CSD18510KTT 40V N 通道 NexFET™ 功率 MOSFET

1 特性

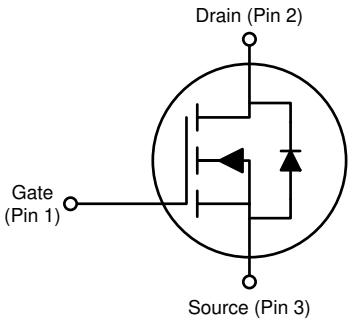
- 超低 Q_g 和 Q_{gd}
- 低热阻
- 雪崩级
- 无铅端子镀层
- 符合 RoHS
- 无卤素
- D^2PAK 塑料封装

2 应用

- 次级侧同步整流器
- 电机控制

3 说明

这款 40V、1.4mΩ、D^2PAK (TO-263) 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)	119		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)

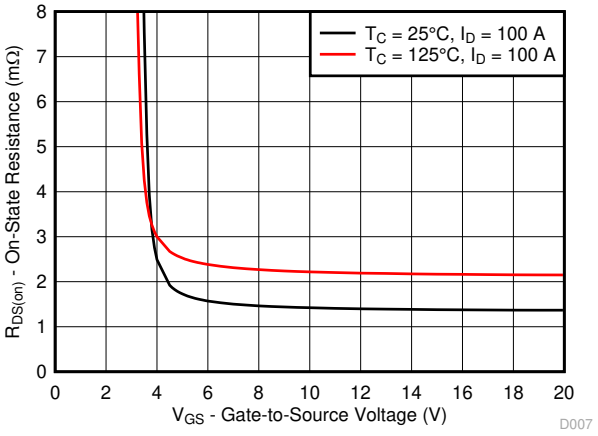
器件	数量	介质	封装	配送
CSD18510KTT	500	13 英寸卷带	D^2PAK 塑料封装	卷带包装
CSD18510KTTT	50			

(1) 如需了解所有可用封装，请参阅产品说明书末尾的可订购产品附录。

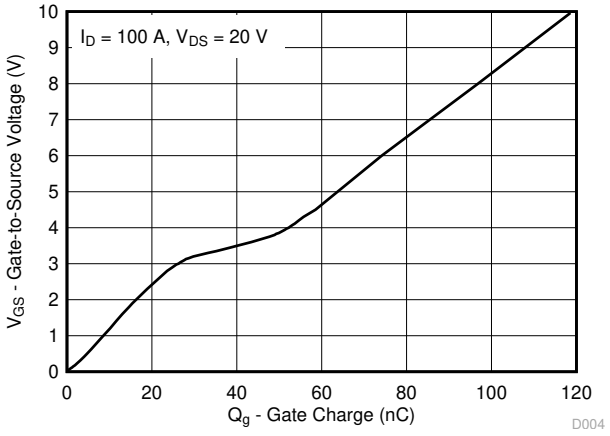
绝对最大额定值

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	274	
	持续漏极电流（受芯片限制），T_C = 100°C 时测得	193	
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}	雪崩能量，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

Table of Contents

4 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 A (January 2017) to Revision B (November 2022) **Page**

- Updated 图 5-3 4

Changes from Revision * (November 2016) to Revision A (January 2017) **Page**

- 在*绝对最大额定值* 表中将 T_C = 25°C 时的芯片电流限制从 237A 更改为 274A..... 1
- 在*绝对最大额定值* 表中将 T_C = 100°C 时的芯片电流限制从 167A 更改为 193A..... 1
- 在*绝对最大额定值* 表中将最大功耗从 188W 更改为 250W..... 1
- Changed the charge values in the Dynamic Characteristics section of the *Electrical Characteristics* table..... 3
- Changed max $R_{\theta JC}$ from 0.8°C/W : to 0.6°C/W in the *Thermal Information* table..... 3
- Changed 图 5-4 in the *Typical MOSFET Characteristics* section to reflect updated gate charges..... 4

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	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	1.4	1.7	2.3	V
$R_{DS(on)}$	Drain-to-source on resistance	V_{GS} = 4.5 V, I_D = 100 A		2.0	2.6	mΩ
		V_{GS} = 10 V, I_D = 100 A		1.4	1.7	
g_{fs}	Transconductance	V_{DS} = 4 V, I_D = 100 A		330		S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input capacitance	V_{GS} = 0 V, V_{DS} = 20 V, f = 1 MHz		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} = 20 V, I_D = 100 A		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} = 20 V, V_{GS} = 0 V		35		nC
$t_{d(on)}$	Turnon delay time	V_{DS} = 20 V, V_{GS} = 10 V, I_{DS} = 100 A, R_G = 0 Ω		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} = 100 A, V_{GS} = 0 V		0.85	1.0	V
Q_{rr}	Reverse recovery charge	V_{DS}= 20 V, I_F = 100 A, di/dt = 300 A/μs		70		nC
t_{rr}	Reverse recovery time			41		ns

5.2 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

5.3 Typical MOSFET Characteristics

T_A =25°C (unless otherwise stated)

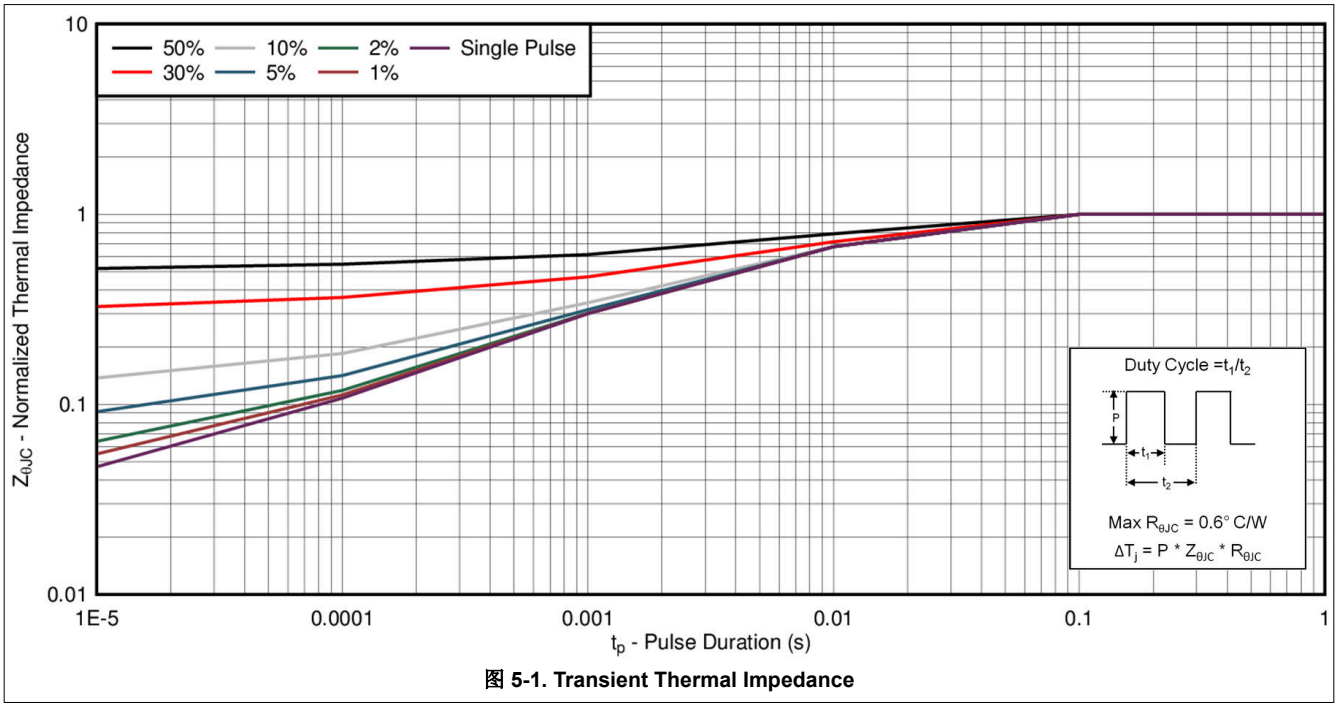


图 5-1. Transient Thermal Impedance

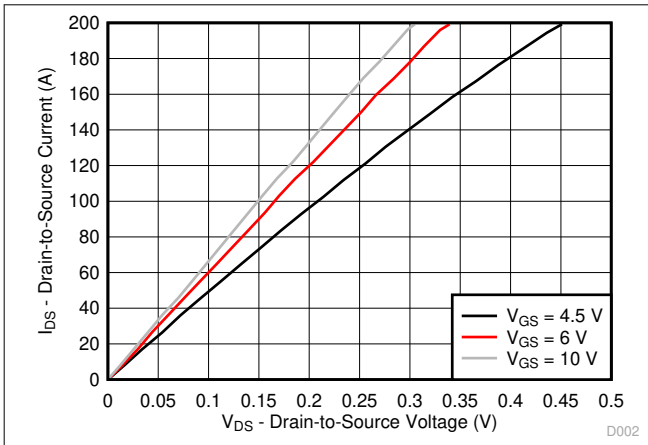
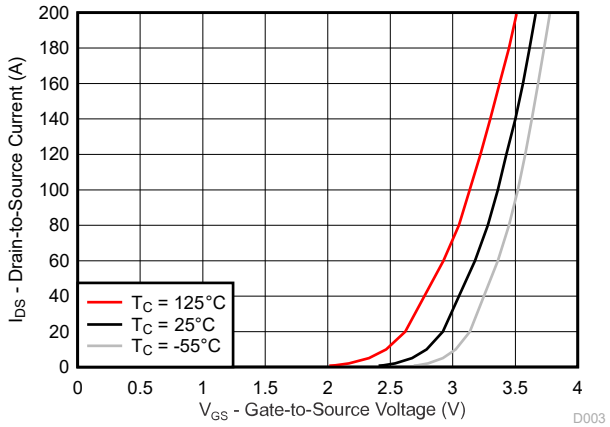


图 5-2. Saturation Characteristics

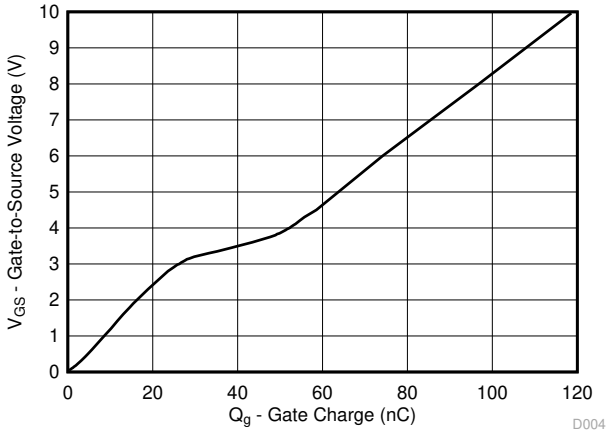


V_{DS} = 5 V

图 5-3. Transfer Characteristics

5.3 Typical MOSFET Characteristics (continued)

T_A =25°C (unless otherwise stated)



V_{DS} = 20 V I_D = 100 A

图 5-4. Gate Charge

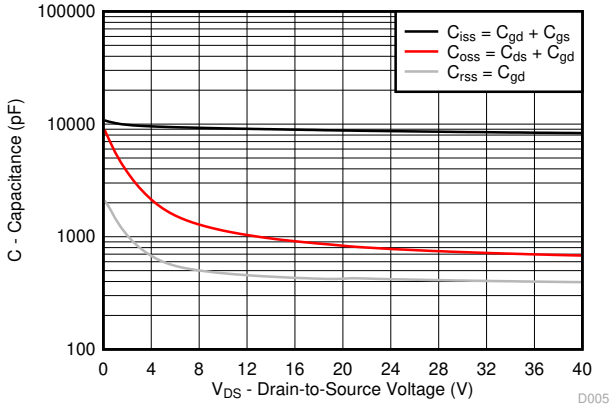
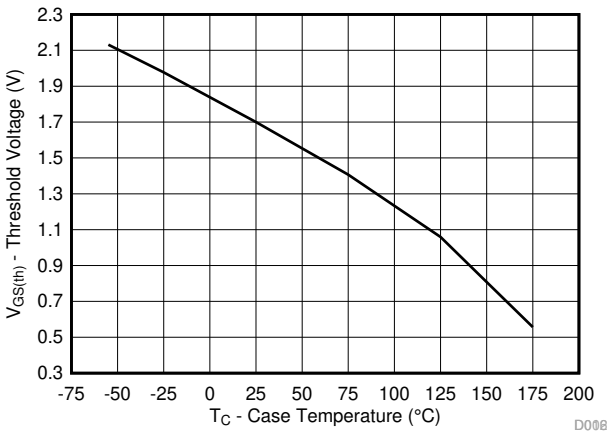


图 5-5. Capacitance



I_D = 250 µA

图 5-6. Threshold Voltage vs Temperature

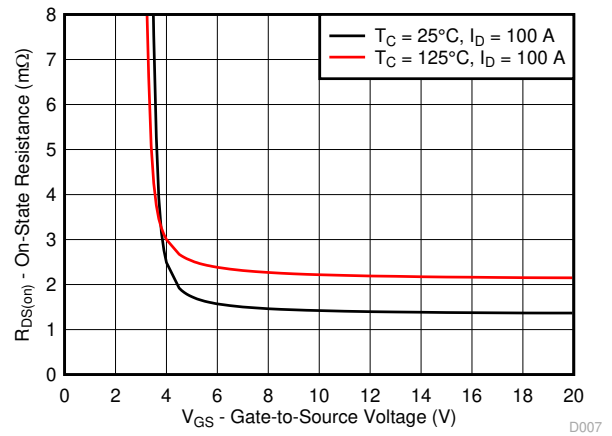
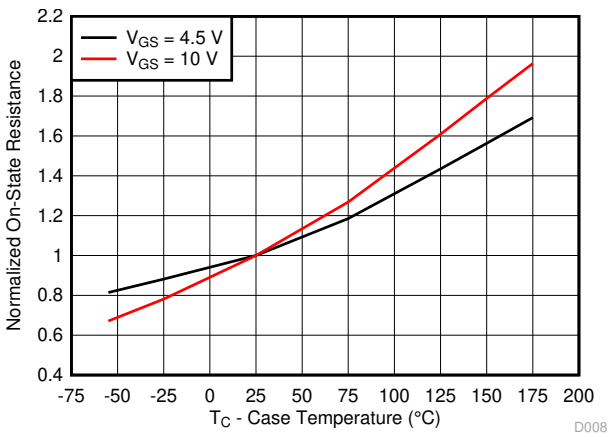


图 5-7. On-State Resistance vs Gate-to-Source Voltage



I_D = 100 A

图 5-8. Normalized On-State Resistance vs Temperature

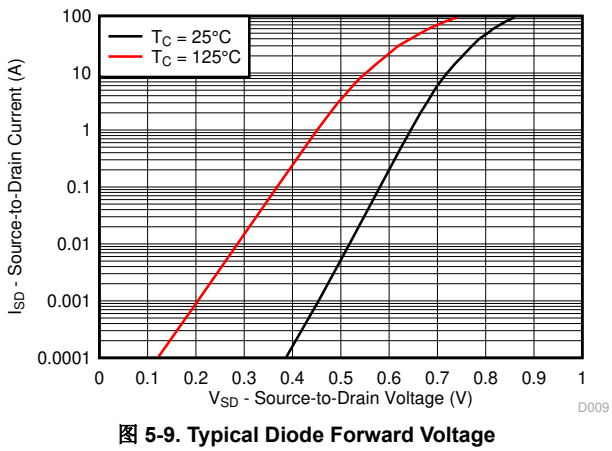
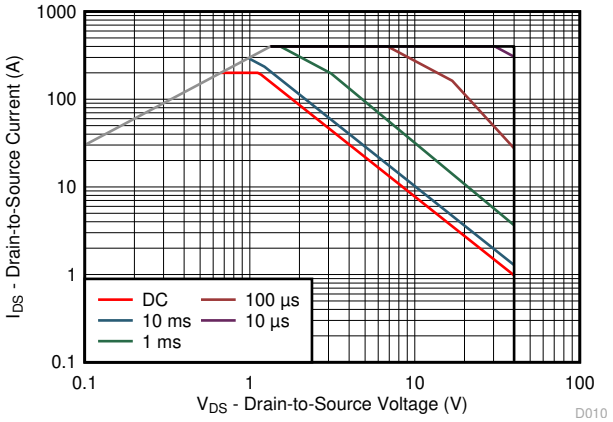


图 5-9. Typical Diode Forward Voltage

5.3 Typical MOSFET Characteristics (continued)

T_A =25°C (unless otherwise stated)



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

图 5-10. Maximum Safe Operating Area

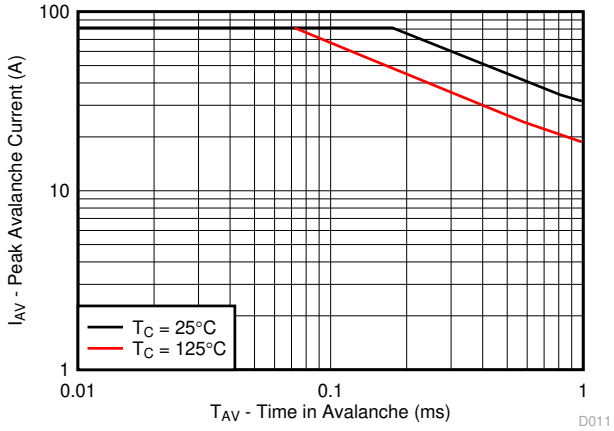
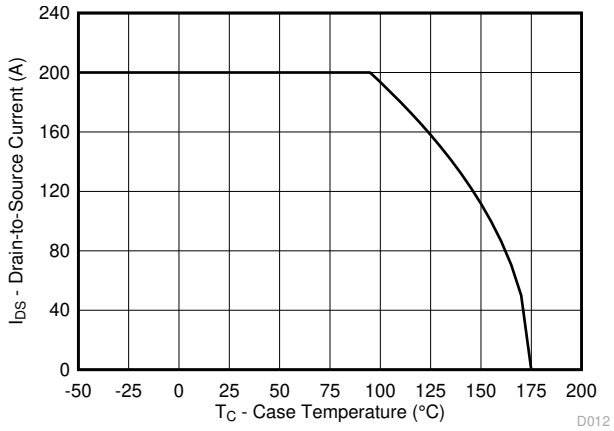


图 5-11. Single Pulse Unclamped Inductive Switching



Max $R_{\theta JC}$ = 0.6°C/W

图 5-12. Maximum Drain Current vs Temperature

6 器件和文档支持

6.1 接收文档更新通知

要接收文档更新通知，请导航至 ti.com 上的器件产品文件夹。点击 *订阅更新* 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。

6.2 支持资源

TI E2E™ 支持论坛是工程师的重要参考资料，可直接从专家获得快速、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可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》。

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6.4 Electrostatic Discharge Caution

This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

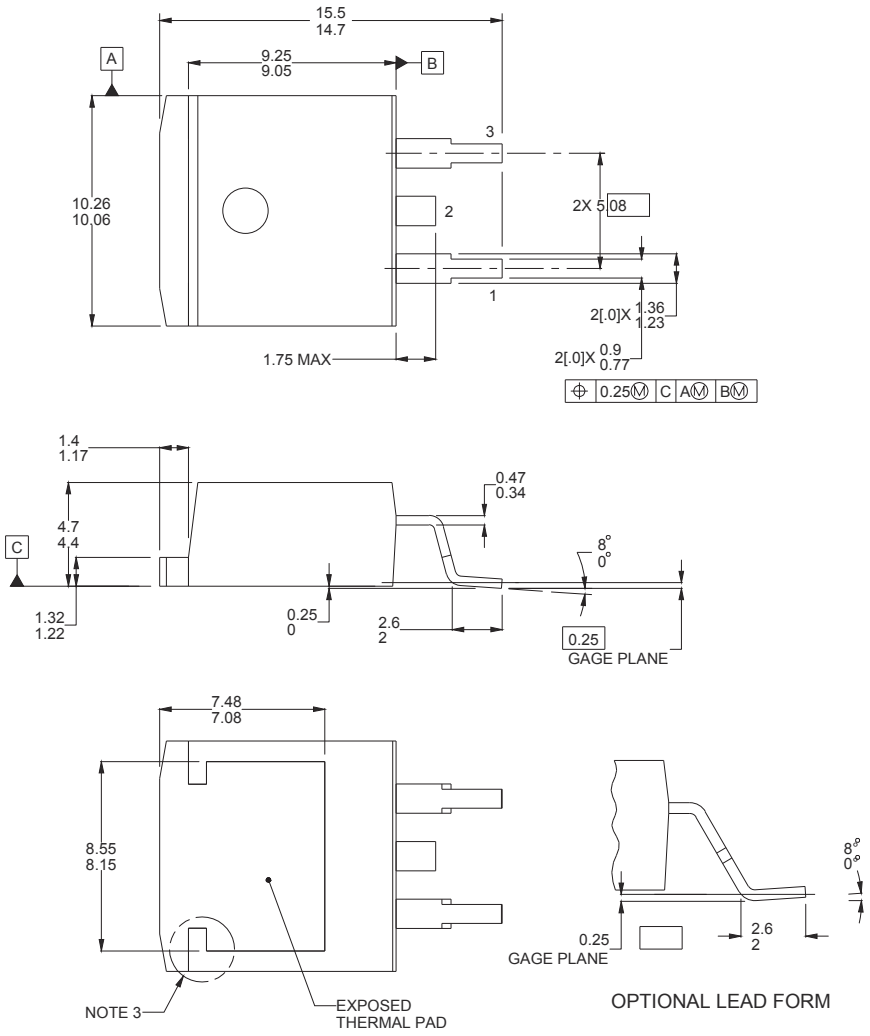
6.5 术语表

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。

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.

7.1 KTT Package Dimensions



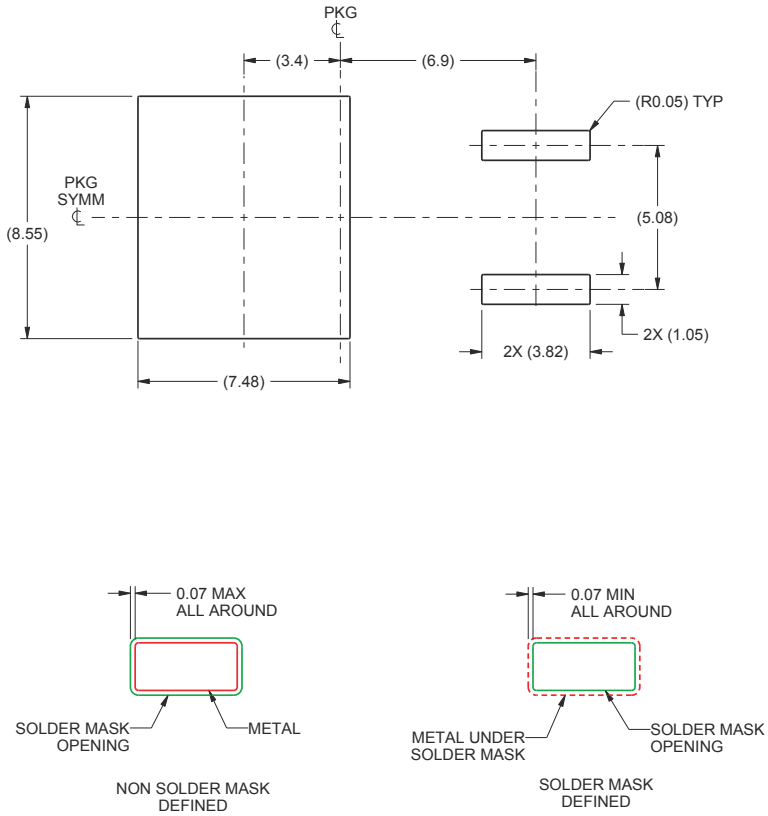
Notes:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Features may not exist and shape may vary per different assembly sites.

表 7-1. Pin Configuration

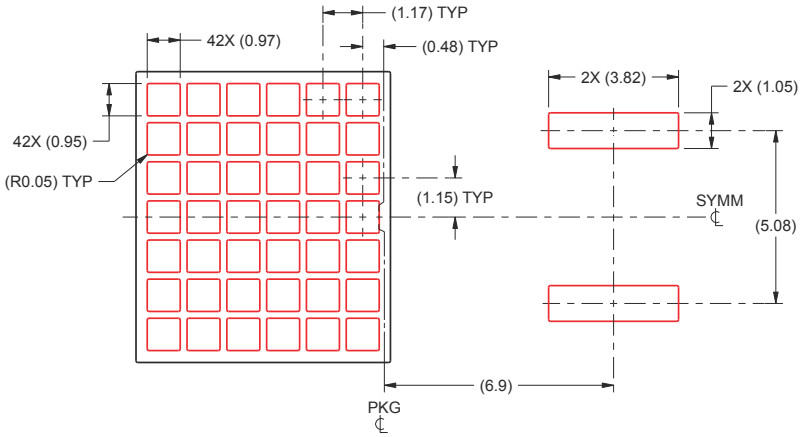
POSITION	DESIGNATION
Pin 1	Gate
Pin 2 / Tab	Drain
Pin 3	Source

7.2 Recommended PCB Pattern



For recommended circuit layout for PCB designs, see *Reducing Ringing Through PCB Layout Techniques* (SLPA005).

7.3 Recommended Stencil Opening (0.125 mm Stencil Thickness)



Notes:

1. This package is designed to be soldered to a thermal pad on the board. See *PowerPAD™ Thermally Enhanced Package* (SLMA002) and *PowerPAD™ Made Easy* (SLMA004) for more information.
2. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
3. Board assembly site may have different recommendations for stencil design.

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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
CSD18510KTT	ACTIVE	DDPAK/ TO-263	KTT	2	500	RoHS-Exempt & Green	SN	Level-2-260C-1 YEAR	-55 to 175	CSD18510KTT	Samples
CSD18510KTTT	ACTIVE	DDPAK/ TO-263	KTT	2	50	RoHS-Exempt & Green	SN	Level-2-260C-1 YEAR	-55 to 175	CSD18510KTT	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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