

# CSD17308Q3 30V N 沟道 NexFET™ 功率 MOSFET

## 1 特性

- 针对 5V 栅极驱动器进行了优化
- 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
- VSON 3.3mm × 3.3mm 塑料封装

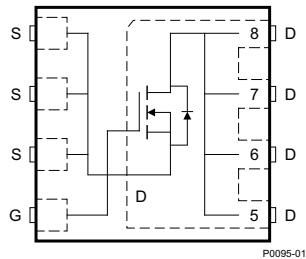
## 2 应用

- 笔记本电脑负载点
- 网络、电信和计算系统的负载点同步降压

## 3 说明

此 30V、8.2mΩ、3.3mm × 3.3mm VSON NexFET™ 功率 MOSFET 旨在用于最大程度降低功率转换应用中的损耗并针对 5V 栅极驱动器应用进行了优化。

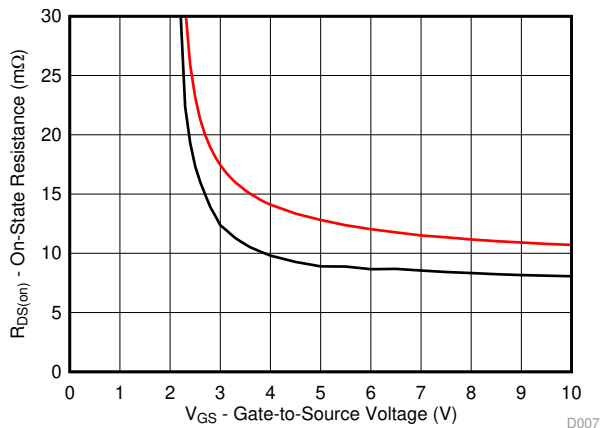
俯视图



产品概要

$T_A = 25^\circ\text{C}$		值	单位
$V_{DS}$	漏源电压	30	V

$R_{DS(on)}$  与  $V_{GS}$  对比



产品概要 (接下页)

$T_A = 25^\circ\text{C}$		值	单位
$Q_g$	栅极电荷总量 (4.5V)	3.9	nC
$Q_{gd}$	栅极电荷 (栅极到漏极)	0.8	nC
$R_{DS(on)}$	漏源导通电阻	$V_{GS} = 3V$	12.5
		$V_{GS} = 4.5V$	9.4
		$V_{GS} = 8V$	8.2
$V_{GS(th)}$	阈值电压	1.3	V

器件信息(1)

器件	数量	包装介质	封装	配送
CSD17308Q3	2500	13 英寸卷带	SON 3.30mm × 3.30mm 塑料封装	卷带封装

(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。

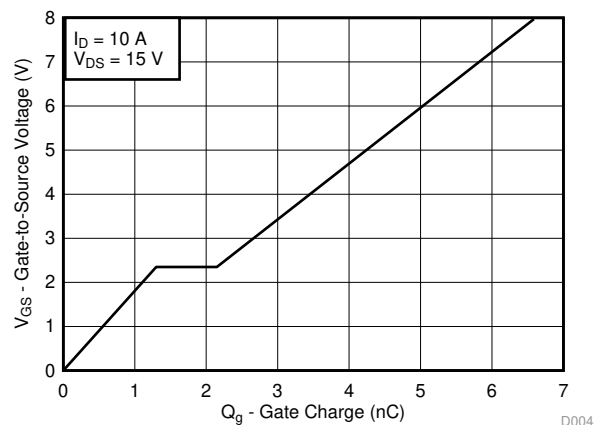
绝对最大额定值

$T_A = 25^\circ\text{C}$ 时测得, 除非另外注明		值	单位
$V_{DS}$	漏源电压	30	V
$V_{GS}$	栅源电压	+10 / -8	V
$I_D$	持续漏极电流 (受封装限制)	50	A
	持续漏极电流, $T_C = 25^\circ\text{C}$	44	
	持续漏极电流(1)	14	
$I_{DM}$	脉冲漏极电流, $T_A = 25^\circ\text{C}$ (2)	167	A
$P_D$	功耗(1)	2.7	W
	功率耗散, $T_C = 25^\circ\text{C}$	28	
$T_J, T_{stg}$	工作结温和贮存温度	-55 至 150	$^\circ\text{C}$
$E_{AS}$	雪崩能量, 单脉冲 $I_D = 36A, L = 0.1mH, R_G = 25\Omega$	65	mJ

(1) 典型  $R_{\theta JA} = 46^\circ\text{C}/\text{W}$  (当在 0.06 英寸 (1.52mm) 厚的 FR4 PCB 上将其安装在 1 平方英寸 (6.45cm<sup>2</sup>) 2oz (0.071mm) 厚的铜焊盘上时)。

(2) 最大  $R_{\theta JC} = 4.5^\circ\text{C}/\text{W}$ , 脉冲持续时间  $\leq 100\mu\text{s}$ , 占空比  $\leq 1\%$ 。

栅极电荷



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## 4 修订历史记录

注：之前版本的页码可能与当前版本有所不同。

### Changes from Revision B (October 2015) to Revision C Page

- Changed  $V_{GS(th)}$  MAX specification in the *Electrical Characteristics* table, From 1.8 V : To 1.6 V ..... **3**

### Changes from Revision A (February 2010) to Revision B Page

- 已添加 向标题中添加了部件编号 ..... **1**
- 已添加 受封装限制的持续漏极电流 ..... **1**
- 已添加 在绝对最大额定值 表格中添加了“功率耗散,  $T_C = 25^\circ\text{C}$ ”行 ..... **1**
- 更新了脉冲电流条件 ..... **1**
- Updated [Figure 1](#) to show  $R_{\theta JC}$  curves ..... **5**
- Added 4.5 V curve in [Figure 8](#) ..... **6**
- Updated [Figure 10](#) ..... **7**
- 已添加 添加了 器件和文档支持 部分 ..... **8**
- 更新了机械、封装和可订购信息 部分 ..... **9**

### Changes from Original (February 2010) to Revision A Page

- 已删除 删除了“封装标记信息”部分 ..... **11**

## 5 Specifications

### 5.1 Electrical Characteristics

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

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>STATIC CHARACTERISTICS</b>						
$BV_{DSS}$	Drain-to-source voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	30			V
$I_{DSS}$	Drain-to-source leakage current	$V_{GS} = 0\text{ V}, V_{DS} = 24\text{ V}$			1	$\mu\text{A}$
$I_{GSS}$	Gate-to-source leakage current	$V_{DS} = 0\text{ V}, V_{GS} = +10 / -8\text{ V}$			100	nA
$V_{GS(th)}$	Gate-to-source threshold voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	0.9	1.3	1.6	V
$R_{DS(on)}$	Drain-to-source on-resistance	$V_{GS} = 3\text{ V}, I_D = 10\text{ A}$		12.5	16.5	m $\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$		9.4	11.8	
		$V_{GS} = 8\text{ V}, I_D = 10\text{ A}$		8.2	10.3	
$g_{fs}$	Transconductance	$V_{DS} = 15\text{ V}, I_D = 10\text{ A}$		37		S
<b>DYNAMIC CHARACTERISTICS</b>						
$C_{ISS}$	Input capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 15\text{ V}, f = 1\text{ MHz}$		540	700	pF
$C_{OSS}$	Output capacitance			280	365	pF
$C_{RSS}$	Reverse transfer capacitance			27	35	pF
$R_g$	Series gate resistance			0.9	1.8	$\Omega$
$Q_g$	Gate charge total (4.5 V)	$V_{DS} = 15\text{ V}, I_D = 10\text{ A}$		3.9	5.1	nC
$Q_{gd}$	Gate charge gate-to-drain			0.8		nC
$Q_{gs}$	Gate charge gate-to-source			1.3		nC
$Q_{g(th)}$	Gate charge at $V_{th}$			0.7		nC
$Q_{OSS}$	Output charge		$V_{DS} = 13\text{ V}, V_{GS} = 0\text{ V}$		7.4	
$t_{d(on)}$	Turnon delay time	$V_{DS} = 15\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}, R_G = 2\ \Omega$		4.5		ns
$t_r$	Rise time			5.7		ns
$t_{d(off)}$	Turnoff delay time			9.9		ns
$t_f$	Fall time			2.3		ns
<b>DIODE CHARACTERISTICS</b>						
$V_{SD}$	Diode forward voltage	$I_{DS} = 10\text{ A}, V_{GS} = 0\text{ V}$		0.85	1	V
$Q_{rr}$	Reverse recovery charge	$V_{DD} = 13\text{ V}, I_F = 10\text{ A}, di/dt = 300\text{ A}/\mu\text{s}$		9.3		nC
$t_{rr}$	Reverse recovery time			14.3		ns

### 5.2 Thermal Information

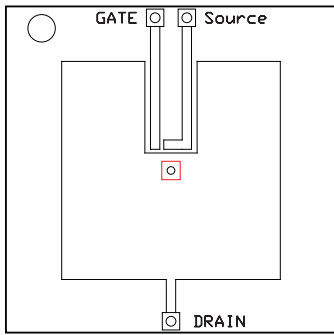
 $T_A = 25^\circ\text{C}$  unless otherwise stated

THERMAL METRIC		MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction-to-case thermal resistance <sup>(1)</sup>			4.5	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Junction-to-ambient thermal resistance <sup>(1)(2)</sup>			58	$^\circ\text{C}/\text{W}$

- (1)  $R_{\theta JC}$  is determined with the device mounted on a 1-in<sup>2</sup> (6.45-cm<sup>2</sup>), 2-oz (0.071-mm) thick Cu pad on a 1.5-in × 1.5-in (3.81-cm × 3.81-cm), 0.06-in (1.52-mm) thick FR4 PCB.  $R_{\theta JC}$  is specified by design, whereas  $R_{\theta JA}$  is determined by the user's board design.
- (2) Device mounted on FR4 material with 1-in<sup>2</sup> (6.45-cm<sup>2</sup>), 2-oz (0.071-mm) thick Cu.

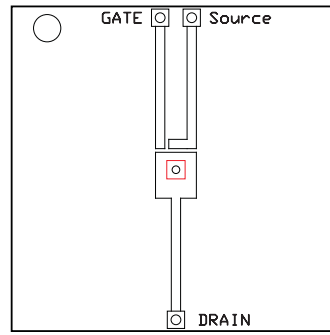
**CSD17308Q3**

ZHCSKK4C – FEBRUARY 2010 – REVISED DECEMBER 2019

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M0161-01

Max  $R_{\theta JA} = 58^{\circ}\text{C/W}$   
 when mounted on 1 in<sup>2</sup>  
 (6.45 cm<sup>2</sup>) of  
 2-oz (0.071-mm) thick  
 Cu.



M0161-02

Max  $R_{\theta JA} = 165^{\circ}\text{C/W}$   
 when mounted on a  
 minimum pad area of  
 2-oz (0.071-mm) thick  
 Cu.

### 5.3 Typical MOSFET Characteristics

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

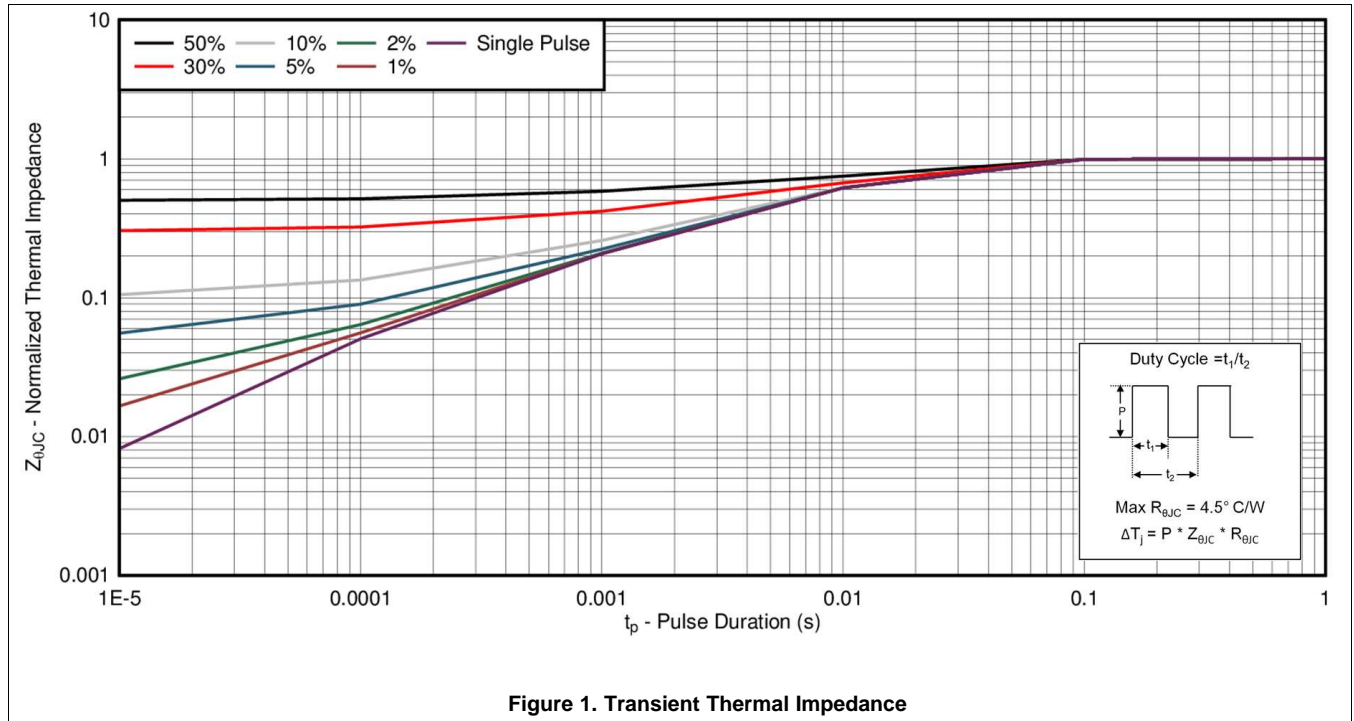


Figure 1. Transient Thermal Impedance

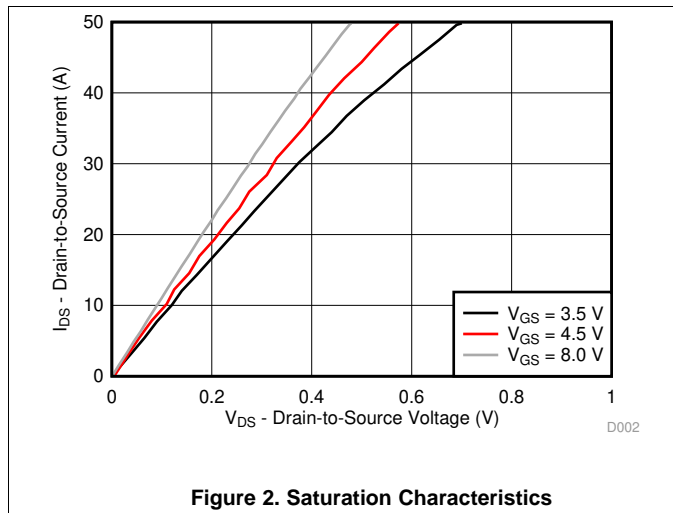


Figure 2. Saturation Characteristics

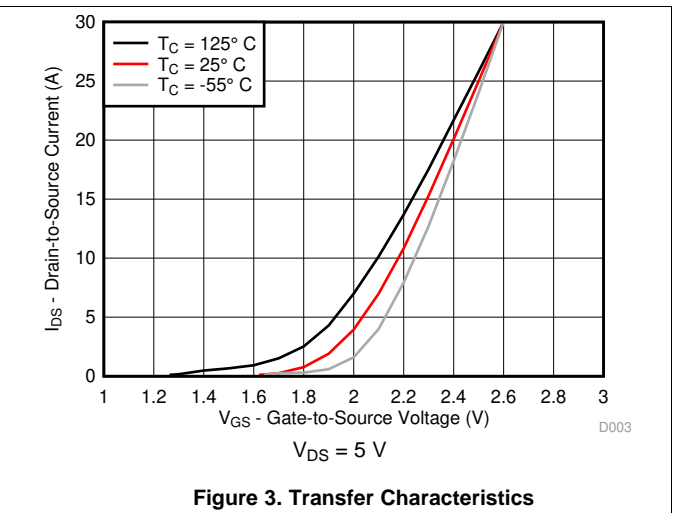
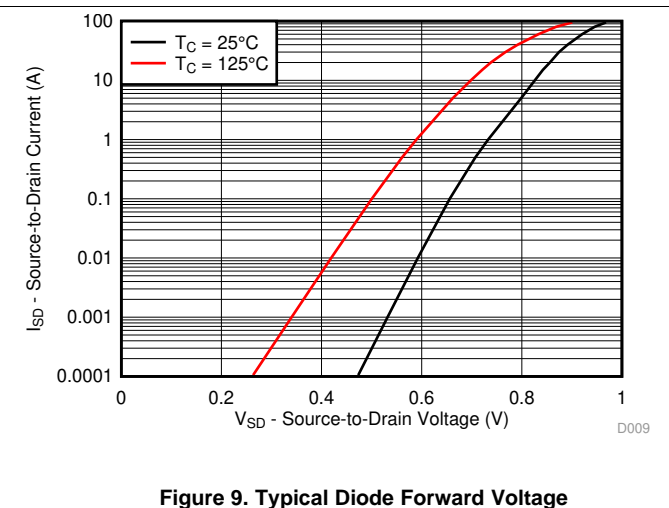
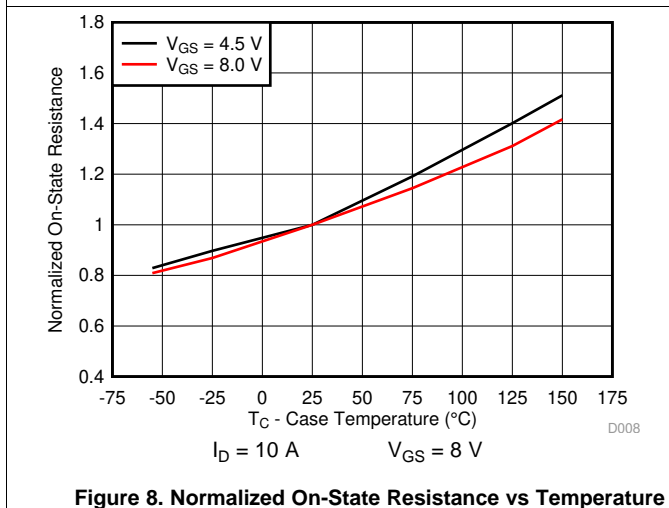
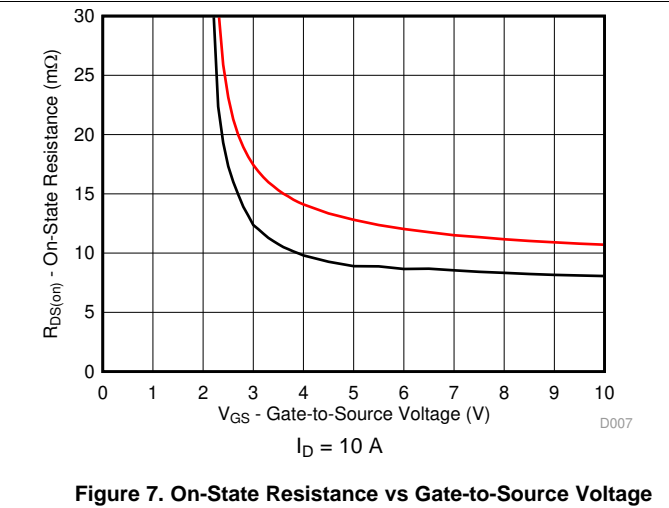
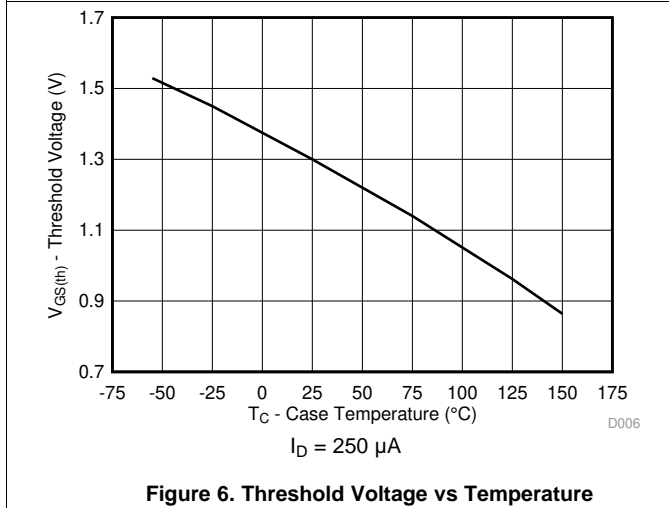
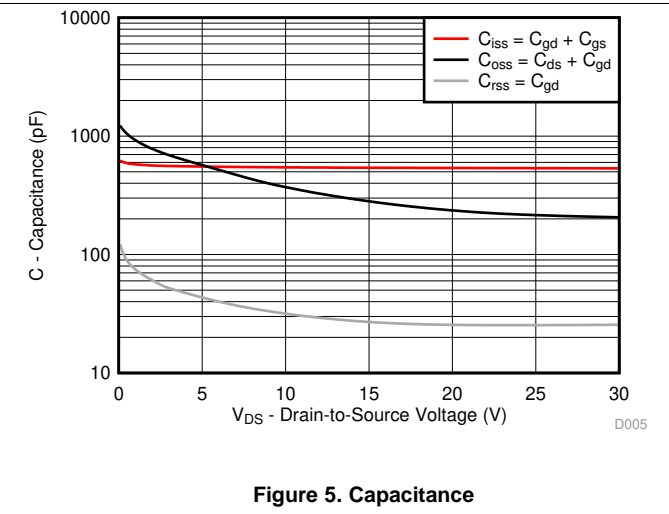
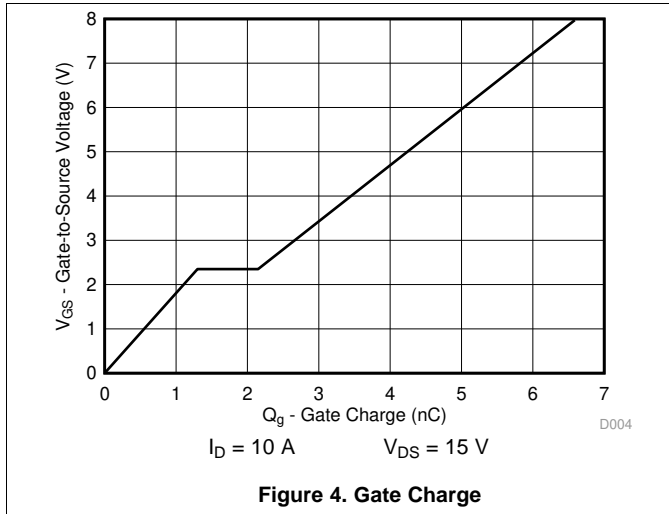


Figure 3. Transfer Characteristics

Typical MOSFET Characteristics (continued)

T<sub>A</sub> = 25°C unless otherwise stated



Typical MOSFET Characteristics (continued)

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

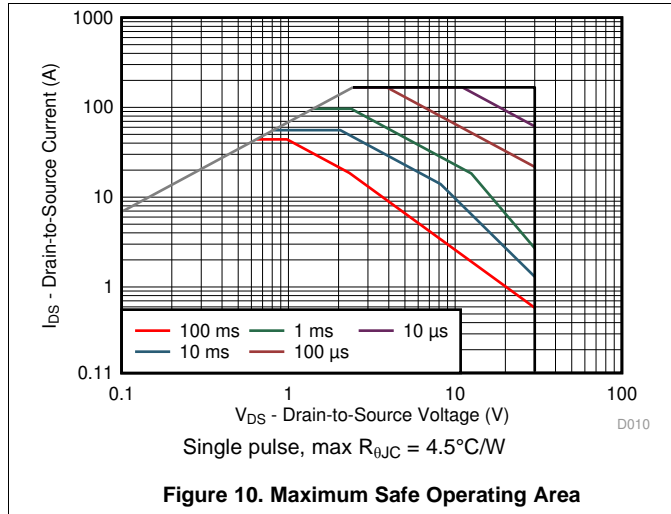


Figure 10. Maximum Safe Operating Area

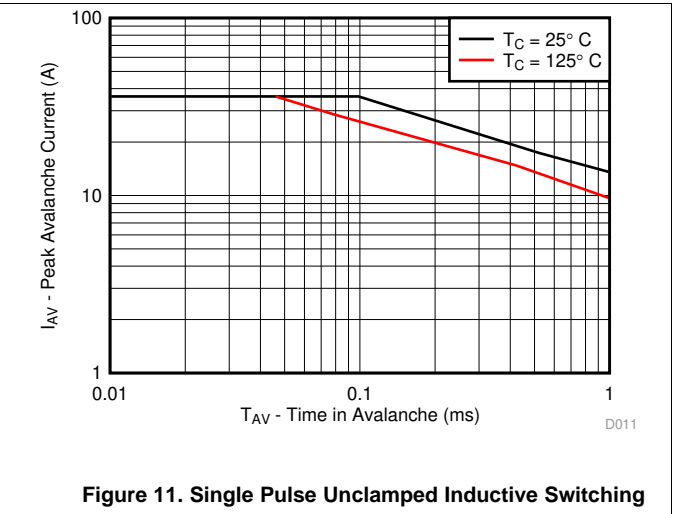


Figure 11. Single Pulse Unclamped Inductive Switching

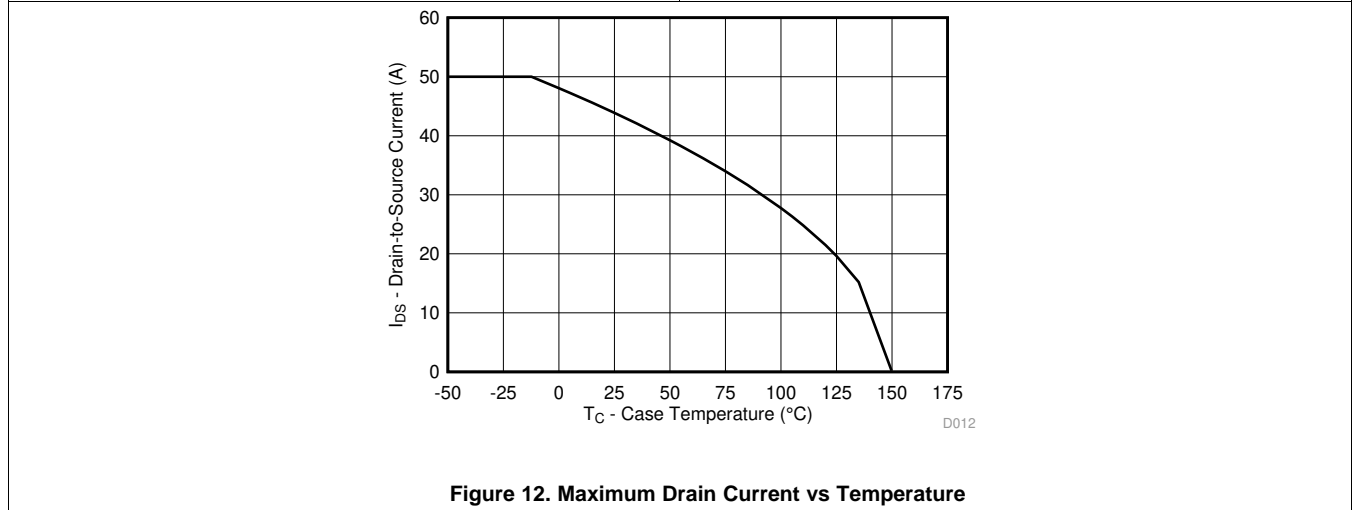


Figure 12. Maximum Drain Current vs Temperature

## 6 器件和文档支持

### 6.1 支持资源

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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### 6.2 商标

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### 6.3 静电放电警告



这些装置包含有限的内置 ESD 保护。存储或装卸时，应将导线一起截短或将装置放置于导电泡棉中，以防止 MOS 门极遭受静电损伤。

### 6.4 Glossary

[SLYZ022](#) — *TI Glossary*.

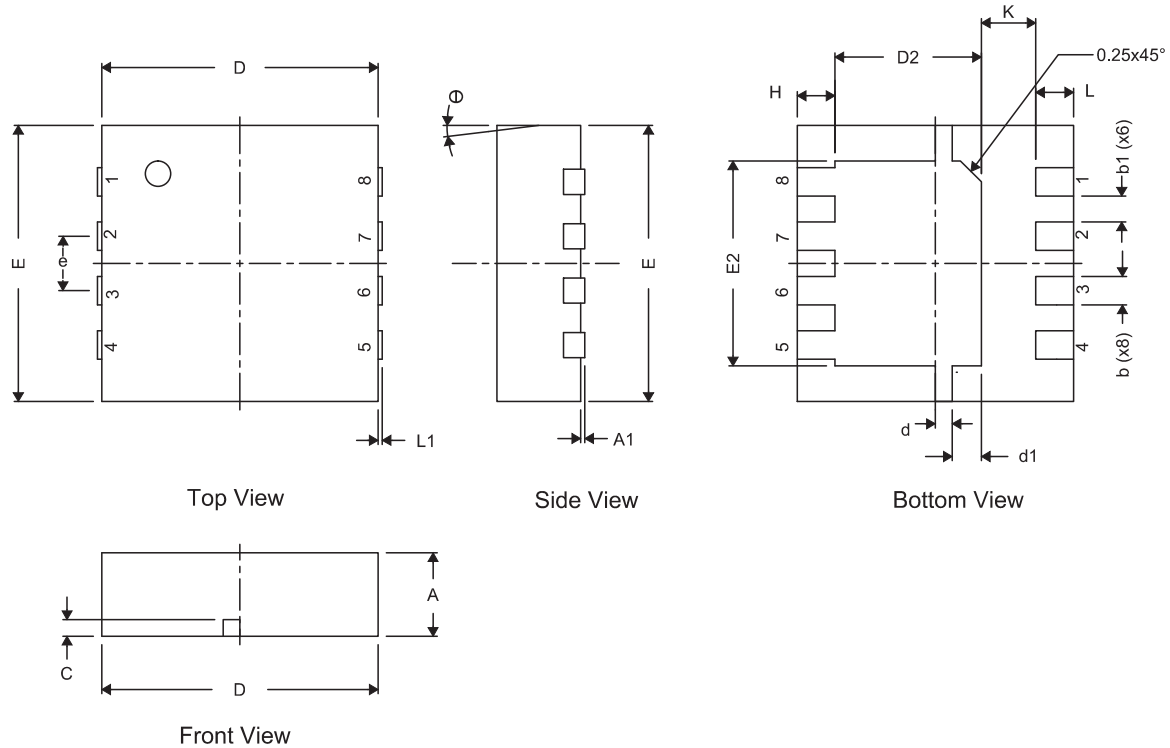
This glossary lists and explains terms, acronyms, and definitions.



## 7 机械、封装和可订购信息

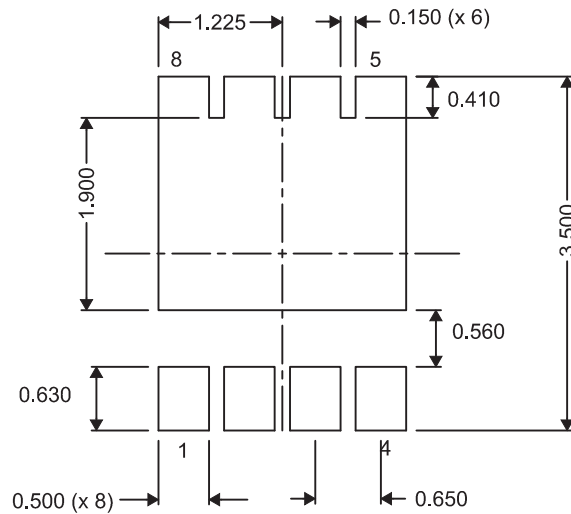
以下页面包含机械、封装和可订购信息。这些信息是指定器件的最新可用数据。数据如有变更，恕不另行通知，且不会对此文档进行修订。如需获取此数据表的浏览器版本，请查阅左侧的导航栏。

### 7.1 Q3 封装尺寸



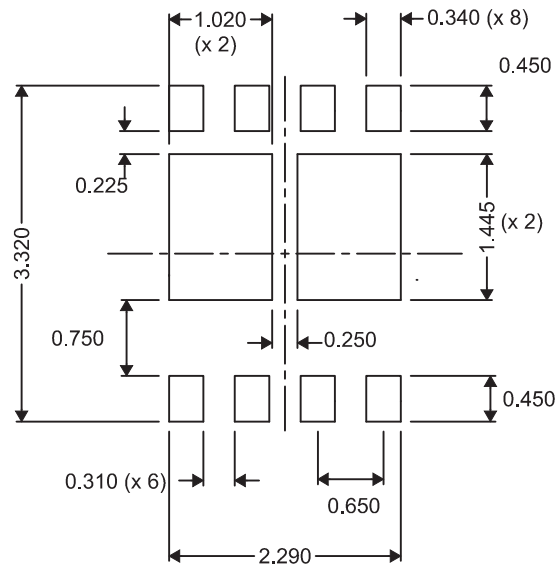
DIM	毫米			英寸		
	最小值	标称值	最大值	最小值	标称值	最大值
A	0.950	1.000	1.100	0.037	0.039	0.043
A1	0.000	0.000	0.050	0.000	0.000	0.002
b	0.280	0.340	0.400	0.011	0.013	0.016
b1	0.310 (标称值)			0.012 (标称值)		
c	0.150	0.200	0.250	0.006	0.008	0.010
D	3.200	3.300	3.400	0.126	0.130	0.134
D2	1.650	1.750	1.800	0.065	0.069	0.071
d	0.150	0.200	0.250	0.006	0.008	0.010
d1	0.300	0.350	0.400	0.012	0.014	0.016
E	3.200	3.300	3.400	0.126	0.130	0.134
E2	2.350	2.450	2.550	0.093	0.096	0.100
e	0.650 典型值			0.026 典型值		
H	0.35	0.450	0.550	0.014	0.018	0.022
K	0.650 典型值			0.026 典型值		
L	0.35	0.450	0.550	0.014	0.018	0.022
L1	0	—	0	0	—	0
$\theta$	0	—	0	0	—	0

## 7.2 建议 PCB 布局



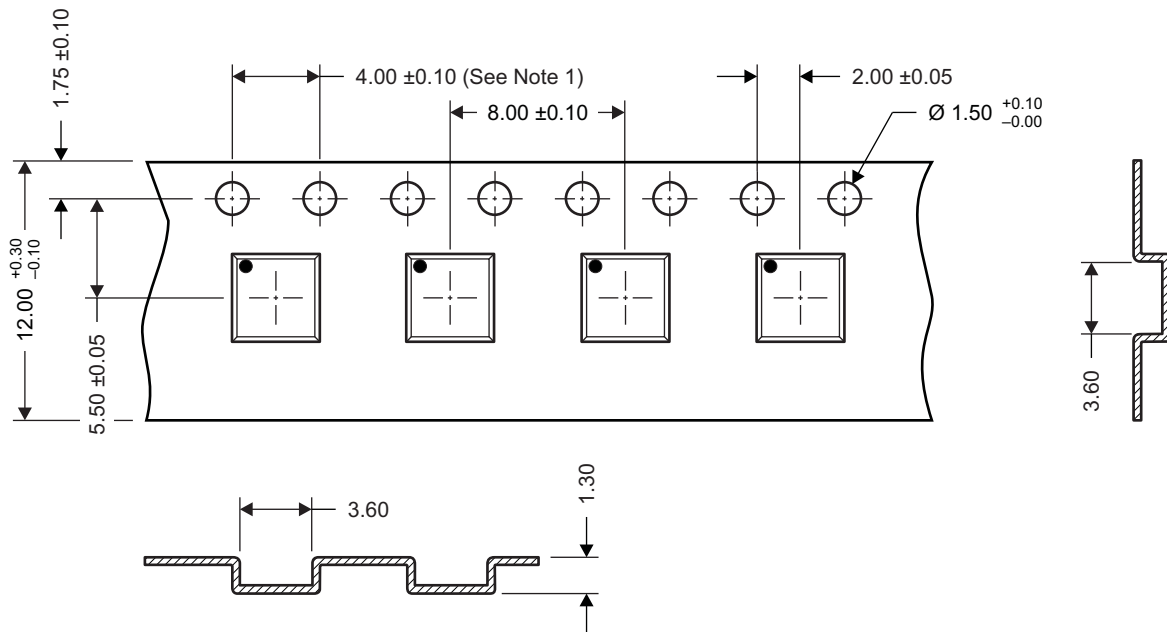
要获得与印刷电路板 (PCB) 设计相关的建议电路布局布线, 请参阅《应用说明》[SLPA005 - 通过 PCB 布局布线技巧来减少振铃](#)。

## 7.3 建议模版开孔



全部尺寸单位为 mm, 除非另外注明。

## 7.4 Q3 卷带信息



M0144-01

注:

1. 10 链轮孔距累积容差为  $\pm 0.2$
2. 每 100mm 长度的翘曲不能超过 1mm，在 250mm 长度上不累积
3. 材料：黑色抗静电聚苯乙烯
4. 全部尺寸单位为 mm（除非另外注明）。
5. 厚度： $0.30 \pm 0.05$ mm
6. MSL1 260°C（红外 (IR) 和传导）无铅回流焊兼容

## 重要声明和免责声明



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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
CSD17308Q3	ACTIVE	VSON-CLIP	DQG	8	2500	RoHS-Exempt & Green	SN	Level-1-260C-UNLIM	-55 to 150	CSD17308	
CSD17308Q3T	ACTIVE	VSON-CLIP	DQG	8	250	RoHS-Exempt & Green	SN	Level-1-260C-UNLIM	-55 to 150	CSD17308	

(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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