



STI360N4F6, STP360N4F6

N-channel 40 V, 120 A STripFET™ VI DeepGATE™
Power MOSFET in I²PAK and TO-220 packages

Datasheet – preliminary data

Features

| Order codes | V _{DSS} | R _{DS(on)} max | I _D |
|-------------|------------------|----------------------------|----------------------|
| STI360N4F6 | 40 V | < 1.8 mΩ | 120 A ⁽¹⁾ |
| STP360N4F6 | | | |

- 1. Current limited by package
- Low gate charge
- Very low on-resistance
- High avalanche ruggedness

Applications

- Switching applications

Description

These devices are N-channel Power MOSFETs developed using the 6th generation of STripFET™ DeepGATE™ technology, with a new gate structure. The resulting Power MOSFETs exhibits the lowest R_{DS(on)} in all packages.

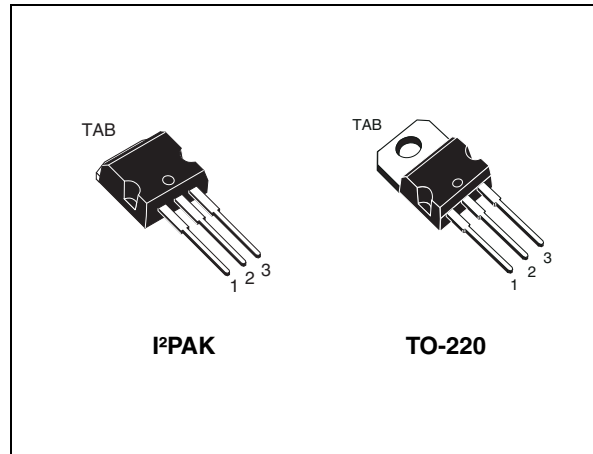


Figure 1. Internal schematic diagram

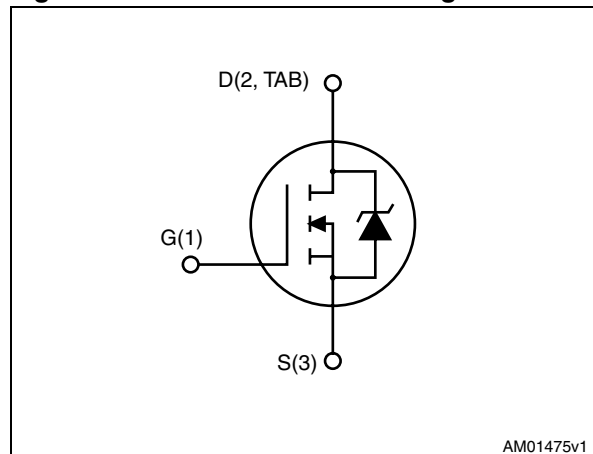


Table 1. Device summary

| Order codes | Marking | Package | Packaging |
|-------------|---------|--------------------|-----------|
| STI360N4F6 | 360N4F6 | I ² PAK | Tube |
| STP360N4F6 | | TO-220 | |

Contents

| | | |
|---|----------------------------------|----|
| 1 | Electrical ratings | 3 |
| 2 | Electrical characteristics | 4 |
| 3 | Package mechanical data | 6 |
| 4 | Revision history | 10 |

1 Electrical ratings

Table 2. Absolute maximum ratings

| Symbol | Parameter | Value | Unit |
|----------------|---|-------------|---------------------|
| V_{DS} | Drain-source voltage | 40 | V |
| V_{GS} | Gate-source voltage | ± 20 | V |
| $I_D^{(1)}$ | Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$ | 120 | A |
| $I_D^{(1)}$ | Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$ | 120 | A |
| $I_{DM}^{(1)}$ | Drain current (pulsed) | 480 | A |
| P_{TOT} | Total dissipation at $T_C = 25\text{ }^\circ\text{C}$ | 300 | W |
| | Derating factor | 2 | W/ $^\circ\text{C}$ |
| T_{stg} | Storage temperature | - 55 to 175 | $^\circ\text{C}$ |
| T_j | Operating junction temperature | | |

1. Current limited by package

Table 3. Thermal data

| Symbol | Parameter | Value | Unit |
|----------------|--|-------|---------------------------|
| $R_{thj-case}$ | Thermal resistance junction-case max | 0.5 | $^\circ\text{C}/\text{W}$ |
| R_{thj-a} | Thermal resistance junction-ambient max | 62.5 | $^\circ\text{C}/\text{W}$ |
| T_l | Maximum lead temperature for soldering purpose | 300 | $^\circ\text{C}$ |

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 ($V_{GS} = 0$) | $I_D = 250\ \mu A$ | 40 | | | V |
| I_{DSS} | Zero gate voltage Drain current ($V_{GS} = 0$) | $V_{DS} = 40\text{ V}$ $V_{DS} = 40\text{ V}, T_C = 125\text{ °C}$ | | | 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 | $V_{DS} = V_{GS}, I_D = 250\ \mu A$ | 3 | | 4.5 | V |
| $R_{DS(on)}$ | Static drain-source on-resistance | $V_{GS} = 10\text{ V}, I_D = 60\text{ A}$ | | TBD | 1.8 | m Ω |

Table 5. Dynamic

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|-----------|------------------------------|---|------|-------|------|------|
| C_{iss} | Input capacitance | $V_{DS} = 25\text{ V}, f = 1\text{ MHz},$ $V_{GS} = 0$ | | 17930 | | pF |
| C_{oss} | Output capacitance | | - | 1560 | - | pF |
| C_{rss} | Reverse transfer capacitance | | | 1170 | | pF |
| Q_g | Total gate charge | $V_{DD} = 20\text{ V}, I_D = 120\text{ A},$ $V_{GS} = 10\text{ V}$ | | 340 | | 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 |
|-----------------------|----------------------------------|--|------|------|------|------|
| $t_{d(on)}$ t_r | Turn-on delay time Rise time | $V_{DD} = 20\text{ V}, I_D = 60\text{ A}$ $R_G = 4.7\ \Omega, V_{GS} = 10\text{ V}$ | - | TBD | - | ns |
| $t_{d(off)}$ t_f | Turn-off-delay time Fall time | | - | TBD | - | ns |

Table 7. Source drain diode

| Symbol | Parameter | Test conditions | Min. | Typ. | Max | Unit |
|-----------------|-------------------------------|---|------|------|-----|------|
| $I_{SD}^{(1)}$ | Source-drain current | | - | | 120 | A |
| $I_{SDM}^{(1)}$ | Source-drain current (pulsed) | | - | | 480 | A |
| $V_{SD}^{(2)}$ | Forward on voltage | $I_{SD} = 120 \text{ A}, V_{GS} = 0$ | - | | 1.1 | V |
| t_{rr} | Reverse recovery time | $I_{SD} = 120 \text{ A}, V_{DD} = 32 \text{ V}$ $di/dt = 100 \text{ A}/\mu\text{s},$ $T_j = 150 \text{ }^\circ\text{C}$ | - | TBD | | ns |
| Q_{rr} | Reverse recovery charge | | | | | nC |
| I_{RRM} | Reverse recovery current | | | | | A |

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

3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK[®] packages, depending on their level of environmental compliance. ECOPACK[®] specifications, grade definitions and product status are available at: www.st.com. ECOPACK[®] is an ST trademark.

Table 8. I²PAK (TO-262) mechanical data

| DIM. | mm. | | |
|------|------|-----|-------|
| | min. | typ | max. |
| A | 4.40 | | 4.60 |
| A1 | 2.40 | | 2.72 |
| b | 0.61 | | 0.88 |
| b1 | 1.14 | | 1.70 |
| c | 0.49 | | 0.70 |
| c2 | 1.23 | | 1.32 |
| D | 8.95 | | 9.35 |
| e | 2.40 | | 2.70 |
| e1 | 4.95 | | 5.15 |
| E | 10 | | 10.40 |
| L | 13 | | 14 |
| L1 | 3.50 | | 3.93 |
| L2 | 1.27 | | 1.40 |

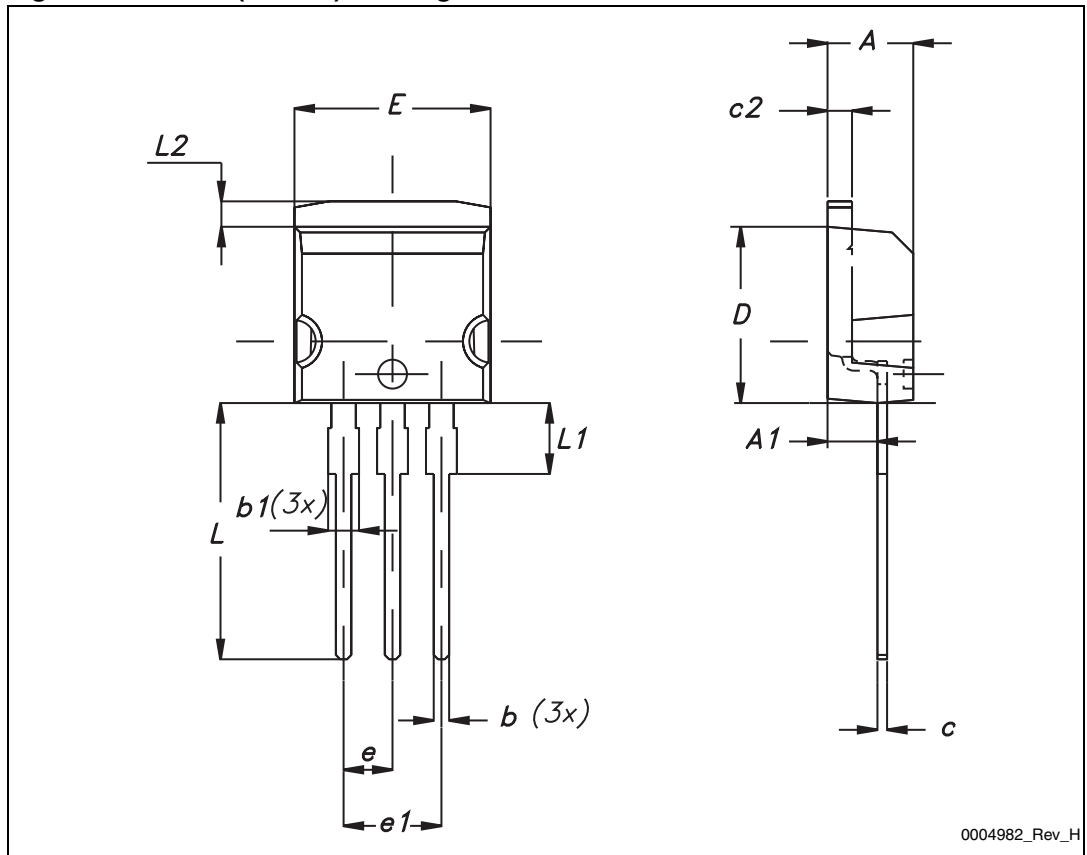
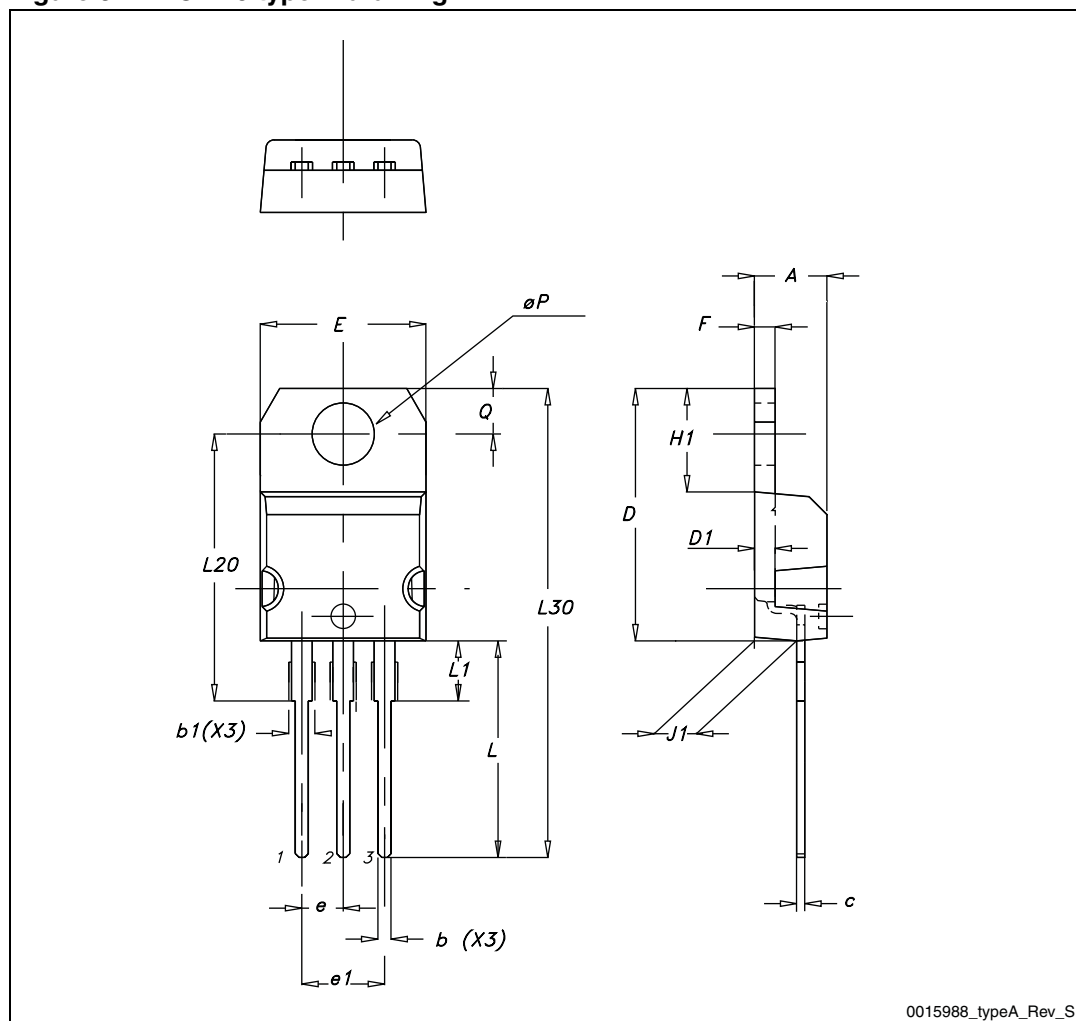
Figure 2. I²PAK (TO-262) drawing

Table 9. TO-220 type A mechanical data

| Dim. | mm | | |
|------|-------|-------|-------|
| | Min. | Typ. | Max. |
| A | 4.40 | | 4.60 |
| b | 0.61 | | 0.88 |
| b1 | 1.14 | | 1.70 |
| c | 0.48 | | 0.70 |
| D | 15.25 | | 15.75 |
| D1 | | 1.27 | |
| E | 10 | | 10.40 |
| e | 2.40 | | 2.70 |
| e1 | 4.95 | | 5.15 |
| F | 1.23 | | 1.32 |
| H1 | 6.20 | | 6.60 |
| J1 | 2.40 | | 2.72 |
| L | 13 | | 14 |
| L1 | 3.50 | | 3.93 |
| L20 | | 16.40 | |
| L30 | | 28.90 | |
| ØP | 3.75 | | 3.85 |
| Q | 2.65 | | 2.95 |

Figure 3. TO-220 type A drawing



4 Revision history

Table 10. Document revision history

| Date | Revision | Changes |
|-------------|----------|------------------|
| 08-Aug-2012 | 1 | Initial release. |

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY TWO AUTHORIZED ST REPRESENTATIVES, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2012 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com

