CSD16327Q3 25V N 沟道 NexFET™ 功率 MOSFET

1 特性

- 针对 5V 栅极驱动器进行优化
- 超低 Q_g 和 Q_{gd}
- 低热阻
- 雪崩级
- 无铅引脚镀层
- 符合 RoHS 标准
- 无卤素
- 小外形尺寸无引线 (SON) 3.3mm × 3.3mm 塑料封装

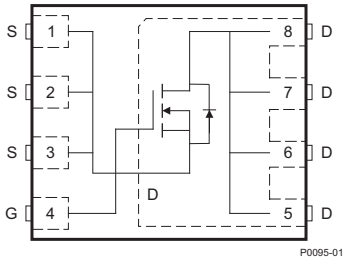
2 应用范围

- 用于网络、电信和计算系统中的 应用的 负载点同步降压转换器
- 已针对控制或同步 FET 应用进行优化

3 说明

这款 25V、3.4mΩ、SON 3.3mm × 3.3mm NexFET™ 功率 MOSFET 旨在最大限度降低功率转换应用中的功率损耗并经优化以适用于 5V 栅极驱动器 应用。

顶视图



产品概要

T_A = 25°C		典型值		单位
V_{DS}	漏源电压	25		V
Q_g	总栅极电荷 (4.5V)	6.2		nC
Q_{gd}	栅极电荷（栅极到漏极）	1.1		nC
$R_{DS(on)}$	漏源导通电阻	V_{GS}=3V	5	mΩ
		V_{GS} = 4.5V	4	
		V_{GS} = 8V	3.4	
$V_{GS(th)}$	阈值电压	1.2		V

器件信息(1)

器件	包装介质	数量	封装	发货
CSD16327Q3	13 英寸卷带	2500	小外形尺寸无引线 (SON) 3.30mm × 3.30mm 塑料封装	卷带式
CSD16327Q3T	7 英寸卷带	250		

(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。

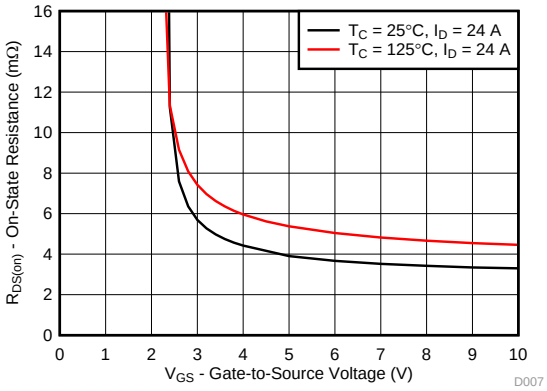
绝对最大额定值

T_A = 25°C		值	单位
V_{DS}	漏源电压	25	V
V_{GS}	栅源电压	+10 / –8	V
I_D	持续漏极电流（受封装限制）	60	A
	持续漏极电流（受芯片限制），T_C = 25°C 时测得	112	
	持续漏极电流(1)	22	
I_{DM}	脉冲漏极电流(2)	240	A
P_D	功率耗散(1)	2.8	W
	功率耗散，T_C = 25°C	74	
T_J、T_{stg}	工作结温、储存温度	–55 至 150	°C
E_{AS}	雪崩能量，单脉冲 I_D = 50A，L = 0.1mH，R_G = 25Ω	125	mJ

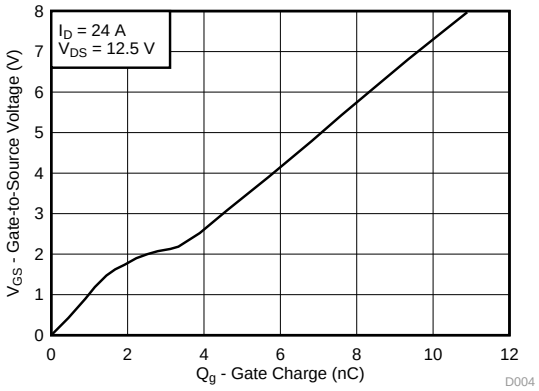
(1) $R_{\theta JA}$ = 45°C/W，这是在一块厚度为 0.06 英寸环氧树脂 (FR4) 印刷电路板 (PCB) 上的 1 英寸，2 盎司覆铜上测得的典型值。

(2) 最大 $R_{\theta JC}$ = 1.7°C/W，脉宽 ≤ 100μs，占空比 ≤ 1%。

$R_{DS(on)}$ 与 V_{GS} 对比



栅极电荷



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4 修订历史记录

Changes from Original (December 2011) to Revision A **Page**

- 已添加 *器件和文档支持* 部分 ... 1
- 已更改 *说明*文字 ... 1
- 已更改 I_D 持续漏极电流从 21A 更改为 22A ... 1
- 已更改 I_{DM} 从 112A 更改为 240A ... 1
- 已更改 P_D 功率损耗从 3W 更改为 2.8W ... 1
- 已更改 更改了*绝对最大额定值* 表中的备注 2 ... 1
- Changed $R_{\theta JA}$ from 56°C/W : to 55°C/W ... 4
- Changed Figure 10 to reflect measured data ... 6
- 已更改 机械数据部分更改为*机械、封装和可订购信息* 部分 ... 9

5 Specifications

5.1 Electrical Characteristics

T_A = 25°C (unless otherwise stated)

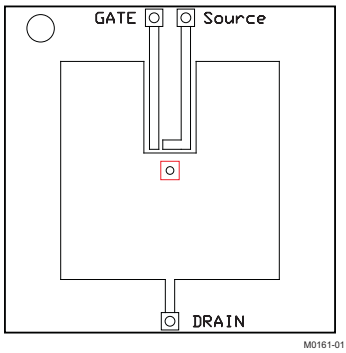
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
STATIC CHARACTERISTICS						
BV_{DSS}	Drain-to-source voltage	V_{GS} = 0 V, I_D = 250 μA	25			V
I_{DSS}	Drain-to-source leakage current	V_{GS} = 0 V, V_{DS} = 20 V			1	μA
I_{GSS}	Gate-to-source leakage current	V_{DS} = 0 V, V_{GS} = +10 / –8 V			100	nA
$V_{GS(th)}$	Gate-to-source threshold voltage	V_{DS} = V_{GS}, I_D = 250 μA	0.9	1.2	1.4	V
$R_{DS(on)}$	Drain-to-source on-resistance	V_{GS} = 3 V, I_D = 24 A		5	6.5	mΩ
		V_{GS} = 4.5 V, I_D = 24 A		4	4.8	
		V_{GS} = 8 V, I_D = 24 A		3.4	4.0	
g_{fs}	Transconductance	V_{DS} = 12.5 V, I_D = 24 A		96		S
DYNAMIC CHARACTERISTICS						
C_{ISS}	Input capacitance	V_{GS} = 0 V, V_{DS} = 12.5 V, f = 1 MHz		1020	1300	pF
C_{OSS}	Output capacitance			740	960	pF
C_{RSS}	Reverse transfer capacitance			50	65	pF
R_g	Series gate resistance			1.4	2.8	Ω
Q_g	Gate charge total (4.5 V)	V_{DS} = 12.5 V, I_D = 24 A		6.2	8.4	nC
Q_{gd}	Gate charge gate-to-drain			1.1		nC
Q_{gs}	Gate charge gate-to-source			1.8		nC
Qg(th)	Gate charge at V_{th}			1		nC
Q_{OSS}	Output charge	V_{DS} = 12.5 V, V_{GS} = 0 V		14		nC
$t_{d(on)}$	Turnon delay time	V_{DS} = 12.5 V, V_{GS} = 4.5 V I_D = 24 A R_G = 2 Ω		5.3		ns
t_r	Rise time			15		ns
$t_{d(off)}$	Turnoff delay time			13		ns
t_f	Fall time			6.3		ns
DIODE CHARACTERISTICS						
V_{SD}	Diode forward voltage	I_S = 24 A, V_{GS} = 0 V		0.85	1	V
Q_{rr}	Reverse recovery charge	V_{DD} = 12.5 V, I_F = 24 A, di/dt = 300 A/μs		21		nC
t_{rr}	Reverse recovery time	V_{DD} = 12.5 V, I_F = 24 A, di/dt = 300 A/μs		16		ns

5.2 Thermal Information

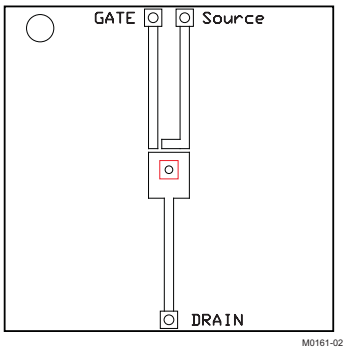
T_A = 25°C (unless otherwise stated)

THERMAL METRIC		MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction-to-case thermal resistance(1)			1.7	°C/W
$R_{\theta JA}$	Junction-to-ambient thermal resistance(1)(2)			55	°C/W

(1) $R_{\theta JC}$ is determined with the device mounted on a 1-in^2 (6.45-cm^2), 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^2 (6.45-cm^2), 2-oz (0.071-mm) thick Cu.



Max $R_{\theta JA}$ = 55°C/W when mounted on 1-in^2 (6.45-cm^2) of 2-oz (0.071-mm) thick Cu.



Max $R_{\theta JA}$ = 160°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°C (unless otherwise stated)

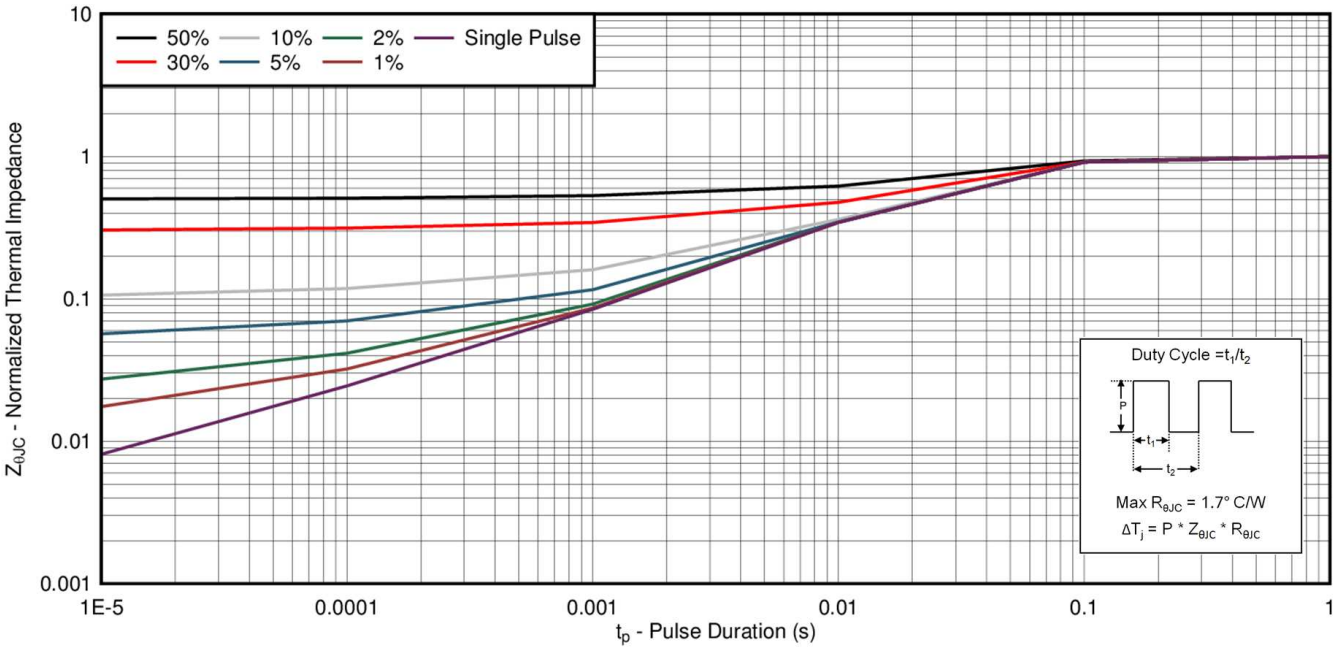


Figure 1. Transient Thermal Impedance

Typical MOSFET Characteristics (continued)

T_A = 25°C (unless otherwise stated)

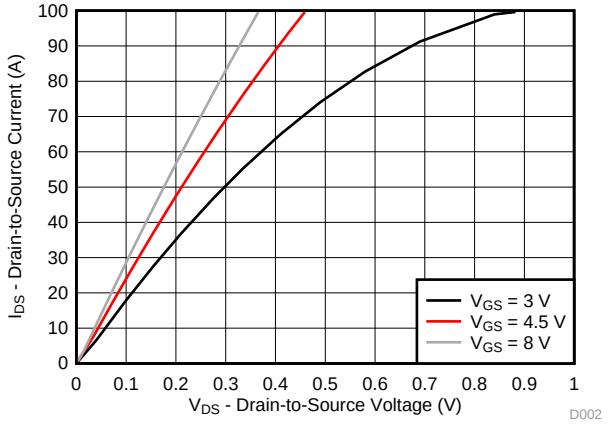


Figure 2. Saturation Characteristics

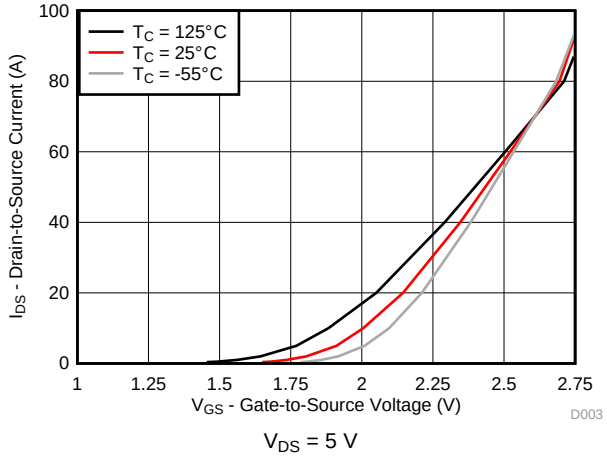


Figure 3. Transfer Characteristics

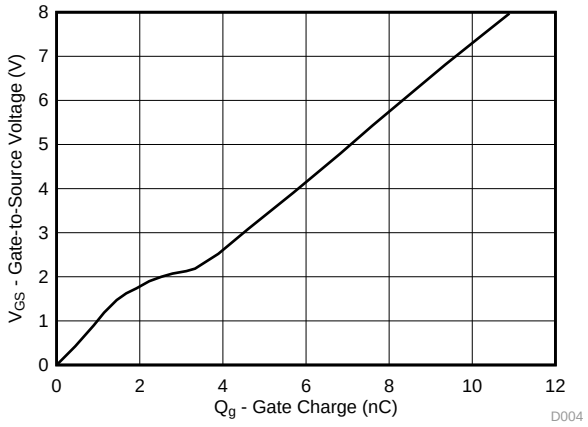


Figure 4. Gate Charge

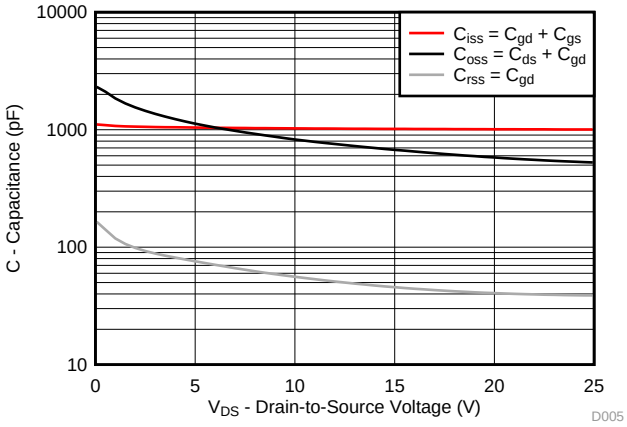


Figure 5. Capacitance

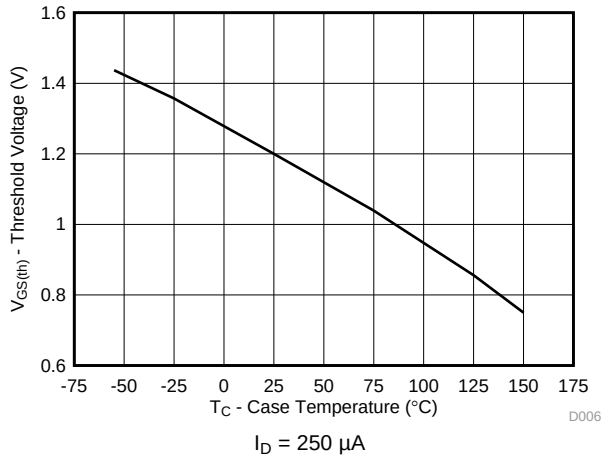


Figure 6. Threshold Voltage vs Temperature

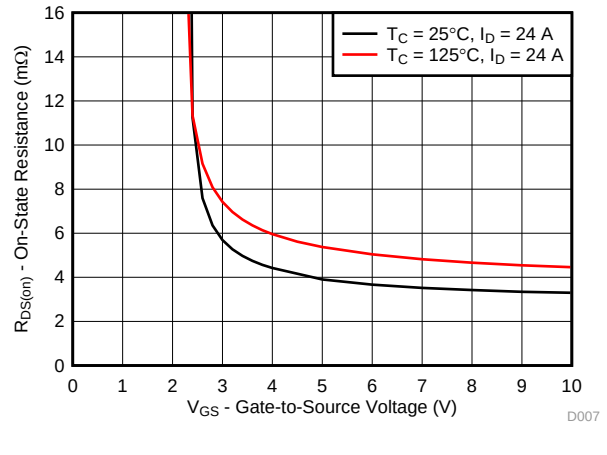


Figure 7. On-State Resistance vs Gate-to-Source Voltage

Typical MOSFET Characteristics (continued)

T_A = 25°C (unless otherwise stated)

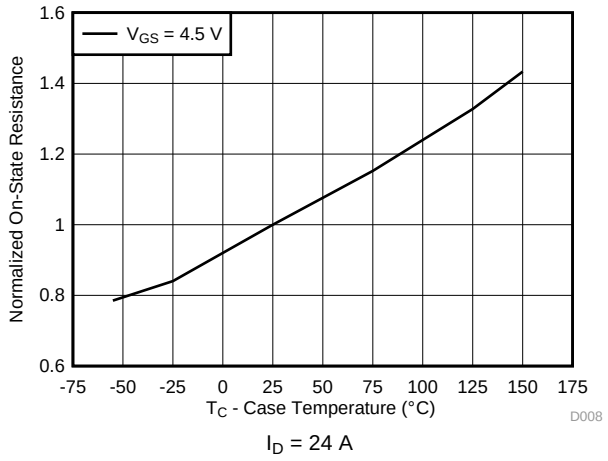


Figure 8. Normalized On-State Resistance vs Temperature

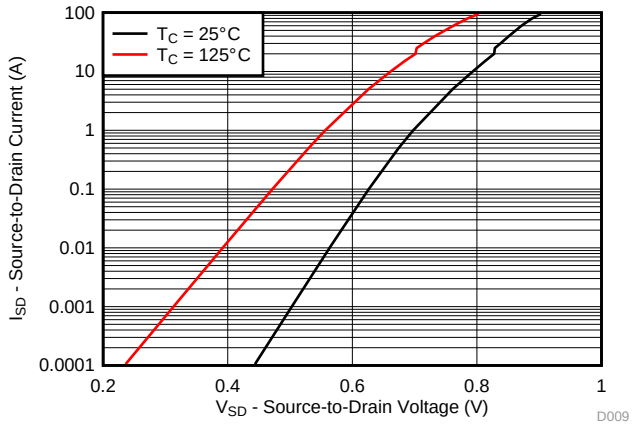


Figure 9. Typical Diode Forward Voltage

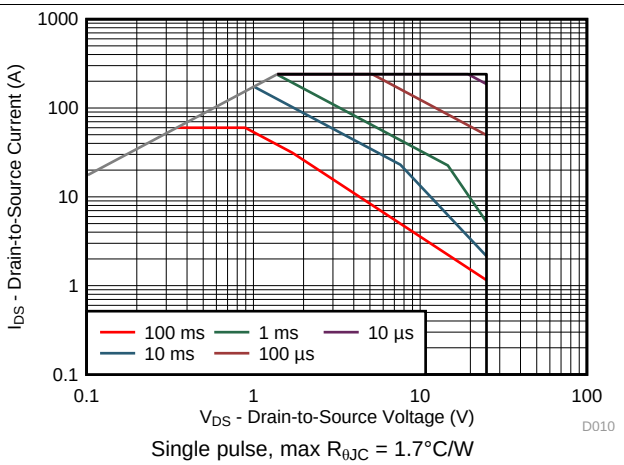


Figure 10. Maximum Safe Operating Area

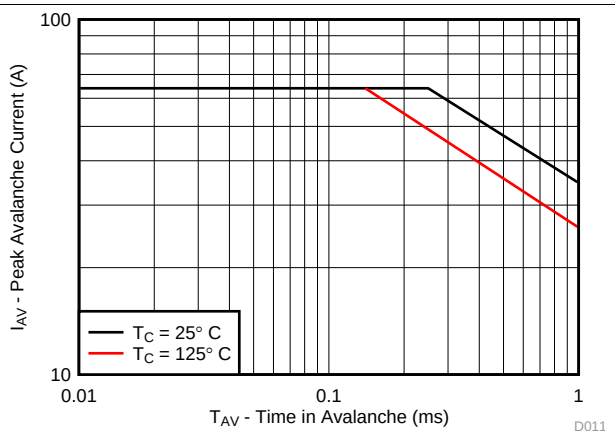


Figure 11. Single Pulse Unclamped Inductive Switching

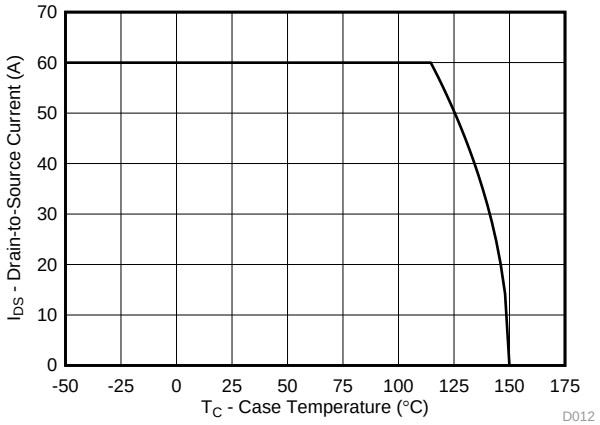


Figure 12. Maximum Drain Current vs Temperature

6 器件和文档支持

6.1 接收文档更新通知

如需接收文档更新通知，请导航至 TI.com 上的器件产品文件夹。单击右上角的*通知我* 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 社区资源

下列链接提供到 TI 社区资源的连接。链接的内容由各个分销商“按照原样”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》。

TI E2E™ 在线社区 ***TI 的工程师对工程师 (E2E) 社区。*** 此社区的创建目的在于促进工程师之间的协作。在 e2e.ti.com 中，您可以咨询问题、分享知识、拓展思路并与同行工程师一道帮助解决问题。

设计支持 ***TI 参考设计支持*** 可帮助您快速查找有帮助的 E2E 论坛、设计支持工具以及技术支持的联系信息。

6.3 商标

NexFET, E2E are trademarks of Texas Instruments.
All other trademarks are the property of their respective owners.

6.4 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。

6.5 Glossary

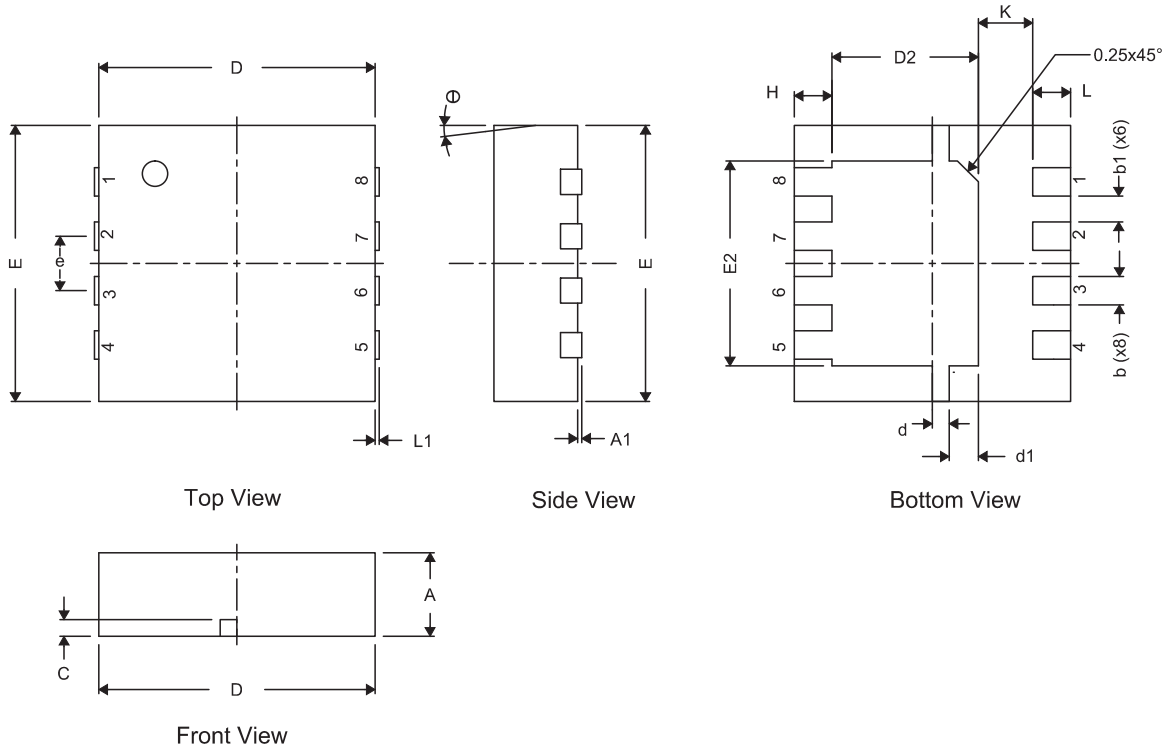
SLYZ022 — *TI Glossary*.

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

7 机械、封装和可订购信息

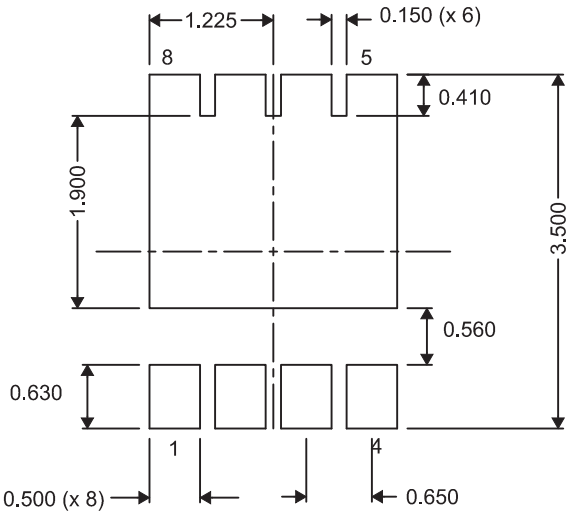
以下页面包括机械、封装和可订购信息。这些信息是指定器件的最新可用数据。数据如有变更，恕不另行通知和修订此文档。如欲获取此产品说明书的浏览器版本，请参阅左侧的导航。

7.1 Q3 封装尺寸



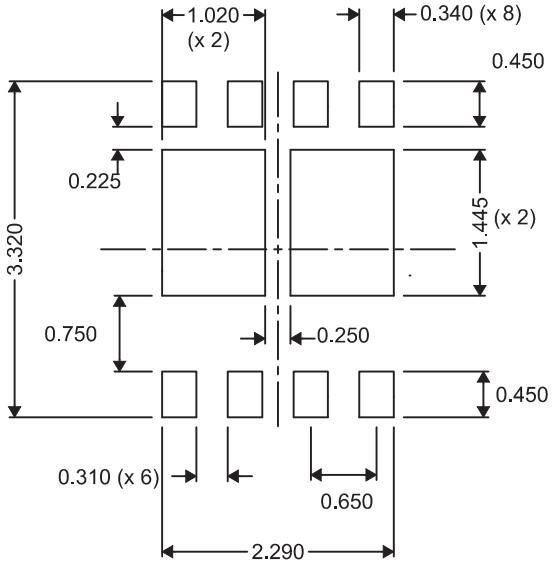
DIM	毫米			英寸		
	最小值	标称值	最大值	最小值	标称值	最大值
A	0.950	1.000	1.100	0.037	0.039	0.043
A1	0.000	0.000	0.050	0.000	0.000	0.002
b	0.280	0.340	0.400	0.011	0.013	0.016
b1		0.310（标称值）			0.012（标称值）	
c	0.150	0.200	0.250	0.006	0.008	0.010
D	3.200	3.300	3.400	0.126	0.130	0.134
D2	1.650	1.750	1.800	0.065	0.069	0.071
d	0.150	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
θ	0	—	0	0	—	0

7.2 建议 PCB 布局



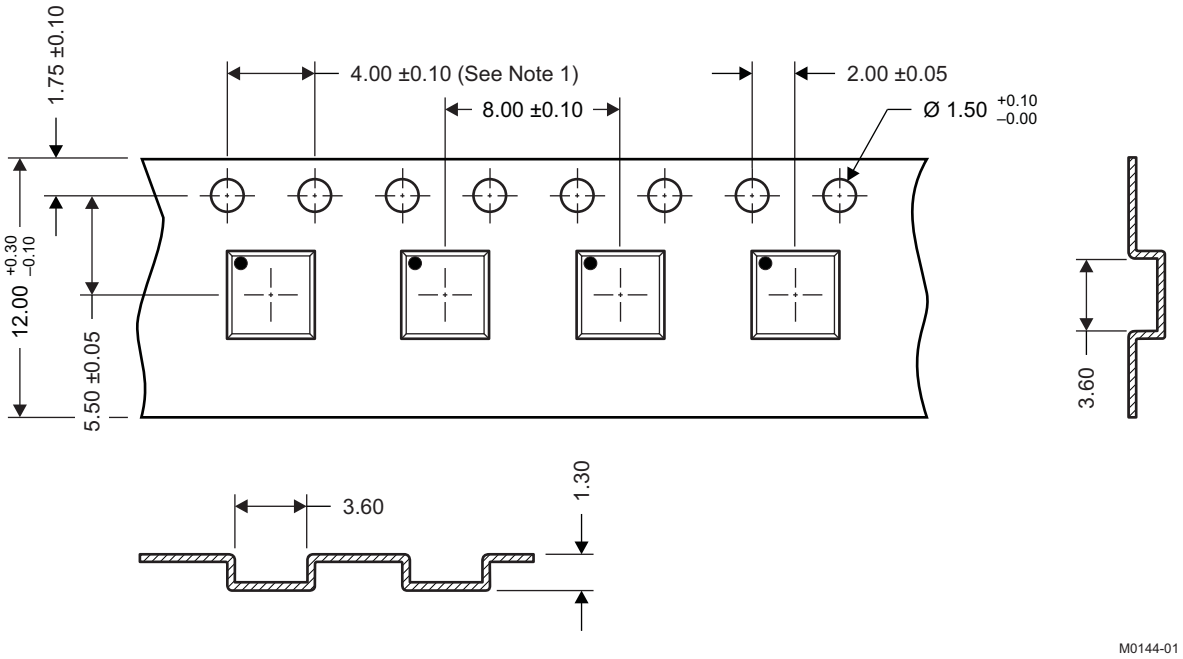
如需了解针对 PCB 设计的建议电路布局，请参阅*《通过 PCB 布局技巧来减少振铃》*(SLPA005)。

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



注：

1. 10 个链齿孔间距的累积容差为 ±0.2。
2. 每 100mm 长度的外倾角不能超过 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 ± 0.05mm。
6. MSL1 260°C（红外 (IR) 和传导）无铅回流焊兼容。

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
CSD16327Q3	ACTIVE	VSON-CLIP	DQG	8	2500	RoHS-Exempt & Green	SN	Level-1-260C-UNLIM	-55 to 150	CSD16327	Samples
CSD16327Q3T	ACTIVE	VSON-CLIP	DQG	8	250	RoHS-Exempt & Green	SN	Level-1-260C-UNLIM	-55 to 150	CSD16327	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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