N 沟道 NexFET™ 功率 MOSFET

1 特性

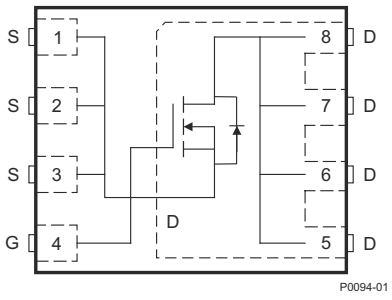
- 超低 Q_g 和 Q_{gd}
- 低热阻
- 具有雪崩能力
- SON 5mm × 6mm 塑料封装

2 应用

- 网络、电信和计算系统中的负载点同步降压转换器
- 针对控制 FET 应用进行了优化

3 说明

NexFET™ 功率 MOSFET 旨在更大限度地降低功率转换应用中的损耗。



顶视图

产品概要

V_{DS}	漏源极电压	25	V
Q_g	栅极电荷，总数(4.5V)	6.7	nC
Q_{gd}	栅极电荷（栅漏极）	1.9	nC
$r_{DS(接通)}$	漏源导通电阻	V_{GS} = 4.5V 5.4	mΩ
		V_{GS} = 10V 3.6	mΩ
$V_{GS(th)}$	阈值电压	1.8	V

订购信息

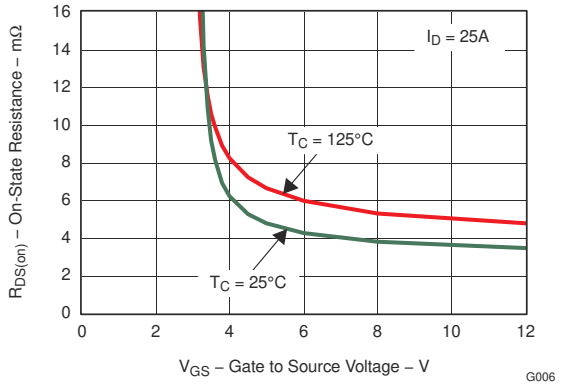
器件	封装	介质	数量	出货
CSD16408Q5	SON 5mm × 6mm 塑料封装	13 英寸 (33cm)卷带	2500	卷带

绝对最大额定值

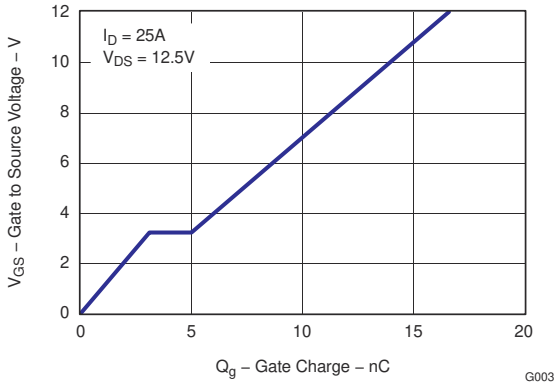
T_A = 25°C 时测得，除非另外注明		值	单位
V_{DS}	漏源极电压	25	V
V_{GS}	栅源电压	–12 至 16	V
I_D	持续漏极电流，T_C = 25°C	113	A
	持续漏极电流(1)	22	A
I_{DM}	脉冲漏极电流，T_A = 25°C(2)	141	A
P_D	功率耗散(1)	3.1	W
T_J，T_{STG}	运行结温和储存温度范围	–55 至 150	°C
E_{AS}	雪崩能量，单一脉冲 I_D = 23A，L = 0.1mH，R_G = 25Ω	126	mJ

(1) 典型 $R_{\theta JA}$ = 41°C/W（在 0.06 英寸 (1.52mm) 厚的 FR4 PCB 上安装 1 平方英寸 (6.45cm^2)、2oz、0.071mm 厚的铜焊盘时）。

(2) 脉冲持续时间 ≤ 300µs，占空比 ≤ 2%



$R_{DS(on)}$ 与 V_{GS} 间的关系



栅极电荷

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4 Revision History

注：以前版本的页码可能与当前版本的页码不同

Changes from Revision A (September 2010) to Revision B (October 2023)	Page
• 更新了整个文档中的表格、图和交叉参考的编号格式	1

Changes from Revision * (October 2009) to Revision A (September 2010)	Page
• 删除了特性列表中的环境要点	1

5 Electrical Characteristics

T_A = 25°C unless otherwise stated

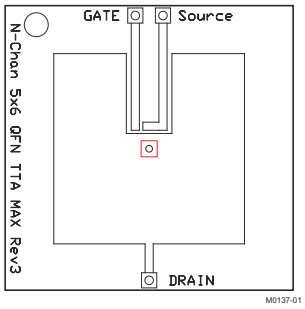
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Static Characteristics						
BV_{DSS}	Drain-to-source voltage	V_{GS} = 0 V, I_D = 250 µA	25			V
I_{DSS}	Drain-to-source leakage	V_{GS} = 0 V, V_{DS} = 20 V			1	µA
I_{GSS}	Gate-to-source leakage	V_{DS} = 0 V, V_{GS} = –12 V to 16 V			100	nA
$V_{GS(th)}$	Gate-to-source threshold voltage	V_{DS} = V_{GS}, I_D = 250 µA	1.4	1.8	2.1	V
$r_{DS(on)}$	Drain-to-source on-resistance	V_{GS} = 4.5 V, I_D = 25 A		5.4	6.8	mΩ
		V_{GS} = 10 V, I_D = 25 A		3.6	4.5	mΩ
g_{fs}	Transconductance	V_{DS} = 15 V, I_D = 25 A		60		S
Dynamic Characteristics						
C_{ISS}	Input capacitance	V_{GS} = 0 V, V_{DS} = 12.5 V , f = 1 MHz		990	1300	pF
C_{OSS}	Output capacitance			760	1000	pF
C_{RSS}	Reverse transfer capacitance			75	100	pF
R_g	Series gate resistance			0.8	1.6	Ω
Q_g	Gate charge total (4.5 V)	V_{DS} = 12.5 V, I_D = 25 A		6.7	8.9	nC
Q_{gd}	Gate charge, gate-to-drain			1.9		nC
Q_{gs}	Gate charge, gate-to-source			3.1		nC
$Q_{g(th)}$	Gate charge at Vth			1.8		nC
Q_{OSS}	Output charge	V_{DS} = 13 V, V_{GS} = 0 V		15.7		nC
$t_{d(on)}$	Turnon delay time	V_{DS} = 12.5 V, V_{GS} = 4.5 V, I_D = 20 A, R_G = 2 Ω		11.3		ns
t_r	Rise time			25		ns
$t_{d(off)}$	Turnoff delay time			11		ns
t_f	Fall time			10.8		ns
Diode Characteristics						
V_{SD}	Diode forward voltage	I_S = 25 A, V_{GS} = 0 V		0.8	1	V
Q_{rr}	Reverse recovery charge	V_{DD} = 13 V, I_F = 2 5A, di/dt = 300 A/µs		17		nC
t_{rr}	Reverse recovery time	V_{DD} = 13 V, I_F = 25 A, di/dt = 300 A/µs		21		ns

6 Thermal Characteristics

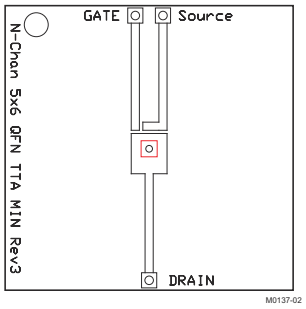
T_A = 25°C unless otherwise stated

PARAMETER		MIN	TYP	MAX	UNIT
$R_{\theta JC}$	Thermal Resistance Junction to Case(1)			1.9	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient(1) (2)			51	°C/W

(1) $R_{\theta JC}$ is determined with the device mounted on a 1-inch^2 (6.45-cm^2), 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. $R_{\theta JC}$ is specified by design, whereas $R_{\theta JA}$ is determined by the user's board design.
(2) Device mounted on FR4 material with 1-inch^2 (6.45-cm^2), 2-oz. (0.071-mm thick) Cu.



Max $R_{\theta JA}$ = 51°C/W when mounted on 1 inch^2 (6.45 cm^2) of 2-oz. (0.071-mm thick) Cu.



Max $R_{\theta JA}$ = 125°C/W when mounted on minimum pad area of 2-oz. (0.071-mm thick) Cu.

7 Typical MOSFET Characteristics

T_A = 25°C unless otherwise stated

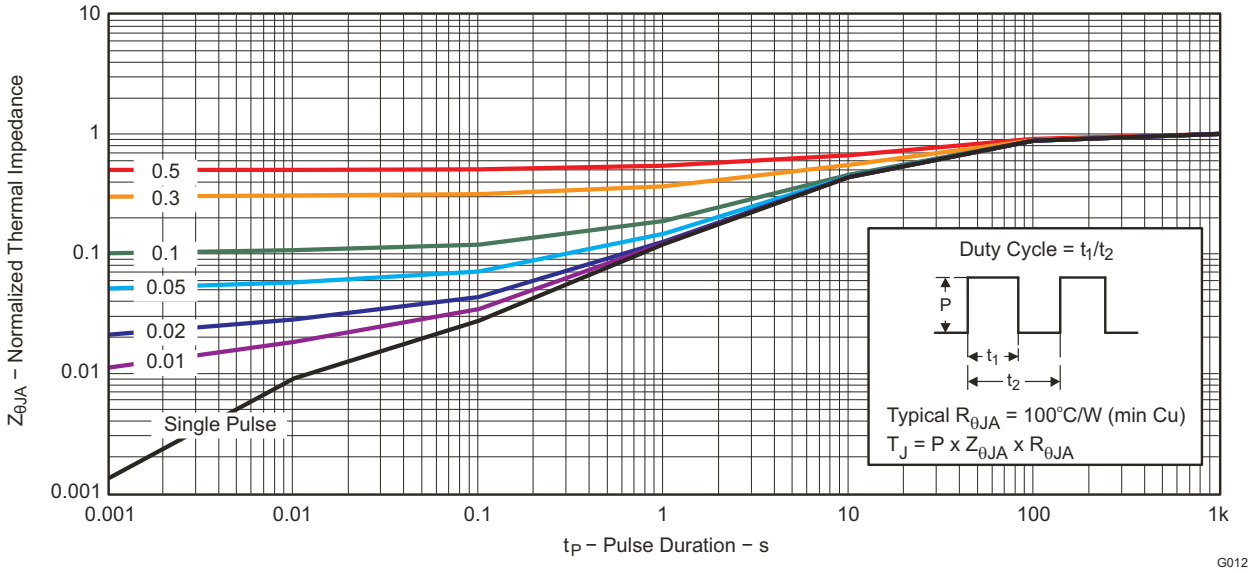


图 7-1. Transient Thermal Impedance

7 Typical MOSFET Characteristics

T_A = 25°C unless otherwise stated

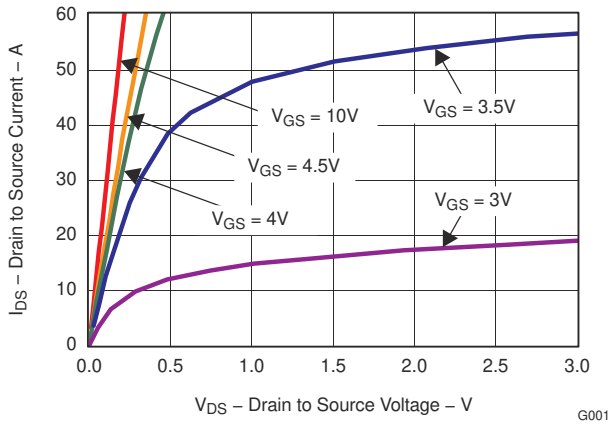


图 7-2. Saturation Characteristics

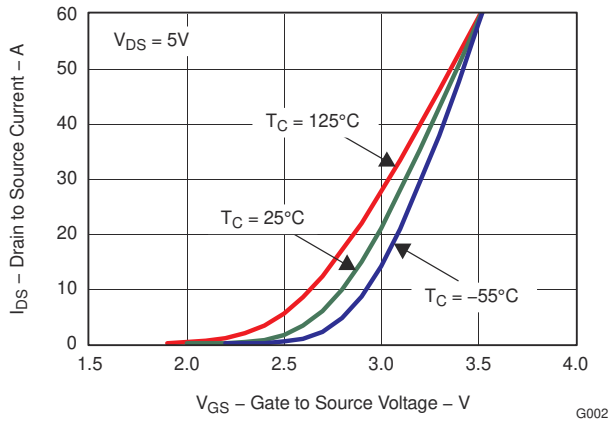


图 7-3. Transfer Characteristics

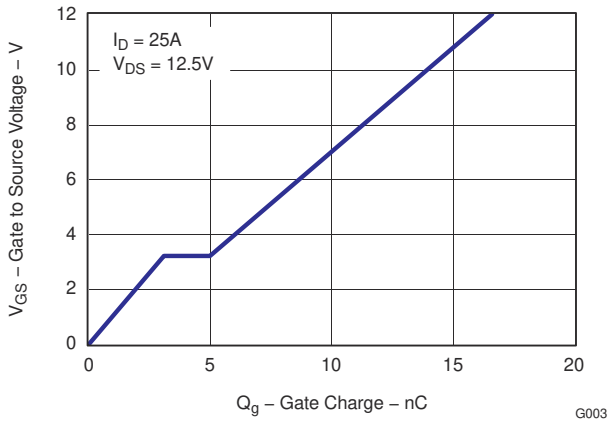


图 7-4. Gate Charge

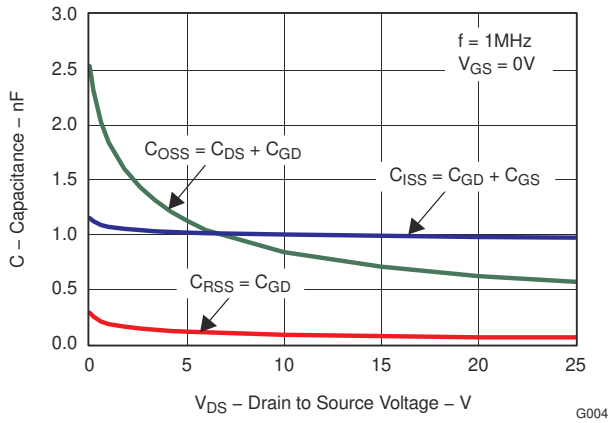


图 7-5. Capacitance

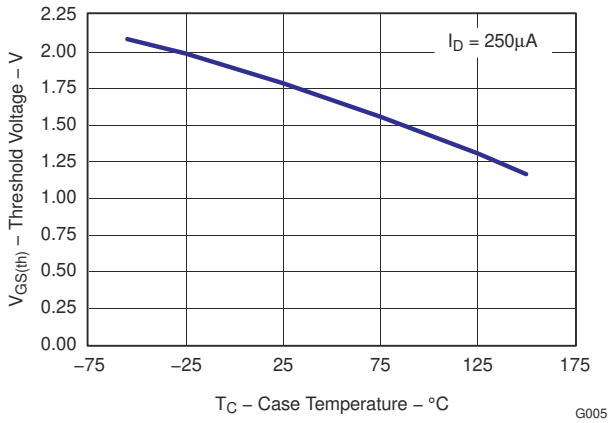


图 7-6. Threshold Voltage vs. Temperature

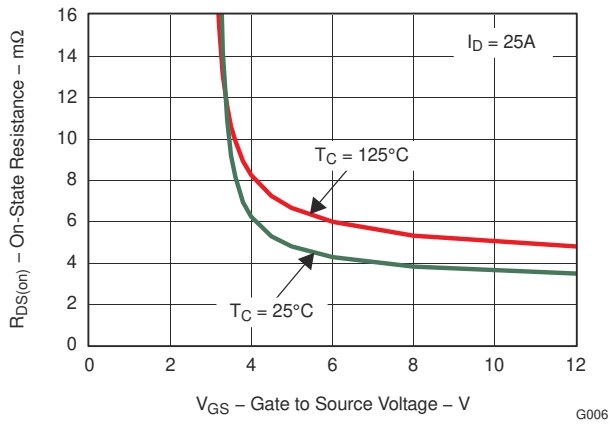


图 7-7. On-State Resistance vs. Gate-to-Source Voltage

7 Typical MOSFET Characteristics (continued)

T_A = 25°C unless otherwise stated

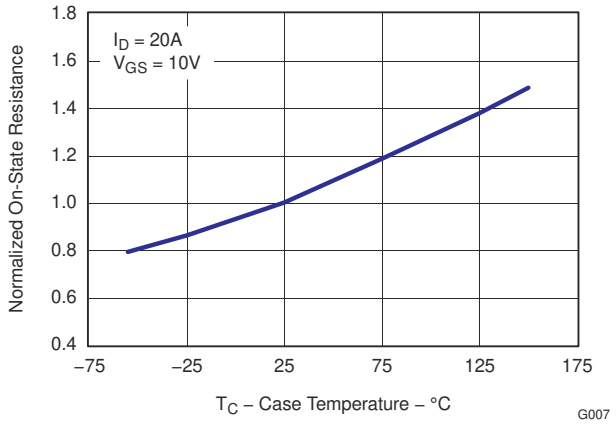


图 7-8. Normalized On-State Resistance vs. Temperature

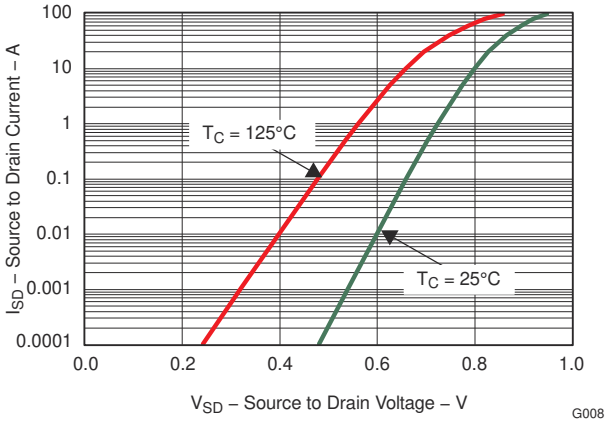


图 7-9. Typical Diode Forward Voltage

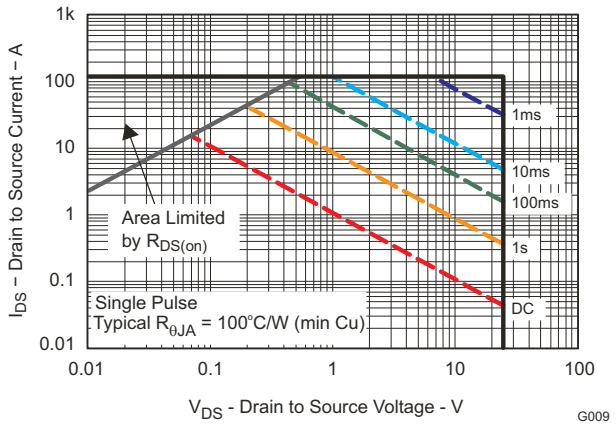


图 7-10. Maximum Safe Operating Area

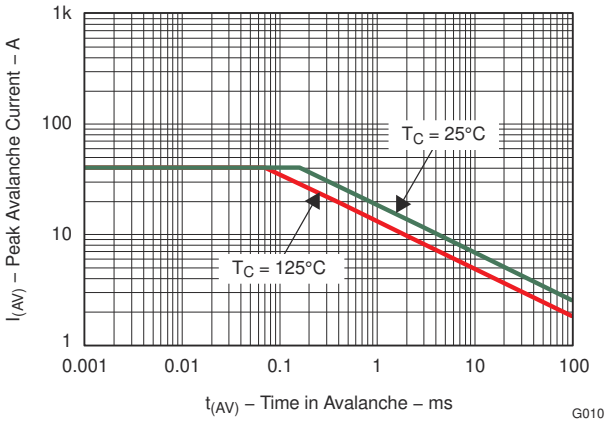


图 7-11. Single-Pulse Unclamped Inductive Switching

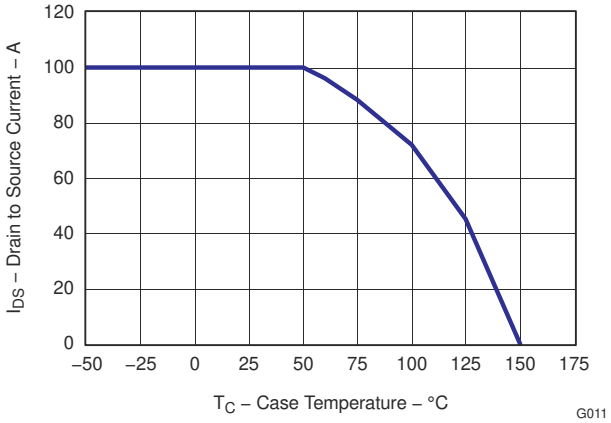


图 7-12. Maximum Drain Current vs. Temperature

8 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.

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
CSD16408Q5	ACTIVE	VSON-CLIP	DQH	8	2500	RoHS-Exempt & Green	SN	Level-1-260C-UNLIM	-55 to 150	CSD16408	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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