

## Important notice

Dear Customer,

On 7 February 2017 the former NXP Standard Product business became a new company with the tradename **Nexperia**. Nexperia is an industry leading supplier of Discrete, Logic and PowerMOS semiconductors with its focus on the automotive, industrial, computing, consumer and wearable application markets

In data sheets and application notes which still contain NXP or Philips Semiconductors references, use the references to Nexperia, as shown below.

Instead of <http://www.nxp.com>, <http://www.philips.com/> or <http://www.semiconductors.philips.com/>, use **<http://www.nexperia.com>**

Instead of [sales.addresses@www.nxp.com](mailto:sales.addresses@www.nxp.com) or [sales.addresses@www.semiconductors.philips.com](mailto:sales.addresses@www.semiconductors.philips.com), use **[salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)** (email)

Replace the copyright notice at the bottom of each page or elsewhere in the document, depending on the version, as shown below:

- © NXP N.V. (year). All rights reserved or © Koninklijke Philips Electronics N.V. (year). All rights reserved

Should be replaced with:

- © **Nexperia B.V. (year). All rights reserved.**

If you have any questions related to the data sheet, please contact our nearest sales office via e-mail or telephone (details via **[salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)**). Thank you for your cooperation and understanding,

Kind regards,

Team Nexperia

# TrenchMOS™ transistor

## Logic level FET

PHT8N06LT

### GENERAL DESCRIPTION

N-channel enhancement mode logic level field-effect power transistor in a plastic envelope suitable for surface mounting. The device features very low on-state resistance and has integral zener diodes giving ESD protection. It is intended for use in DC-DC converters and general purpose switching applications.

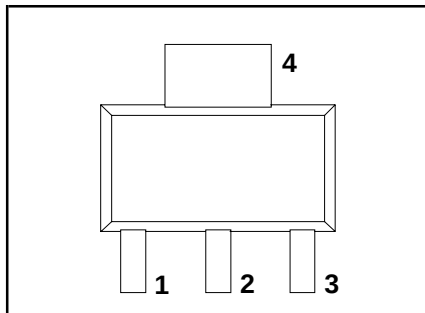
### QUICK REFERENCE DATA

| SYMBOL       | PARAMETER                                              | MAX. | UNIT |
|--------------|--------------------------------------------------------|------|------|
| $V_{DS}$     | Drain-source voltage                                   | 55   | V    |
| $I_D$        | Drain current                                          | 7.5  | A    |
| $P_{tot}$    | Total power dissipation                                | 1.8  | W    |
| $T_j$        | Junction temperature                                   | 150  | °C   |
| $R_{DS(ON)}$ | Drain-source on-state resistance $V_{GS} = 5\text{ V}$ | 80   | mΩ   |

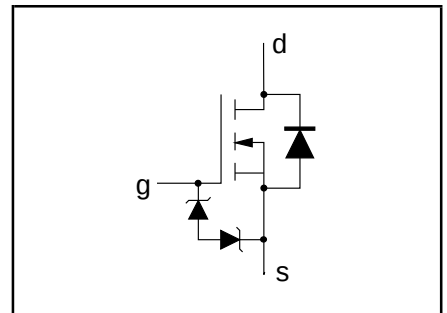
### PINNING - SOT223

| PIN | DESCRIPTION |
|-----|-------------|
| 1   | gate        |
| 2   | drain       |
| 3   | source      |
| 4   | drain (tab) |

### PIN CONFIGURATION



### SYMBOL



### LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134)

| SYMBOL         | PARAMETER                        | CONDITIONS                   | MIN. | MAX. | UNIT |
|----------------|----------------------------------|------------------------------|------|------|------|
| $V_{DS}$       | Drain-source voltage             | -                            | -    | 55   | V    |
| $V_{DGR}$      | Drain-gate voltage               | $R_{GS} = 20\text{ k}\Omega$ | -    | 55   | V    |
| $\pm V_{GS}$   | Gate-source voltage              | -                            | -    | 13   | V    |
| $I_D$          | Drain current (DC)               | $T_{sp} = 25\text{ °C}$      | -    | 7.5  | A    |
| $I_D$          | Drain current (DC)               | On PCB in Fig.2              | -    | 3.5  | A    |
| $I_D$          | Drain current (DC)               | $T_{amb} = 25\text{ °C}$     | -    | 2.2  | A    |
| $I_D$          | Drain current (DC)               | On PCB in Fig.2              | -    | 2.2  | A    |
| $I_{DM}$       | Drain current (pulse peak value) | $T_{amb} = 100\text{ °C}$    | -    | 40   | A    |
| $P_{tot}$      | Total power dissipation          | $T_{sp} = 25\text{ °C}$      | -    | 8.3  | W    |
| $P_{tot}$      | Total power dissipation          | On PCB in Fig.2              | -    | 1.8  | W    |
| $T_{stg}, T_j$ | Storage & operating temperature  | $T_{amb} = 25\text{ °C}$     | -55  | 150  | °C   |

### ESD LIMITING VALUE

| SYMBOL | PARAMETER                                 | CONDITIONS                        | MIN. | MAX. | UNIT |
|--------|-------------------------------------------|-----------------------------------|------|------|------|
| $V_C$  | Electrostatic discharge capacitor voltage | Human body model (100 pF, 1.5 kΩ) | -    | 2    | kV   |

# TrenchMOS™ transistor

## Logic level FET

PHT8N06LT

### THERMAL RESISTANCES

| SYMBOL          | PARAMETER                     | CONDITIONS               | TYP. | MAX. | UNIT |
|-----------------|-------------------------------|--------------------------|------|------|------|
| $R_{th\ j-sp}$  | From junction to solder point | Mounted on any PCB       | 12   | 15   | K/W  |
| $R_{th\ j-amb}$ | From junction to ambient      | Mounted on PCB of Fig.17 | -    | 70   | K/W  |

### STATIC CHARACTERISTICS

 $T_j = 25^\circ\text{C}$  unless otherwise specified

| SYMBOL            | PARAMETER                        | CONDITIONS                                                                                     | MIN.            | TYP.          | MAX.            | UNIT                           |
|-------------------|----------------------------------|------------------------------------------------------------------------------------------------|-----------------|---------------|-----------------|--------------------------------|
| $V_{(BR)DSS}$     | Drain-source breakdown voltage   | $V_{GS} = 0\text{ V}; I_D = 0.25\text{ mA}$<br>$T_j = -55^\circ\text{C}$                       | 55<br>50        | -<br>-        | -<br>-          | V<br>V                         |
| $V_{GS(TO)}$      | Gate threshold voltage           | $V_{DS} = V_{GS}; I_D = 1\text{ mA}$<br>$T_j = 150^\circ\text{C}$<br>$T_j = -55^\circ\text{C}$ | 1.0<br>0.6<br>- | 1.5<br>-<br>- | 2.0<br>-<br>2.3 | V<br>V<br>V                    |
| $I_{DSS}$         | Zero gate voltage drain current  | $V_{DS} = 55\text{ V}; V_{GS} = 0\text{ V};$<br>$T_j = 150^\circ\text{C}$                      | -<br>-          | 0.05<br>-     | 10<br>100       | $\mu\text{A}$<br>$\mu\text{A}$ |
| $I_{GSS}$         | Gate source leakage current      | $V_{GS} = \pm 5\text{ V}$<br>$T_j = 150^\circ\text{C}$                                         | -<br>-          | 0.02<br>-     | 1<br>5          | $\mu\text{A}$<br>$\mu\text{A}$ |
| $\pm V_{(BR)GSS}$ | Gate source breakdown voltage    | $I_G = \pm 1\text{ mA}$                                                                        | 10              | -             | -               | V                              |
| $R_{DS(ON)}$      | Drain-source on-state resistance | $V_{GS} = 5\text{ V}; I_D = 5\text{ A}$<br>$T_j = 150^\circ\text{C}$                           | -<br>-          | 65<br>-       | 80<br>148       | m $\Omega$<br>m $\Omega$       |

### DYNAMIC CHARACTERISTICS

 $T_{mb} = 25^\circ\text{C}$  unless otherwise specified

| SYMBOL       | PARAMETER                  | CONDITIONS                                                                                                        | MIN. | TYP. | MAX. | UNIT |
|--------------|----------------------------|-------------------------------------------------------------------------------------------------------------------|------|------|------|------|
| $g_{fs}$     | Forward transconductance   | $V_{DS} = 25\text{ V}; I_D = 5\text{ A}; T_j = 25^\circ\text{C}$                                                  | 4    | -    | -    | S    |
| $Q_{g(tot)}$ | Total gate charge          | $I_D = 7\text{ A}; V_{DD} = 44\text{ V}; V_{GS} = 5\text{ V}$                                                     | -    | 11.2 | -    | nC   |
| $Q_{gs}$     | Gate-source charge         |                                                                                                                   | -    | 2.2  | -    | nC   |
| $Q_{gd}$     | Gate-drain (Miller) charge |                                                                                                                   | -    | 5    | -    | nC   |
| $C_{iss}$    | Input capacitance          | $V_{GS} = 0\text{ V}; V_{DS} = 25\text{ V}; f = 1\text{ MHz}$                                                     | -    | 500  | 650  | pF   |
| $C_{oss}$    | Output capacitance         |                                                                                                                   | -    | 110  | 135  | pF   |
| $C_{rss}$    | Feedback capacitance       |                                                                                                                   | -    | 60   | 85   | pF   |
| $t_{d\ on}$  | Turn-on delay time         | $V_{DD} = 30\text{ V}; I_D = 7\text{ A};$<br>$V_{GS} = 5\text{ V}; R_G = 10\ \Omega;$<br>$T_j = 25^\circ\text{C}$ | -    | 10   | 15   | ns   |
| $t_r$        | Turn-on rise time          |                                                                                                                   | -    | 30   | 50   | ns   |
| $t_{d\ off}$ | Turn-off delay time        |                                                                                                                   | -    | 30   | 45   | ns   |
| $t_f$        | Turn-off fall time         |                                                                                                                   | -    | 30   | 40   | ns   |

### REVERSE DIODE LIMITING VALUES AND CHARACTERISTICS

 $T_j = -55$  to  $175^\circ\text{C}$  unless otherwise specified

| SYMBOL    | PARAMETER                        | CONDITIONS                                                                                             | MIN. | TYP. | MAX. | UNIT          |
|-----------|----------------------------------|--------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| $I_{DR}$  | Continuous reverse drain current | $T_{sp} = 25^\circ\text{C}$                                                                            | -    | -    | 7.5  | A             |
| $I_{DRM}$ | Pulsed reverse drain current     | $T_{sp} = 25^\circ\text{C}$                                                                            | -    | -    | 40   | A             |
| $V_{SD}$  | Diode forward voltage            | $I_F = 5\text{ A}; V_{GS} = 0\text{ V}$                                                                | -    | 0.85 | 1.1  | V             |
| $t_{rr}$  | Reverse recovery time            | $I_F = 5\text{ A}; -dI_F/dt = 100\text{ A}/\mu\text{s};$<br>$V_{GS} = -10\text{ V}; V_R = 30\text{ V}$ | -    | 38   | -    | ns            |
| $Q_{rr}$  | Reverse recovery charge          |                                                                                                        | -    | 0.2  | -    | $\mu\text{C}$ |

---

**TrenchMOS™ transistor**  
**Logic level FET**

---

**PHT8N06LT**

---

**AVALANCHE LIMITING VALUE**

| SYMBOL    | PARAMETER                                                       | CONDITIONS                                                                                                                    | MIN. | TYP. | MAX. | UNIT |
|-----------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|
| $W_{DSS}$ | Drain-source non-repetitive unclamped inductive turn-off energy | $I_D = 2.5\text{ A}$ ; $V_{DD} \leq 25\text{ V}$ ;<br>$V_{GS} = 5\text{ V}$ ; $R_{GS} = 50\ \Omega$ ; $T_{sp} = 25\text{ °C}$ | -    | -    | 30   | mJ   |

# TrenchMOS™ transistor

## Logic level FET

PHT8N06LT

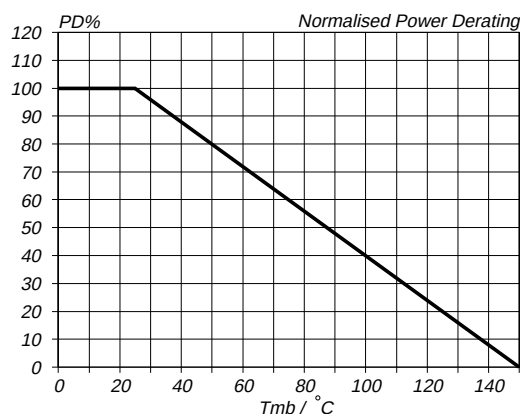


Fig.1. Normalised power dissipation.  
 $PD\% = 100 \cdot P_D / P_{D\ 25\ ^\circ C} = f(T_{sp})$

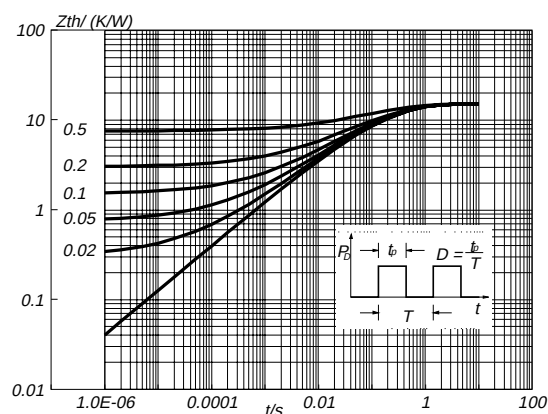


Fig.4. Transient thermal impedance.  
 $Z_{th\ j-sp} = f(t)$ ; parameter  $D = t_p / T$

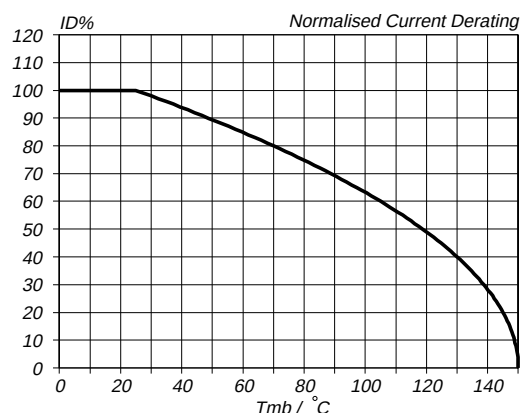


Fig.2. Normalised continuous drain current.  
 $ID\% = 100 \cdot I_D / I_{D\ 25\ ^\circ C} = f(T_{sp})$ ; conditions:  $V_{GS} \geq 5\ V$

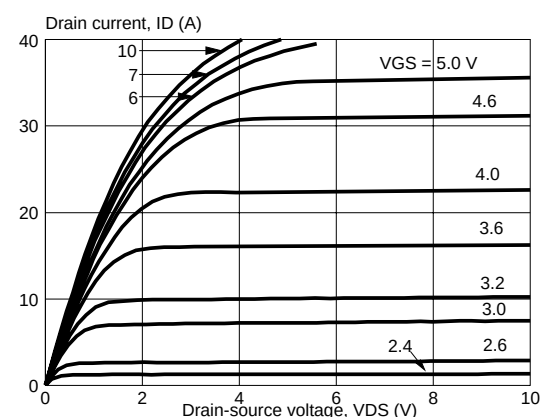


Fig.5. Typical output characteristics,  $T_j = 25\ ^\circ C$ .  
 $I_D = f(V_{DS})$ ; parameter  $V_{GS}$

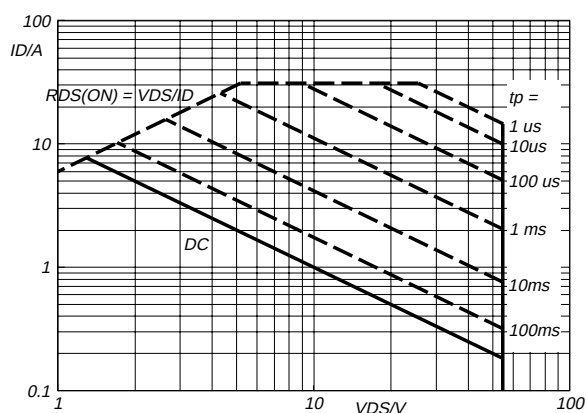


Fig.3. Safe operating area.  $T_{sp} = 25\ ^\circ C$   
 $I_D$  &  $I_{DM} = f(V_{DS})$ ;  $I_{DM}$  single pulse; parameter  $t_p$

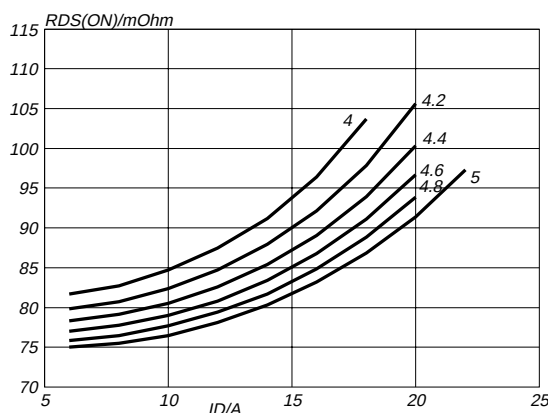
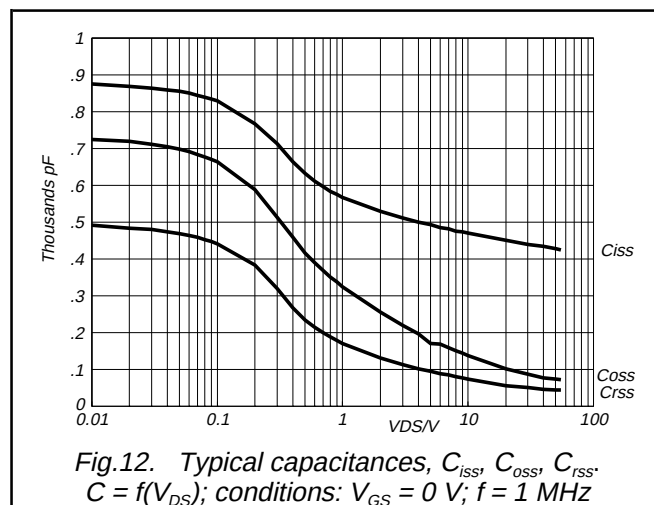
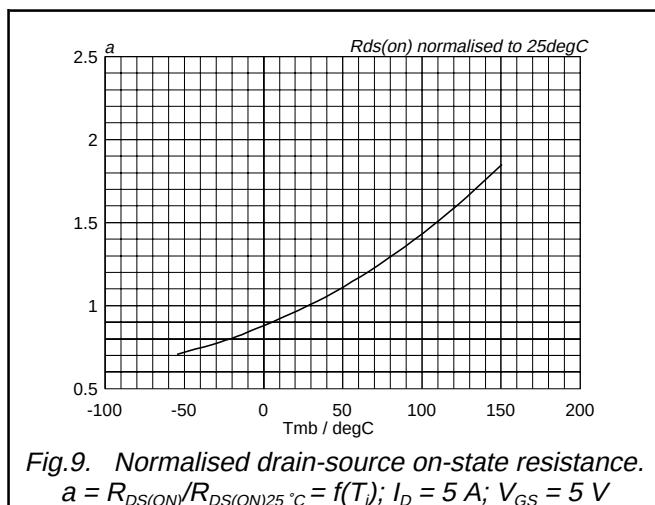
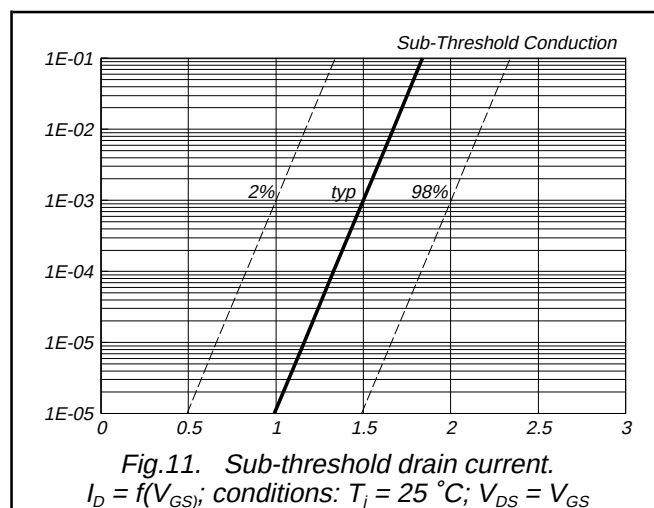
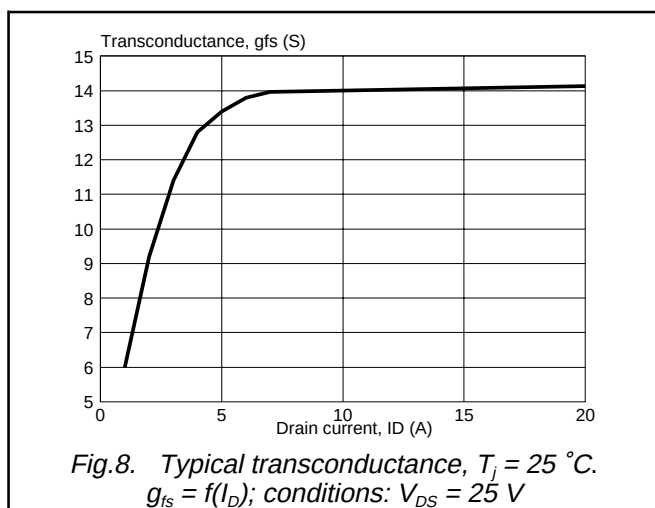
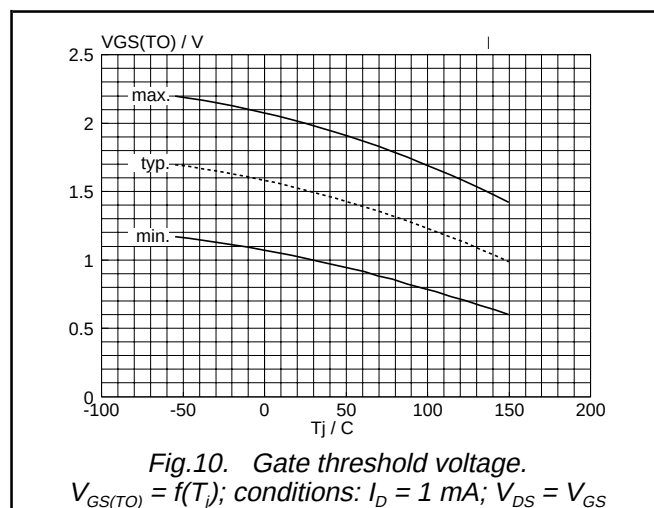
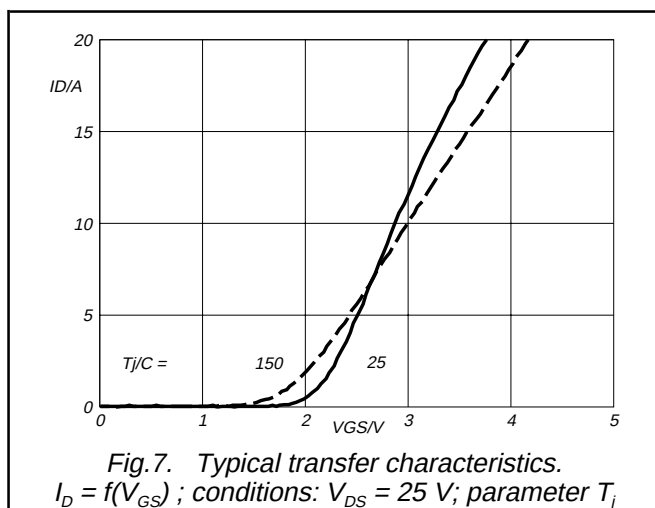


Fig.6. Typical on-state resistance,  $T_j = 25\ ^\circ C$ .  
 $R_{DS(ON)} = f(I_D)$ ; parameter  $V_{GS}$

# TrenchMOS™ transistor

## Logic level FET

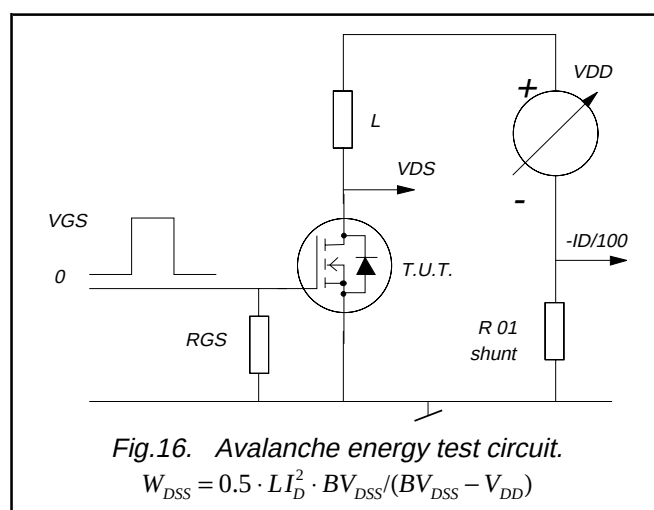
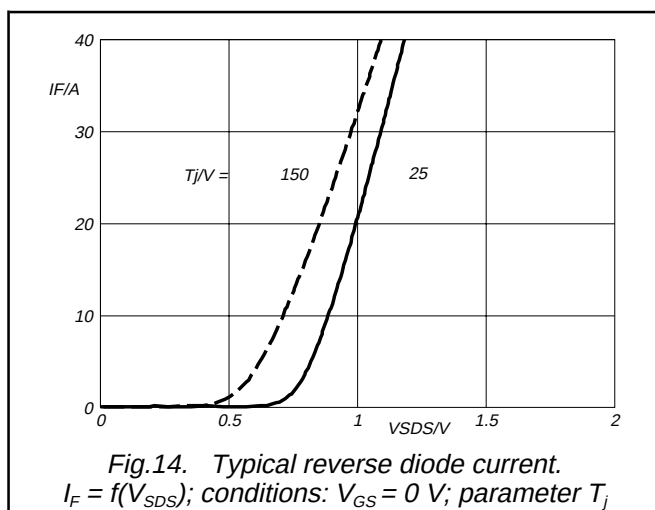
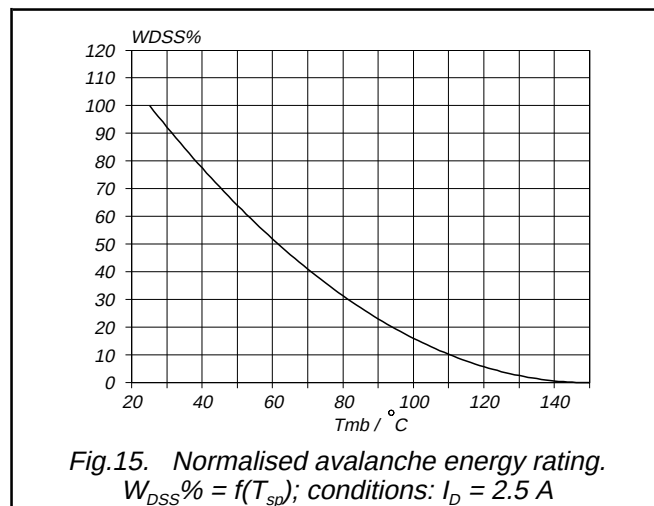
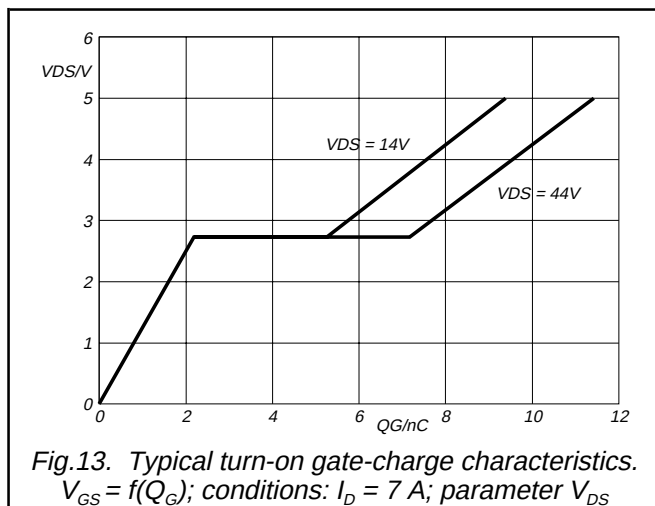
PHT8N06LT

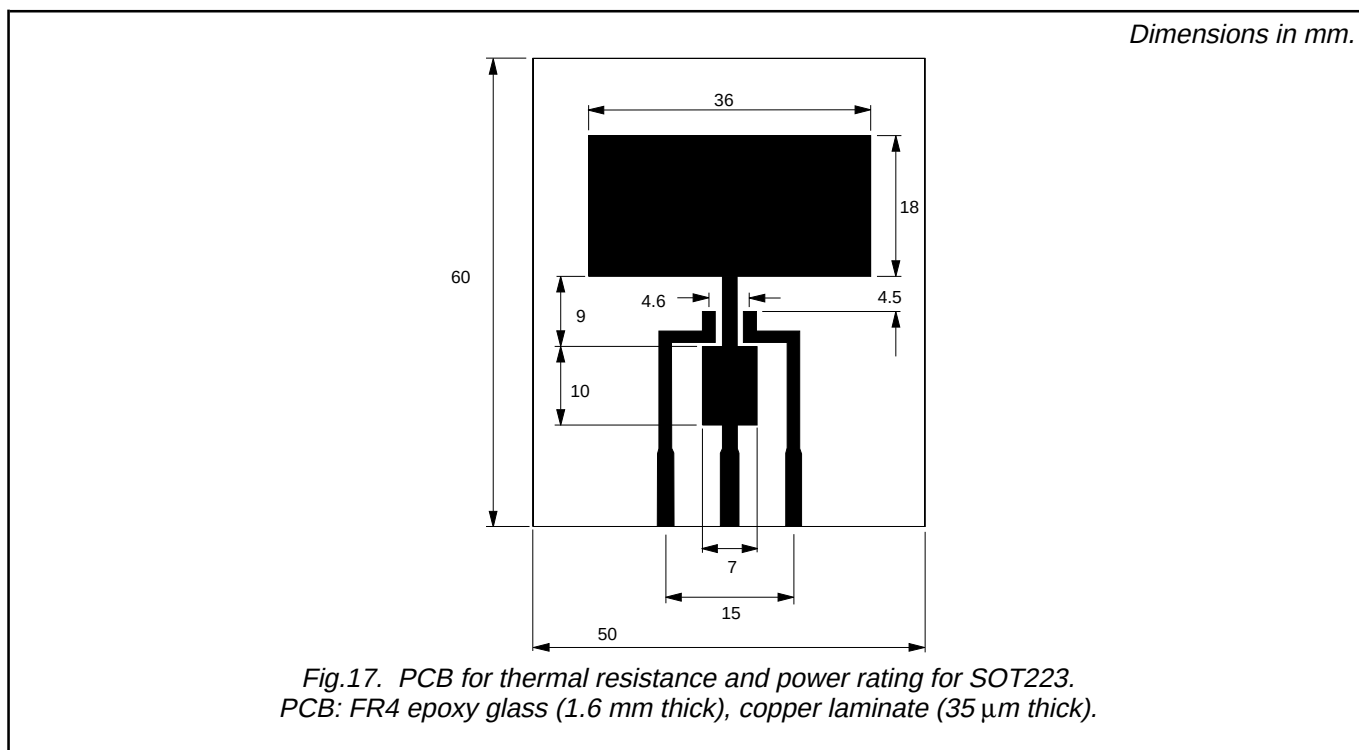


# TrenchMOS™ transistor

## Logic level FET

PHT8N06LT



**TrenchMOS™ transistor**  
**Logic level FET****PHT8N06LT****PRINTED CIRCUIT BOARD**

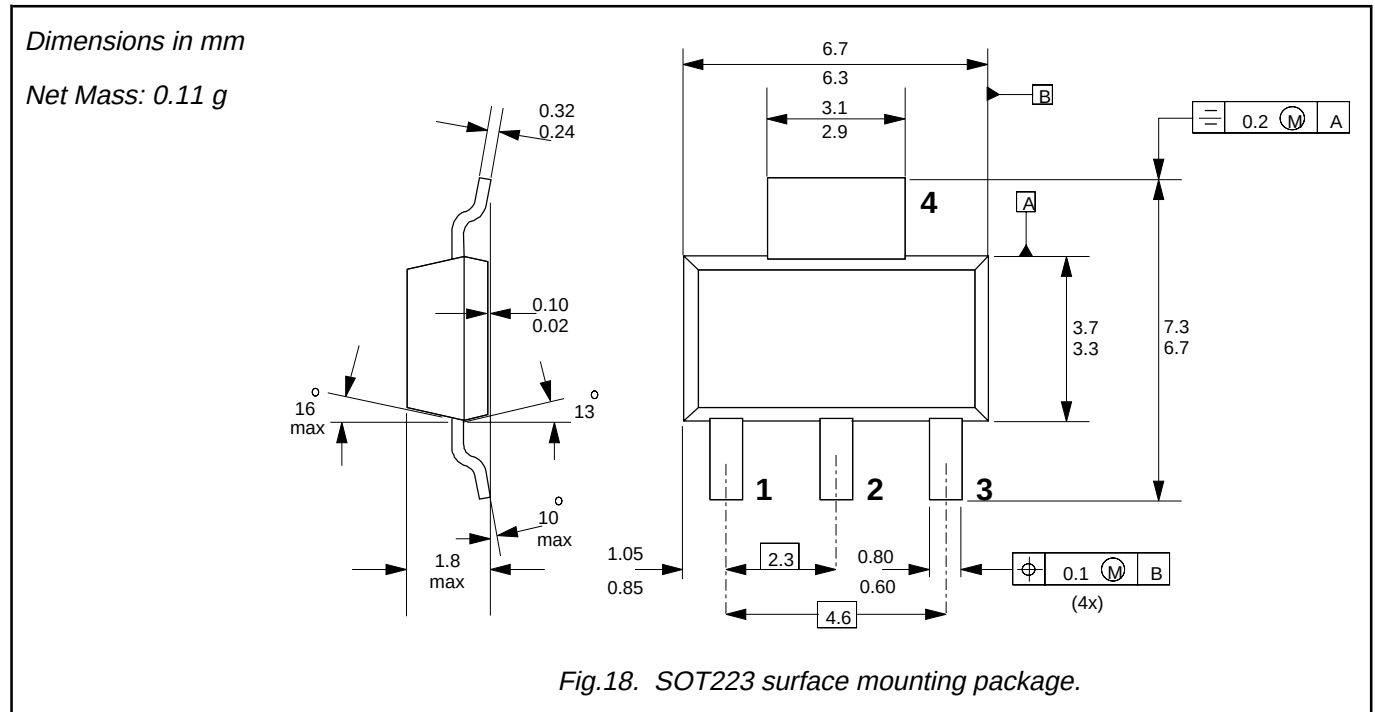


# TrenchMOS™ transistor

## Logic level FET

PHT8N06LT

### MECHANICAL DATA



#### Notes

1. Observe the general handling precautions for electrostatic-discharge sensitive devices (ESDs) to prevent damage to MOS gate oxide.
2. Refer to surface mounting instructions for SOT223 envelope.
3. Epoxy meets UL94 V0 at 1/8".

# TrenchMOS™ transistor

## Logic level FET

PHT8N06LT

### DEFINITIONS

| Data sheet status                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Objective specification                                                                                                                                                                                                                                                                                                                                                                                                                                    | This data sheet contains target or goal specifications for product development.       |
| Preliminary specification                                                                                                                                                                                                                                                                                                                                                                                                                                  | This data sheet contains preliminary data; supplementary data may be published later. |
| Product specification                                                                                                                                                                                                                                                                                                                                                                                                                                      | This data sheet contains final product specifications.                                |
| Limiting values                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                       |
| Limiting values are given in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of this specification is not implied. Exposure to limiting values for extended periods may affect device reliability. |                                                                                       |
| Application information                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                       |
| Where application information is given, it is advisory and does not form part of the specification.                                                                                                                                                                                                                                                                                                                                                        |                                                                                       |
| © Philips Electronics N.V. 1998                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                       |
| All rights are reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner.                                                                                                                                                                                                                                                                                                                          |                                                                                       |
| The information presented in this document does not form part of any quotation or contract, it is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent or other industrial or intellectual property rights.                                                                       |                                                                                       |

### LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.