

CSD18534Q5A 60V N 沟道 NexFET™ 功率 MOSFET

1 特性

- 超低 Q_g 和 Q_{gd}
- 低热阻
- 雪崩额定值
- 逻辑电平
- 无铅引脚镀层
- 符合 RoHS 标准
- 无卤素
- 小外形尺寸无引线 (SON) 5mm x 6mm 塑料封装

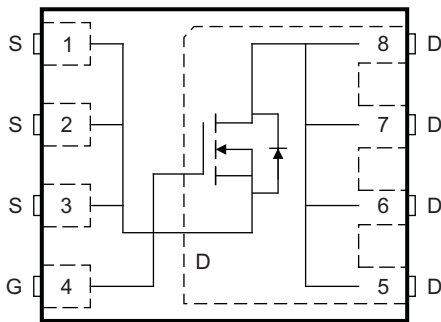
2 应用

- 直流 - 直流转换
- 次级侧同步整流器
- 隔离式转换器主级侧开关
- 电机控制

3 说明

此 7.8mΩ、60V、SON 5 × 6mm NexFET™ 功率 MOSFET 旨在最大限度地降低功率转换应用中的损耗。

顶视图



P0093-01

产品概要

$T_A = 25^\circ\text{C}$		典型值		单位
V_{DS}	漏源电压	60		V
Q_g	栅极电荷总量 (10V)	17		nC
Q_{gd}	栅极电荷 (栅极到漏极)	3.5		nC
$R_{DS(on)}$	漏源导通电阻	$V_{GS} = 4.5\text{V}$	9.9	mΩ
		$V_{GS} = 10\text{V}$	7.8	mΩ
$V_{GS(th)}$	阈值电压	1.9		V

订购信息⁽¹⁾

器件	数量	包装介质	封装	发货
CSD18534Q5A	2500	13 英寸卷带	小外形尺寸无引线 (SON) 5mm × 6mm 塑料封装	卷带封装
CSD18534Q5AT	250	7 英寸卷带		

(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。

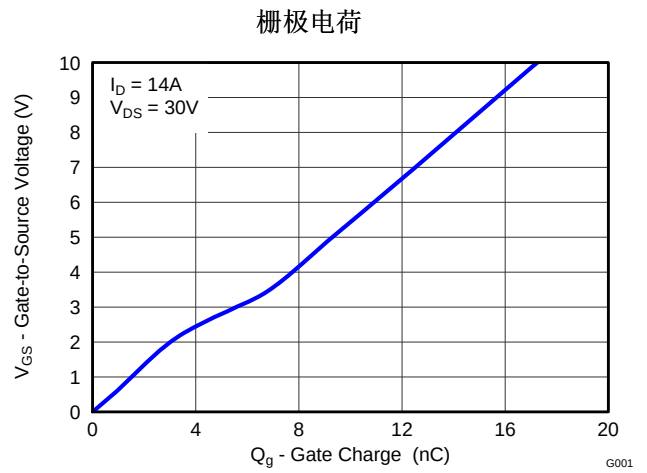
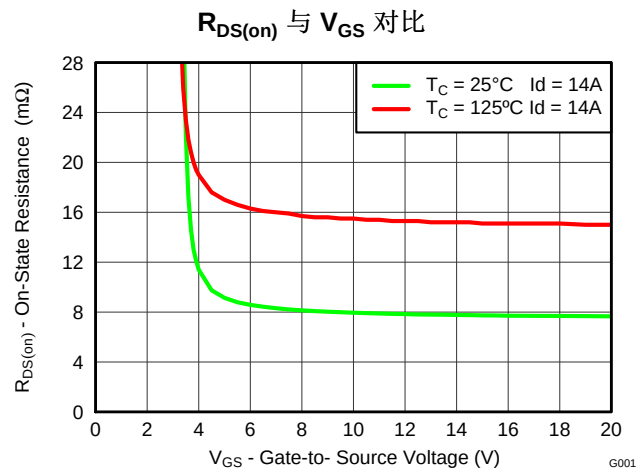
绝对最大额定值

$T_A = 25^\circ\text{C}$		值	单位
V_{DS}	漏源电压	60	V
V_{GS}	栅源电压	±20	V
I_D	持续漏极电流 (受封装限制)	50	A
	持续漏极电流 (受芯片限制), $T_C = 25^\circ\text{C}$ 时测得	69	
	持续漏极电流, $T_A = 25^\circ\text{C}$ 时测得 ⁽¹⁾	13	
I_{DM}	脉冲漏极电流, $T_A = 25^\circ\text{C}$ ⁽²⁾	229	A
P_D	功耗 ⁽¹⁾	3.1	W
	功耗, $T_C = 25^\circ\text{C}$	77	
T_J, T_{stg}	工作结温, 储存温度	-55 至 150	°C
E_{AS}	雪崩能量, 单一脉冲 $I_D = 40\text{A}$, $L = 0.1\text{mH}$, $R_G = 25\Omega$	80	mJ

(1) $R_{\theta JA} = 40^\circ\text{C/W}$ ，这是在厚度为 0.06 英寸的环氧板 (FR4) 印刷电路板 (PCB) 上的 1 英寸² 2 盎司的铜过渡垫片上测得的典型值。

(2) 最大 $R_{\theta JC} = 2.0^\circ\text{C/W}$ ，脉冲持续时间 ≤ 100μs，占空比 ≤ 1%





目录

1	特性	1	6.1	社区资源	8
2	应用	1	6.2	商标	8
3	说明	1	6.3	静电放电警告	8
4	修订历史记录	3	6.4	Glossary	8
5	Specifications	4	7	机械、封装和可订购信息	9
5.1	Electrical Characteristics	4	7.1	Q5A 封装尺寸	9
5.2	Thermal Information	4	7.2	建议印刷电路板 (PCB) 布局	10
5.3	Typical MOSFET Characteristics	5	7.3	建议模板开口	10
6	器件和文档支持	8	7.4	Q5A 卷带信息	11

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 C (August 2014) to Revision D Page

• 已更改 将说明中的电压更改成了 60V	1
• 已添加 社区资源	8

Changes from Revision B (July 2014) to Revision C Page

• 向订购信息表中添加了 7 英寸卷带	1
• 脉冲电流增加至 229A	1
• Updated the SOA in Figure 10	7

Changes from Revision A (January 2013) to Revision B Page

• 添加了外壳温度保持在 25°C 时的功率耗散参数	1
• 更新了脉冲电流条件	1
• Updated Figure 1 to a normalized $R_{\theta JC}$ curve	5

Changes from Original (October 2012) to Revision A Page

• Changed g_{fs} , Transconductance from: 122 to: 72	4
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5 Specifications

5.1 Electrical Characteristics

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

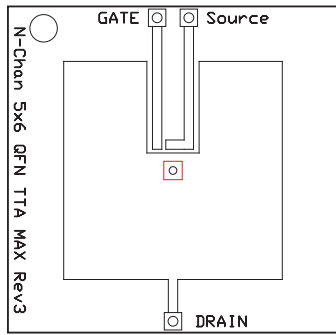
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
STATIC CHARACTERISTICS						
BV _{DSS}	Drain-to-source voltage	V _{GS} = 0 V, I _D = 250 μA	60			V
I _{DSS}	Drain-to-source leakage current	V _{GS} = 0 V, V _{DS} = 48 V	1			μA
I _{GSS}	Gate-to-source leakage current	V _{DS} = 0 V, V _{GS} = 20 V	100			nA
V _{GS(th)}	Gate-to-source threshold voltage	V _{DS} = V _{GS} , I _D = 250 μA	1.5	1.9	2.3	V
R _{DS(on)}	Drain-to-source on-resistance	V _{GS} = 4.5 V, I _D = 14 A	9.9		12.4	mΩ
		V _{GS} = 10 V, I _D = 14 A	7.8		9.8	mΩ
g _{fs}	Transconductance	V _{DS} = 30 V, I _D = 14 A	72			S
DYNAMIC CHARACTERISTICS						
C _{iss}	Input capacitance	V _{GS} = 0 V, V _{DS} = 30 V, f = 1 MHz	1360		1770	pF
C _{oss}	Output capacitance		167		217	pF
C _{rss}	Reverse transfer capacitance		5		6.5	pF
R _G	Series gate resistance		1.5		3	Ω
Q _g	Gate charge total (4.5 V)	V _{DS} = 30 V, I _D = 14 A	8.5		11.1	nC
Q _g	Gate charge total (10 V)		17		22	
Q _{gd}	Gate charge gate-to-drain		3.5			nC
Q _{gs}	Gate charge gate-to-source		3.2			nC
Q _{g(th)}	Gate charge at V _{th}		2.6			nC
Q _{oss}	Output charge	V _{DS} = 30 V, V _{GS} = 0 V	19			nC
t _{d(on)}	Turn on delay time	V _{DS} = 30 V, V _{GS} = 10 V, I _{DS} = 14 A, R _G = 0 Ω	5.2			ns
t _r	Rise time		5.5			ns
t _{d(off)}	Turn off delay time		15			ns
t _f	Fall time		2			ns
DIODE CHARACTERISTICS						
V _{SD}	Diode forward voltage	I _{SD} = 14 A, V _{GS} = 0 V	0.8		1	V
Q _{rr}	Reverse recovery charge	V _{DS} = 30 V, I _F = 14 A, di/dt = 300 A/μs	54			nC
t _{rr}	Reverse recovery time		40			ns

5.2 Thermal Information

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

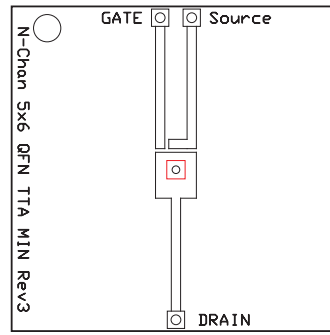
THERMAL METRIC		MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Junction-to-case thermal resistance ⁽¹⁾			2.0	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Junction-to-ambient thermal resistance ⁽¹⁾⁽²⁾			50	$^\circ\text{C}/\text{W}$

- (1) $R_{\theta JC}$ is determined with the device mounted on a 1 inch² (6.45 cm²), 2 oz. (0.071 mm thick) Cu pad on a 1.5 inches $\times$ 1.5 inches (3.81 cm $\times$ 3.81 cm), 0.06 inch (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 inch² (6.45 cm²), 2 oz. (0.071 mm thick) Cu.



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Max $R_{\theta JA} = 50^{\circ}\text{C/W}$
when mounted on
1 inch² (6.45 cm²) of
2 oz. (0.071 mm thick)
Cu.

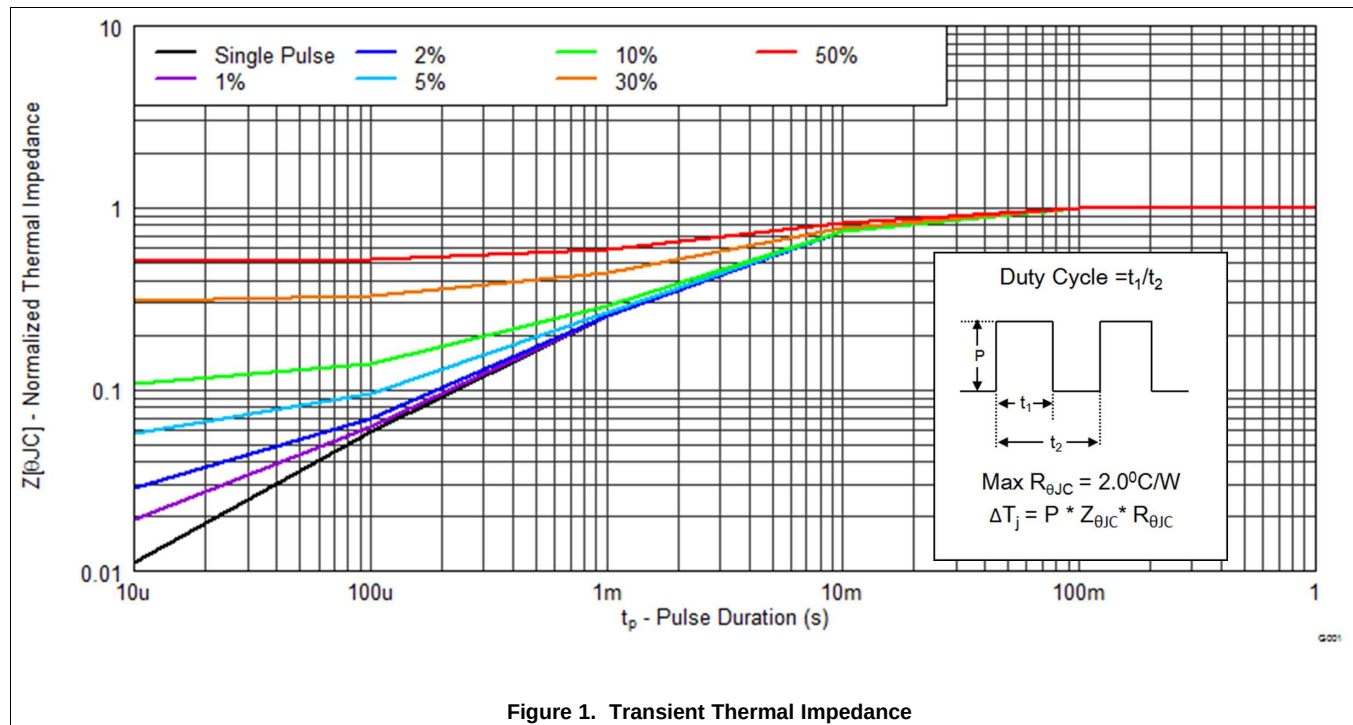


M0137-02

Max $R_{\theta JA} = 125^{\circ}\text{C/W}$
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)



Typical MOSFET Characteristics (continued)

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

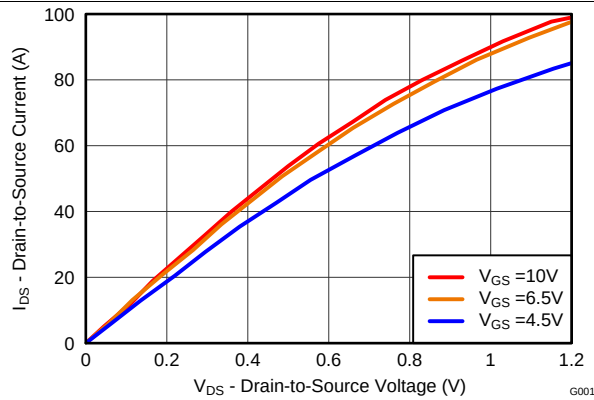


Figure 2. Saturation Characteristics

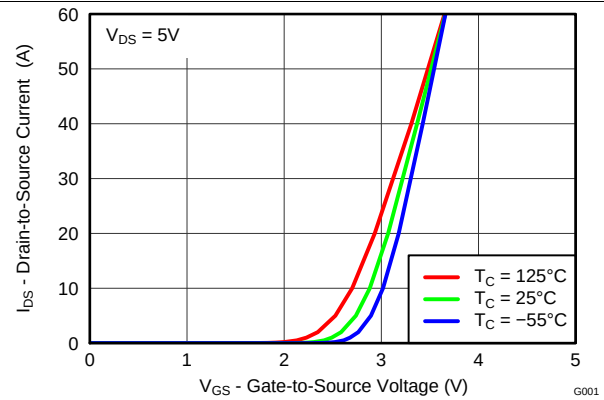


Figure 3. Transfer Characteristics

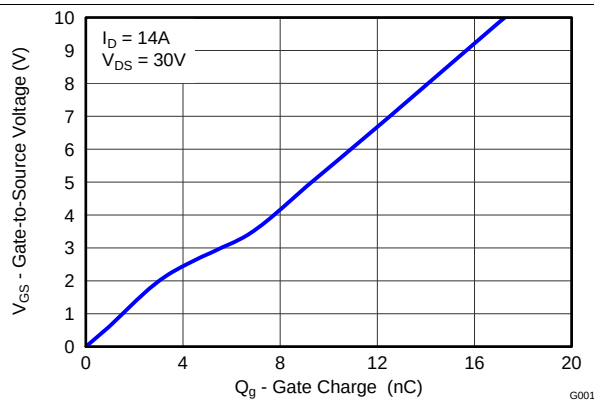


Figure 4. Gate Charge

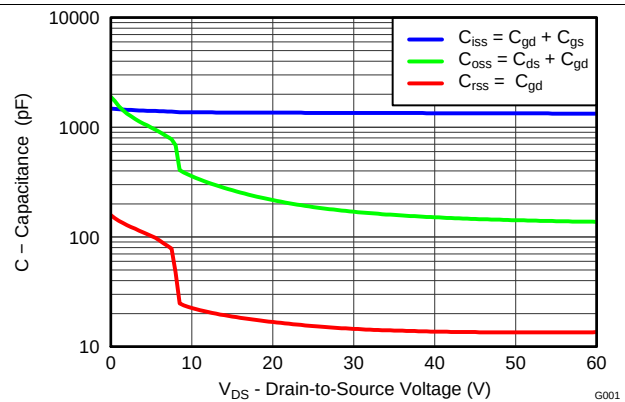


Figure 5. Capacitance

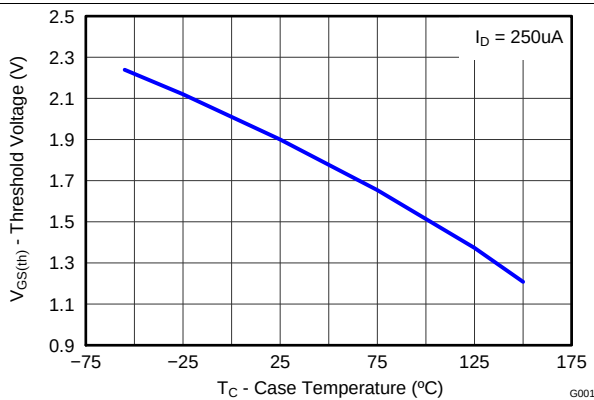


Figure 6. Threshold Voltage vs Temperature

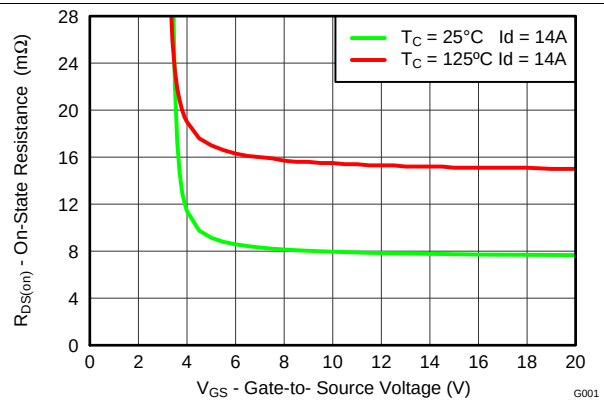


Figure 7. On-State Resistance vs Gate-to-Source Voltage

Typical MOSFET Characteristics (continued)

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

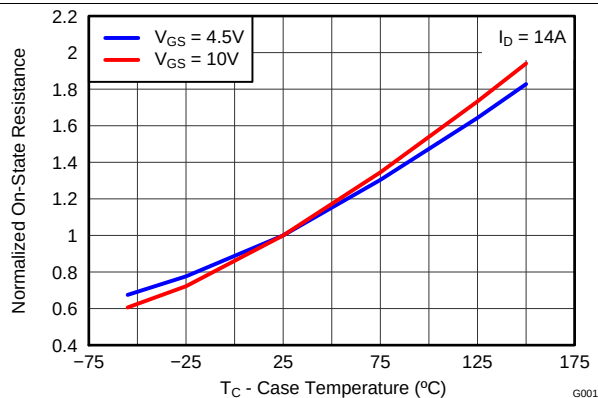


Figure 8. Normalized On-State Resistance vs Temperature

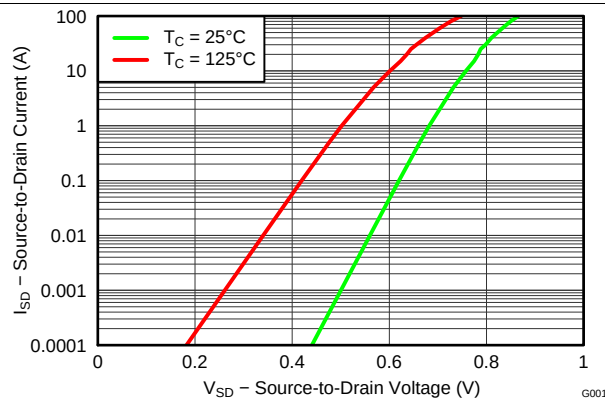


Figure 9. Typical Diode Forward Voltage

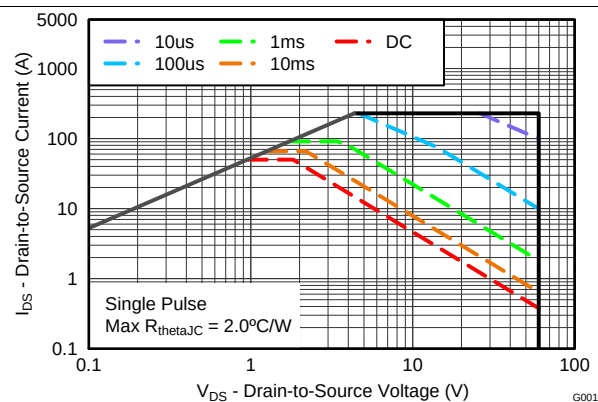


Figure 10. Maximum Safe Operating Area

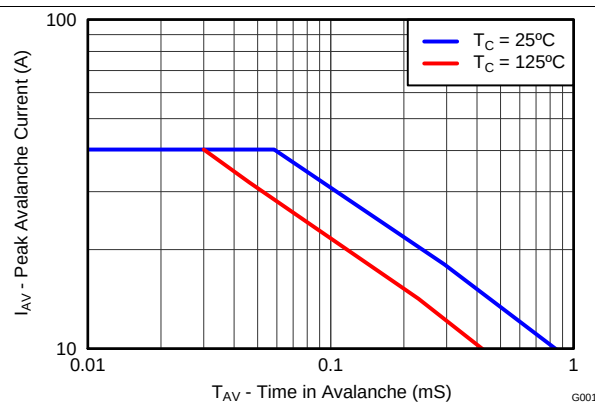


Figure 11. Single Pulse Unclamped Inductive Switching

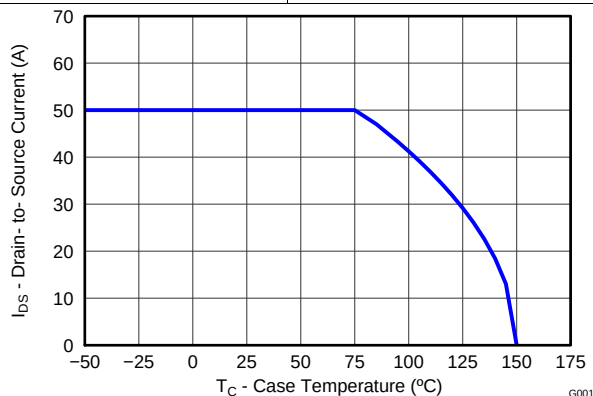


Figure 12. Maximum Drain Current vs Temperature

6 器件和文档支持

6.1 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》。

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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。

6.2 商标

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

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

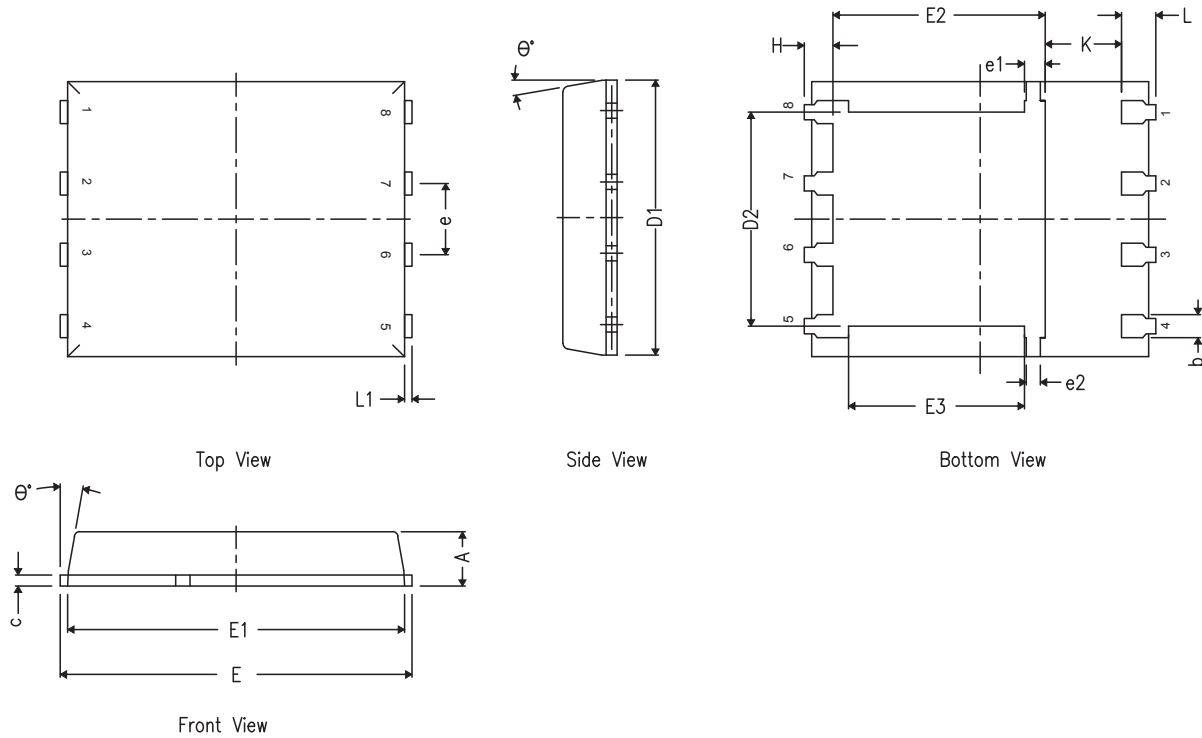
SLYZ022 — *TI Glossary*.

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

7 机械、封装和可订购信息

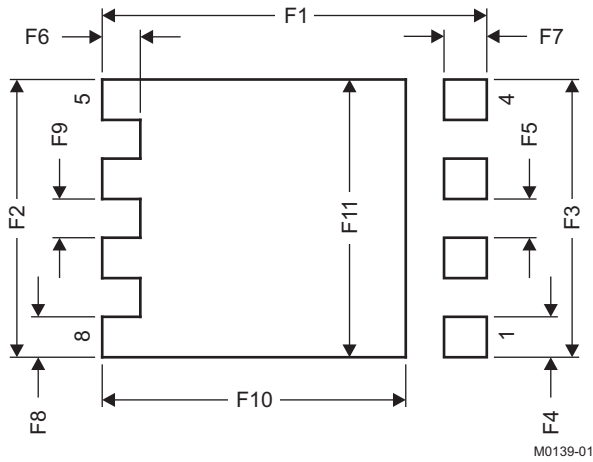
以下页面包含机械、封装和可订购信息。这些信息是指定器件的最新可用数据。数据如有变更，恕不另行通知和修订此文档。如欲获取此数据表的浏览器版本，请参阅左侧的导航。

7.1 Q5A 封装尺寸



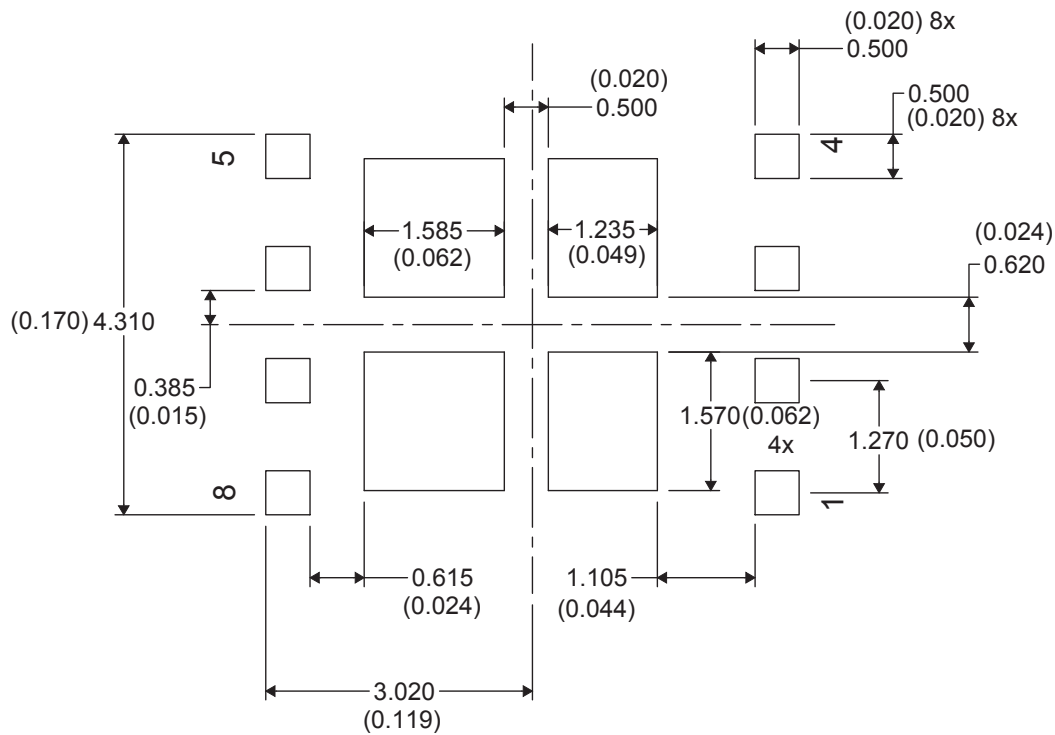
DIM	毫米		
	最小值	标称值	最大值
A	0.90	1.00	1.10
b	0.33	0.41	0.51
c	0.20	0.25	0.34
D1	4.80	4.90	5.00
D2	3.61	3.81	4.02
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
E3	3.03	3.13	3.23
e	1.17	1.27	1.37
e1	0.27	0.37	0.47
e2	0.15	0.25	0.35
H	0.41	0.56	0.71
K	1.10	—	—
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
θ	0°	—	12°

7.2 建议印刷电路板 (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, 请参见应用说明《通过 PCB 布局布线技巧来减少振铃》, [SLPA005](#)。

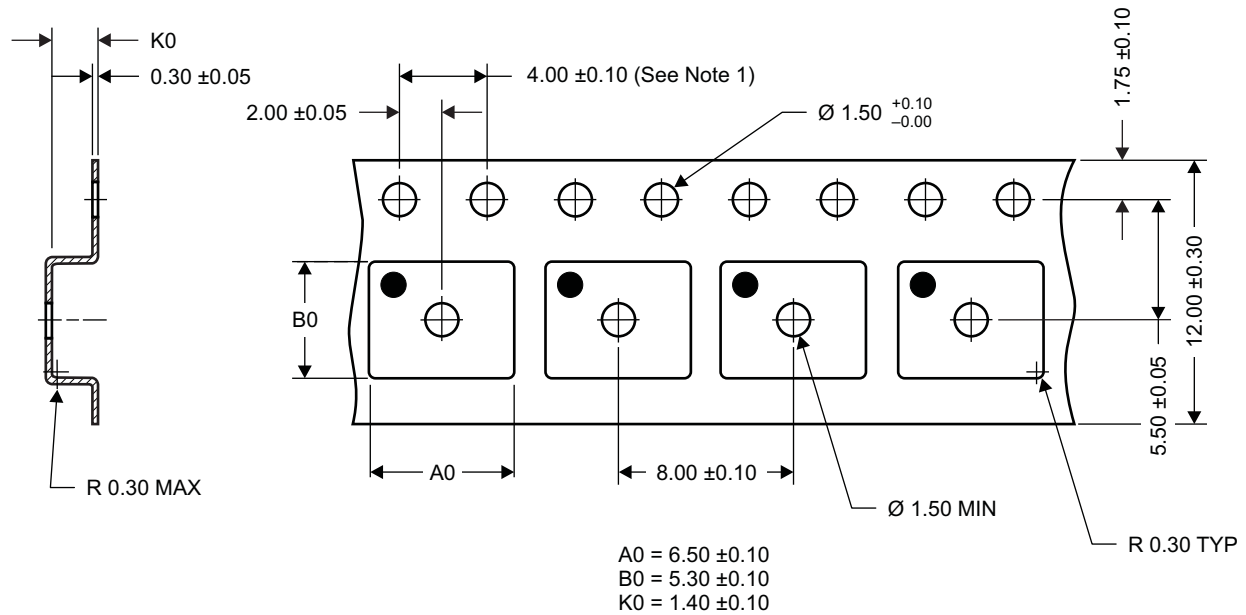
7.3 建议模板开口



建议印刷电路板 (PCB) 布局 (接下页)

DIM	毫米		英寸	
	最小值	最大值	最小值	最大值
F1	6.205	6.305	0.244	0.248
F2	4.46	4.56	0.176	0.18
F3	4.46	4.56	0.176	0.18
F4	0.65	0.7	0.026	0.028
F5	0.62	0.67	0.024	0.026
F6	0.63	0.68	0.025	0.027
F7	0.7	0.8	0.028	0.031
F8	0.65	0.7	0.026	0.028
F9	0.62	0.67	0.024	0.026
F10	4.9	5	0.193	0.197
F11	4.46	4.56	0.176	0.18

7.4 Q5A 卷带信息



M0138-01

注:

1. 10 个链齿孔的累积容差为 ± 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. 全部尺寸为 mm (除非另外注明)。
5. 高于孔眼底部 0.3mm 的平面上测量得到 $A0$ 和 $B0$ 值。

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)
CSD18534Q5A	Active	Production	VSONP (DQJ) 8	2500 LARGE T&R	ROHS Exempt	SN	Level-1-260C-UNLIM	-55 to 150	CSD18534
CSD18534Q5A.B	Active	Production	VSONP (DQJ) 8	2500 LARGE T&R	ROHS Exempt	SN	Level-1-260C-UNLIM	-55 to 150	CSD18534
CSD18534Q5AT	Active	Production	VSONP (DQJ) 8	250 SMALL T&R	ROHS Exempt	SN	Level-1-260C-UNLIM	-55 to 150	CSD18534
CSD18534Q5AT.B	Active	Production	VSONP (DQJ) 8	250 SMALL T&R	ROHS Exempt	SN	Level-1-260C-UNLIM	-55 to 150	CSD18534

⁽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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