



NMOS 数据手册

NP130S030P56A

30V 130A Advanced Trench NMOS
Rev. 1.0

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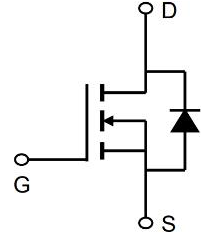
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NMOS 30V/130A NP130S030P56A

产品特性 Features

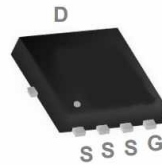
- ◆ 先进沟槽工艺技术 Advanced Trench Technology
- ◆ 超低栅极电荷 Super Low Gate Charge
- ◆ 超低 Ron 高密度单元设计 High Density Cell Design for Ultra Low Rdson
- ◆ RoHS 产品 RoHS Product



应用领域 Applications

- ◆ 负载开关 Load Switching
- ◆ 脉宽调制器 PWM
- ◆ DC/DC 转换器 DC/DC Converter
- ◆ 高频开关 High Frequency Switching

关键参数与封装信息 Key Performance and Package Parameters



PDFN5X6

| 产品型号 Part No. | 封装 Package | 漏极-源极电压 V _{DS} | 漏极电流 I _D | 导通电阻 R _{DS(on) Typ.} |
|------------------|---------------|----------------------------|------------------------|----------------------------------|
| NP130S030P56A | PDFN5X6 | 30V | 130A | 1.5mΩ @V _{GS} =10V |

最大额定值 Maximum Ratings

| 参数 Parameter | 符号 Symbol | 数值 Value | 单位 Unit |
|---|--------------|-------------|------------|
| 最高漏极-源极直流电压 Drain to Source Voltage | V_{DS} | 30 | V |
| 最高栅源电压 Gate to Source Voltage | V_{GS} | ± 20 | V |
| 连续漏极电流 Drain Current-Continuous, Limited by T_{vjmax} TC = 25° C TC = 100° C | I_D | 130 81 | A |
| 最大脉冲漏极电流 Pulse Drain Current $PW \leq 300 \mu s, Duty\ Cycle \leq 2\%$ | I_{Dpuls} | 260 | A |
| 二极管正向电流 Diode Forward Current, Limited by T_{vjmax} TC = 25° C | I_S/I_{SM} | 130/260 | A |
| 单脉冲雪崩能量 Single Pulsed Avalanche Energy ^② | EAS | 256 | mJ |
| 最大耗散功率 Maximum Power Dissipation TC = 25° C TC = 100° C | P_D | 96 38 | W |
| 结温 Operating Junction Temperature | T_J | -55...+150 | ° C |
| 存储温度 Storage Temperature | T_{stg} | -55...+150 | ° C |
| 最高焊接温度 Maximum Soldering Temperature | | 260 | ° C |

① 脉冲宽度由最高结温限制 Pulse width limited by maximum junction temperature

② EAS 测试条件: $T_J=25^\circ C$, $V_{DD}=20V$, $I_{AR}=32A$, $L=0.5mH$, $R_g=25\Omega$

热阻特性 Thermal Resistance

| 参数 Parameter | 符号 Symbol | 数值 (最大) Max. Value | 单位 Unit |
|---|-----------------|-----------------------|------------|
| 结到管壳热阻 Thermal Resistance Junction to Case | $R_{\theta JC}$ | 1.3 | ° C /W |
| 结到环境热阻 Thermal Resistance Junction to Ambient ^③ | $R_{\theta JA}$ | 50 | ° C /W |

③ Device on 40mm x 40mm x 1.5mm epoxy PCB FR4 with 6cm² (one layer, 7μm thick) copper area for drain connection. PCB is vertical in still air.

电气特性 Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise noted)

| 项目 Parameter | 符号 Symbol | 测试条件 Conditions | 数值 Value | | | 单位 Unit |
|---|--------------|--|----------|------|-----------|------------|
| | | | Min. | Typ. | Max. | |
| 漏-源击穿电压 Drain to Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 30 | - | - | V |
| 零栅压下漏极漏电流 Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=30V, V_{GS}=0V$ $T_J=25^\circ\text{C}$ $T_J=150^\circ\text{C}$ | - | - | 1 100 | μA |
| 栅极漏电流 Gate to Source Leakage Current | I_{GSS} | $V_{DS}=0V, V_{GS}=\pm 20V$ | - | - | ± 100 | nA |
| 阈值电压 Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1 | - | 2.2 | V |
| 静态导通电阻 Drain to Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}=10V, I_D=20A$ | - | 1.5 | 1.95 | $m\Omega$ |
| | | $V_{GS}=4.5V, I_D=10A$ | - | 2.4 | 3.35 | $m\Omega$ |
| 正向压降 Diode Forward Voltage | V_{SD} | $I_S=10A, V_{GS}=0V$ | - | 0.8 | 1.4 | V |
| 输入电容 Input Capacitance | C_{iss} | $V_{DS}=15V$ $V_{GS}=0V$ $f=1\text{MHz}$ | - | 3.09 | - | nF |
| 输出电容 Output Capacitance | C_{oss} | | - | 1.62 | - | nF |
| 反向传输电容 Reverse Transfer Capacitance | C_{rss} | | - | 140 | - | pF |
| 栅极电荷总量 Total Gate Charge | Q_g | $V_{DS}=15V$ $V_{GS}=10V$ $I_{DS}=20A$ | - | 47.6 | - | nC |
| 栅极-源极电荷 Gate to Source Charge | Q_{gs} | | - | 9.63 | - | |
| 栅极-漏极电荷 Gate to Drain Charge | Q_{gd} | | - | 13.5 | - | |
| 开启延迟时间 Turn-On Delay Time | $t_{d(on)}$ | $T_J=25^\circ\text{C}$ $V_{DD}=15V, I_D=15A$ $V_{GS}=10V, R_G=3\Omega$ | - | 17 | - | ns |
| 上升时间 Rise Time | t_r | | - | 11 | - | |
| 关断延迟时间 Turn-Off Delay Time | $t_{d(off)}$ | | - | 52 | - | |
| 下降时间 Fall Time | t_f | | - | 22 | - | |
| 反向恢复时间 Reverse Recovery Time | t_{rr} | $I_F=15A, di/dt=120A/\mu s$ | - | 37 | - | ns |
| 反向恢复电荷 Reverse Recovery Charge | Q_{rr} | | - | 21 | - | nC |

特征曲线 Characteristic Curve

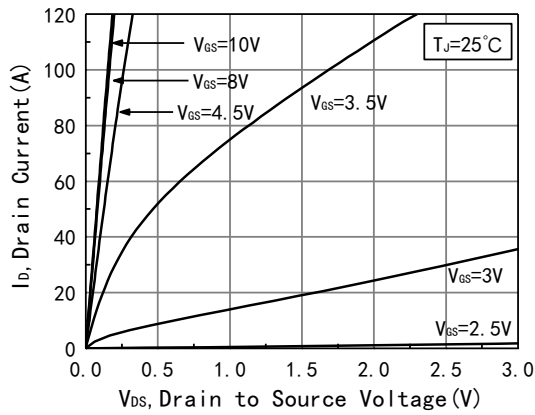


Figure 1. Typical Output Characteristics

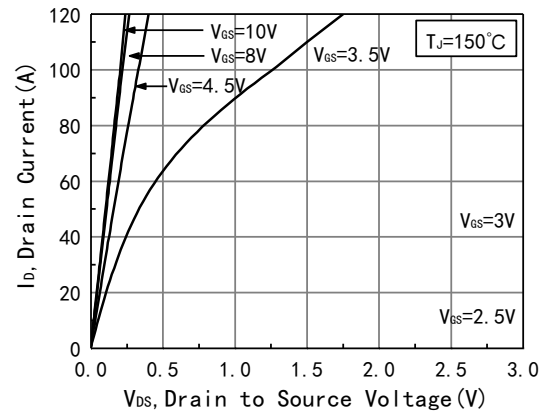


Figure 2. Typical Output Characteristics

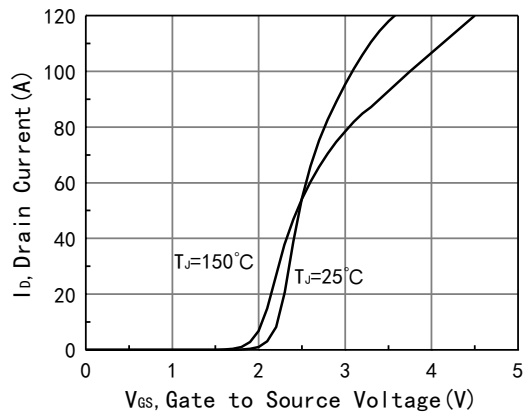


Figure 3. Typical Transfer Characteristics

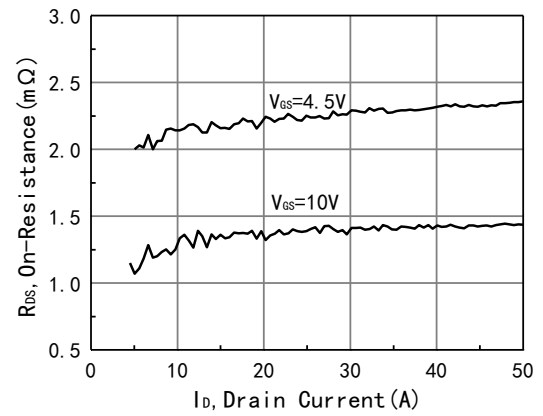


Figure 4. RDS(on) vs. Id

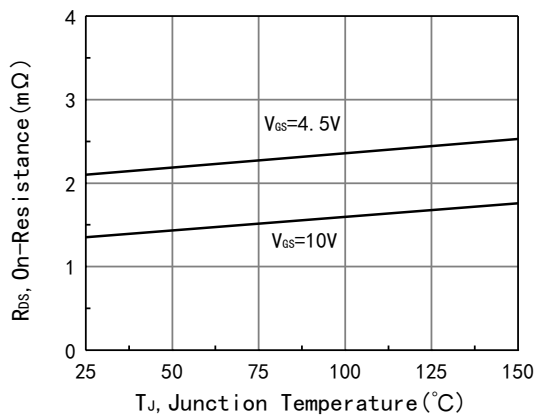


Figure 5. RDS(on) vs. Tj

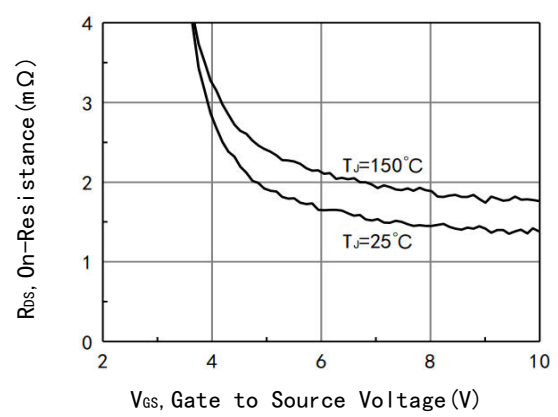


Figure 6. RDS(on) vs. Vgs

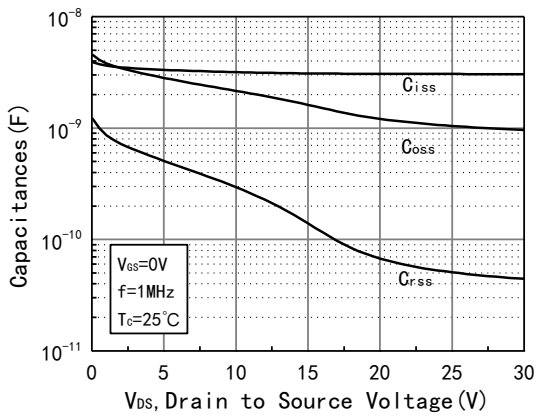


Figure 7. Capacitance vs. Vds

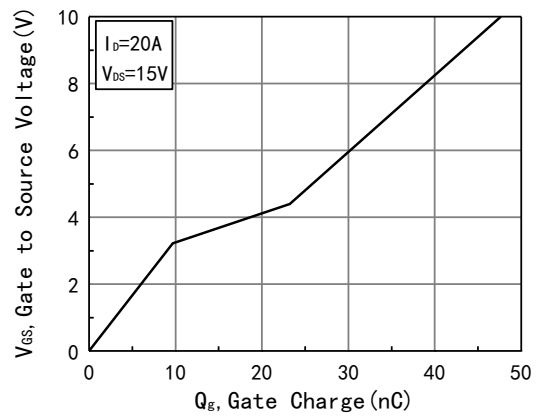


Figure 8. Gate Charge Characteristic

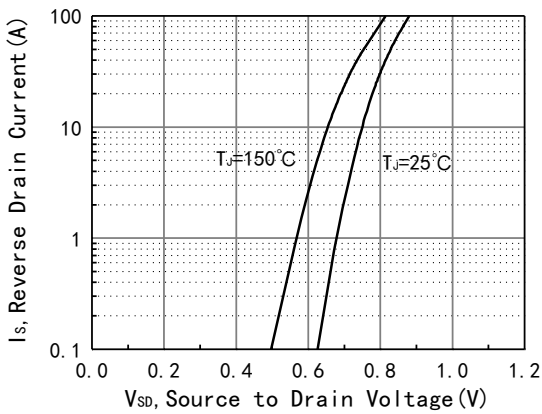


Figure 9. Diode Forward Characteristic

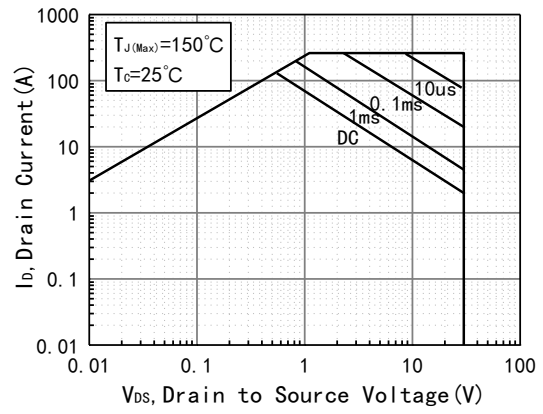


Figure 10. Safe Operating Area

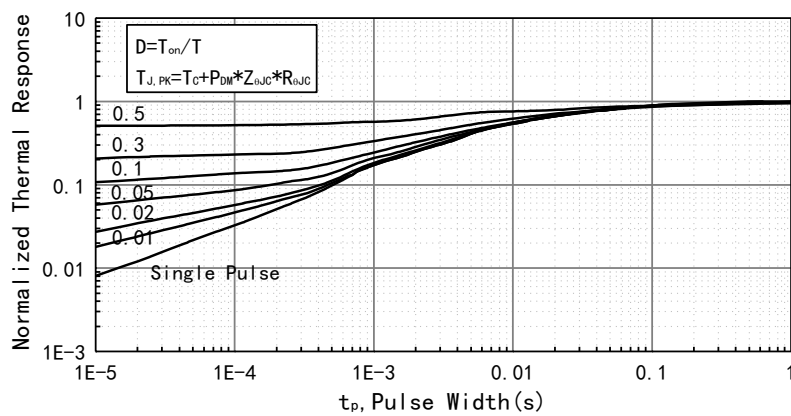
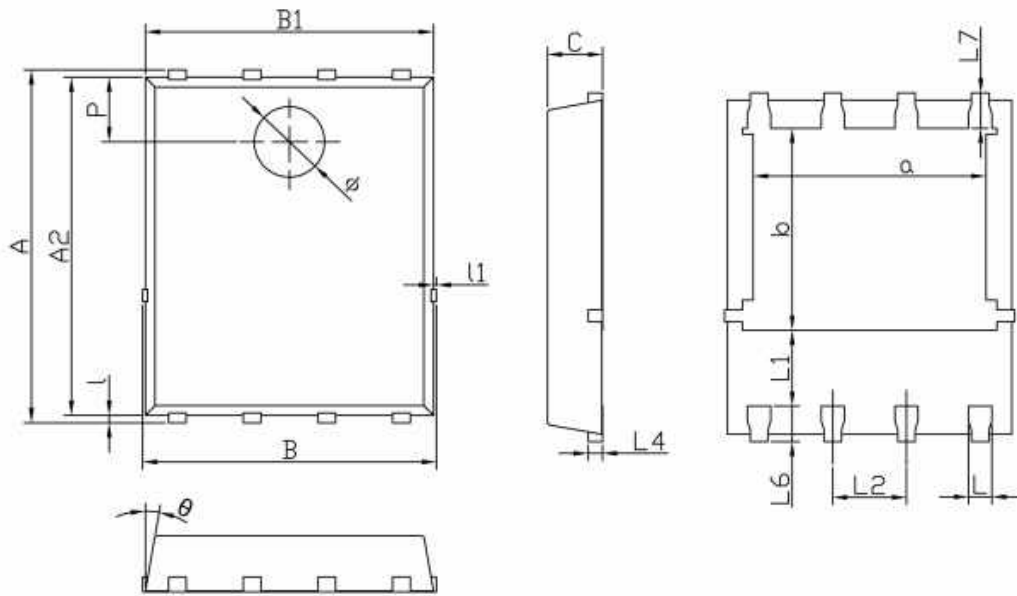


Figure 11. Normalized Maximum Transient Thermal Impedance

Notes:

Pulse Test: Pulse Width ≤ 380µs, Pulse Delay ≤ 200µs.

外形尺寸 Mechanical Data: PDFN5x6



| Symbol | Dimensions In Millimeters | | |
|--------|---------------------------|------|------|
| | Min. | Typ. | Max. |
| A | 5.90 | 6.00 | 6.10 |
| a | 3.91 | 4.01 | 4.11 |
| A2 | 5.70 | 5.75 | 5.80 |
| B | 4.90 | 5.00 | 5.10 |
| b | 3.37 | 3.47 | 3.57 |
| B1 | 4.80 | 4.90 | 5.00 |
| C | 0.90 | 0.95 | 1.00 |
| L | 0.35 | 0.40 | 0.45 |
| l | 0.06 | 0.13 | 0.20 |
| L1 | 1.10 | - | - |
| l1 | - | - | 0.10 |
| L2 | 1.17 | 1.27 | 1.37 |
| L4 | 0.21 | 0.26 | 0.34 |
| L6 | 0.51 | 0.61 | 0.71 |
| L7 | 0.51 | 0.61 | 0.71 |
| P | 1.00 | 1.10 | 1.20 |
| θ | 8° | 10° | 12° |
| φ | 1.10 | 1.20 | 1.30 |

历史版本

| 版本号 | 时间 | 修改内容 |
|------|-------------|------|
| V1.0 | 2021 年 11 月 | 初始版本 |