

## MOSFET

### OptiMOS™ 5 Power-Transistor, 150 V

#### Features

- Dual-side cooled package with lowest Junction-top thermal resistance
- N-channel, normal level
- Excellent gate charge  $\times R_{DS(on)}$  product (FOM)
- Very low on-resistance  $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating; RoHS compliant
- Ideal for high-frequency switching and synchronous rectification

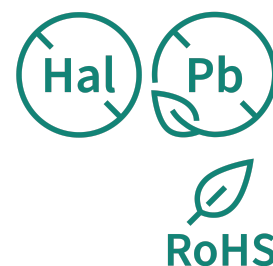
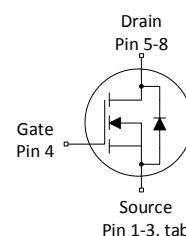
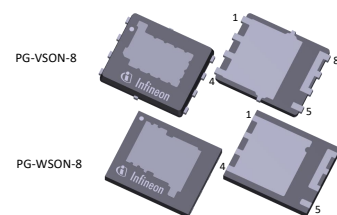
#### Product validation

Qualified for industrial applications according to the relevant tests of JEDEC JESD47, JESD22 and J-STD-020.

**Table 1** Key performance parameters

| Parameter        | Value | Unit |
|------------------|-------|------|
| $V_{DS}$         | 150   | V    |
| $R_{DS(on),max}$ | 11    | mΩ   |
| $I_D$            | 77    | A    |
| $Q_{rr}$         | 46    | nC   |

PG-VSON-8 / PG-WSO8-8



| Part number    | Package               | Marking  | Related links |
|----------------|-----------------------|----------|---------------|
| BSC110N15NS5SC | PG-VSON-8 / PG-WSO8-8 | 110N15SC | -             |



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## 1 Maximum ratings

at  $T_A=25\text{ °C}$ , unless otherwise specified

**Table 2 Maximum ratings**

| Parameter                                    | Symbol            | Values |      |      | Unit | Note / Test condition                         |
|----------------------------------------------|-------------------|--------|------|------|------|-----------------------------------------------|
|                                              |                   | Min.   | Typ. | Max. |      |                                               |
| Continuous drain current <sup>1)</sup>       | $I_D$             | -      | -    | 77   | A    | $T_C=25\text{ °C}$                            |
|                                              |                   |        |      | 55   |      | $T_C=100\text{ °C}$                           |
| Pulsed drain current <sup>2)</sup>           | $I_{D,pulse}$     | -      | -    | 308  | A    | $T_C=25\text{ °C}$                            |
| Avalanche energy, single pulse <sup>3)</sup> | $E_{AS}$          | -      | -    | 90   | mJ   | $I_D=50\text{ A}$ , $R_{GS}=25\text{ }\Omega$ |
| Gate source voltage                          | $V_{GS}$          | -20    | -    | 20   | V    | -                                             |
| Power dissipation                            | $P_{tot}$         | -      | -    | 150  | W    | $T_C=25\text{ °C}$                            |
| Operating and storage temperature            | $T_j$ , $T_{stg}$ | -55    | -    | 175  | °C   | -                                             |

<sup>1)</sup> Rating refers to the product only with datasheet specified absolute maximum values, maintaining case temperature as specified. For other case temperatures please refer to Diagram 2. De-rating will be required based on the actual environmental conditions.

<sup>2)</sup> See Diagram 3 for more detailed information

<sup>3)</sup> See Diagram 13 for more detailed information

## 2 Thermal characteristics

**Table 3 Thermal characteristics**

| Parameter                                                                            | Symbol     | Values |      |      | Unit | Note / Test condition |
|--------------------------------------------------------------------------------------|------------|--------|------|------|------|-----------------------|
|                                                                                      |            | Min.   | Typ. | Max. |      |                       |
| Thermal resistance, junction - case, bottom                                          | $R_{thJC}$ | -      | 0.6  | 1.0  | K/W  | -                     |
| Thermal resistance, junction - case, top                                             | $R_{thJC}$ |        | 0.36 | 0.72 |      |                       |
| Thermal resistance, junction - ambient, 6 cm <sup>2</sup> cooling area <sup>4)</sup> | $R_{thJA}$ |        | -    | 50   |      |                       |

<sup>4)</sup> Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm<sup>2</sup> (one layer, 70 µm thick) copper area for drain connection. PCB is vertical in still air.

### 3 Electrical characteristics

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

**Table 4 Static characteristics**

| Parameter                        | Symbol        | Values |      |      | Unit          | Note / Test condition                                             |
|----------------------------------|---------------|--------|------|------|---------------|-------------------------------------------------------------------|
|                                  |               | Min.   | Typ. | Max. |               |                                                                   |
| Drain-source breakdown voltage   | $V_{(BR)DSS}$ | 150    | -    | -    | V             | $V_{GS}=0\text{ V}$ , $I_D=1\text{ mA}$                           |
| Gate threshold voltage           | $V_{GS(th)}$  | 3      | 3.8  | 4.6  | V             | $V_{DS}=V_{GS}$ , $I_D=91\text{ }\mu\text{A}$                     |
| Zero gate voltage drain current  | $I_{DSS}$     | -      | 0.1  | 1    | $\mu\text{A}$ | $V_{DS}=120\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=25\text{ °C}$  |
|                                  |               |        | 10   | 100  |               | $V_{DS}=120\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=125\text{ °C}$ |
| Gate-source leakage current      | $I_{GSS}$     | -      | 1    | 100  | nA            | $V_{GS}=20\text{ V}$ , $V_{DS}=0\text{ V}$                        |
| Drain-source on-state resistance | $R_{DS(on)}$  | -      | 9    | 11   | m $\Omega$    | $V_{GS}=10\text{ V}$ , $I_D=38\text{ A}$                          |
|                                  |               |        | 10   | 13   |               | $V_{GS}=8\text{ V}$ , $I_D=19\text{ A}$                           |
| Gate resistance                  | $R_G$         | -      | 0.9  | 1.35 | $\Omega$      | -                                                                 |
| Transconductance                 | $g_{fs}$      | 29     | 58   | -    | S             | $ V_{DS} >2 I_D R_{DS(on)max}$ , $I_D=38\text{ A}$                |

**Table 5 Dynamic characteristics**

| Parameter                                  | Symbol       | Values |      |      | Unit | Note / Test condition                                                                            |
|--------------------------------------------|--------------|--------|------|------|------|--------------------------------------------------------------------------------------------------|
|                                            |              | Min.   | Typ. | Max. |      |                                                                                                  |
| Input capacitance                          | $C_{iss}$    | -      | 2080 | 2770 | pF   | $V_{GS}=0\text{ V}$ , $V_{DS}=75\text{ V}$ , $f=1\text{ MHz}$                                    |
| Output capacitance <sup>5)</sup>           | $C_{oss}$    |        | 515  | 685  |      |                                                                                                  |
| Reverse transfer capacitance <sup>5)</sup> | $C_{rss}$    |        | 13   | 23   |      |                                                                                                  |
| Turn-on delay time                         | $t_{d(on)}$  | -      | 10.3 | -    | ns   | $V_{DD}=75\text{ V}$ , $V_{GS}=10\text{ V}$ , $I_D=38\text{ A}$ ,<br>$R_{G,ext}=3\text{ }\Omega$ |
| Rise time                                  | $t_r$        |        | 3.3  |      |      |                                                                                                  |
| Turn-off delay time                        | $t_{d(off)}$ |        | 14.5 |      |      |                                                                                                  |
| Fall time                                  | $t_f$        |        | 2.9  |      |      |                                                                                                  |

<sup>5)</sup> Defined by design. Not subject to production test

**Table 6 Gate charge characteristics** <sup>6)</sup>

| Parameter                          | Symbol        | Values |      |      | Unit | Note / Test condition                                                       |
|------------------------------------|---------------|--------|------|------|------|-----------------------------------------------------------------------------|
|                                    |               | Min.   | Typ. | Max. |      |                                                                             |
| Gate to source charge              | $Q_{gs}$      | -      | 12   | -    | nC   | $V_{DD}=75\text{ V}$ , $I_D=38\text{ A}$ , $V_{GS}=0\text{ to }10\text{ V}$ |
| Gate to drain charge <sup>7)</sup> | $Q_{gd}$      |        | 5.8  | 8.7  | nC   |                                                                             |
| Switching charge                   | $Q_{sw}$      |        | 11.5 | -    | nC   |                                                                             |
| Gate charge total <sup>7)</sup>    | $Q_g$         |        | 28   | 35   | nC   |                                                                             |
| Gate plateau voltage               | $V_{plateau}$ |        | 5.8  | -    | V    |                                                                             |
| Output charge <sup>7)</sup>        | $Q_{oss}$     | -      | 78   | 103  | nC   | $V_{DD}=75\text{ V}$ , $V_{GS}=0\text{ V}$                                  |

<sup>6)</sup> See "Gate charge waveforms" for parameter definition

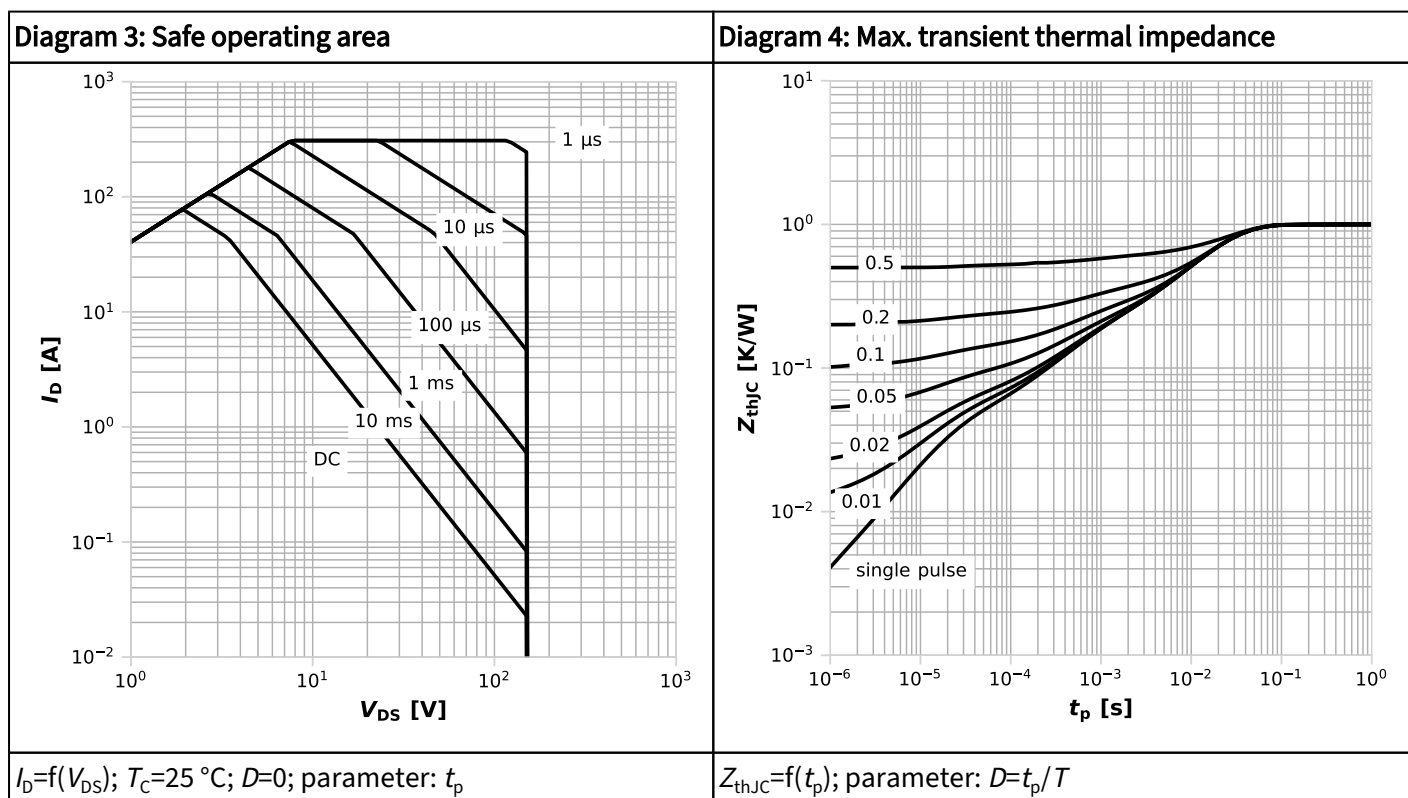
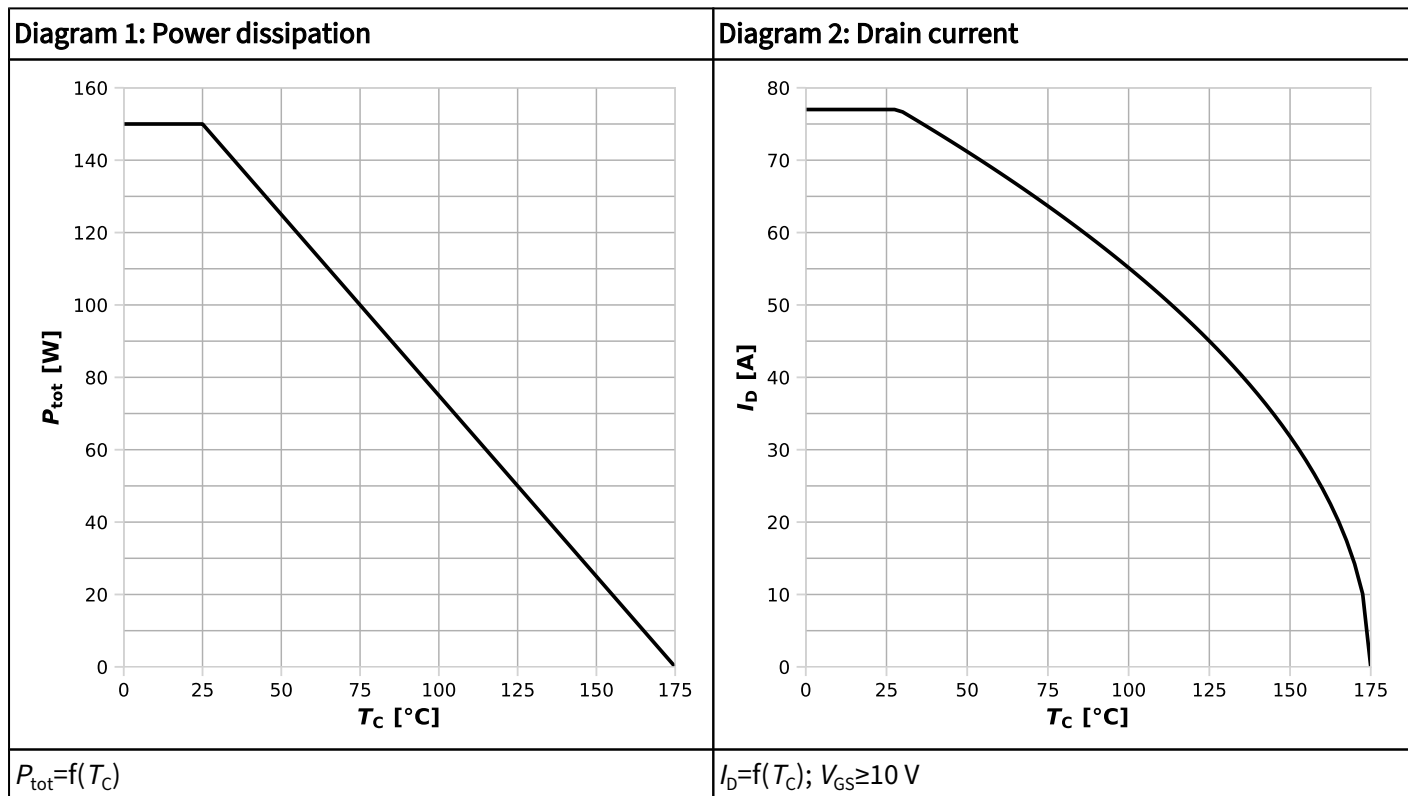
<sup>7)</sup> Defined by design. Not subject to production test

**Table 7 Reverse diode**

| Parameter                             | Symbol        | Values |      |      | Unit | Note / Test condition                                                      |
|---------------------------------------|---------------|--------|------|------|------|----------------------------------------------------------------------------|
|                                       |               | Min.   | Typ. | Max. |      |                                                                            |
| Diode continuous forward current      | $I_S$         | -      | -    | 77   | A    | $T_C=25\text{ °C}$                                                         |
| Diode pulse current                   | $I_{S,pulse}$ |        |      | 308  |      |                                                                            |
| Diode forward voltage                 | $V_{SD}$      | -      | 0.88 | 1.2  | V    | $V_{GS}=0\text{ V}$ , $I_F=38\text{ A}$ , $T_J=25\text{ °C}$               |
| Reverse recovery time <sup>8)</sup>   | $t_{rr}$      | -      | 45   | 90   | ns   | $V_R=75\text{ V}$ , $I_F=38\text{ A}$ , $di_F/dt=100\text{ A}/\mu\text{s}$ |
| Reverse recovery charge <sup>8)</sup> | $Q_{rr}$      |        | 46   | 92   | nC   |                                                                            |

<sup>8)</sup> Defined by design. Not subject to production test

## 4 Electrical characteristics diagrams



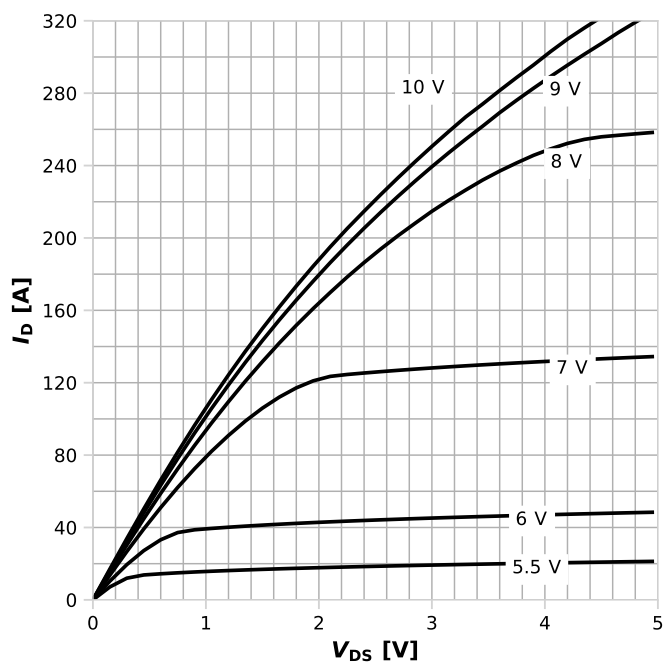
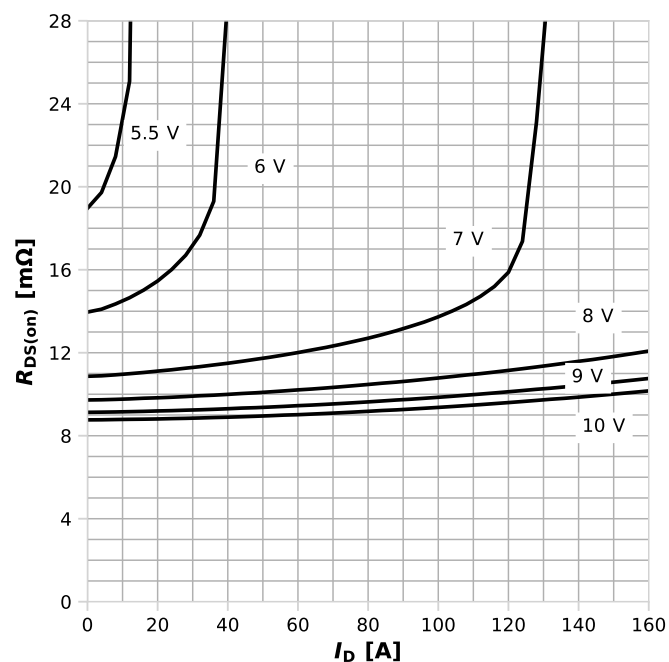
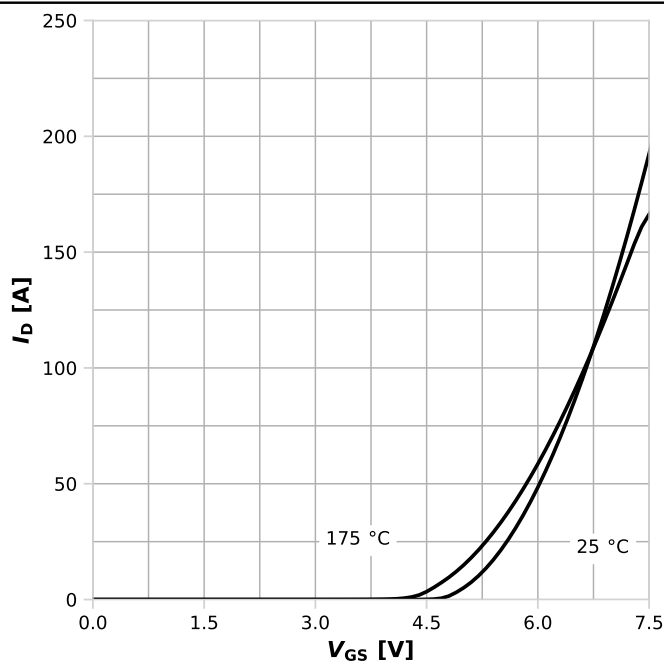
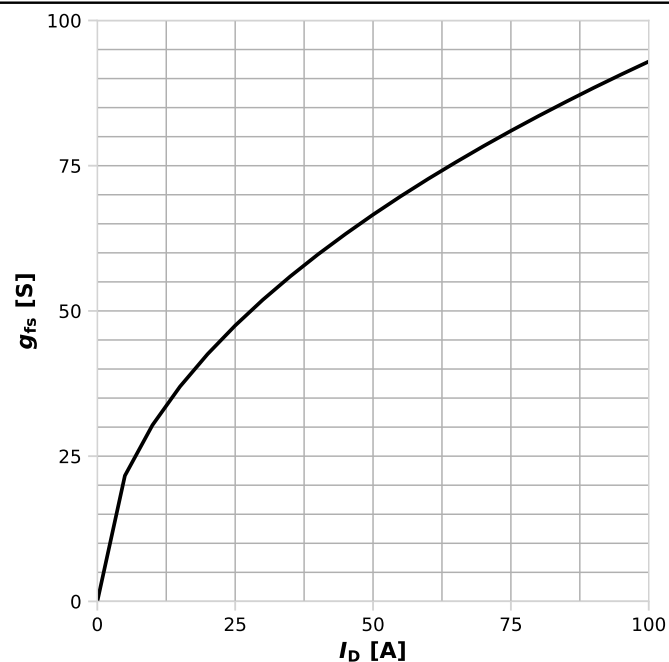
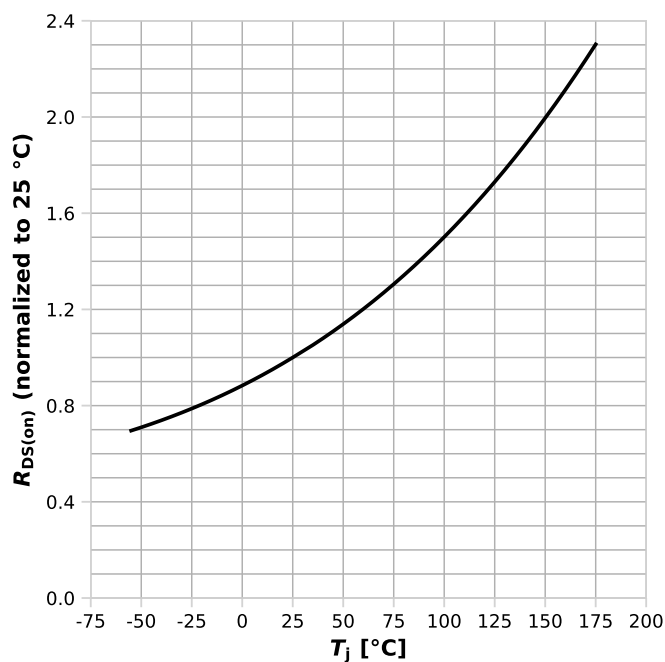
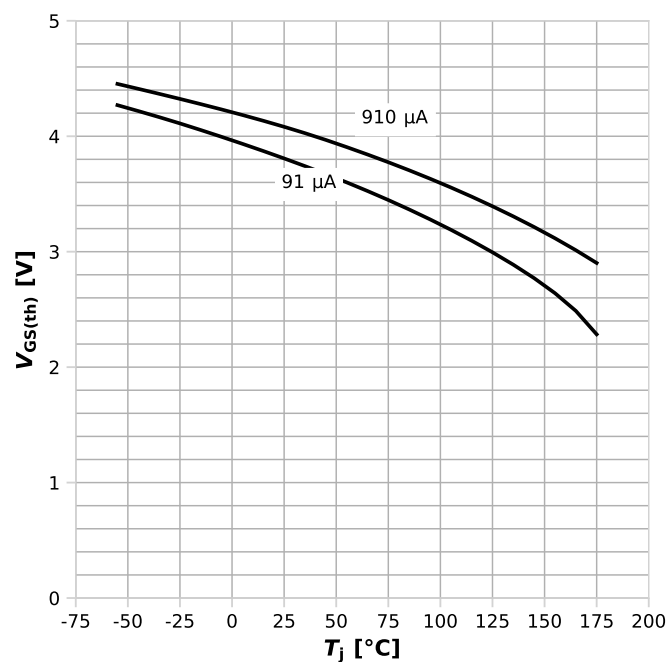
**Diagram 5: Typ. output characteristics**

 $I_D = f(V_{DS}), T_j = 25^\circ\text{C}; \text{parameter: } V_{GS}$ 
**Diagram 6: Typ. drain-source on resistance**

 $R_{DS(on)} = f(I_D), T_j = 25^\circ\text{C}; \text{parameter: } V_{GS}$ 
**Diagram 7: Typ. transfer characteristics**

 $I_D = f(V_{GS}), |V_{DS}| > 2|I_D|R_{DS(on)max}; \text{parameter: } T_j$ 
**Diagram 8: Typ. forward transconductance**

 $g_{fs} = f(I_D); \text{parameter: } V_{DS}, T_j$

Diagram 9: Drain-source on-state resistance



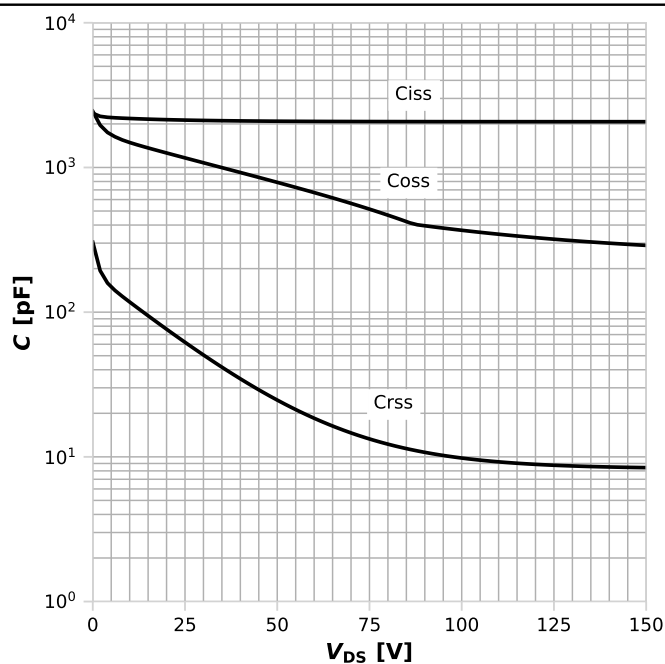
$$R_{DS(on)} = f(T_j), I_D = 38 \text{ A}, V_{GS} = 10 \text{ V}$$

Diagram 10: Typ. gate threshold voltage



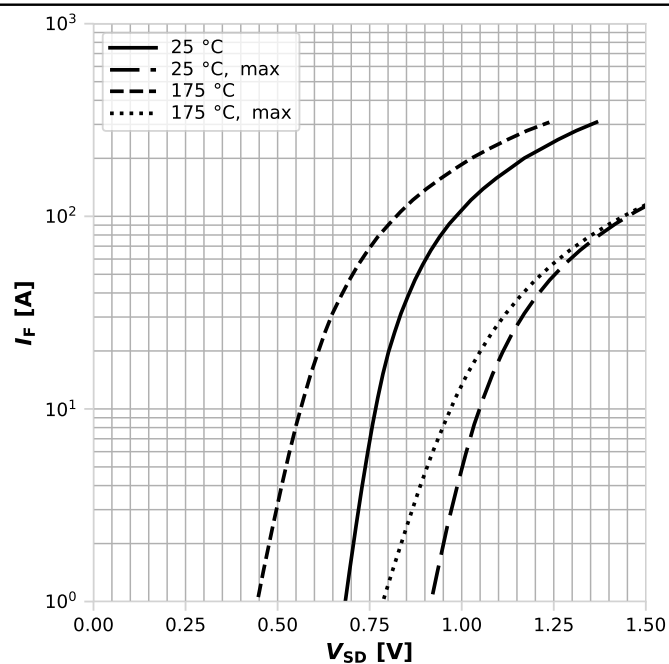
$$V_{GS(th)} = f(T_j), V_{GS} = V_{DS}; \text{ parameter: } I_D$$

Diagram 11: Typ. capacitances



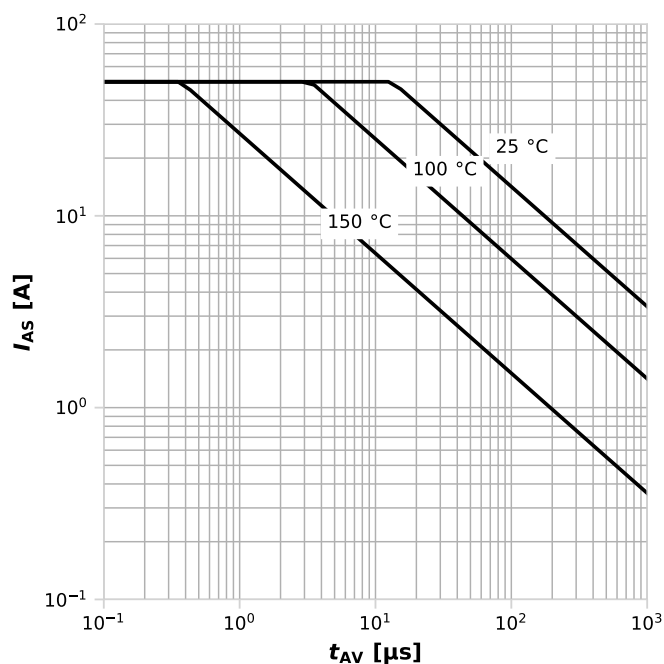
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$

Diagram 12: Forward characteristics of reverse diode



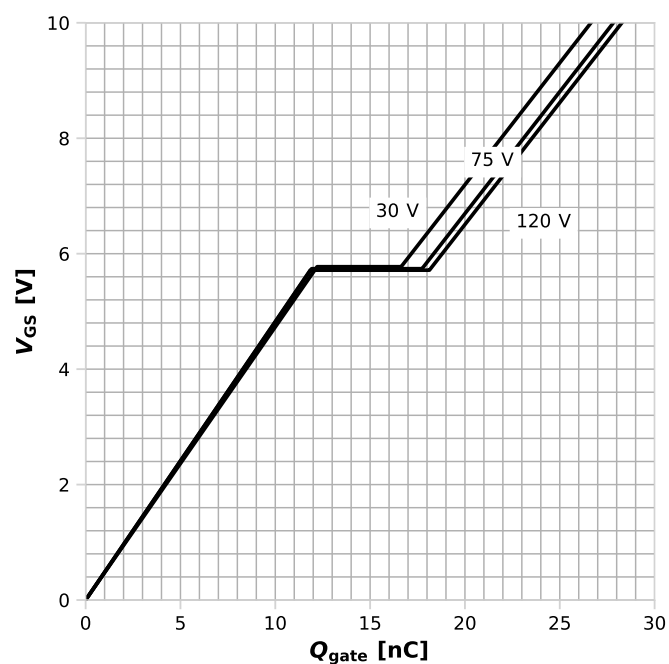
$$I_F = f(V_{SD}); \text{ parameter: } T_j$$

Diagram 13: Avalanche characteristics



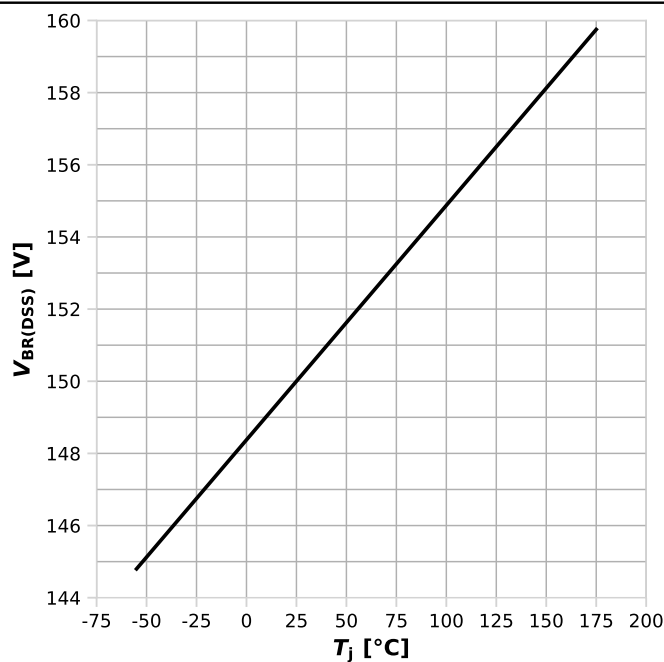
$I_{AS}=f(t_{AV})$ ;  $R_{GS}=25\ \Omega$ ; parameter:  $T_{j,start}$

Diagram 14: Typ. gate charge



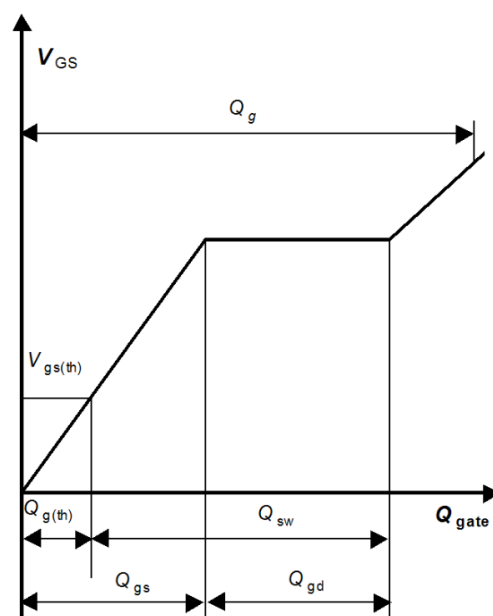
$V_{GS}=f(Q_{gate})$ ,  $I_D=38\text{ A}$  pulsed,  $T_j=25\text{ °C}$ ; parameter:  $V_{DD}$

Diagram 15: Drain-source breakdown voltage



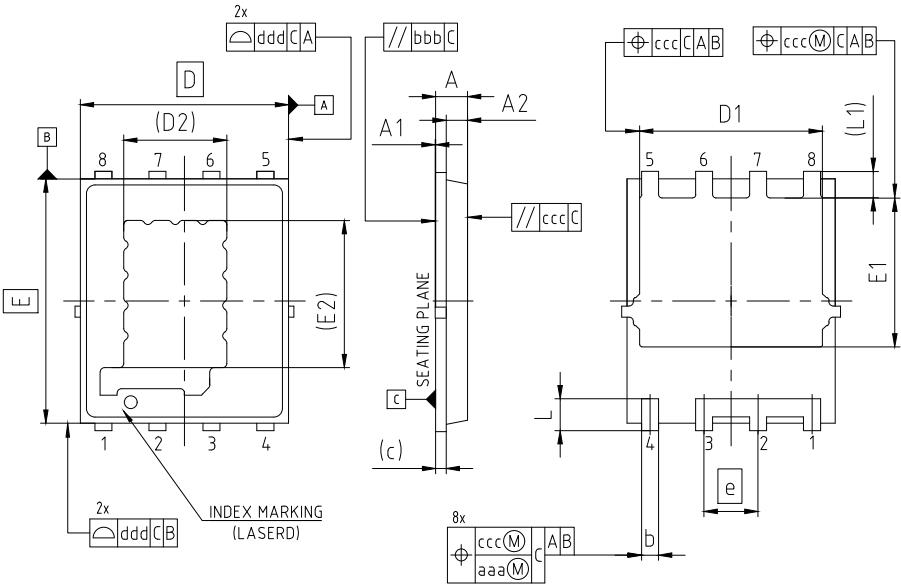
$V_{BR(DSS)}=f(T_j)$ ;  $I_D=1\text{ mA}$

Gate charge waveforms



-

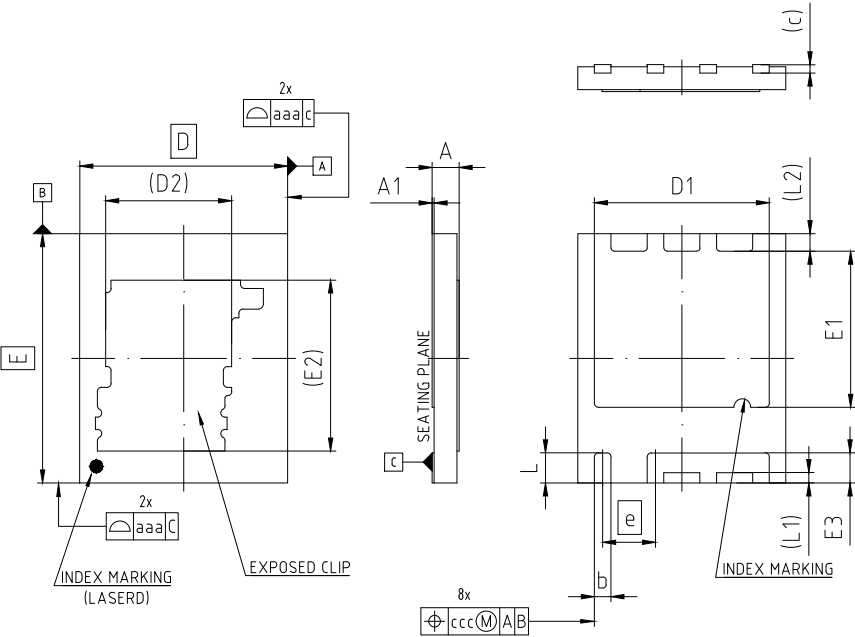
5 Package outlines



| PACKAGE - GROUP NUMBER: PG-VSON-8-U01 |             |      |            |             |      |
|---------------------------------------|-------------|------|------------|-------------|------|
| DIMENSIONS                            | MILLIMETERS |      | DIMENSIONS | MILLIMETERS |      |
|                                       | MIN.        | MAX. |            | MIN.        | MAX. |
| A                                     | 0.65        | 0.85 | e          | 1.27        |      |
| A1                                    | 0.00        | 0.05 | L          | 0.70        | 0.90 |
| A2                                    | 0.45        | 0.55 | L1         | 0.52        | 0.72 |
| b                                     | 0.35        | 0.55 | aaa        | 0.05        |      |
| c                                     | 0.25        |      | bbb        | 0.08        |      |
| D                                     | 4.90        |      | ccc        | 0.10        |      |
| D1                                    | 4.20        | 4.40 | ddd        | 0.15        |      |
| D2                                    | 2.43        |      |            |             |      |
| E                                     | 5.75        |      |            |             |      |
| E1                                    | 3.40        | 3.60 |            |             |      |
| E2                                    | 3.46        |      |            |             |      |

NOTE: DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURRS

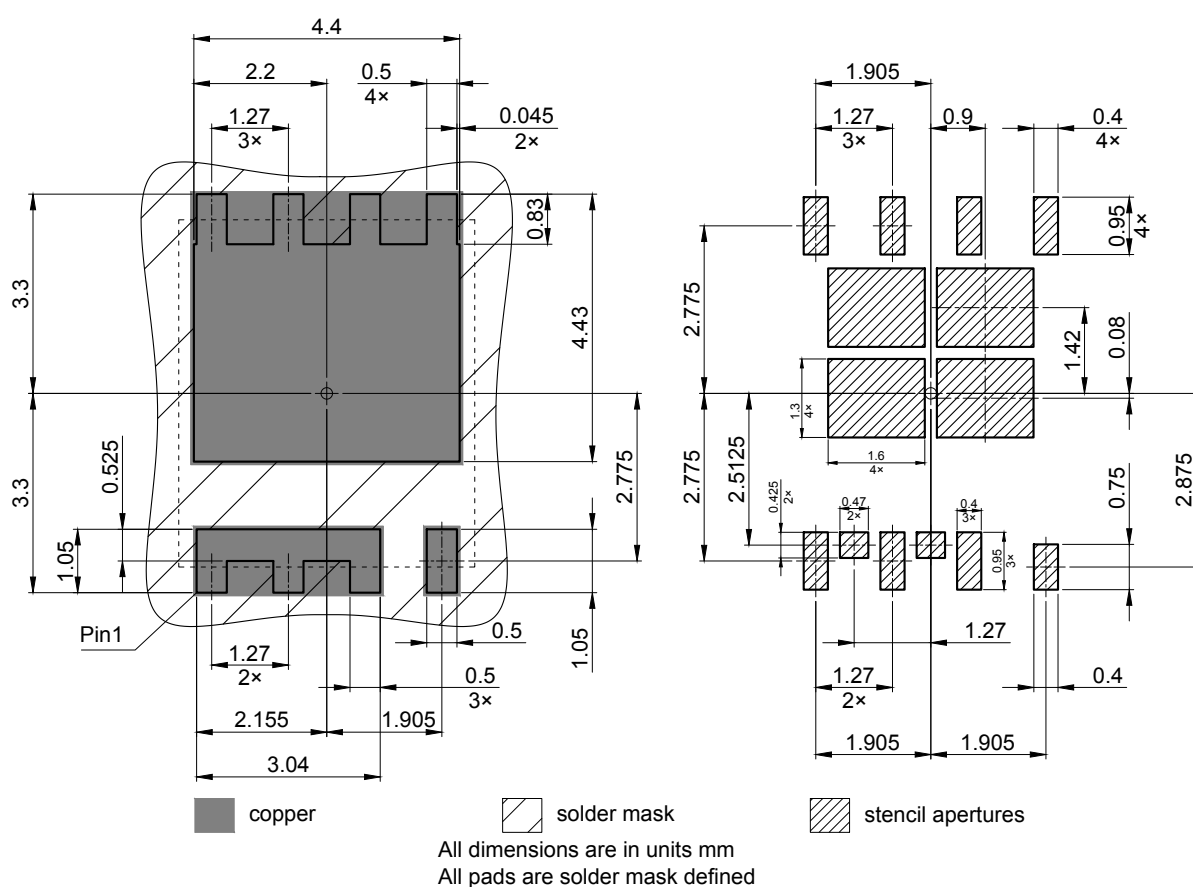
Figure 1 Outline PG-VSON-8 / PG-WSO8-8, dimensions in mm



| PACKAGE - GROUP<br>NUMBER: PG-WSN-8-U01 |             |      |            |             |      |
|-----------------------------------------|-------------|------|------------|-------------|------|
| DIMENSIONS                              | MILLIMETERS |      | DIMENSIONS | MILLIMETERS |      |
|                                         | MIN.        | MAX. |            | MIN.        | MAX. |
| A                                       | 0.55        | 0.75 | e          | 1.27        |      |
| A1                                      | 0.00        | 0.05 | L          | 0.68        | 0.78 |
| b                                       | 0.35        | 0.45 | L1         | 0.25        |      |
| c                                       | 0.20        |      | L2         | 0.42        |      |
| D                                       | 5.00        |      | aaa        | 0.05        |      |
| D1                                      | 4.11        | 4.31 | ccc        | 0.10        |      |
| D2                                      | 3.03        |      |            |             |      |
| E                                       | 6.00        |      |            |             |      |
| E1                                      | 3.66        | 3.86 |            |             |      |
| E2                                      | 4.11        |      |            |             |      |
| E3                                      | 0.63        | 0.83 |            |             |      |

NOTE: DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURRS

Figure 2 PG-VSON-8 / PG-WSN-8, dimensions in mm



**Figure 3 Bonding diagram PG-VSON-8 / PG-WSN-8, dimensions in mm**

**Revision history**

BSC110N15NS5SC

**Revision 2025-05-23, Rev. 2.2**

Previous revisions

| Revision | Date       | Subjects (major changes since last revision) |
|----------|------------|----------------------------------------------|
| 2.0      | 2022-09-17 | Release of final version                     |
| 2.1      | 2022-10-07 | Update "Features                             |
| 2.2      | 2025-05-23 | Update package drawings                      |

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