{oss}$	Output capacitance 输出电容		—	2.36	—	nF
$C_{rss}$	Reverse transfer capacitance 反向传输电容		—	1.0	—	nF
$Q_g$	Total gate charge 栅极电荷	$V_{GE} = -15\text{.....}+15\text{V}$	—	2.36	—	$\mu\text{C}$
$R_g$	Internal gate resistor 内部栅极电阻	$T_{vj}=25^{\circ}\text{C}$	—	2.36	—	$\Omega$
$I_{CES}$	Collector-Emitter leakage current 集电极-发射极截止电流	$V_{CE}=1200\text{V},$ $V_{GE} = 0\text{V}, T_{vj}=25^{\circ}\text{C}$	-	-	5.0	mA
$I_{GES}$	Gate-Emitter leakage current 栅极-发射极漏电流	$V_{CE}=0\text{V}, V_{GE}=20\text{V},$ $T_{vj}=25^{\circ}\text{C}$	-	-	400	nA

动态电气参数/Switching Electrical Characteristic

符号 symbol	参数 Parameter	测试条件 Test Condition	值 Value			单位 Unit
			Min. 最小	Typ. 典型	Max. 最大	
$T_{d(on)}$	Turn-On DelayTime 开通延迟时间	$T_{vj}=25^{\circ}C, V_{CE}=600V,$ $I_c=450A, R_g=1.0\Omega,$ $V_{GE}=+15V$	-	279	-	ns
$T_r$	Rise Time 上升时间		-	94	-	ns
$T_{d(off)}$	Turn-Off DelayTime 关断延迟时间		-	728	-	ns
$T_f$	Turn-Off Fall Time 下降时间		-	88	-	ns
$T_{d(on)}$	Turn-On DelayTime 开通延迟时间	$T_{vj}=150^{\circ}C, V_{CE}=600V,$ $I_c=450A, R_g=1.0\Omega,$ $V_{GE}=+15V$	-	286	-	ns
$T_r$	Rise Time 上升时间		-	100	-	ns
$T_{d(off)}$	Turn-Off DelayTime 关断延迟时间		-	765	-	ns
$T_f$	Turn-Off Fall Time 下降时间		-	129	-	ns
$E_{on}$	Turn-on switch loss 开通损耗	$T_{vj}=25^{\circ}C, V_{CE}=600V,$ $I_c=450A, R_g=1.0\Omega,$ $V_{GE}=+15V$	-	43	-	mJ
$E_{off}$	Turn-off switch loss 关断损耗		-	57	-	mJ
$E_{on}$	Turn-on switch loss 开通损耗	$T_{vj}=150^{\circ}C, V_{CE}=600V,$ $I_c=450A, R_g=1.0\Omega,$ $V_{GE}=+15V$	-	53	-	mJ
$E_{off}$	Turn-off switch loss 关断损耗		-	63	-	mJ
$I_{sc}$	Short-circuit current 短路电流	$T_{vj}=25^{\circ}C, V_{GE}=15V,$ $V_{CE}=800V, t_p < 10\mu s$	-	2500	-	A
$R_{thJC}$	Junction-Case Thermal resistance 结 - 外壳热阻	-	-	-	0.062	K/W
$T_{vj op}$	Temperature under switching 在开关状态下温度	-	-40	-	150	$^{\circ}C$

■ 二极管-逆变器/Diode-Inverter

最大额定值/Maximum Rated Values

符号 symbol	参数 Parameter	条件 Condition	值 Value	单位 Unit
$V_{RRM}$	Repetitive peak reverse voltage 反向重复峰值电压	$T_{vj}=25\text{ }^{\circ}\text{C}$	1200	V
$I_F$	Continuous DC forward current 连续正向直流电流		450	A
$I_{FRM}$	Repetitive peak forward current 正向重复峰值电流	$T_p=1\text{ms}$	900	A
$I^2t$	$I^2t$ Data	$V_R=0\text{V}, T_p=10\text{ms}, T_{vj}=25\text{ }^{\circ}\text{C}$	34000	A <sup>2</sup> S

静态电气参数/Static Electrical Characteristic

符号 symbol	参数 Parameter	测试条件 Test Condition	值 Value			单位 Unit
			Min. 最小	Typ. 典型	Max. 最大	
$V_F$	Forward voltage 正向电压	$I_F=600\text{A}, T_{vj}=25\text{ }^{\circ}\text{C}$	-	2.35	-	V
		$I_F=600\text{A}, T_{vj}=150\text{ }^{\circ}\text{C}$	-	2.48	-	V

动态电气参数/Switching Electrical Characteristic

符号 symbol	参数 Parameter	测试条件 Test Condition	值 Value			单位 Unit
			Min. 最小	Typ. 典型	Max. 最大	
$I_{RM}$	Peak reverse recovery current 反向恢复峰值电流	$I_F=450\text{A}, V_R=600\text{V}$ $T_{vj}=25\text{ }^{\circ}\text{C}$	-	216	-	A
		$I_F=450\text{A}, V_R=600\text{V}$ $T_{vj}=150\text{ }^{\circ}\text{C}$	-	309	-	A
$Q_r$	Recovery charge 恢复电荷	$I_F=450\text{A}, V_R=600\text{V}$ $T_{vj}=25\text{ }^{\circ}\text{C}$	-	21	-	uC
		$I_F=450\text{A}, V_R=600\text{V}$ $T_{vj}=150\text{ }^{\circ}\text{C}$	-	55	-	uC
$E_{rec}$	Reverse recovery energy 反向恢复损耗	$I_F=450\text{A}$ $V_R=600\text{V}$ $T_{vj}=25\text{ }^{\circ}\text{C}$	-	11	-	mJ
		$I_F=450\text{A}$ $V_R=600\text{V}$ $T_{vj}=150\text{ }^{\circ}\text{C}$	-	27	-	mJ
$R_{ThJC}$	Junction-Case Thermal resistance 结-外壳热阻		-	-	0.145	K/W
$T_{VJ OP}$	Temperature under switching 在开关状态下温度		-40	-	150	$^{\circ}\text{C}$

## ■ 模块/Module

符号 symbol	参数 Parameter	测试条件 Test Condition	值 Value			单位 Unit
			Min. 最小	Typ. 典型	Max. 最大	
V <sub>ISOL</sub>	Isolation voltage 绝缘测试电压	RMS,f=50Hz,t=1min	-	4.0	-	kV
	Material of Base plate 模块基板材料		-	Cu	-	
	Internal Isolation 内部绝缘	Basic insulation (class1,IEC61140)	-	Al <sub>2</sub> O <sub>3</sub>	-	
R <sub>thCH</sub>	Junction to heatsink, Thermal Resistance 外壳 - 散热器热阻		-	0.009	-	K/W
L <sub>s CE</sub>	Stray induction module 杂散电感,模块		-	25	-	nH
R <sub>CC'+EE'</sub>	Module lead resistance 模块引线电阻,端子-芯片	T <sub>C</sub> = 25 °C	-	1.5	-	mΩ
T <sub>STG</sub>	Storage Temperature 储存温度		-40	-	+150	°C
M	Mounting torque for modul mounting 模块安装的 安装扭距	Mounting to heat sink M5	3.0	-	6.0	Nm
	Terminal connection torque 端子联接扭距	Main Terminal M6	2.5	-	5.0	Nm
G	Weigh 重量		-	350	-	g

■ 特征曲线/Characteristic Curve

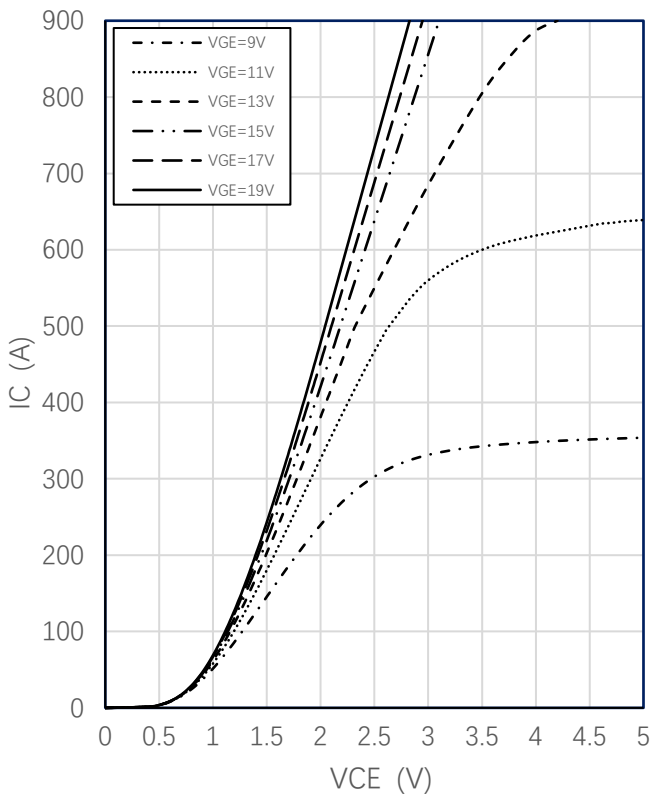


图 1: 输出特性@150°C/Typical Output Characteristic @150°C

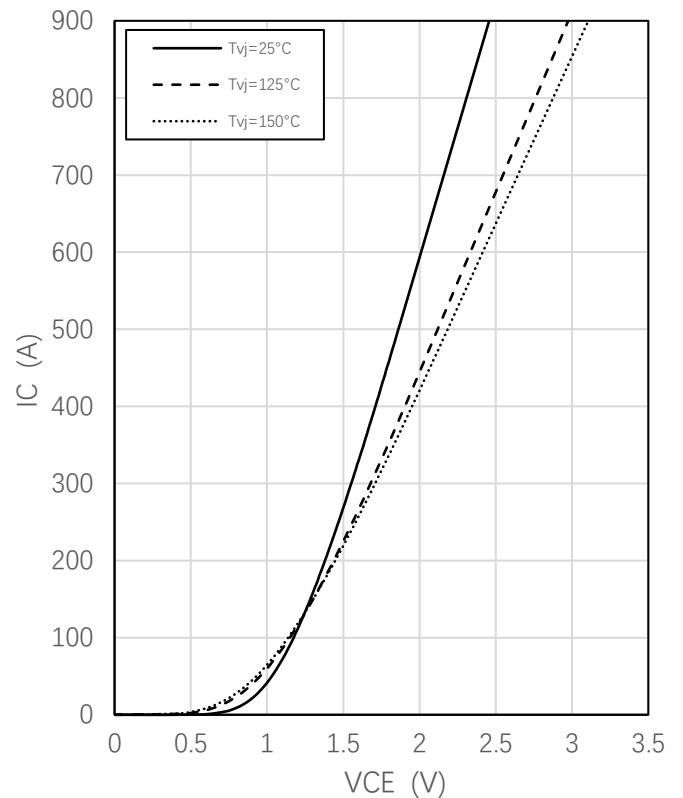


图 2: 输出特性@/Typical Output Characteristic

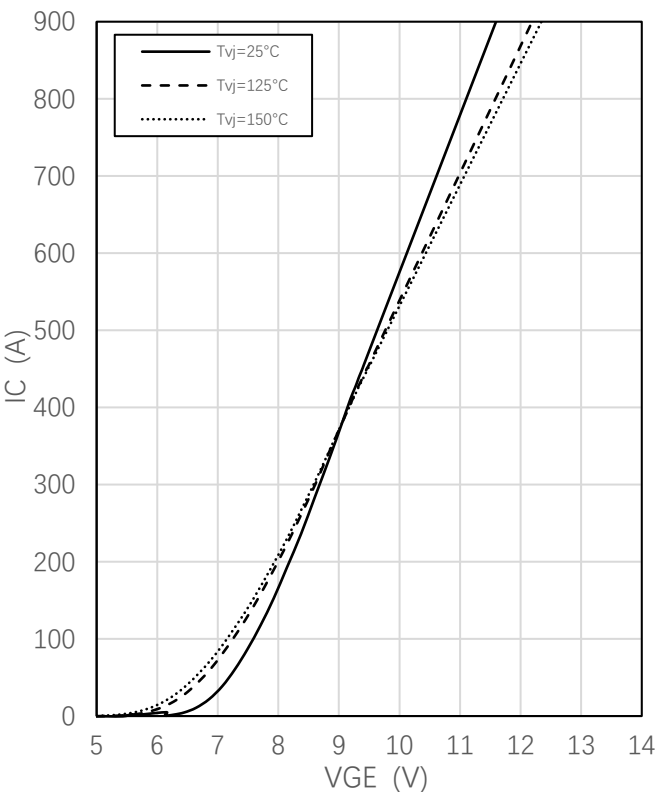


图 3: 传输特性/Transfer Characteristic

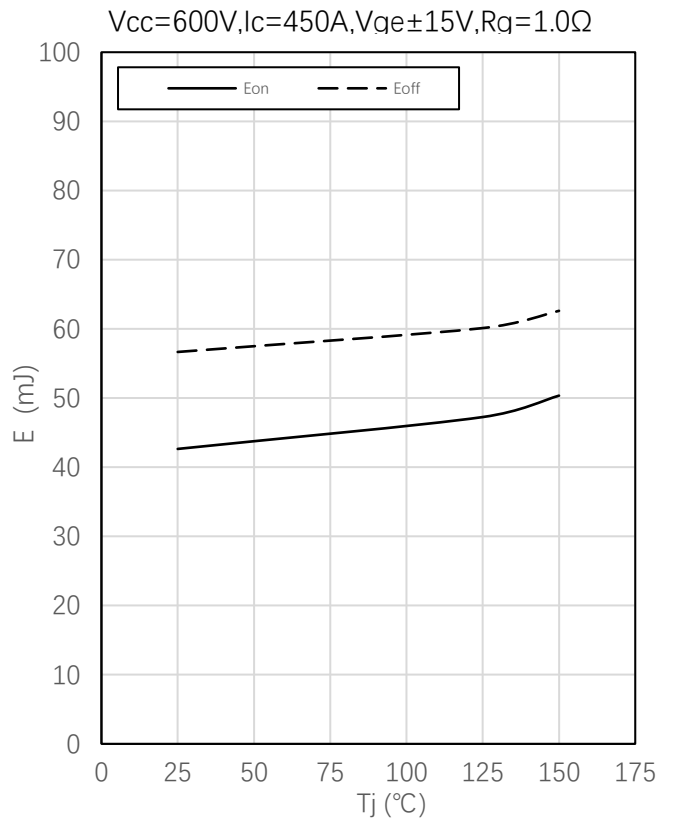


图 4: 动态损耗-温度特性/Typical switching losses as  $T_j$

Vcc=600V, Vge=±15V, Rg=1.0Ω

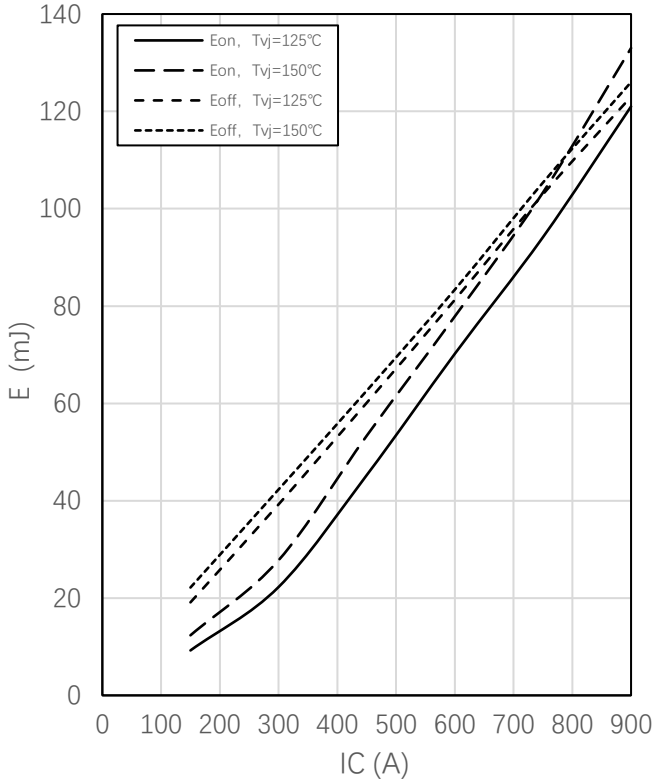


图 5: 动态损耗-电流特性/Typical switching losses as  $I_c$

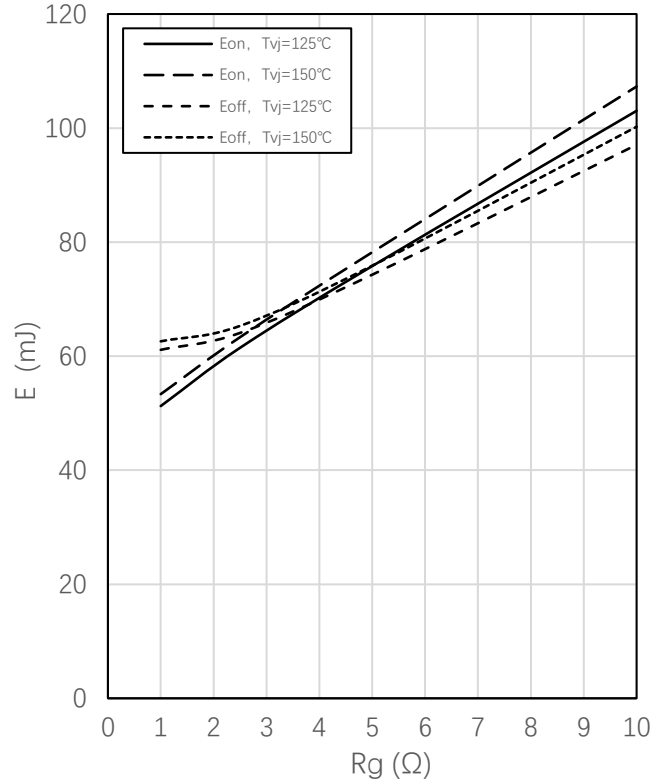


图 6: 动态损耗-门极电阻特性/Typical switching losses as  $R_g$

Vcc=600V, Vge=±15V, IF=450A

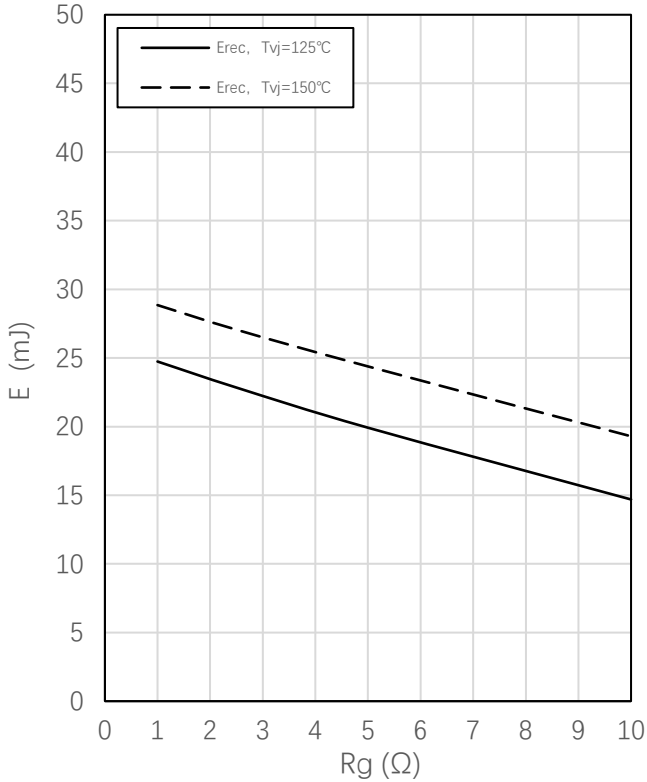


图 7: 反向恢复损耗-门极电阻特性/Typical EREC as a function of  $R_g$

Vcc=600V, Vge=±15V, Rg=1.0Ω

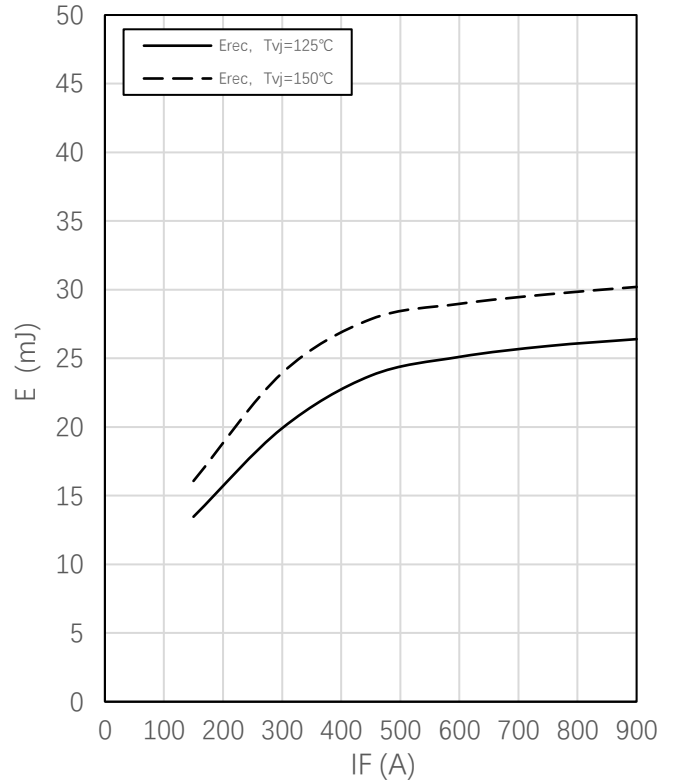


图 8: 反向恢复损耗-电流/Typical EREC as a function of  $I_c$  as  $T_j$

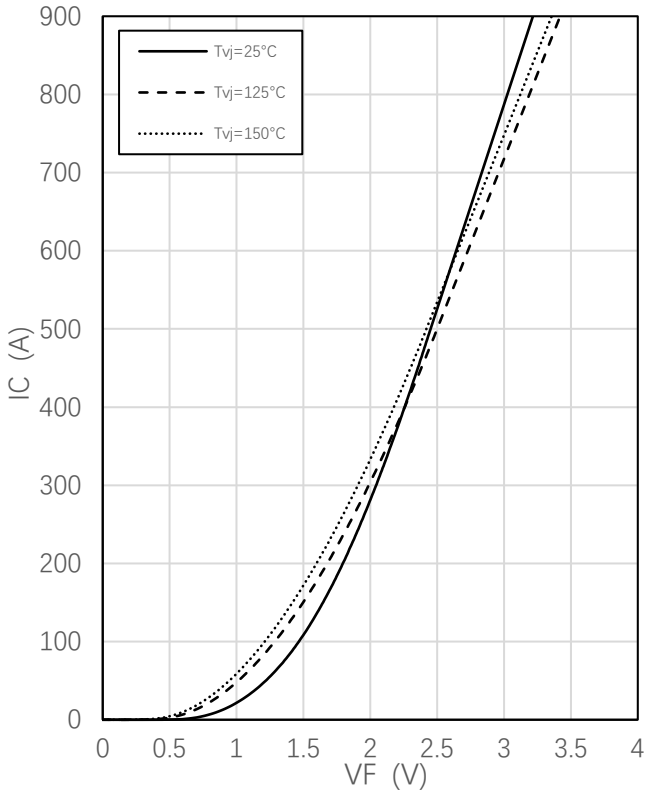


图 9: 二极管压降/Typical  $I_F$  as a function of  $V_F$

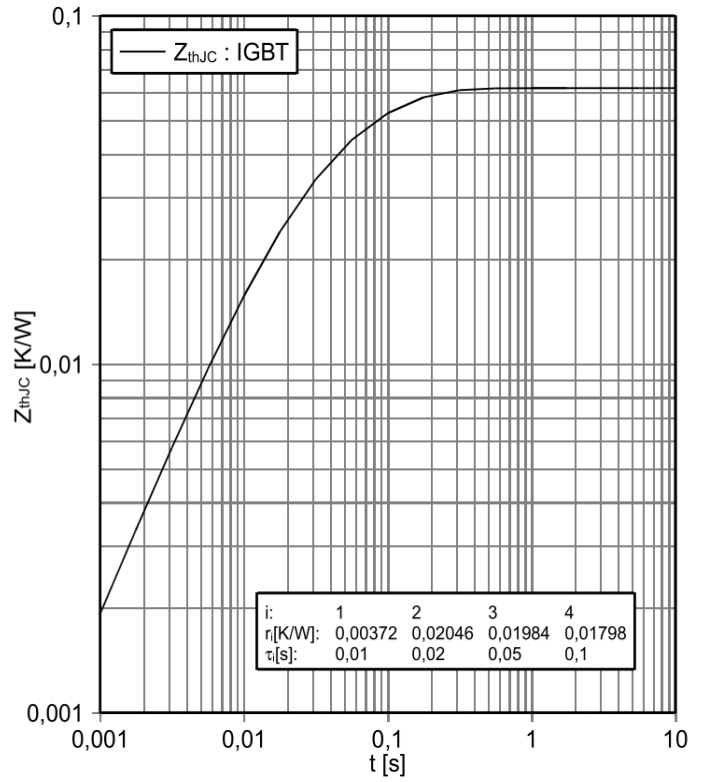


图 10: IGBT 瞬态热阻抗/IGBT Transient Thermal Impedance

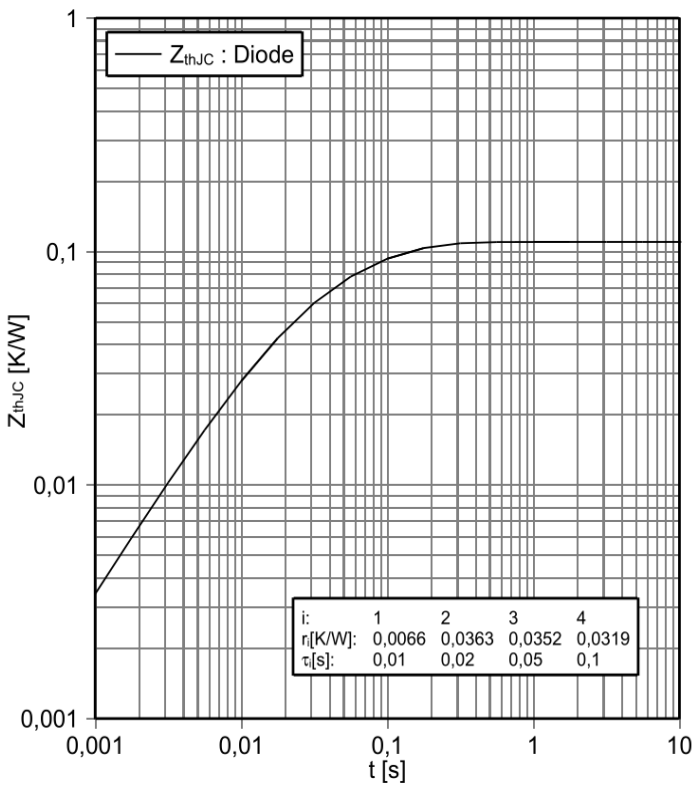


图 11: 二极管瞬态热阻抗/Diode Transient Thermal Impedance





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