

20V P 通道 NexFET™ 功率金属氧化物半导体场效应晶体管 (MOSFET)

查询样片: [CSD25402Q3A](#)

特性

- 超低 Q_g 和 Q_{gd}
- 低热阻
- 低 $R_{DS(on)}$
- 无铅且无卤素
- 符合 RoHS 环保标准
- 小外形尺寸无引线 (SON) 3.3mm × 3.3mm 塑料封装

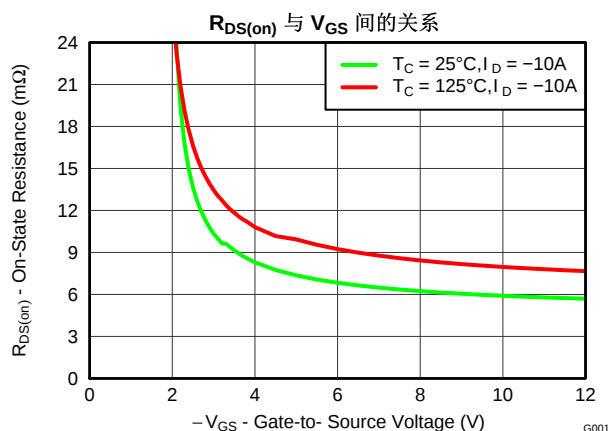
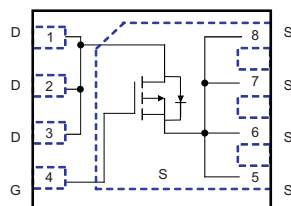
应用范围

- 直流-直流转换器
- 电池管理
- 负载开关
- 电池保护

说明

这款 -20V, 7.7mΩ NexFET™ 功率 MOSFET 被设计成最大限度地减少 SON 3 × 3 封装内的功率转换负载管理应用中的损耗, 此封装类型针对器件的尺寸提供出色的热性能。

顶视图



产品概述

V_{DS}	漏源极电压	-20	V
Q_g	栅极电荷总量 (-4.5V)	7.5	nC
Q_{gd}	栅极电荷漏极	1.1	nC
$R_{DS(on)}$	漏源导通电阻	$V_{GS} = -1.8\text{V}$	74 mΩ
		$V_{GS} = -2.5\text{V}$	13.3 mΩ
		$V_{GS} = -4.5\text{V}$	7.7 mΩ
V_{th}	阈值电压	-0.9	V

订购信息

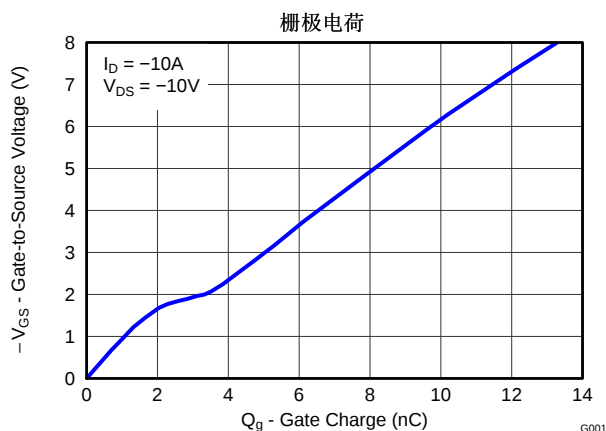
器件	封装	介质	数量	出货
CSD25402Q3A	SON 3 × 3 塑料封装	13 英寸卷带	2500	卷带封装

绝对最大额定值

$T_A = 25^\circ\text{C}$		值	单位
V_{DS}	漏源电压	-20	V
V_{GS}	栅源电压	+12 或 -12	V
I_D	持续漏极电流, $T_C = 25^\circ\text{C}$ 时测得	-72	A
	持续漏极电流 (受封装限制)	-35	A
	持续漏极电流 ⁽¹⁾	-15	A
I_{DM}	脉冲漏极电流 ⁽²⁾	-82	A
P_D	功率耗散 ⁽¹⁾	2.8	W
T_J, T_{STG}	运行结温和储存温度范围	-55 至 150	$^\circ\text{C}$

(1) $R_{\theta JA} = 55^\circ\text{C/W}$, 这是在厚度为 0.060" 的环氧树脂 (FR4) 印刷电路板 (PCB) 上的 1 英寸² 铜过渡垫片 (2 盎司) 上测得的典型值。

(2) 脉宽 ≤ 300μs, 占空比 ≤ 2%



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

NexFET is a trademark of Texas Instruments.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of the Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

版权 © 2013, Texas Instruments Incorporated
English Data Sheet: [SLPS454](#)

ELECTRICAL CHARACTERISTICS

(T_A = 25°C unless otherwise stated)

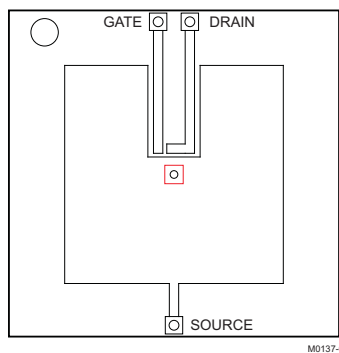
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Static Characteristics						
BV _{DSS}	Drain-to-Source Voltage	V _{GS} = 0 V, I _D = −250 μA	−20			V
I _{DSS}	Drain-to-Source Leakage Current	V _{GS} = 0 V, V _{DS} = −16 V	−1			μA
I _{GSS}	Gate-to-Source Leakage Current	V _{DS} = 0 V, V _{GS} = ±12 V	−100			nA
V _{GS(th)}	Gate-to-Source Threshold Voltage	V _{DS} = V _{GS} , I _D = −250 μA	−0.65	−0.90	−1.15	V
R _{DS(on)}	Drain-to-Source On Resistance	V _{GS} = −1.8 V, I _D = −1 A	74		300	mΩ
		V _{GS} = −2.5 V, I _D = −10 A	13.3		15.9	mΩ
		V _{GS} = −4.5 V, I _D = −10 A	7.7		8.9	mΩ
g _{fs}	Transconductance	V _{DS} = −10 V, I _D = −10 A	59			S
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{GS} = 0 V, V _{DS} = −10 V, f = 1 MHz	1380		1790	pF
C _{OSS}	Output Capacitance		763		992	pF
C _{RSS}	Reverse Transfer Capacitance		39		51	pF
R _G	Series Gate Resistance		3.7		7.4	Ω
Q _g	Gate Charge Total (4.5 V)	V _{DS} = −10 V, I _D = −10 A	7.5		9.7	nC
Q _{gd}	Gate Charge Gate to Drain		1.1			nC
Q _{gs}	Gate Charge Gate to Source		2.4			nC
Q _{g(th)}	Gate Charge at V _{th}		1.0			nC
Q _{OSS}	Output Charge	V _{DS} = −10 V, V _{GS} = 0 V	7.6			nC
t _{d(on)}	Turn On Delay Time	V _{DS} = −10 V, V _{GS} = −4.5 V, I _D = −10 A, R _G = 5 Ω	10			ns
t _r	Rise Time		7			ns
t _{d(off)}	Turn Off Delay Time		25			ns
t _f	Fall Time		12			ns
Diode Characteristics						
V _{SD}	Diode Forward Voltage	I _S = −10 A, V _{GS} = 0 V	−0.8		−1	V
Q _{rr}	Reverse Recovery Charge	V _{DS} = −8.5 V, I _F = −10 A, di/dt = 200 A/μs	10.3			nC
t _{rr}	Reverse Recovery Time		21			ns

THERMAL CHARACTERISTICS

(T_A = 25°C unless otherwise stated)

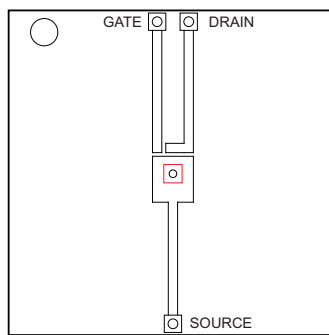
PARAMETER		MIN	TYP	MAX	UNIT
R _{θJC}	Thermal Resistance Junction to Case ⁽¹⁾			2.3	°C/W
R _{θJA}	Thermal Resistance Junction to Ambient ⁽¹⁾⁽²⁾			55	°C/W

- (1) R_{θJC} 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-inch × 1.5-inch (3.81-cm × 3.81-cm), 0.06-inch (1.52-mm) thick FR4 PCB. R_{θJC} is specified by design, whereas R_{θJA} 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.



M0137-01

Max $R_{\theta JA} = 55^{\circ}\text{C/W}$
when mounted on
1 inch² of 2 oz. Cu.



M0137-02

Max $R_{\theta JA} = 175^{\circ}\text{C/W}$
when mounted on
minimum pad area of
2 oz. Cu.

TYPICAL MOSFET CHARACTERISTICS

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

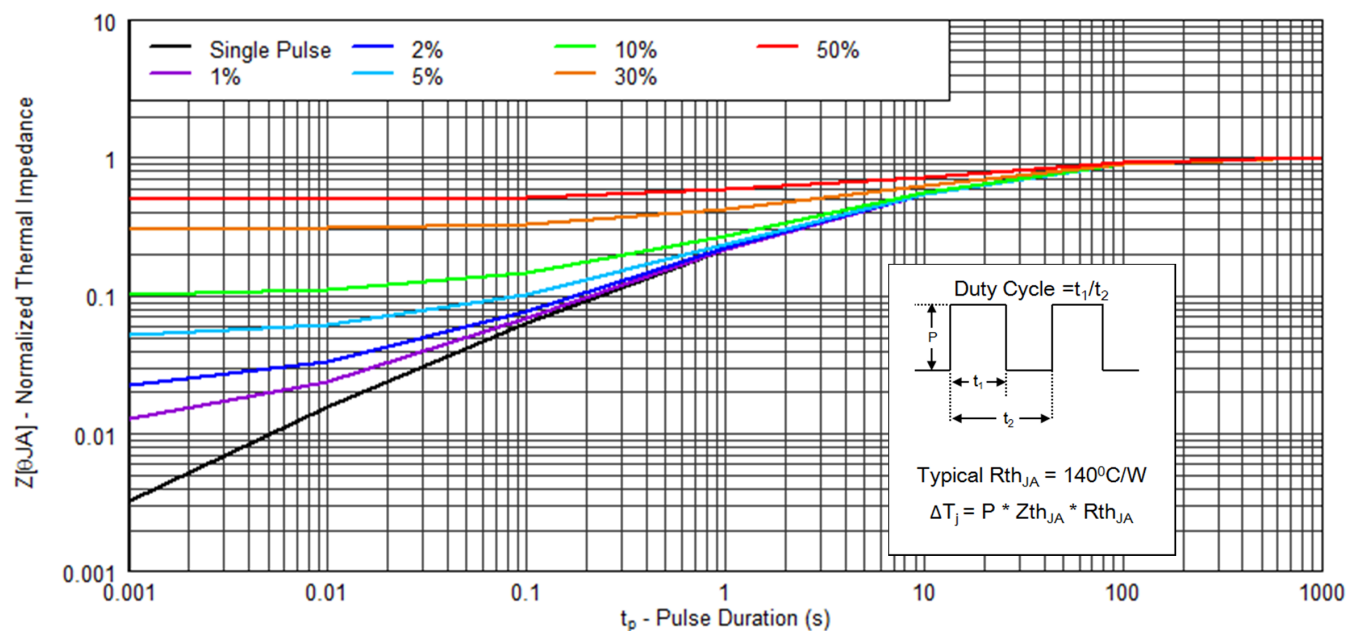


Figure 1. Transient Thermal Impedance

g201

TYPICAL MOSFET CHARACTERISTICS (continued)

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

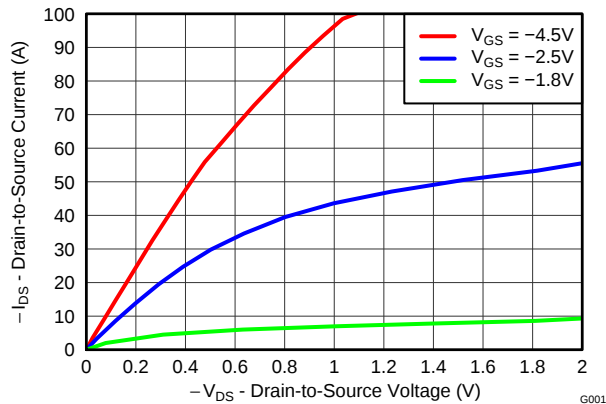


Figure 2. Saturation Characteristics

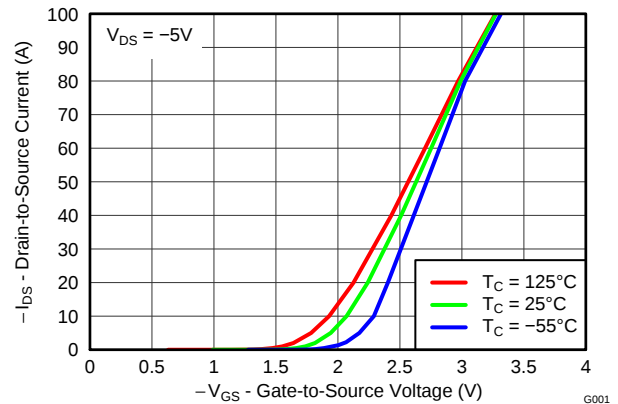


Figure 3. Transfer Characteristics

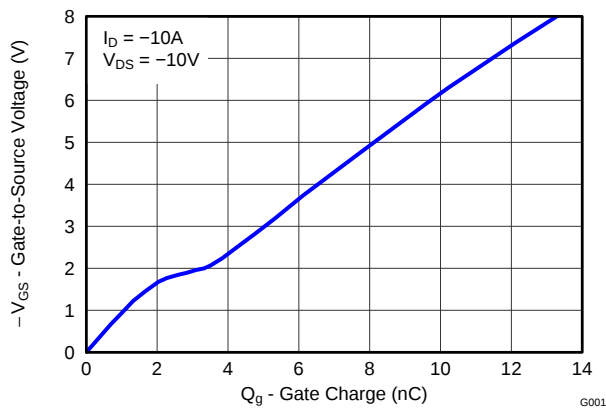


Figure 4. Gate Charge

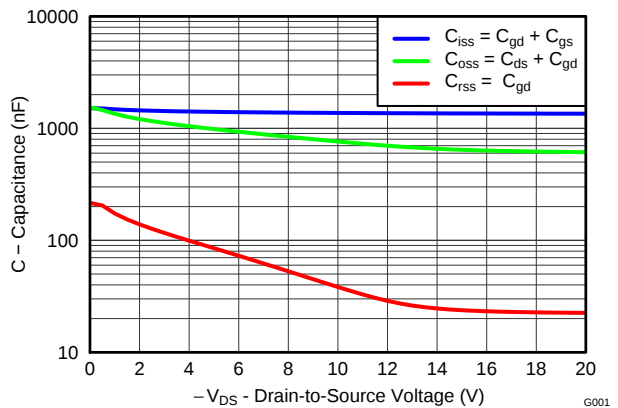


Figure 5. Capacitance

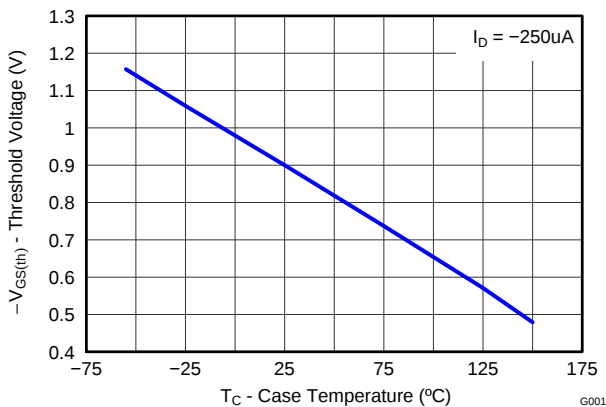


Figure 6. Threshold Voltage vs. Temperature

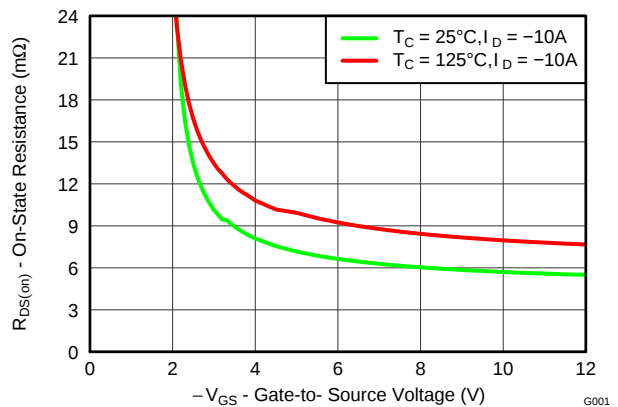


Figure 7. On-State Resistance vs. Gate-to-Source Voltage

TYPICAL MOSFET CHARACTERISTICS (continued)

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

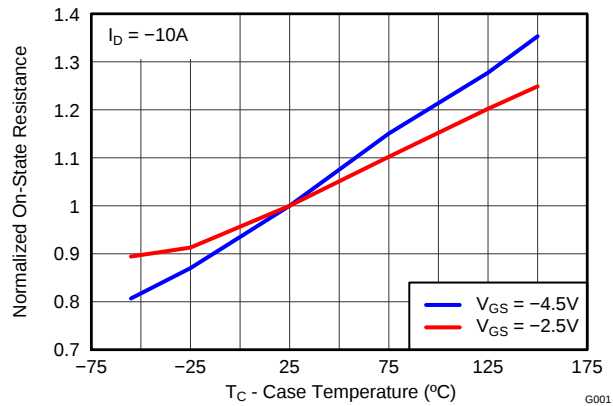


Figure 8. Normalized On-State Resistance vs. Temperature

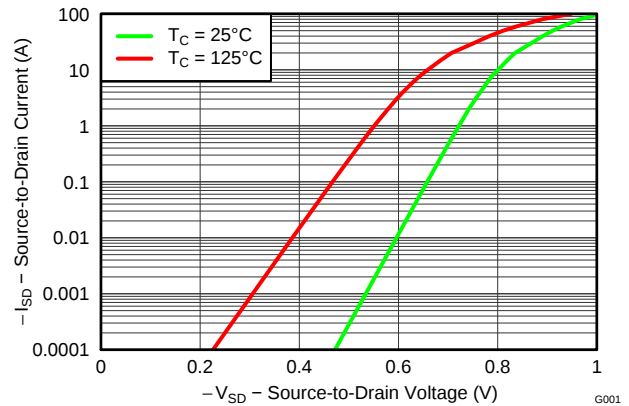


Figure 9. Typical Diode Forward Voltage

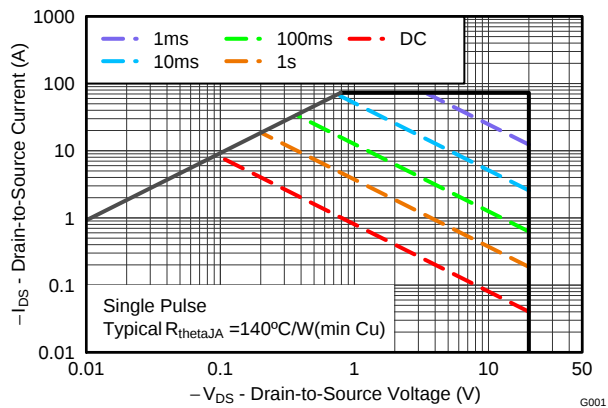


Figure 10. Maximum Safe Operating Area

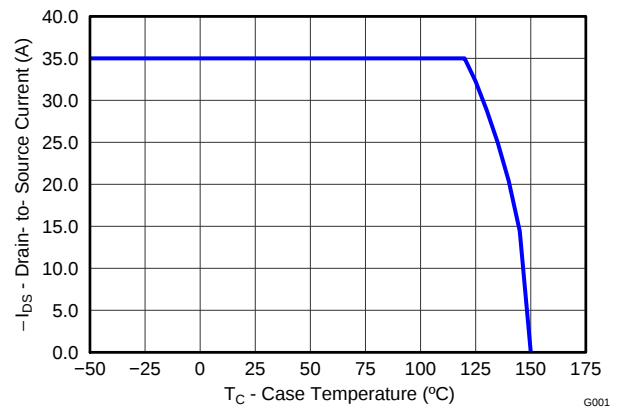
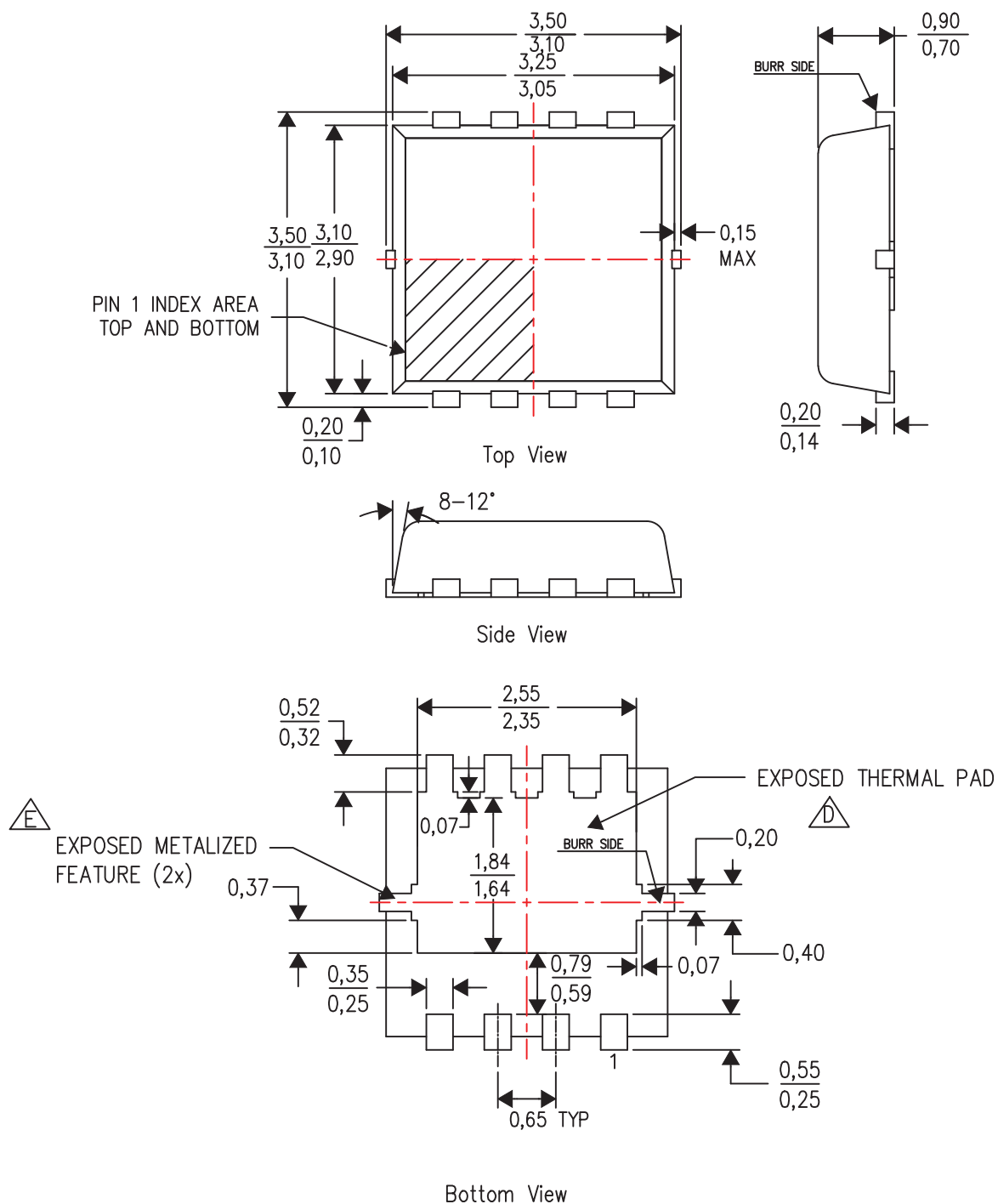
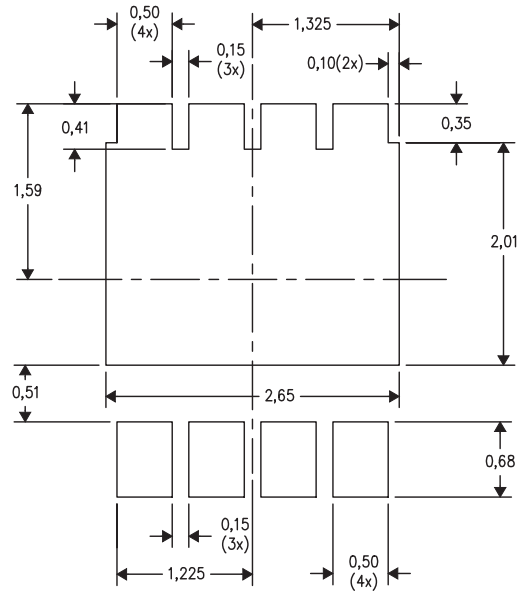


Figure 11. Maximum Drain Current vs. Temperature

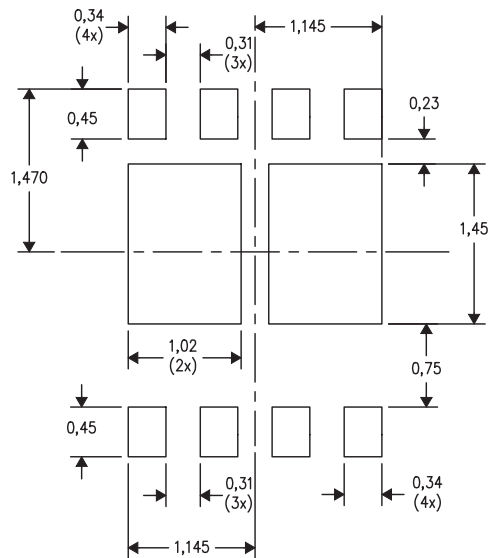
MECHANICAL DATA**Q3A Package Dimensions**

Q3A Recommended PCB Pattern

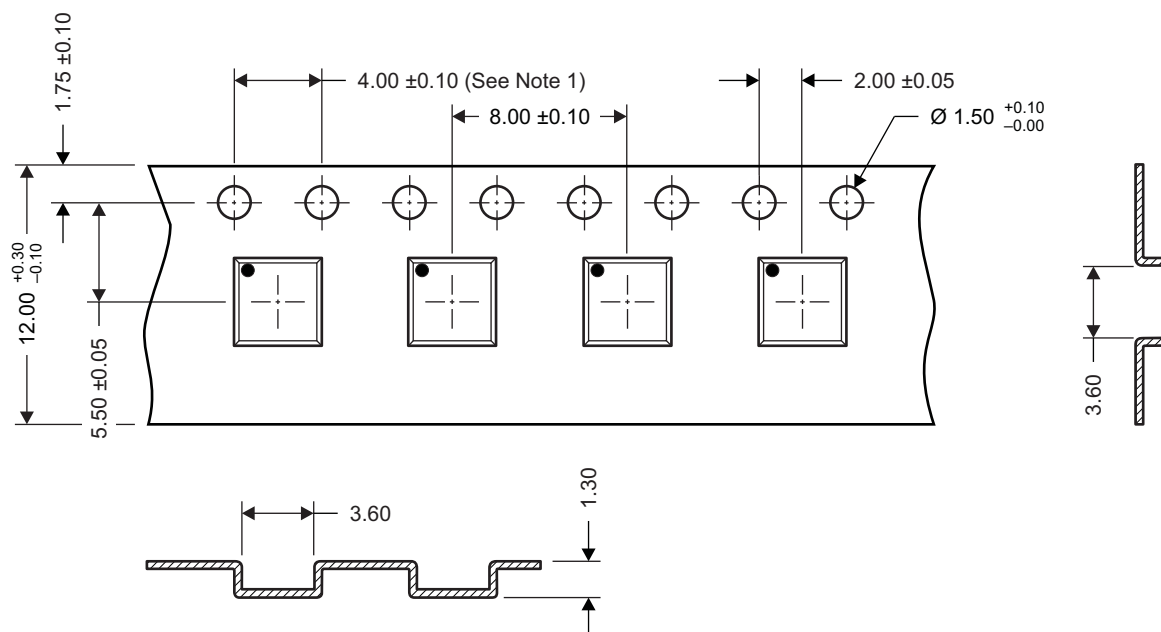


For recommended circuit layout for PCB designs, see application note [SLPA005](#) – *Reducing Ringing Through PCB Layout Techniques*.

Q3A Recommended Stencil Pattern



Q3A Tape and Reel Information



M0144-01

- Notes:
1. 10-sprocket hole-pitch cumulative tolerance ± 0.2
 2. Camber not to exceed 1 mm in 100 mm, noncumulative over 250 mm
 3. Material: black static-dissipative polystyrene
 4. All dimensions are in mm, unless otherwise specified
 5. Thickness: 0.30 ± 0.05 mm
 6. MSL1 260°C (IR and convection) PbF reflow compatible

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
CSD25402Q3A	ACTIVE	VSONP	DNH	8	2500	Green (RoHS & no Sb/Br)	CU SN	Level-1-260C-UNLIM	-55 to 125	25402	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) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(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/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

重要声明

德州仪器(TI) 及其下属子公司有权根据 JESD46 最新标准, 对所提供的产品和服务进行更正、修改、增强、改进或其它更改, 并有权根据 JESD48 最新标准中止提供任何产品和服务。客户在下订单前应获取最新的相关信息, 并验证这些信息是否完整且是最新的。所有产品的销售都遵循在订单确认时所提供的TI 销售条款与条件。

TI 保证其所销售的组件的性能符合产品销售时 TI 半导体产品销售条件与条款的适用规范。仅在 TI 保证的范围内, 且 TI 认为 有必要时才会使用测试或其它质量控制技术。除非适用法律做出了硬性规定, 否则没有必要对每种组件的所有参数进行测试。

TI 对应用帮助或客户产品设计不承担任何义务。客户应对其使用 TI 组件的产品和应用自行负责。为尽量减小与客户产品和应用相关的风险, 客户应提供充分的设计与操作安全措施。

TI 不对任何 TI 专利权、版权、屏蔽作品权或其它与使用了 TI 组件或服务的组合设备、机器或流程相关的 TI 知识产权中授予 的直接或隐含权限作出任何保证或解释。TI 所发布的与第三方产品或服务有关的信息, 不能构成从 TI 获得使用这些产品或服务 的许可、授权、或认可。使用此类信息可能需要获得第三方的专利权或其它知识产权方面的许可, 或是 TI 的专利权或其它 知识产权方面的许可。

对于 TI 的产品手册或数据表中 TI 信息的重要部分, 仅在没有对内容进行任何篡改且带有相关授权、条件、限制和声明的情况 下才允许进行复制。TI 对此类篡改过的文件不承担任何责任或义务。复制第三方的信息可能需要服从额外的限制条件。

在转售 TI 组件或服务时, 如果对该组件或服务参数的陈述与 TI 标明的参数相比存在差异或虚假成分, 则会失去相关 TI 组件 或服务的所有明示或暗示授权, 且这是不正当的、欺诈性商业行为。TI 对任何此类虚假陈述均不承担任何责任或义务。

客户认可并同意, 尽管任何应用相关信息或支持仍可能由 TI 提供, 但他们将独力负责满足与其产品及其应用中使用的 TI 产品 相关的所有法律、法规和安全相关要求。客户声明并同意, 他们具备制定与实施安全措施所需的全部专业技术和知识, 可预见 故障的危险后果、监测故障及其后果、降低有可能造成人身伤害的故障的发生机率并采取适当的补救措施。客户将全额赔偿因 在此类安全关键应用中使用任何 TI 组件而对 TI 及其代理造成的任何损失。

在某些场合中, 为了推进安全相关应用有可能对 TI 组件进行特别的促销。TI 的目标是利用此类组件帮助客户设计和创立其特 有的可满足适用的功能安全性标准 and 要求的终端产品解决方案。尽管如此, 此类组件仍然服从这些条款。

TI 组件未获得用于 FDA Class III (或类似的生命攸关医疗设备) 的授权许可, 除非各方授权官员已经达成了专门管控此类使 用的特别协议。

只有那些 TI 特别注明属于军用等级或“增强型塑料”的 TI 组件才是设计或专门用于军事/航空应用或环境的。购买者认可并同 意, 对并非指定面向军事或航空航天用途的 TI 组件进行军事或航空航天方面的应用, 其风险由客户单独承担, 并且由客户独 力负责满足与此类使用相关的所有法律和法规要求。

TI 已明确指定符合 ISO/TS16949 要求的产品, 这些产品主要用于汽车。在任何情况下, 因使用非指定产品而无法达到 ISO/TS16949 要 求, TI 不承担任何责任。

	产品		应用
数字音频	www.ti.com.cn/audio	通信与电信	www.ti.com.cn/telecom
放大器和线性器件	www.ti.com.cn/amplifiers	计算机及周边	www.ti.com.cn/computer
数据转换器	www.ti.com.cn/dataconverters	消费电子	www.ti.com.cn/consumer-apps
DLP® 产品	www.dlp.com	能源	www.ti.com.cn/energy
DSP - 数字信号处理器	www.ti.com.cn/dsp	工业应用	www.ti.com.cn/industrial
时钟和计时器	www.ti.com.cn/clockandtimers	医疗电子	www.ti.com.cn/medical
接口	www.ti.com.cn/interface	安防应用	www.ti.com.cn/security
逻辑	www.ti.com.cn/logic	汽车电子	www.ti.com.cn/automotive
电源管理	www.ti.com.cn/power	视频和影像	www.ti.com.cn/video
微控制器 (MCU)	www.ti.com.cn/microcontrollers		
RFID 系统	www.ti.com.cn/rfidsys		
OMAP应用处理器	www.ti.com.cn/omap		
无线连通性	www.ti.com.cn/wirelessconnectivity	德州仪器在线技术支持社区	www.deyisupport.com

邮寄地址: 上海市浦东新区世纪大道1568号, 中建大厦32楼邮政编码: 200122
Copyright © 2014, 德州仪器半导体技术(上海)有限公司