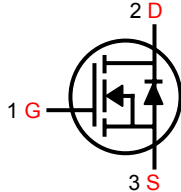


| 工业型号                  | 公司型号             | 通俗命名 | H      | 封装标识                       | 包装方式        | 每管数量  | 每盒数量    | 每箱数量    |
|-----------------------|------------------|------|--------|----------------------------|-------------|-------|---------|---------|
| FQP2N60C<br>FQPF2N60C | H2N60P<br>H2N60F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

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |                                                                                                 |  |                                                                                                                                                                                                                                                                                                                                                                    |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p>■ APPLICATION<br/>ELECTRONIC BALLAST<br/>ELECTRONIC TRANSFORMER<br/>SWITCH MODE POWER SUPPLY</p> <p>■ FEATURES<br/>LOW ON-RESISTANCE<br/>FAST SWITCHING<br/>HIGH INPUT RESISTANCE<br/>RoHS COMPLIANT<br/>Package: TO-220AB &amp; TO-220F</p> <p>■ 特点<br/>导通电阻低、开关速度快、输入阻抗高、符合RoHS规范</p> <p>■ 应用范围<br/>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</p> <p>■ 封装形式<br/>TO-220AB 或 TO-220P (半塑封)<br/>TO-220F 或 TO-220FP (全塑封)</p> |  | <p><math>I_D=2A</math><br/><math>BV_{DSS}=600V</math><br/><math>R_{DS(on)}=4.2\Omega</math></p> |  | <p>2N60 Series Pin Assignment</p> <p>3-Lead Plastic TO-220AB<br/>Package Code: P<br/>Pin 1: Gate<br/>Pin 2 &amp; Tab: Drain<br/>Pin 3: Source</p> <p>3-Lead Plastic TO-220FP<br/>Package Code: F<br/>Pin 1: Gate<br/>Pin 2: Drain<br/>Pin 3: Source</p> <p>Series Symbol: </p> |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

■ 最大额定 Absolute Maximum Ratings ( $T_C=25^{\circ}C$ )

| 参数<br>PARAMETER                         |                    | 符号<br>SYMBOL | 额定值<br>VALUE | 单位<br>UNIT  |
|-----------------------------------------|--------------------|--------------|--------------|-------------|
| 漏-源电压 Drain-source Voltage              |                    | $V_{DS}$     | 600          | V           |
| 栅-源电压 gate-source Voltage               |                    | $V_{GS}$     | $\pm 30$     |             |
| 漏极电流 Continuous Drain Current           | $T_C=25^{\circ}C$  | $I_D$        | 2.0 *        | A           |
|                                         | $T_C=100^{\circ}C$ |              | 1.25 *       |             |
| 最大脉冲电流 Drain Current — Pulsed ①         |                    | $I_{DM}$     | 8.0 *        |             |
| 耗散功率 Power Dissipation                  | TO-220P            | $P_{tot}$    | 54           | W           |
|                                         | TO-220F            |              | 23           |             |
| 最高结温 Junction Temperature               |                    | $T_J$        | 150          | $^{\circ}C$ |
| 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 ( $T_c=25^{\circ}\text{C}$ )

| 参数<br>PARAMETER                                       | 符号<br>SYMBOL                 | 测试条件<br>TEST CONDITION                                | 最小值<br>MIN | 典型值<br>TYP | 最大值<br>MAX | 单位<br>UNIT           |
|-------------------------------------------------------|------------------------------|-------------------------------------------------------|------------|------------|------------|----------------------|
| 漏-源击穿电压<br>Drain-source Breakdown Voltage             | $BV_{DSS}$                   | $V_{GS}=0V$<br>$I_D=250\mu A$                         | 600        |            |            | V                    |
| 击穿电压温度系数<br>Breakdown Voltage Temperature Coefficient | $\Delta BV_{DSS}/\Delta T_j$ | $I_D=250\mu A$<br>Referenced to $25^{\circ}\text{C}$  |            | 0.6        |            | $V/^{\circ}\text{C}$ |
| 栅极开启电压<br>Gate Threshold Voltage                      | $V_{GS(TH)}$                 | $V_{GS}=V_{DS}$<br>$I_D=250\mu A$                     | 2.0        |            | 4.0        | V                    |
| 漏-源漏电流<br>Drain-source Leakage Current                | $I_{DSS}$                    | $V_{DS}=600V$<br>$V_{GS}=0V, T_j=25^{\circ}\text{C}$  |            |            | 25         | $\mu A$              |
|                                                       |                              | $V_{DS}=480V$<br>$V_{GS}=0V, T_j=125^{\circ}\text{C}$ |            |            | 250        |                      |
| 跨导<br>Forward Transconductance                        | $g_{FS}$                     | $V_{DS}=40V$<br>$I_D=1A$ ③                            |            | 1.5        |            | S                    |

■ 订货方式 ORDERING INFORMATION

| 包装方式<br>PACKING          | 订货方式 ORDERING CODE              |                       |
|--------------------------|---------------------------------|-----------------------|
|                          | 普通塑封料<br>Nomal Package Material | 无卤塑封料<br>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<sub>C</sub>=25°C)

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

■ 热特性 Thermal Characteristics

| 参数<br>PARAMETER                             | 符号<br>SYMBOL      | 最大值 MAX |          | 单位<br>UNIT |
|---------------------------------------------|-------------------|---------|----------|------------|
|                                             |                   | TO-220F | TO-220AB |            |
| 热阻 结-壳 Thermal Resistance Junction-case     | R <sub>thJC</sub> | 5.43    | 2.31     | °C/W       |
| 热阻 结-环境 Thermal Resistance Junction-ambient | R <sub>thJA</sub> | 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<sub>DD</sub>=50V, L=56mH, R<sub>G</sub>=25Ω, I<sub>AS</sub>=2A (Starting T<sub>J</sub>=25°C, V<sub>DD</sub>=50V, L=56mH, R<sub>G</sub>=25Ω, I<sub>AS</sub>=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,  $T_c=25^\circ\text{C}$

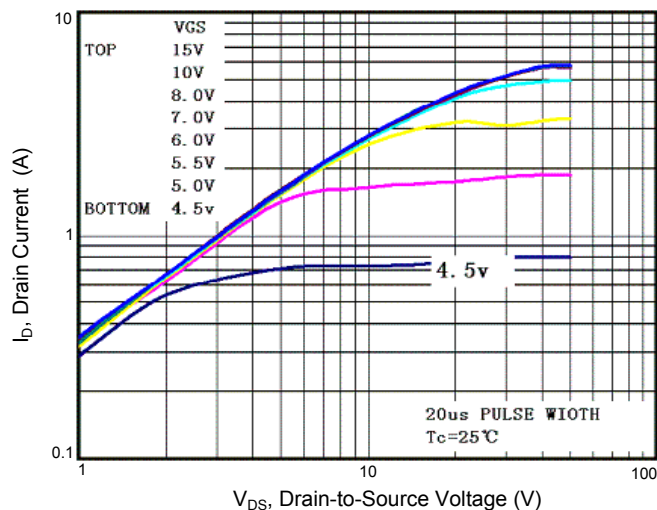


图2: 输出特性曲线,  $T_c=150^\circ\text{C}$

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

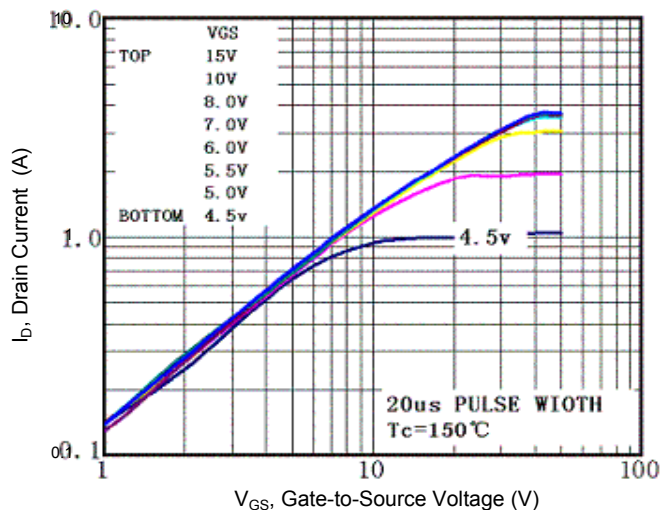


图3: 归一化导通电阻与温度曲线图

Fig3: Normalized On-Resistance Vs. Temperature

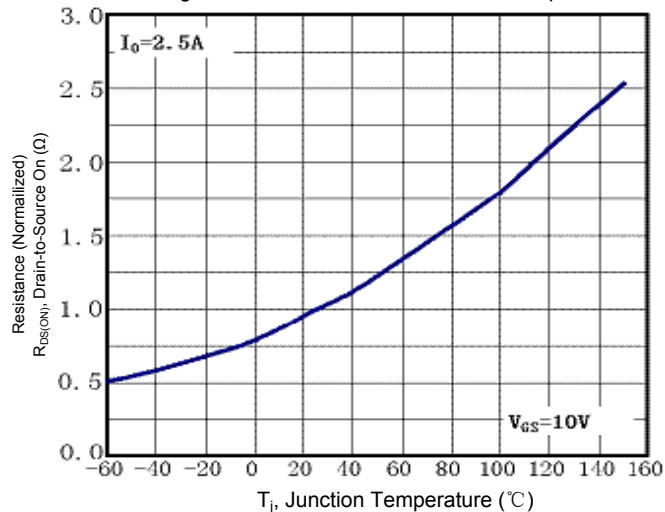


图4: 二极管正向电压曲线

Fig4: Typical Source-Drain Diode Forward Voltage

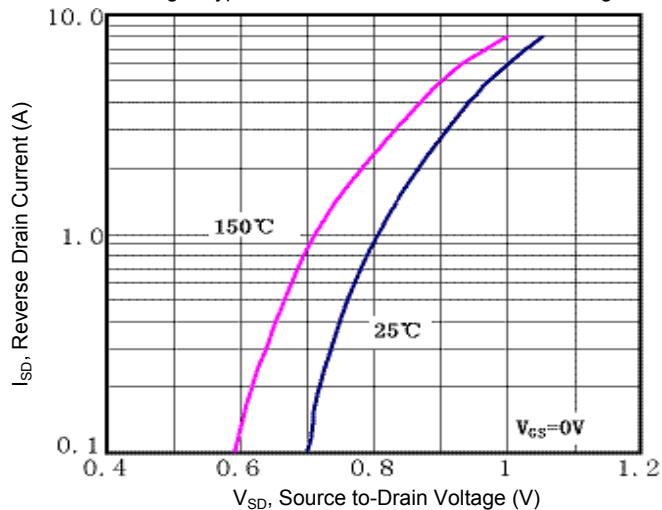


图5: 最大漏极电流与壳温曲线

Fig5: Maximum Drain Current Vs. Case Temperature

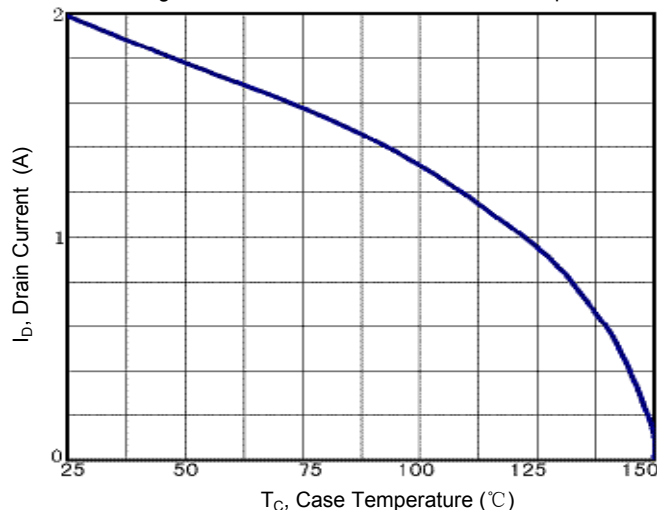
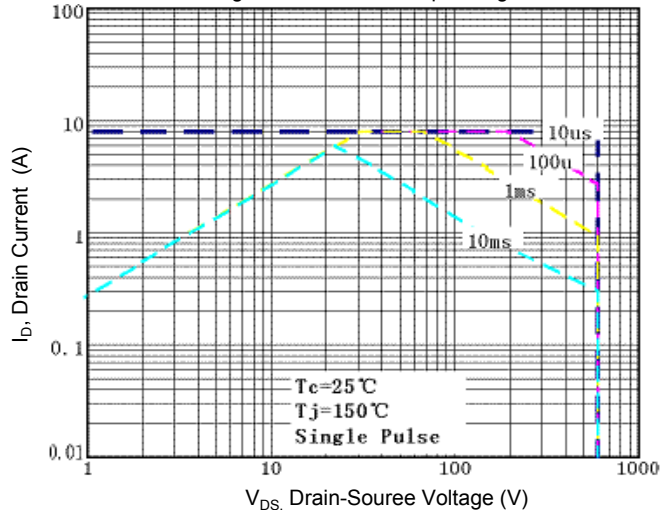
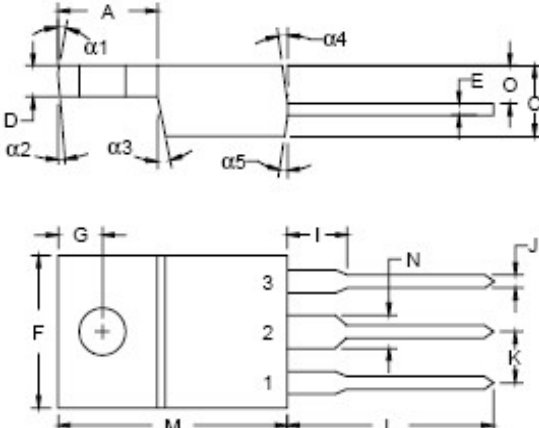


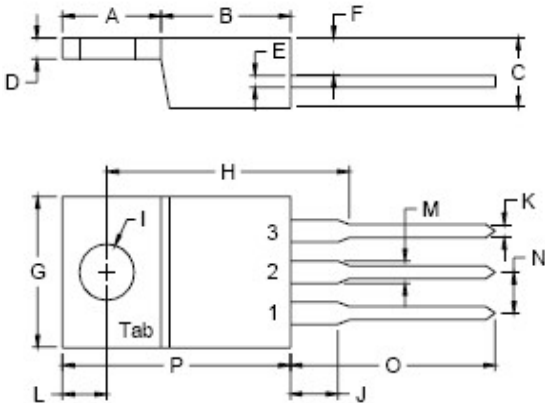
图6: 最大安全工作区曲线

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.  | <br><br>左上角: LOGO<br>AAA: 芯片代码<br>BBBBB: 批次识别码<br>aabb: 生产批号<br>其中:<br>aa: 出厂年份<br>bb: 出厂自然周<br>(01~53)<br>XXXXXXXX: 器件型号 |
|                                                                                   | 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. | <br><br>左上角: LOGO<br>AAA: 芯片代码<br>XXXXXXXX: 器件型号<br>BBBBB: 批次识别码<br>aabb: 生产批号<br>其中:<br>aa: 出厂年份<br>bb: 出厂自然周<br>(01~53) |
|                                                                                     | 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  |      |                                                                                                                                                                                                                |



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