

最终数据手册

英飞凌工业用耐短路 1200 V TRENCHSTOP™ IGBT 7 技术：碳化硅 MOSFET

特性

- $V_{CE} = 1200\text{ V}$
- $I_C = 8\text{ A}$
- 低饱和电压 $V_{CEsat} = 2\text{ V}$ at $T_{vj} = 150^\circ\text{C}$
- 短路耐受性 $8\ \mu\text{s}$
- 广泛的 dv/dt 可控性
- 完整的产品范围和 PSpice 模型：<http://www.infineon.com/igbt/>

潜在应用

- 工业驱动

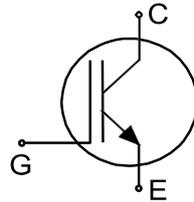
产品验证

- 符合 JEDEC47/20/22 相关测试的工业应用要求
- 所需应用的封装

描述

封装引脚定义：

- 引脚 1 - 栅极
- 引脚 2 (E) - 发射器
- TAB (C) - 收集器



Type	Package	Marking
IGB08N120S7	PG-TO263-3-STD-C1.6	G08MS7

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）。



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1封装

1 封装

表1 特征值

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Internal emitter inductance measured 5 mm (0.197 in.) from case	L_E			7		nH
Storage temperature	T_{stg}		-55		150	°C
Soldering temperature	T_{sold}	reflow soldering (MSL1 according to JEDEC J-STA-020)			260	°C
Thermal resistance, 6 cm ² Cu on PCB junction to ambient	$R_{th(j-a)}$				40	K/W
IGBT thermal resistance, junction-case	$R_{th(j-c)}$			1.07	1.44	K/W

2 绝缘栅双极晶体管

表2 最大额定值

Parameter	Symbol	Note or test condition	Values	Unit
Collector-emitter voltage	V_{CE}	$T_{vj} \geq 25 \text{ °C}$	1200	V
DC collector current, limited by T_{vjmax}	I_C	$T_c = 25 \text{ °C}$	20 ¹⁾	A
		$T_c = 100 \text{ °C}$	13	
Pulsed collector current, t_p limited by T_{vjmax}	I_{Cpulse}		24	A
Turn-off safe operating area		$V_{CE} \leq 1200 \text{ V}, T_{vj} \leq 150 \text{ °C}$	24	A
Gate-emitter voltage	V_{GE}		± 20	V
Transient gate-emitter voltage	V_{GE}	$t_p \leq 0.5 \text{ }\mu\text{s}, D < 0.001$	± 25	V
Short-circuit withstand time	t_{SC}	$V_{CC} \leq 600 \text{ V}, V_{GE} = 15 \text{ V}$, Allowed number of short circuits < 1000, Time between short circuits $\geq 1.0 \text{ s}, T_{vj} = 150 \text{ °C}$	8	μs
Power dissipation	P_{tot}	$T_c = 25 \text{ °C}$	87	W
		$T_c = 100 \text{ °C}$	35	

1) 受封装限制

表3 特征值

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	V_{CEsat}	$I_C = 8\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25\text{ °C}$		1.65	2	V
			$T_{vj} = 150\text{ °C}$		2		
Gate-emitter threshold voltage	V_{Geth}	$I_C = 0.16\text{ mA}, V_{CE} = V_{GE}$		5.15	5.7	6.45	V
Zero gate-voltage collector current	I_{CES}	$V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$			20	μA
			$T_{vj} = 150\text{ °C}$		130		
Gate-emitter leakage current	I_{GES}	$V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}$				100	nA
Transconductance	g_{fs}	$I_C = 8\text{ A}, V_{CE} = 20\text{ V}, T_{vj} = 150\text{ °C}$			3.6		S
Short-circuit collector current	I_{SC}	$V_{CC} \leq 600\text{ V}, V_{GE} = 15\text{ V}, t_{SC} \leq 8\text{ }\mu\text{s}$, Allowed number of short circuits < 1000, Time between short circuits $\geq 1.0\text{ s}, T_{vj} = 150\text{ °C}$			38		A
Input capacitance	C_{ies}	$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 100\text{ kHz}$			1.3		nF
Output capacitance	C_{oes}	$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 100\text{ kHz}$			24		pF
Reverse transfer capacitance	C_{res}	$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 100\text{ kHz}$			17		pF
Gate charge	Q_G	$V_{CC} = 960\text{ V}, I_C = 8\text{ A}, V_{GE} = 15\text{ V}$			55		nC
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}, V_{GE} = 0/15\text{ V}, R_{G(on)} = 20\text{ }\Omega, R_{G(off)} = 20\text{ }\Omega$	$T_{vj} = 25\text{ °C}, I_C = 8\text{ A}$		15		ns
			$T_{vj} = 150\text{ °C}, I_C = 8\text{ A}$		14		
Rise time (inductive load)	t_r	$V_{CC} = 600\text{ V}, V_{GE} = 0/15\text{ V}, R_{G(on)} = 20\text{ }\Omega, R_{G(off)} = 20\text{ }\Omega$	$T_{vj} = 25\text{ °C}, I_C = 8\text{ A}$		15		ns
			$T_{vj} = 150\text{ °C}, I_C = 8\text{ A}$		18		
Turn-off delay time	$t_{d(off)}$	$V_{CC} = 600\text{ V}, V_{GE} = 0/15\text{ V}, R_{G(on)} = 20\text{ }\Omega, R_{G(off)} = 20\text{ }\Omega$	$T_{vj} = 25\text{ °C}, I_C = 8\text{ A}$		149		ns
			$T_{vj} = 150\text{ °C}, I_C = 8\text{ A}$		225		
Fall time (inductive load)	t_f	$V_{CC} = 600\text{ V}, V_{GE} = 0/15\text{ V}, R_{G(on)} = 20\text{ }\Omega, R_{G(off)} = 20\text{ }\Omega$	$T_{vj} = 25\text{ °C}, I_C = 8\text{ A}$		131		ns
			$T_{vj} = 150\text{ °C}, I_C = 8\text{ A}$		246		
Turn-on energy	E_{on}	$V_{CC} = 600\text{ V}, V_{GE} = 0/15\text{ V}, R_{G(on)} = 20\text{ }\Omega, R_{G(off)} = 20\text{ }\Omega$	$T_{vj} = 25\text{ °C}, I_C = 8\text{ A}$		0.46		mJ
			$T_{vj} = 150\text{ °C}, I_C = 8\text{ A}$		0.67		
Turn-off energy	E_{off}	$V_{CC} = 600\text{ V}, V_{GE} = 0/15\text{ V}, R_{G(on)} = 20\text{ }\Omega, R_{G(off)} = 20\text{ }\Omega$	$T_{vj} = 25\text{ °C}, I_C = 8\text{ A}$		0.41		mJ
			$T_{vj} = 150\text{ °C}, I_C = 8\text{ A}$		0.73		

(表格续下页.....)

表 3 (续) 特征值

Parameter	Symbol	Note or test condition	Values			Unit	
			Min.	Typ.	Max.		
Total switching energy	E_{ts}	$V_{CC} = 600 \text{ V}$, $V_{GE} = 0/15 \text{ V}$, $R_{G(on)} = 20 \Omega$, $R_{G(off)} = 20 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$, $I_C = 8 \text{ A}$		0.87		mJ
			$T_{vj} = 150 \text{ }^\circ\text{C}$, $I_C = 8 \text{ A}$		1.4		
Operating junction temperature	T_{vj}		-40		150	$^\circ\text{C}$	

注意：为了获得最佳的使用寿命和可靠性，英飞凌建议工作条件不超过本数据手册中所述最大额定值的 80%。

除非另有规定，电气特性均为 $T_{vj} = 25^\circ\text{C}$ 。

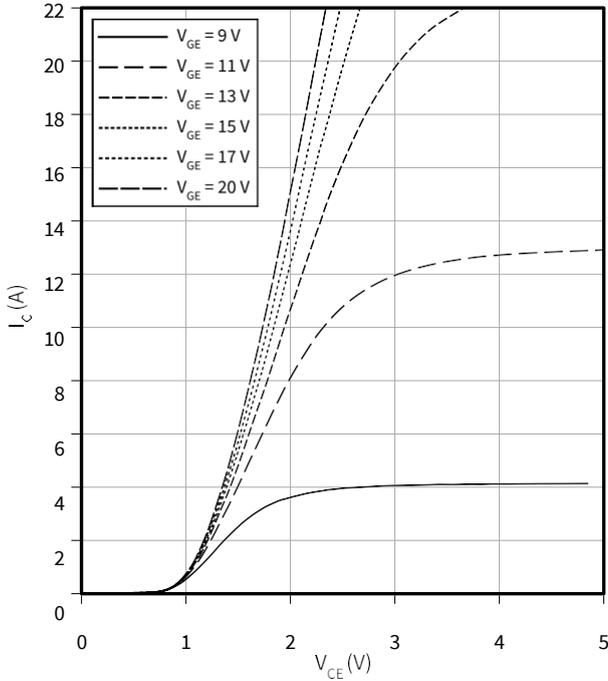
动态测试电路，寄生电感 $L_\sigma = 45 \text{ nH}$ ，寄生电容 $C_\sigma = 25 \text{ pF}$ ，来自图 E。能量损失包括“尾部”和二极管 (IKW08N120CS7) 反向恢复。

3 特性图

Typical output characteristic

$I_C = f(V_{CE})$

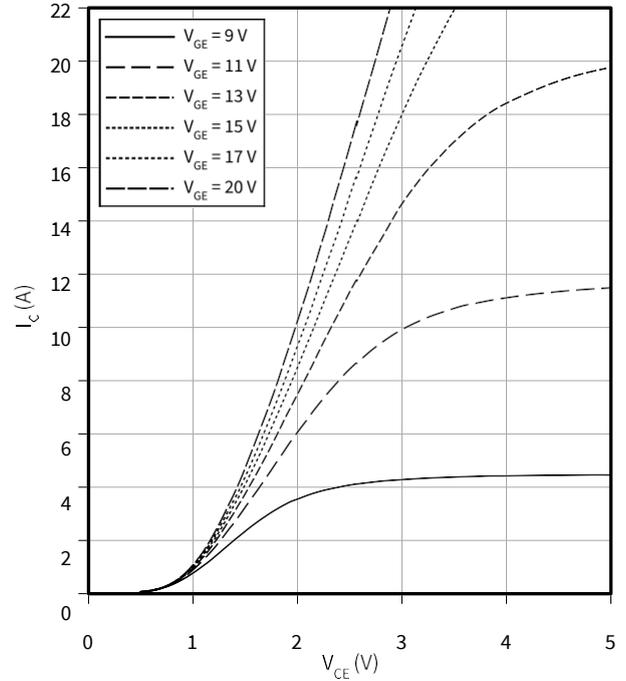
$T_{vj} = 25\text{ }^\circ\text{C}$



Typical output characteristic

$I_C = f(V_{CE})$

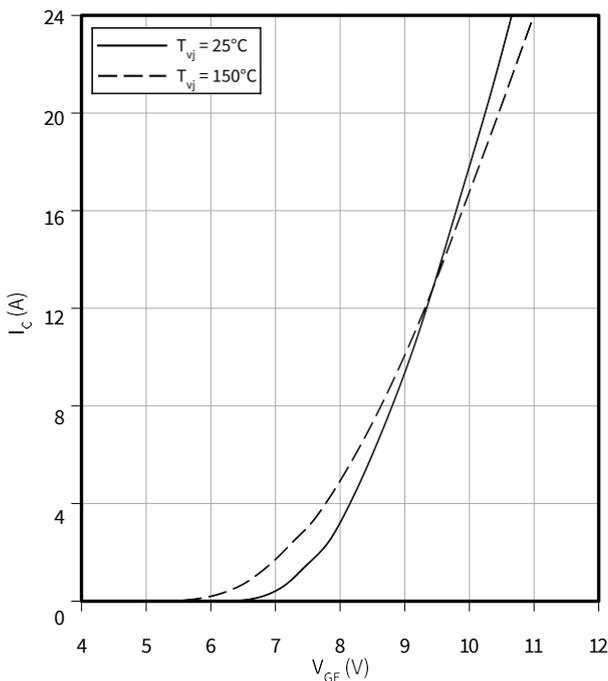
$T_{vj} = 150\text{ }^\circ\text{C}$



Typical transfer characteristic

$I_C = f(V_{GE})$

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

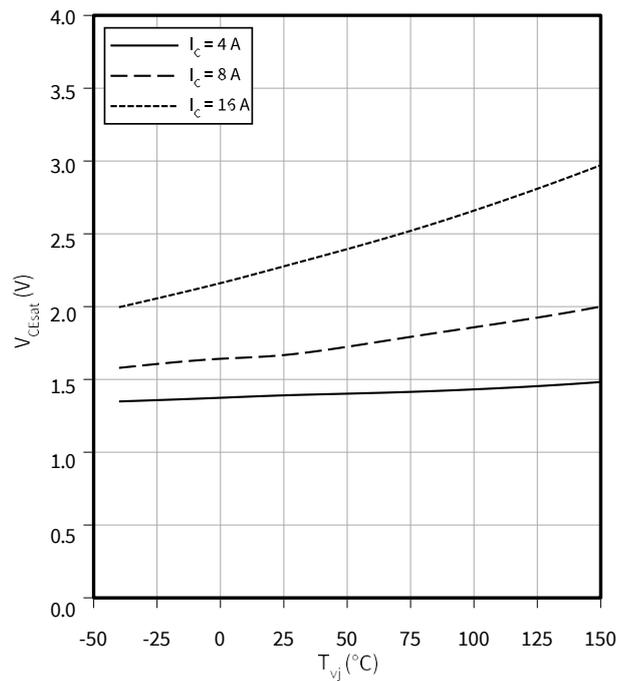


Typical collector-emitter saturation voltage as a function of junction temperature

$V_{CEsat} =$

$f(T_{vj})$

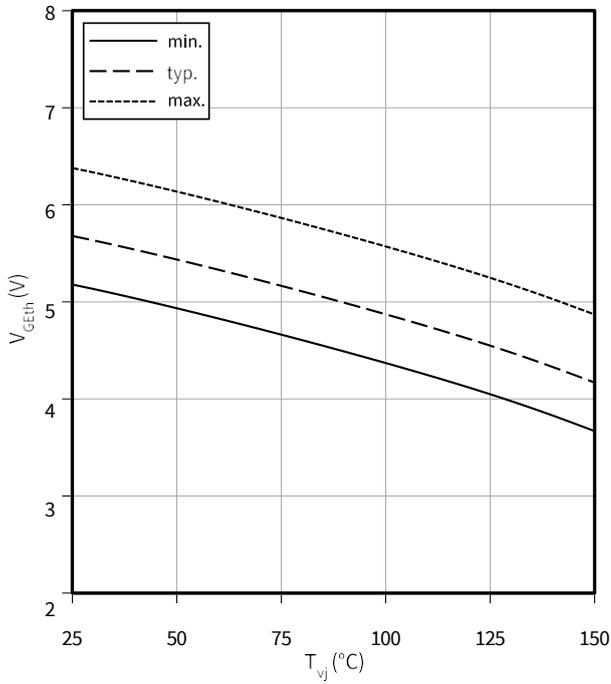
$V_{GE} = 15\text{ V}$



Gate-emitter threshold voltage as a function of junction temperature

$V_{GEth} = f(T_{vj})$

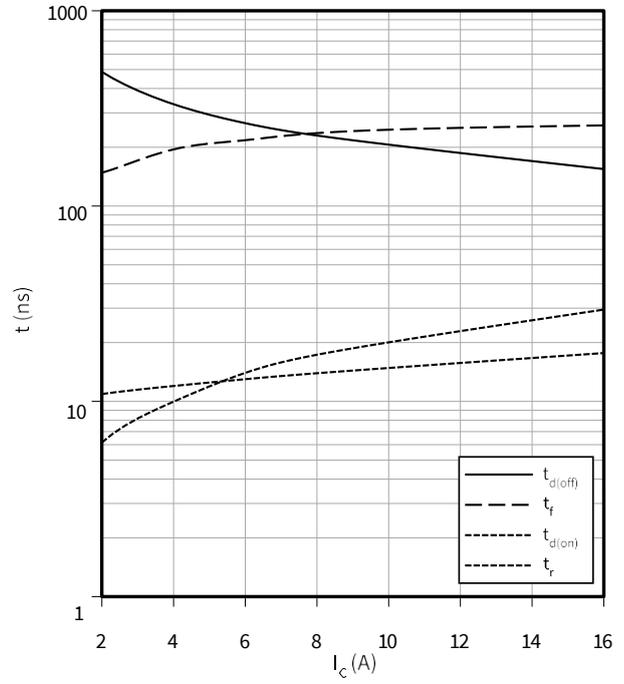
$I_c = 0.16 \text{ mA}$



Typical switching times as a function of collector current

$t = f(I_c)$

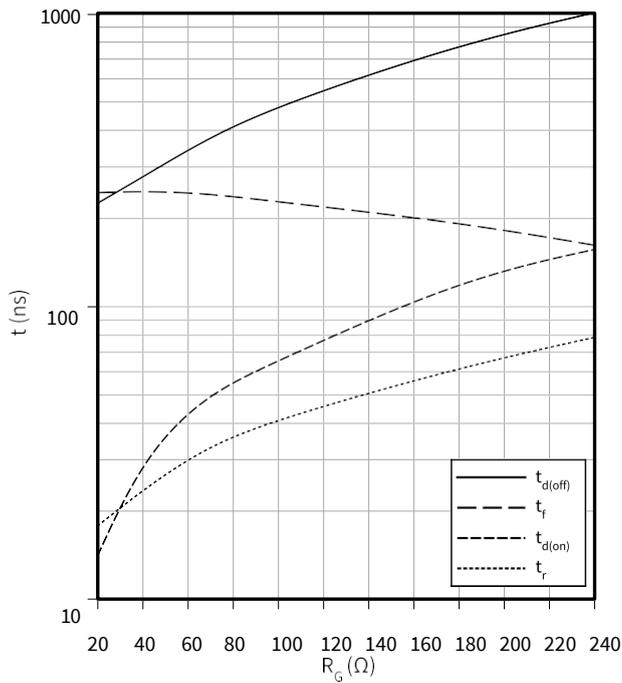
$V_{CC} = 600 \text{ V}, T_{vj} = 150 \text{ °C}, V_{GE} = 0/15 \text{ V}, R_G = 20 \text{ } \Omega$



Typical switching times as a function of gate resistor

$t = f(R_G)$

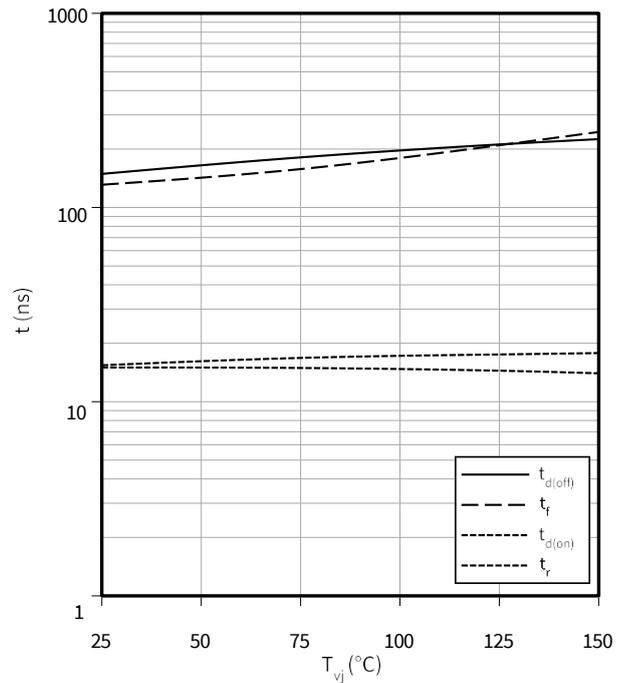
$I_c = 8 \text{ A}, V_{CC} = 600 \text{ V}, T_{vj} = 150 \text{ °C}, V_{GE} = 0/15 \text{ V}$



Typical switching times as a function of junction temperature

$t = f(T_{vj})$

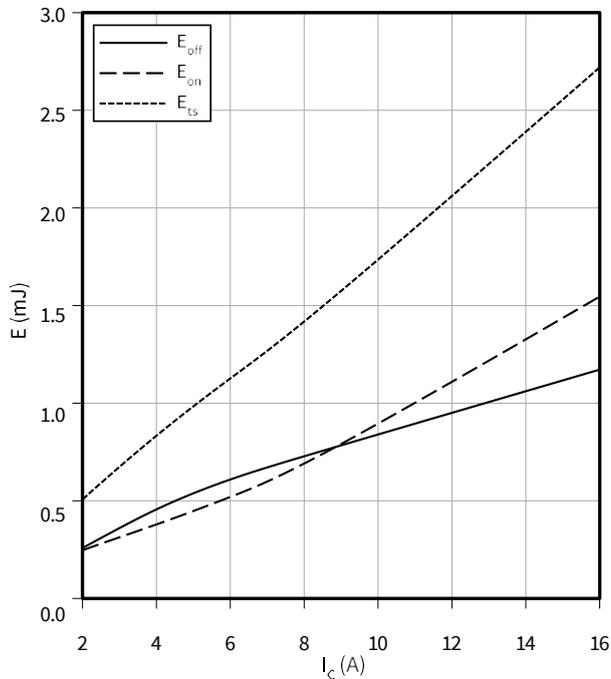
$I_c = 8 \text{ A}, V_{CC} = 600 \text{ V}, V_{GE} = 0/15 \text{ V}, R_G = 20 \text{ } \Omega$



Typical switching energy losses as a function of collector current

$E = f(I_C)$

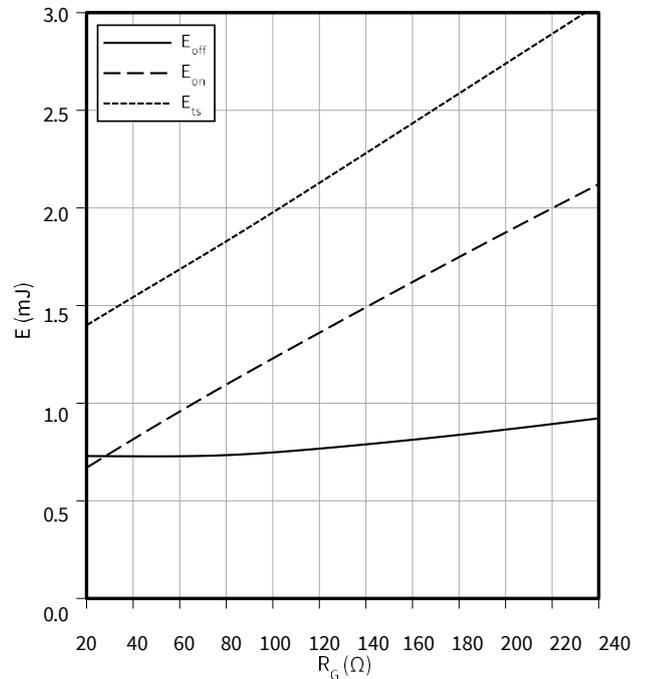
$V_{CC} = 600\text{ V}$, $T_{vj} = 150\text{ °C}$, $V_{GE} = 0/15\text{ V}$, $R_G = 20\text{ }\Omega$



Typical switching energy losses as a function of gate resistor

$E = f(R_G)$

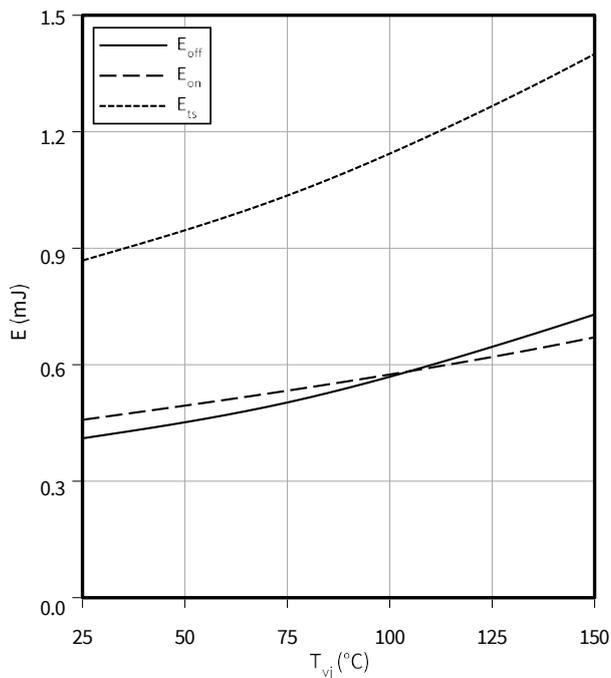
$I_C = 8\text{ A}$, $V_{CC} = 600\text{ V}$, $T_{vj} = 150\text{ °C}$, $V_{GE} = 0/15\text{ V}$



Typical switching energy losses as a function of junction temperature

$E = f(T_{vj})$

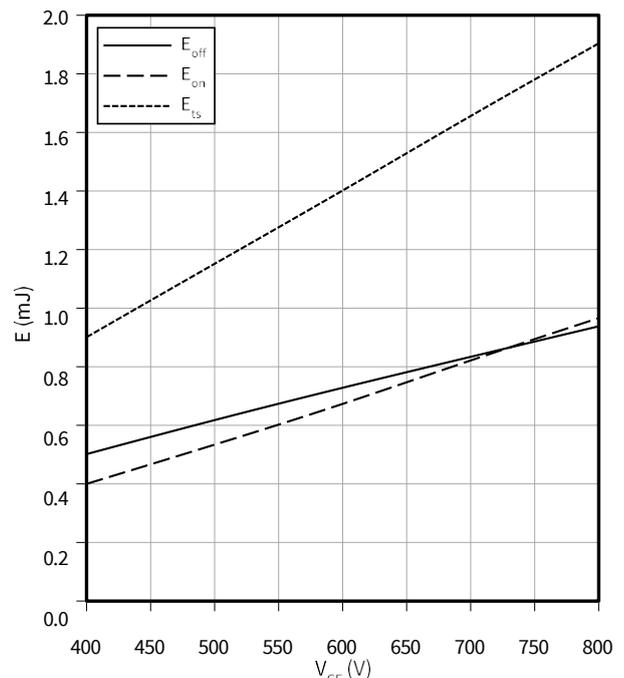
$I_C = 8\text{ A}$, $V_{CC} = 600\text{ V}$, $V_{GE} = 0/15\text{ V}$, $R_G = 20\text{ }\Omega$



Typical switching energy losses as a function of collector emitter voltage

$E = f(V_{CE})$

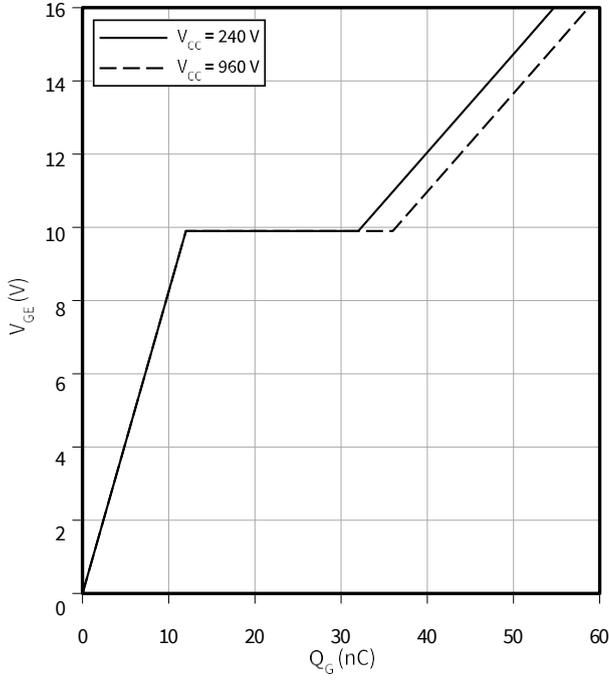
$I_C = 8\text{ A}$, $T_{vj} = 150\text{ °C}$, $V_{GE} = 0/15\text{ V}$, $R_G = 20\text{ }\Omega$



Typical gate charge

$V_{GE} = f(Q_G)$

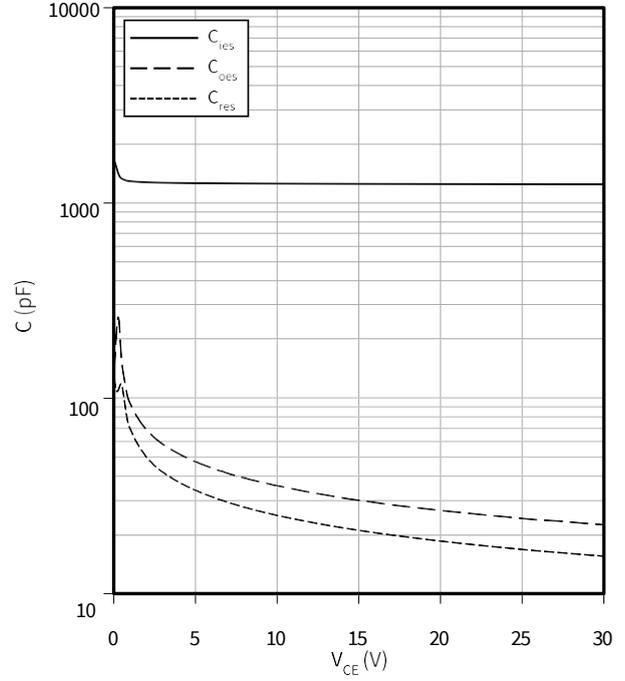
$I_C = 8 \text{ A}$



Typical capacitance as a function of collector-emitter voltage

$C = f(V_{CE})$

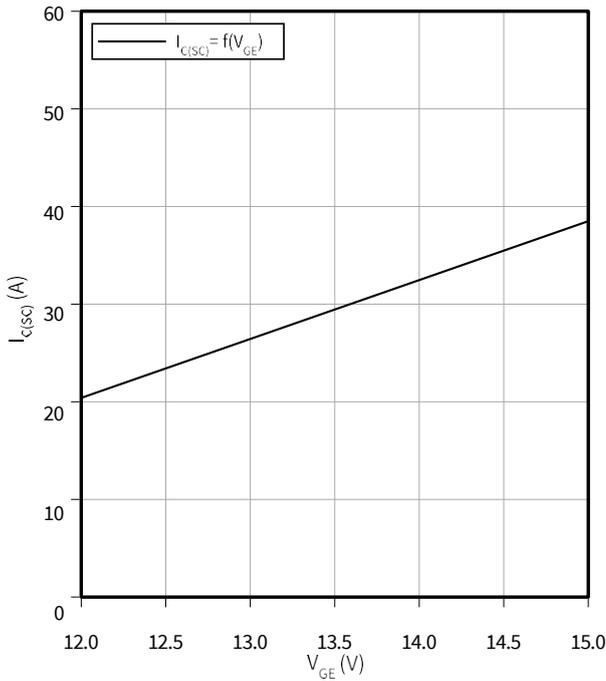
$f = 100 \text{ kHz}, V_{GE} = 0 \text{ V}$



Typical short circuit collector current as a function of gate-emitter voltage

$I_{C(SC)} = f(V_{GE})$

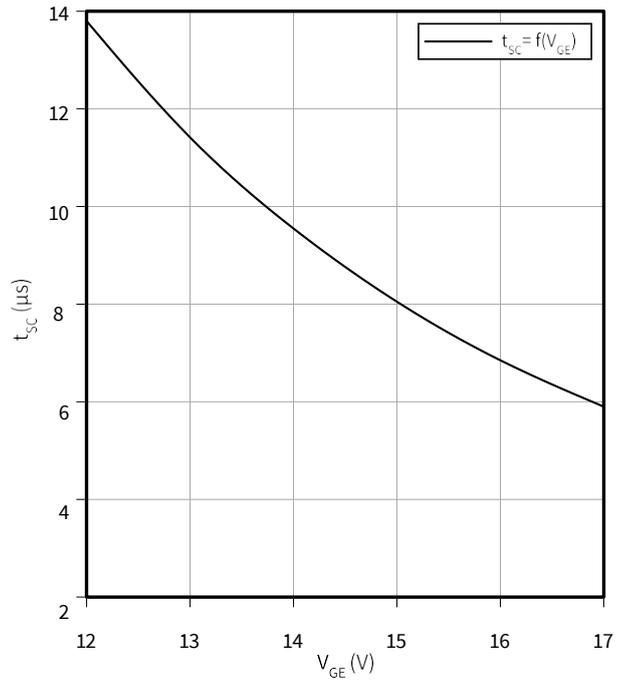
$T_{vj} = 150 \text{ }^\circ\text{C}, V_{CC} = 600 \text{ V}$



Short circuit withstand time as a function of gate-emitter voltage

$t_{SC} = f(V_{GE})$

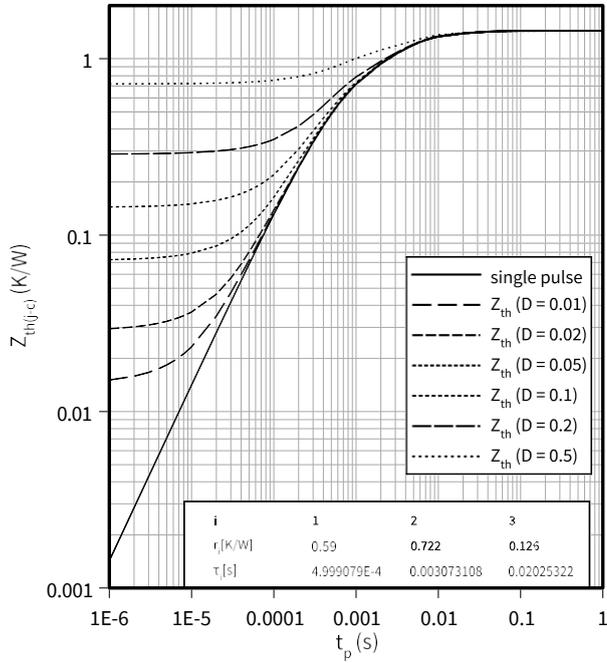
$T_{vj} = 150 \text{ }^\circ\text{C}, V_{CC} = 600 \text{ V}$



IGBT transient thermal impedance as a function of pulse width

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

$$D = t_p / T$$



4 封装外形

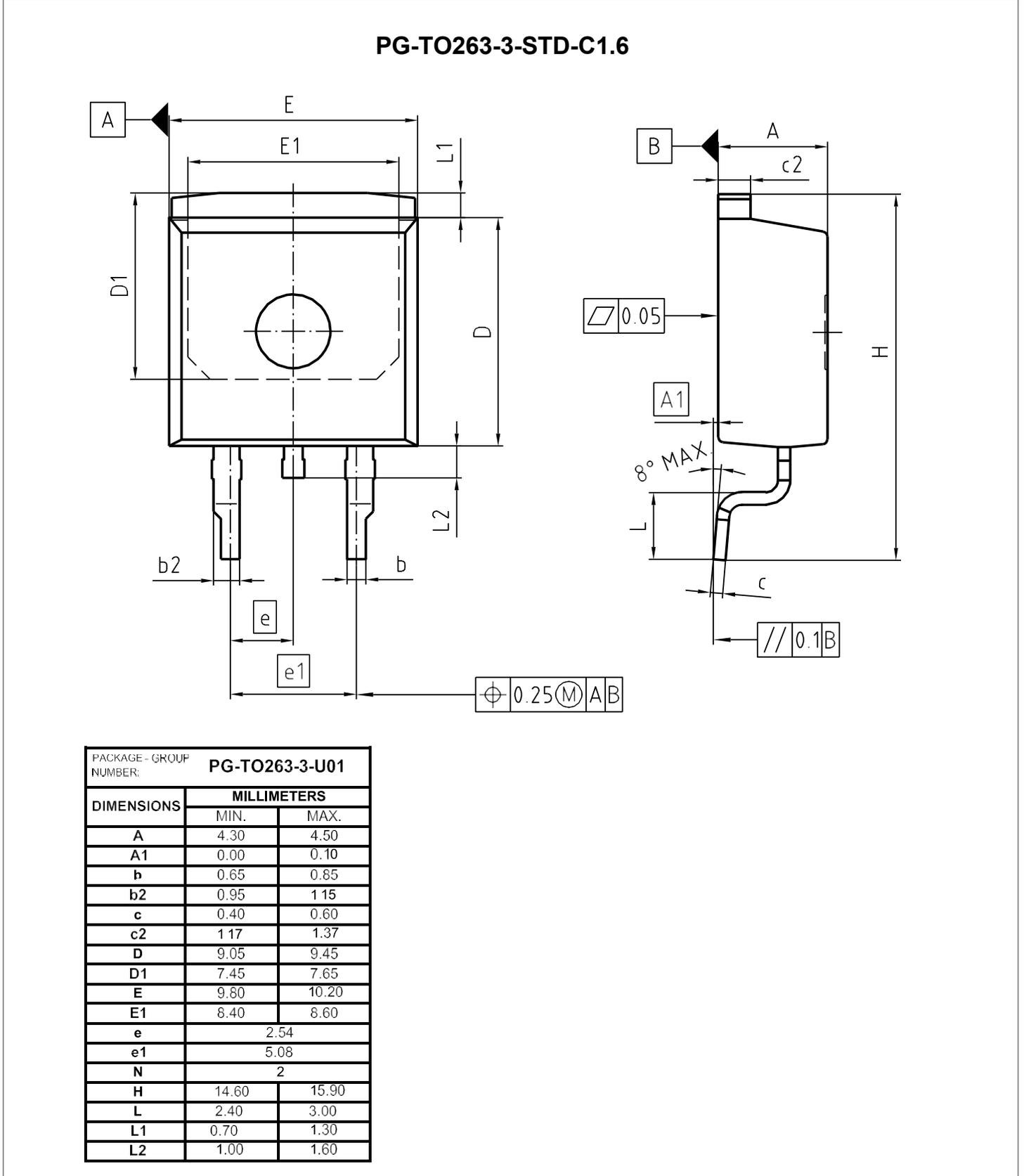
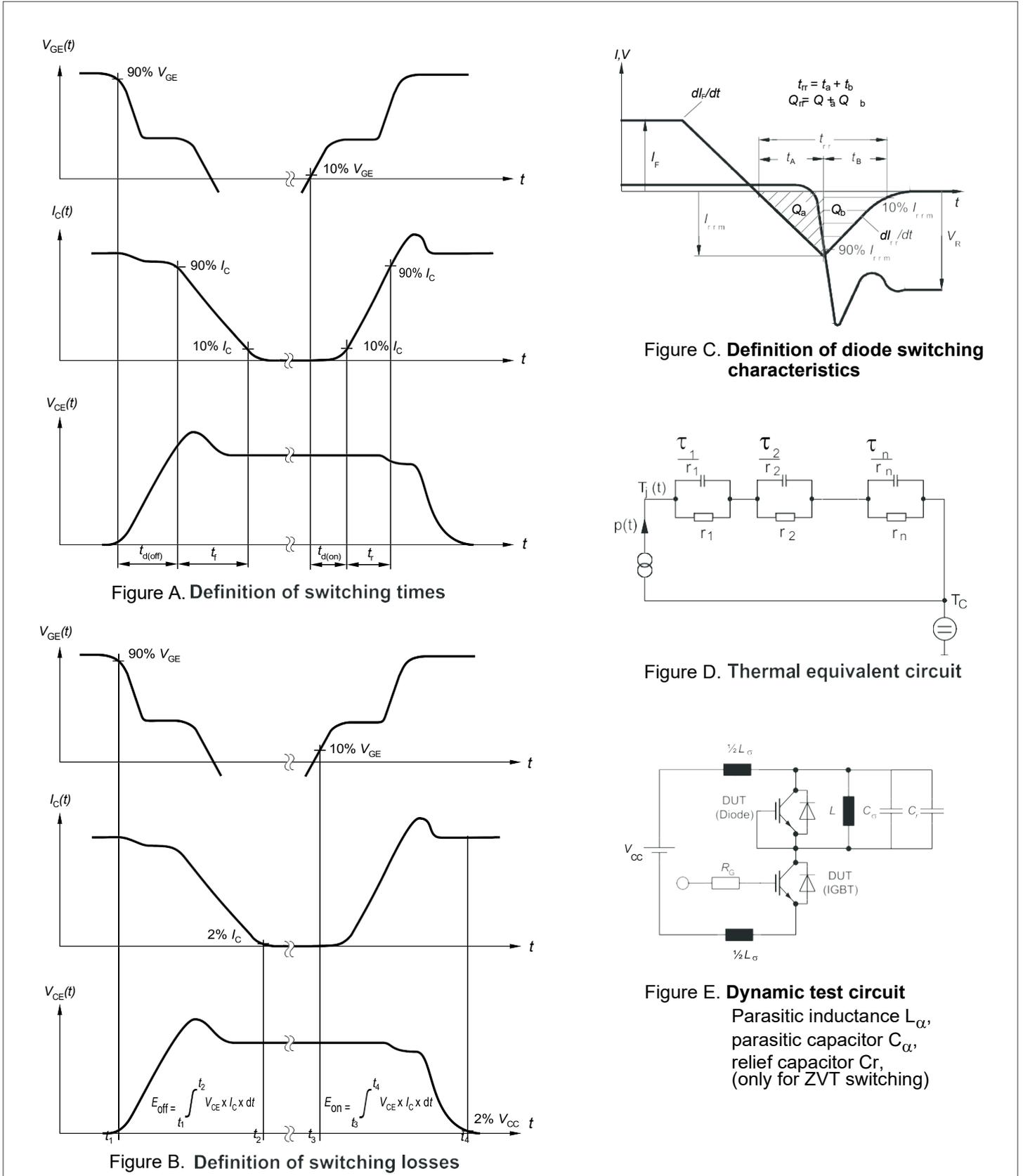


图 1

5 测试条件





修订记录

修订记录

Document revision	Date of release	Description of changes
1.00	2024-03-11	Final datasheet



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