



# STD80N6F6

## N-channel 60 V, 80 A STripFET™ VI DeepGATE™ Power MOSFET in DPAK package

Datasheet – preliminary data

### Features

| Order codes | V <sub>DSS</sub> | R <sub>DS(on)</sub> max | I <sub>D</sub>      |
|-------------|------------------|-------------------------|---------------------|
| STD80N6F6   | 60 V             | 6.5 mΩ                  | 80 A <sup>(1)</sup> |

1. Current limited by package

- Low gate charge
- Very low on-resistance
- High avalanche ruggedness

### Applications

- Switching applications

### Description

This device is an N-channel Power MOSFET developed using the 6th generation of STripFET™ DeepGATE™ technology, with a new gate structure. The resulting Power MOSFET exhibits the lowest RDS(on) in all packages.

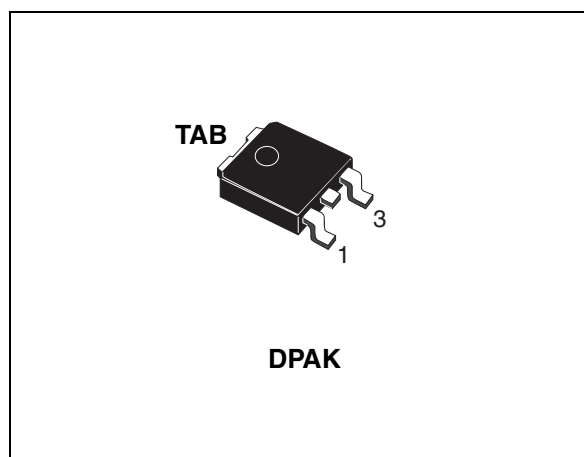


Figure 1. Internal schematic diagram

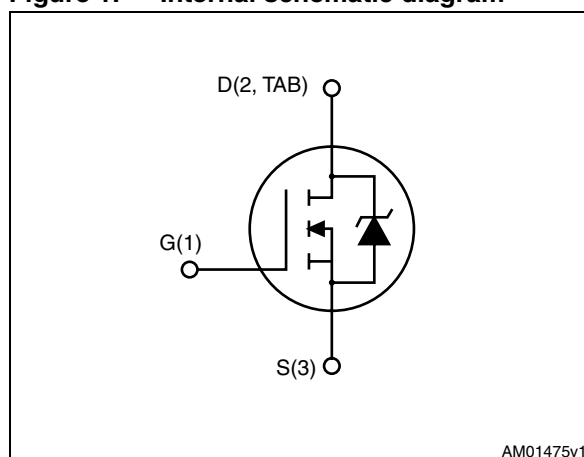


Table 1. Device summary

| Order codes | Marking | Package | Packaging     |
|-------------|---------|---------|---------------|
| STD80N6F6   | 80N6F6  | DPAK    | Tape and reel |

Contents

1      **Electrical ratings** ..... 3

2      **Electrical characteristics** ..... 4

3      **Package mechanical data** ..... 6

4      **Packaging mechanical data** ..... 8

5      **Revision history** ..... 10



# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

| Symbol         | Parameter                                                       | Value       | Unit                |
|----------------|-----------------------------------------------------------------|-------------|---------------------|
| $V_{DS}$       | Drain-source voltage                                            | 60          | V                   |
| $V_{GS}$       | Gate-source voltage                                             | $\pm 20$    | V                   |
| $I_D^{(1)}$    | Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$  | 80          | A                   |
| $I_D^{(1)}$    | Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$ | 80          | A                   |
| $I_{DM}^{(1)}$ | Drain current (pulsed)                                          | 320         | A                   |
| $P_{TOT}$      | Total dissipation at $T_C = 25\text{ }^\circ\text{C}$           | 120         | 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  | 1.25  | $^\circ\text{C}/\text{W}$ |
| $R_{thj-pcb}^{(1)}$ | Thermal resistance junction - PCB max | 50    | $^\circ\text{C}/\text{W}$ |

1. When mounted on FR-4 board of 1 inch<sup>2</sup>, 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 ( $V_{GS} = 0$ )  | $I_D = 250\text{ }\mu\text{A}$                                        | 60   |      |           | V                              |
| $I_{DSS}$     | Zero gate voltage Drain current ( $V_{GS} = 0$ ) | $V_{DS} = 60\text{ V}$<br>$V_{DS} = 60\text{ V}, T_C = 125\text{ °C}$ |      |      | 1<br>100  | $\mu\text{A}$<br>$\mu\text{A}$ |
| $I_{GSS}$     | Gate-body leakage current ( $V_{DS} = 0$ )       | $V_{GS} = \pm 20\text{ V}$                                            |      |      | $\pm 100$ | nA                             |
| $V_{GS(th)}$  | Gate threshold voltage                           | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$                       | 3    |      | 4.5       | V                              |
| $R_{DS(on)}$  | Static drain-source on-resistance                | $V_{GS} = 10\text{ V}, I_D = 40\text{ A}$                             |      | TBD  | 6.5       | m $\Omega$                     |

**Table 5. Dynamic**

| Symbol    | Parameter                    | Test conditions                                                      | Min. | Typ. | Max. | Unit |
|-----------|------------------------------|----------------------------------------------------------------------|------|------|------|------|
| $C_{iss}$ | Input capacitance            | $V_{DS} = 25\text{ V}, f = 1\text{ MHz},$<br>$V_{GS} = 0$            | -    | 7480 | -    | pF   |
| $C_{oss}$ | Output capacitance           |                                                                      |      | 450  |      | pF   |
| $C_{rss}$ | Reverse transfer capacitance |                                                                      |      | 310  |      | pF   |
| $Q_g$     | Total gate charge            | $V_{DD} = 30\text{ V}, I_D = 80\text{ A},$<br>$V_{GS} = 10\text{ V}$ | -    | 122  | -    | 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  | $V_{DD} = 30\text{ V}, I_D = 40\text{ A}$<br>$R_G = 4.7\text{ }\Omega, V_{GS} = 10\text{ V}$ | -    | TBD  | -    | ns   |
| $t_r$        | Rise time           |                                                                                              |      |      |      | ns   |
| $t_{d(off)}$ | Turn-off-delay time |                                                                                              | -    | TBD  | -    | ns   |
| $t_f$        | Fall time           |                                                                                              |      |      |      | ns   |

**Table 7. Source drain diode**

| Symbol          | Parameter                     | Test conditions                                                                                                                | Min. | Typ. | Max | Unit |
|-----------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------|------|------|-----|------|
| $I_{SD}$        | Source-drain current          |                                                                                                                                | -    |      | 80  | A    |
| $I_{SDM}^{(1)}$ | Source-drain current (pulsed) |                                                                                                                                | -    |      | 320 | A    |
| $V_{SD}^{(2)}$  | Forward on voltage            | $I_{SD} = 80\text{ A}$ , $V_{GS} = 0$                                                                                          | -    |      | 1.1 | V    |
| $t_{rr}$        | Reverse recovery time         | $I_{SD} = 80\text{ A}$ , $V_{DD} = 48\text{ V}$<br>$di/dt = 100\text{ A}/\mu\text{s}$ ,<br>$T_j = 150\text{ }^{\circ}\text{C}$ | -    | TBD  |     | ns   |
| $Q_{rr}$        | Reverse recovery charge       |                                                                                                                                |      |      |     | nC   |
| $I_{RRM}$       | Reverse recovery current      |                                                                                                                                |      |      |     | A    |

1. Current limited by package

2. Pulsed: pulse duration = 300  $\mu\text{s}$ , 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](http://www.st.com). ECOPACK® is an ST trademark.

**Table 8. DPAK (TO-252) mechanical data**

| Dim. | mm   |      |       |
|------|------|------|-------|
|      | Min. | Typ. | Max.  |
| A    | 2.20 |      | 2.40  |
| A1   | 0.90 |      | 1.10  |
| A2   | 0.03 |      | 0.23  |
| b    | 0.64 |      | 0.90  |
| b4   | 5.20 |      | 5.40  |
| c    | 0.45 |      | 0.60  |
| c2   | 0.48 |      | 0.60  |
| D    | 6.00 |      | 6.20  |
| D1   |      | 5.10 |       |
| E    | 6.40 |      | 6.60  |
| E1   |      | 4.70 |       |
| e    |      | 2.28 |       |
| e1   | 4.40 |      | 4.60  |
| H    | 9.35 |      | 10.10 |
| L    | 1    |      |       |
| L1   |      | 2.80 |       |
| L2   |      | 0.80 |       |
| L4   | 0.60 |      | 1     |
| R    |      | 0.20 |       |
| V2   | 0°   |      | 8°    |

Figure 2. DPAK (TO-252) drawing

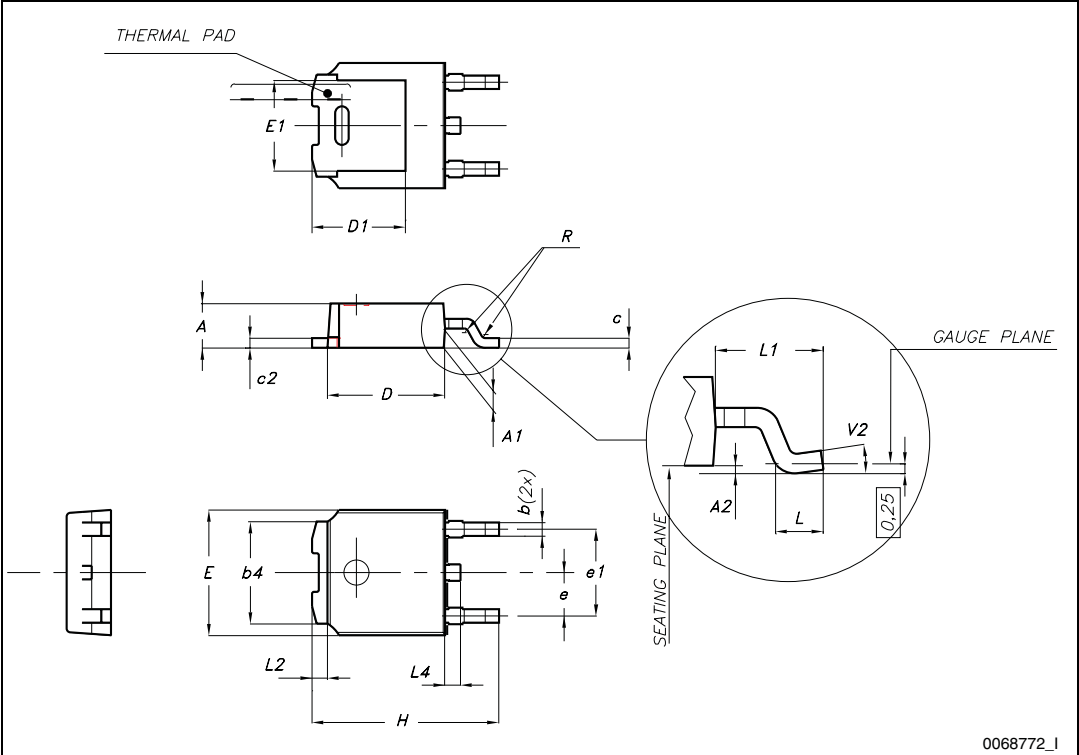
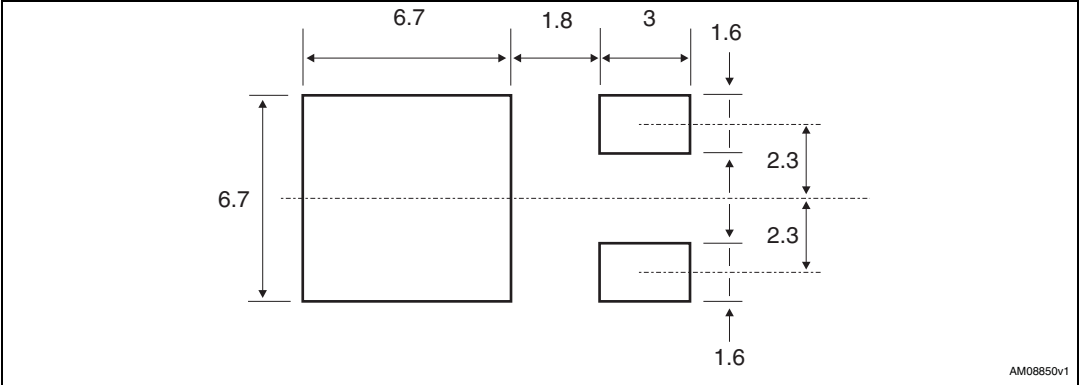


Figure 3. DPAK footprint<sup>(a)</sup>



a. All dimensions are in millimeters.

## 4 Packaging mechanical data

**Table 9. DPAK (TO-252) tape and reel mechanical data**

| Tape |      |      | Reel      |      |      |
|------|------|------|-----------|------|------|
| Dim. | mm   |      | Dim.      | mm   |      |
|      | Min. | Max. |           | Min. | Max. |
| A0   | 6.8  | 7    | A         |      | 330  |
| B0   | 10.4 | 10.6 | B         | 1.5  |      |
| B1   |      | 12.1 | C         | 12.8 | 13.2 |
| D    | 1.5  | 1.6  | D         | 20.2 |      |
| D1   | 1.5  |      | G         | 16.4 | 18.4 |
| E    | 1.65 | 1.85 | N         | 50   |      |
| F    | 7.4  | 7.6  | T         |      | 22.4 |
| K0   | 2.55 | 2.75 |           |      |      |
| P0   | 3.9  | 4.1  | Base qty. |      | 2500 |
| P1   | 7.9  | 8.1  | Bulk qty. |      | 2500 |
| P2   | 1.9  | 2.1  |           |      |      |
| R    | 40   |      |           |      |      |
| T    | 0.25 | 0.35 |           |      |      |
| W    | 15.7 | 16.3 |           |      |      |



Figure 4. Tape for DPAK (TO-252)

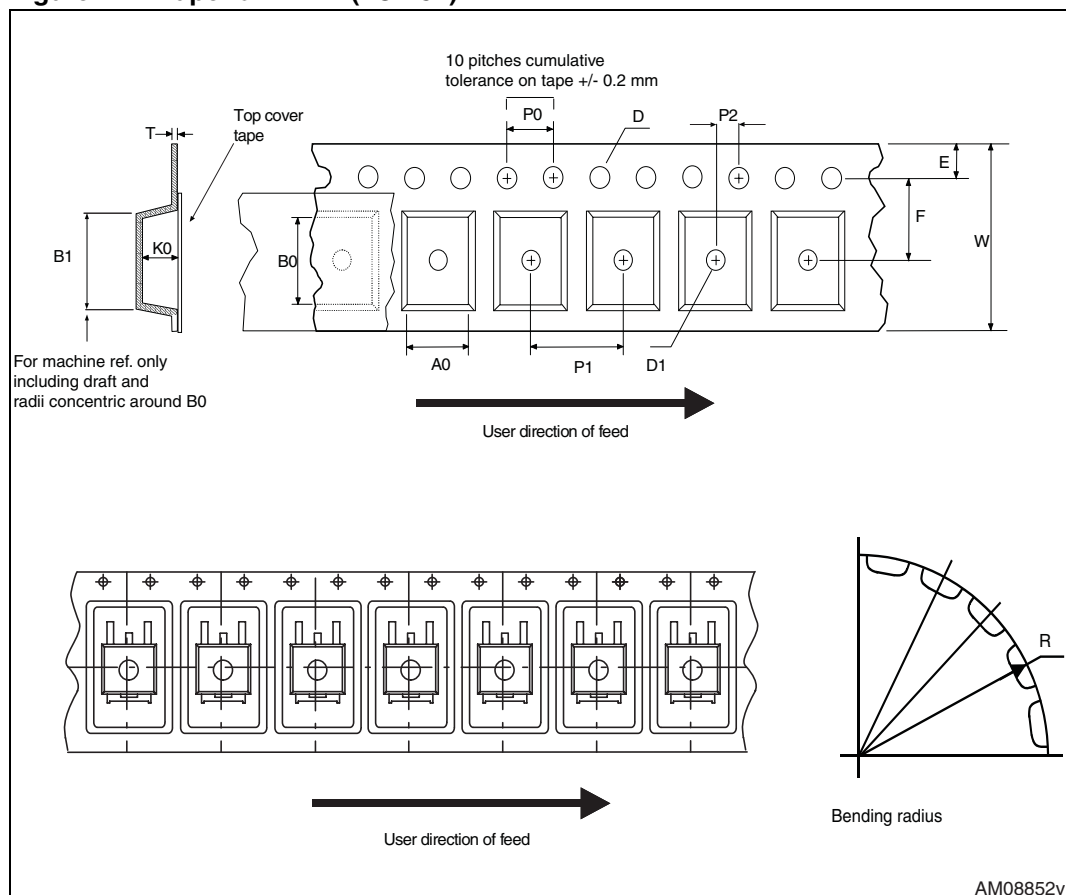
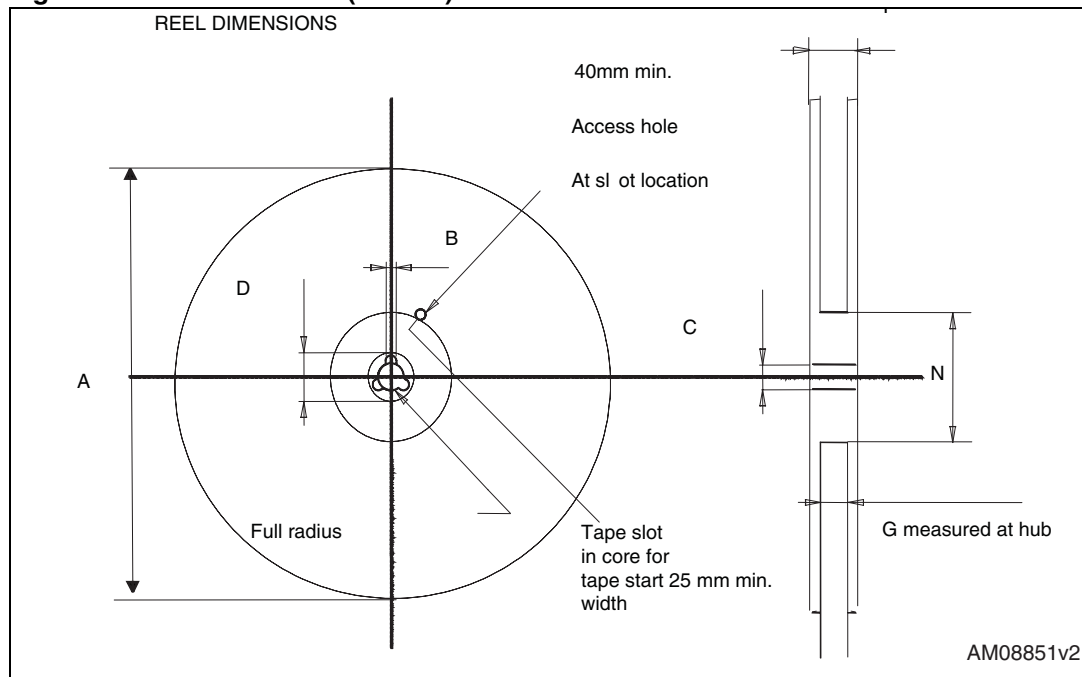


Figure 5. Reel for DPAK (TO-252)



## 5 Revision history

**Table 10. Document revision history**

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

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