

英飞凌MOSFET

英飞凌600V CoolMOS™ CM8 功率晶体管

该器件基于英飞凌世界一流的超结 MOSFET 平台，集成了快速体二极管，应用广泛。它能以最低的系统成本实现最高的功率密度和卓越的可靠性。它增强了英飞凌的 WBG 产品，是 600 V CoolMOS™ 7 MOSFET 系列的后继产品。

特性

- 同类最佳的 SJ Mosfet
- 凭借极高的换向耐用性，适用于广泛的硬开关和软开关应用
- 集成快速体二极管和 ESD 保护功能
- .XT 互连技术，实现行业领先的热性能

优点

- 提供最佳性价比和同类最佳的 SJ Mosfet 性能
- 易于使用，缩短设计周期
- 支持多种拓扑结构
- 14-42% 更低 R_{th} ，提升热性能

潜在应用

- 数据中心，AI 服务器，通信电源
- 微型和家用混合动力逆变器
- 便携式和民用储能设备，UPS
- 电动汽车充电、轻型电动汽车、电动叉车
- 高压固态配电系统
- 家用及专业工具
- 充电器、适配器、电视和控制台 SMPS

产品验证

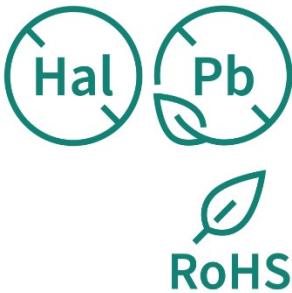
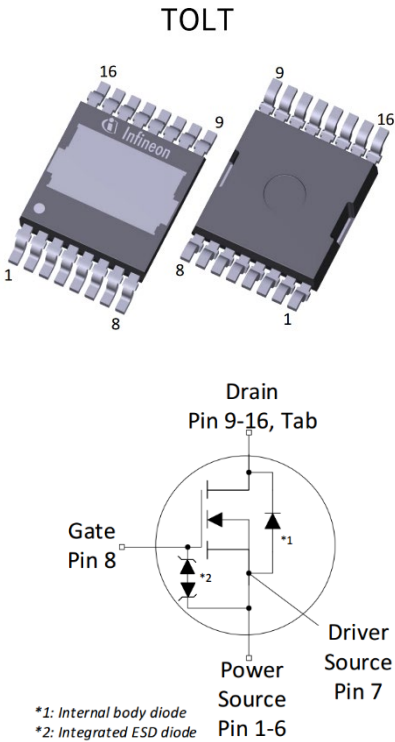
通过 JEDEC 相关测试。

请注意：对于 MOSFET 并联，通常建议在栅极上使用铁氧体磁珠或单独的图腾柱。

表 1 主要性能参数

Parameter	Value	Unit
$V_{DS} @ T_{j,max}$	650	V
$R_{DS(on),max}$	160	mΩ
$Q_{g,typ}$	18	nC
$I_{D,pulse}$	51	A
$E_{oss} @ 400 V$	2.6	μJ
Body diode di_F/dt	1300	A/μs
ESD class (HBM)	2	

Part number	Package	Marking	Related links
IPLT60R160CM8	PG-HDSOP-16	60R160C8	see Appendix A



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](https://www.infineon.com) 参考最新的英文版本（控制文档）。

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1 最大额定值

除非另有规定, $T_j = 25^\circ\text{C}$

表 2 最大额定值

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Continuous drain current ¹⁾	I_D	-	-	19	A	$T_C = 25^\circ\text{C}$
Continuous drain current	I_D	-	-	12	A	$T_C = 100^\circ\text{C}$
Pulsed drain current ²⁾	$I_{D,pulse}$	-	-	51	A	$T_C = 25^\circ\text{C}$
Avalanche energy, single pulse	E_{AS}	-	-	30	mJ	$I_D = 1.7\text{ A}; V_{DD} = 50\text{ V};$ see table 10
Avalanche energy, repetitive	E_{AR}			0.15		
Avalanche current, single pulse	I_{AS}	-	-	1.7	A	-
MOSFET dv/dt ruggedness	dv/dt	-	-	120	V/ns	$V_{DS} = 0 \dots 400\text{ V}$
Gate source voltage (static)	V_{GS}	-20	-	20	V	static;
Gate source voltage (dynamic)	V_{GS}	-30	-	30	V	AC ($f > 1\text{ Hz}$)
Power dissipation	P_{tot}	-	-	124	W	$T_C = 25^\circ\text{C}$
Storage temperature	T_{stg}	-55	-	150	$^\circ\text{C}$	-
Operating junction temperature	T_j					
Extended operating junction temperature	T_j	150	-	175	$^\circ\text{C}$	$\leq 50\text{ h}$ in the application lifetime
Mounting torque	-	-	-	-	Ncm	-
Continuous diode forward current	I_S	-	-	19	A	$T_C = 25^\circ\text{C}$
Diode pulse current ²⁾	$I_{S,pulse}$			51		
Reverse diode dv/dt ³⁾	dv/dt	-	-	70	V/ns	$V_{DS} = 0 \dots 400\text{ V}, I_{SD} \leq 19\text{ A}, T_j = 25^\circ\text{C}$ see table 8
Maximum diode commutation speed	di _F /dt			1300	A/ μs	
Insulation withstand voltage	V_{ISO}	-	-	n.a.	V	$V_{rms}, T_C = 25^\circ\text{C}, t = 1\text{ min}$

1) 受限于 $T_{j,max}$

2) 脉冲宽度 t_p 受限于 $T_{j,max}$

3) 相同低侧和高侧开关, 具有相同的 R_G

2 热特性

表 3 热特性

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Thermal resistance, junction - case	R_{thJC}	-	-	1.01	K/W	-
Thermal resistance, junction - ambient	R_{thJA}	-	-	62	K/W	device on PCB, minimal footprint
Thermal resistance, junction - ambient for SMD version	R_{thJA}	-	45	55	K/W	Device on 40 mm*40 mm*1.5 mm epoxy PCB FR4 with 6 cm ² (one layer, 70 μm thickness) copper area for drain connection and cooling. PCB is vertical without air stream cooling.
Soldering temperature, wave- & reflow soldering allowed	T_{sold}	-	-	260	°C	reflow MSL1

3 电气特性

除非另有规定, $T_j = 25^\circ\text{C}$

表 4 静态特性

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Drain-source breakdown voltage	$V_{(BR)DSS}$	600	-	-	V	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$
Gate threshold voltage	$V_{(GS)th}$	3.7	4.2	4.7	V	$V_{DS} = V_{GS}, I_D = 0.15\text{ mA}$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}, T_j = 25^\circ\text{C}$
			27.7	-		$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}, T_j = 150^\circ\text{C}$
Gate-source leakage current	I_{GSS}	-	-	1.5	μA	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	0.133	0.160	Ω	$V_{GS} = 10\text{ V}, I_D = 6.3\text{ A}, T_j = 25^\circ\text{C}$
			0.294	-		$V_{GS} = 10\text{ V}, I_D = 6.3\text{ A}, T_j = 150^\circ\text{C}$
Gate resistance	R_G	-	11.1	-	Ω	$f = 1\text{ MHz}$

表 5 动态特性

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	785	-	pF	$V_{GS} = 0\text{ V}, V_{DS} = 400\text{ V}, f = 250\text{ kHz}$
Output capacitance	C_{oss}		12			
Effective output capacitance, energy related ⁴⁾	$C_{o(er)}$	-	32	-	pF	$V_{GS} = 0\text{ V}, V_{DS} = 0 \dots 400\text{ V}$
Effective output capacitance, time related ⁵⁾	$C_{o(tr)}$	-	317	-	pF	$I_D = \text{constant}, V_{GS} = 0\text{ V}, V_{DS} = 0 \dots 400\text{ V}$
Turn-on delay time	$t_{d(on)}$	-	17	-	ns	$V_{DD} = 400\text{ V}, V_{GS} = 13\text{ V}, I_D = 3.0\text{ A}, R_G = 10.0\text{ }\Omega$; see table 9
Rise time	t_r		6			
Turn-off delay time	$t_{d(off)}$		90			
Fall time	t_f		12			

⁴⁾ $C_{o(er)}$ 是一个固定电容, 当 V_{DS} 从 0 升至 400 V 时, 其存储能量与 C_{oss} 相同

⁵⁾ $C_{o(tr)}$ 是一个固定电容, 当 V_{DS} 从 0 升至 400 V 时, 其充电时间与 C_{oss} 相同

表 6 栅极电荷特性

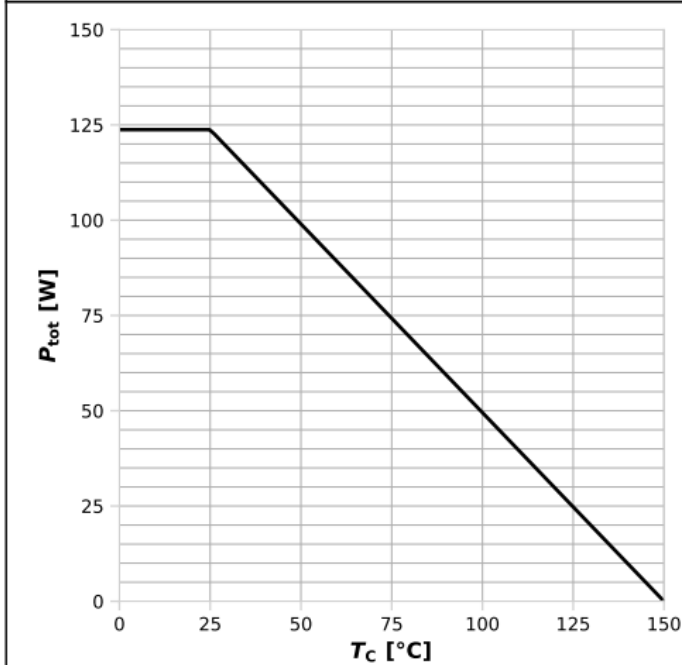
Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Gate to source charge	Q_{gs}	-	5	-	nC	$V_{DD} = 400\text{ V}, I_D = 3.0\text{ A}, V_{GS} = 0\text{ to }10\text{ V}$
Gate to drain charge	Q_{gd}		7		nC	
Gate charge total	Q_g		18		nC	
Gate plateau voltage	$V_{plateau}$		6.1		V	

表 7 反向二极管特性

Parameter	Symbol	Values			Unit	Note / Test condition
		Min.	Typ.	Max.		
Diode forward voltage	V_{SD}	-	0.9	-	V	$V_{GS} = 0\text{ V}$, $I_F = 3.0\text{ A}$, $T_j = 25^\circ\text{C}$
Reverse recovery time	t_{rr}	-	61	77	ns	$V_R = 400\text{ V}$, $I_F = 3.0\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$; see table 8
Reverse recovery charge	Q_{rr}		0.19	0.28	μC	
Peak reverse recovery current	I_{rrm}		6.45	-	A	

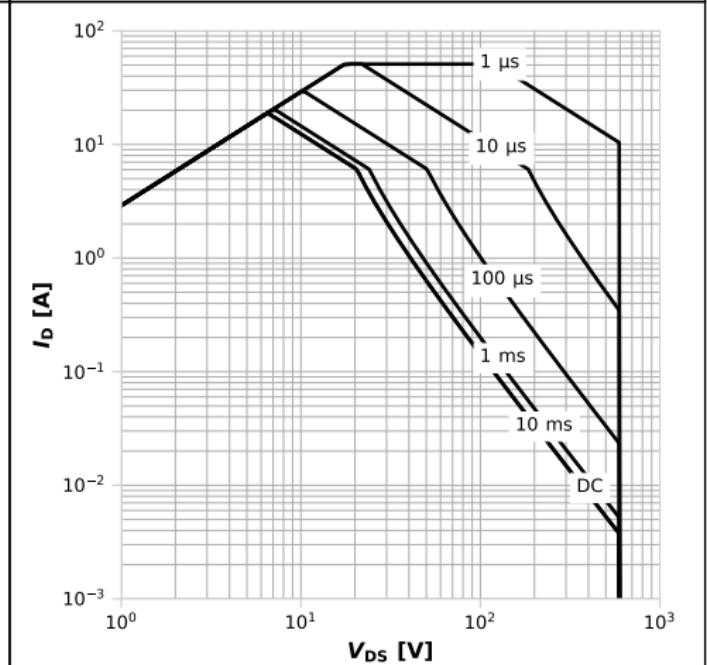
4 电气特性图

Diagram 1: Power dissipation



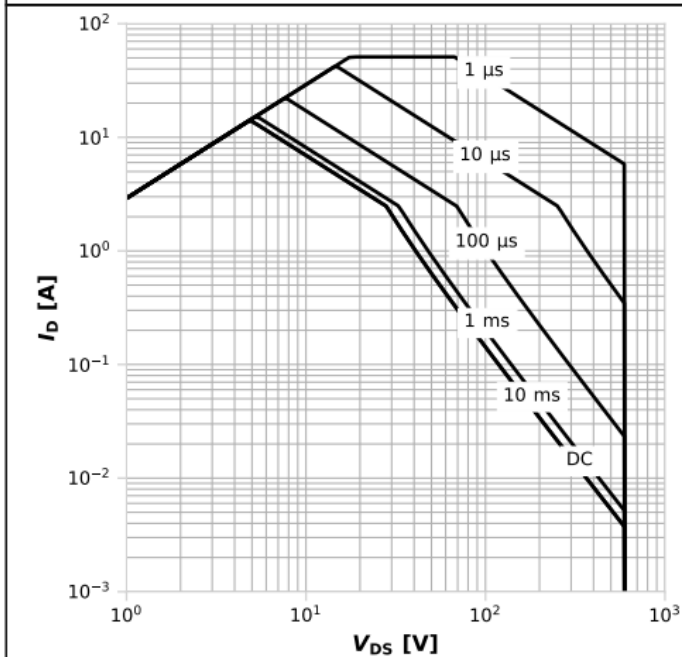
$$P_{\text{tot}} = f(T_c)$$

Diagram 2: Safe operating area



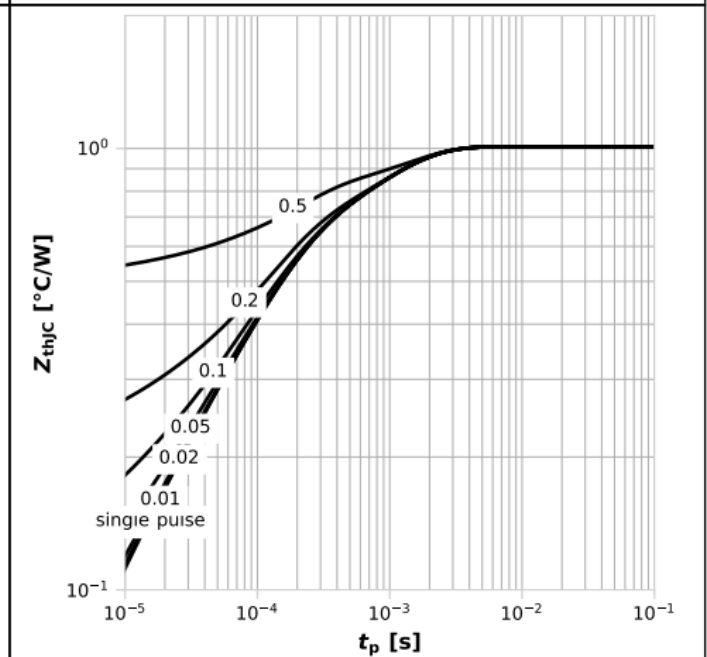
$$I_D = f(V_{DS}); T_c = 25^\circ\text{C}; D = 0; \text{parameter: } t_p$$

Diagram 3: Safe operating area



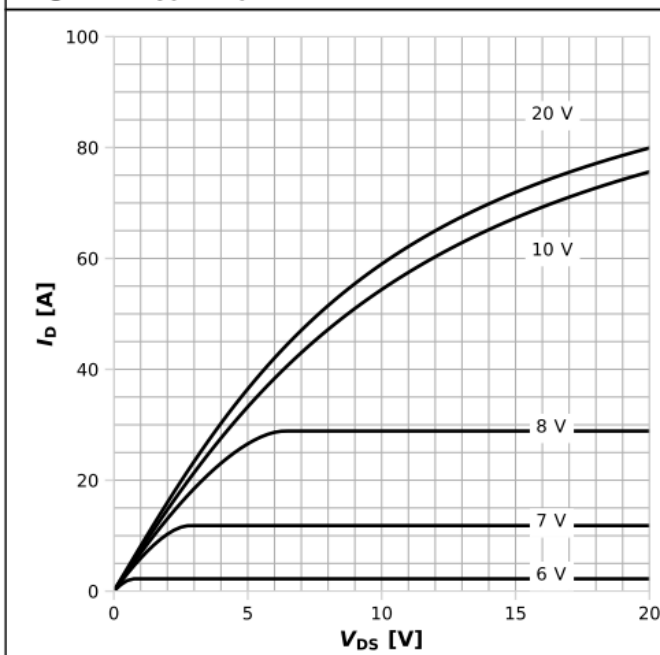
$$I_D = f(V_{DS}); T_c = 80^\circ\text{C}; D = 0; \text{parameter: } t_p$$

Diagram 4: Max. transient thermal impedance



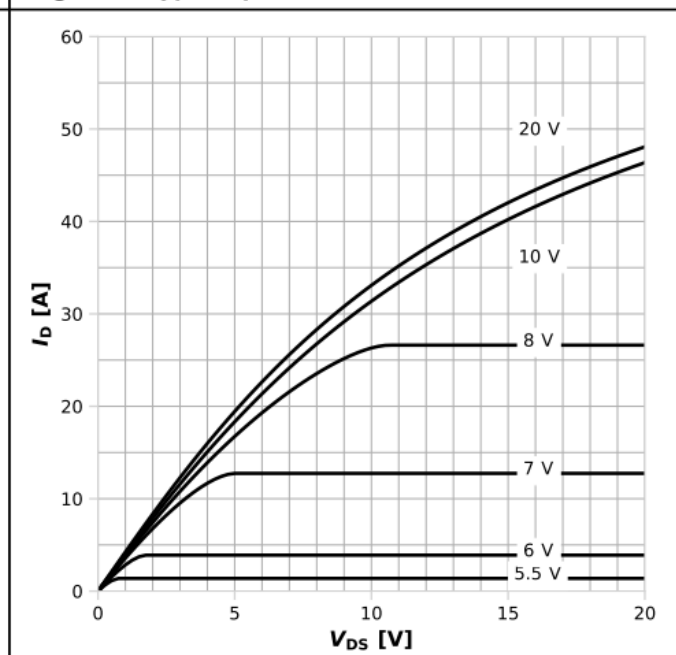
$$Z_{thJC} = f(t_p); \text{parameter: } D = t_p / T$$

Diagram 5: Typ. output characteristics



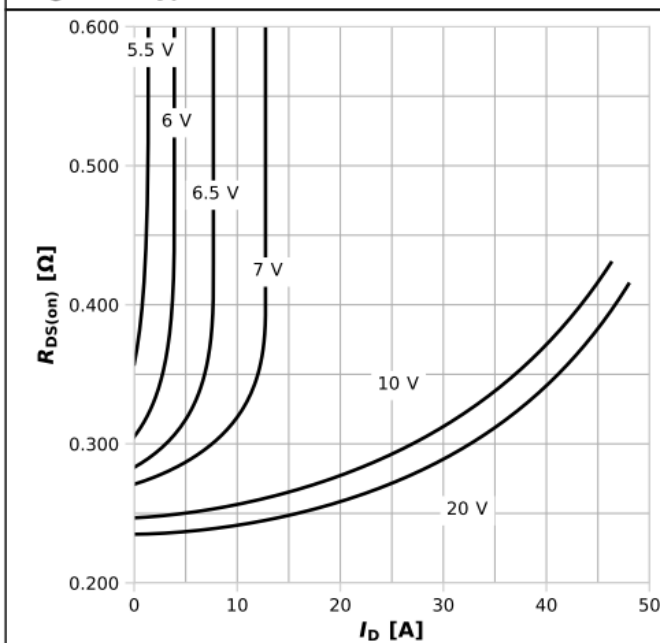
$I_D = f(V_{DS}); T_j = 25^\circ\text{C}; \text{parameter: } V_{GS}$

Diagram 6: Typ. output characteristics



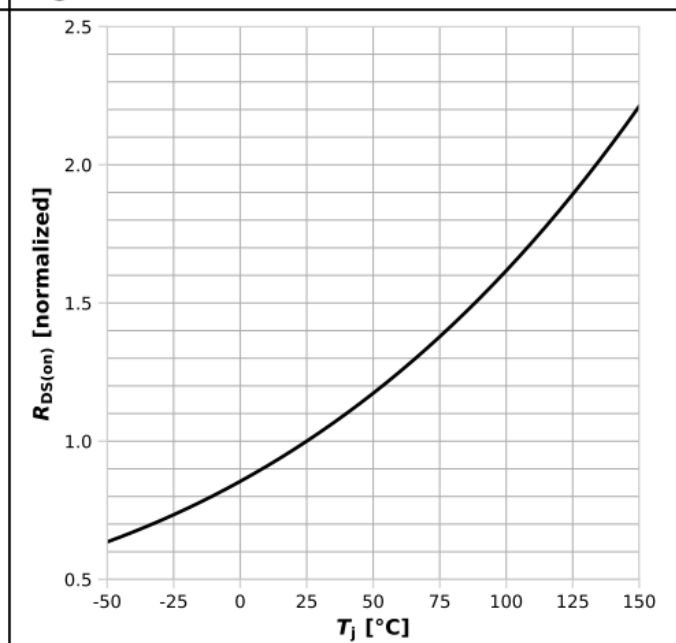
$I_D = f(V_{DS}); T_j = 125^\circ\text{C}; \text{parameter: } V_{GS}$

Diagram 7: Typ. drain-source on-state resistance



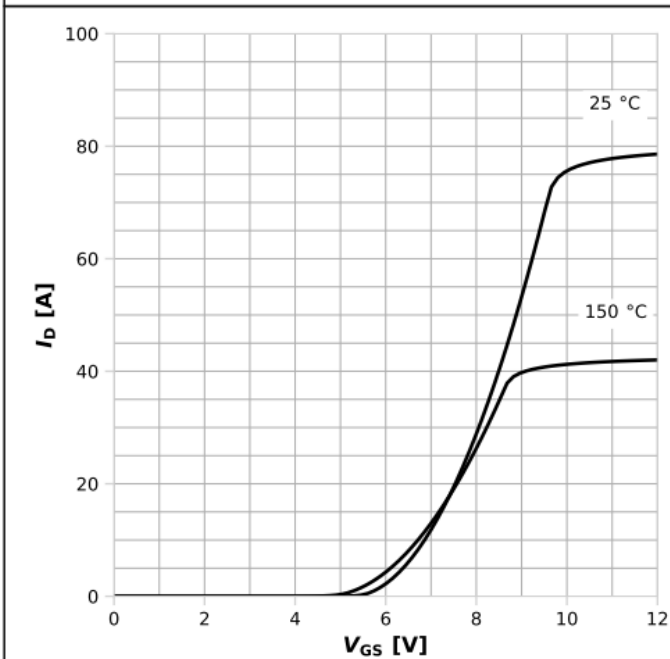
$R_{DS(on)} = f(I_D); T_j = 125^\circ\text{C}; \text{parameter: } V_{GS}$

Diagram 8: Drain-source on-state resistance



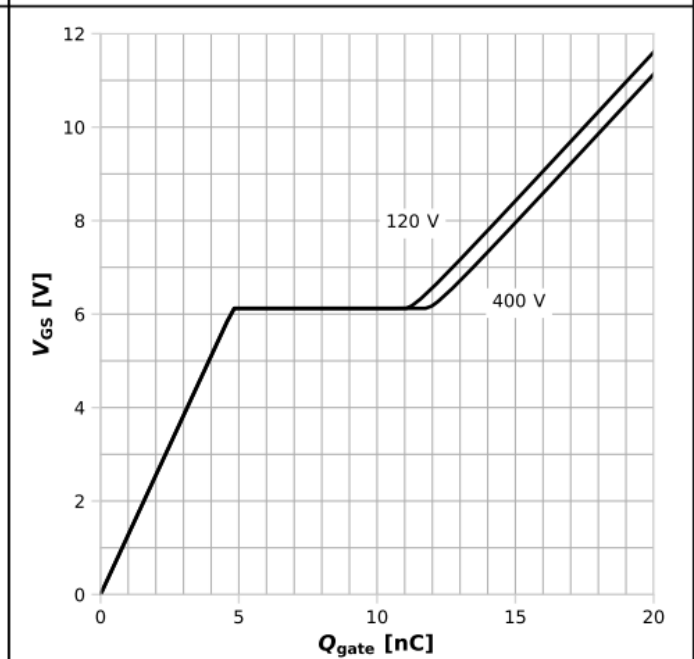
$R_{DS(on)} = f(T_j); I_D = 6.3 \text{ A}; V_{GS} = 10 \text{ V}$

Diagram 9: Typ. transfer characteristics



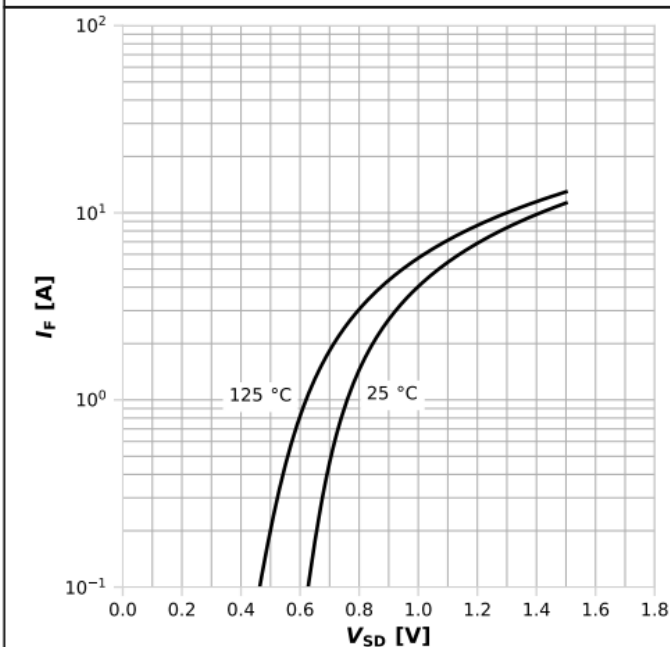
$I_D = f(V_{GS})$; $V_{DS} = 20$ V; parameter: T_j

Diagram 10: Typ. gate charge



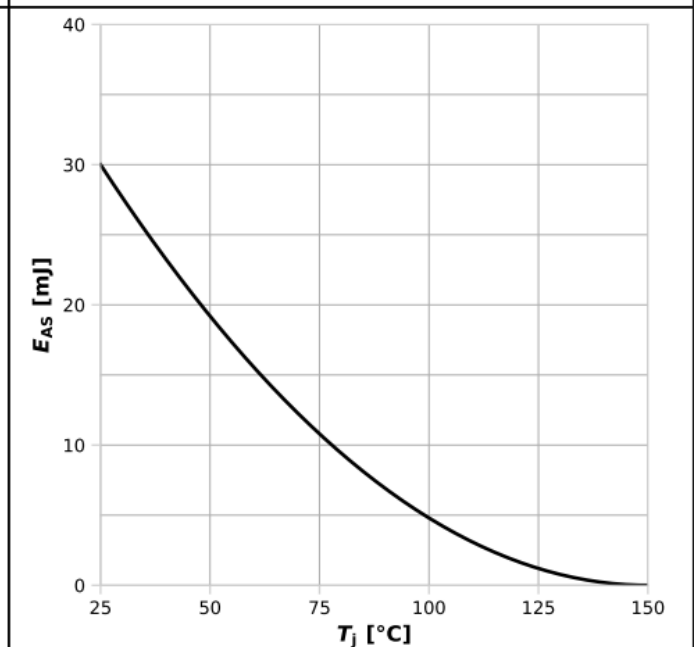
$V_{GS} = f(Q_{gate})$; $I_D = 3.0$ A pulsed; parameter: V_{DD}

Diagram 11: Forward characteristics of reverse diode



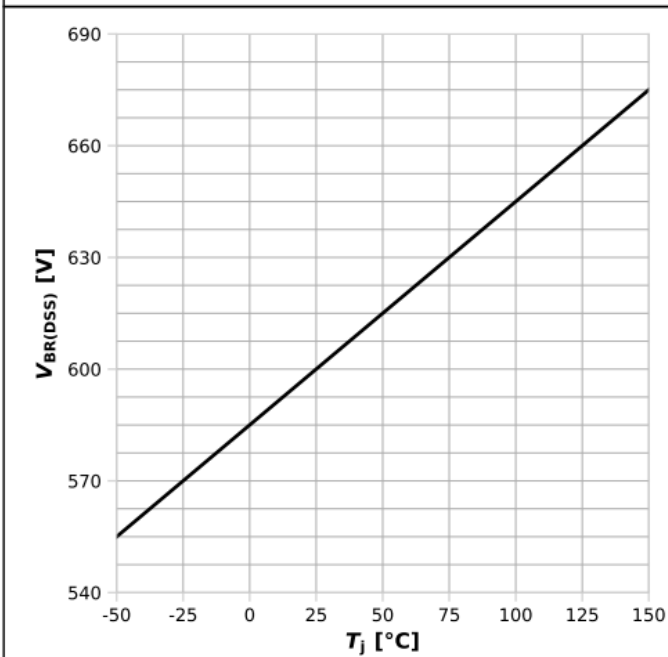
$I_F = f(V_{SD})$; parameter: T_j

Diagram 12: Avalanche energy



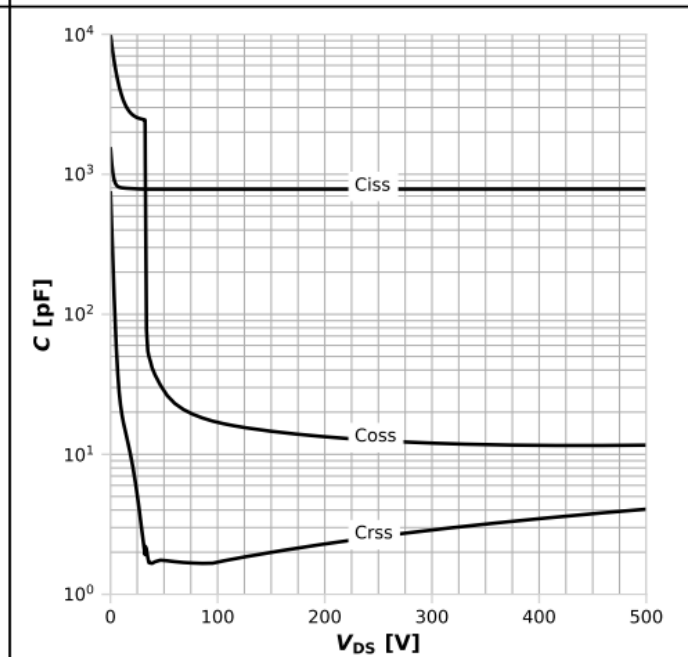
$E_{AS} = f(T_j)$; $I_D = 1.7$ A; $V_{DD} = 50$ V

Diagram 13: Drain-source breakdown voltage



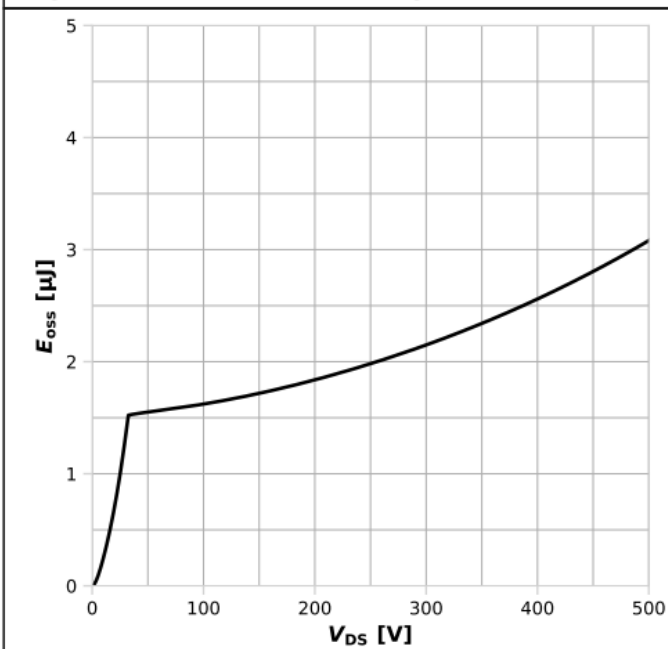
$$V_{BR(DSS)} = f(T_j); I_D = 1 \text{ mA}$$

Diagram 14: Typ. capacitances



$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 250 \text{ kHz}$$

Diagram 15: Typ. Coss stored energy



$$E_{oss} = f(V_{DS})$$

5 测试电路

表 8 二极管特性

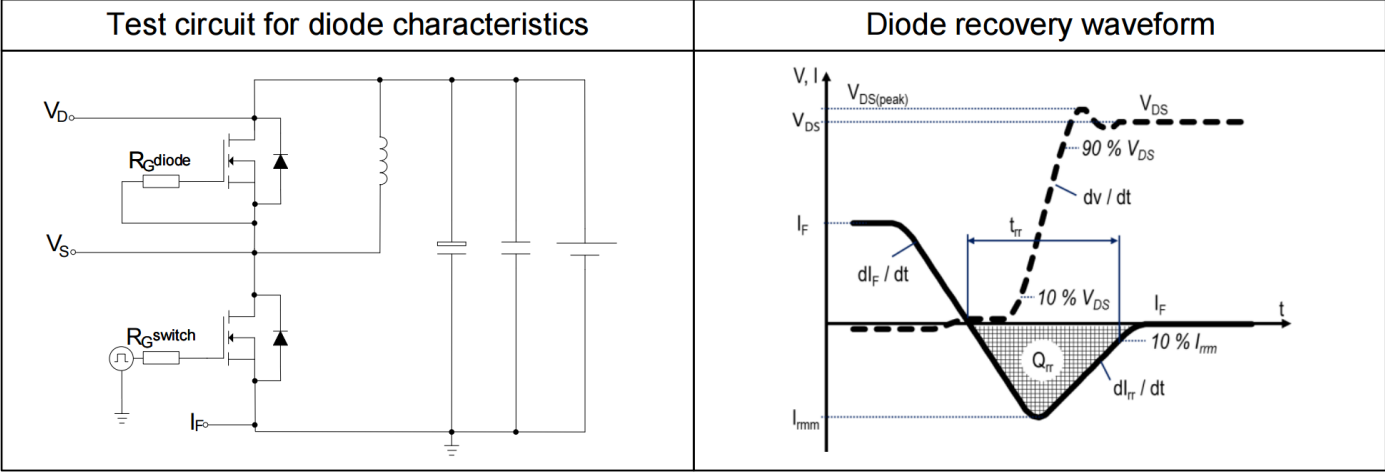


表 9 开关时间 (ss)

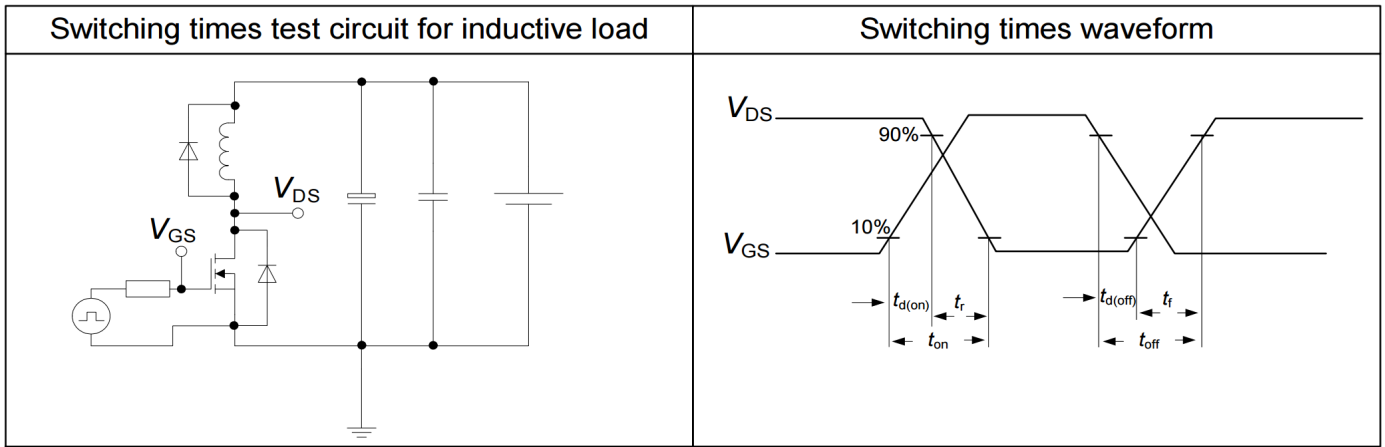
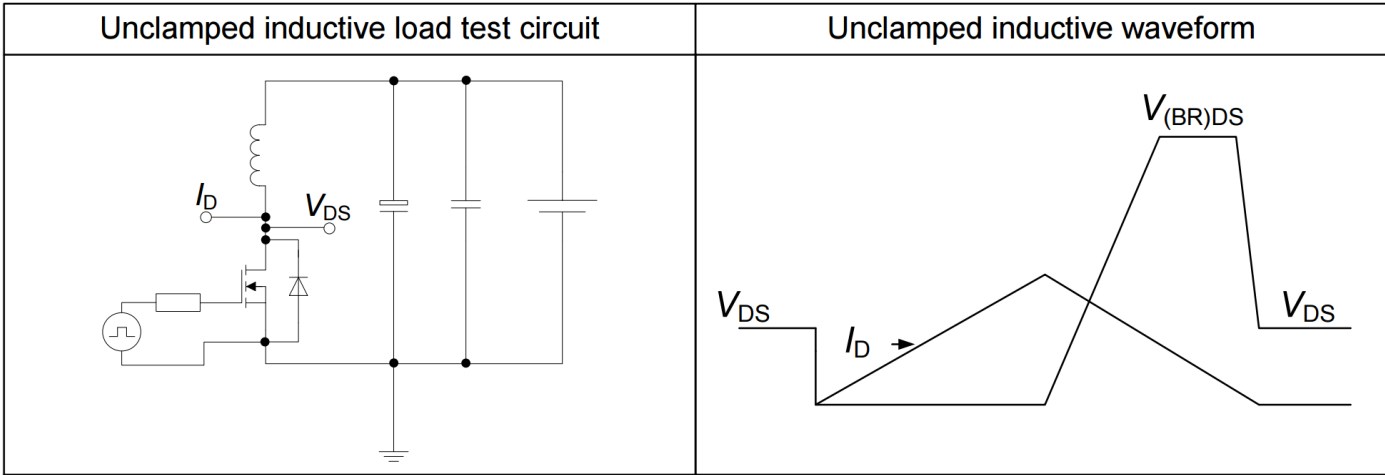


表 10 非钳位感性负载 (ss)



6 封装外形

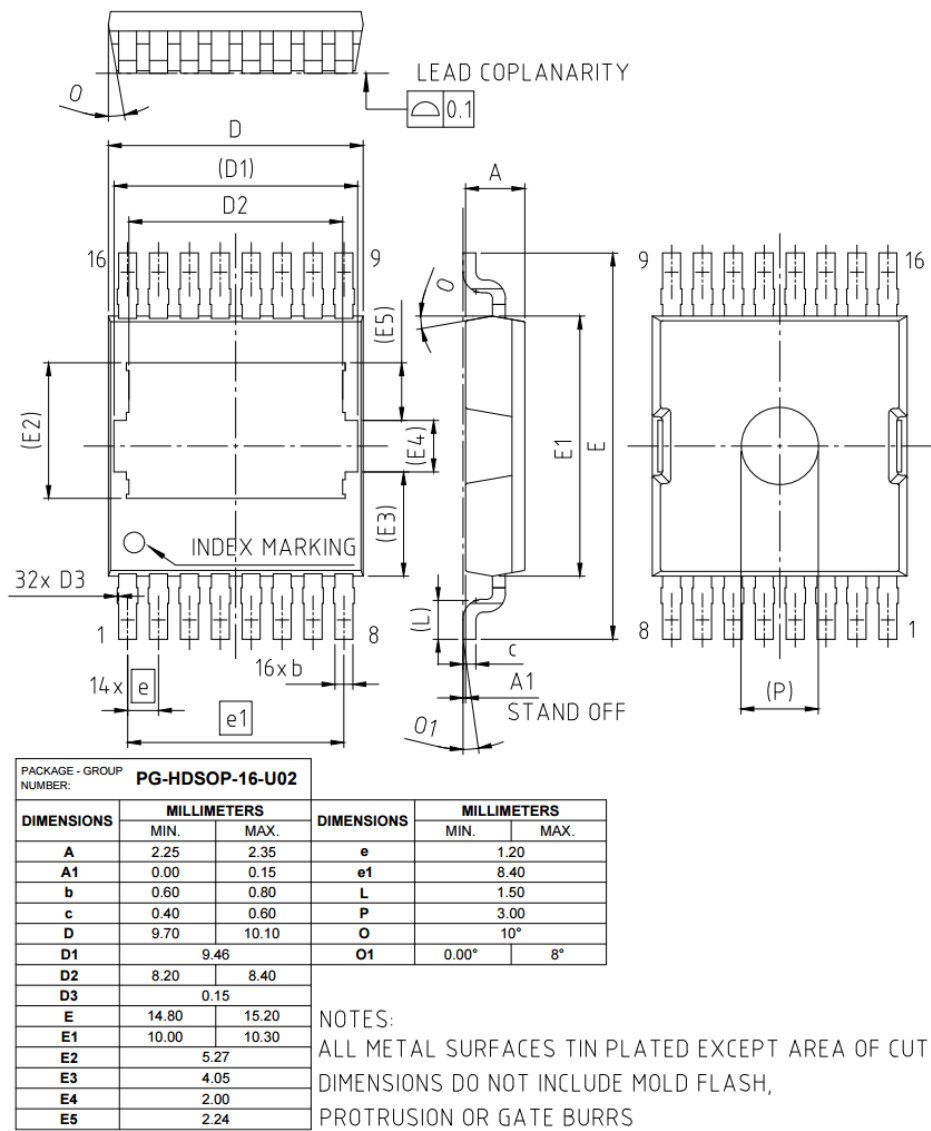


图 1 PG-HDSOP- 16 封装外形图，尺寸单位为毫米

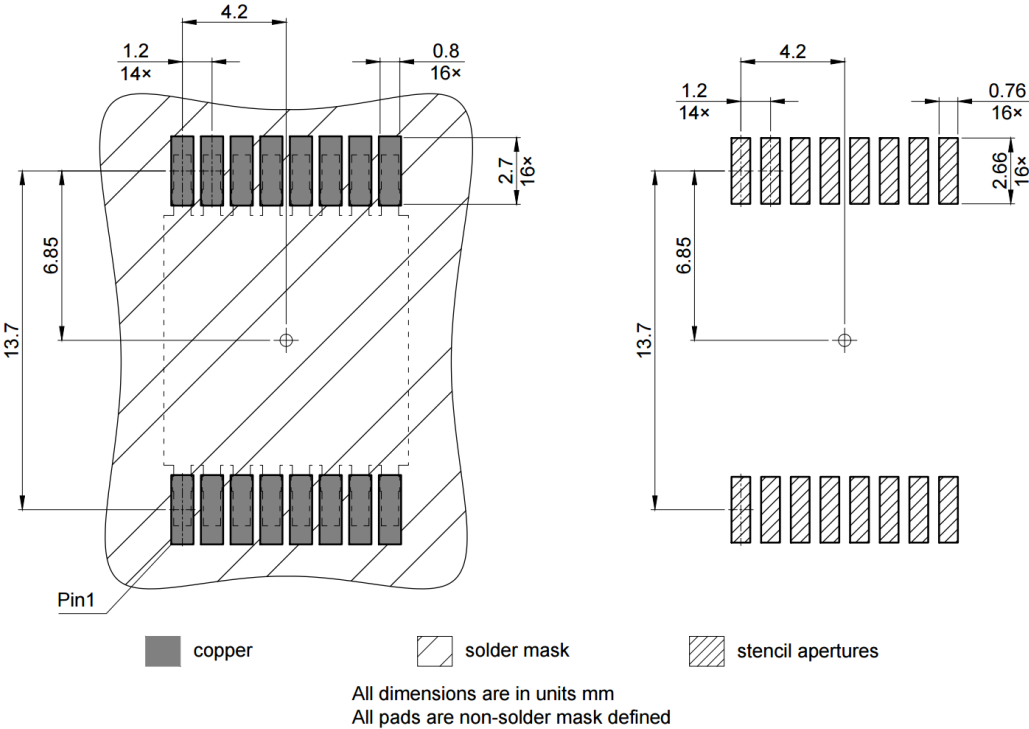
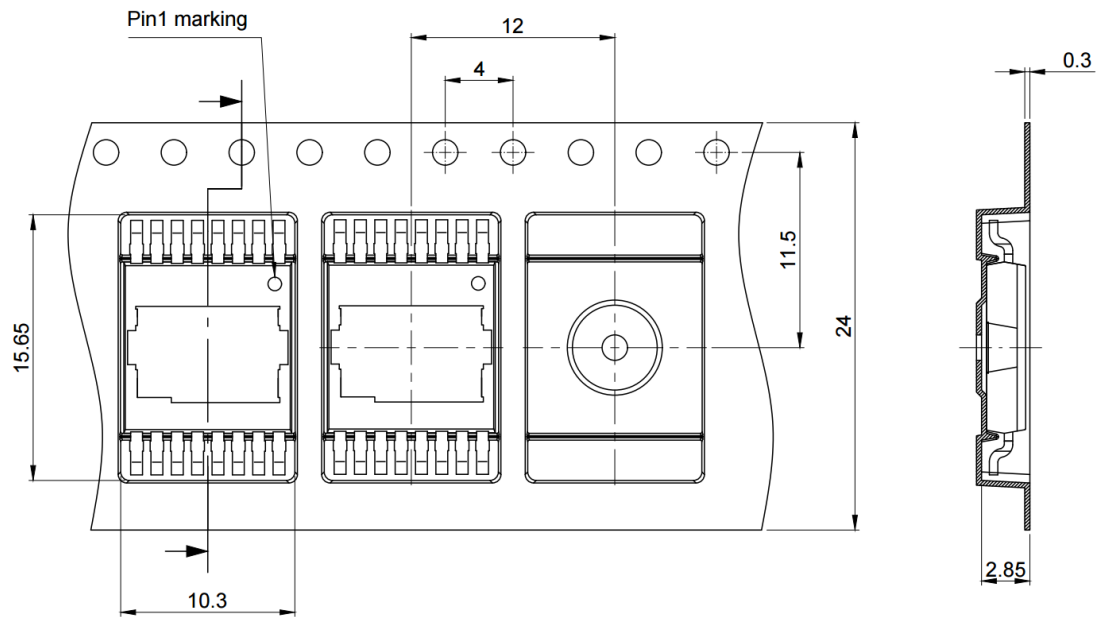


图 2 PG-HDSOP- 16 封装图，尺寸单位为毫米



All dimensions are in units mm

The drawing is in compliance with ISO 128-30, Projection Method 1 [第一角法]

图 3 PG-HDSOP-16 封装变体，尺寸单位为毫米

7 附录 A

表 11 相关链接

- [IFX CoolMOS CM8 网页](#)
- [IFX CoolMOS CM8 应用笔记](#)
- [IFX CoolMOS CM8 仿真模型](#)
- [IFX 设计工具](#)

修订记录

IPLT60R160CM8

Revision 2025-11-18, Rev. 2. 0

Previous revisions

Revision	Date	Subjects (major changes since last revision)
2.0	2025-11-18	Release of final version

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版本 2026-09-14

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