CSD18510KTT 40V N-Channel NexFET™ Power MOSFET

1 Features

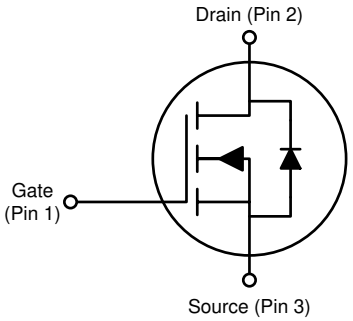
- Ultra-low Q_g and Q_{gd}
- Low-thermal resistance
- Avalanche rated
- Lead-free terminal plating
- RoHS compliant
- Halogen free
- D^2PAK plastic package

2 Applications

- Secondary side synchronous rectifier
- Motor control

3 Description

This 40V, 1.4mΩ, D^2PAK (TO-263) NexFET™ power MOSFET is designed to minimize losses in power conversion applications.



Product Summary

T_A = 25°C		TYPICAL VALUE		UNIT
V_{DS}	Drain-to-Source Voltage	40		V
Q_g	Gate Charge Total (10V)	119		nC
Q_{gd}	Gate Charge Gate-to-Drain	21		nC
$R_{DS(on)}$	Drain-to-Source On Resistance	V_{GS} = 4.5V	2.0	mΩ
		V_{GS} = 10V	1.4	
$V_{GS(th)}$	Threshold Voltage	1.7		V

Device Information(1)

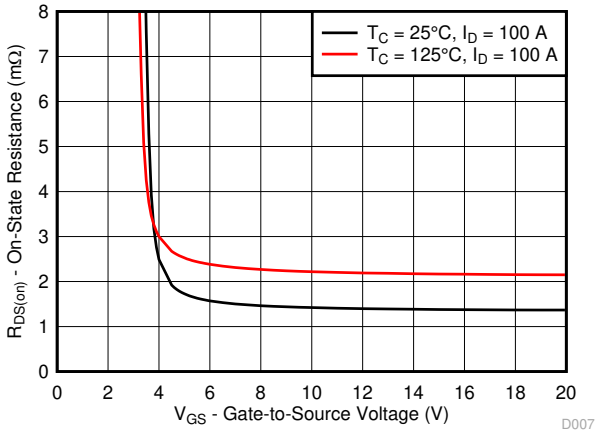
DEVICE	QTY	MEDIA	PACKAGE	SHIP
CSD18510KTT	500	13-Inch Reel	D^2PAK Plastic Package	Tape and Reel
CSD18510KTTT	50			

(1) For all available packages, see the orderable addendum at the end of the data sheet.

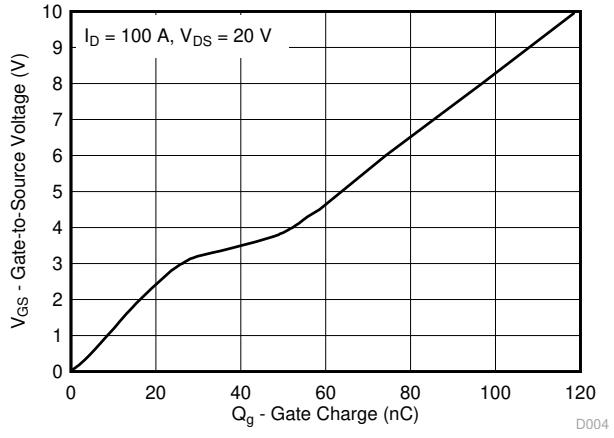
Absolute Maximum Ratings

T_A = 25°C		VALUE	UNIT
V_{DS}	Drain-to-Source Voltage	40	V
V_{GS}	Gate-to-Source Voltage	±20	V
I_D	Continuous Drain Current (Package Limited)	200	A
	Continuous Drain Current (Silicon Limited), T_C = 25°C	274	
	Continuous Drain Current (Silicon Limited), T_C = 100°C	193	
I_{DM}	Pulsed Drain Current(1)	400	A
P_D	Power Dissipation	250	W
T_J, T_{stg}	Operating Junction, Storage Temperature	–55 to 175	°C
E_{AS}	Avalanche Energy, Single Pulse I_D = 81A, L = 0.1mH, R_G = 25Ω	328	mJ

(1) Max $R_{\theta JC}$ = 0.6°C/W, pulse duration ≤ 100 µs, duty cycle ≤ 1%.



$R_{DS(on)}$ vs V_{GS}



Gate Charge

An IMPORTANT NOTICE at the end of this data sheet addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers. PRODUCTION DATA.

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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 = 250µA	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 = 250µA	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 (4.5V)	V_{DS} = 20V, I_D = 100A		58	75	nC
Q_g	Gate charge total (10V)			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)

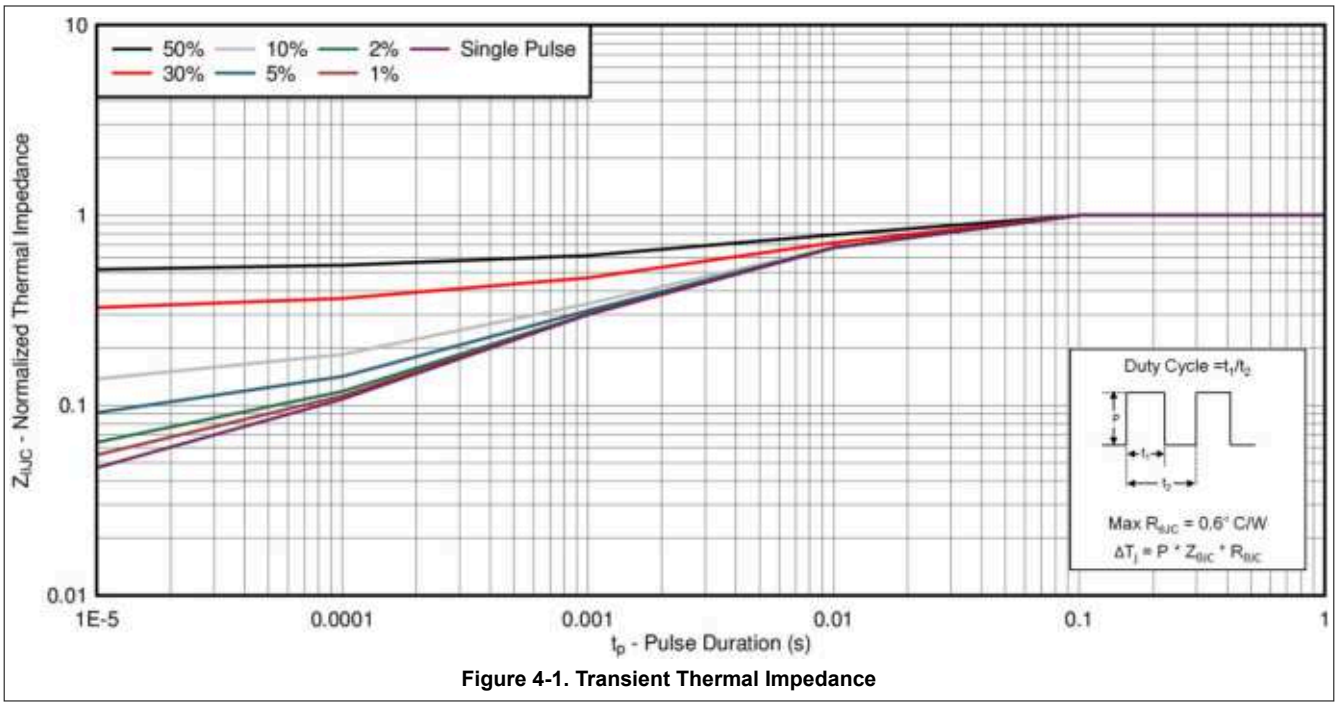


Figure 4-1. Transient Thermal Impedance

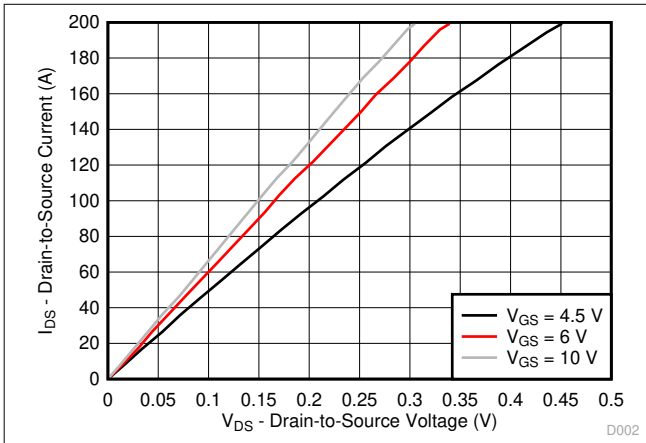
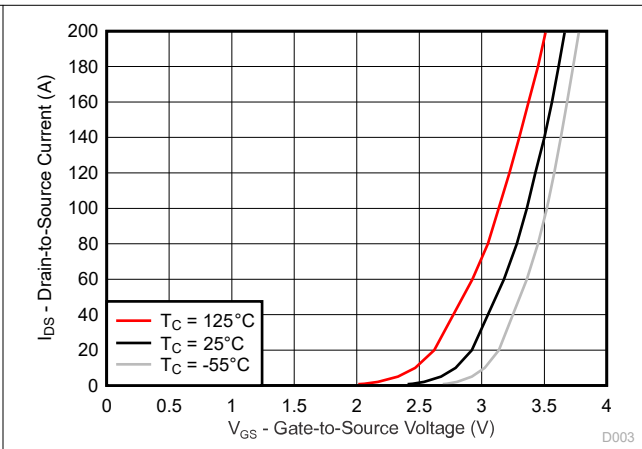


Figure 4-2. Saturation Characteristics



V_{DS} = 5V

Figure 4-3. Transfer Characteristics

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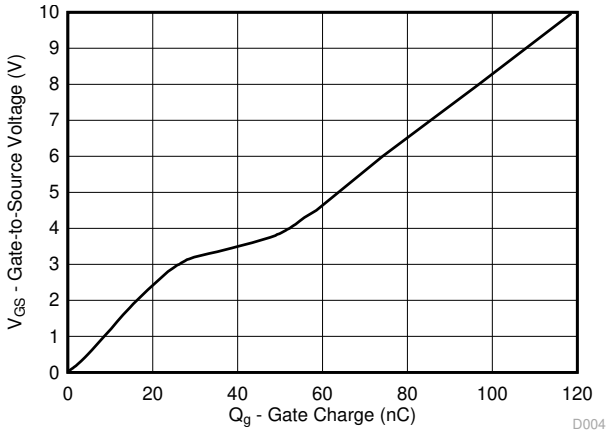
4.3 Typical MOSFET Characteristics (continued)

T_A =25°C (unless otherwise stated)



V_{DS} = 20V I_D = 100A

Figure 4-4. Gate Charge

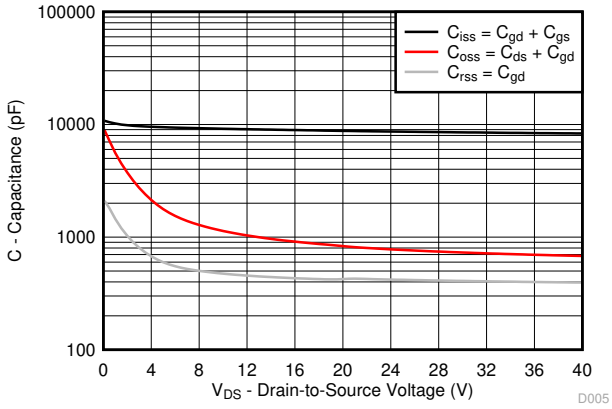
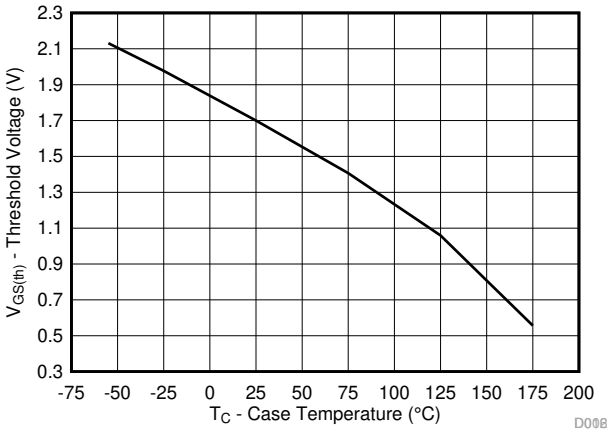


Figure 4-5. Capacitance



I_D = 250µA

Figure 4-6. Threshold Voltage vs Temperature

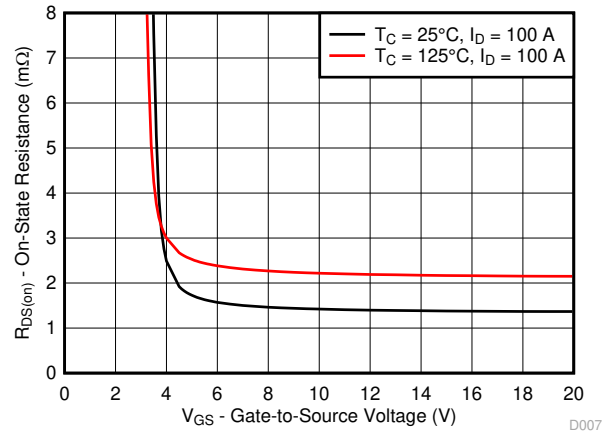
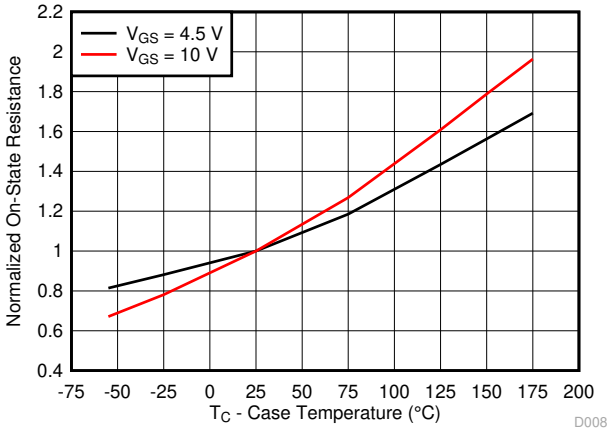


Figure 4-7. On-State Resistance vs Gate-to-Source Voltage



I_D = 100A

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

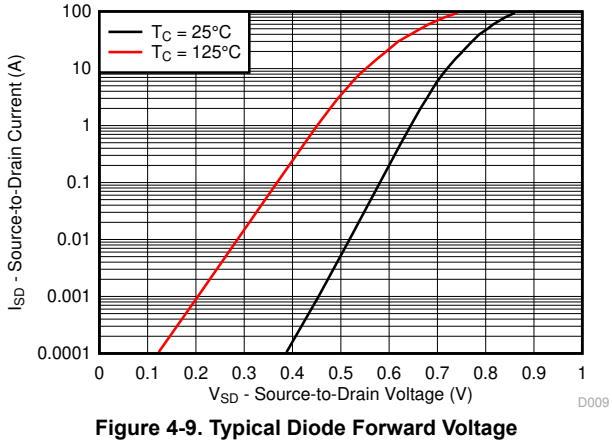


Figure 4-9. Typical Diode Forward Voltage

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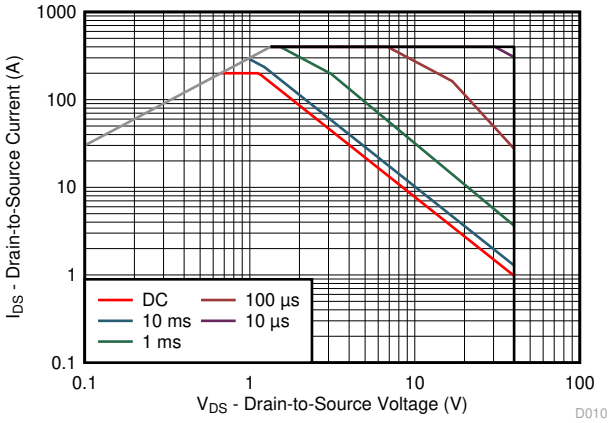
4.3 Typical MOSFET Characteristics (continued)

T_A =25°C (unless otherwise stated)



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

Figure 4-10. Maximum Safe Operating Area

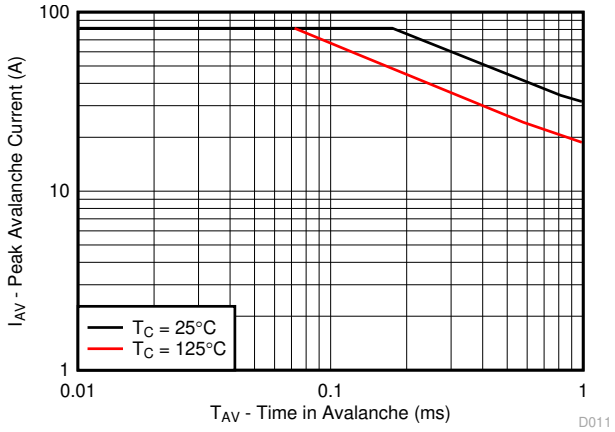
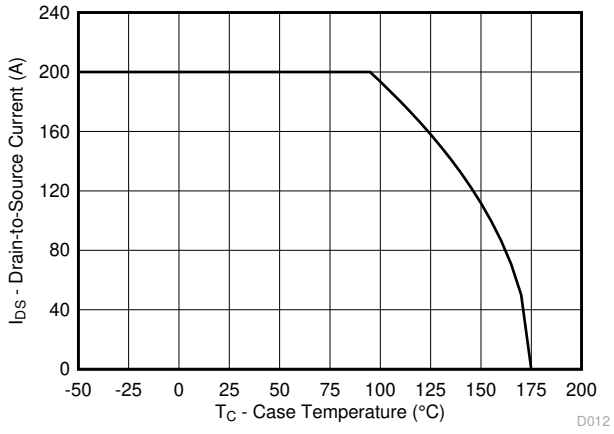


Figure 4-11. Single Pulse Unclamped Inductive Switching



Max $R_{\theta JC}$ = 0.6°C/W

Figure 4-12. Maximum Drain Current vs Temperature

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5 Device and Documentation Support

5.1 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

5.2 Support Resources

TI E2E™ support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

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5.3 Trademarks

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5.4 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.

5.5 Glossary

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

6 Revision History

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

Changes from Revision B (November 2022) to Revision C (June 2024)	Page
• Updated the numbering format for tables, figures, and cross-references throughout the document	1

Changes from Revision A (January 2017) to Revision B (November 2022)	Page
• Updated Figure 4-3	4

Changes from Revision * (November 2016) to Revision A (January 2017)	Page
• Changed silicon current limit, T_C = 25°C from 237A : to 274A in the *Absolute Maximum Ratings* table	1
• Changed silicon current limit, T_C = 100°C from 167A : to 193A in the *Absolute Maximum Ratings* table	1
• Changed max power dissipation from 188W : to 250W in the *Absolute Maximum Ratings* table	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 Figure 4-4 in the *Typical MOSFET Characteristics* section to reflect updated gate charges	4

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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)
CSD18510KTT	Active	Production	DDPAK/ TO-263 (KTT) | 2	500 | LARGE T&R	ROHS Exempt	SN	Level-2-260C-1 YEAR	-55 to 175	CSD18510KTT
CSD18510KTT.B	Active	Production	DDPAK/ TO-263 (KTT) | 2	500 | LARGE T&R	ROHS Exempt	SN	Level-2-260C-1 YEAR	-55 to 175	CSD18510KTT
CSD18510KTTT	Active	Production	DDPAK/ TO-263 (KTT) | 2	50 | SMALL T&R	ROHS Exempt	SN	Level-2-260C-1 YEAR	-55 to 175	CSD18510KTT
CSD18510KTTT.B	Active	Production	DDPAK/ TO-263 (KTT) | 2	50 | SMALL T&R	ROHS Exempt	SN	Level-2-260C-1 YEAR	-55 to 175	CSD18510KTT

(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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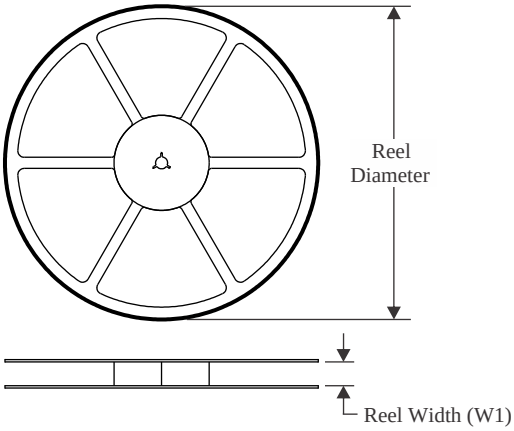
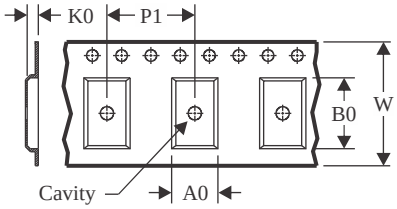
TAPE AND REEL INFORMATION

REEL DIMENSIONS

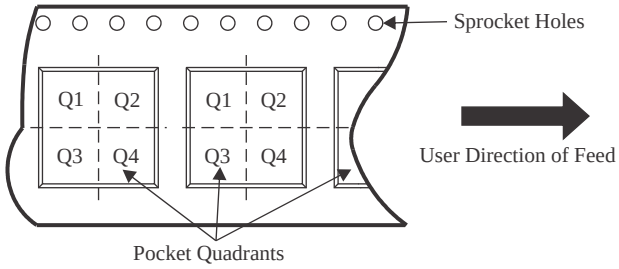


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

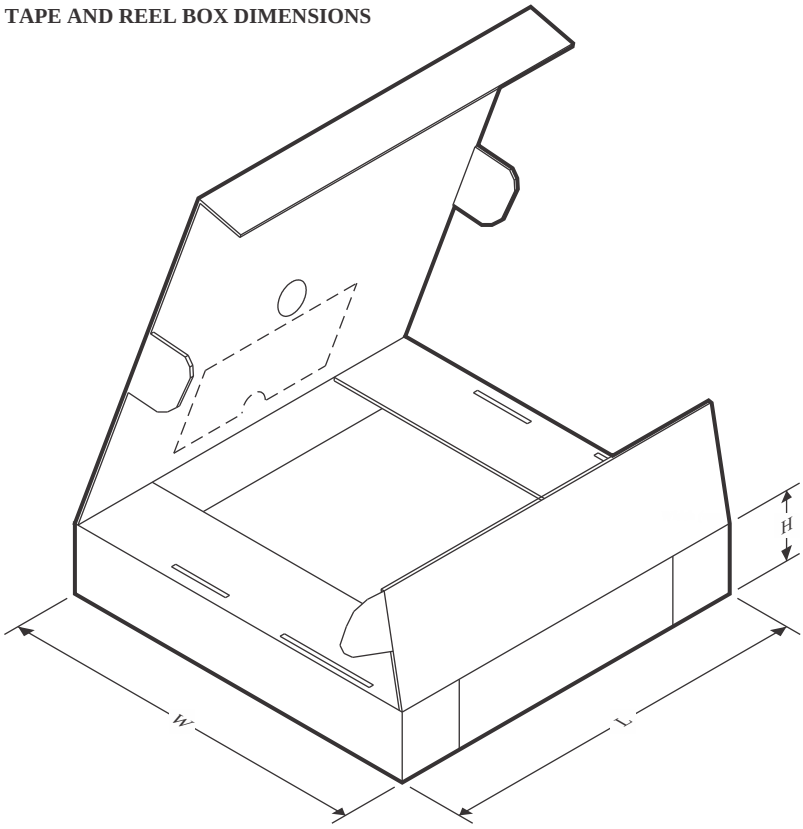
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
CSD18510KTT	DDPAK/ TO-263	KTT	2	500	330.0	24.4	10.8	16.3	5.11	16.0	24.0	Q2
CSD18510KTTT	DDPAK/ TO-263	KTT	2	50	330.0	24.4	10.8	16.3	5.11	16.0	24.0	Q2

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CSD18510KTT	DDPAK/TO-263	KTT	2	500	340.0	340.0	38.0
CSD18510KTTT	DDPAK/TO-263	KTT	2	50	340.0	340.0	38.0

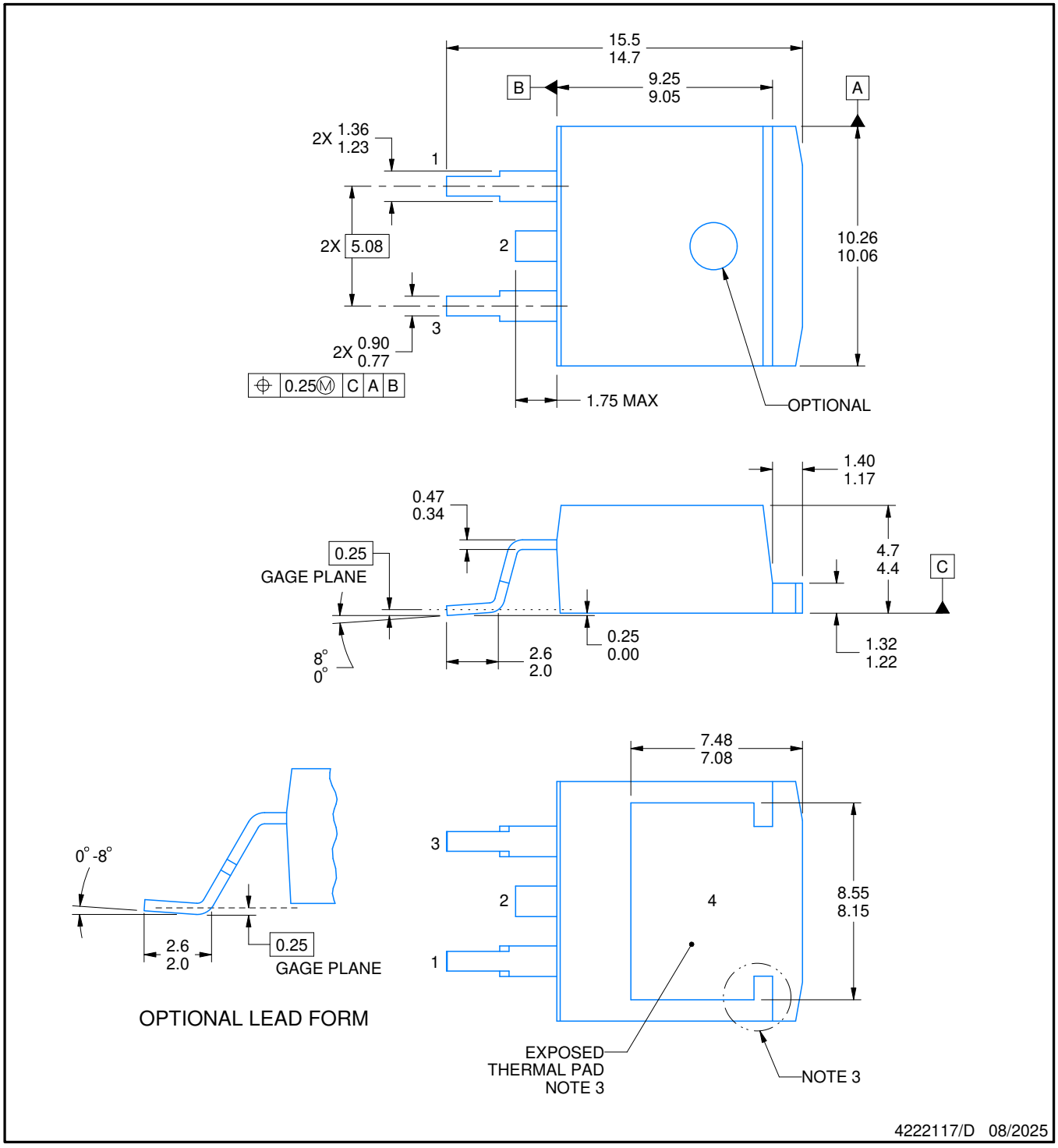
KTT0002A



PACKAGE OUTLINE

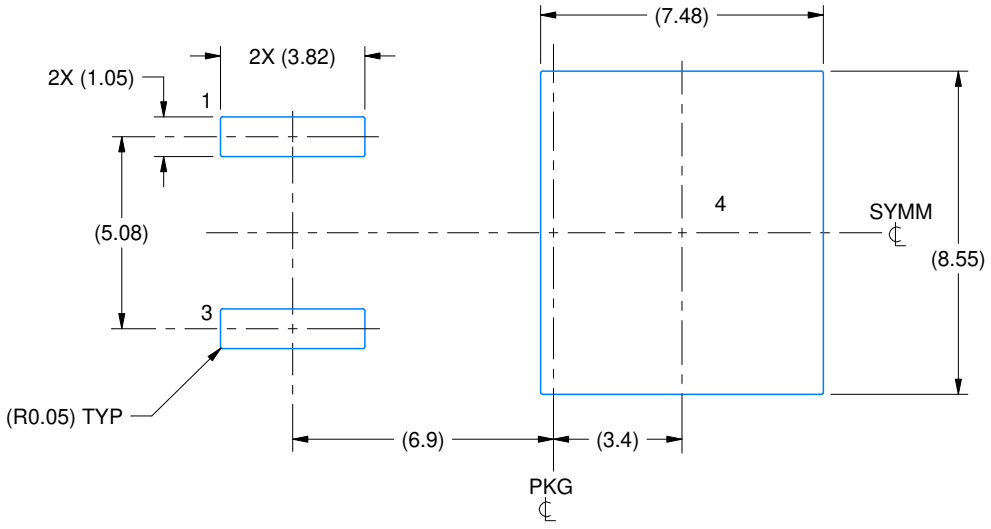
TO-263 - 4.7 mm max height

TRANSISTOR OUTLINE

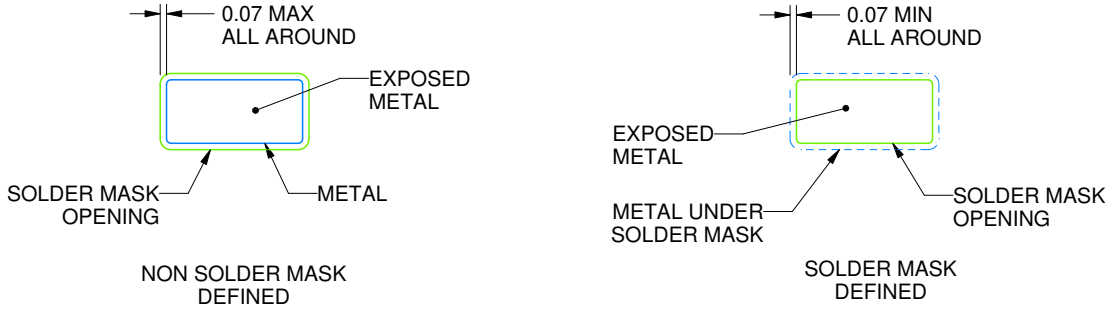


NOTES:

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. Pin 2 and Pin 4 connected.
4. Reference JEDEC registration TO-263.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:5X



SOLDER MASK DETAILS

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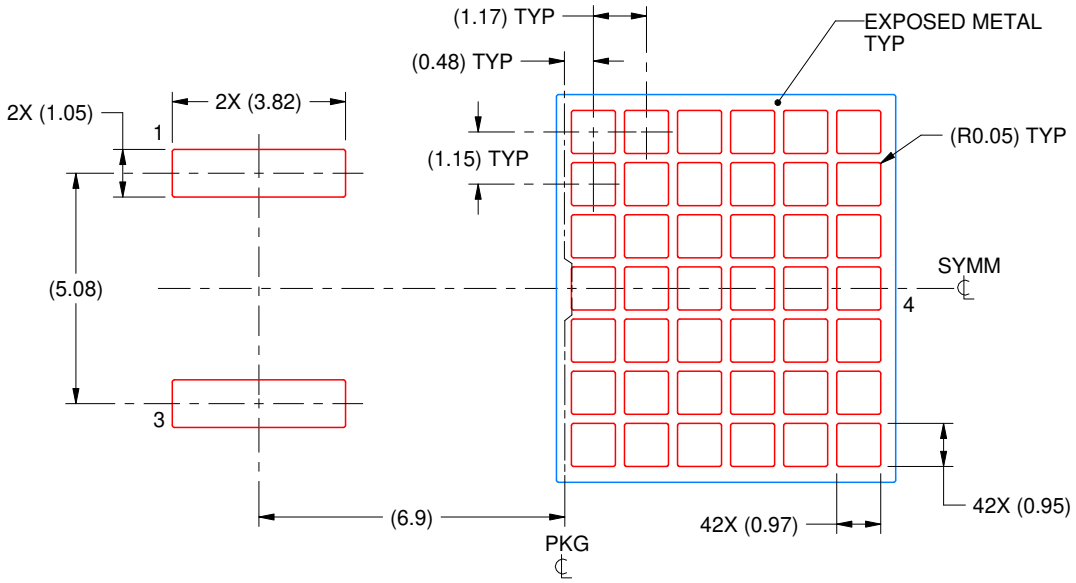
NOTES: (continued)

5. This package is designed to be soldered to a thermal pad on the board. For more information, see Texas Instruments literature numbers SLMA002(www.ti.com/lit/slm002) and SLMA004 (www.ti.com/lit/slma004).
6. Vias are optional depending on application, refer to device data sheet. It is recommended that vias under paste be filled, plugged or tented.



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL

EXPOSED PAD
60.5% PRINTED SOLDER COVERAGE BY AREA
SCALE:6X

4222117/D 08/2025

NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

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