DATASHEET 规格书

SISD0600ED120i20

ED-Type phase leg IGBT module
ED 封装半桥 IGBT 模块

V_{CE} = 1200 V
I_C = 2 x 600 A

- *i20* ultra-low loss fine pattern Trench IGBT chipset
  i20 超低损耗精细沟槽栅型 IGBT 芯片组
- Baseplate isolation with efficient Al_2O_3 ceramic
  高效 Al_2O_3 绝缘陶瓷基板
- Cu baseplate for low thermal resistance
  低热阻铜底板
- Industry standard package
  行业标准封装

Maximum ratings[1] 最大额定值 [1]

PARAMETER 参数	SYMBOL 符号	CONDITIONS 工作条件	MIN 最小值	MAX 最大值	UNIT 单位
Collector-emitter voltage 集电极-发射极电压	V_{CES}	V_{GE} = 0 V, T_{vj} = 25 °C		1200	V
DC collector current 集电极直流电流	I_C	T_C = 120 °C, T_{vj} = 175 °C		600	A
Peak collector current 集电极峰值电流	I_{CM}	t_p = 1 ms		1200	A
Gate-emitter voltage 栅极-发射极驱动电压	V_{GES}		-20	20	V
Total power dissipation 最大功率损耗	P_{tot}	T_C = 25 °C, T_{vj} = 175 °C, per switch		3260	W
DC forward current 二极管直流正向电流	I_F			600	A
Peak forward current 二极管最大脉冲正向电流	I_{FRM}	t_p = 1 ms		1200	A
Surge current 二极管最大浪涌电流	I_{FSM} I^2t	V_R = 0 V, T_{vj} = 150 °C, t_p = 10 ms, half-sinewave		2750 37500	A A^2s
Isolation voltage 绝缘电压	V_{isol}	1 min, f = 50 Hz		3400	V
Junction operating temperature 运行结温	$T_{vj(op)}$		-40	175[2]	°C
Case temperature 壳温	T_C		-40	125[3]	°C
Storage temperature 存储温度	T_{stg}		-40	125	°C
Mounting torques 紧固力矩[4]	M_S	Base-heatsink, M5 screws	3	6	Nm
	M_{t1}	Main terminals, M6 screws	3	6	Nm

Scan for latest download 扫描最新下载

---

[1] Maximum rated values indicate limits beyond which damage to the device may occur per IEC 60747; 根据标准 IEC 60747 要求，最大额定值表示超过该限值可能会对器件造成损坏

[2] $T_{vj(op)}$ > 150°C allowed for overload conditions, in maximum for 60s and less than 20% of operation time; 过载条件下 Tvj(op) > 150°C 时，允许运行的时间不超过 60s，或者小于运行时间的 20%

[3] For UL1557 compliance T_{Cmax} must be limited to 125°C; UL1557 标准中要求，最大壳温不能超过 125℃

[4] For details, please refer to the mounting instructions. 详细信息，请参考安装说明书

IGBT[5]

PARAMETER 参数	SYMBOL 符号	CONDITIONS 工作条件		MIN 最小值	TYP 典型	MAX 最大值	UNIT 单位
Collector(-emitter) breakdown voltage 集电极-发射极击穿电压	$V_{(BR)CES}$	V_{GE} = 0 V, I_C = 10 mA, T_{vj} = 25°C		1200			V
Collector-emitter saturation voltage [6] 集电极-发射极饱和电压	V_{CEsat}	I_c = 600 A, V_{GE} = 15 V	T_{vj} = 25 °C		1.5	1.9	V
			T_{vj} = 125 °C		1.7		V
			T_{vj} = 175 °C		1.8		V
Collector cut-off current 集电极截止电流	I_{CES}	V_{CE} = 1200 V, V_{GE} = 0 V	T_{vj} = 25 °C			1	mA
			T_{vj} = 125 °C		1		mA
			T_{vj} = 175 °C		20		mA
Gate leakage current 栅极漏电流	I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V		-0.5		0.5	µA
Gate-emitter threshold voltage 栅极-发射极阈值电压	$V_{GE(th)}$	I_C = 30 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		5	6.2	7.5	V
Gate charge 栅极电荷	Q_G	I_C = 600 A, V_{CE} = 600 V, V_{GE} = -15 V .. 15 V			5.3		µC
Input capacitance 输入电容	C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz, T_{vj} = 25 °C			44		nF
Output capacitance 输出电容	C_{oes}				3.9		nF
Reverse tansfer capacitance 反向传输电容	C_{res}				2.1		nF
Internal gate resistor 栅极内阻	R_{Gint}	Per switch			1.2		Ω
Turn-on delay time 开通延迟	$t_{d(on)}$	V_{CC} = 600 V, I_C = 600 A, R_G = 0.47 Ω, V_{GE} = ± 15 V, L_s = 30 nH, inductive load	T_{vj} = 25 °C		120		ns
			T_{vj} = 125 °C		145		ns
			T_{vj} = 175 °C		155		ns
Rise time 上升时间	t_r		T_{vj} = 25 °C		60		ns
			T_{vj} = 125 °C		67		ns
			T_{vj} = 175 °C		70		ns
Turn-off delay time 关断延迟	$t_{d(off)}$	V_{CC} = 600 V, I_C = 600 A, R_G = 1.5 Ω, V_{GE} = ± 15 V, L_s = 30 nH, inductive load	T_{vj} = 25 °C		575		ns
			T_{vj} = 125 °C		685		ns
			T_{vj} = 175 °C		735		ns
Fall time 下降时间	t_f		T_{vj} = 25 °C		165		ns
			T_{vj} = 125 °C		290		ns
			T_{vj} = 175 °C		335		ns
Turn-on switching energy 开通损耗	E_{on}	V_{CC} = 600 V, I_C = 600 A, R_G = 0.47 Ω, V_{GE} = ± 15 V, L_s = 30 nH, inductive load	T_{vj} = 25 °C		20		mJ
			T_{vj} = 125 °C		50		mJ
			T_{vj} = 175 °C		73		mJ
Turn-off switching energy 关断损耗	E_{off}	V_{CC} = 600 V, I_C = 600 A, R_G = 1.5 Ω, V_{GE} = ± 15 V, L_s = 30 nH, inductive load	T_{vj} = 25 °C		66		mJ
			T_{vj} = 125 °C		90		mJ
			T_{vj} = 175 °C		100		mJ
Short circuit current 短路电流	I_{SC}	t_{pcs} ≤ 10 µs, V_{GE} = 15 V, T_{vj} = 175 °C, V_{CC} = 800 V, $V_{CEM\ Chip}$ ≤ 1200 V			2000		A

---

[5] Characteristic values according to IEC 60747-9

[6] Collector-emitter saturation voltage is given at chip-level 集电极-发射极饱和电压

Diode[7]

PARAMETER 参数	SYMBOL 符号	CONDITIONS 工作条件		MIN 最小值	TYP 典型	MAX 最大值	UNIT 单位
Forward voltage[8] 正向压降	V_F	I_F = 600 A	T_{vj} = 25 °C		1.85	2.3	V
			T_{vj} = 125 °C		1.95		V
			T_{vj} = 175 °C		2.00		V
Peak reverse recovery current 反向恢复电流峰值	I_{RM}	V_R = 600 V, I_F = 600 A, dI/dt = 9000 A/µs (175 °C), R_G = 0.47 Ω, V_{GE} = ± 15 V, L_s = 30 nH, inductive load	T_{vj} = 25 °C		485		A
			T_{vj} = 125 °C		570		A
			T_{vj} = 175 °C		585		A
Recovery charge 恢复电荷	Q_{rr}		T_{vj} = 25 °C		53		µC
			T_{vj} = 125 °C		75		µC
			T_{vj} = 175 °C		133		µC
Reverse recovery time 反向恢复时间	t_{rr}		T_{vj} = 25 °C		155		ns
			T_{vj} = 125 °C		700		ns
			T_{vj} = 175 °C		840		ns
Reverse recovery energy 反向恢复能量	E_{rec}		T_{vj} = 25 °C		27		mJ
			T_{vj} = 125 °C		43		mJ
			T_{vj} = 175 °C		55		mJ

Package properties 封装特性[9]

PARAMETER 参数	SYMBOL 符号	CONDITIONS 工作条件		MIN 最小值	TYP 典型	MAX 最大值	UNIT 单位
IGBT thermal resistance junction to case IGBT 结-壳热阻	$R_{th(j-c)IGBT}$	Per switch				0.046	K/W
Diode thermal resistance junction to case 二极管结-壳热阻	$R_{th(j-c)Diode}$					0.077	K/W
IGBT thermal resistance case to heatsink IGBT 壳到散热器热阻	$R_{th(c-s)IGBT}$	IGBT per switch			0.030		K/W
Diode thermal resistance case to heatsink 二极管壳到散热器热阻	$R_{th(c-s)Diode}$	diode per switch			0.036		K/W
Comparative tracking index 相对漏电起痕指数	CTI			200			
Module stray inductance 模块自身杂散电感	$L_{s\ CE}$	Per switch			20		nH
Resistance, terminal chip 端子到芯片之间的阻抗	$R_{CC'+EE'}$	Per switch	T_{vj} = 25 °C		0.9		mΩ
			T_{vj} = 125 °C		1.25		mΩ
			T_{vj} = 175 °C		1.4		mΩ

---

[7] Characteristic values according to IEC 60747-2

[8] Forward voltage is given at chip-level 正向压降是芯片两端的电压值。

[9] Package and mechanical properties according to IEC 60747-15

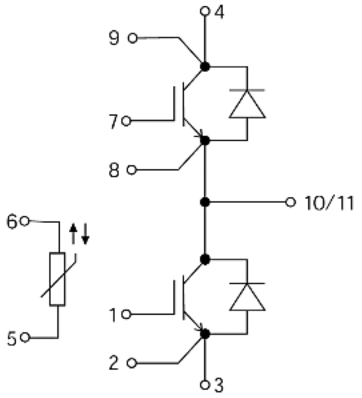
Mechanical properties 机械特性

PARAMETER 参数	SYMBOL 符号	CONDITIONS 工作条件		MIN 最小值	TYP 典型	MAX 最大值	UNIT 单位
Dimensions	L x W x H	Typical		152 x 62 x 17			mm^3
Clearance distance in air 电气间隙	d_a	According to IEC 60664-1 and EN 50124-1	Terminal to base:	12.5			mm
			Terminal to terminal:	10			mm
Surface creepage distance 爬电距离	d_s	According to IEC 60664-1 and EN 50124-1	Terminal to base:	14.5			mm
			Terminal to terminal:	13			mm
Mass 重量	M				350		g

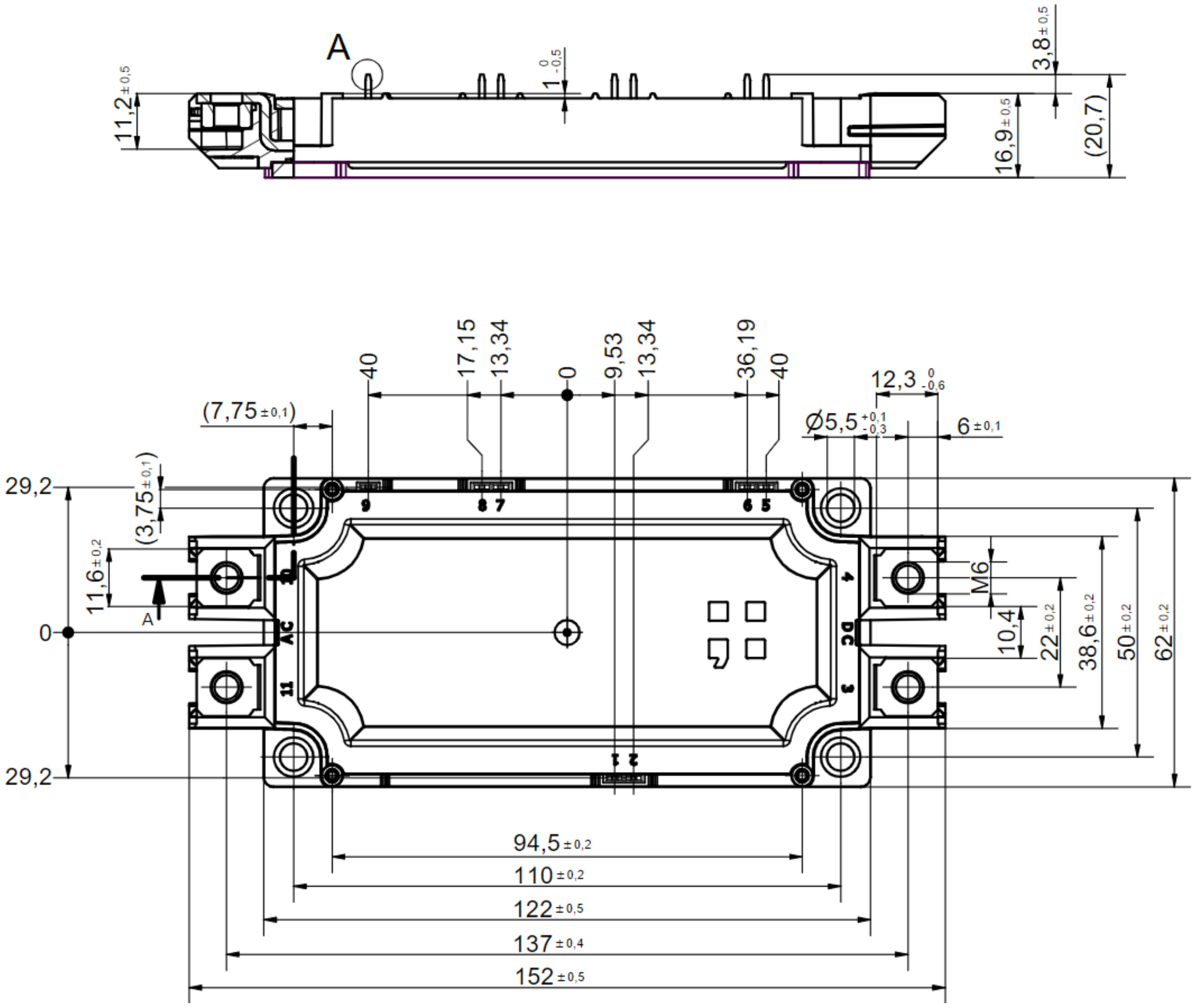
NTC Thermistor

PARAMETER 参数	SYMBOL 符号	CONDITIONS 工作条件	MIN 最小值	TYP 典型	MAX 最大值	UNIT 单位
Rated resistance 额定电阻	R_{25}	$T_C = 25$ °C		5		kΩ
R100	R_{100}	$T_C = 100$ °C	468		518	Ω
B-value B 值	$B_{25/50}$	$R_2 = R_{25} \exp [B_{25/50}(1/T2 - 1/(298.15K))]$		3375		K
B-value B 值	$B_{25/100}$	$R_2 = R_{25} \exp [B_{25/100}(1/T2 - 1/(298.15K))]$		3433		K

Electrical configuration 电气图



Outline drawing 外形图

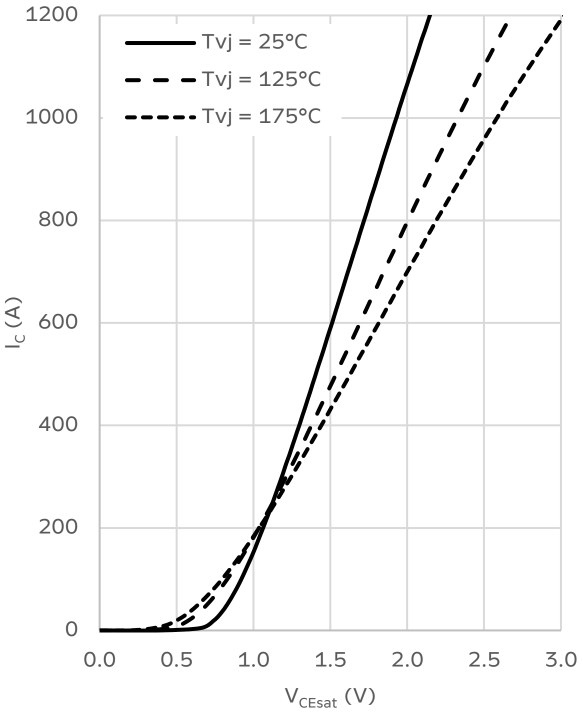


This is an electrocstatic sensitive device. 本产品对静电特别敏感

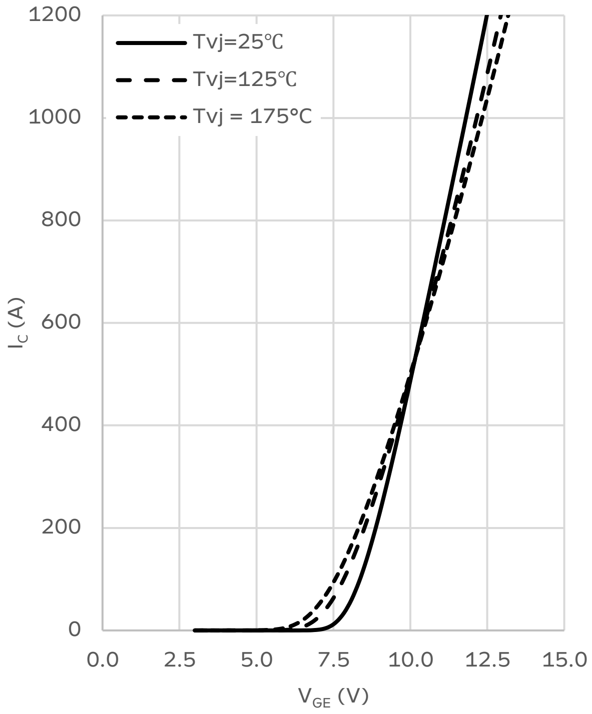
This product has been designed and qualified for Industrial Level. 本产品的设计符合工业级标准.

Characteristics 特性曲线

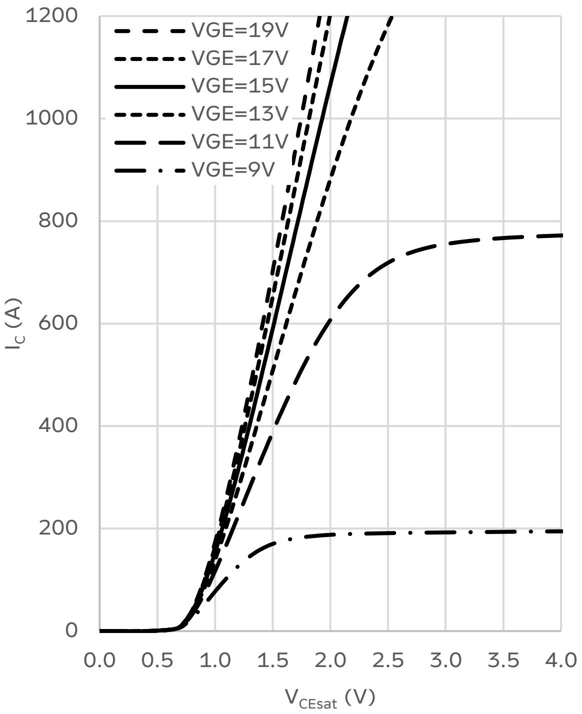
IGBT on-state characteristics (typical)
IGBT 通态特性曲线（典型）
$I_C = f(V_{CE})$
$V_{GE} = 15$ V



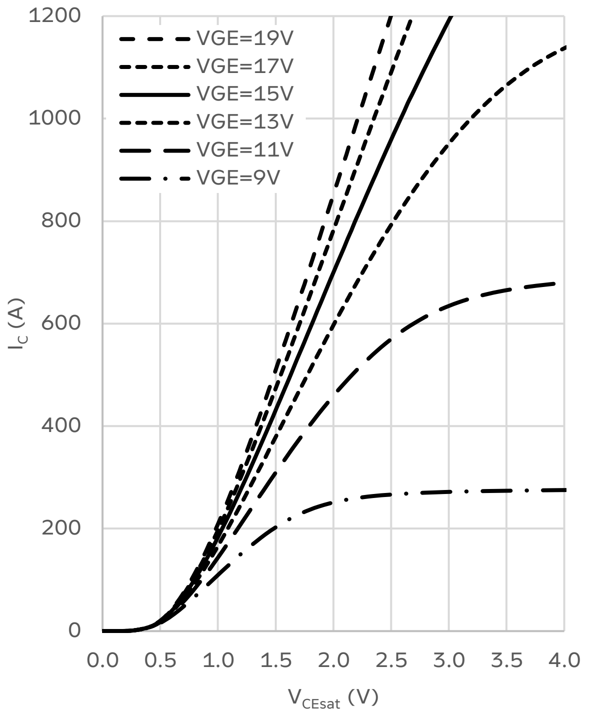
IGBT transfer characteristics (typical)
IGBT 转移特性曲线（典型）
$I_C = f(V_{GE})$
$V_{CE} = 20$V



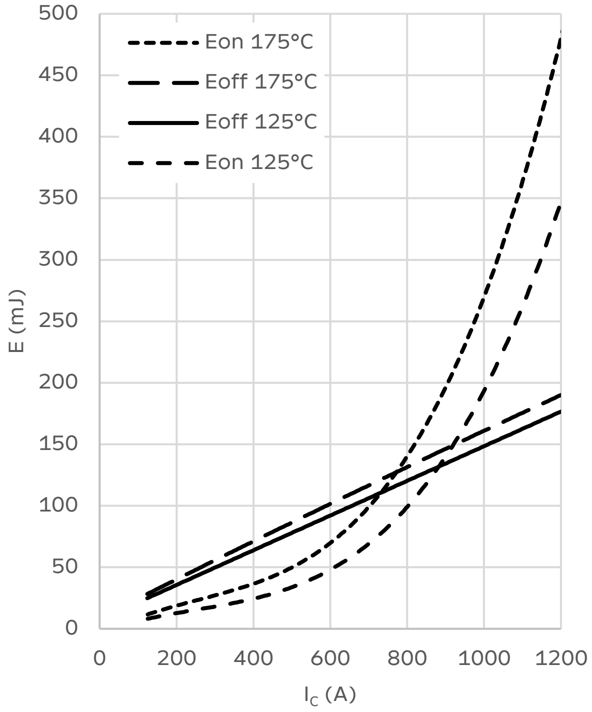
IGBT output characteristics (typical)
IGBT 输出特性曲线（典型）
$I_C = f(V_{CE})$
$T_{vj} = 25$ °C



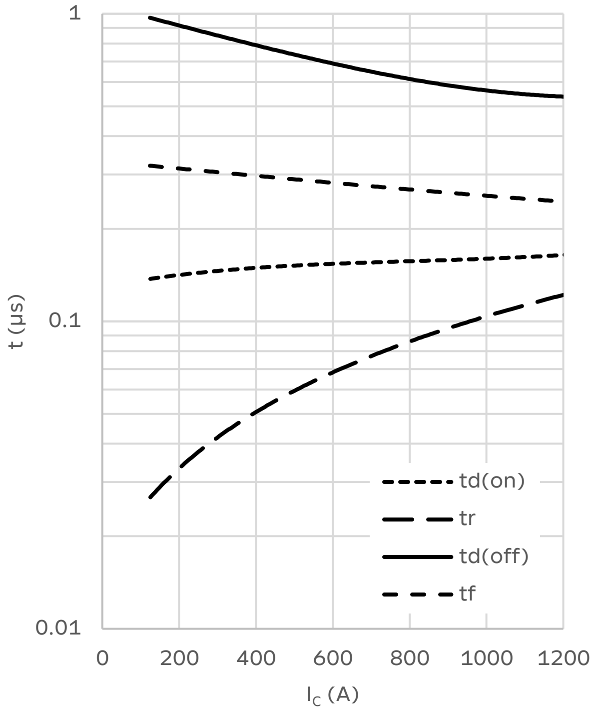
IGBT output characteristics (typical)
IGBT 输出特性曲线（典型）
$I_C = f(V_{CE})$
$T_{vj} = 175$ °C



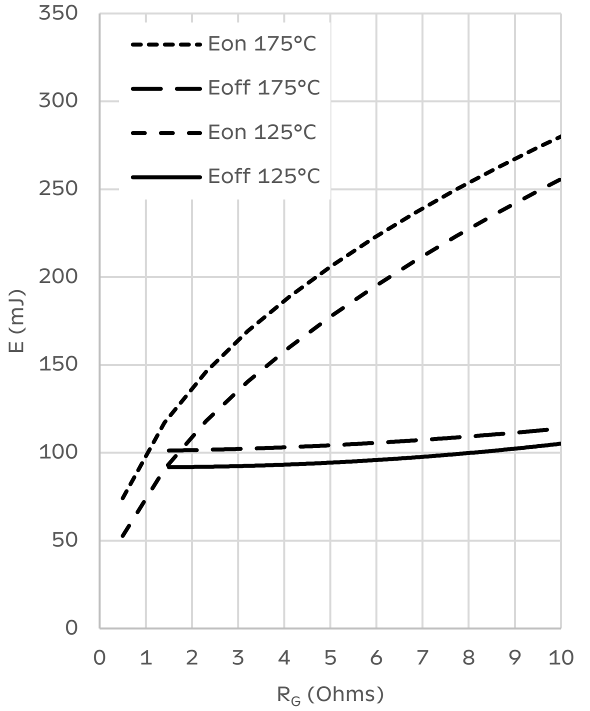
IGBT switching losses (typical)
IGBT 开关损耗曲线（典型）
E = f(I_{CE})
V_{CE} = 600 V, R_{Gon} = 0.47 Ω, R_{Goff} = 1.5 Ω, V_{GE} = -15/+15 V



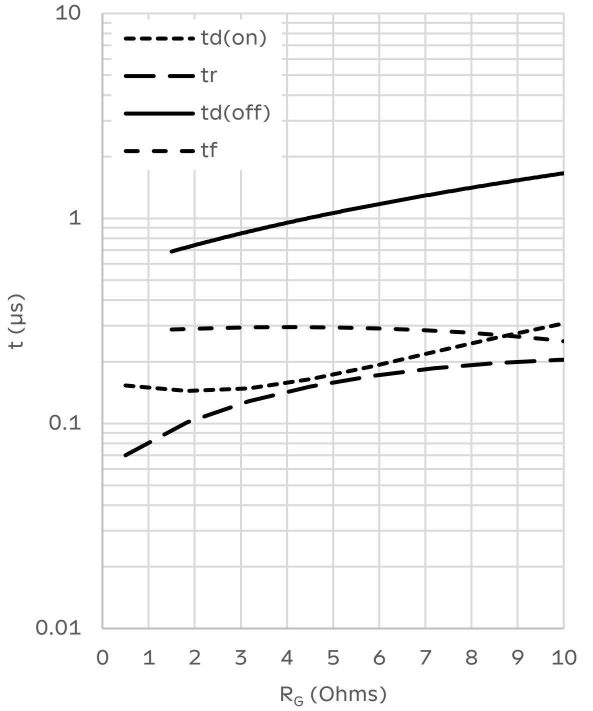
IGBT switching times (typical)
IGBT 开关时间曲线（典型）
t = f(I_{CE}), T_{vj} = 175 °C
V_{CE} = 600 V, R_{Gon} = 0.47 Ω, R_{Goff} = 1.5 Ω, V_{GE} =-15/+15 V



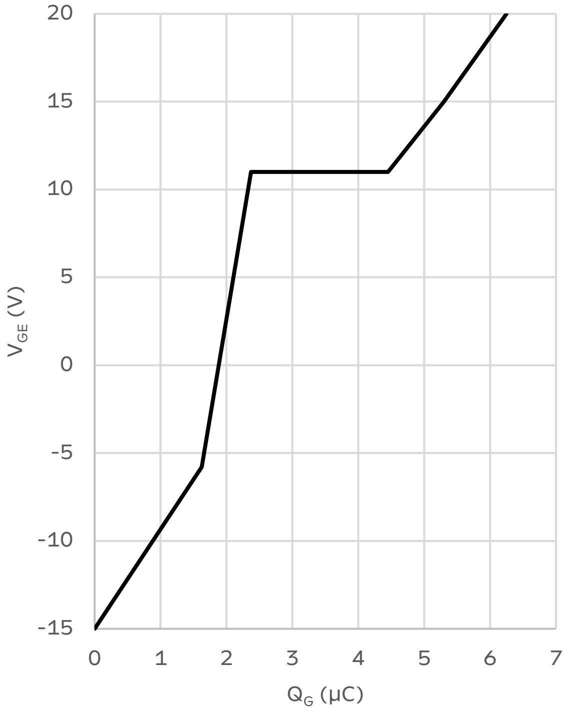
IGBT switching losses (typical)
IGBT 开关损耗曲线（典型）
E = f(R_G)
V_{CE} = 600 V, I_C = 600 A, V_{GE} = -15/+15 V



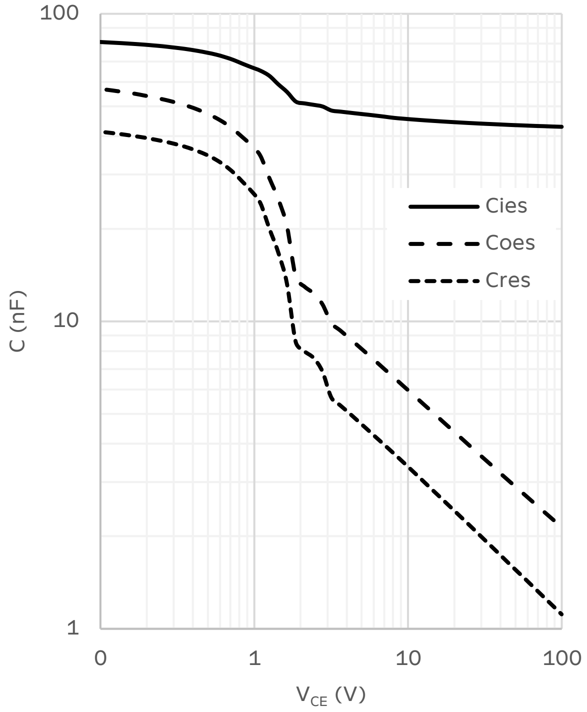
IGBT switching times (typical)
IGBT 开关时间曲线（典型）
t = f(R_G), T_{vj} = 175 °C
V_{CE} = 600 V, I_C = 600 A, V_{GE} = -15/+15 V



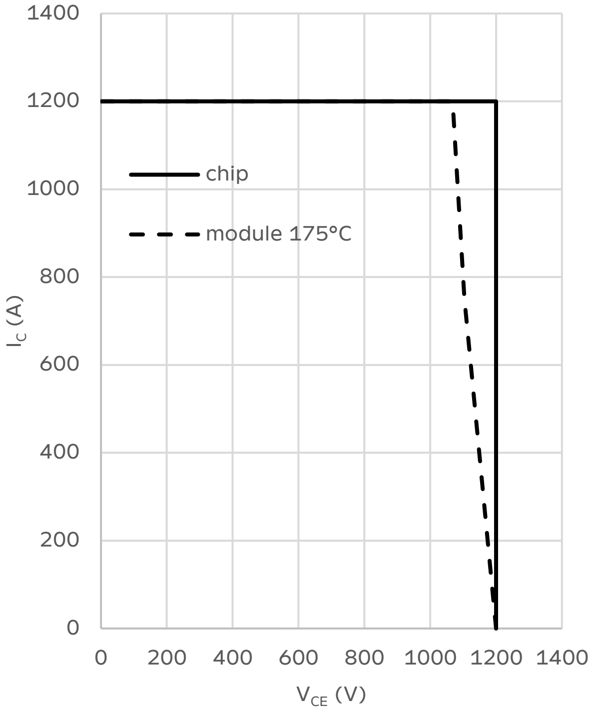
IGBT gate charge (typical)
IGBT 门极电荷（典型）
$V_{GE} = f(Q_G)$, $T_{vj} = 25$ °C
$V_{CE} = 600$ V, $I_C = 600$ A



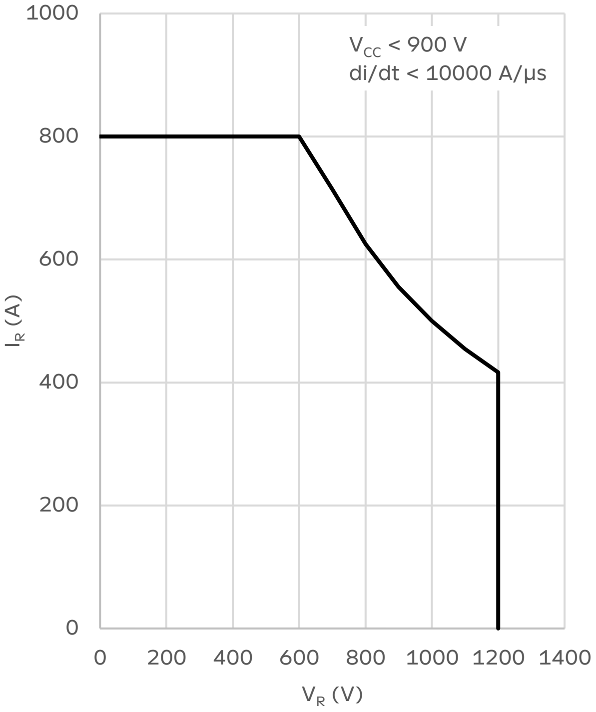
Capacitance characteristics (typical)
电容特性曲线（典型）
$C = f(V_{CE})$, $T_{vj} = 25$ °C
$f = 100$ kHz, $V_{GE} = 0$ V



IGBT RBSOA
IGBT 反偏安全工作区域
$I_C = f(V_{CEm})$
$R_{Goff} = 1.5\ \Omega$, $V_{GE} = \pm 15$ V



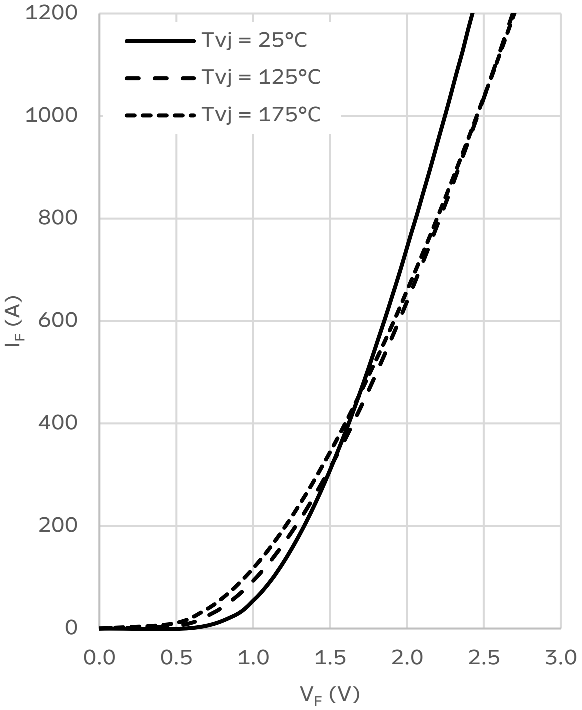
Diode SOA
Diode 反偏安全工作区域
$T_{vj} \leq 175$ °C



Diode forward characteristic (typical)

二极管正向特性（典型）

$I_F = f(V_F)$

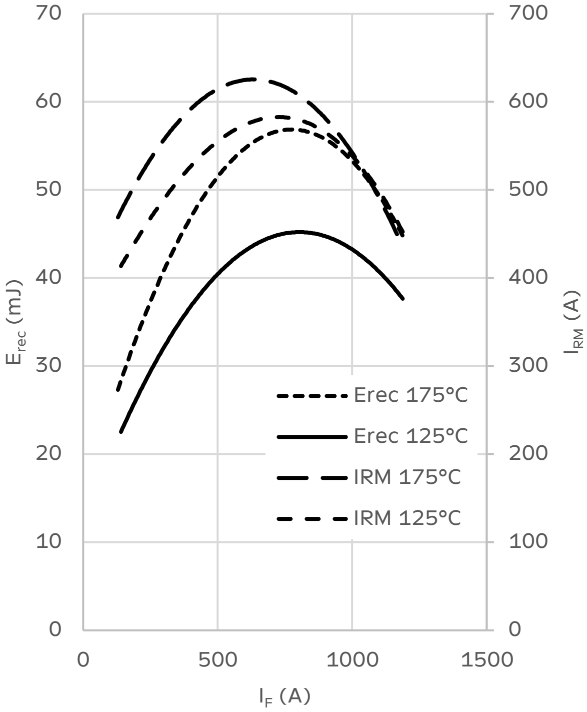


Diode switching characteristics (typical)

二极管开关特性（典型）

$E_{rec} = f(I_F)$, $I_{RM} = f(I_F)$

$V_{DC} = 600$ V, $R_{Gon} = 0.47\ \Omega$ (IGBT), $V_{GE} = -15/+15$ V (IGBT)

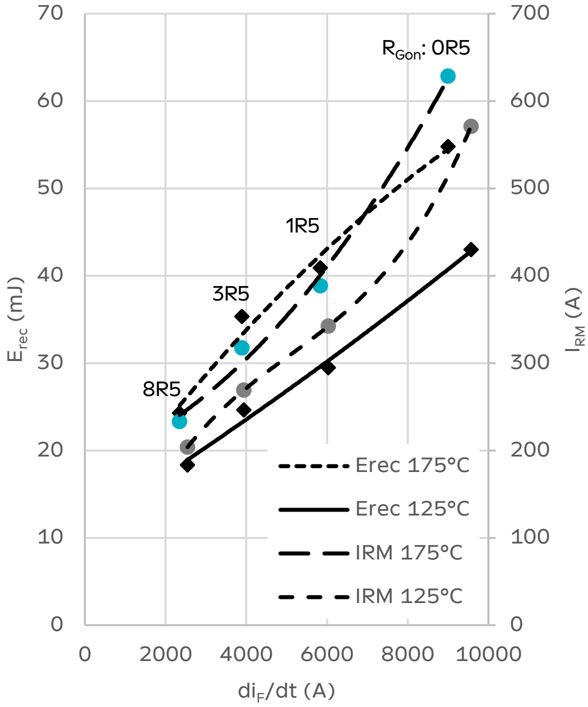


Diode switching characteristics (typical)

二极管开关特性（典型）

$E_{rec} = f(di/dt)$, $I_{RM} = f(di/dt)$

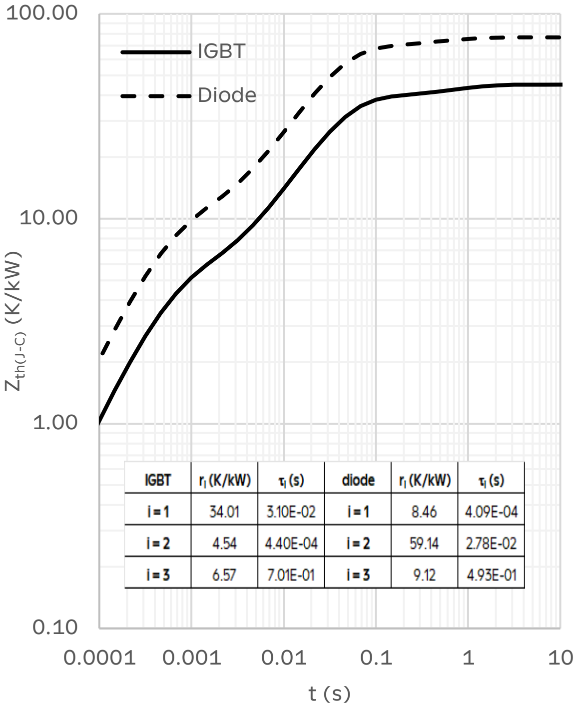
$V_{DC} = 600$ V, $I_F = 600$ A, $V_{GE} = -15/+15$ V (IGBT)



Thermal impedance

热阻抗（典型）

$Z_{th(j-c)} = f(t)$



IGBT	r_i (K/kW)	τ_i (s)	diode	r_i (K/kW)	τ_i (s)
i = 1	34.01	3.10E-02	i = 1	8.46	4.09E-04
i = 2	4.54	4.40E-04	i = 2	59.14	2.78E-02
i = 3	6.57	7.01E-01	i = 3	9.12	4.93E-01