

SISD0600ED120i23_D01

ED-Type phase leg IGBT module

ED 封装半桥 IGBT 模块

 $V_{CE} = 1200\text{ V}$ $I_C = 2 \times 600\text{ A}$

- i23 ultra-low loss micro pattern Trench IGBT chip-set
i23 超低损耗微沟槽栅 IGBT 芯片组
- Baseplate isolation with reinforced Al_2O_3 ceramic
加强 Al_2O_3 绝缘陶瓷基板
- Cu baseplate for low thermal resistance
低热阻铜底板
- Improved Package with reduced internal impedance and terminal heating
采用改进封装技术，显著降低内部阻抗与接线端温升
- Enhanced diode performance for regenerative power flow
增强二极管性能以更好适配能量再生应用

Maximum ratings¹ 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}	$V_{GE} = 0\text{ V}$, $T_{vj} = 25\text{ °C}$		1200	V
DC collector current 集电极直流电流	I_C	$T_C = 110\text{ °C}$, $T_{vj} = 175\text{ °C}$		600	A
Peak collector current 集电极峰值电流	I_{CM}	$t_p = 1\text{ ms}$		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}	$T_C = 25\text{ °C}$, $T_{vj} = 175\text{ °C}$, per switch		2775	W
DC forward current 二极管直流正向电流	I_F			900	A
Peak forward current 二极管最大脉冲正向电流	I_{FRM}	$t_p = 1\text{ ms}$		1800	A
Surge current 二极管最大浪涌电流	I_{FSM} I^2t	$V_R = 0\text{ V}$, $T_{vj} = 150\text{ °C}$, $t_p = 10\text{ ms}$, half-sinewave		3000 45000	A A^2s
Isolation voltage 绝缘电压	V_{isol}	1 min, $f = 50\text{ Hz}$		3400	V
Junction operating temperature 运行结温	$T_{vj(op)}$		-40	175	°C
Case temperature 壳温	T_C		-40	125 ²	°C
Storage temperature 存储温度	T_{stg}		-40	125	°C
Mounting torques 紧固力矩 ³	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 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°C

³ For details, please refer to the mounting instructions. 详细信息，请参考安装说明书

IGBT⁴

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	$V_{(BR)CES}$	$V_{GE} = 0 \text{ V}$, $I_C = 10 \text{ mA}$, $T_{vj} = 25^\circ\text{C}$	1200			V
Collector-emitter saturation voltage⁵ 集电极-发射极饱和电压	V_{CESat}	$I_C = 600 \text{ A}$, $V_{GE} = 15 \text{ V}$	$T_{vj} = 25^\circ\text{C}$	1.55	1.85	V
			$T_{vj} = 125^\circ\text{C}$	1.75		V
			$T_{vj} = 175^\circ\text{C}$	1.85		V
Collector cut-off current 集电极截止电流	I_{CES}	$V_{CE} = 1200 \text{ V}$, $V_{GE} = 0 \text{ V}$	$T_{vj} = 25^\circ\text{C}$		1	mA
			$T_{vj} = 125^\circ\text{C}$	2		mA
			$T_{vj} = 175^\circ\text{C}$	24		mA
Gate leakage current 栅极漏电流	I_{GES}	$V_{CE} = 0 \text{ V}$, $V_{GE} = \pm 20 \text{ V}$	-0.5		0.5	μA
Gate-emitter threshold voltage 栅极-发射极阈值电压	$V_{GE(th)}$	$I_C = 30 \text{ mA}$, $V_{CE} = V_{GE}$, $T_{vj} = 25^\circ\text{C}$	5	6.3	7.5	V
Gate charge 栅极电荷	Q_G	$I_C = 600 \text{ A}$, $V_{CE} = 600 \text{ V}$, $V_{GE} = -15 \text{ V} \dots 15 \text{ V}$		5		μC
Input capacitance 输入电容	C_{ies}	$V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$, $f = 100 \text{ kHz}$, $T_{vj} = 25^\circ\text{C}$		78		nF
Reverse transfer capacitance 反向传输电容	C_{res}			0.72		nF
Internal gate resistor 栅极内阻	R_{Gint}	Per switch		1.05		Ω
Turn-on delay time 开通延迟	$t_{d(on)}$	$V_{CC} = 600 \text{ V}$, $I_C = 600 \text{ A}$, $R_G = 0.5 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $L_s = 35 \text{ nH}$, inductive load	$T_{vj} = 25^\circ\text{C}$	260		ns
			$T_{vj} = 125^\circ\text{C}$	266		ns
			$T_{vj} = 175^\circ\text{C}$	267		ns
Rise time 上升时间	t_r		$T_{vj} = 25^\circ\text{C}$	60		ns
			$T_{vj} = 125^\circ\text{C}$	68		ns
			$T_{vj} = 175^\circ\text{C}$	71		ns
Turn-off delay time 关断延迟	$t_{d(off)}$	$V_{CC} = 600 \text{ V}$, $I_C = 600 \text{ A}$, $R_G = 0.5 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $L_s = 35 \text{ nH}$, inductive load	$T_{vj} = 25^\circ\text{C}$	313		ns
			$T_{vj} = 125^\circ\text{C}$	375		ns
			$T_{vj} = 175^\circ\text{C}$	402		ns
Fall time 下降时间	t_f		$T_{vj} = 25^\circ\text{C}$	230		ns
			$T_{vj} = 125^\circ\text{C}$	334		ns
			$T_{vj} = 175^\circ\text{C}$	387		ns
Turn-on switching energy 开通损耗	E_{on}	$V_{CC} = 600 \text{ V}$, $I_C = 600 \text{ A}$, $R_G = 0.5 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $L_s = 35 \text{ nH}$, inductive load	$T_{vj} = 25^\circ\text{C}$	52		mJ
			$T_{vj} = 125^\circ\text{C}$	80		mJ
			$T_{vj} = 175^\circ\text{C}$	95		mJ
Turn-off switching energy 关断损耗	E_{off}	$V_{CC} = 600 \text{ V}$, $I_C = 600 \text{ A}$, $R_G = 0.5 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $L_s = 35 \text{ nH}$, inductive load	$T_{vj} = 25^\circ\text{C}$	56		mJ
			$T_{vj} = 125^\circ\text{C}$	75		mJ
			$T_{vj} = 175^\circ\text{C}$	84		mJ
Short circuit current 短路电流	I_{SC}	$t_{PCS} \leq 8 \mu\text{s}$, $V_{GE} = 15 \text{ V}$, $T_{vj} = 175^\circ\text{C}$, $V_{CC} = 800 \text{ V}$, $V_{CEM \text{ Chip}} \leq 1200 \text{ V}$		2800		A

⁴ Characteristic values according to IEC 60747-9

⁵ Collector-emitter saturation voltage is given at chip-level 集电极-发射极饱和电压



Diode⁶

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 ⁷ 正向压降	V _F	I _F = 600 A	T _{Vj} = 25 °C		1.45	1.85	V
			T _{Vj} = 125 °C		1.45		V
			T _{Vj} = 175 °C		1.35		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 = 8100 A/μs (175°C), R _G = 0.5 Ω, V _{GE} = ± 15 V, L _s = 35 nH, inductive load	T _{Vj} = 25 °C		533		A
			T _{Vj} = 125 °C		627		A
			T _{Vj} = 175 °C		692		A
Recovery charge 恢复电荷	Q _{rr}		T _{Vj} = 25 °C		76		μC
			T _{Vj} = 125 °C		131		μC
			T _{Vj} = 175 °C		165		μC
Reverse recovery time 反向恢复时间	t _{rr}		T _{Vj} = 25 °C		572		ns
			T _{Vj} = 125 °C		637		ns
			T _{Vj} = 175 °C		747		ns
Reverse recovery energy 反向恢复能量	E _{rec}		T _{Vj} = 25 °C		33		mJ
			T _{Vj} = 125 °C		55		mJ
			T _{Vj} = 175 °C		68		mJ

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}	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15K))]$		3375		K
B-value B 值	B _{25/100}	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298.15K))]$		3433		K

⁶ Characteristic values according to IEC 60747-2

⁷ Forward voltage is given at chip-level 正向压降是芯片两端的电压值。



Package properties 封装特性⁸

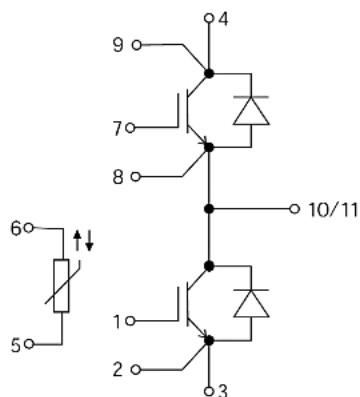
PARAMETER 参数	SYMBOL 符号	CONDITIONS 工作条件		MIN 最小值	TYP 典型	MAX 最大值	UNIT 单位
IGBT thermal resistance junction to case IGBT 结-壳热阻	$R_{th(j-c)IGBT}$	Per switch 每一个开关				0.054	K/W
Diode thermal resistance junction to case 二极管结-壳热阻	$R_{th(j-c)Diode}$					0.062	K/W
IGBT thermal resistance case to heatsink IGBT 壳到散热器热阻	$R_{th(c-s)IGBT}$	IGBT per switch IGBT 每一个开关			0.033		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 二极管每一个开关			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 每一个开关			16		nH
Resistance, terminal chip 端子到芯片之间的阻抗	$R_{CC+EE'}$	Per switch 每一个开关	$T_{vj} = 25\ ^\circ\text{C}$		0.7		m Ω
			$T_{vj} = 125\ ^\circ\text{C}$		1		m Ω
			$T_{vj} = 175\ ^\circ\text{C}$		1.1		m Ω
Maximum RMS DC-Terminal current 最大端子电流	$I_{Term\ RMS}$		$T_{Terminal} = 90^\circ\text{C}$		590		A
			$T_{Terminal} = 105^\circ\text{C}$		565		A

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 参考标准 IEC 60664-1 和 EN 50124-1	Terminal to base: 端子到基板	12.5			mm
			Terminal to terminal: 端子到端子	10			mm
Surface creepage distance 爬电距离	d_s	According to IEC 60664-1 and EN 50124-1 参考标准 IEC 60664-1 和 EN 50124-1	Terminal to base: 端子到基板	15			mm
			Terminal to terminal: 端子到端子	13			mm
Mass 重量	m				350		g

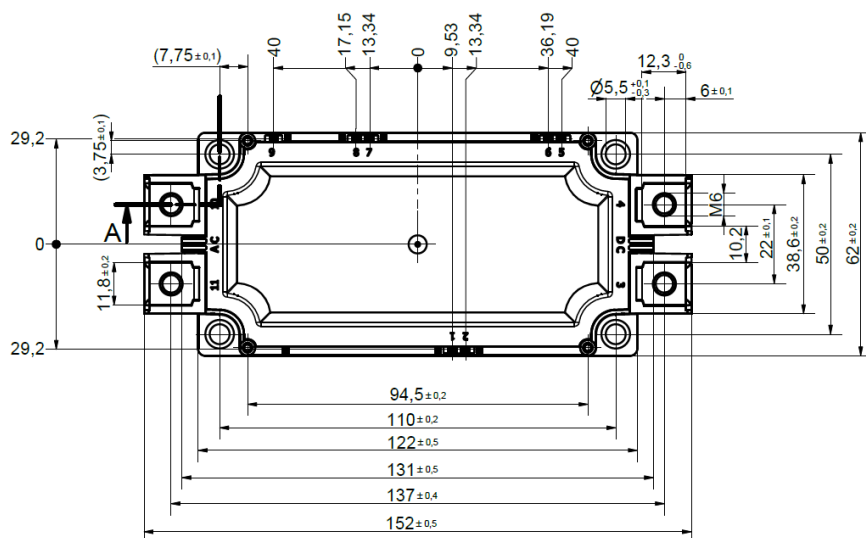
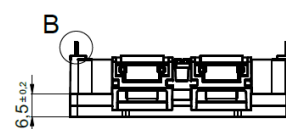
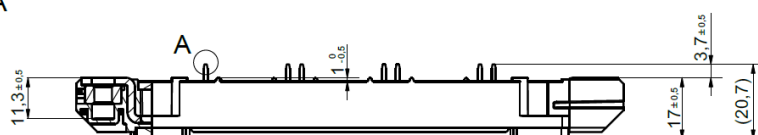
⁸ Package and mechanical properties according to IEC 60747-15

Electrical configuration 电气图

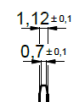


Outline drawing 外形图

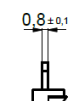
A-A



A (2:1)



B (2:1)



This is an electrostatic 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。



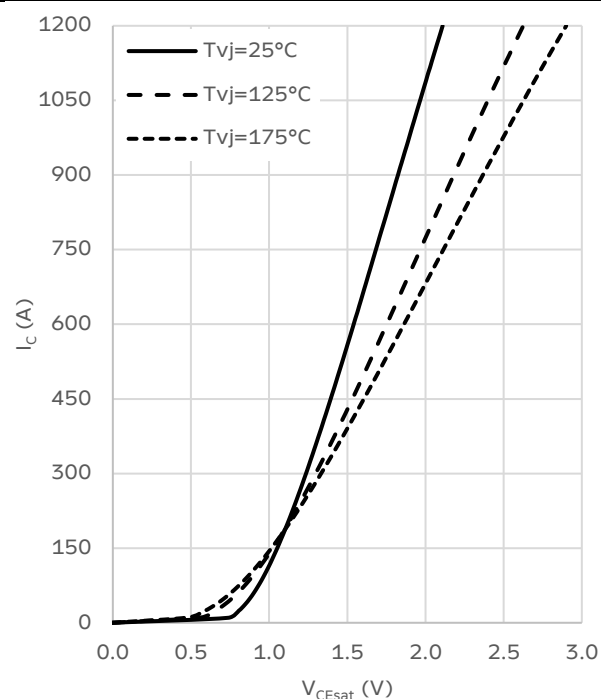
Characteristics 特性曲线

IGBT on-state characteristics (typical)

IGBT 通态特性曲线 (典型)

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

$$V_{GE} = 15 \text{ V}$$

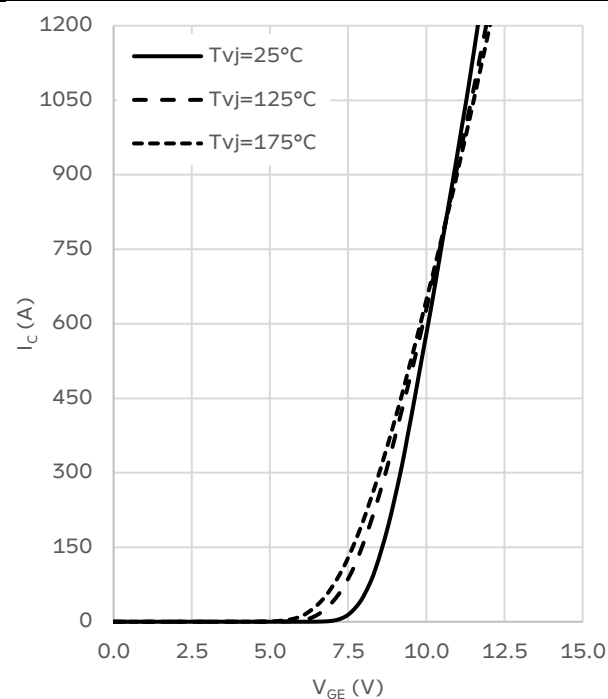


IGBT transfer characteristics (typical)

IGBT 转移特性曲线 (典型)

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

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

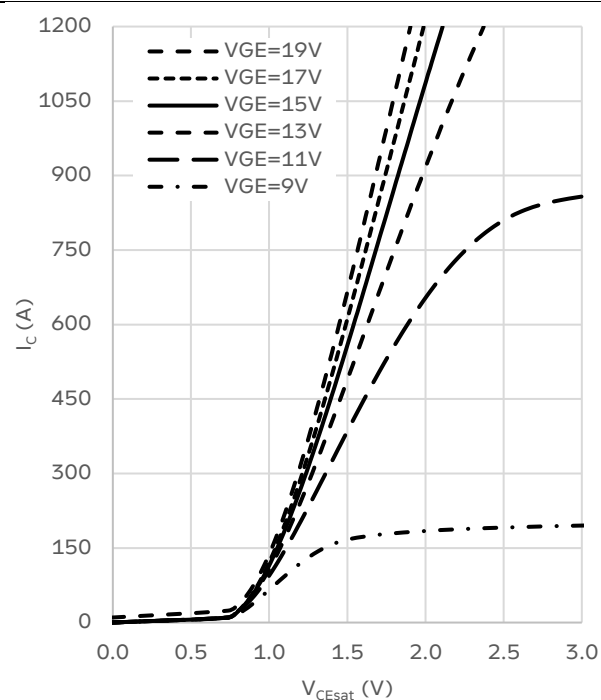


IGBT output characteristics (typical)

IGBT 输出特性曲线 (典型)

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

$$T_{vj} = 25^\circ\text{C}$$

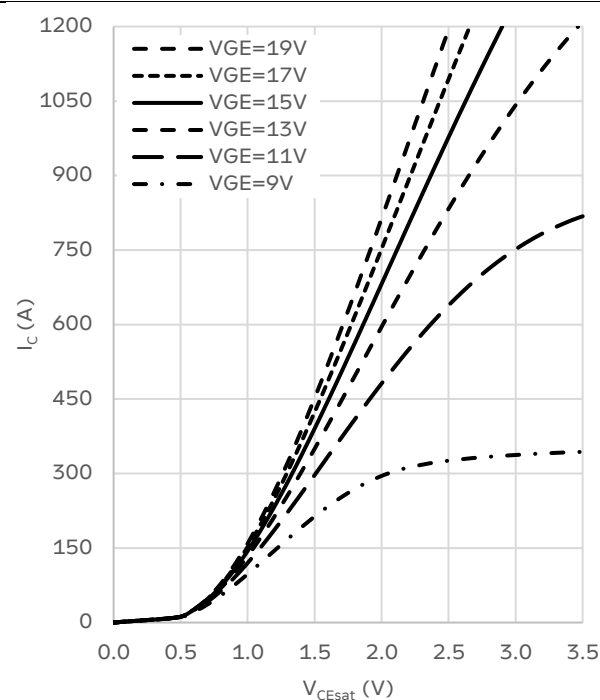


IGBT output characteristics (typical)

IGBT 输出特性曲线 (典型)

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

$$T_{vj} = 175^\circ\text{C}$$



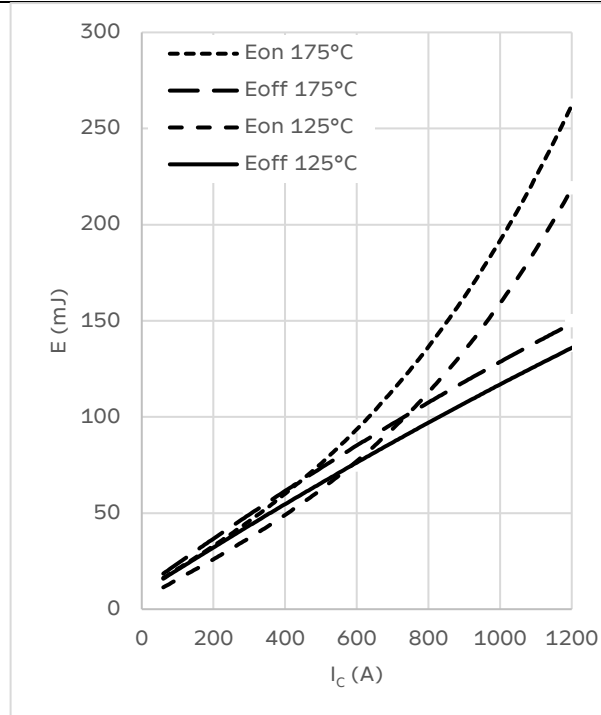


IGBT switching losses (typical)

IGBT 开关损耗曲线 (典型)

$$E = f(I_{CE})$$

$V_{CE} = 600 \text{ V}$, $R_{Gon} = 0.5 \Omega$, $R_{Goff} = 0.5 \Omega$, $V_{GE} = -15/+15 \text{ V}$

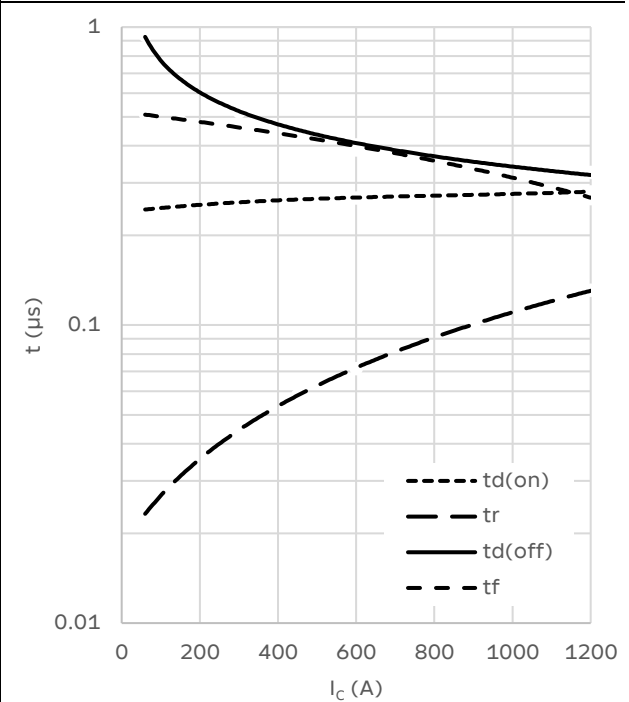


IGBT switching times (typical)

IGBT 开关时间曲线 (典型)

$$t = f(I_{CE}), T_{vj} = 175^\circ\text{C}$$

$V_{CE} = 600 \text{ V}$, $R_{Gon} = 0.5 \Omega$, $R_{Goff} = 0.5 \Omega$, $V_{GE} = -15/+15 \text{ V}$

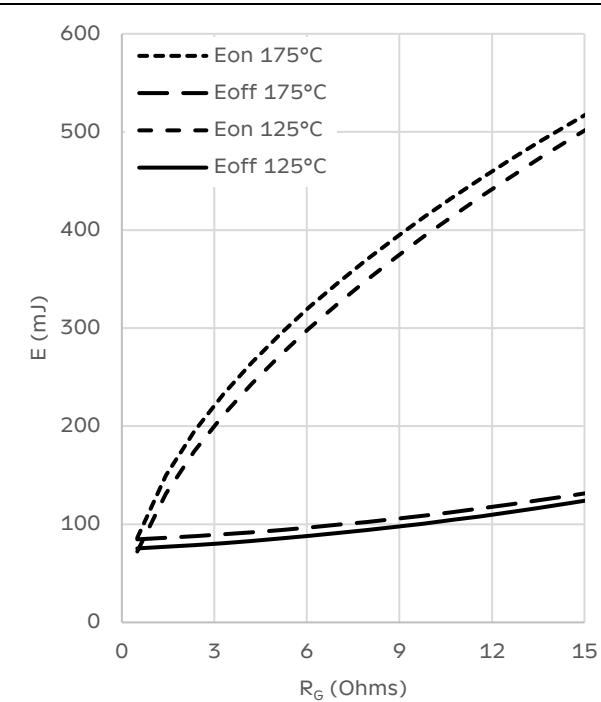


IGBT switching losses (typical)

IGBT 开关损耗曲线 (典型)

$$E = f(R_G)$$

$V_{CE} = 600 \text{ V}$, $I_C = 600 \text{ A}$, $V_{GE} = -15/+15 \text{ V}$

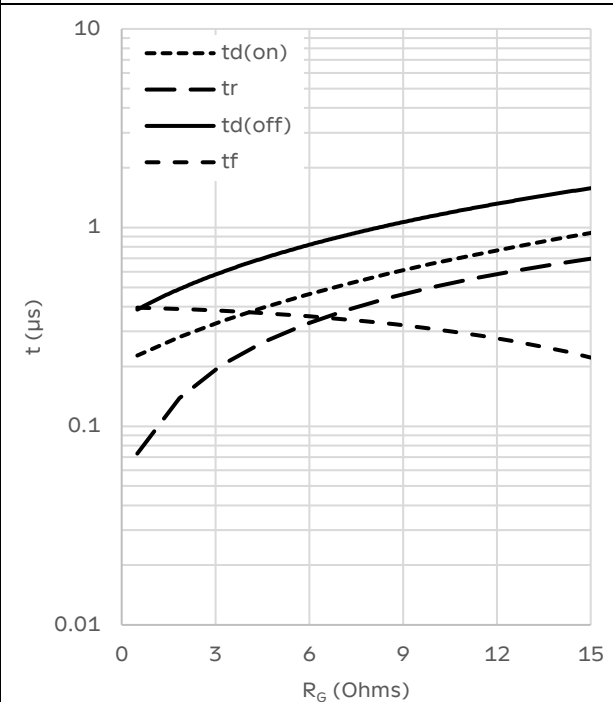


IGBT switching times (typical)

IGBT 开关时间曲线 (典型)

$$t = f(R_G), T_{vj} = 175^\circ\text{C}$$

$V_{CE} = 600 \text{ V}$, $I_C = 600 \text{ A}$, $V_{GE} = -15/+15 \text{ V}$



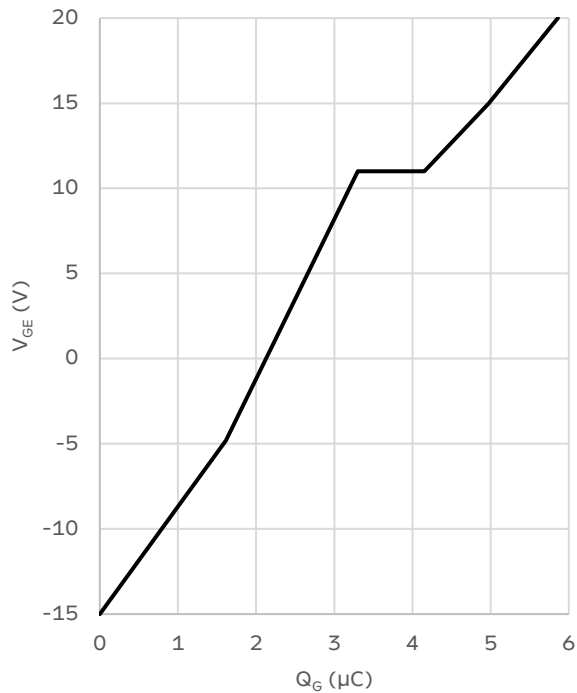


IGBT gate charge (typical)

IGBT 门极电荷 (典型)

$V_{GE} = f(Q_G)$, $T_{vj} = 25\text{ °C}$

$V_{CE} = 600\text{ V}$, $I_C = 600\text{ A}$

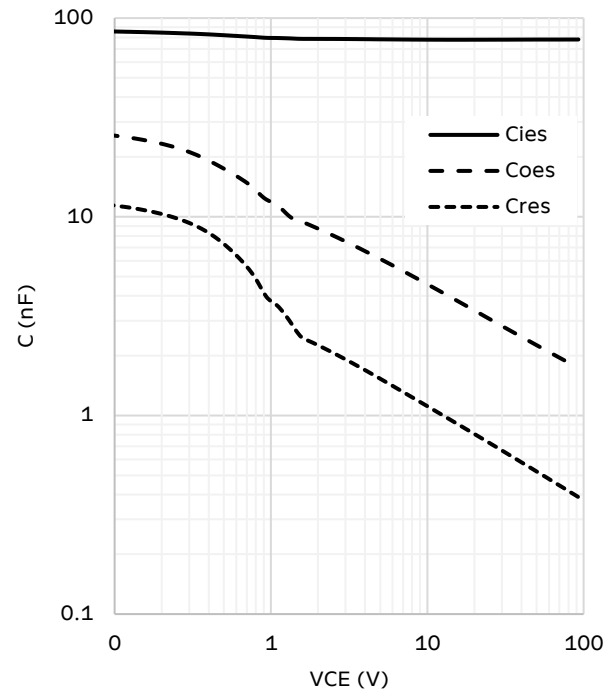


Capacitance characteristics (typical)

电容特性曲线 (典型)

$C = f(V_{CE})$, $T_{vj} = 25\text{ °C}$

$f = 100\text{ kHz}$, $V_{GE} = 0\text{ V}$

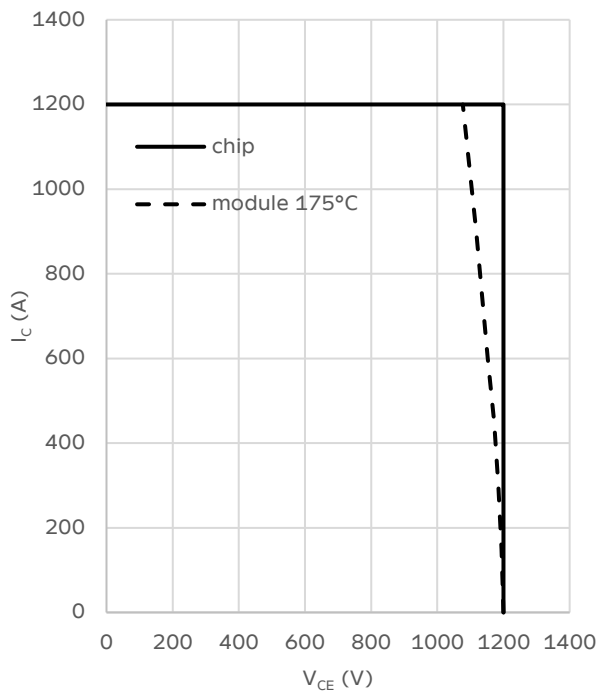


IGBT RBSOA

IGBT 反偏安全工作区域

$I_C = f(V_{CEM})$

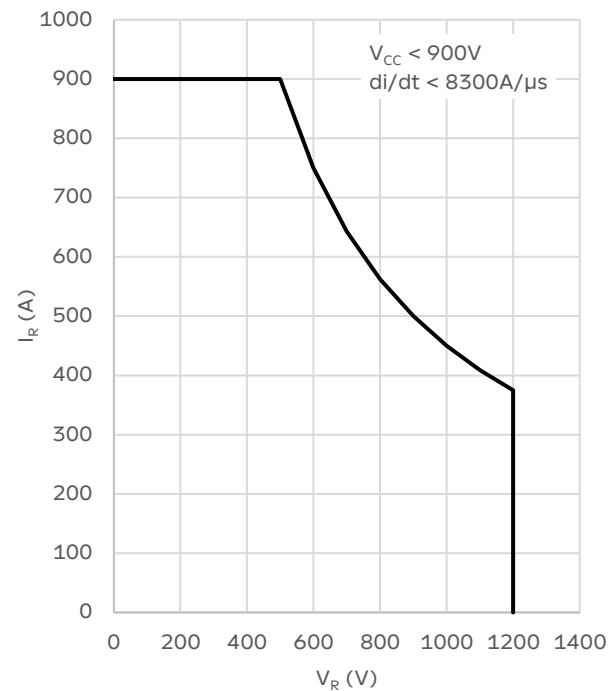
$R_{Goff} = 0.5\text{ }\Omega$, $V_{GE} = \pm 15\text{ V}$



Diode SOA

Diode 反偏安全工作区域

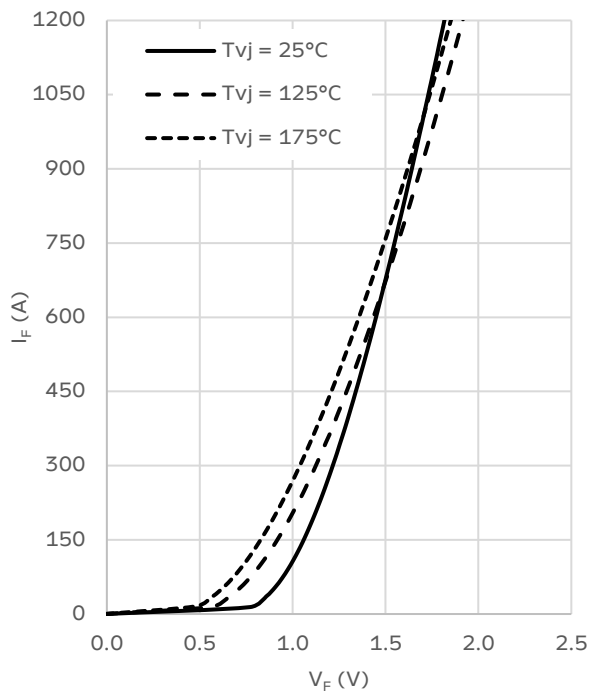
$T_{vj} \leq 175\text{ °C}$



Diode forward characteristic (typical)

二极管正向特性 (典型)

$$I_F = f(V_F)$$

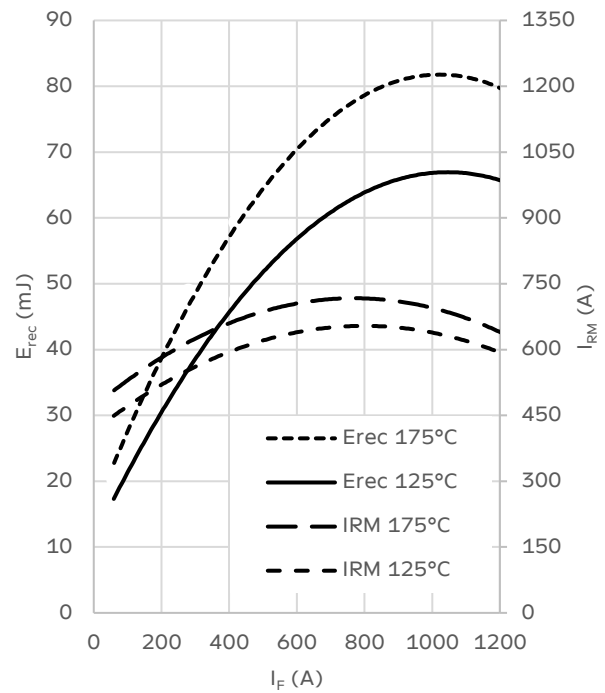


Diode switching characteristics (typical)

二极管开关特性 (典型)

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

$$V_{DC} = 600 \text{ V}, R_{Gon} = 0.5 \Omega (\text{IGBT}), V_{GE} = -15/+15 \text{ V (IGBT)}$$

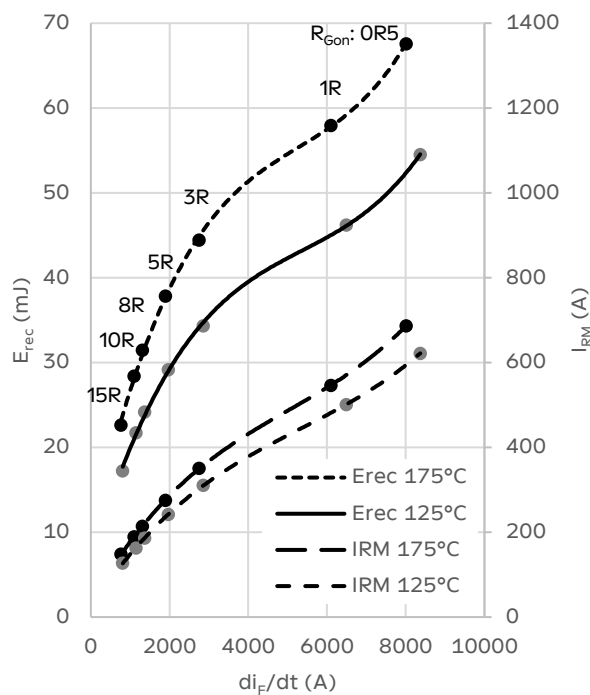


Diode switching characteristics (typical)

二极管开关特性 (典型)

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

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



Thermal impedance (typical)

热阻抗 (典型)

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

