

MOSFET

StrongIRFET™ 2 Power-Transistor, 30 V

Features

- Optimized for a wide range of applications
- N-channel, logic level
- 100% avalanche tested
- 175°C rated
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21

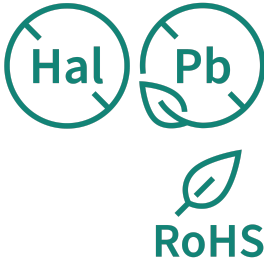
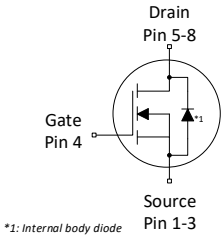
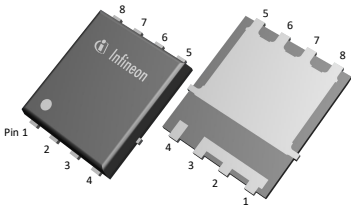
Product validation

Qualified according to JEDEC Standard

Table 1 Key performance parameters

| Parameter        | Value | Unit |
|------------------|-------|------|
| $V_{DS}$         | 30    | V    |
| $R_{DS(on),max}$ | 1.5   | mΩ   |
| $I_D$            | 214   | A    |
| $Q_{oss}$        | 39    | nC   |
| $Q_G$ (0V..4.5V) | 24    | nC   |

PG-TDSON-8



| Type / Ordering code | Package    | Marking  | Related links |
|----------------------|------------|----------|---------------|
| ISC015N03LF2S        | PG-TDSON-8 | 015N03F2 | -             |



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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>       | $I_D$          | -      | -    | 214<br>151<br>43 | A    | $V_{GS}=10\text{ V}$ , $T_C=25\text{ °C}$<br>$V_{GS}=10\text{ V}$ , $T_C=100\text{ °C}$<br>$V_{GS}=10\text{ V}$ , $T_A=25\text{ °C}$ , $R_{THJA}=50\text{ °C/W}$ <sup>2)</sup> |
| Pulsed drain current <sup>3)</sup>           | $I_{D,pulse}$  | -      | -    | 856              | A    | $T_C=25\text{ °C}$                                                                                                                                                             |
| Avalanche energy, single pulse <sup>4)</sup> | $E_{AS}$       | -      | -    | 246<br>493       | mJ   | $I_D=50\text{ A}$ , $R_{GS}=25\text{ }\Omega$<br>$I_D=25\text{ A}$ , $R_{GS}=25\text{ }\Omega$                                                                                 |
| Gate source voltage                          | $V_{GS}$       | -20    | -    | 20               | V    | -                                                                                                                                                                              |
| Power dissipation                            | $P_{tot}$      | -      | -    | 125<br>3.0       | W    | $T_C=25\text{ °C}$<br>$T_A=25\text{ °C}$ , $R_{THJA}=50\text{ °C/W}$ <sup>2)</sup>                                                                                             |
| 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> 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.

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

<sup>4)</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                                     | $R_{thJC}$ | -      | -    | 1.2  | °C/W | -                     |
| Thermal resistance, junction - case, top                                | $R_{thJC}$ | -      | -    | 20   | °C/W |                       |
| Thermal resistance, junction - ambient, minimal footprint <sup>5)</sup> | $R_{thJA}$ | -      | -    | 50   | °C/W |                       |

<sup>5)</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   | $V_{(BR)DSS}$ | 30     | -            | -          | V             | $V_{GS}=0\text{ V}$ , $I_D=2\text{ mA}$                                                                                             |
| Gate threshold voltage           | $V_{GS(th)}$  | 1.35   | 1.85         | 2.35       | V             | $V_{DS}=V_{GS}$ , $I_D=60\text{ }\mu\text{A}$                                                                                       |
| Zero gate voltage drain current  | $I_{DSS}$     | -      | 0.1<br>10    | 1<br>100   | $\mu\text{A}$ | $V_{DS}=30\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=25\text{ °C}$<br>$V_{DS}=30\text{ V}$ , $V_{GS}=0\text{ V}$ , $T_j=125\text{ °C}$ |
| Gate-source leakage current      | $I_{GSS}$     | -      | 10           | 100        | nA            | $V_{GS}=20\text{ V}$ , $V_{DS}=0\text{ V}$                                                                                          |
| Drain-source on-state resistance | $R_{DS(on)}$  | -      | 1.28<br>1.69 | 1.5<br>2.6 | m $\Omega$    | $V_{GS}=10\text{ V}$ , $I_D=50\text{ A}$<br>$V_{GS}=4.5\text{ V}$ , $I_D=25\text{ A}$                                               |
| Gate resistance                  | $R_G$         | -      | 1.9          | -          | $\Omega$      | -                                                                                                                                   |
| Transconductance <sup>6)</sup>   | $g_{fs}$      | 85     | -            | -          | S             | $ V_{DS} \geq 2 I_D R_{DS(on)max}$ , $I_D=50\text{ A}$                                                                              |

<sup>6)</sup> Defined by design. Not subject to production test.

**Table 5 Dynamic characteristics**

| Parameter                    | Symbol       | Values |      |      | Unit | Note / Test condition                                                                               |
|------------------------------|--------------|--------|------|------|------|-----------------------------------------------------------------------------------------------------|
|                              |              | Min.   | Typ. | Max. |      |                                                                                                     |
| Input capacitance            | $C_{iss}$    | -      | 3400 | -    | pF   | $V_{GS}=0\text{ V}$ , $V_{DS}=15\text{ V}$ , $f=1\text{ MHz}$                                       |
| Output capacitance           | $C_{oss}$    | -      | 660  | -    | pF   |                                                                                                     |
| Reverse transfer capacitance | $C_{rss}$    | -      | 170  | -    | pF   |                                                                                                     |
| Turn-on delay time           | $t_{d(on)}$  | -      | 19   | -    | ns   | $V_{DD}=15\text{ V}$ , $V_{GS}=4.5\text{ V}$ , $I_D=50\text{ A}$ ,<br>$R_{G,ext}=1.6\text{ }\Omega$ |
| Rise time                    | $t_r$        | -      | 13   | -    | ns   |                                                                                                     |
| Turn-off delay time          | $t_{d(off)}$ | -      | 15   | -    | ns   |                                                                                                     |
| Fall time                    | $t_f$        | -      | 8.3  | -    | ns   |                                                                                                     |

**Table 6 Gate charge characteristics <sup>7)</sup>**

| Parameter                       | Symbol        | Values |      |      | Unit | Note / Test condition                                                        |
|---------------------------------|---------------|--------|------|------|------|------------------------------------------------------------------------------|
|                                 |               | Min.   | Typ. | Max. |      |                                                                              |
| Gate to source charge           | $Q_{gs}$      | -      | 11   | -    | nC   | $V_{DD}=15\text{ V}$ , $I_D=50\text{ A}$ , $V_{GS}=0\text{ to }4.5\text{ V}$ |
| Gate charge at threshold        | $Q_{g(th)}$   | -      | 6.2  | -    | nC   |                                                                              |
| Gate to drain charge            | $Q_{gd}$      | -      | 7.2  | -    | nC   |                                                                              |
| Switching charge                | $Q_{sw}$      | -      | 12   | -    | nC   |                                                                              |
| Gate charge total <sup>8)</sup> | $Q_g$         | -      | 24   | 36   | nC   |                                                                              |
| Gate plateau voltage            | $V_{plateau}$ | -      | 3.2  | -    | V    | $V_{DD}=15\text{ V}$ , $I_D=50\text{ A}$ , $V_{GS}=0\text{ to }10\text{ V}$  |
| Gate charge total <sup>8)</sup> | $Q_g$         | -      | 50   | 75   | nC   |                                                                              |
| Gate charge total, sync. FET    | $Q_{g(sync)}$ | -      | 21   | -    | nC   |                                                                              |

**Table 6 Gate charge characteristics** <sup>7)</sup>

| Parameter     | Symbol    | Values |      |      | Unit | Note / Test condition                      |
|---------------|-----------|--------|------|------|------|--------------------------------------------|
|               |           | Min.   | Typ. | Max. |      |                                            |
| Output charge | $Q_{oss}$ | -      | 39   | -    | nC   | $V_{DS}=15\text{ V}$ , $V_{GS}=0\text{ V}$ |

<sup>7)</sup> See "Gate charge waveforms" for parameter definition

<sup>8)</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 | $I_S$         | -      | -    | 122  | A    | $T_C=25\text{ °C}$                                                         |
| Diode pulse current              | $I_{S,pulse}$ | -      | -    | 856  | A    |                                                                            |
| Diode forward voltage            | $V_{SD}$      | -      | 0.80 | 1.0  | V    | $V_{GS}=0\text{ V}$ , $I_F=50\text{ A}$ , $T_J=25\text{ °C}$               |
| Reverse recovery time            | $t_{rr}$      | -      | 18   | -    | ns   | $V_R=15\text{ V}$ , $I_F=50\text{ A}$ , $di_F/dt=500\text{ A}/\mu\text{s}$ |
| Reverse recovery charge          | $Q_{rr}$      | -      | 54   | -    | nC   |                                                                            |

4 Electrical characteristics diagrams

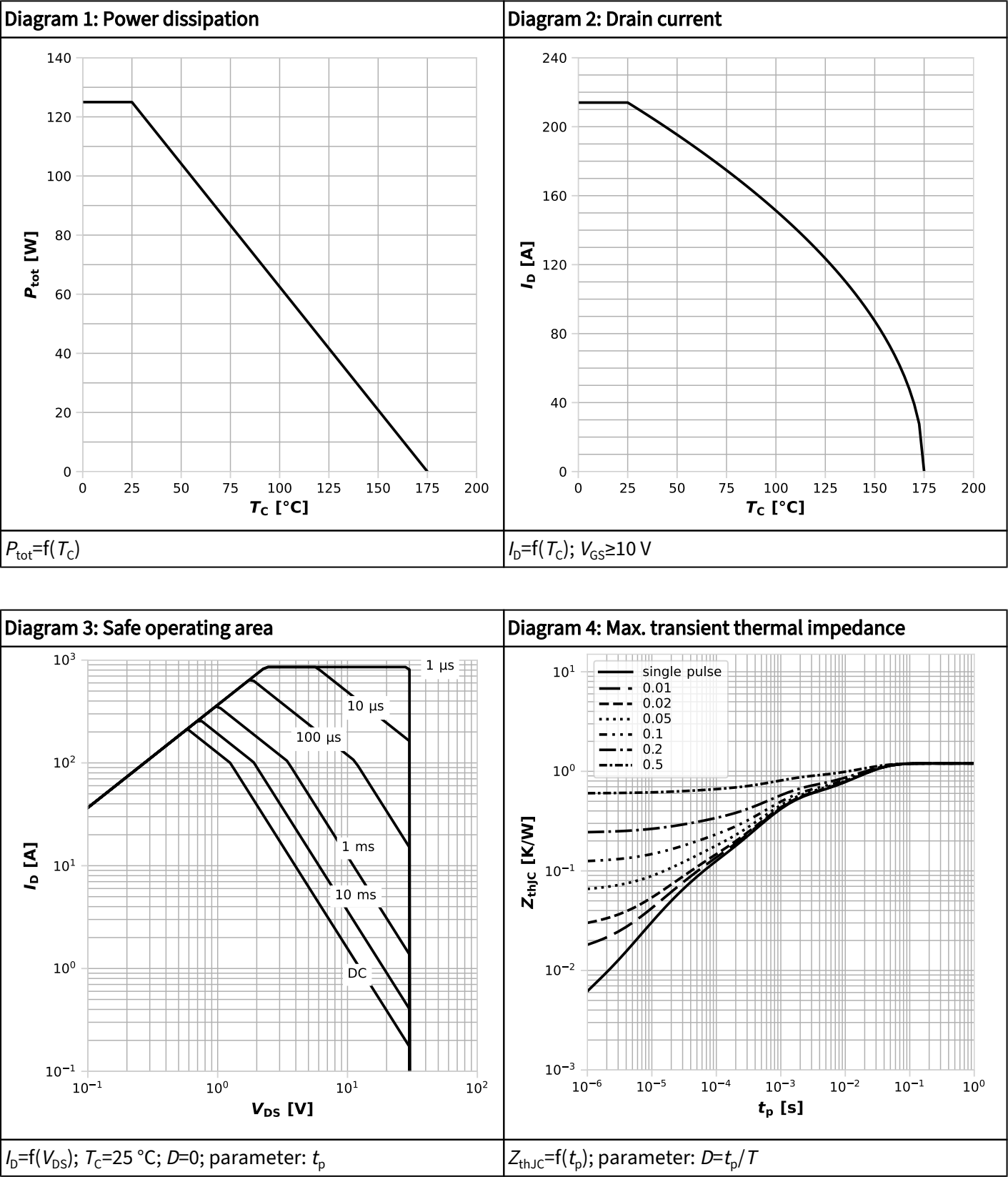
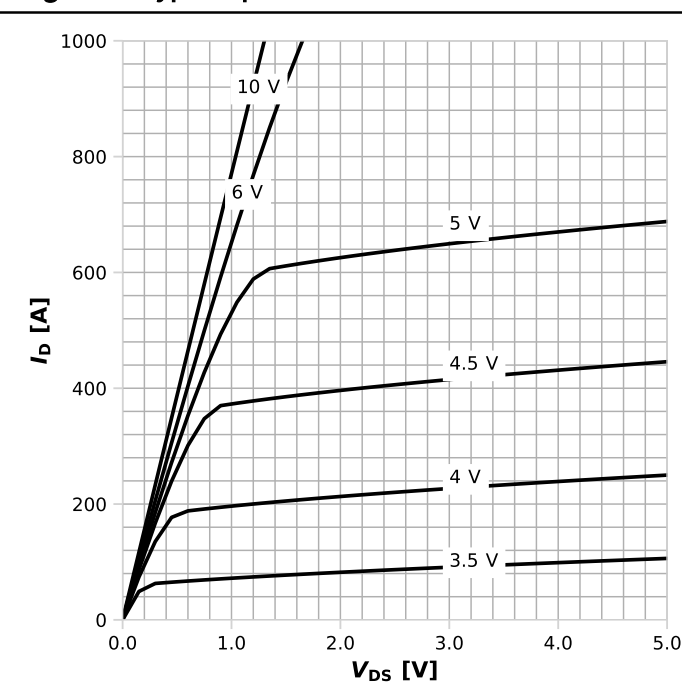
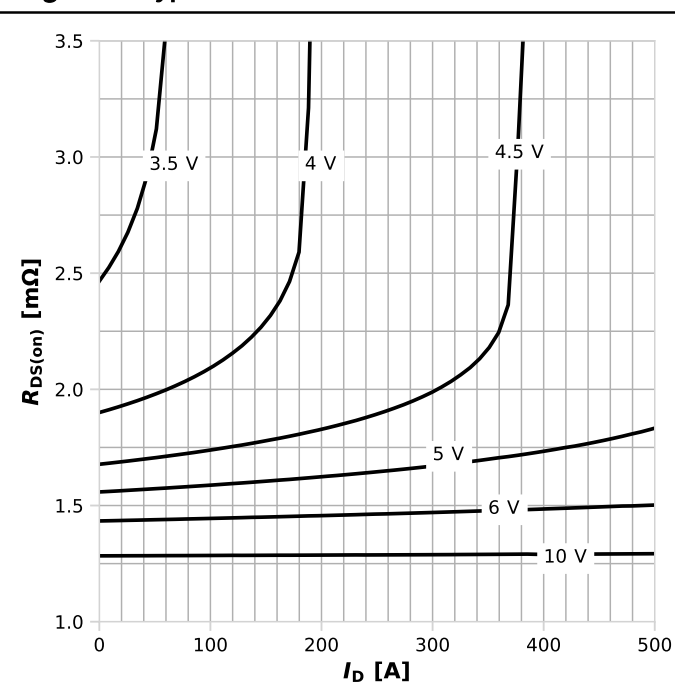


Diagram 5: Typ. output characteristics



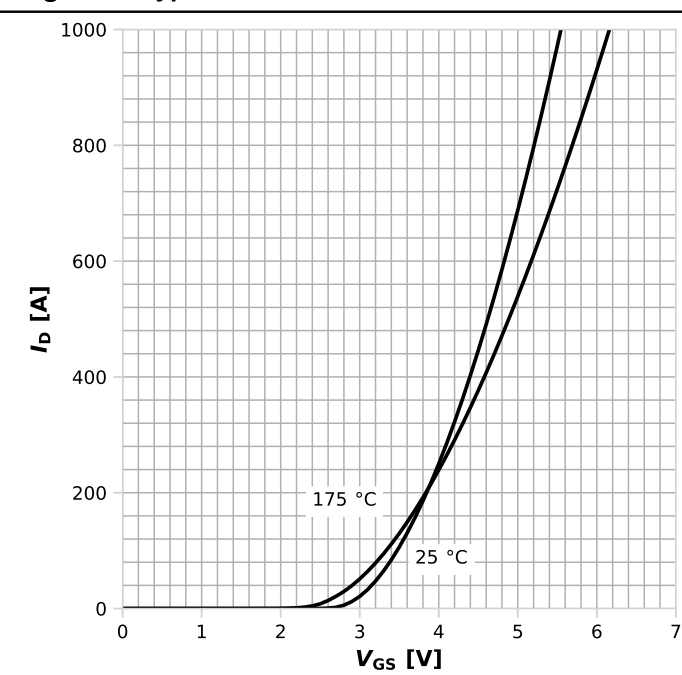
$I_D = f(V_{DS})$ ,  $T_j = 25^\circ\text{C}$ ; parameter:  $V_{GS}$

Diagram 6: Typ. drain-source on resistance



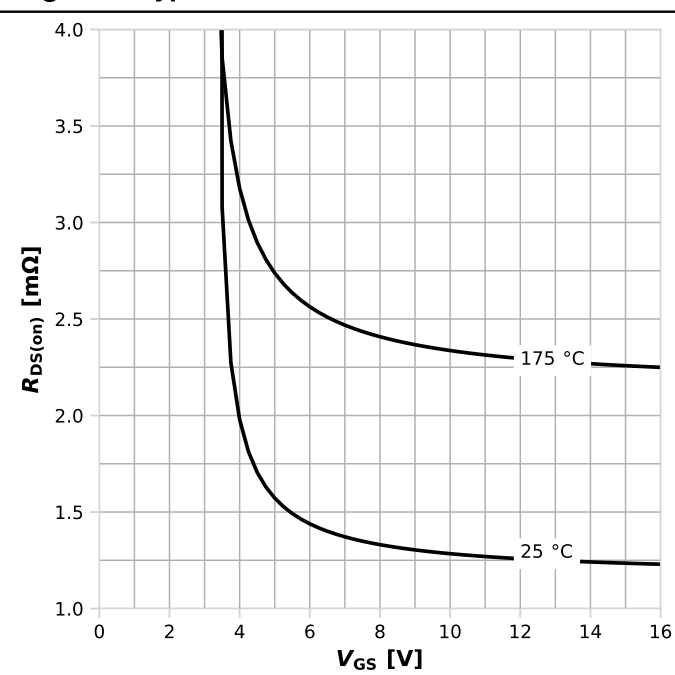
$R_{DS(on)} = f(I_D)$ ,  $T_j = 25^\circ\text{C}$ ; parameter:  $V_{GS}$

Diagram 7: Typ. transfer characteristics

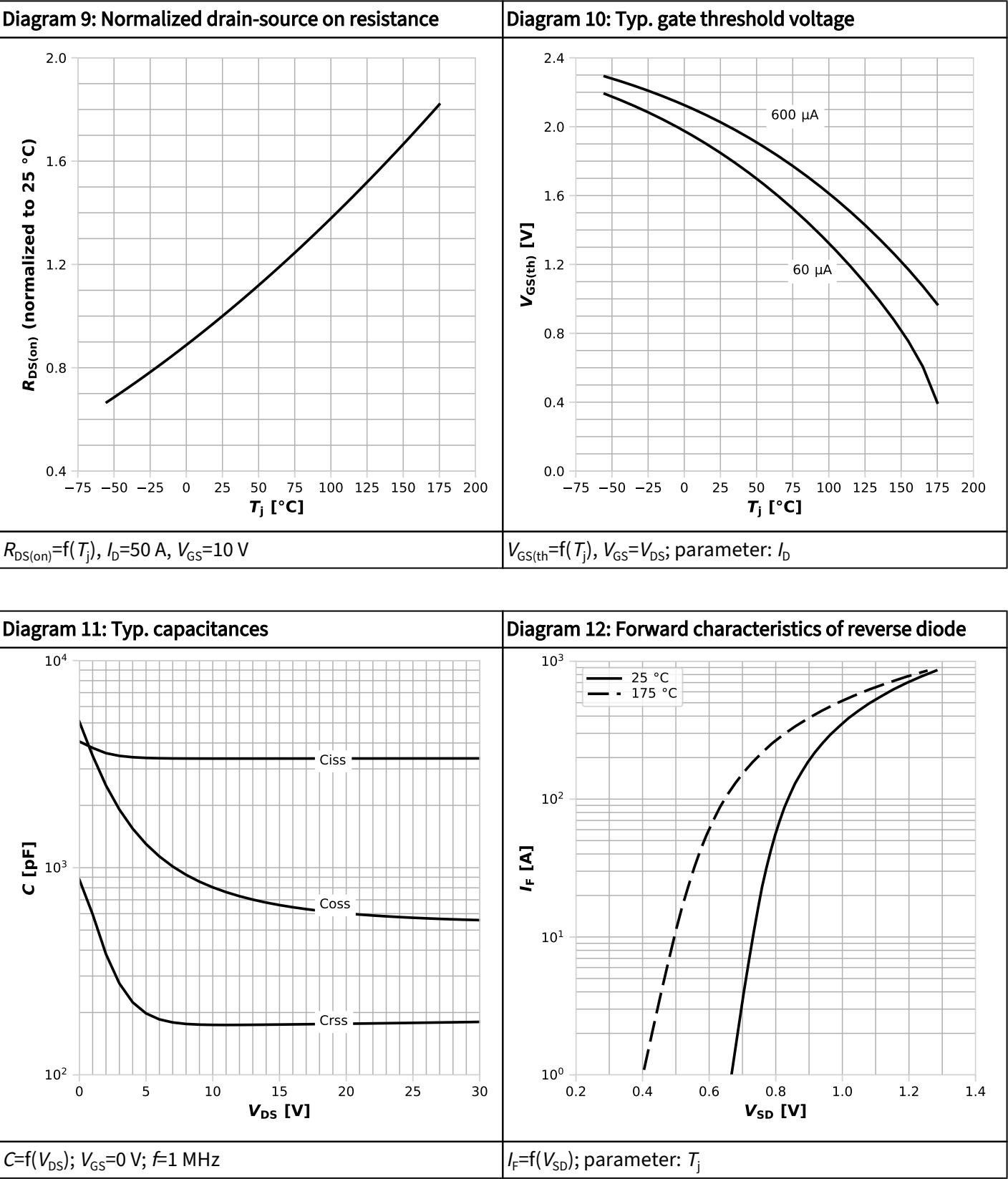


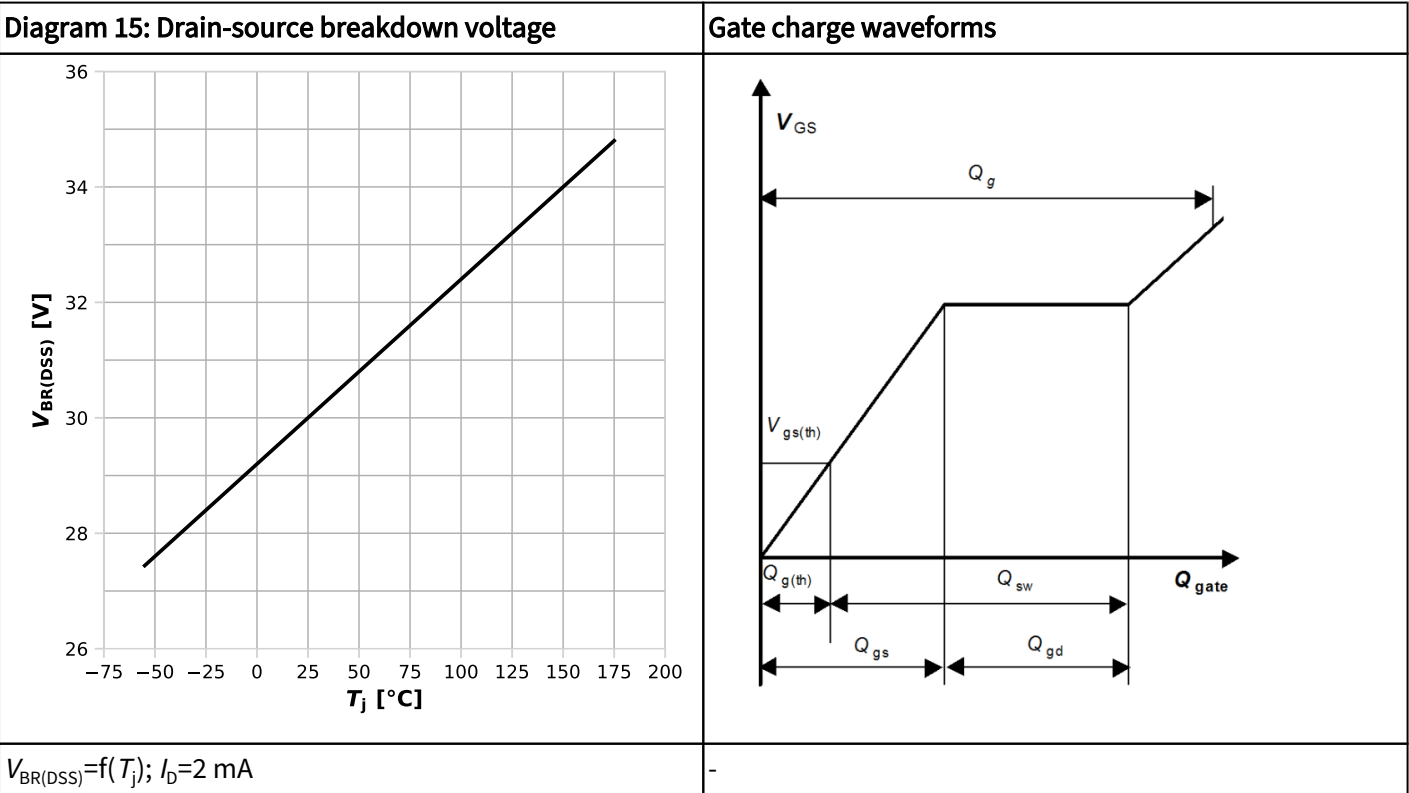
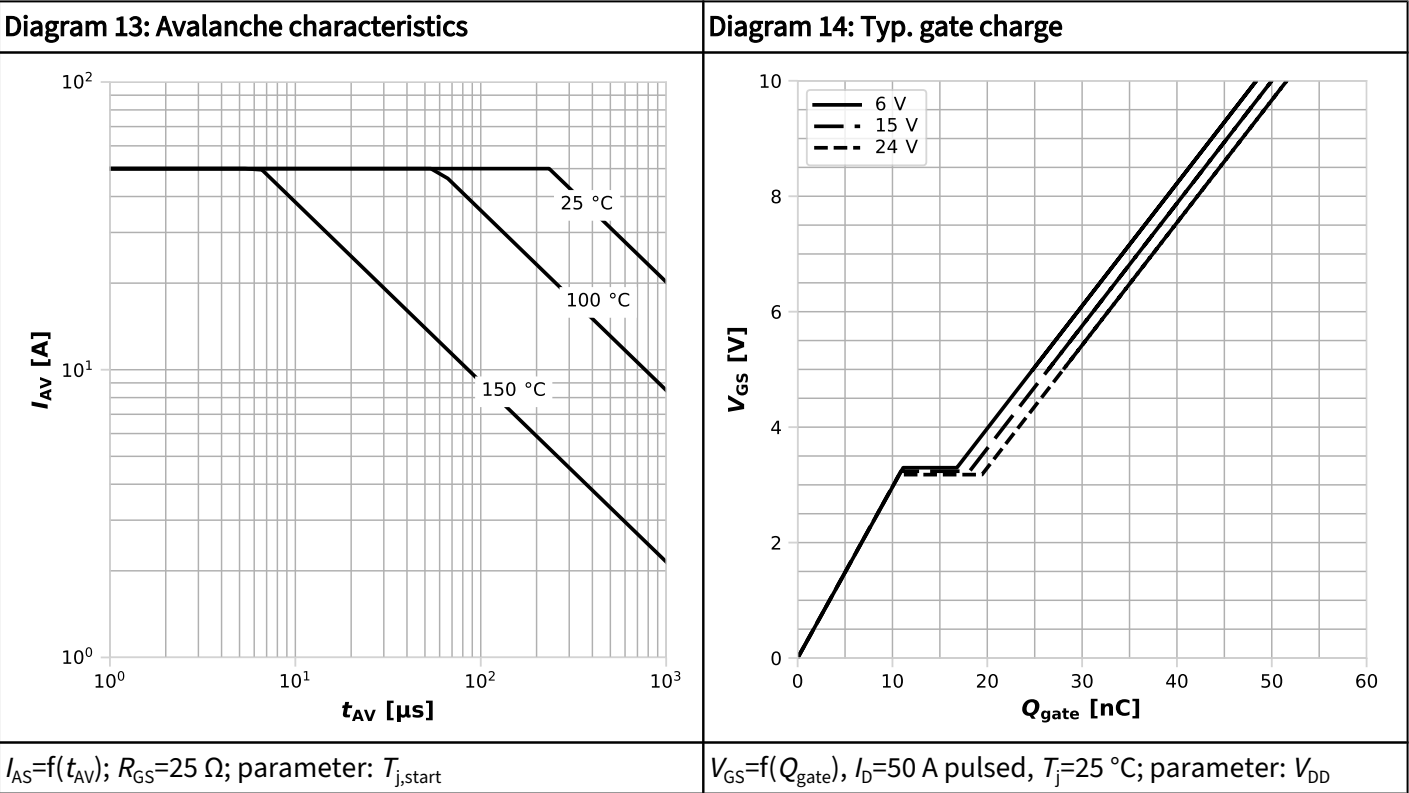
$I_D = f(V_{GS})$ ,  $|V_{DS}| > 2|I_D|R_{DS(on)max}$ ; parameter:  $T_j$

Diagram 8: Typ. drain-source on resistance



$R_{DS(on)} = f(V_{GS})$ ,  $I_D = 50\text{ A}$ ; parameter:  $T_j$





## 5 Package outlines

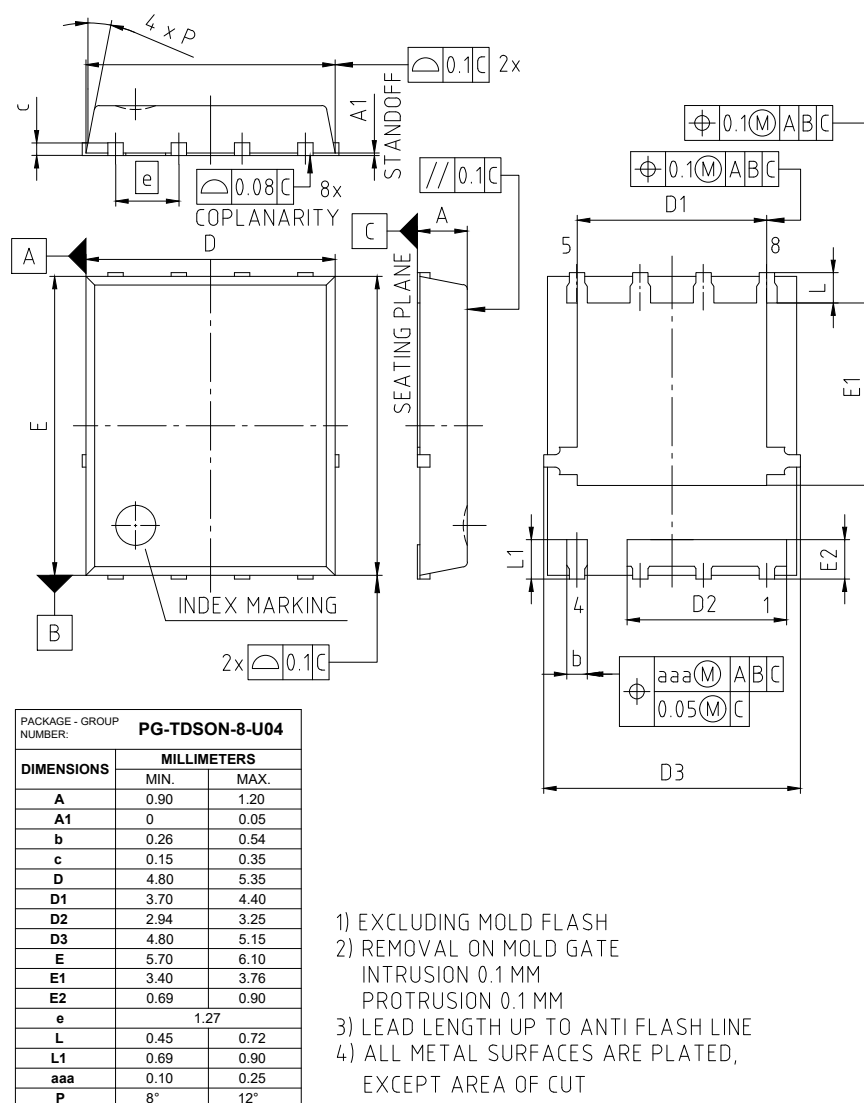
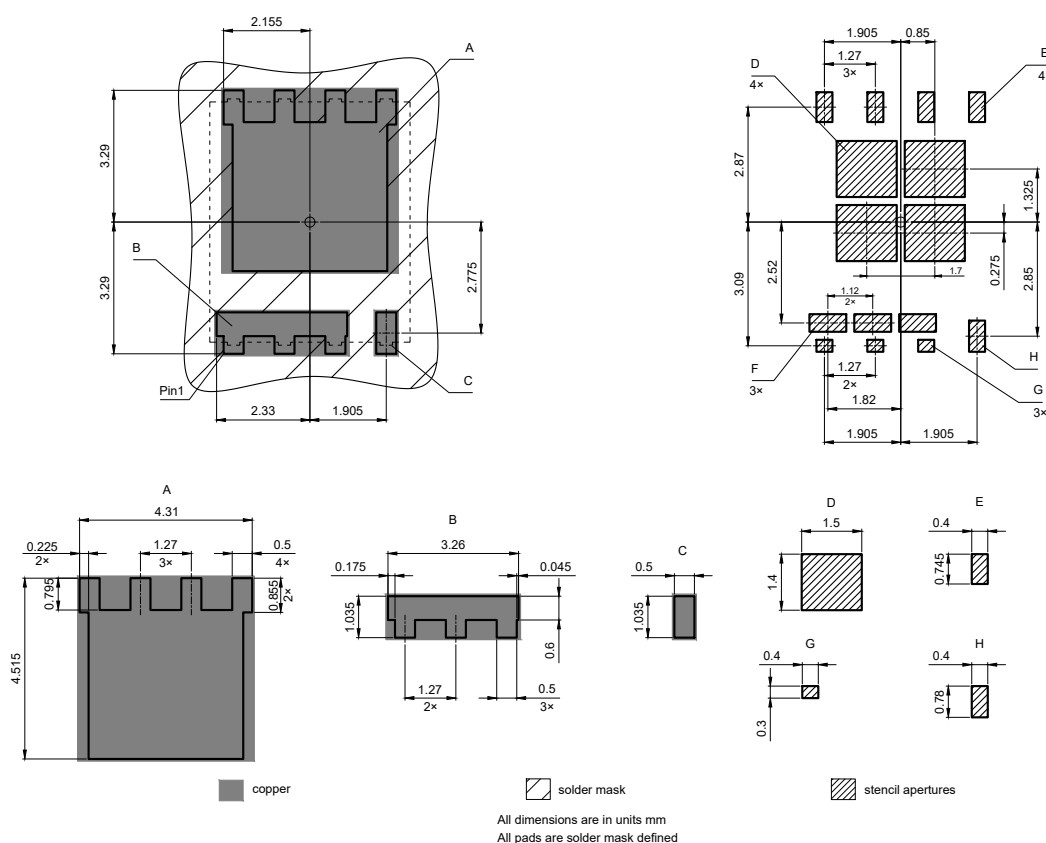
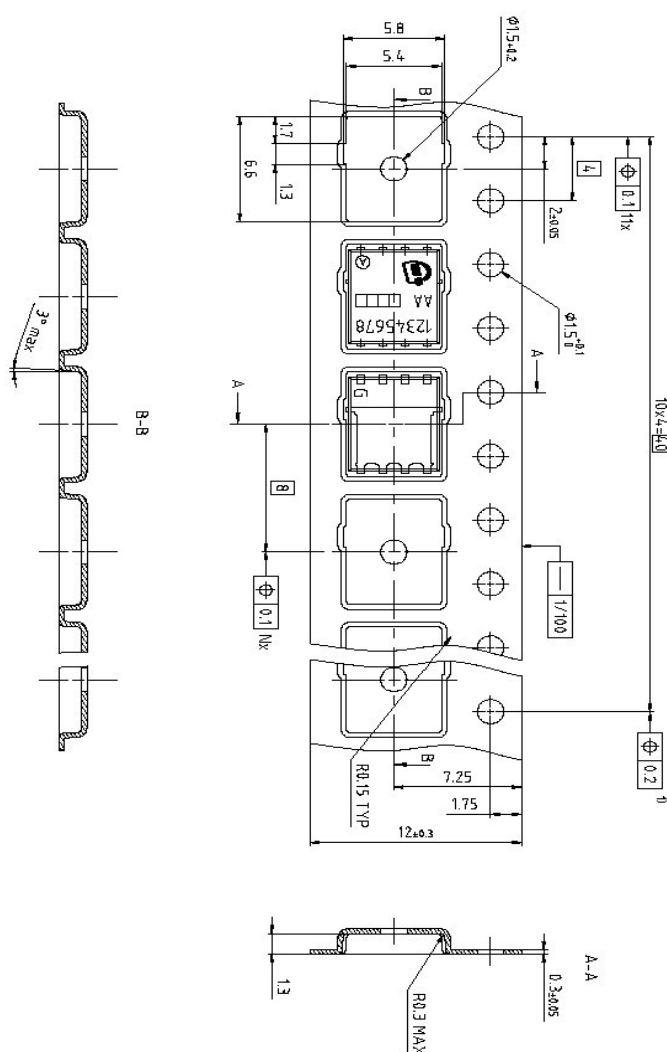


Figure 1 Outline PG-TDSON-8, dimensions in mm



**Figure 2 Footprint drawing PG-TDSON-8, dimensions in mm**



**Figure 3** Packaging variant PG-TDSON-8, dimensions in mm

## Revision history

ISC015N03LF2S

### Revision 2024-11-25, Rev. 1.1

Previous revisions

| Revision | Date       | Subjects (major changes since last revision)                       |
|----------|------------|--------------------------------------------------------------------|
| 1.0      | 2024-10-08 | Release of final                                                   |
| 1.1      | 2024-11-25 | updated product validation to "JEDEC standard" and Package outline |

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