



STH260N6F6-2 STP260N6F6

N-channel 60 V, 0.0016 Ω , 180 A TO-220, H²PAK-2
STripFET™ DeepGATE™ VI Power MOSFET

Preliminary data

Features

| Type | V _{DSS} | R _{DS(on) max} | I _D |
|--------------|------------------|-------------------------|----------------|
| STH260N6F6-2 | 60 V | < 0.002 Ω | 180 A |
| STP260N6F6 | 60 V | < 0.003 Ω | 120 A |

- N-channel enhancement mode
- 100% avalanche rated
- Low gate charge
- Very low on-resistance

Application

- Switching applications

Description

This STripFET™ DeepGATE™ Power MOSFET technology is among the latest improvements, which have been especially tailored to minimize on-state resistance, with a new gate structure, providing superior switching performances.

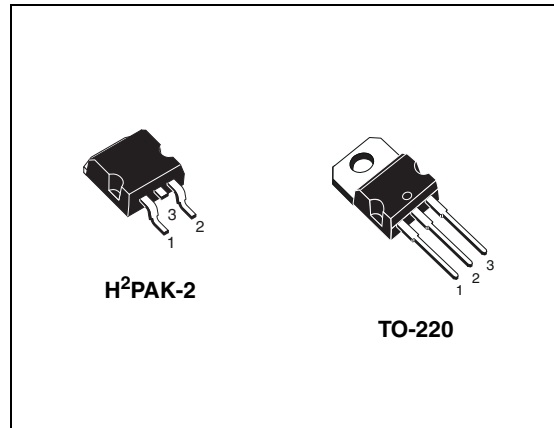
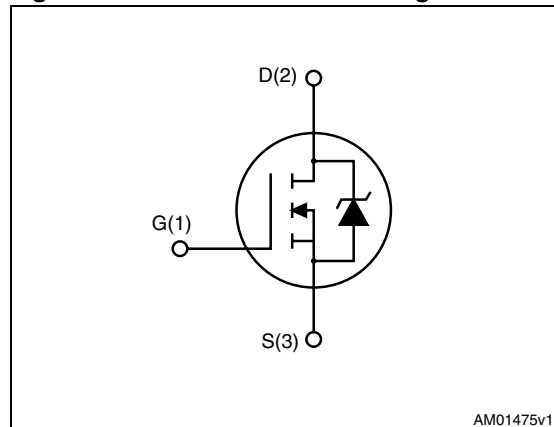


Figure 1. Internal schematic diagram



AM01475v1

Table 1. Device summary

| Order code | Marking | Package | Packaging |
|--------------|---------|----------------------|---------------|
| STH260N6F6-2 | 260N6F6 | H ² PAK-2 | Tape and reel |
| STP260N6F6 | 260N6F6 | TO-220 | Tube |

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1 Electrical ratings

Table 2. Absolute maximum ratings

| Symbol | Parameter | Value | | Unit |
|--------------------------------|---|-------------|----------------------|------|
| | | TO-220 | H ² PAK-2 | |
| V _{DS} | Drain-source voltage (V _{GS} = 0) | 75 | | V |
| V _{GS} | Gate-source voltage | ± 20 | | V |
| I _D | Drain current (continuous) at T _C = 25 °C | 120 | 180 | A |
| I _D | Drain current (continuous) at T _C = 100 °C | 134 | 170 | A |
| I _{DM} ⁽¹⁾ | Drain current (pulsed) | 480 | 720 | A |
| P _{TOT} | Total dissipation at T _C = 25 °C | 300 | | W |
| | Derating factor | 1 | 0.8 | W/°C |
| E _{AS} ⁽²⁾ | Single pulse avalanche energy | TBD | | mJ |
| T _{stg} | Storage temperature | – 55 to 175 | | °C |
| T _j | Operating junction temperature | | | |

1. Current limited by package.
2. Starting T_j = 25 °C, I_D = 35 A, V_{DD} = 50 V.

Table 3. Thermal data

| Symbol | Parameter | Value | | Unit |
|-------------------------------------|--|--------|----------------------|------|
| | | TO-220 | H ² PAK-2 | |
| R _{thj-case} | Thermal resistance junction-case max | 0.5 | | °C/W |
| R _{thj-a} | Thermal resistance junction-ambient max | 62.5 | | °C/W |
| R _{thj-pcb} ⁽¹⁾ | Thermal resistance junction-pcb max | | 35 | °C/W |
| T _l | Maximum lead temperature for soldering purpose | 300 | | °C |

1. When mounted on FR-4 board of 1 inch², 2 oz Cu.

2 Electrical characteristics

($T_{CASE} = 25\text{ °C}$ unless otherwise specified)

Table 4. On/off states

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---------------|---|--|------|------|----------|--------------------------------|
| $V_{(BR)DSS}$ | Drain-source Breakdown voltage | $I_D = 250\text{ }\mu\text{A}$, $V_{GS} = 0$ | 60 | | | V |
| I_{DSS} | Zero gate voltage Drain current ($V_{GS} = 0$) | $V_{DS} = \text{max rating}$ $V_{DS} = \text{max rating}$, $T_C = 125\text{ °C}$ | | | 1 100 | μA μA |
| I_{GSS} | Gate-body leakage current ($V_{DS} = 0$) | $V_{GS} = \pm 20\text{ V}$ | | | 100 | nA |
| $V_{GS(th)}$ | Gate threshold voltage | $V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$ | 2 | | 4 | V |
| $R_{DS(on)}$ | Static drain-source on resistance | For H ² PAK-2 $V_{GS} = 10\text{ V}$, $I_D = 90\text{ A}$ | | 1.6 | 2 | m Ω |
| | | For TO-220 $V_{GS} = 10\text{ V}$, $I_D = 60\text{ A}$ | | 2.4 | 3 | |

Table 5. Dynamic

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit | | |
|-----------|---------------------------------|--|------|-------|------|------|-----|----|
| C_{iss} | Input capacitance | | | 10500 | | pF | | |
| C_{oss} | Output capacitance | $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$ | - | 780 | - | pF | | |
| C_{rss} | Reverse transfer capacitance | | | | | | 440 | pF |
| Q_g | Total gate charge | $V_{DD} = 30\text{ V}$, $I_D = 120\text{ A}$, $V_{GS} = 10\text{ V}$ <i>(see Figure 3)</i> | - | 150 | - | nC | | |
| Q_{gs} | Gate-source charge | | | | | | TBD | nC |
| Q_{gd} | Gate-drain charge | | | | | | TBD | nC |

Table 6. Switching times

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit | | |
|--------------|---------------------|---|------|------|------|------|-----|----|
| $t_{d(on)}$ | Turn-on delay time | $V_{DD} = 30\text{ V}$, $I_D = 60\text{ A}$ $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$ <i>(see Figure 2)</i> | - | TBD | - | ns | | |
| t_r | Rise time | | | | | | TBD | ns |
| $t_{d(off)}$ | Turn-off-delay time | | | | | | TBD | ns |
| t_f | Fall time | | | | | | TBD | ns |

Table 7. Source drain diode

| Symbol | Parameter | Test conditions | Min. | Typ. | Max | Unit |
|-----------------------------------|--|--|------|-------------------|-----|---------------|
| I_{SD} | Source-drain current | For TO-220 | - | | 120 | A |
| | | For H ² PAK-2 | - | | 180 | A |
| $I_{SDM}^{(1)}$ | Source-drain current (pulsed) | TO-220 | - | | 480 | A |
| | | H ² PAK-2 | - | | 720 | A |
| $V_{SD}^{(2)}$ | Forward on voltage | For TO-220 $I_{SD} = 120\text{ A}, V_{GS} = 0$ | - | | TBD | V |
| | | For H ² PAK-2 $I_{SD} = 180\text{ A}, V_{GS} = 0$ | | | | |
| t_{rr} Q_{rr} I_{RRM} | Reverse recovery time Reverse recovery charge Reverse recovery current | $I_{SD} = 120\text{ A}, V_{DD} = 60\text{ V}$ $di/dt = 100\text{ A}/\mu\text{s},$ $T_j = 150\text{ }^\circ\text{C}$ <i>(see Figure 4)</i> | - | TBD TBD TBD | | ns nC A |

1. Current limited by package.
2. Pulsed: pulse duration = 300 μs , duty cycle 1.5%

3 Test circuits

Figure 2. Switching times test circuit for resistive load

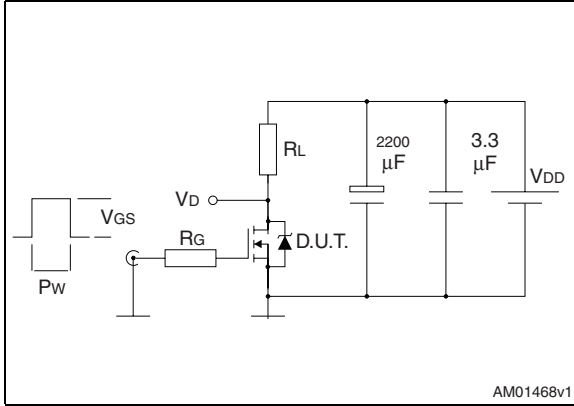


Figure 3. Gate charge test circuit

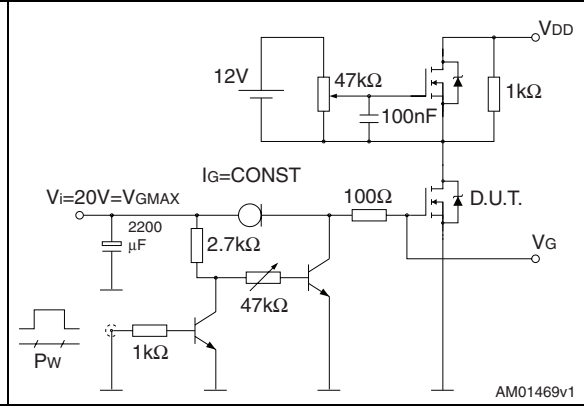


Figure 4. Test circuit for inductive load switching and diode recovery times

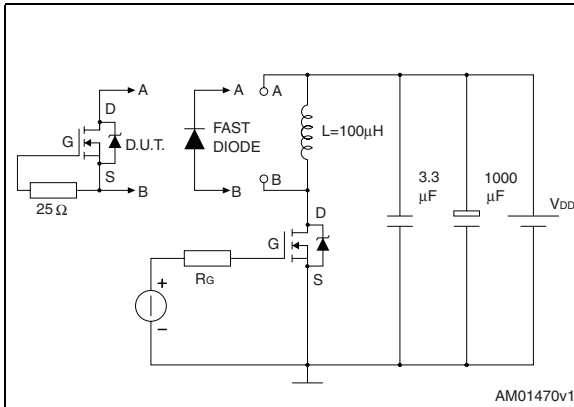


Figure 5. Unclamped inductive load test circuit

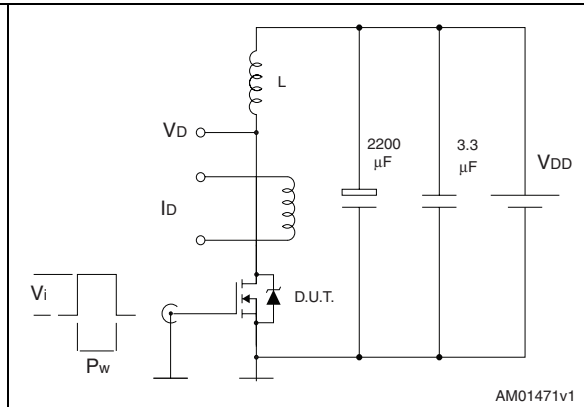


Figure 6. Unclamped inductive waveform

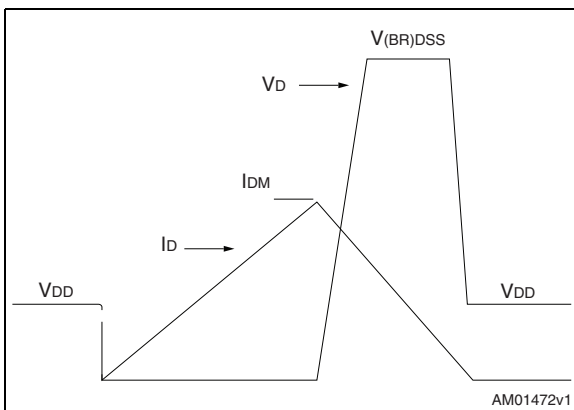
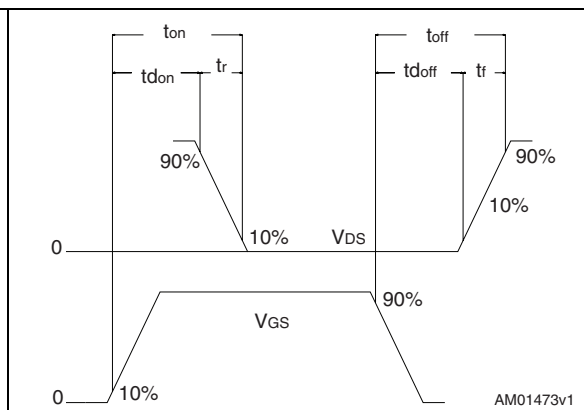


Figure 7. Switching time waveform



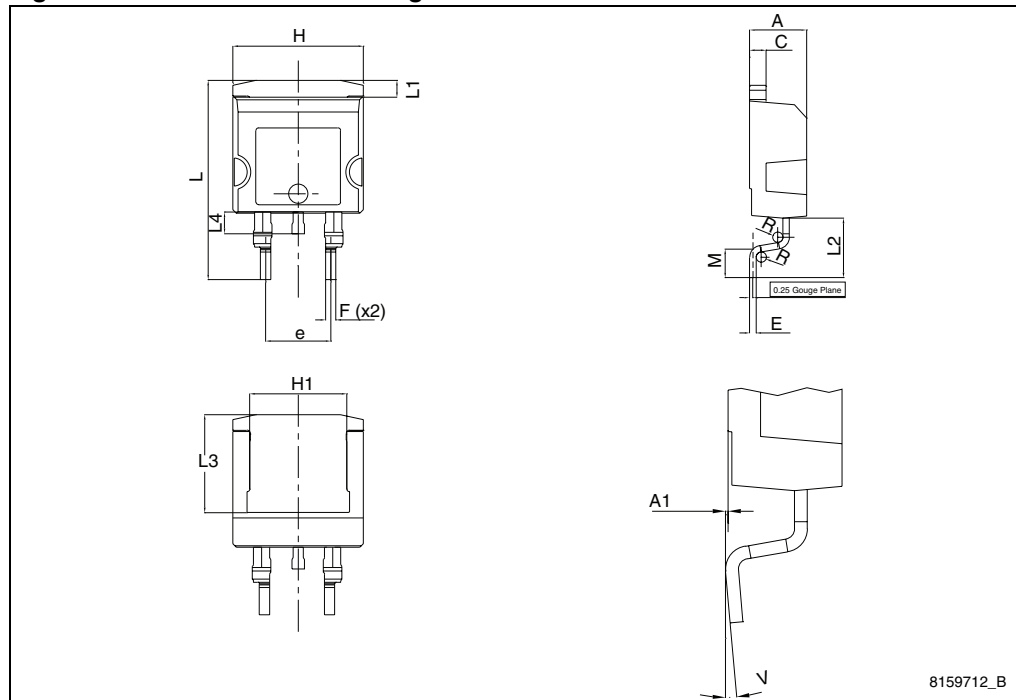
4 Package mechanical data

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Table 8. H²PAK 2 leads mechanical data

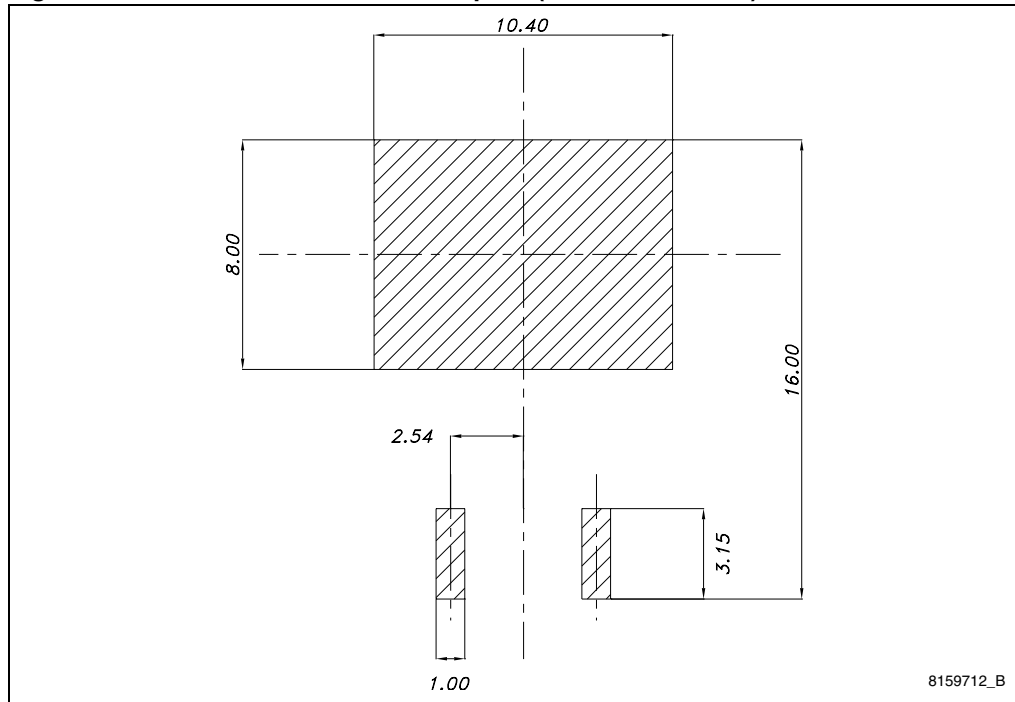
| Dim. | mm | | |
|------|-------|------|-------|
| | Min. | Typ. | Max. |
| A | 4.30 | | 4.80 |
| A1 | 0.03 | | 0.20 |
| C | 1.17 | | 1.37 |
| e | 4.98 | | 5.18 |
| E | 0.50 | | 0.90 |
| F | 0.78 | | 0.85 |
| H | 10.00 | | 10.40 |
| H1 | 7.171 | | 7.971 |
| L | 15.30 | | 15.80 |
| L1 | 1.27 | | 1.40 |
| L2 | 4.93 | | 5.23 |
| L3 | 7.45 | | 7.85 |
| L4 | 1.5 | | 1.7 |
| M | 2.6 | | 2.9 |
| R | 0.20 | | 0.60 |
| V | 0° | | 8° |

Figure 8. H²PAK 2 leads drawing



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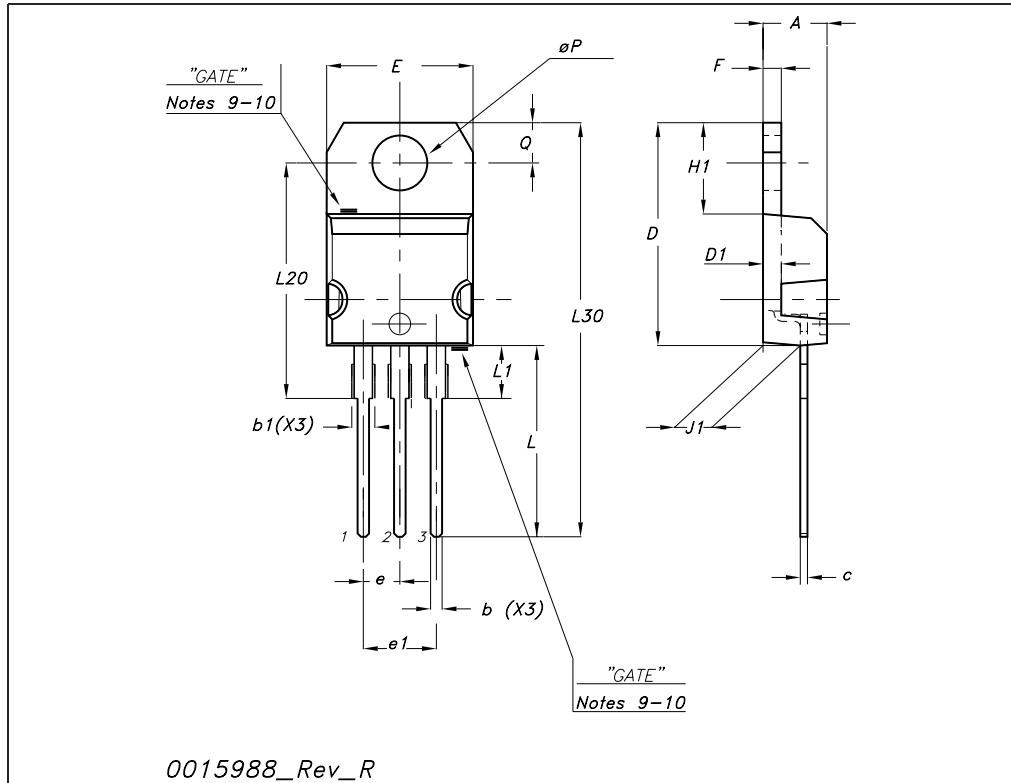
Figure 9. H²PAK2 recommended footprint (dimension in mm)



8159712_B

TO-220 mechanical data

| Dim | mm | | | inch | | |
|-----|-------|-------|-------|-------|-------|-------|
| | Min | Typ | Max | Min | Typ | Max |
| A | 4.40 | | 4.60 | 0.173 | | 0.181 |
| b | 0.61 | | 0.88 | 0.024 | | 0.034 |
| b1 | 1.14 | | 1.70 | 0.044 | | 0.066 |
| c | 0.48 | | 0.70 | 0.019 | | 0.027 |
| D | 15.25 | | 15.75 | 0.6 | | 0.62 |
| D1 | | 1.27 | | | 0.050 | |
| E | 10 | | 10.40 | 0.393 | | 0.409 |
| e | 2.40 | | 2.70 | 0.094 | | 0.106 |
| e1 | 4.95 | | 5.15 | 0.194 | | 0.202 |
| F | 1.23 | | 1.32 | 0.048 | | 0.051 |
| H1 | 6.20 | | 6.60 | 0.244 | | 0.256 |
| J1 | 2.40 | | 2.72 | 0.094 | | 0.107 |
| L | 13 | | 14 | 0.511 | | 0.551 |
| L1 | 3.50 | | 3.93 | 0.137 | | 0.154 |
| L20 | | 16.40 | | | 0.645 | |
| L30 | | 28.90 | | | 1.137 | |
| ∅P | 3.75 | | 3.85 | 0.147 | | 0.151 |
| Q | 2.65 | | 2.95 | 0.104 | | 0.116 |



5 Revision history

Table 9. Document revision history

| Date | Revision | Changes |
|-------------|----------|----------------|
| 07-May-2010 | 1 | First release. |

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