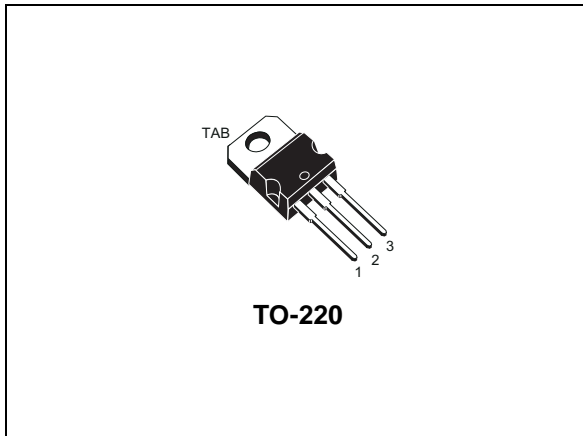
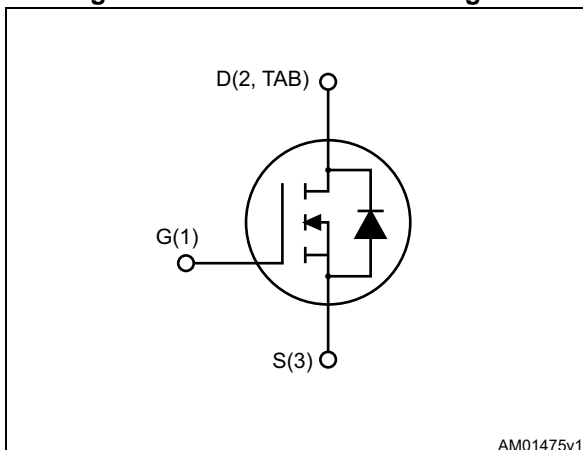


## N-channel 80 V, 0.0056 $\Omega$ typ., 110 A, STripFET™ F6 Power MOSFET in a TO-220 package

Datasheet - production data



**Figure 1. Internal schematic diagram**



### Features

| Order code | V <sub>DS</sub> | R <sub>DS(on)max</sub> | I <sub>D</sub> | P <sub>TOT</sub> |
|------------|-----------------|------------------------|----------------|------------------|
| STP110N8F6 | 80 V            | 0.0065 $\Omega$        | 110 A          | 200 W            |

- Very low on-resistance
- Very low gate charge
- High avalanche ruggedness
- Low gate drive power loss

### Applications

- Switching applications

### Description

This device is an N-channel Power MOSFET developed using the STripFET™ F6 technology with a new trench gate structure. The resulting Power MOSFET exhibits very low R<sub>DS(on)</sub> in all packages.

**Table 1. Device summary**

| Order code | Marking | Package | Packing |
|------------|---------|---------|---------|
| STP110N8F6 | 110N8F6 | TO-220  | Tube    |

# Contents

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# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

| Symbol         | Parameter   | Value      | Unit               |
|----------------|---|------------|--------------------|
| $V_{DS}$       | Drain-source voltage                                | 80         | V                  |
| $V_{GS}$       | Gate-source voltage                                 | $\pm 20$   | V                  |
| $I_D$          | Drain current (continuous) at $T_C = 25\text{ °C}$  | 110        | A                  |
| $I_D$          | Drain current (continuous) at $T_C = 100\text{ °C}$ | 85         | A                  |
| $I_{DM}^{(1)}$ | Drain current (pulsed)                              | 440        | A                  |
| $P_{TOT}$      | Total dissipation at $T_C = 25\text{ °C}$           | 200        | W                  |
| $E_{AS}^{(2)}$ | Single pulse avalanche energy                       | 180        | mJ                 |
| $T_J$          | Operating junction temperature                      | -55 to 175 | $^{\circ}\text{C}$ |
| $T_{stg}$      | Storage temperature                                 |            | $^{\circ}\text{C}$ |

1. Pulse width is limited by safe operating area

2. Starting  $T_J = 25\text{ °C}$ ,  $I_D = 55\text{ A}$ ,  $V_{DD} = 60\text{ V}$

**Table 3. Thermal data**

| Symbol         | Parameter                                | Value | Unit                        |
|----------------|--|-------|-----------------------------|
| $R_{thj-case}$ | Thermal resistance junction-case max.    | 0.75  | $^{\circ}\text{C}/\text{W}$ |
| $R_{thj-amb}$  | Thermal resistance junction-ambient max. | 62.5  | $^{\circ}\text{C}/\text{W}$ |

## 2 Electrical characteristics

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

**Table 4. On/off-state**

| Symbol        | Parameter                          | Test conditions   | Min. | Typ.   | Max.   | Unit          |
|---------------|------------------------------------|---|------|--------|--------|---------------|
| $V_{(BR)DSS}$ | Drain-source breakdown voltage     | $V_{GS} = 0, I_D = 1\text{ mA}$                         | 80   |        |        | V             |
| $I_{DSS}$     | Zero-gate voltage drain current    | $V_{GS} = 0, V_{DS} = 80\text{ V}$                      |      |        | 1      | $\mu\text{A}$ |
|               |                                    | $V_{GS} = 0, V_{DS} = 80\text{ V}, T_C = 125\text{ °C}$ |      |        | 100    | $\mu\text{A}$ |
| $I_{GSS}$     | Gate-body leakage current          | $V_{DS} = 0, V_{GS} = +20\text{ V}$                     |      |        | 100    | nA            |
| $V_{GS(th)}$  | Gate threshold voltage             | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$         | 2.5  |        | 4.5    | V             |
| $R_{DS(on)}$  | Static drain-source on- resistance | $V_{GS} = 10\text{ V}, I_D = 55\text{ A}$               |      | 0.0056 | 0.0065 | $\Omega$      |

**Table 5. Dynamic**

| Symbol     | Parameter                    | Test conditions  | Min. | Typ. | Max. | Unit |
|------------|------------------------------|--|------|------|------|------|
| $C_{iss}$  | Input capacitance            | $V_{DS} = 40\text{ V}, f = 1\text{ MHz}, V_{GS} = 0$   | -    | 9130 | -    | pF   |
| $C_{oss}$  | Output capacitance           |  | -    | 320  | -    | pF   |
| $C_{riss}$ | Reverse transfer capacitance |  | -    | 225  | -    | pF   |
| $Q_g$      | Total gate charge            | $V_{DD} = 40\text{ V}, I_D = 110\text{ A}, V_{GS} = 10\text{ V}$<br>(see <a href="#">Figure 14</a> ) | -    | 150  | -    | nC   |
| $Q_{gs}$   | Gate-source charge           |  | -    | 40   | -    | nC   |
| $Q_{gd}$   | Gate-drain charge            |  | -    | 30   | -    | nC   |

**Table 6. Switching times**

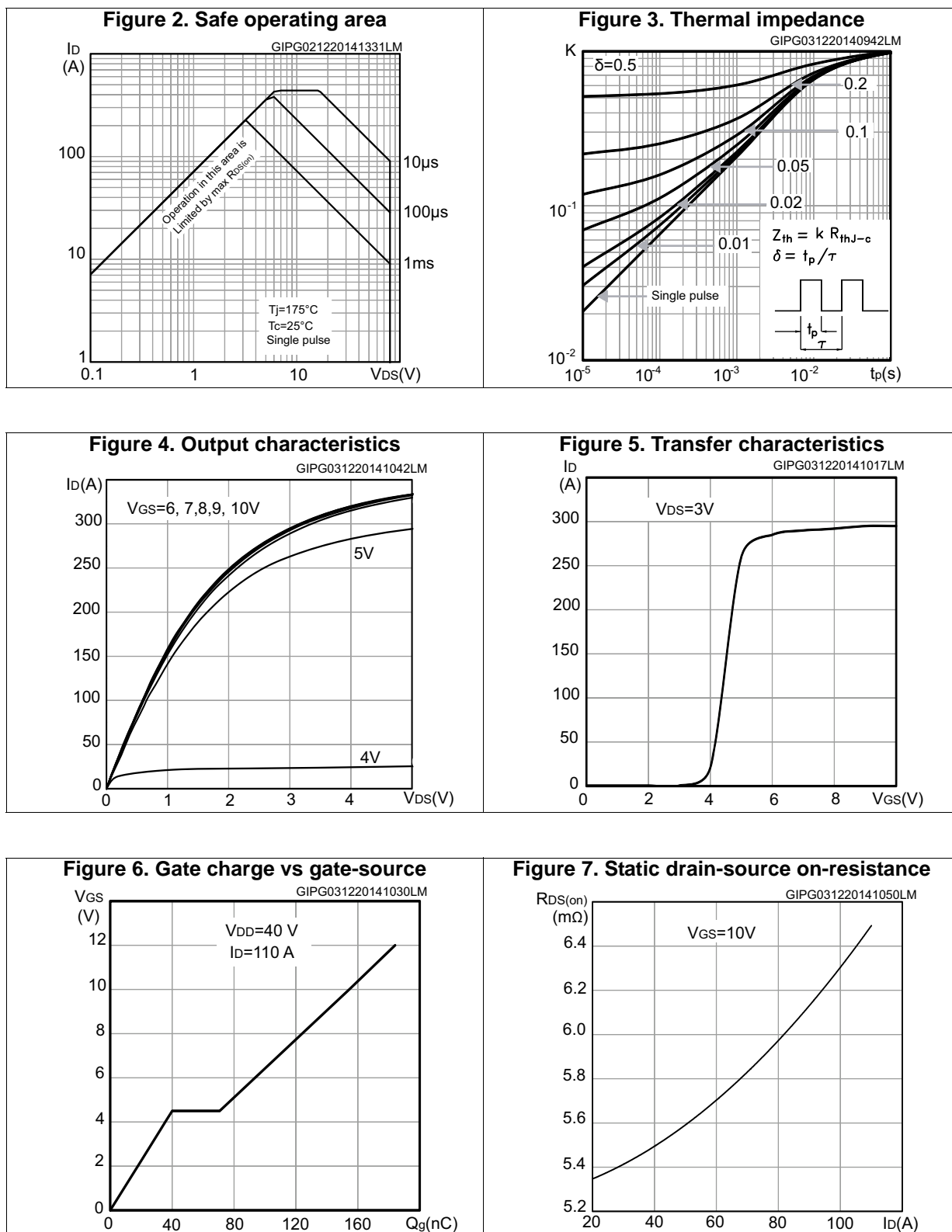
| Symbol       | Parameter           | Test conditions  | Min. | Typ. | Max. | Unit |
|--------------|---------------------|--|------|------|------|------|
| $t_{d(on)}$  | Turn-on delay time  | $V_{DD} = 40\text{ V}, I_D = 55\text{ A}, R_G = 4.7\text{ }\Omega, V_{GS} = 10\text{ V}$<br>(see <a href="#">Figure 13</a> ) | -    | 24   | -    | ns   |
| $t_r$        | Rise time           |  | -    | 61   | -    | ns   |
| $t_{d(off)}$ | Turn-off delay time |  | -    | 162  | -    | ns   |
| $t_f$        | Fall time           |  | -    | 48   | -    | ns   |

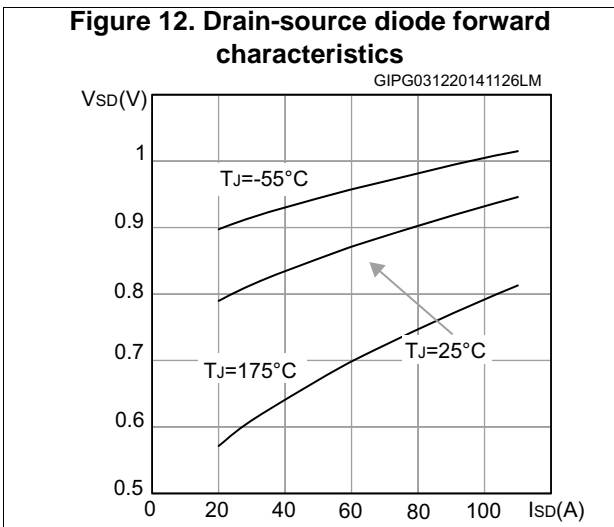
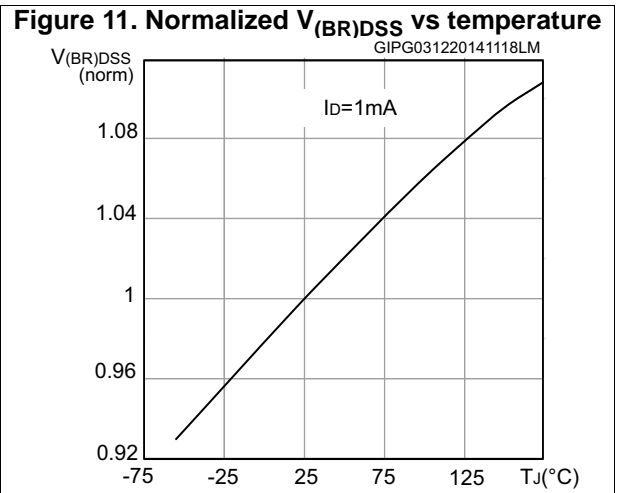
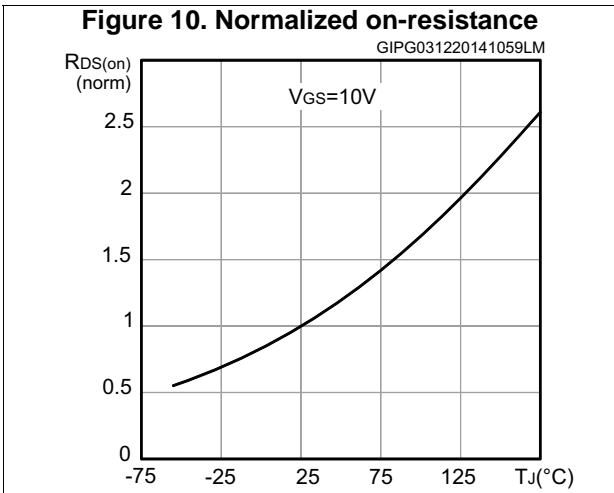
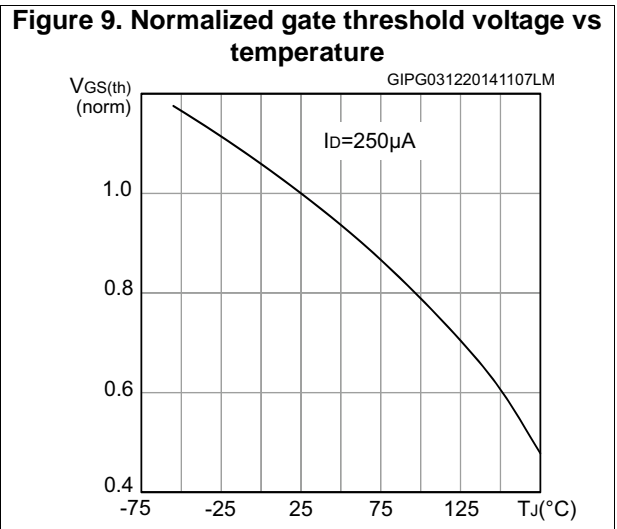
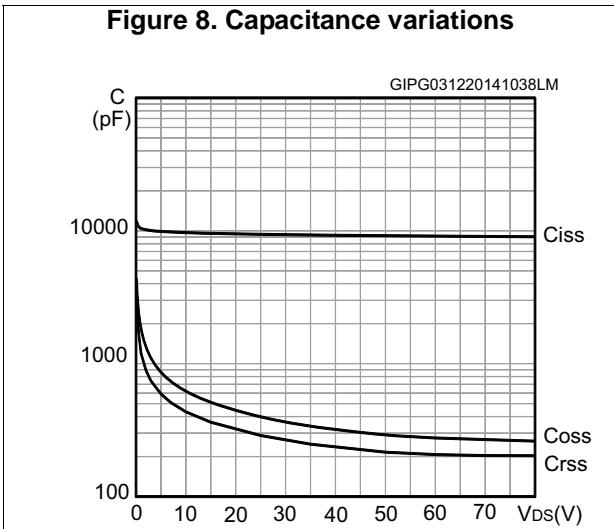
Table 7. Source-drain diode

| Symbol         | Parameter                | Test conditions  | Min. | Typ. | Max. | Unit |
|----------------|--------------------------|--|------|------|------|------|
| $V_{SD}^{(1)}$ | Forward on voltage       | $I_{SD} = 110 \text{ A}$ , $V_{GS} = 0$  | -    |      | 1.2  | V    |
| $t_{rr}$       | Reverse recovery time    | $I_{SD} = 110 \text{ A}$ , $di/dt = 100 \text{ A}/\mu\text{s}$<br>$V_{DD} = 64 \text{ V}$ (see <a href="#">Figure 15</a> ) | -    | 30   |      | ns   |
| $Q_{rr}$       | Reverse recovery charge  |  | -    | 34   |      | nC   |
| $I_{RRM}$      | Reverse recovery current |  | -    | 2.3  |      | A    |

1. Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

## 2.1 Electrical characteristics (curves)





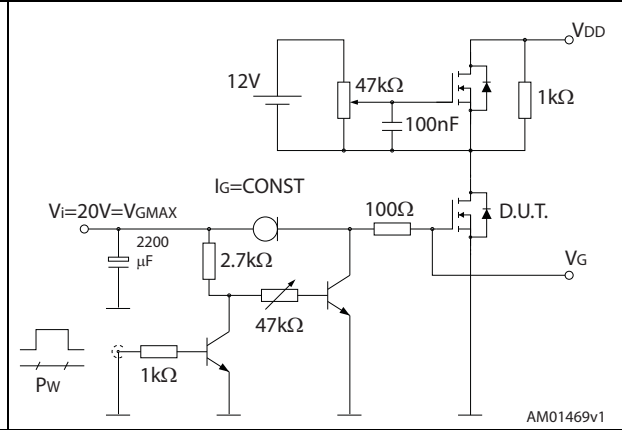
### 3 Test circuits

**Figure 13. Switching times test circuit for resistive load**



AM01468v1

**Figure 14. Gate charge test circuit**



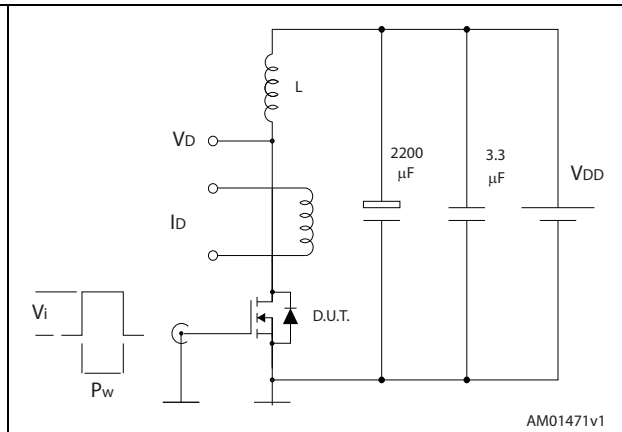
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**Figure 15. Test circuit for inductive load switching and diode recovery times**



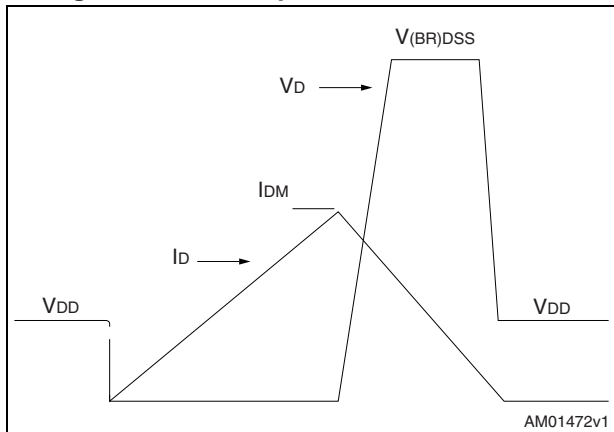
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**Figure 16. Unclamped inductive load test circuit**



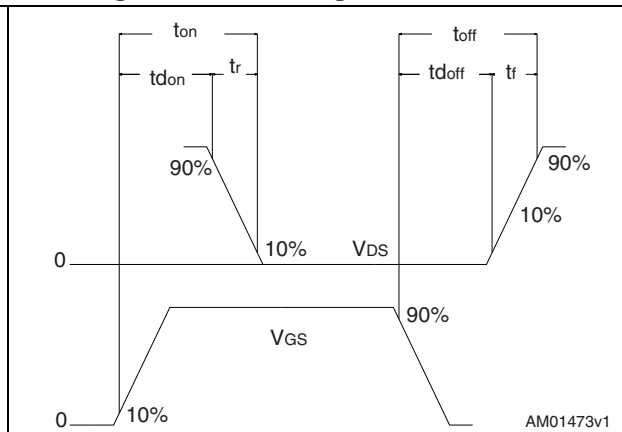
AM01471v1

**Figure 17. Unclamped inductive waveform**



AM01472v1

**Figure 18. Switching time waveform**



AM01473v1



## 4 Package information

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

### 4.1 TO-220 package information

Figure 19. TO-220 type A outline

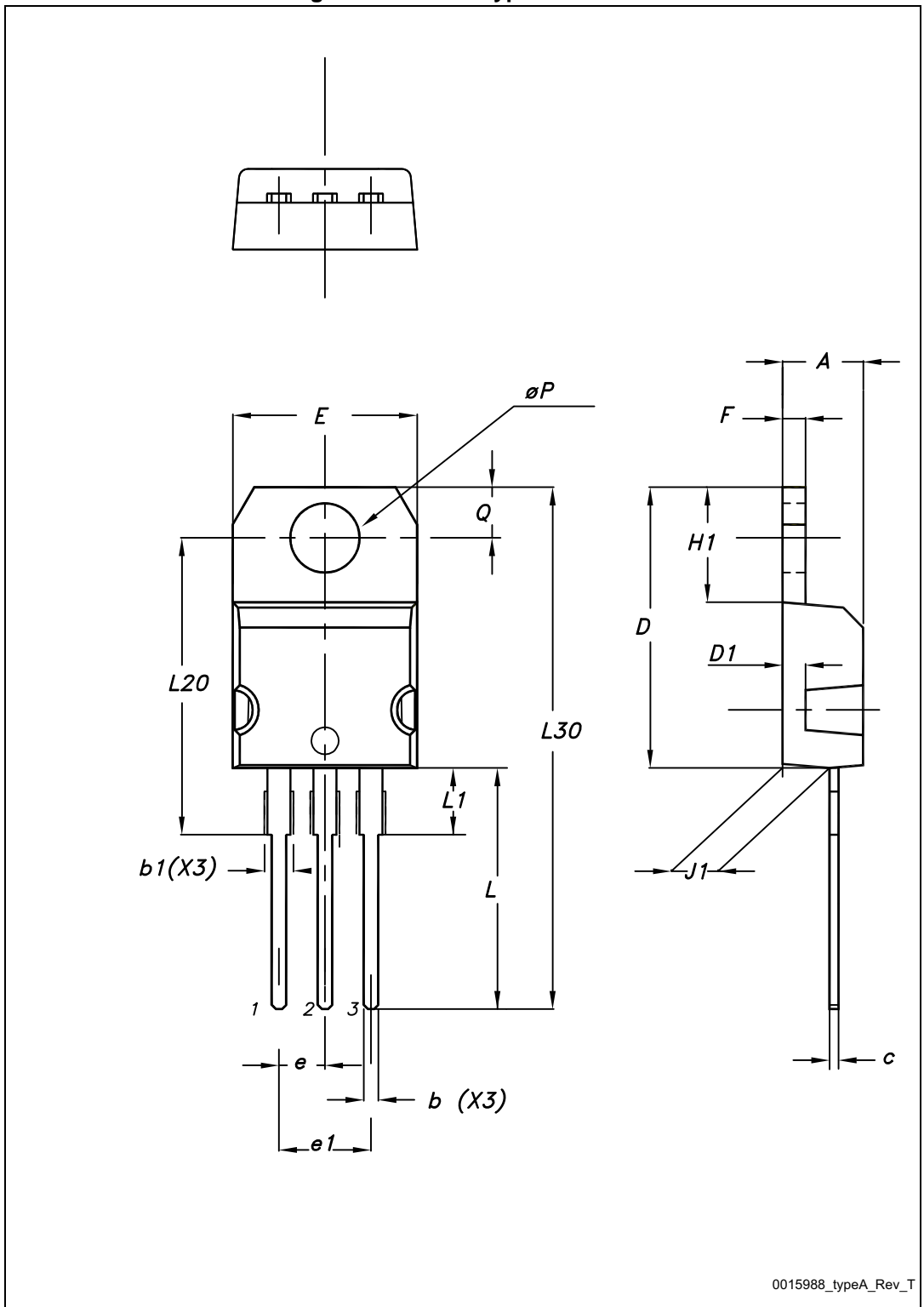


Table 8. TO-220 type A mechanical data

| 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  |

## 5 Revision history

**Table 9. Document revision history**

| Date        | Revision | Changes   |
|-------------|----------|---|
| 26-Sep-2014 | 1        | First release.  |
| 05-Dec-2014 | 2        | Updated in cover page the title and features.<br>Product status promoted from preliminary to production data.<br>Updated $E_{AS}$ parameter in <a href="#">Table 2</a> and $R_{DS(on)}$ in <a href="#">Table 4</a> .<br>Updated <a href="#">Table 5</a> , <a href="#">Table 6</a> and <a href="#">Table 7</a> .<br>Inserted <a href="#">Section 2.1</a> . |

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