

CSD18536KCS 60V N 通道 NexFET™ 功率金属氧化物半导体场效应晶体管 (MOSFET)

1 特性

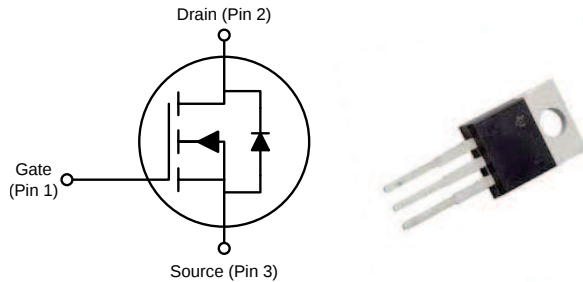
- 超低 Q_g 和 Q_{gd}
- 低热阻
- 雪崩级
- 无铅引脚镀层
- 符合 RoHS 标准
- 无卤素
- 晶体管 (TO)-220 塑料封装

2 应用范围

- 次级侧同步整流器
- 电机控制

3 说明

这款 60V, 1.3mΩ, TO-220 NexFET™ 功率 MOSFET 的设计被用来降低功率转换中的损耗, 损耗。



产品概要

$T_A = 25^\circ\text{C}$		典型值	单位
V_{DS}	漏源电压	60	V
Q_g	栅极电荷总量 (10V)	108	nC
Q_{gd}	栅极电荷 (栅极到漏极)	14	nC
$R_{DS(on)}$	漏源导通电阻	$V_{GS} = 4.5\text{V}$	1.7 mΩ
		$V_{GS} = 10\text{V}$	1.3 mΩ
$V_{GS(th)}$	阈值电压	1.8	V

订购信息⁽¹⁾

器件	封装	介质	数量	出货
CSD18536KCS	TO-220 塑料封装	管	50	管

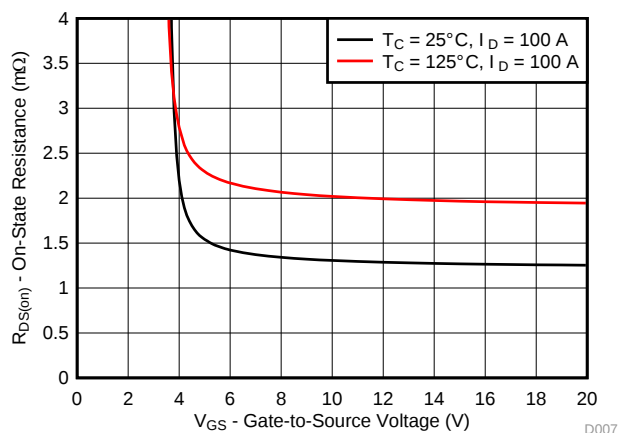
(1) 要了解所有可用封装, 请见数据表末尾的可订购产品附录。

绝对最大额定值

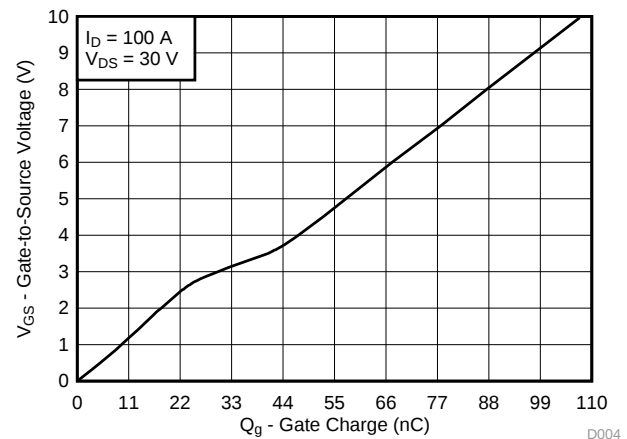
$T_A = 25^\circ\text{C}$		值	单位
V_{DS}	漏源电压	60	V
V_{GS}	栅源电压	±20	V
I_D	持续漏极电流 (受封装限制)	200	A
	持续漏极电流 (受芯片限制), $T_C = 25^\circ\text{C}$ 时测得	349	
	持续漏极电流 (受芯片限制), $T_C = 100^\circ\text{C}$ 时测得	247	
I_{DM}	脉冲漏极电流 ⁽¹⁾	400	A
P_D	功率耗散	375	W
T_J, T_{stg}	运行结温和 储存温度范围	-55 至 175	°C
E_{AS}	雪崩能量, 单一脉冲 $I_D=128\text{A}, L=0.1\text{mH}, R_G=25\Omega$	819	mJ

(1) 最大 $R_{\theta JC} = 0.4^\circ\text{C/W}$, 脉冲持续时间 $\leq 100\mu\text{s}$, 占空比 $\leq 1\%$ 。

$R_{DS(on)}$ 与 V_{GS} 之间的关系



栅极电荷



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4 修订历史记录

Changes from Original (March 2015) to Revision A	Page
• 更新了栅极电荷曲线	1
• Changed C_{OSS} values From: TYP = 1700 pF MAX = 2210 pF To: TYP = 1410 pF MAX = 1840 pF in <i>Dynamic Characteristics</i>	3
• Changed Q_g values From: TYP = 83 nC MAX = 108 nC To: TYP = 108 nC MAX = 140 nC in the <i>Dynamic Characteristics</i>	3
• Changed $Q_{g(th)}$ value From: 12 nC To: 17 nC in the <i>Dynamic Characteristics</i>	3
• Changed $t_{d(on)}$ value From: 8 ns To: 11 ns in <i>Dynamic Characteristics</i>	3
• Changed t_r value From: 17 ns To: 5 ns in <i>Dynamic Characteristics</i>	3
• Changed $t_{d(off)}$ value From: 23 ns To: 24 ns in <i>Dynamic Characteristics</i>	3
• Changed t_f value From: 12 ns To: 4 ns in <i>Dynamic Characteristics</i>	3
• Updated Figure 4.	4
• Updated Figure 5.	4
• 已添加 社区资源	7

5 Specifications

5.1 Electrical Characteristics

(T_A = 25°C unless otherwise stated)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
STATIC CHARACTERISTICS						
BV _{DSS}	Drain-to-Source Voltage	V _{GS} = 0 V, I _D = 250 μA	60			V
I _{DSS}	Drain-to-Source Leakage Current	V _{GS} = 0 V, V _{DS} = 48 V			1	μA
I _{GSS}	Gate-to-Source Leakage Current	V _{DS} = 0 V, V _{GS} = 20 V			100	nA
V _{GS(th)}	Gate-to-Source Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 μA	1.4	1.8	2.2	V
R _{DS(on)}	Drain-to-Source On-Resistance	V _{GS} = 4.5 V, I _D = 100 A	1.7		2.2	mΩ
		V _{GS} = 10 V, I _D = 100 A	1.3		1.6	mΩ
g _{fs}	Transconductance	V _{DS} = 6 V, I _D = 100 A	312			S
DYNAMIC CHARACTERISTICS						
C _{iSS}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 30 V, f = 1 MHz	8790		11430	pF
C _{oSS}	Output Capacitance		1410		1840	pF
C _{rSS}	Reverse Transfer Capacitance		39		51	pF
R _G	Series Gate Resistance		0.7	1.4		Ω
Q _g	Gate Charge Total (10 V)	V _{DS} = 30 V, I _D = 100 A	108		140	nC
Q _{gd}	Gate Charge Gate-to-Drain		14			nC
Q _{gs}	Gate Charge Gate-to-Source		18			nC
Q _{g(th)}	Gate Charge at V _{th}		17			nC
Q _{oSS}	Output Charge	V _{DS} = 30 V, V _{GS} = 0 V	230			nC
t _{d(on)}	Turn On Delay Time	V _{DS} = 30 V, V _{GS} = 10 V, I _{DS} = 100 A, R _G = 0 Ω	11			ns
t _r	Rise Time		5			ns
t _{d(off)}	Turn Off Delay Time		24			ns
t _f	Fall Time		4			ns
DIODE CHARACTERISTICS						
V _{SD}	Diode Forward Voltage	I _{SD} = 100 A, V _{GS} = 0 V	0.9		1.0	V
Q _{rr}	Reverse Recovery Charge	V _{DS} = 30 V, I _F = 100 A, di/dt = 300 A/μs	323			nC
t _{rr}	Reverse Recovery Time		86			ns

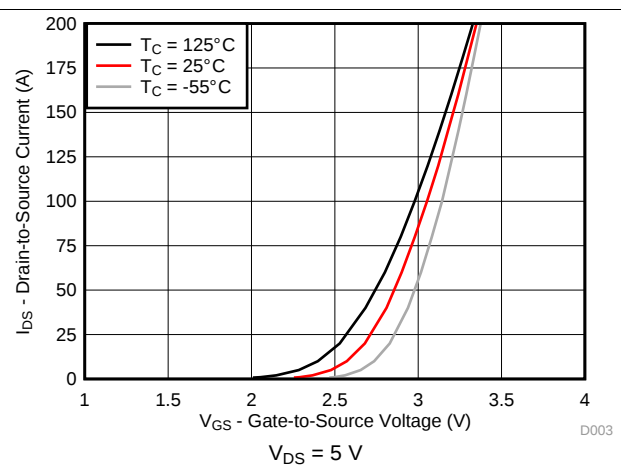
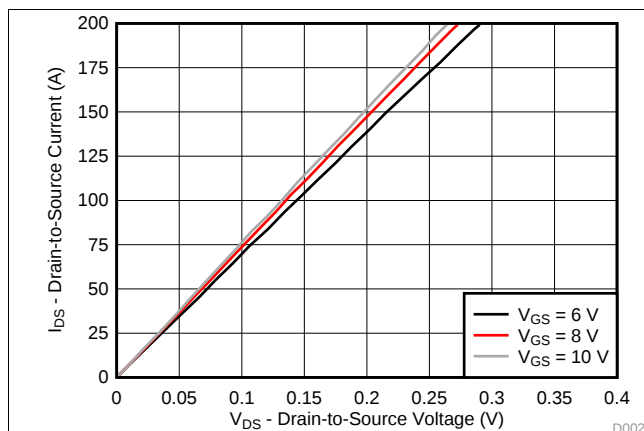
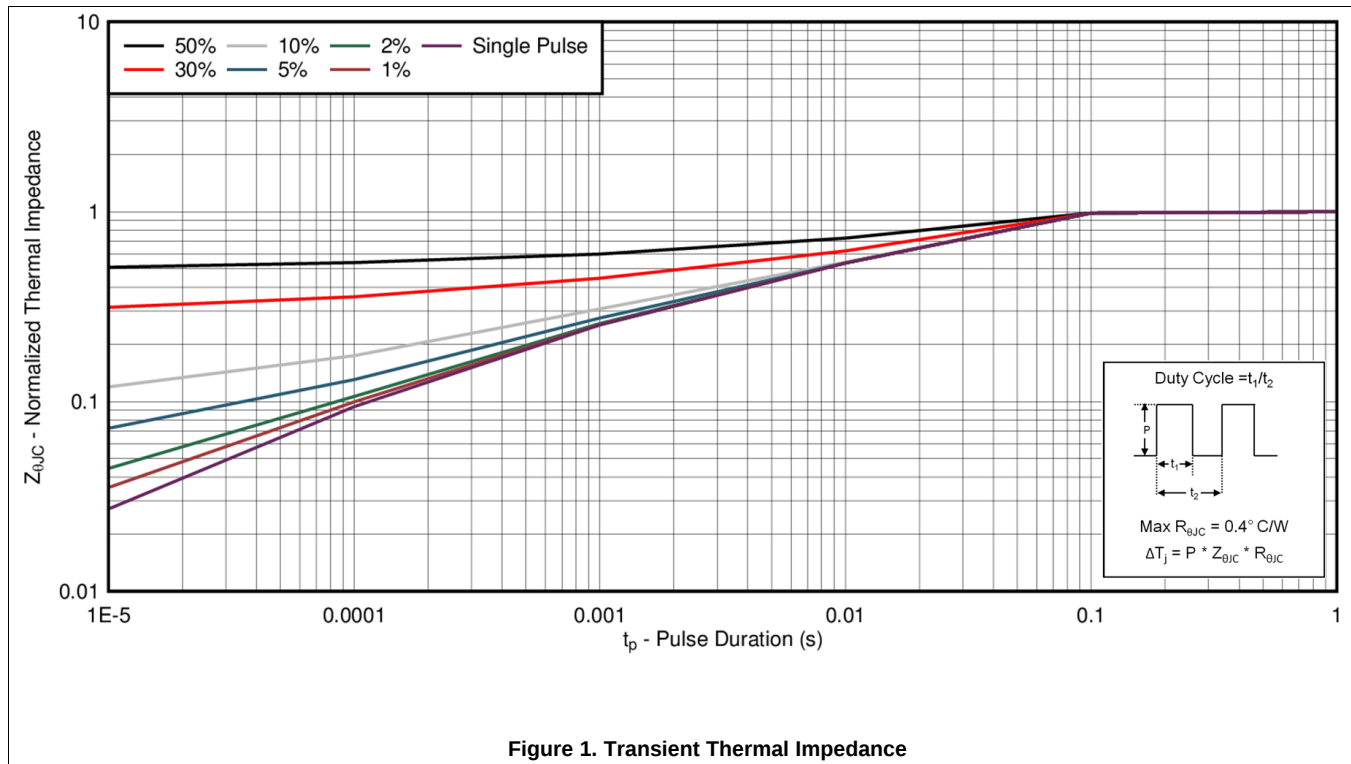
5.2 Thermal Information

(T_A = 25°C unless otherwise stated)

THERMAL METRIC		MIN	TYP	MAX	UNIT
R _{θJC}	Junction-to-Case Thermal Resistance			0.4	°C/W
R _{θJA}	Junction-to-Ambient Thermal Resistance			62	

5.3 Typical MOSFET Characteristics

($T_A = 25^\circ\text{C}$ unless otherwise stated)



Typical MOSFET Characteristics (continued)

($T_A = 25^\circ\text{C}$ unless otherwise stated)

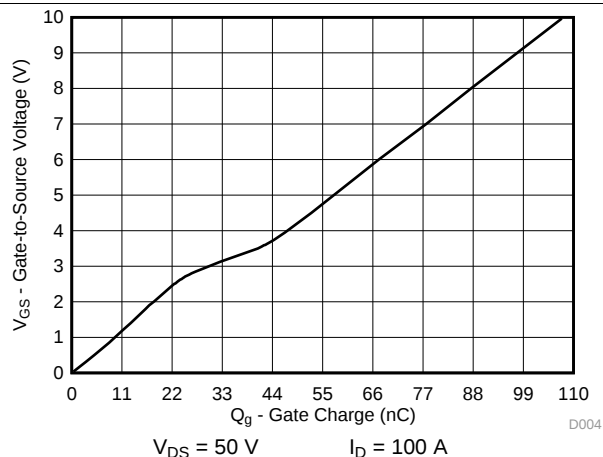


Figure 4. Gate Charge

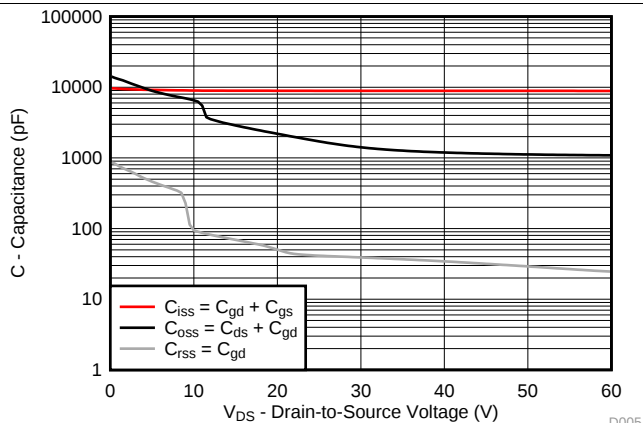


Figure 5. Capacitance

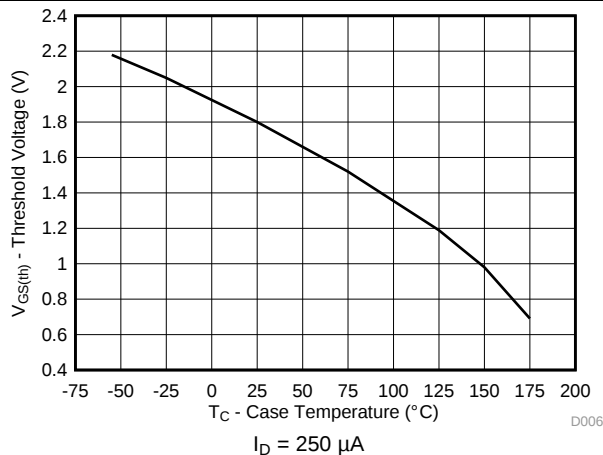


Figure 6. Threshold Voltage vs Temperature

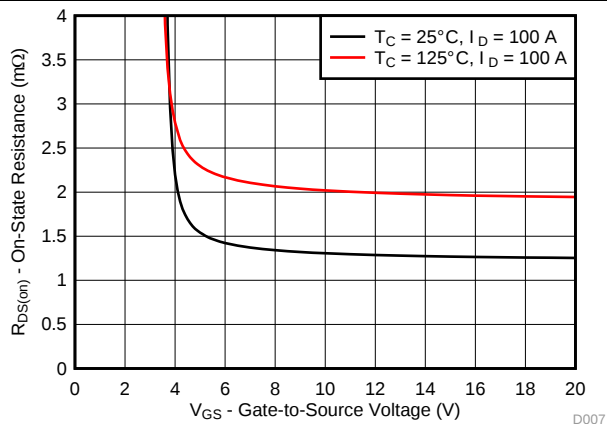


Figure 7. On-State Resistance vs Gate-to-Source Voltage

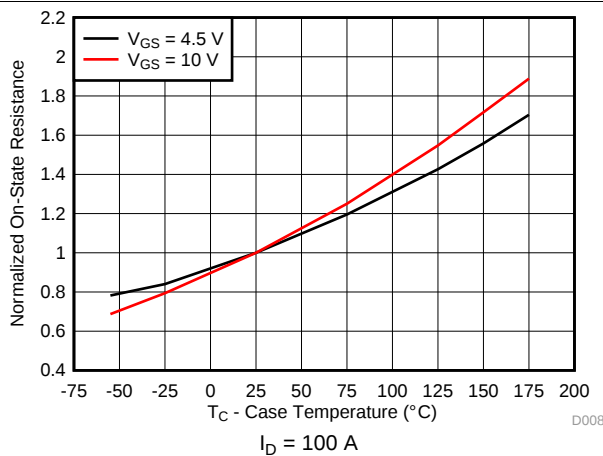


Figure 8. Normalized On-State Resistance vs Temperature

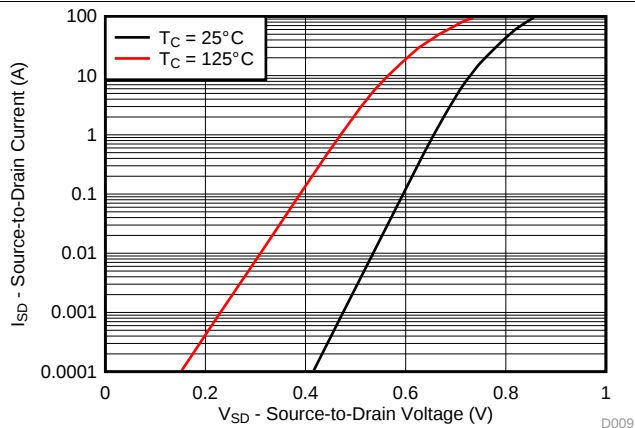


Figure 9. Typical Diode Forward Voltage

Typical MOSFET Characteristics (continued)

($T_A = 25^\circ\text{C}$ unless otherwise stated)

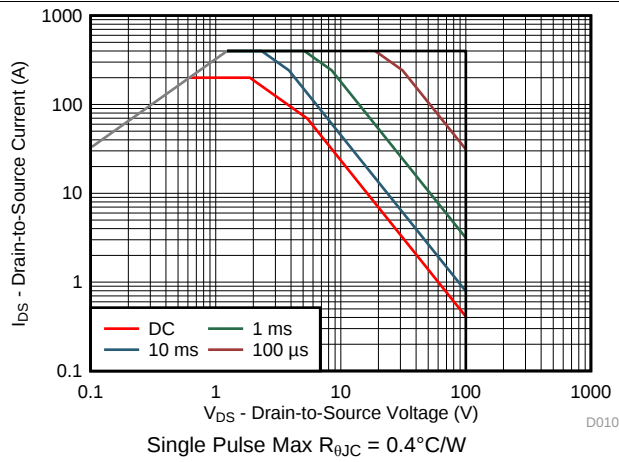


Figure 10. Maximum Safe Operating Area

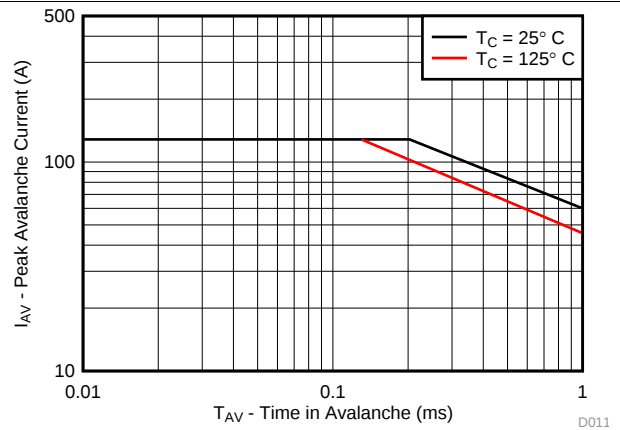


Figure 11. Single Pulse Unclamped Inductive Switching

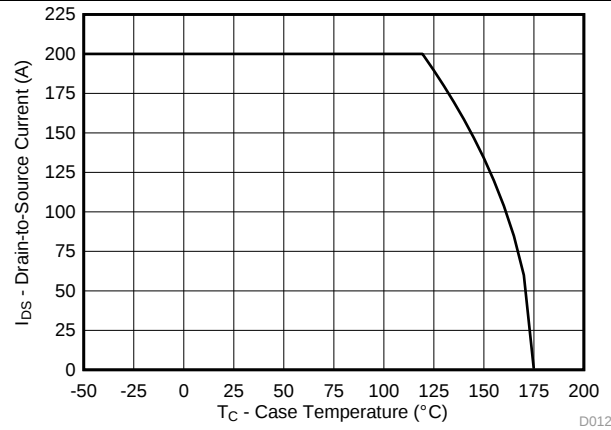


Figure 12. Maximum Drain Current vs Temperature

6 器件和文档支持

6.1 社区资源

下列链接提供到 TI 社区资源的连接。链接的内容由各个分销商“按照原样”提供。这些内容并不构成 TI 技术规范，并且不一定反映 TI 的观点；请参阅 TI 的《使用条款》。

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6.2 商标

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6.3 静电放电警告



这些装置包含有限的内置 ESD 保护。存储或装卸时，应将导线一起截短或将装置放置于导电泡棉中，以防止 MOS 门极遭受静电损伤。

6.4 Glossary

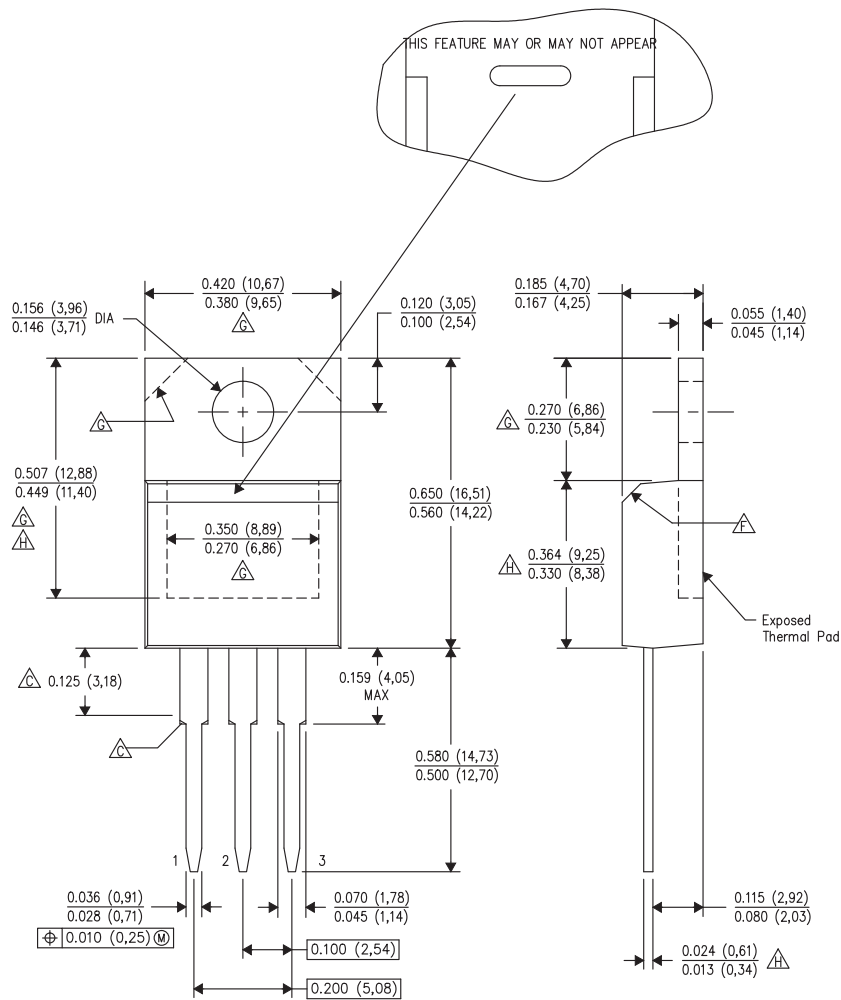
SLYZ022 — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

7 机械、封装和可订购信息

以下页面包含机械、封装和可订购信息。这些信息是指定器件的最新可用数据。数据如有变更，恕不另行通知和修订此文档。如欲获取此产品说明书的浏览器版本，请参阅左侧的导航。

7.1 KCS 封装尺寸



- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - Lead dimensions are not controlled within this area. Chamfer may or may not appear.
 - All lead dimensions apply before solder dip.
 - The center lead is in electrical contact with the mounting tab.
 - The chamfer is optional.
 - Thermal pad contour optional within these dimensions.
 - Falls within JEDEC TO-220 variation AB, except minimum lead thickness, minimum exposed pad length, and maximum body length.

表 1. 引脚配置

位置	名称
引脚 1	栅极
引脚 2 / 标签	漏极
引脚 3	源极

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
CSD18536KCS	ACTIVE	TO-220	KCS	3	50	RoHS-Exempt & Green	SN	N / A for Pkg Type	-55 to 175	CSD18536KCS	Samples

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
CSD18536KCS	KCS	TO-220	3	50	532	34.1	700	9.6

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