

CSD18536KCS 60V N 沟道 NexFET™ 功率 MOSFET

1 特性

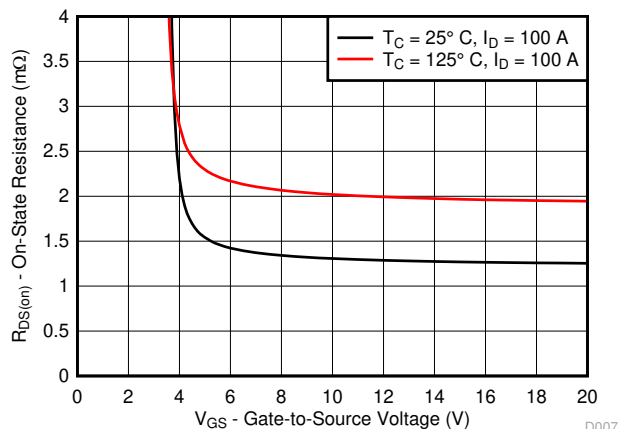
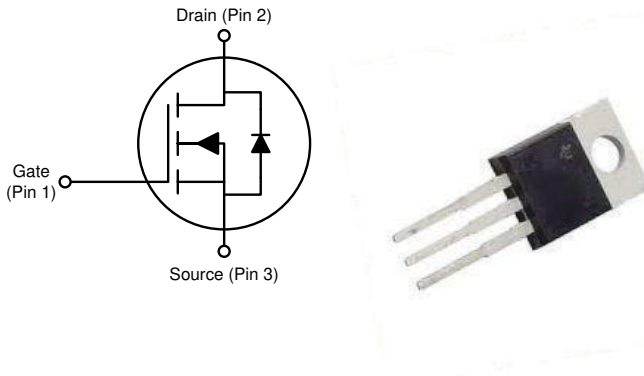
- 超低 Q_g 和 Q_{gd}
- 低热阻
- 雪崩级
- 无铅端子镀层
- 符合 RoHS
- 无卤素
- TO-220 塑料封装

2 应用

- 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 旨在用于更大限度地降低功率转换应用中的损耗。

 $R_{DS(on)}$ 与 V_{GS} 之间的关系

D007

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

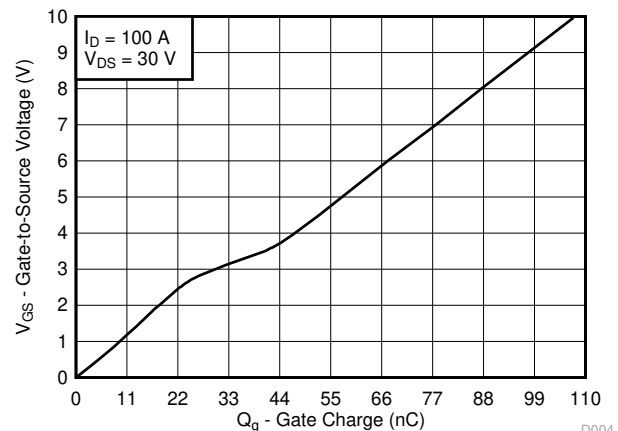
器件 ⁽¹⁾	封装	介质	数量	出货
CSD18536KCS	TO-220 塑料封装	管	50	管

- (1) 如需了解所有可用封装, 请参阅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}	工作结温和 贮存温度范围	-55 至 175	$^\circ\text{C}$
E_{AS}	Avalanche Energy, 单脉冲 $I_D = 128\text{A}$, $L = 0.1\text{mH}$, $R_G = 25\Omega$	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 $\leq 1\%$ 。



栅极电荷

D004



Table of Contents

1 特性.....	1	5.1 接收文档更新通知.....	7
2 应用.....	1	5.2 支持资源.....	7
3 说明.....	1	5.3 Trademarks.....	7
4 Specifications.....	3	5.4 静电放电警告.....	7
4.1 Electrical Characteristics.....	3	5.5 术语表.....	7
4.2 Thermal Information.....	3	6 Revision History.....	7
4.3 Typical MOSFET Characteristics.....	4	7 Mechanical, Packaging, and Orderable Information....	9
5 Device and Documentation Support.....	7		

4 Specifications

4.1 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} = 0V, I _D = 250 μ A	60			V
I _{DSS}	Drain-to-Source Leakage Current	V _{GS} = 0V, V _{DS} = 48V			1	μ A
I _{GSS}	Gate-to-Source Leakage Current	V _{DS} = 0V, V _{GS} = 20V			100	nA
V _{GS(th)}	Gate-to-Source Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 μ A	1.4	1.8	2.2	V
R _{DS(on)}	Drain-to-Source On-Resistance	V _{GS} = 4.5V, I _D = 100A	1.7		2.2	mΩ
		V _{GS} = 10V, I _D = 100A	1.3		1.6	mΩ
g _{fs}	Transconductance	V _{DS} = 6V, I _D = 100A	312			S
DYNAMIC CHARACTERISTICS						
C _{iss}	Input Capacitance	V _{GS} = 0V, V _{DS} = 30V, f = 1MHz	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 (10V)	V _{DS} = 30V, I _D = 100A	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} = 30V, V _{GS} = 0V	230			nC
t _{d(on)}	Turn On Delay Time	V _{DS} = 30V, V _{GS} = 10 V, I _{DS} = 100A, R _G = 0Ω	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} = 100A, V _{GS} = 0V	0.9		1.0	V
Q _{rr}	Reverse Recovery Charge	V _{DS} = 30V, I _F = 100A,	323			nC
t _{rr}	Reverse Recovery Time	di/dt = 300A/ μ s	86			ns

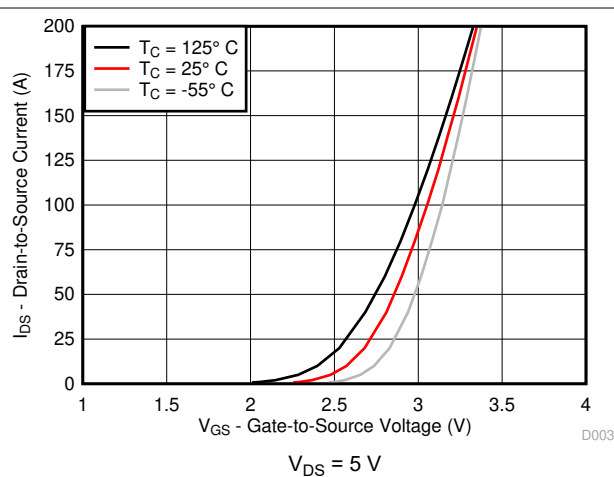
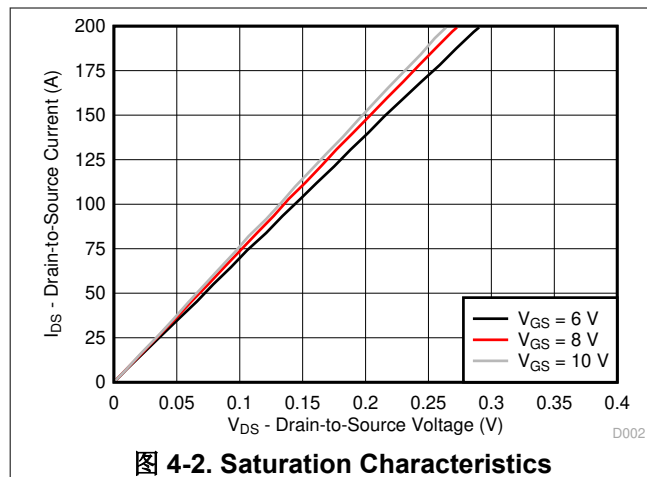
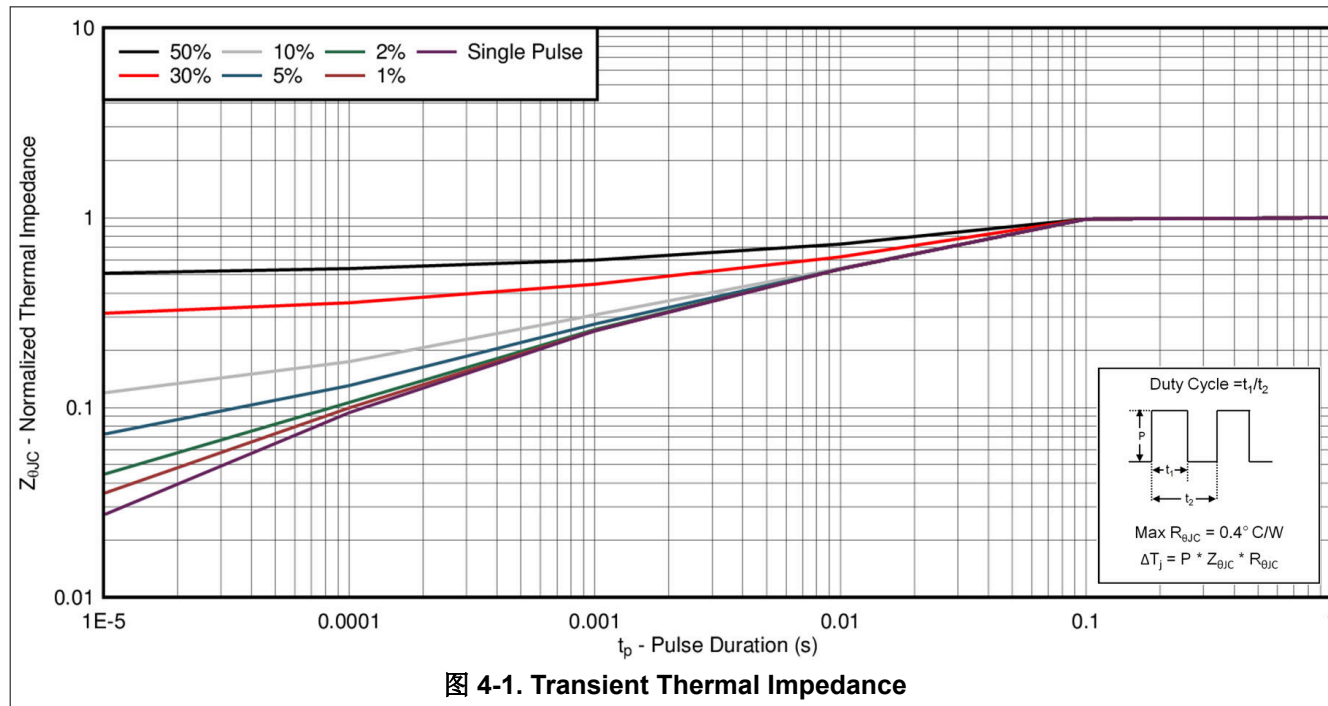
4.2 Thermal Information

(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	

4.3 Typical MOSFET Characteristics

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



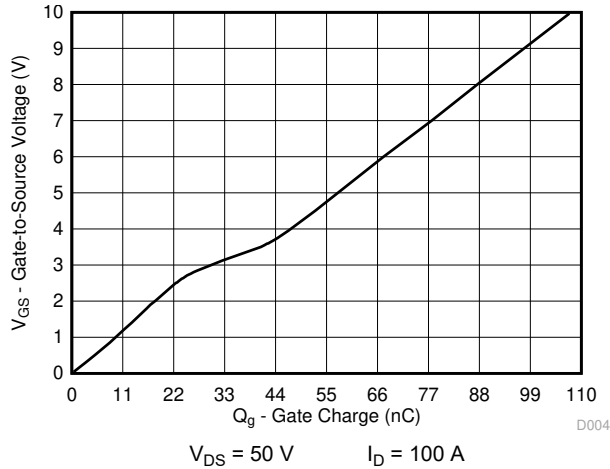


图 4-4. Gate Charge

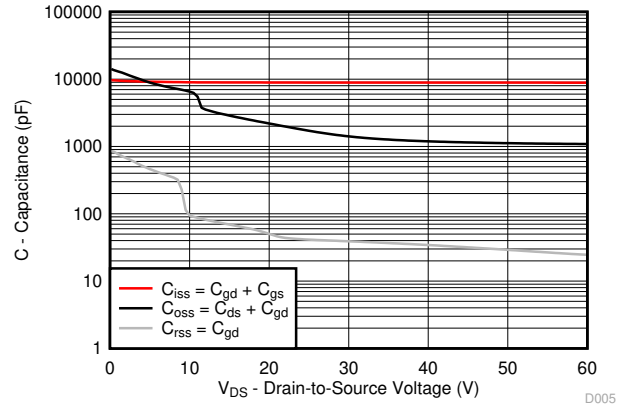


图 4-5. Capacitance

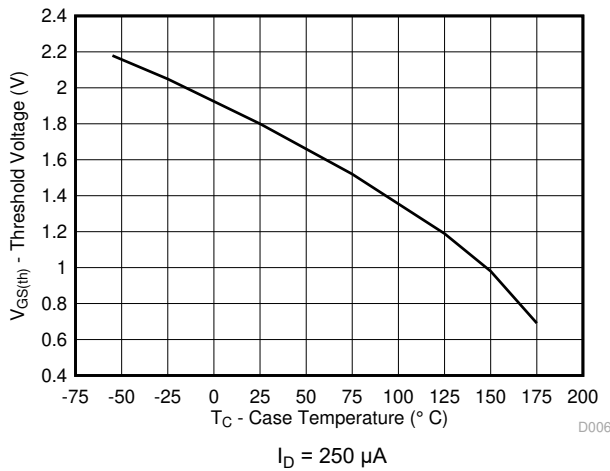


图 4-6. Threshold Voltage vs Temperature

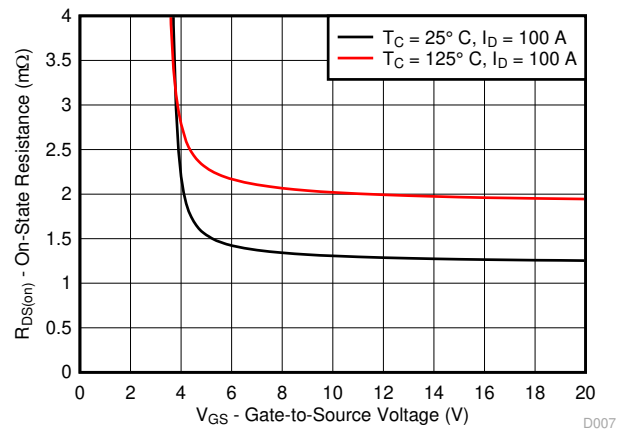


图 4-7. On-State Resistance vs Gate-to-Source Voltage

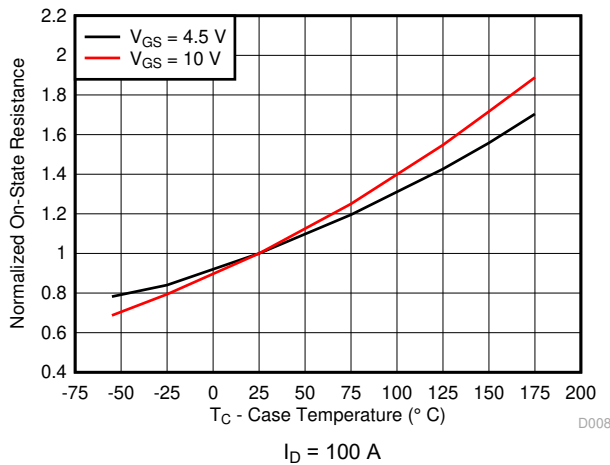


图 4-8. Normalized On-State Resistance vs Temperature

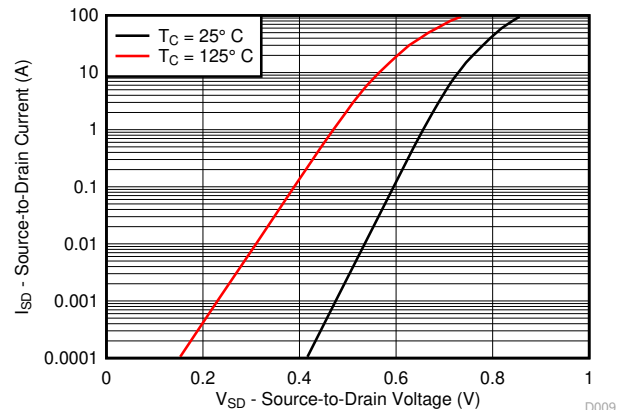


图 4-9. Typical Diode Forward Voltage

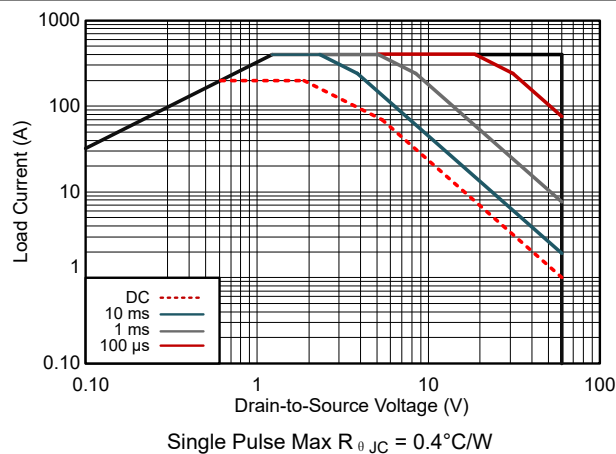


图 4-10. Maximum Safe Operating Area

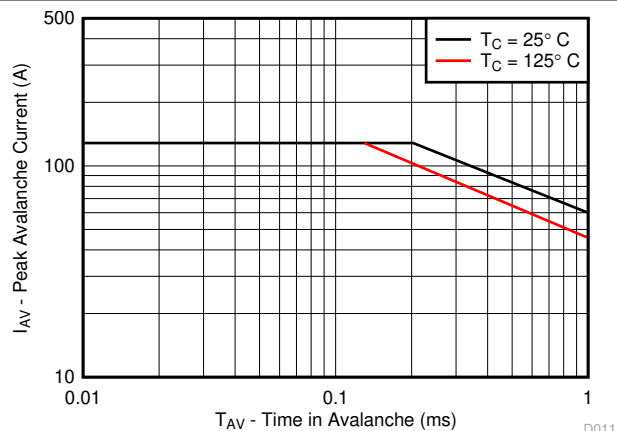


图 4-11. Single Pulse Unclamped Inductive Switching

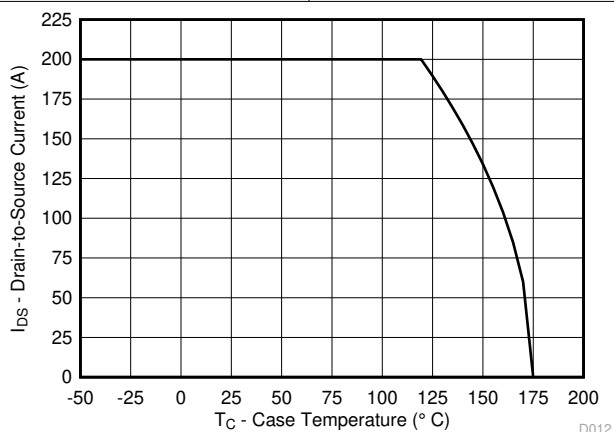


图 4-12. Maximum Drain Current vs Temperature

5 Device and Documentation Support

5.1 接收文档更新通知

要接收文档更新通知，请导航至 [ti.com](https://www.ti.com) 上的器件产品文件夹。点击 [通知](#) 进行注册，即可每周接收产品信息更改摘要。有关更改的详细信息，请查看任何已修订文档中包含的修订历史记录。

5.2 支持资源

TI E2E™ 中文支持论坛 是工程师的重要参考资料，可直接从专家处获得快速、经过验证的解答和设计帮助。搜索现有解答或提出自己的问题，获得所需的快速设计帮助。

链接的内容由各个贡献者“按原样”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](#)。

5.3 Trademarks

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ESD 的损坏小至导致微小的性能降级，大至整个器件故障。精密的集成电路可能更容易受到损坏，这是因为非常细微的参数更改都可能会导致器件与其发布的规格不相符。

5.5 术语表

TI 术语表 本术语表列出并解释了术语、首字母缩略词和定义。

6 Revision History

Changes from Revision B (June 2023) to Revision C (March 2024) Page

- 更新了整个文档中的表格、图和交叉参考的编号格式..... 1

Changes from Revision A (December 2017) to Revision B (June 2023) Page

- Updated [图 4-10](#) 4

Changes from Revision * (March 2015) to Revision A (December 2017) Page

- 更新了栅极电荷曲线..... 1
- Changed C_{OSS} values From: TYP = 1700pF MAX = 2210pF To: TYP = 1410 pF MAX = 1840pF in *Dynamic Characteristics* 3
- Changed Q_g values From: TYP = 83nC MAX = 108nC To: TYP = 108nC MAX = 140nC in the *Dynamic Characteristics* 3
- Changed Q_{g(th)} value From: 12nC To: 17nC in the *Dynamic Characteristics* 3
- Changed t_{d(on)} value From: 8ns To: 11ns in *Dynamic Characteristics*. 3
- Changed t_r value From: 17ns To: 5ns in *Dynamic Characteristics*. 3
- Changed t_{d(off)} value From: 23ns To: 24ns in *Dynamic Characteristics*. 3
- Changed t_f value From: 12ns To: 4ns in *Dynamic Characteristics* 3
- Updated [图 4-4](#). 4

-
- Updated [图 4-5](#) [4](#)
-

7 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
CSD18536KCS	Active	Production	TO-220 (KCS) 3	50 TUBE	ROHS Exempt	SN	N/A for Pkg Type	-55 to 175	CSD18536KCS
CSD18536KCS.B	Active	Production	TO-220 (KCS) 3	50 TUBE	ROHS Exempt	SN	N/A for Pkg Type	-55 to 175	CSD18536KCS

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts 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.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

Important Information and Disclaimer:The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

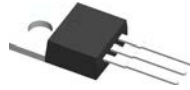
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

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
CSD18536KCS.B	KCS	TO-220	3	50	532	34.1	700	9.6

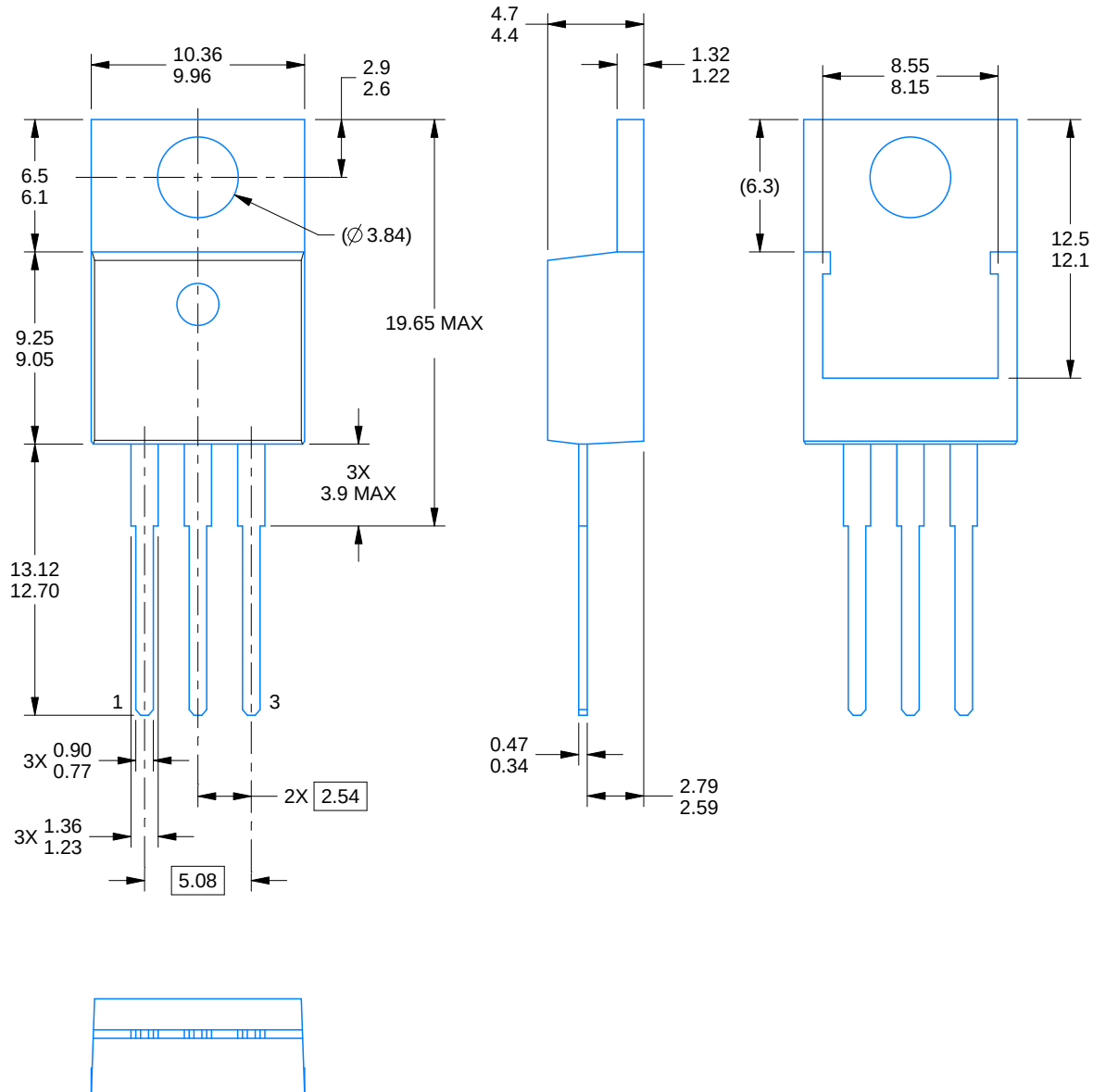


PACKAGE OUTLINE

KCS0003B

TO-220 - 19.65 mm max height

TO-220



4222214/B 08/2018

NOTES:

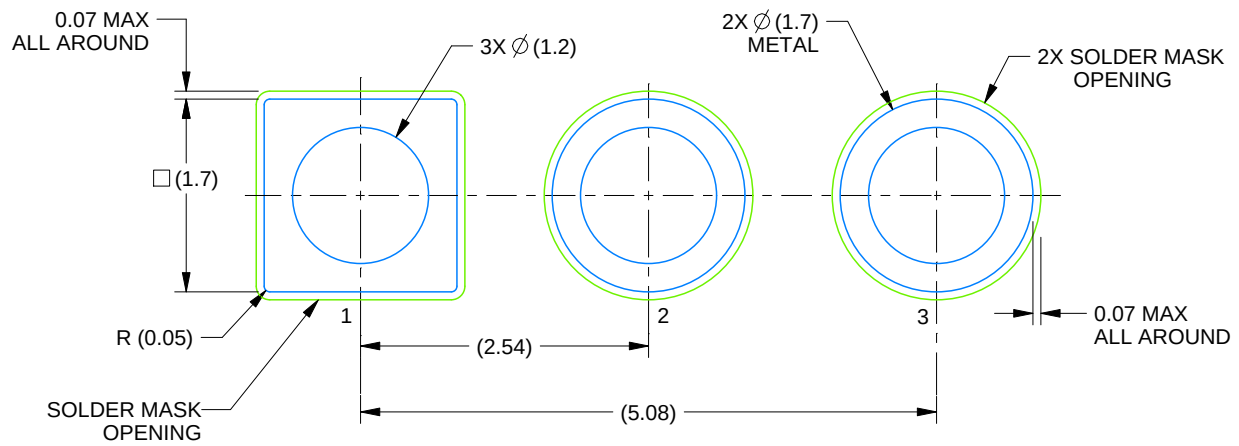
1. Dimensions are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC registration TO-220.

EXAMPLE BOARD LAYOUT

KCS0003B

TO-220 - 19.65 mm max height

TO-220



LAND PATTERN EXAMPLE
NON-SOLDER MASK DEFINED
SCALE:15X

4222214/B 08/2018

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