

| 工业型号 | 公司型号 | 通俗命名 | H | 封装标识 | 包装方式 | 每管数量 | 每盒数量 | 每箱数量 |
|-----------------------|------------------|------|--------|----------------------------|-------------|-------|---------|---------|
| FQP2N60C FQPF2N60C | H2N60P H2N60F | 2N60 | HAOHAI | P: TO-220AB F: TO-220FP | 条管装 盒装箱装 | 50Pcs | 1000Pcs | 5000Pcs |

APPLICATION
ELECTRONIC BALLAST
ELECTRONIC TRANSFORMER
SWITCH MODE POWER SUPPLY

FEATURES
LOW ON-RESISTANCE
FAST SWITCHING
HIGH INPUT RESISTANCE
RoHS COMPLIANT
Package: TO-220AB & TO-220F


特点
导通电阻低、开关速度快、输入阻抗高、符合RoHS规范

应用范围
开关电源、LCD电源、LED驱动电源、机箱电源、UPS电源、各种充电器、电子整流器、电子变压器、逆变器、控制器、转换器、风扇控制板、以及电源适配器、汽车稳压器等线性放大和功率开关电路

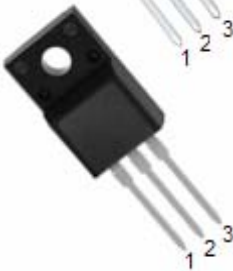
封装形式
TO-220AB 或 TO-220P (半塑封)
TO-220F 或 TO-220FP (全塑封)

$I_D=2A$
 $BV_{DSS}=600V$
 $R_{DS(on)}=4.2\Omega$

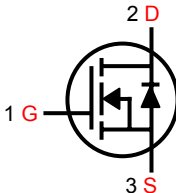
2N60 Series Pin Assignment



3-Lead Plastic TO-220AB
Package Code: P
Pin 1: Gate
Pin 2 & Tab: Drain
Pin 3: Source



3-Lead Plastic TO-220FP
Package Code: F
Pin 1: Gate
Pin 2: Drain
Pin 3: Source

Series Symbol: 

最大额定 Absolute Maximum Ratings (T_C=25°C)

| 参数 PARAMETER | 符号 SYMBOL | 额定值 VALUE | 单位 UNIT |
|---|------------------|-----------------------|------------|
| 漏-源电压 Drain-source Voltage | V _{DS} | 600 | V |
| 栅-源电压 gate-source Voltage | V _{GS} | ±30 | |
| 漏极电流 Continuous Drain Current | I _D | T _C =25°C | 2.0 * |
| | | T _C =100°C | 1.25 * |
| 最大脉冲电流 Drain Current —Pulsed ① | I _{DM} | 8.0 * | W |
| 耗散功率 Power Dissipation | P _{tot} | TO-220P | |
| | | TO-220F | 23 |
| 最高结温 Junction Temperature | T _J | 150 | °C |
| 存储温度 Storage Temperature | T _{STG} | -55~+150 | |
| 单脉冲雪崩能量 Single Pulse Avalanche Energy ② | E _{AS} | 120 | mJ |

* 漏极电流由最高结温限制 (*Drain current limited by maximum junction temperature)

电特性 Electronic Characteristics (T_C=25°C)

| 参数 PARAMETER | 符号 SYMBOL | 测试条件 TEST CONDITION | 最小值 MIN | 典型值 TYP | 最大值 MAX | 单位 UNIT |
|---|-------------------------------------|---|------------|------------|------------|------------|
| 漏-源击穿电压 Drain-source Breakdown Voltage | BV _{DSS} | V _{GS} =0V I _D =250μA | 600 | | | V |
| 击穿电压温度系数 Breakdown Voltage Temperature Coefficient | ΔBV _{DSS} /ΔT _j | I _D =250uA Referenced to 25°C | | 0.6 | | V/°C |
| 栅极开启电压 Gate Threshold Voltage | V _{GS(TH)} | V _{GS} =V _{DS} I _D =250μA | 2.0 | | 4.0 | V |
| 漏-源漏电流 Drain-source Leakage Current | I _{DSS} | V _{DS} =600V V _{GS} =0V, T _j =25°C | | | 25 | μA |
| | | V _{DS} =480V V _{GS} =0V, T _j =125°C | | | 250 | |
| 跨导 Forward Transconductance | g _{FS} | V _{DS} =40V I _D =1A ③ | | 1.5 | | S |

订货方式 ORDERING INFORMATION

| 包装方式 PACKING | 订货方式 ORDERING CODE | |
|--------------------------|---------------------------------|-----------------------|
| | 普通塑封料 Nomal Package Material | 无卤塑封料 Halogen Free |
| TO-220P 条管装 TUBE PACKING | H2N60P-TU | H2N60P-TU-PbF |
| TO-220F 条管装 TUBE PACKING | H2N60F-TU | H2N60F-TU-PbF |

包装规格 Packing

| | |
|----------|--|
| TO-220AB | 管装, 每管50只, 每盒1000只, 每箱5000只 (50Pcs/Tub, 1Kpcs/BOX, 5Kpcs/Carton) |
| TO-220FP | 管装, 每管50只, 每盒1000只, 每箱5000只 (50Pcs/Tub, 1Kpcs/BOX, 5Kpcs/Carton) |

■ Electrical Characteristics (T_C=25°C)

| 参数 PARAMETER | 符号 SYMBOL | 测试条件 TEST CONDITION | 最小值 MIN | 典型值 TYP | 最大值 MAX | 单位 UNIT |
|---|---------------------|--|------------|------------|------------|------------|
| 栅极漏电流 Gate-body Leakage Current (V _{DS} =0) | I _{GSS} | V _{GS} =±30V | | | ±100 | nA |
| 漏-源导通电阻 Static Drain-source On Resistance | R _{DS(ON)} | V _{GS} =10V, I _D =1A ③ | | 4.2 | 4.5 | Ω |
| 输入电容 Input Capacitance | C _{iss} | V _{GS} =0V, V _{DS} =25V F=1.0MHZ | | 320 | | pF |
| 关断延迟时间 Turn -Off Delay Time | T _{d(off)} | V _{DD} =300V, I _D =2A R _G =25Ω ③ | | 24 | | nS |
| 栅极电荷 Total Gate Charge | Q _g | I _D =2A V _{DS} =480V V _{GS} =10V ③ | | 7.2 | | nC |
| 栅源电荷 Gate-to-Source Charge | Q _{gs} | | | 4.3 | | |
| 栅漏电荷 Gate-to-Drain Charge | Q _{gd} | | | 1.6 | | |
| 二极管正向电流 Continuous Diode Forward Current | I _s | | | | 2.0 | A |
| 二极管正向压降 Diode Forward Voltage | V _{SD} | T _j =25°C, I _s =2A V _{GS} =0V ③ | | | 1.4 | V |
| 反向恢复时间 Reverse Recovery Time | t _{rr} | T _j =25°C I _F =2A di/dt=100A/μs ③ | | 380 | | nS |
| 反向恢复电荷 Reverse Recovery Charge | Q _{rr} | | | 0.9 | | μC |

■ 热特性 Thermal Characteristics

| 参数 PARAMETER | 符号 SYMBOL | 最大值 MAX | | 单位 UNIT |
|---|-------------------|---------|----------|------------|
| | | TO-220F | TO-220AB | |
| 热阻 结-壳 Thermal Resistance Junction-case | R _{thJC} | 5.43 | 2.31 | °C/W |
| 热阻 结-环境 Thermal Resistance Junction-ambient | R _{thJA} | 62.5 | 62.5 | |

注释 (Notes):

- ① 脉冲宽度: 以最高结温为限制 (Repetitive rating: Pulse width limited by maximum junction temperature)
- ② 初始结温=25°C, V_{DD}=50V, L=56mH, R_G=25Ω, I_{AS}=2A (Starting T_j=25°C, V_{DD}=50V, L=56mH, R_G=25Ω, I_{AS}=2A)
- ③ 脉冲测试: 脉冲宽度≤300μs, 占空比≤2% (Pulse Test: Pulse width ≤300μs, Duty cycle ≤2%)

■ 特性曲线 Typical Performance Characteristics

图1: 输出特性曲线, $T_c=25^\circ\text{C}$

Fig1: Typical Output Characteristics, $T_c=25^\circ\text{C}$

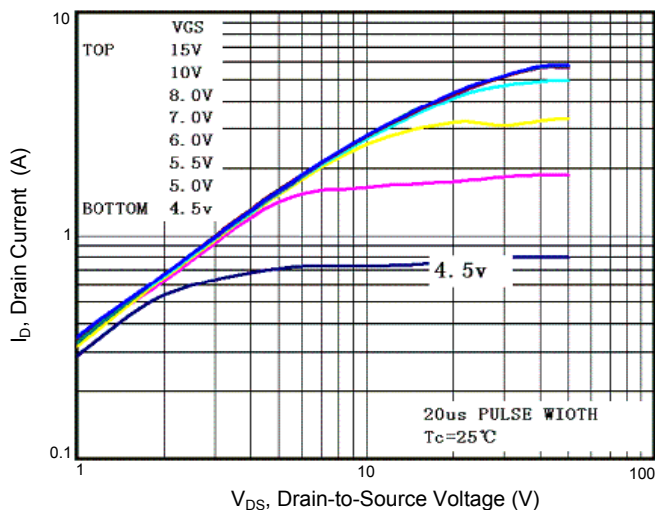


图2: 输出特性曲线, $T_c=150^\circ\text{C}$

Fig2: Typical Output Characteristics, $T_c=150^\circ\text{C}$

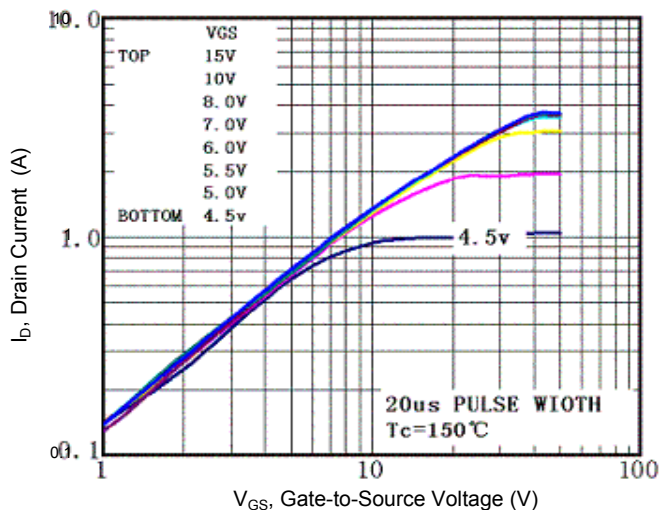


图3: 归一化导通电阻与温度曲线图

Fig3: Normalized On-Resistance Vs. Temperature

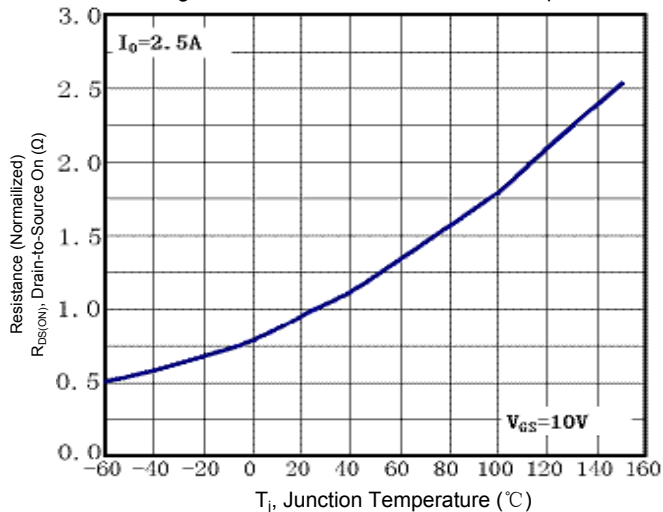


图4: 二极管正向电压曲线

Fig4: Typical Source-Drain Diode Forward Voltage

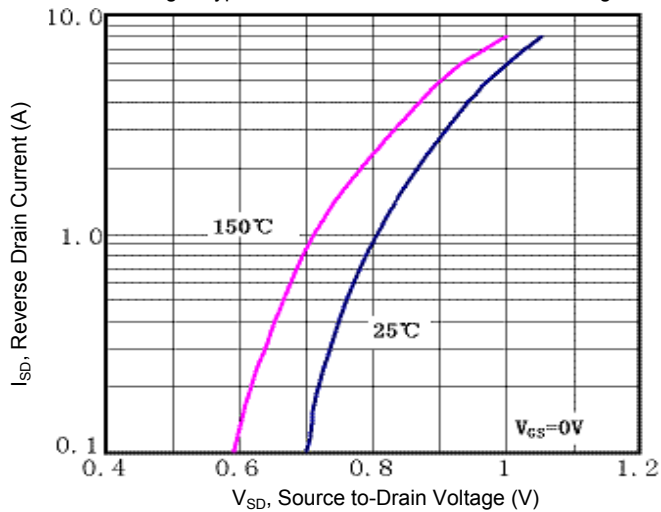


图5: 最大漏极电流与壳温曲线

Fig5: Maximum Drain Current Vs. Case Temperature

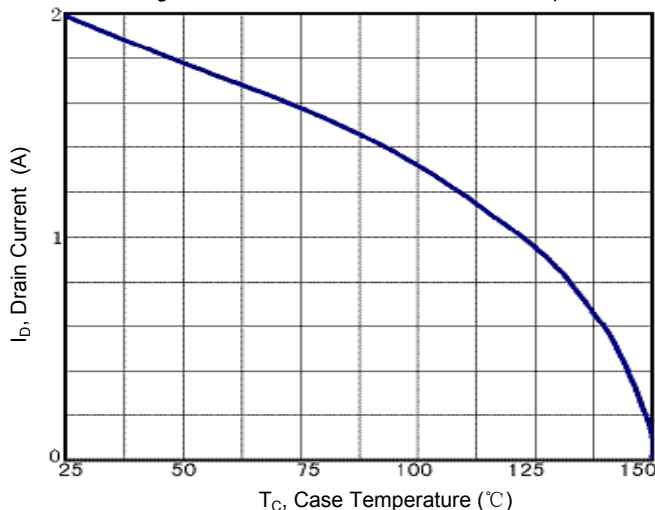
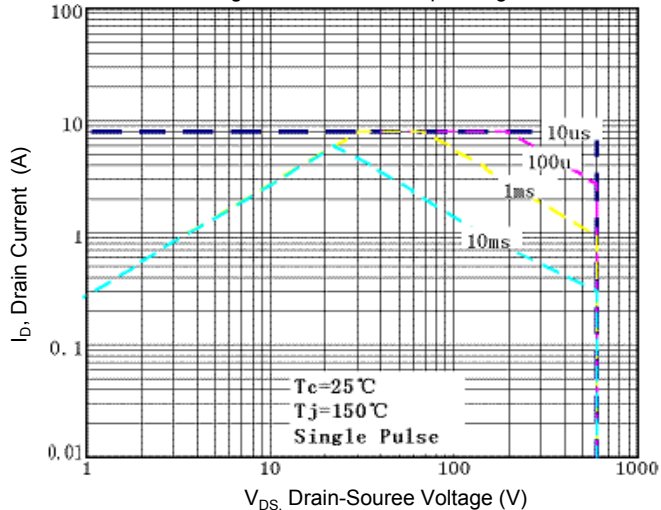


图6: 最大安全工作区曲线

Fig6: Maximum Safe Operating Area



PACKAGE DIMENSIONS

| ■ TO-220AB (TO-220P) Dimension (封装尺寸数据, 单位: mm) | | | | 元件打印标识 |
|---|------------------|-------|-------|--|
| | DIM | Min. | Max. | <p>左上角: LOGO AAA: 芯片代码 BBBBB: 批次识别码 aabb: 生产批号 其中: aa: 出厂年份 bb: 出厂自然周 (01~53) XXXXXXXX: 器件型号</p> |
| | A | 6.48 | 7.40 | |
| | C | 4.40 | 4.90 | |
| | D | 2.34 | 3.00 | |
| | E | 0.45 | 0.80 | |
| | F | 9.80 | 10.36 | |
| | G | 3.10 | 3.60 | |
| | I | 2.70 | 3.43 | |
| | J | 0.60 | 1.00 | |
| | K | 2.34 | 2.74 | |
| | L | 12.48 | 13.60 | |
| | M | 15.67 | 16.20 | |
| | N | 0.90 | 1.47 | |
| | O | 2.00 | 2.96 | |
| | $\alpha 1/2/4/5$ | - | *5° | |
| $\alpha 3$ | - | *27° | | |

| ■ TO-220F (TO-220FP) Dimension (封装尺寸数据, 单位: mm) | | | | 元件打印标识 |
|---|-------|-------|--------|--|
| | DIM | Min. | Max. | <p>左上角: LOGO AAA: 芯片代码 XXXXXXXX: 器件型号 BBBBB: 批次识别码 aabb: 生产批号 其中: aa: 出厂年份 bb: 出厂自然周 (01~53)</p> |
| | A | 5.58 | 7.49 | |
| | B | 8.38 | 8.90 | |
| | C | 4.40 | 4.70 | |
| | D | 1.15 | 1.39 | |
| | E | 0.35 | 0.60 | |
| | F | 2.03 | 2.92 | |
| | G | 9.66 | 10.28 | |
| | H | -- | *16.25 | |
| | I | -- | *3.83 | |
| | J | 3.00 | 4.00 | |
| | K | 0.75 | 0.95 | |
| | L | 2.54 | 3.42 | |
| | M | 1.14 | 1.40 | |
| | N | -- | *2.54 | |
| O | 12.70 | 14.27 | | |
| P | 14.48 | 15.87 | | |

Manufacturers version information

2007-03-11, HAOHAI™ Product Data-S1.0

2010-04-10, HAOHAI™ Product Data-S1.1

2014-07-11, HAOHAI™ Product Data-S2.0



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