



CSD18502KCS 40V N 通道 NexFET™ 功率金属氧化物半导体场效应晶体管 (MOSFET)

1 特性

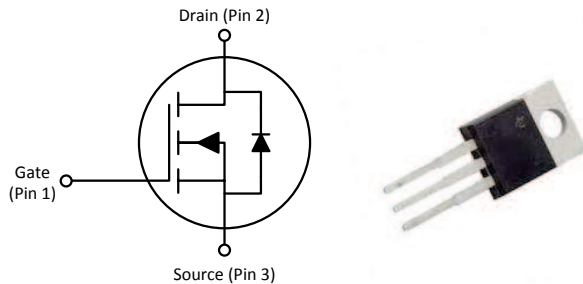
- 超低 Q_g 和 Q_{gd}
- 低热阻
- 雪崩额定值
- 逻辑电平
- 无铅端子镀层
- 符合 RoHS 标准
- 无卤素
- 晶体管 (TO)-220 塑料封装

2 应用范围

- 直流 - 直流转换
- 次级侧同步整流器
- 电机控制

3 说明

这款 2.4mΩ, 40V, TO-220 NexFET™ 功率 MOSFET 被设计成在功率转换应用中最大限度地降低功率损耗。



产品概要

$T_A = 25^\circ\text{C}$		典型值	单位
V_{DS}	漏源电压	40	V
Q_g	栅极电荷总量 (10V)	52	nC
Q_{gd}	栅漏栅极电荷	8.4	nC
$R_{DS(on)}$	漏源导通电阻	$V_{GS} = 4.5\text{V}$	3.3 mΩ
		$V_{GS} = 10\text{V}$	2.4 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
CSD18502KCS	TO-220 塑料封装	管	50	管

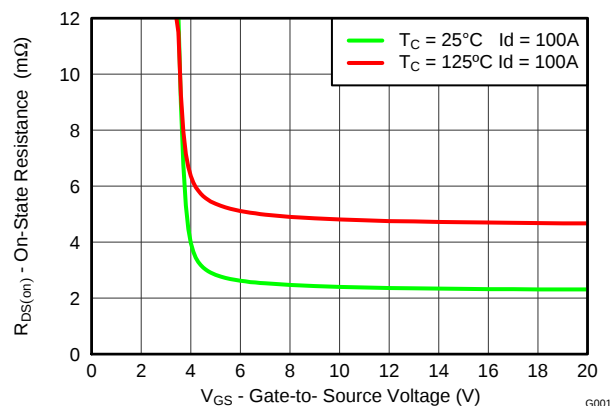
(1) 要了解所有可用封装, 请见数据表末尾的可订购产品附录。

最大绝对额定值

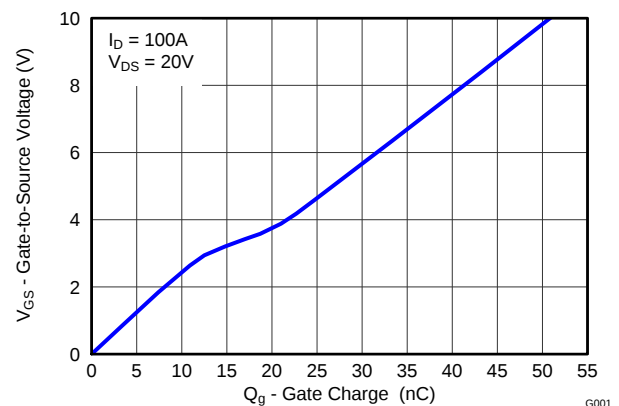
$T_A = 25^\circ\text{C}$		值	单位
V_{DS}	漏源电压	40	V
V_{GS}	栅源电压	±20	V
I_D	持续漏极电流 (受封装限制)	100	A
	持续漏极电流 (受芯片限制), $T_C = 25^\circ\text{C}$ 时测得	212	
	持续漏极电流 (受芯片限制), $T_C = 100^\circ\text{C}$ 时测得	150	
I_{DM}	脉冲漏极电流 ⁽¹⁾	400	A
P_D	功率耗散	259	W
T_J, T_{stg}	运行结温和储存温度范围	-55 至 175	°C
E_{AS}	雪崩能量, 单一脉冲 $I_D = 81\text{A}, L = 0.1\text{mH}, R_G = 25\Omega$	330	mJ

(1) 最大 $R_{\theta JC} = 0.6^\circ\text{C/W}$, 脉冲持续时间 $\leq 100\mu\text{s}$, 占空比 $\leq 1\%$

$R_{DS(on)}$ 与 V_{GS} 间的关系



栅极电荷



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4 修订历史记录

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision A (October 2012) to Revision B	Page
• $T_C = 25^\circ$ 时的连续漏极电流增加至 212A	1
• $T_C = 125^\circ$ 时的连续漏极电流增加至 150A	1
• 最大功耗增加至 259W	1
• 最大运行结温和储存温度增加至 175°	1
• 更新了脉冲电流条件	1
• Updated Figure 1 from a normalized $R_{\theta JA}$ to an $R_{\theta JC}$ curve	4
• Updated Figure 6 to extend to 175°C	5
• Updated Figure 8 to extend to 175°C	5
• Updated the SOA in Figure 10	6
• Updated Figure 12 to extend to 175°C	6

Changes from Original (August 2012) to Revision A	Page
• 脉冲漏极电流增加至 400A	1
• Changed the Transconductance TYP value From: 149 S To: 138 S	3
• Changed $R_{\theta JA}$ From: 65°C/W To: 62°C/W	3

5 Specifications

5.1 Electrical Characteristics

($T_A = 25^\circ\text{C}$ 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	40			V
I _{DSS}	Drain-to-Source Leakage Current	V _{GS} = 0 V, V _{DS} = 32 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	1.5	1.8	2.1	V
R _{DS(on)}	Drain-to-Source On Resistance	V _{GS} = 4.5 V, I _D = 100 A	3.3		4.3	mΩ
		V _{GS} = 10 V, I _D = 100 A	2.4		2.9	mΩ
g _{fs}	Transconductance	V _{DS} = 20 V, I _D = 100 A	138			S
DYNAMIC CHARACTERISTICS						
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 20 V, f = 1 MHz	3900		4680	pF
C _{oss}	Output Capacitance		900		1080	pF
C _{rss}	Reverse Transfer Capacitance		21		26	pF
R _G	Series Gate Resistance		1.2	2.4		Ω
Q _g	Gate Charge Total (4.5 V)	V _{DS} = 20 V, I _D = 100 A	25		30	nC
Q _g	Gate Charge Total (10 V)		52		62	nC
Q _{gd}	Gate Charge Gate-to-Drain		8.4			nC
Q _{gs}	Gate Charge Gate-to-Source		10.3			nC
Q _{g(th)}	Gate Charge at V _{th}		7.5			nC
Q _{oss}	Output Charge	V _{DS} = 20 V, V _{GS} = 0 V	52			nC
t _{d(on)}	Turn On Delay Time	V _{DS} = 20 V, V _{GS} = 10 V, I _{DS} = 100 A, R _G = 0 Ω	11			ns
t _r	Rise Time		7.3			ns
t _{d(off)}	Turn Off Delay Time		33			ns
t _f	Fall Time		9.3			ns
DIODE CHARACTERISTICS						
V _{SD}	Diode Forward Voltage	I _{SD} = 100 A, V _{GS} = 0 V	0.8		1	V
Q _{rr}	Reverse Recovery Charge	V _{DS} = 20 V, I _F = 100A, di/dt = 300A/μs	105			nC
t _{rr}	Reverse Recovery Time		48			ns

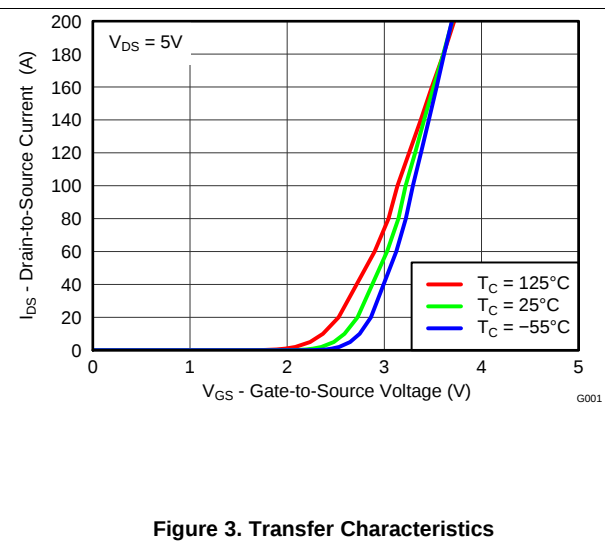
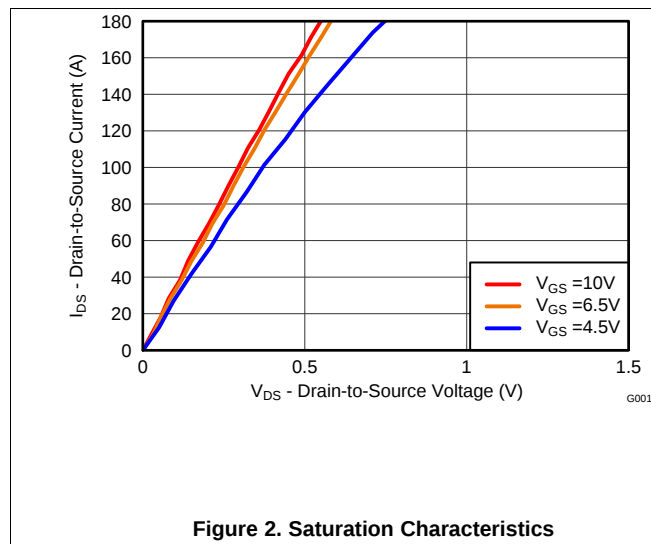
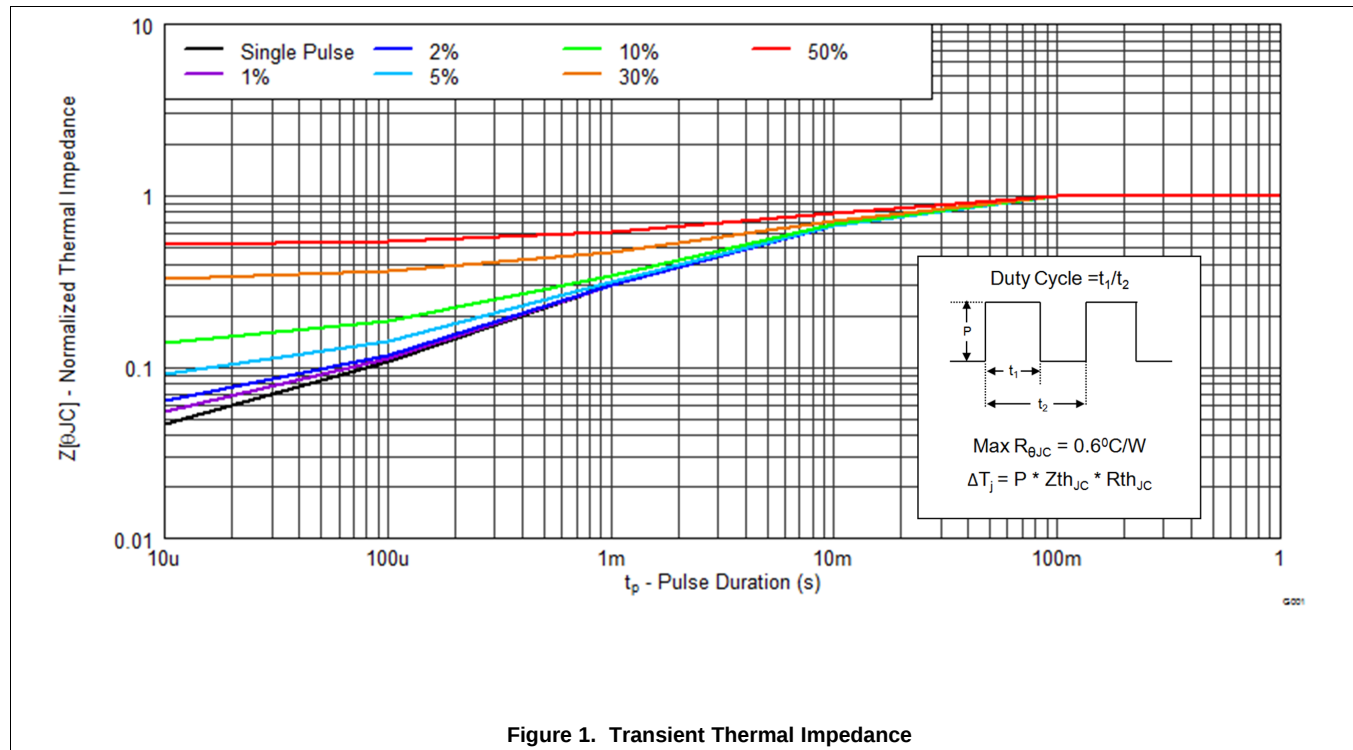
5.2 Thermal Information

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

THERMAL METRIC		MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction-to-Case Thermal Resistance			0.6	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	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)

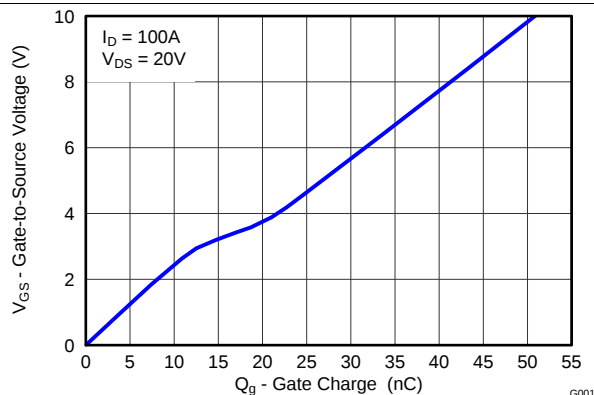


Figure 4. Gate Charge

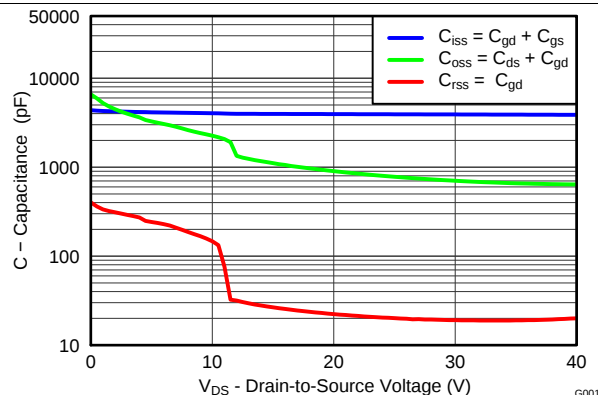


Figure 5. Capacitance

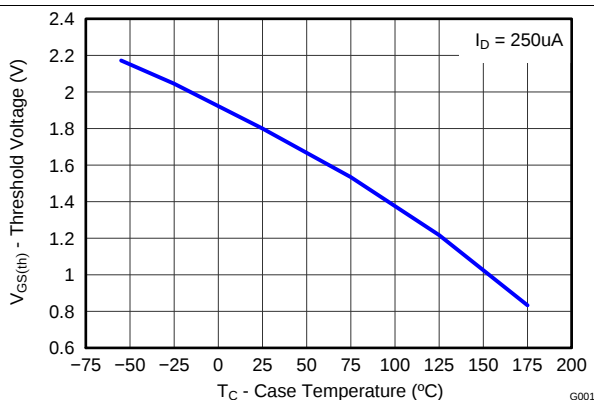


Figure 6. Threshold Voltage vs. Temperature

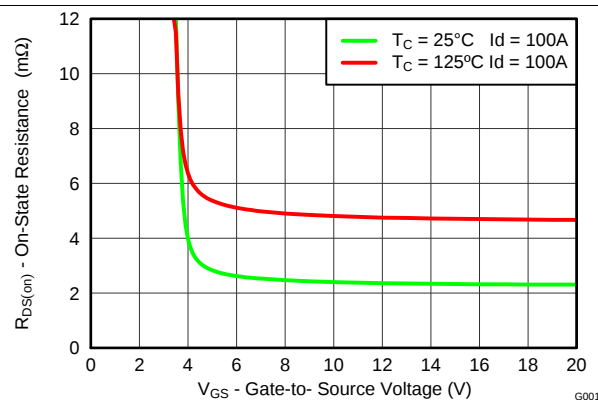


Figure 7. On-State Resistance vs. Gate-to-Source Voltage

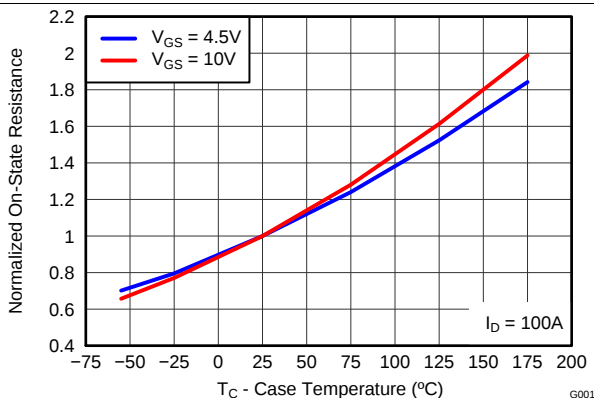


Figure 8. Normalized On-State Resistance vs. Temperature

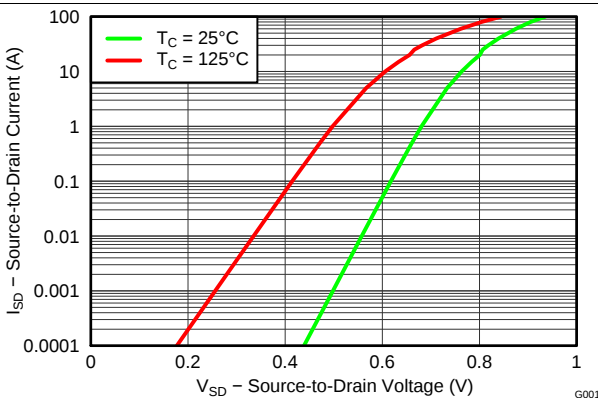


Figure 9. Typical Diode Forward Voltage

Typical MOSFET Characteristics (continued)

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

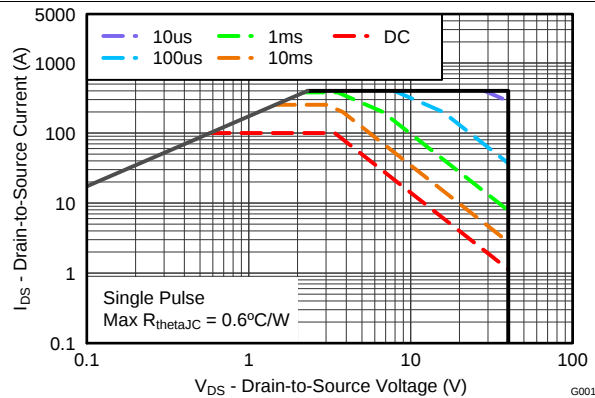


Figure 10. Maximum Safe Operating Area

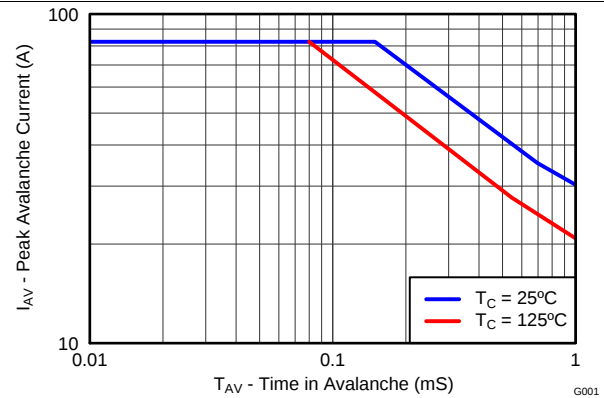


Figure 11. Single Pulse Unclamped Inductive Switching

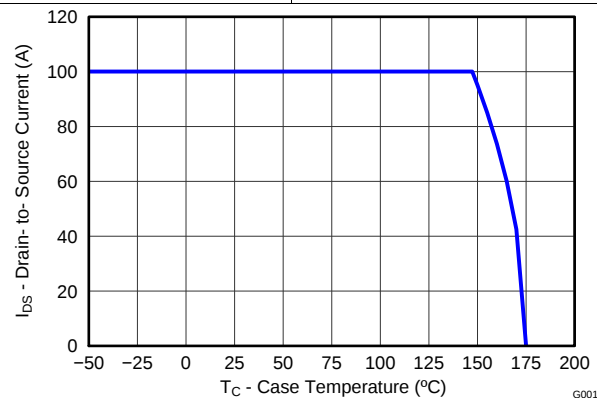


Figure 12. Maximum Drain Current vs. Temperature

6 器件和文档支持

6.1 Trademarks

NexFET is a trademark of Texas Instruments.

6.2 Electrostatic Discharge Caution



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

6.3 术语表

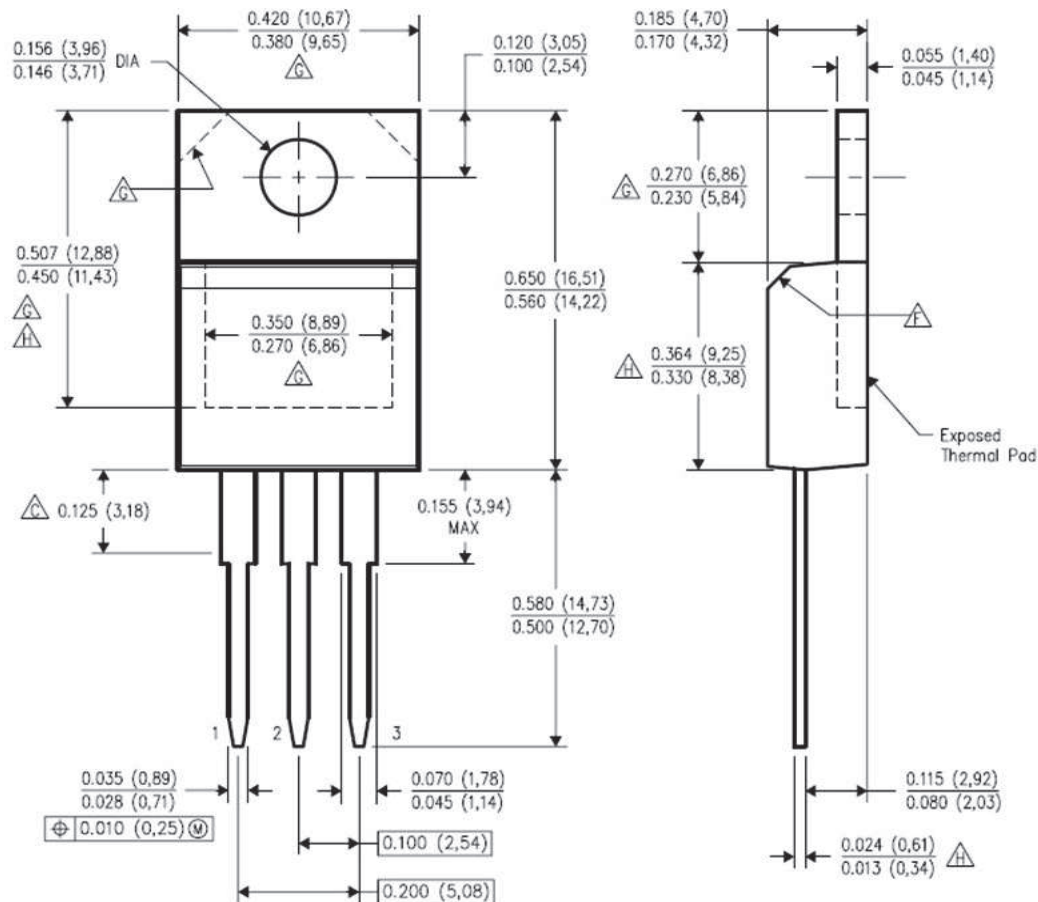
[SLYZ022](#) — *TI* 术语表。

这份术语表列出并解释术语、首字母缩略词和定义。

7 机械封装和可订购信息

以下页中包括机械封装和可订购信息。 这些信息是针对指定器件可提供的最新数据。 这些数据会在无通知且不对本文档进行修订的情况下发生改变。 欲获得该数据表的浏览器版本，请查阅左侧的导航栏。

7.1 KCS 封装尺寸



注释:

1. 所有线性尺寸的单位均为英寸。
2. 本图纸如有变更，恕不通知。
3. 引脚尺寸在“C”区域内不受控制
4. 浸焊之前所有引脚尺寸均适用。
5. 中心引脚与零配件之间采用电气接触。
6. “F”处的斜面是可选的。
7. “G”处的散热焊盘外形可采用这些尺寸
8. “H”符合 JEDEC TO-220 变体 AB 标准（最小引脚厚度、最短外露焊盘长度和最大主体长度除外）。

引脚配置

位置	名称
引脚 1	栅极
引脚 2 / 标签	漏
引脚 3	源

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
CSD18502KCS	ACTIVE	TO-220	KCS	3	50	RoHS-Exempt & Green	SN	N / A for Pkg Type	-55 to 175	CSD18502KCS	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)
CSD18502KCS	KCS	TO-220	3	50	532	34.1	700	9.6
CSD18502KCS	KCS	TO-220	3	50	532	34.1	700	9.6

重要声明和免责声明

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