

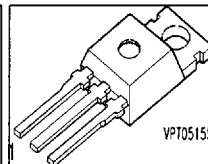
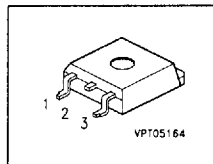
## SIPMOS® Power Transistor

### Features

- N channel
- Enhancement mode
- Avalanche rated
- $dv/dt$  rated
- 175 °C operating temperature

### Product Summary

|                                  |              |       |          |
|----------------------------------|--------------|-------|----------|
| Drain source voltage             | $V_{DS}$     | 55    | V        |
| Drain-Source on-state resistance | $R_{DS(on)}$ | 0.015 | $\Omega$ |
| Continuous drain current         | $I_D$        | 77    | A        |



| Type           | Package     | Ordering Code   | Packaging     |
|----------------|-------------|-----------------|---------------|
| BUZ100S        | P-TO220-3-1 | Q67040-S4001-A2 | Tube          |
| BUZ100S E3045A | P-TO263-3-2 | Q67040-S4001-A6 | Tape and Reel |
| BUZ100S E3045  | P-TO263-3-2 | Q67040-S4001-A5 | Tube          |

| Pin 1 | Pin 2 | Pin 3 |
|-------|-------|-------|
| G     | D     | S     |

**Maximum Ratings, at  $T_j = 25\text{ °C}$ , unless otherwise specified**

| Parameter                                                                                                                                  | Symbol            | Value       | Unit              |
|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------|-------------------|
| Continuous drain current<br>$T_C = 25\text{ °C}$<br>$T_C = 100\text{ °C}$                                                                  | $I_D$             | 77<br>55    | A                 |
| Pulsed drain current<br>$T_C = 25\text{ °C}$                                                                                               | $I_{Dpulse}$      | 308         |                   |
| Avalanche energy, single pulse<br>$I_D = 77\text{ A}$ , $V_{DD} = 25\text{ V}$ , $R_{GS} = 25\text{ }\Omega$                               | $E_{AS}$          | 380         | mJ                |
| Avalanche energy, periodic limited by $T_{I_{max}}$                                                                                        | $E_{AR}$          | 17          |                   |
| Reverse diode $dv/dt$<br>$I_S = 77\text{ A}$ , $V_{DS} = 40\text{ V}$ , $di/dt = 200\text{ A}/\mu\text{s}$ ,<br>$T_{jmax} = 175\text{ °C}$ | $dv/dt$           | 6           | kV/ $\mu\text{s}$ |
| Gate source voltage                                                                                                                        | $V_{GS}$          | $\pm 20$    | V                 |
| Power dissipation<br>$T_C = 25\text{ °C}$                                                                                                  | $P_{tot}$         | 170         | W                 |
| Operating and storage temperature                                                                                                          | $T_j$ , $T_{stg}$ | -55... +175 | °C                |
| IEC climatic category; DIN IEC 68-1                                                                                                        |                   | 55/175/56   |                   |

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**Thermal Characteristics**

| Parameter                                      | Symbol     | Values |      |      | Unit |
|------------------------------------------------|------------|--------|------|------|------|
|                                                |            | min.   | typ. | max. |      |
| Characteristics                                |            |        |      |      |      |
| Thermal resistance, junction - case            | $R_{thJC}$ | -      | -    | 0.88 | K/W  |
| Thermal resistance, junction - ambient, leded  | $R_{thJA}$ | -      | -    | 62   |      |
| SMD version, device on PCB:                    | $R_{thJA}$ |        |      |      |      |
| @ min. footprint                               |            | -      | -    | 62   |      |
| @ 6 cm <sup>2</sup> cooling area <sup>F)</sup> |            | -      | -    | 40   |      |

**Electrical Characteristics, at  $T_j = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified**

| Parameter                                                                                                                                                                                                      | Symbol        | Values |          |          | Unit          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|----------|----------|---------------|
|                                                                                                                                                                                                                |               | min.   | typ.     | max.     |               |
| Static Characteristics                                                                                                                                                                                         |               |        |          |          |               |
| Drain- source breakdown voltage<br>$V_{GS} = 0\text{ V}$ , $I_D = 0.25\text{ mA}$                                                                                                                              | $V_{(BR)DSS}$ | 55     | -        | -        | V             |
| Gate threshold voltage, $V_{GS} = V_{DS}$<br>$I_D = 130\text{ }\mu\text{A}$                                                                                                                                    | $V_{GS(th)}$  | 2.1    | 3        | 4        |               |
| Zero gate voltage drain current<br>$V_{DS} = 50\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 25\text{ }^{\circ}\text{C}$<br>$V_{DS} = 50\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_j = 150\text{ }^{\circ}\text{C}$ | $I_{DSS}$     | -<br>- | 0.1<br>- | 1<br>100 | $\mu\text{A}$ |
| Gate-source leakage current<br>$V_{GS} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$                                                                                                                                  | $I_{GSS}$     | -      | 10       | 100      |               |
| Drain-Source on-state resistance<br>$V_{GS} = 10\text{ V}$ , $I_D = 55\text{ A}$                                                                                                                               | $R_{DS(on)}$  | -      | 0.01     | 0.015    | $\Omega$      |

<sup>1)</sup> Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6 cm<sup>2</sup> (one layer, 70 $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical without blown air.

**Electrical Characteristics, at  $T_j = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified**

| Parameter                                                                                                                   | Symbol       | Values |      |      | Unit |
|-----------------------------------------------------------------------------------------------------------------------------|--------------|--------|------|------|------|
|                                                                                                                             |              | min.   | typ. | max. |      |
| Dynamic Characteristics                                                                                                     |              |        |      |      |      |
| Transconductance<br>$V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ , $I_D = 55\text{ A}$                                     | $g_{fs}$     | 25     | 40   | -    | S    |
| Input capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                                    | $C_{iss}$    | -      | 1900 | 2375 | pF   |
| Output capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                                   | $C_{oss}$    | -      | 615  | 770  |      |
| Reverse transfer capacitance<br>$V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                         | $C_{rss}$    | -      | 310  | 390  |      |
| Turn-on delay time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 77\text{ A}$ ,<br>$R_G = 4.7\text{ }\Omega$  | $t_{d(on)}$  | -      | 15   | 25   | ns   |
| Rise time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 77\text{ A}$ ,<br>$R_G = 4.7\text{ }\Omega$           | $t_r$        | -      | 30   | 45   |      |
| Turn-off delay time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 77\text{ A}$ ,<br>$R_G = 4.7\text{ }\Omega$ | $t_{d(off)}$ | -      | 40   | 60   |      |
| Fall time<br>$V_{DD} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 77\text{ A}$ ,<br>$R_G = 4.7\text{ }\Omega$           | $t_f$        | -      | 25   | 40   |      |

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**Electrical Characteristics, at  $T_j = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified**

| Parameter                                                                                              | Symbol                 | Values |      |      | Unit |
|--------------------------------------------------------------------------------------------------------|------------------------|--------|------|------|------|
|                                                                                                        |                        | min.   | typ. | max. |      |
| Dynamic Characteristics                                                                                |                        |        |      |      |      |
| Gate to source charge<br>$V_{DD} = 40\text{ V}$ , $I_D = 77\text{ A}$                                  | $Q_{gs}$               | -      | 14   | 21   | nC   |
| Gate to drain charge<br>$V_{DD} = 40\text{ V}$ , $I_D = 77\text{ A}$                                   | $Q_{gd}$               | -      | 31   | 46.5 |      |
| Gate charge total<br>$V_{DD} = 40\text{ V}$ , $I_D = 77\text{ A}$ , $V_{GS} = 0\text{ to }10\text{ V}$ | $Q_g$                  | -      | 65   | 100  |      |
| Gate plateau voltage<br>$V_{DD} = 40\text{ V}$ , $I_D = 77\text{ A}$                                   | $V_{(\text{plateau})}$ | -      | 5.9  | -    | V    |

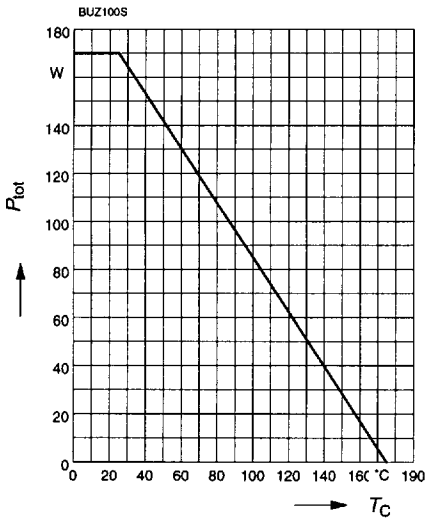
**Reverse Diode**

|                                                                                                     |          |   |      |      |               |
|-----------------------------------------------------------------------------------------------------|----------|---|------|------|---------------|
| Inverse diode continuous forward current<br>$T_C = 25\text{ }^{\circ}\text{C}$                      | $I_S$    | - | -    | 77   | A             |
| Inverse diode direct current, pulsed<br>$T_C = 25\text{ }^{\circ}\text{C}$                          | $I_{SM}$ | - | -    | 308  |               |
| Inverse diode forward voltage<br>$V_{GS} = 0\text{ V}$ , $I_F = 154\text{ A}$                       | $V_{SD}$ | - | 1.25 | 1.8  | V             |
| Reverse recovery time<br>$V_R = 30\text{ V}$ , $I_F = I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$   | $t_{rr}$ | - | 105  | 160  | ns            |
| Reverse recovery charge<br>$V_R = 30\text{ V}$ , $I_F = I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$ | $Q_{rr}$ | - | 0.16 | 0.25 | $\mu\text{C}$ |

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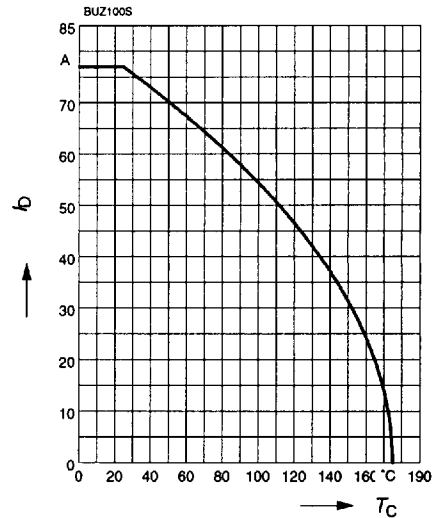
**Power Dissipation**

$$P_{\text{tot}} = f(T_C)$$


**Drain current**

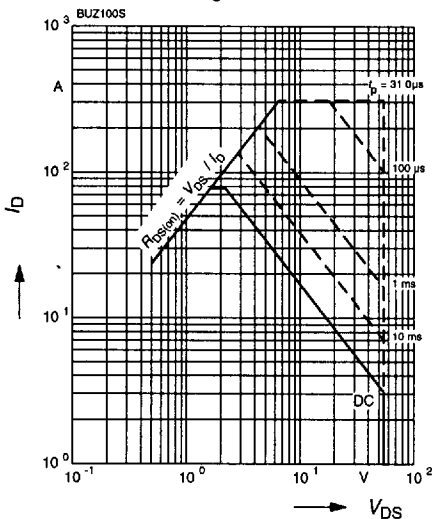
$$I_D = f(T_C)$$

parameter:  $V_{\text{GS}} \geq 10 \text{ V}$


**Safe operating area**

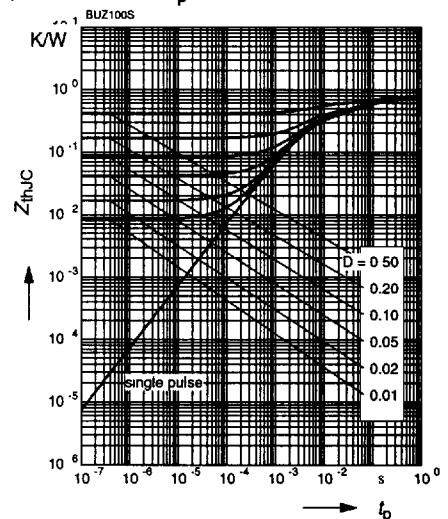
$$I_D = f(V_{\text{DS}})$$

parameter:  $D = 0$ ,  $T_C = 25^{\circ}\text{C}$


**Transient thermal impedance**

$$Z_{\text{thJC}} = f(t_p)$$

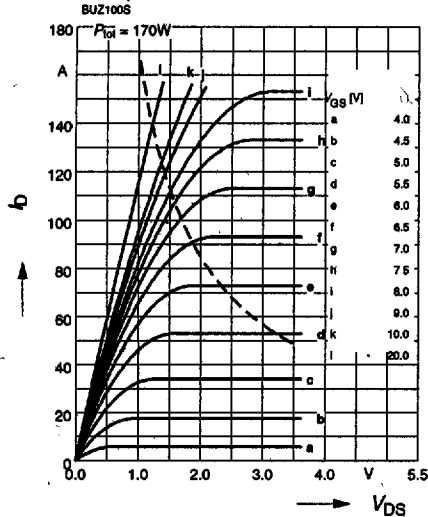
parameter:  $D = t_p/T$



**Typ. output characteristics**

$$I_D = f(V_{DS})$$

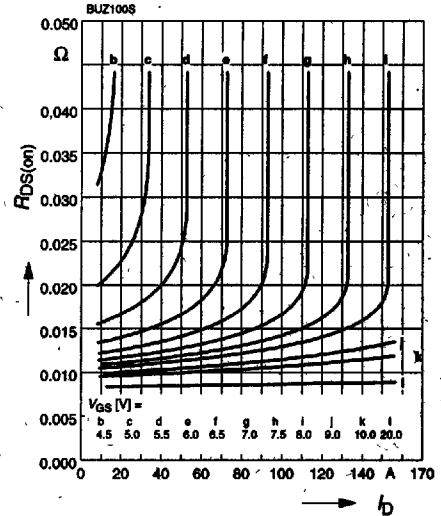
parameter:  $t_p = 80 \mu s$



**Typ. drain-source-on-resistance**

$$R_{DS(on)} = f(I_D)$$

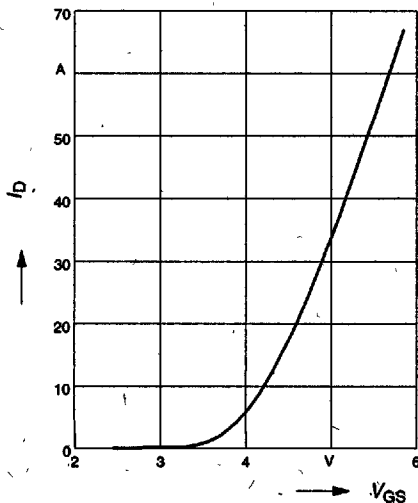
parameter:  $V_{GS}$



**Typ. transfer characteristics  $I_D = f(V_{GS})$**

parameter:  $t_p = 80 \mu s$

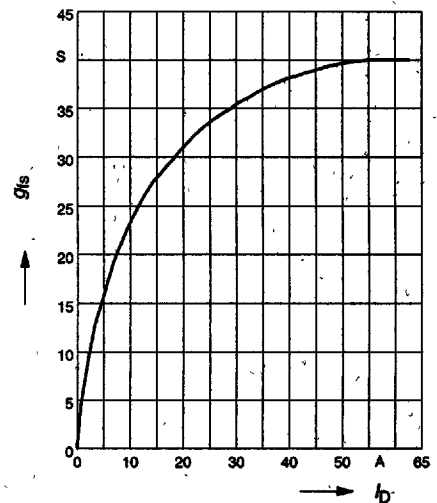
$$V_{DS} \geq 2 \times I_D \times R_{DS(on) \max}$$



**Typ. forward transconductance**

$$g_{fs} = f(I_D); T_j = 25^\circ C$$

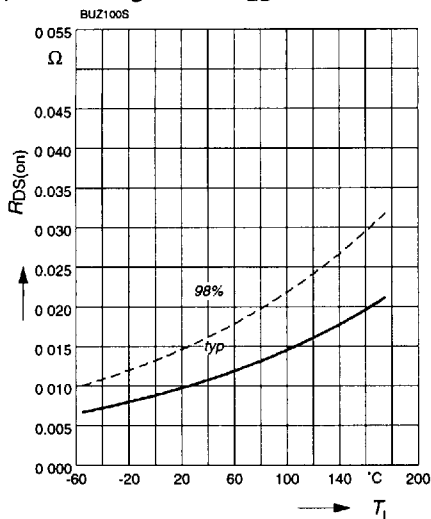
parameter:  $g_{fs}$



**Drain-source on-resistance**

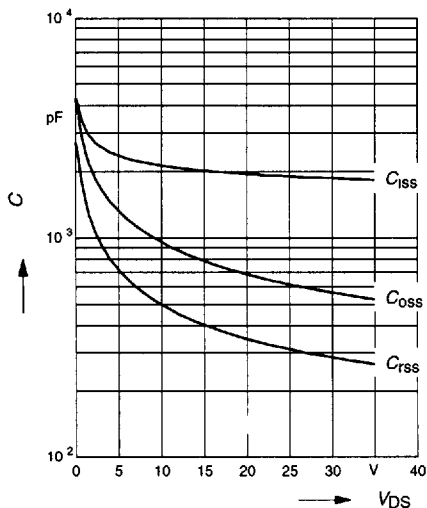
$$R_{DS(on)} = f(T_j)$$

parameter :  $I_D = 55 \text{ A}$ ,  $V_{GS} = 10$


**Typ. capacitances**

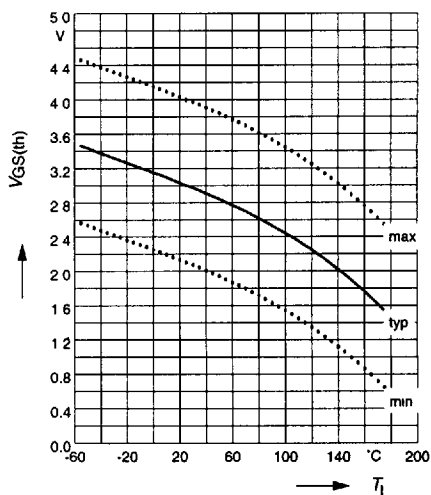
$$C = f(V_{DS})$$

parameter:  $V_{GS} = 0 \text{ V}$ ,  $f = 1 \text{ MHz}$


**Gate threshold voltage**

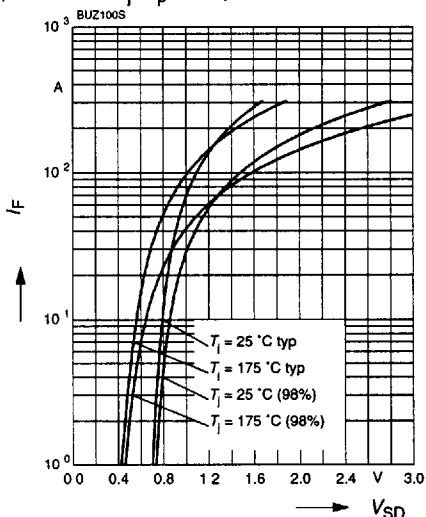
$$V_{GS(th)} = f(T_j)$$

parameter :  $V_{GS} = V_{DS}$ ,  $I_D = 130 \mu\text{A}$


**Forward characteristics of reverse diode**

$$I_F = f(V_{SD})$$

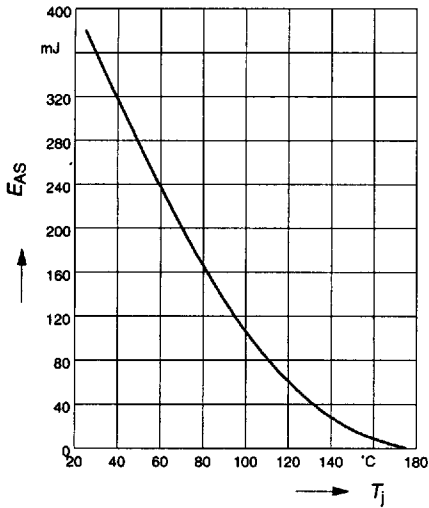
parameter:  $T_j$ ,  $t_p = 80 \mu\text{s}$



### Avalanche Energy $E_{AS} = f(T_j)$

parameter:  $I_D = 77 \text{ A}$ ,  $V_{DD} = 25 \text{ V}$

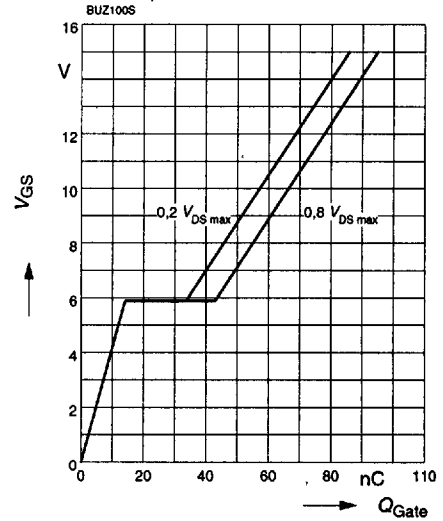
$R_{GS} = 25 \Omega$



### Typ. gate charge

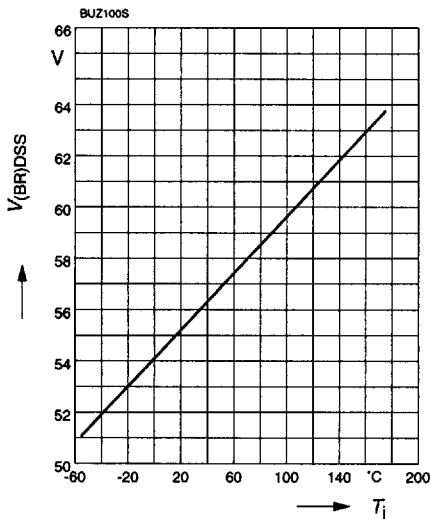
$V_{GS} = f(Q_{Gate})$

parameter:  $I_D \text{ puls} = 77 \text{ A}$



### Drain-source breakdown voltage

$V_{(BR)DSS} = f(T_j)$





## Gehäusemaßbilder

(Maße in mm, wenn nicht anders angegeben)

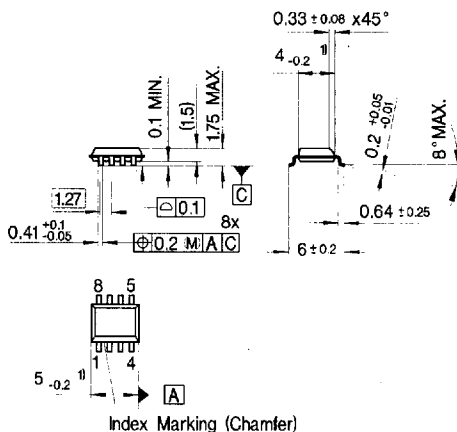
## Package Outlines

(Dimensions in mm, unless otherwise specified)

### P-DSO-8-6/-7

Gewicht etwa 0.15 g

Approx. weight 0.15 g



1) Does not include plastic or metal protrusion of 0.15 max. per side

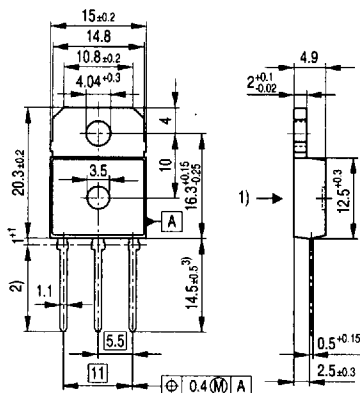
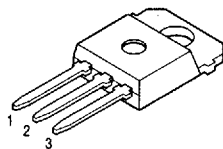
Bild 16

Figure 16

### P-TO218-AA (P-TO218-2-1)

Gewicht etwa 4.9 g

Approx. weight 4.9 g



- 1) Punch direction, burr max. 0.04
- 2) Dip tinning
- 3) Max. 15.5 by dip tinning press burr max. 0.05 radii not dimensioned max. 0.2

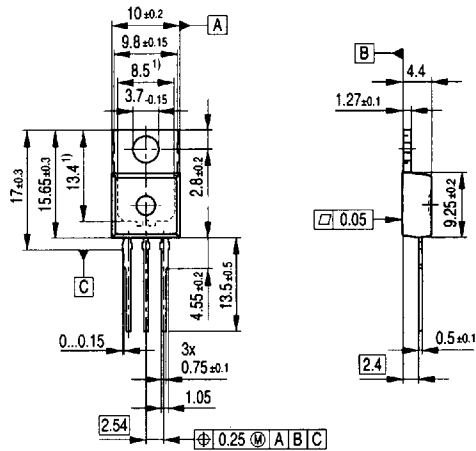
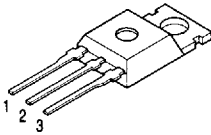
GPT05156

Bild 17

Figure 17

**P-TO220-3-1**

Gewicht etwa 1.8 g  
Approx. weight 1.8 g



<sup>1)</sup> Typical

All metal surfaces tin plated, except area of cut.

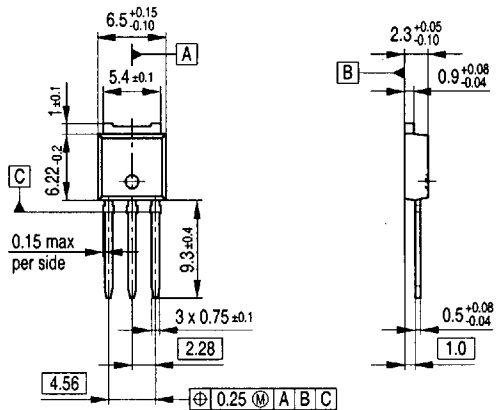
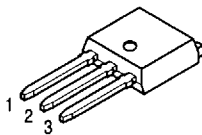
GPT05155

**Bild 18**

**Figure 18**

**P-TO251-3-1**

Gewicht etwa 2.0 g  
Approx. weight 2.0 g



All metal surfaces tin plated, except area of cut.

GPT09060

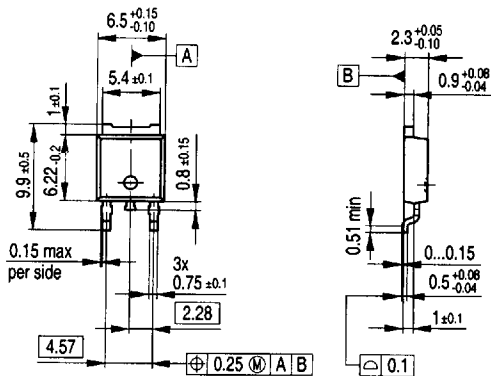
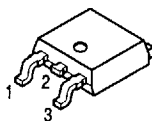
**Bild 19**

**Figure 19**

## P-TO252-3-1

Gewicht etwa 0.38 g

Approx. weight 0.38 g



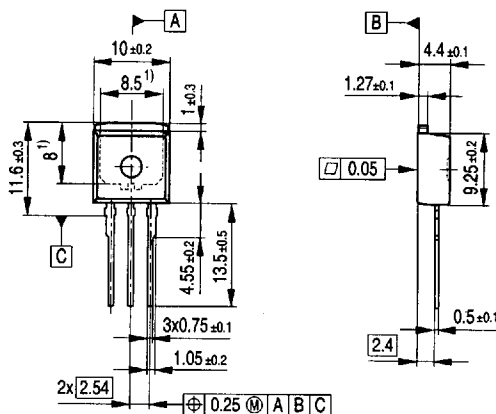
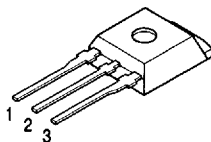
All metal surfaces tin plated, except area of cut.

GPT09051

Bild 20

Figure 20

## P-TO262-3-1/I<sup>2</sup>PAK



<sup>1)</sup> Typical

Metal surface min. X = 7.25, Y = 7.35

All metal surfaces tin plated, except area of cut.

GPT09244

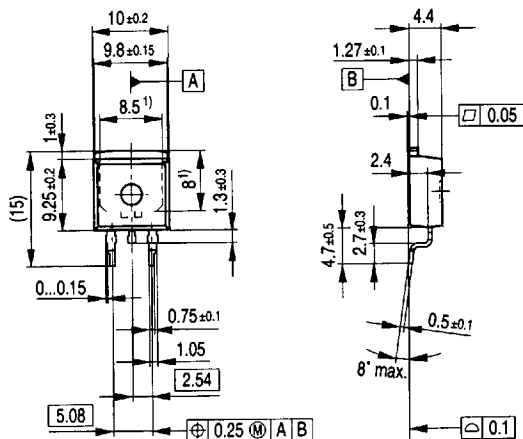
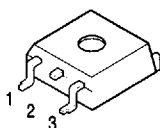
Bild 21

Figure 21

**P-TO263-3-2/D<sup>2</sup>PAK**

Gewicht etwa 1.38 g

Approx. weight 1.38 g



<sup>1)</sup> Typical

All metal surfaces tin plated, except area of cut.

GPT09085

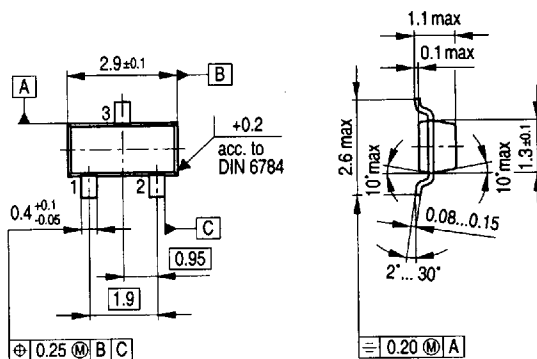
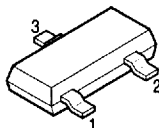
**Bild 22**

**Figure 22**

**SOT-23 (P-SOT23-3-1)**

Gewicht etwa 0.01 g

Approx. weight 0.01 g



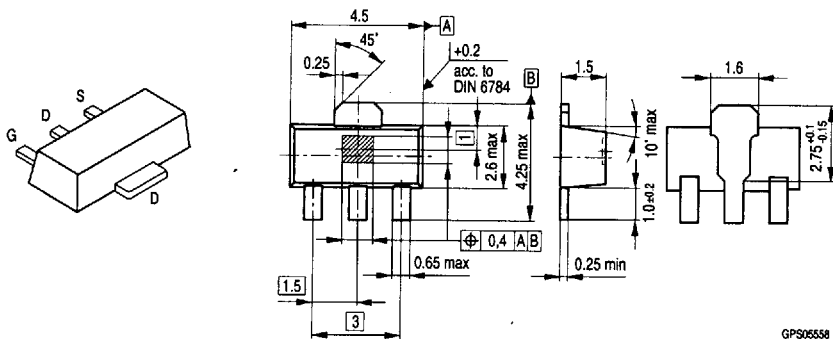
GPS05557

**Bild 23**

**Figure 23**

**SOT-89**

Gewicht etwa 0.01 g  
Approx. weight 0.01 g

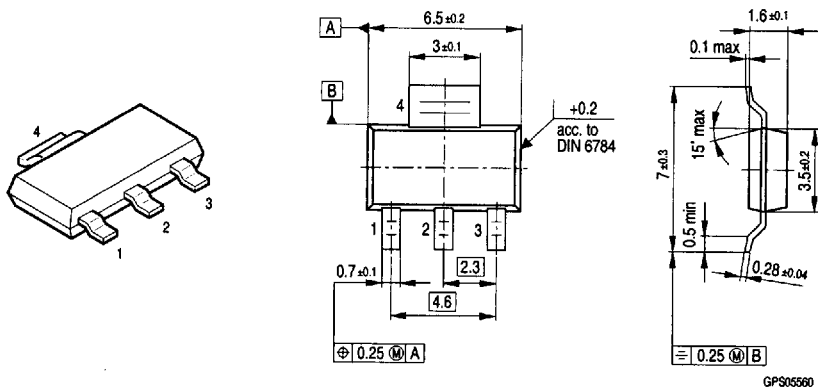


**Bild 24**

**Figure 24**

**SOT-223 (P-SOT223-4-1)**

Gewicht etwa 0.15 g  
Approx. weight 0.15 g



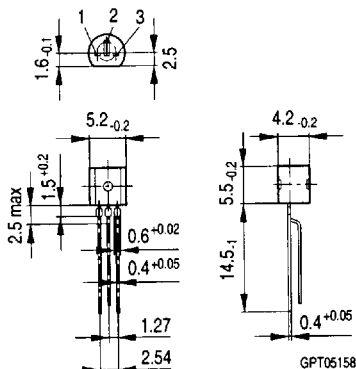
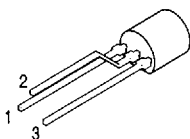
**Bild 25**

**Figure 25**

**TO-92**

Gewicht etwa 0.23 g

Approx. weight 0.23 g



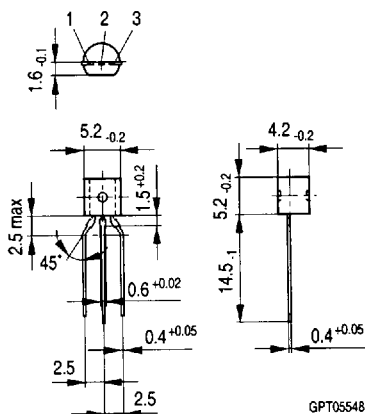
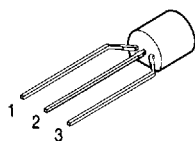
**Bild 26**

**Figure 26**

**TO-92-E6288**

Gewicht etwa 0.23 g

Approx. weight 0.23 g



**Bild 27**

**Figure 27**

**Sorts of Packing**

Package outlines for tubes, trays etc. are contained in our Data Book "Package Information".

**SMD = Surface Mounted Device**