CSD18510KCS 40V N 沟道 NexFET™ 功率 MOSFET

1 特性

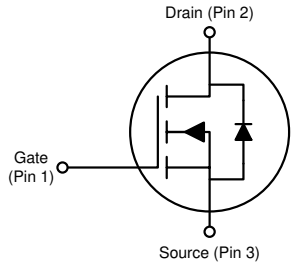
- 低 Q_g 和 Q_{gd}
- 低 $R_{DS(ON)}$
- 低热阻
- 雪崩级
- 无铅端子镀层
- 符合 RoHS
- 无卤素
- TO-220 塑料封装

2 应用

- 次级侧同步整流器
- 电机控制

3 说明

这款 40V、1.4mΩ、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。



产品概要

T_A = 25°C		典型值		单位
V_{DS}	漏源电压	40		V
Q_g	栅极电荷总量 (10V)	118		nC
Q_{gd}	栅极电荷（栅极到漏极）	21		nC
$R_{DS(on)}$	漏源导通电阻	V_{GS} = 4.5V	2.0	mΩ
		V_{GS} = 10V	1.4	
$V_{GS(th)}$	阈值电压	1.7		V

器件信息(1)

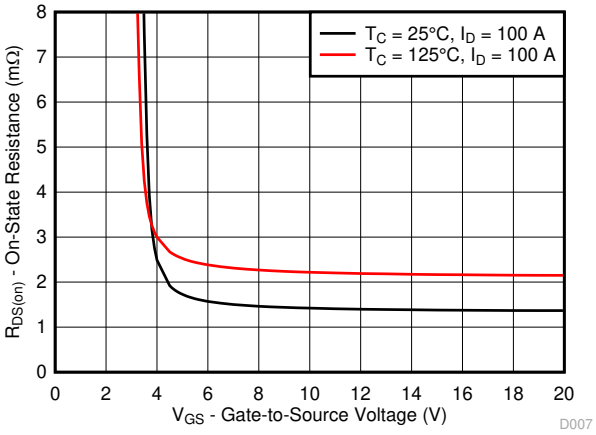
器件	介质	数量	封装	出货
CSD18510KCS	管	50	TO-220 塑料封装	管

(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。

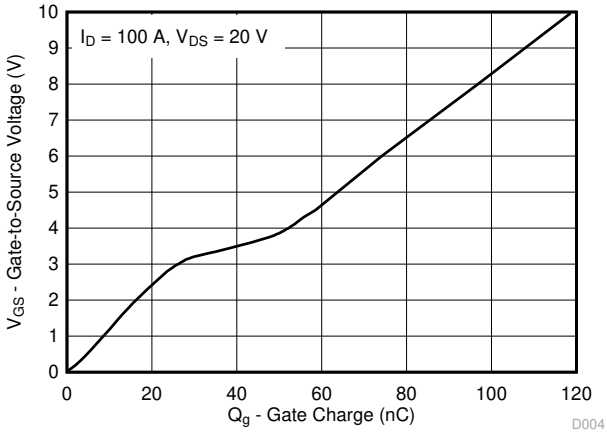
绝对最大额定值

T_A = 25°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）	200	A
	持续漏极电流（受芯片限制），T_C = 25°C 时测得	288	
	持续漏极电流（受芯片限制），T_C = 100°C 时测得	204	
I_{DM}	脉冲漏极电流(1)	400	A
P_D	功率耗散	250	W
T_J、T_{stg}	工作结温，贮存温度	-55 至 175	°C
E_{AS}	Avalanche Energy，单脉冲 I_D = 81A，L = 0.1mH，R_G = 25Ω	328	mJ

(1) 最大 $R_{\theta JC}$ = 0.6°C/W，脉冲持续时间 ≤ 100μs，占空比 ≤ 1%。



$R_{DS(on)}$ 与 V_{GS} 之间的关系



栅极电荷

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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 μA	40			V
I_{DSS}	Drain-to-source leakage current	V_{GS} = 0V, V_{DS} = 32V			1	μA
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 μA	1.4	1.7	2.3	V
$R_{DS(on)}$	Drain-to-source on-resistance	V_{GS} = 4.5V, I_D = 100A		2.0	2.6	mΩ
		V_{GS} = 10V, I_D = 100A		1.4	1.7	
g_{fs}	Transconductance	V_{DS} = 4V, I_D = 100A		330		S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input capacitance	V_{GS} = 0V, V_{DS} = 20V, f = 1MHz		8770	11400	pF
C_{oss}	Output capacitance			832	1080	pF
C_{rss}	Reverse transfer capacitance			424	551	pF
R_G	Series gate resistance			0.9	1.8	Ω
Q_g	Gate charge total (4.5 V)	V_{DS} = 20V, I_D = 100A		58	75	nC
Q_g	Gate charge total (10 V)			118	153	nC
Q_{gd}	Gate charge gate-to-drain			21		nC
Q_{gs}	Gate charge gate-to-source			28		nC
$Q_{g(th)}$	Gate charge at V_{th}			15		nC
Q_{oss}	Output charge	V_{DS} = 20V, V_{GS} = 0V		35		nC
$t_{d(on)}$	Turnon delay time	V_{DS} = 20V, V_{GS} = 10V, I_{DS} = 100A, R_G = 0Ω		10		ns
t_r	Rise time			8		ns
$t_{d(off)}$	Turnoff delay time			29		ns
t_f	Fall time			8		ns
DIODE CHARACTERISTICS						
V_{SD}	Diode forward voltage	I_{SD} = 100A, V_{GS} = 0V		0.85	1.0	V
Q_{rr}	Reverse recovery charge	V_{DS}= 20V, I_F = 100A, di/dt = 300A/μs		70		nC
t_{rr}	Reverse recovery time			41		ns

4.2 Thermal Information

T_A = 25°C (unless otherwise stated)

THERMAL METRIC		MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction-to-case thermal resistance			0.6	°C/W
$R_{\theta JA}$	Junction-to-ambient thermal resistance			62	°C/W

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4.3 Typical MOSFET Characteristics

T_A = 25°C (unless otherwise stated)

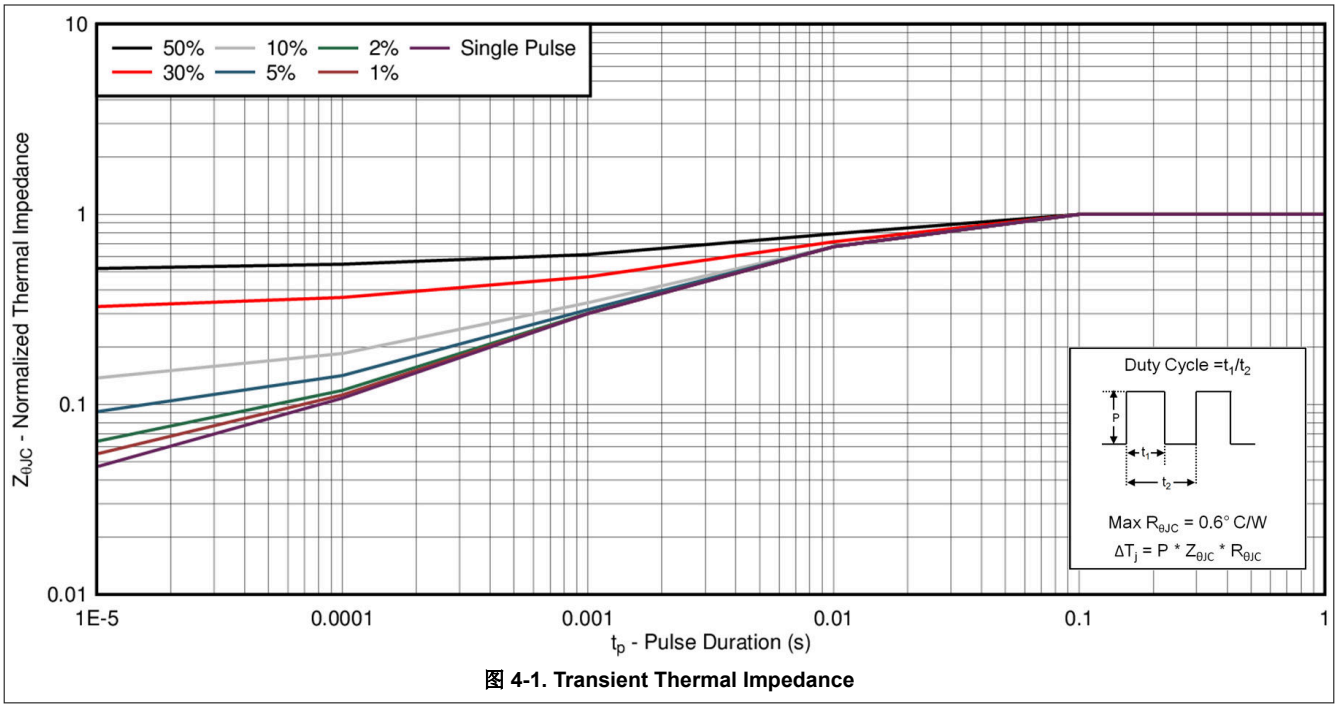


图 4-1. Transient Thermal Impedance

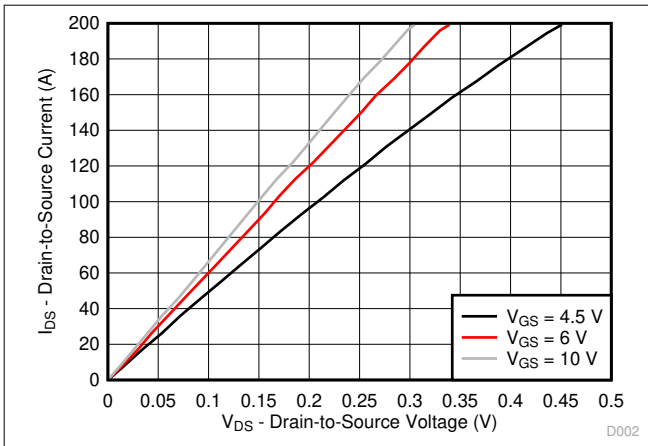
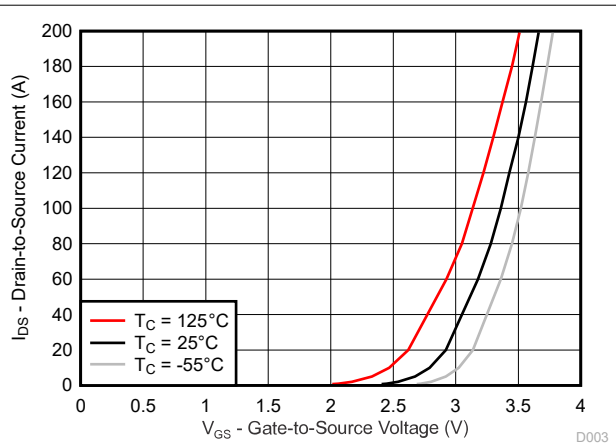


图 4-2. Saturation Characteristics



V_{DS} = 5V

图 4-3. Transfer Characteristics

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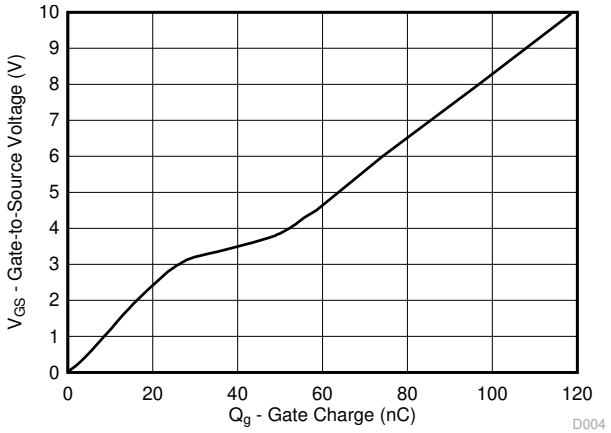
4.3 Typical MOSFET Characteristics (continued)

T_A = 25°C (unless otherwise stated)



V_{DS} = 20V I_D = 100A

图 4-4. Gate Charge

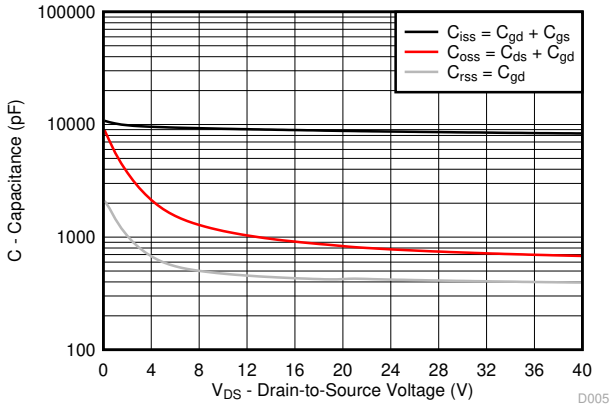
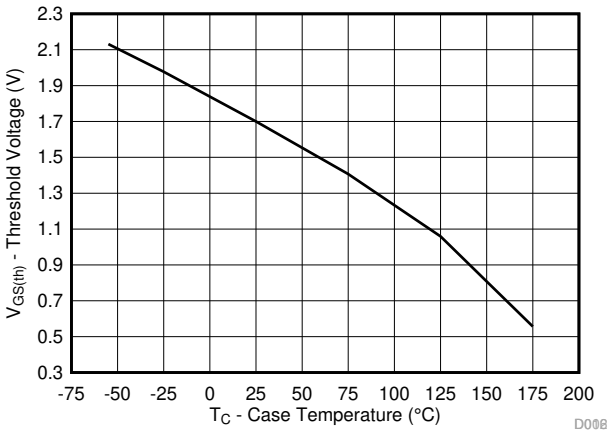


图 4-5. Capacitance



I_D = 250µA

图 4-6. Threshold Voltage vs Temperature

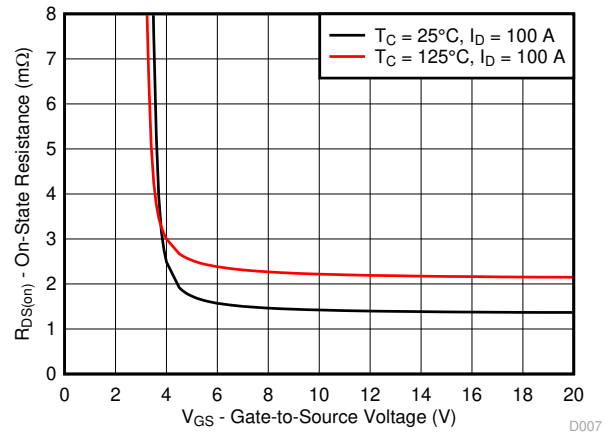
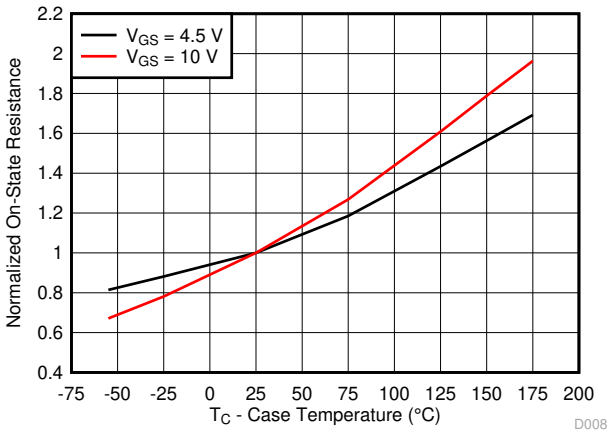


图 4-7. On-State Resistance vs Gate-to-Source Voltage



I_D = 100A

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

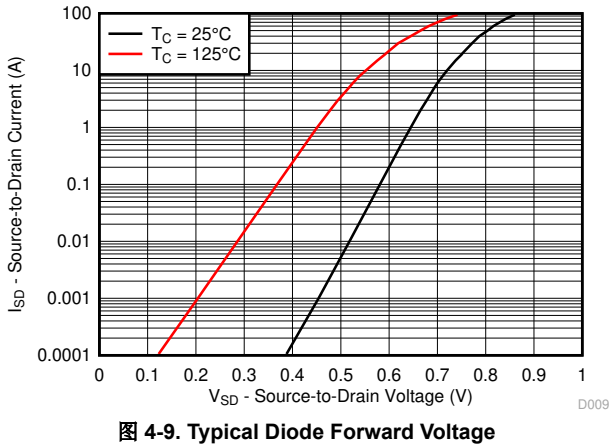


图 4-9. Typical Diode Forward Voltage

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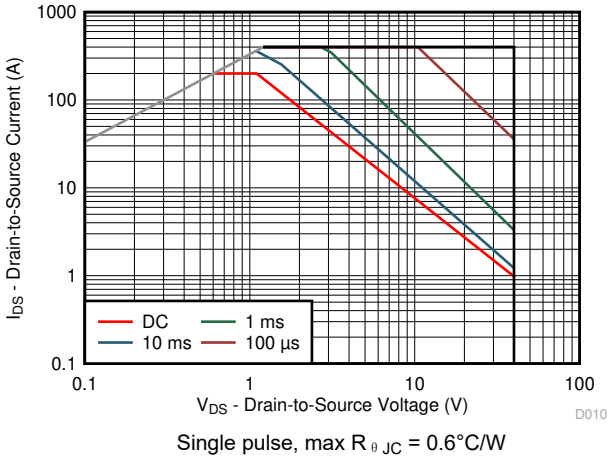
4.3 Typical MOSFET Characteristics (continued)

T_A = 25°C (unless otherwise stated)



Single pulse, max $R_{\theta JC}$ = 0.6°C/W

图 4-10. Maximum Safe Operating Area

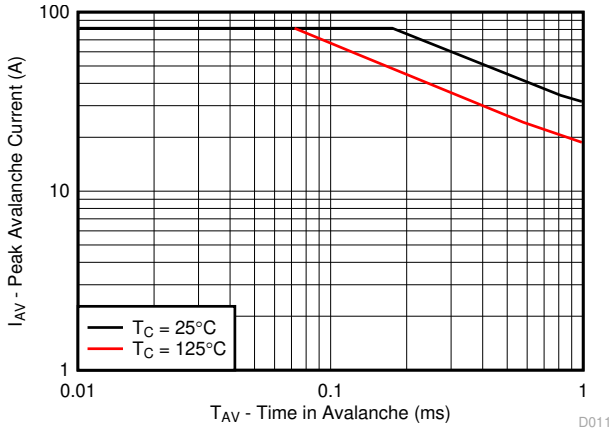
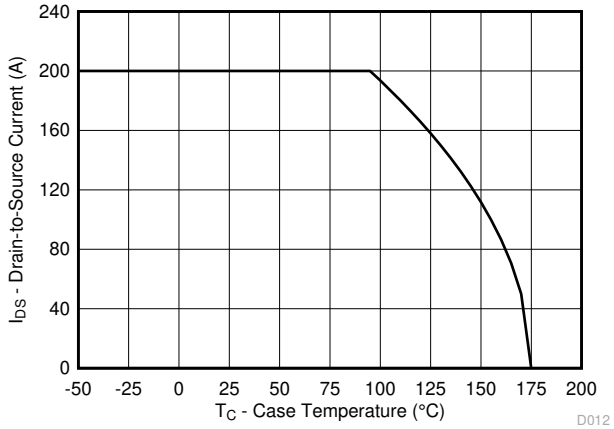


图 4-11. Single Pulse Unclamped Inductive Switching



Max $R_{\theta JC}$ = 0.6°C/W

图 4-12. Maximum Drain Current vs Temperature

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5 Device and Documentation Support

5.1 接收文档更新通知

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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

注：以前版本的页码可能与当前版本的页码不同

Changes from Revision B (November 2022) 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 (July 2017) to Revision B (November 2022)	Page
• Updated 图 4-3	4

Changes from Revision * (March 2017) to Revision A (July 2017)	Page
• 更正了*特性* 部分中的封装类型	1

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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.

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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)
CSD18510KCS	Active	Production	TO-220 (KCS) | 3	50 | TUBE	ROHS Exempt	SN	N/A for Pkg Type	-55 to 175	CSD18510KCS
CSD18510KCS.B	Active	Production	TO-220 (KCS) | 3	50 | TUBE	ROHS Exempt	SN	N/A for Pkg Type	-55 to 175	CSD18510KCS

(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.

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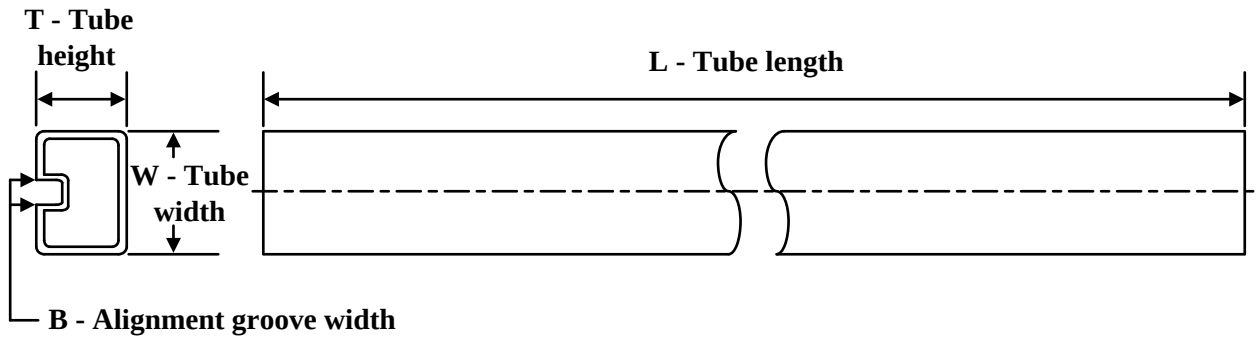
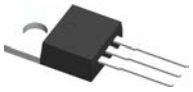
TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
CSD18510KCS	KCS	TO-220	3	50	532	34.1	700	9.6
CSD18510KCS.B	KCS	TO-220	3	50	532	34.1	700	9.6

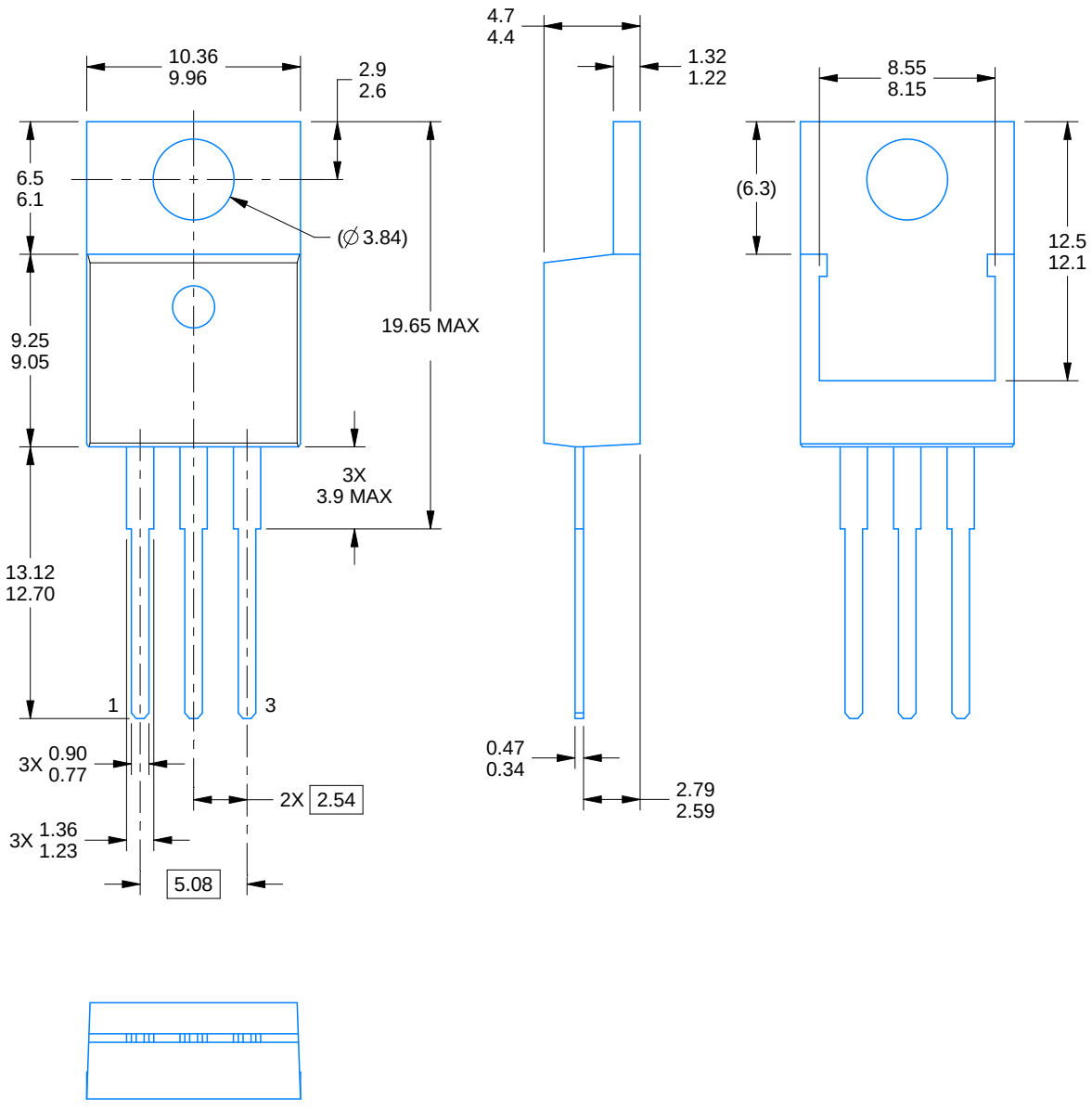
KCS0003B



PACKAGE OUTLINE

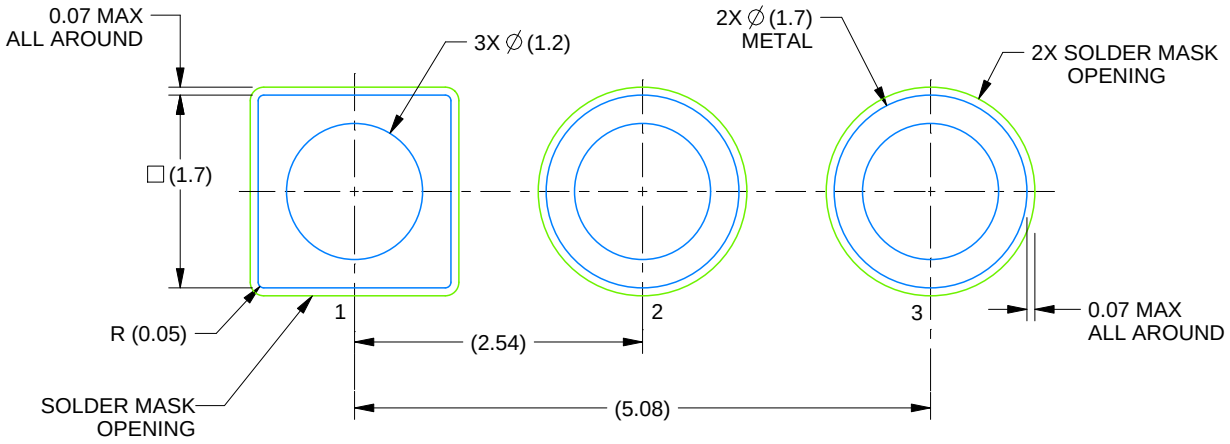
TO-220 - 19.65 mm max height

TO-220



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.



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

4222214/B 08/2018

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