

Preliminary Specification: Subject to Change without Notice

## N-Channel 25 V MOSFET

### Product summary

| $V_{DS}$ (V) | $R_{DS(on),max}$ (m $\Omega$ ) | $I_D$ (A)          |
|--------------|--------------------------------|--------------------|
| 25           | 0.55 @ $V_{GS} = 10V$          | 323 <sup>(1)</sup> |

### Features

- Low  $R_{DS(on)}$  SGT technology
- Low thermal impedance
- Fast switching speed
- 100% avalanche tested

### Applications

- DC/DC conversion
- Power switch
- Motor drives

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### Package and ordering information

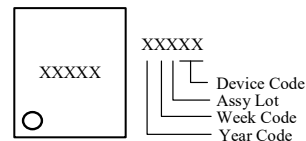
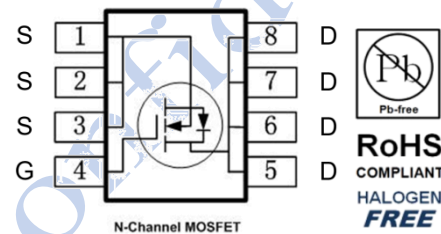
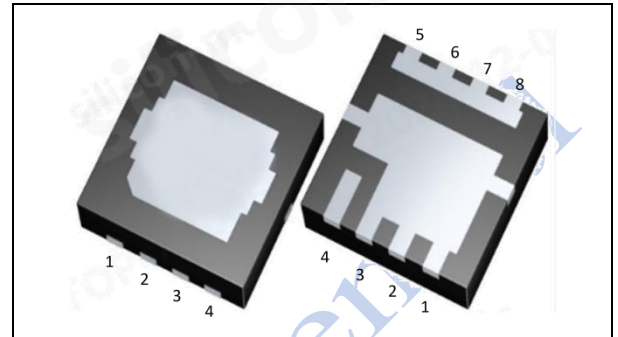
| Ordering code  | Package                    | Device code |
|----------------|----------------------------|-------------|
| SDHE2L0P6VN-AD | DFN3.3*3.3 Source Down DSC | TE          |

### 1. Maximum ratings

Absolute maximum ratings ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

| Parameter                                        |                                         | Symbol         | Limit      | Unit             |
|--------------------------------------------------|-----------------------------------------|----------------|------------|------------------|
| Drain-source voltage                             |                                         | $V_{DS}$       | 25         | V                |
| Gate-source voltage                              |                                         | $V_{GS}$       | $\pm 16$   |                  |
| Continuous drain current                         | $T_C = 25^\circ\text{C}$ <sup>(1)</sup> | $I_D$          | 323        | A                |
|                                                  | $T_C = 100^\circ\text{C}$               |                | 204        |                  |
|                                                  | $T_A = 25^\circ\text{C}$ <sup>(4)</sup> |                | 48         |                  |
| Pulsed drain current <sup>(2)</sup>              |                                         | $I_{D,pulse}$  | 1292       |                  |
| Avalanche energy, single pulse <sup>(3)</sup>    |                                         | $E_{AS}$       | 101        | mJ               |
| Power dissipation                                | $T_C = 25^\circ\text{C}$                | $P_D$          | 89.2       | W                |
|                                                  | $T_A = 25^\circ\text{C}$ <sup>(4)</sup> |                | 2          |                  |
| Operating junction and storage temperature range |                                         | $T_J, T_{stg}$ | -55 to 150 | $^\circ\text{C}$ |

### DFN3.3\*3.3 Source Down DSC



## 2. Thermal resistance ratings

| Thermal resistance ratings                             |              |                 |      |      |
|--------------------------------------------------------|--------------|-----------------|------|------|
| Parameter                                              |              | Symbol          | Max. | Unit |
| Thermal resistance, junction-to-case                   | Steady state | $R_{\theta JC}$ | 1.4  | °C/W |
| Thermal resistance, junction-to-ambient <sup>(4)</sup> | Steady state | $R_{\theta JA}$ | 62.5 |      |

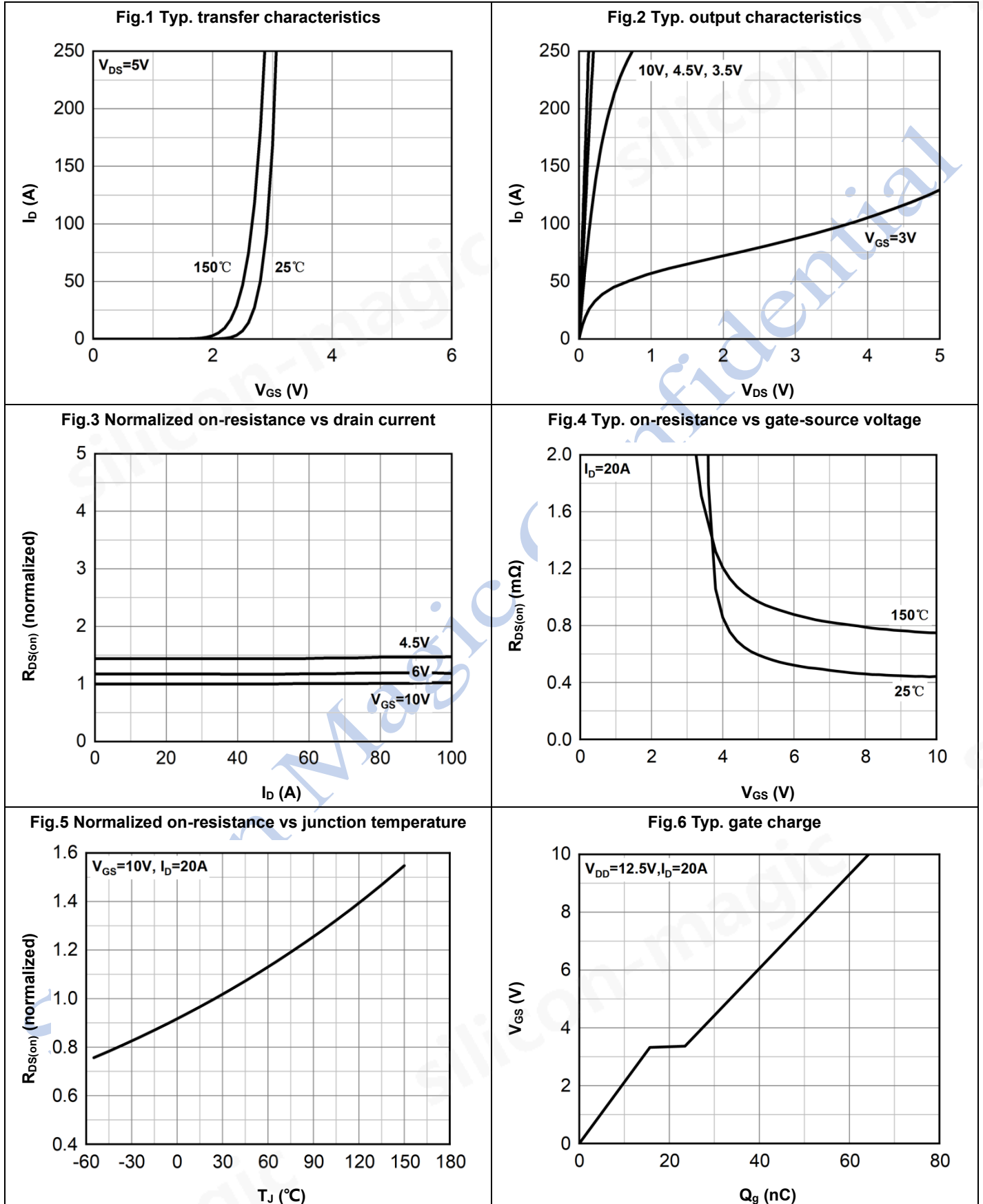
## 3. Electrical Characteristics

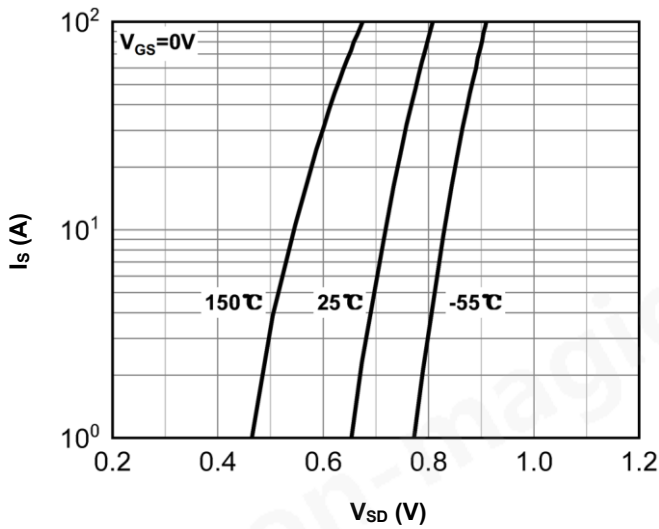
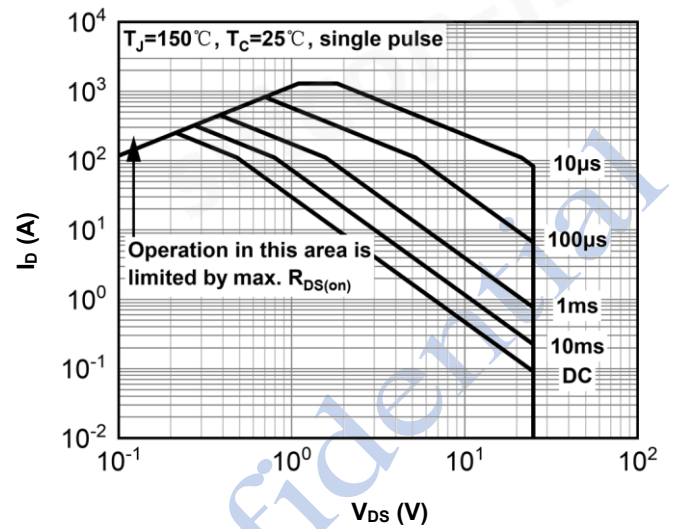
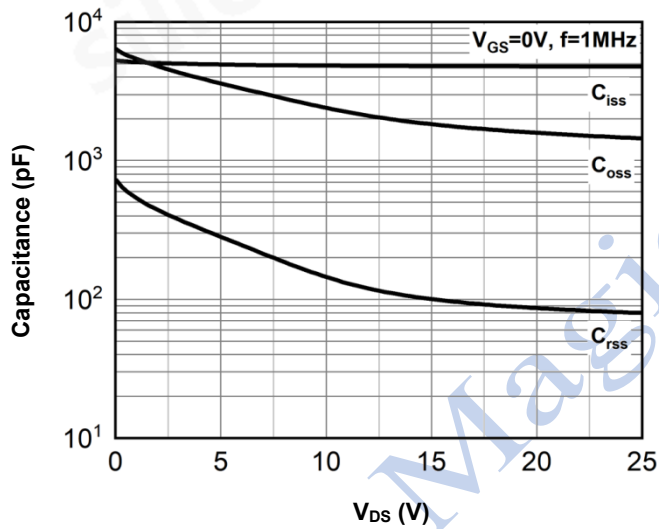
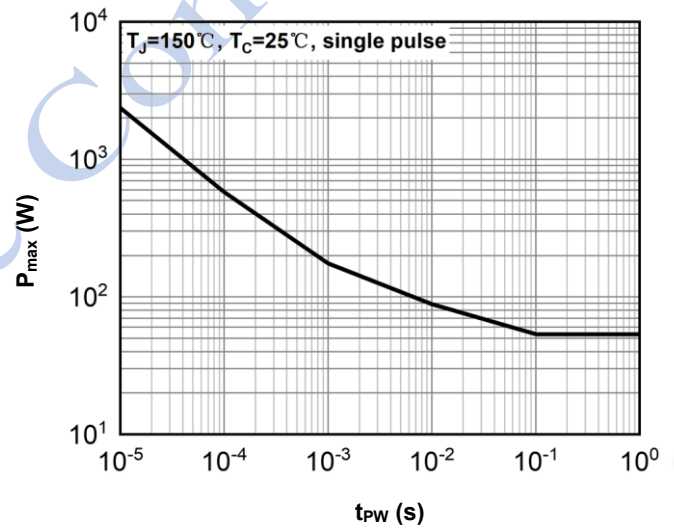
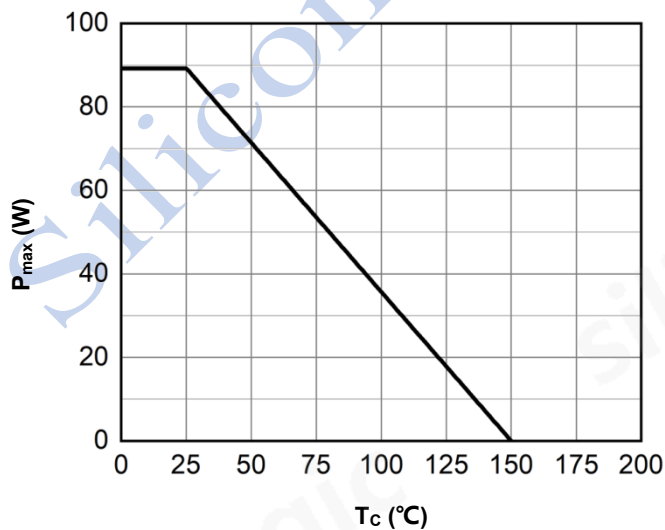
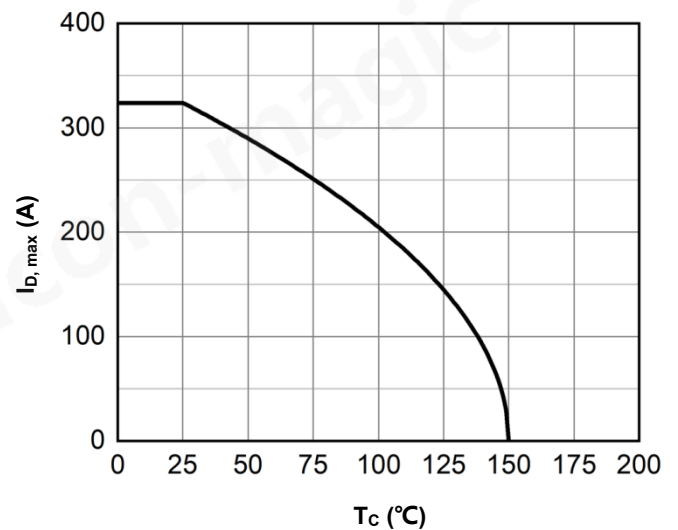
| Electrical characteristics (T <sub>J</sub> = 25°C unless otherwise noted) |                      |                                                                                                      |      |      |      |      |
|---------------------------------------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------|------|------|------|------|
| Parameter                                                                 | Symbol               | Test conditions                                                                                      | Min. | Typ. | Max. | Unit |
| Static parameter                                                          |                      |                                                                                                      |      |      |      |      |
| Drain to source breakdown voltage                                         | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA                                                       | 25   |      |      | V    |
| Gate-source threshold voltage                                             | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA                                          | 1    | 1.6  | 2.2  | V    |
| Gate-body leakage                                                         | I <sub>GSS</sub>     | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±16 V                                                       |      |      | ±100 | nA   |
| Zero gate voltage drain current                                           | I <sub>DSS</sub>     | V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V                                                        |      |      | 1    | μA   |
| Drain-source on-resistance                                                | R <sub>DS(on)</sub>  | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A                                                        |      | 0.45 | 0.55 | mΩ   |
|                                                                           |                      | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 20 A                                                       |      | 0.63 | 0.80 |      |
| Forward transconductance <sup>(5)</sup>                                   | g <sub>fs</sub>      | V <sub>DS</sub> = 5 V, I <sub>D</sub> = 20 A                                                         |      | 140  |      | S    |
| Gate resistance                                                           | R <sub>g</sub>       | f = 1 MHz                                                                                            |      | 0.8  |      | Ω    |
| Dynamic <sup>(5)</sup>                                                    |                      |                                                                                                      |      |      |      |      |
| Total gate charge                                                         | Q <sub>g</sub>       | V <sub>DS</sub> = 12.5 V, I <sub>D</sub> = 20 A, V <sub>GS</sub> = 4.5 V                             |      | 29   |      | nC   |
| Total gate charge                                                         | Q <sub>g</sub>       | V <sub>DS</sub> = 12.5 V, I <sub>D</sub> = 20 A, V <sub>GS</sub> = 10 V                              |      | 63   |      | nC   |
| Gate-source charge                                                        | Q <sub>gs</sub>      |                                                                                                      |      | 15   |      |      |
| Gate-drain charge                                                         | Q <sub>gd</sub>      |                                                                                                      |      | 8    |      |      |
| Turn-on delay time                                                        | t <sub>d(on)</sub>   | V <sub>DS</sub> = 12.5 V, I <sub>D</sub> = 20 A, V <sub>GS</sub> = 10 V,<br>R <sub>GEN</sub> = 1.6 Ω |      | 6.6  |      | ns   |
| Rise time                                                                 | t <sub>r</sub>       |                                                                                                      |      | 7.1  |      |      |
| Turn-off delay time                                                       | t <sub>d(off)</sub>  |                                                                                                      |      | 28.3 |      |      |
| Fall time                                                                 | t <sub>f</sub>       |                                                                                                      |      | 11.2 |      |      |
| Input capacitance                                                         | C <sub>iss</sub>     | V <sub>DS</sub> = 12.5 V, V <sub>GS</sub> = 0 V, f = 1 MHz                                           |      | 4788 |      | pF   |
| Output capacitance                                                        | C <sub>oss</sub>     |                                                                                                      |      | 2093 |      |      |
| Reverse transfer capacitance                                              | C <sub>rss</sub>     |                                                                                                      |      | 118  |      |      |
| Reverse Diode Characteristics <sup>(5)</sup>                              |                      |                                                                                                      |      |      |      |      |
| Diode forward voltage                                                     | V <sub>SD</sub>      | V <sub>GS</sub> = 0 V, I <sub>F</sub> = 20 A                                                         |      | 0.8  | 1.1  | V    |
| Reverse recovery time                                                     | t <sub>rr</sub>      | V <sub>DS</sub> = 12.5 V, I <sub>F</sub> = 20 A, di/dt = 100 A/μs                                    |      | 12   |      | ns   |
| Reverse recovery charge                                                   | Q <sub>rr</sub>      |                                                                                                      |      | 25   |      | nC   |

### Notes

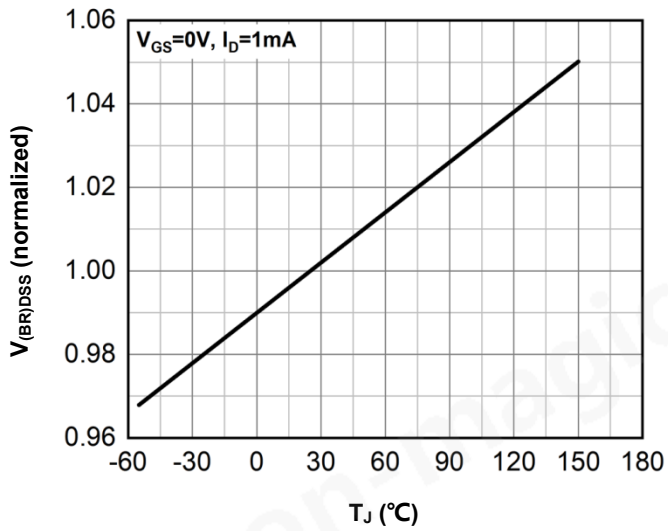
- (1) Limited by maximum junction temperature.
- (2) Pulse width limited by maximum junction temperature.
- (3)  $V_{DS} = 12.5\text{ V}, V_{GS} = 10\text{ V}, L = 0.1\text{ mH}$ .
- (4)  $R_{\theta JA}$  is determined with the device mounted on a 1 in<sup>2</sup> pad 2 oz copper pad on a 1.5x1.5 in. board of FR-4 material.
- (5) Guaranteed by design, not subject to production testing.

#### 4. Electrical characteristics diagrams

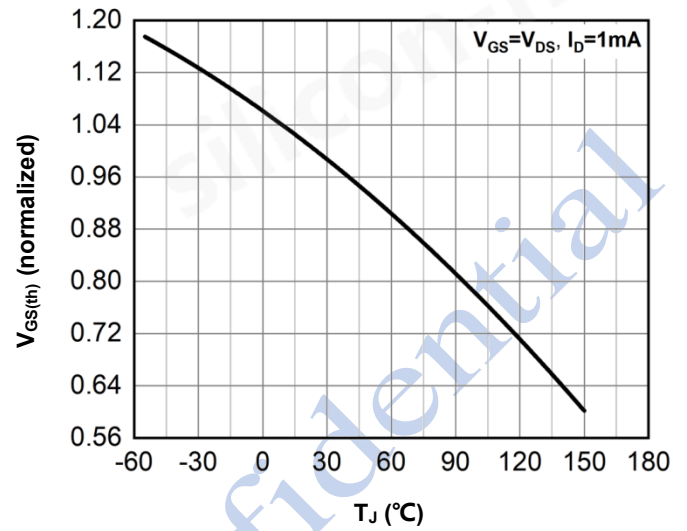


**Fig.7 Typ. forward characteristics of body diode**

**Fig.8 Safe operating area**

**Fig.9 Typ. Capacitance**

**Fig.10 Single pulse maximum power dissipation**

**Fig.11 Max. power dissipation vs case temperature**

**Fig.12 Max. continuous drain current vs case temperature**


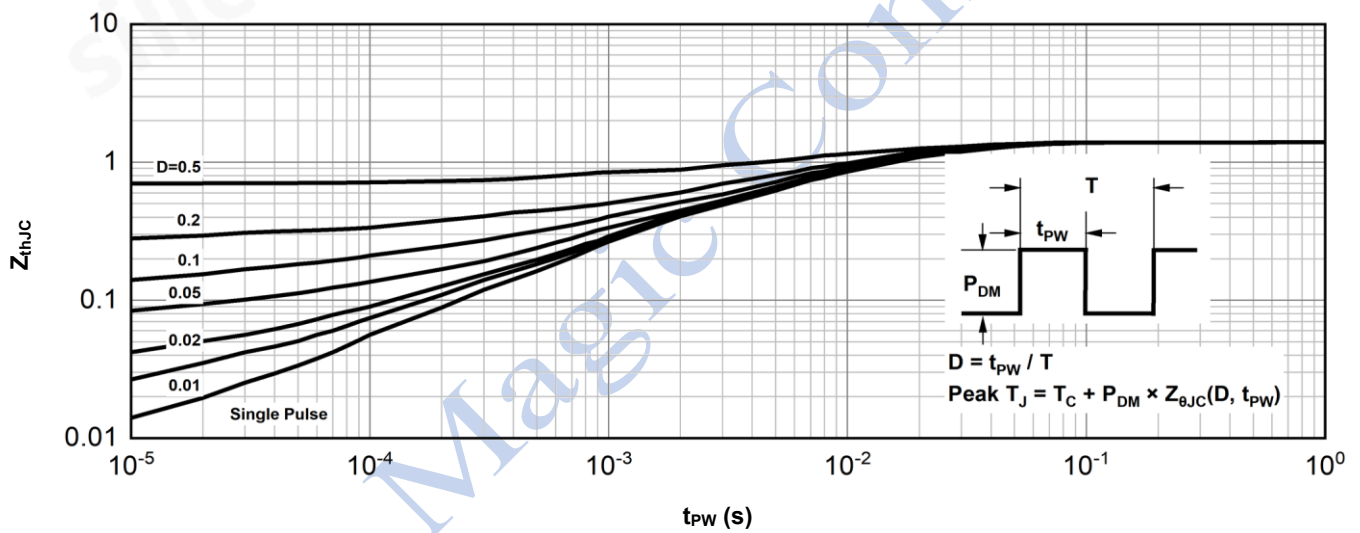
**Fig.13 Normalized  $V_{(BR)DSS}$  vs junction temperature**



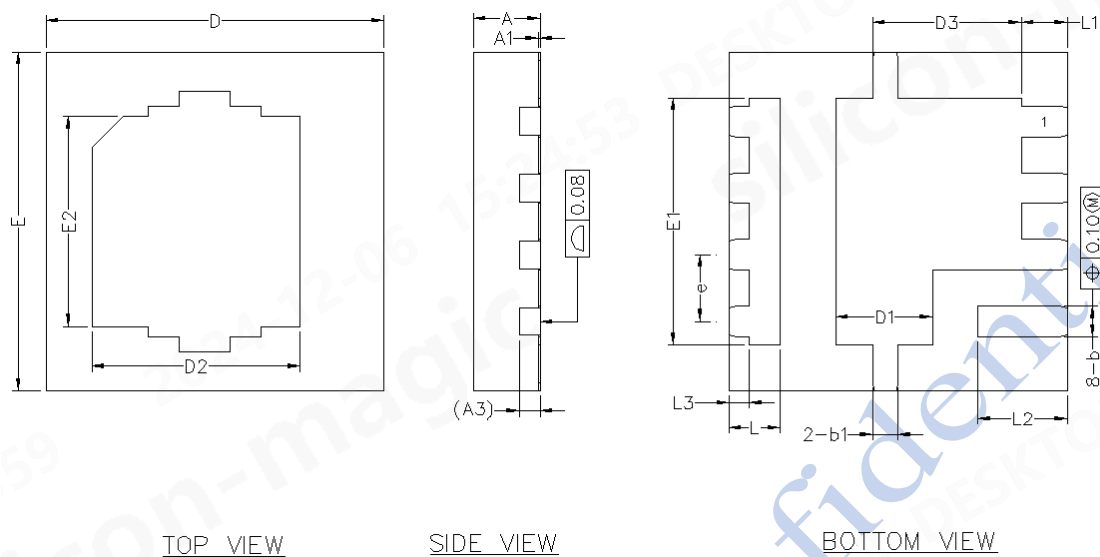
**Fig.14 Normalized  $V_{GS(th)}$  vs junction temperature**



**Fig.15 Transient thermal impedance from junction to case**



## 5. Package outline dimensions



| Dim | Millimeters |      |      |
|-----|-------------|------|------|
|     | Min         | Nom  | Max  |
| A   | 0.55        | 0.65 | 0.75 |
| A1  | 0.00        | 0.02 | 0.05 |
| A3  | 0.203 REF   |      |      |
| b   | 0.20        | 0.30 | 0.40 |
| b1  | 0.25 REF    |      |      |
| D   | 3.20        | 3.30 | 3.40 |
| D1  | 0.84        | 0.94 | 1.04 |
| D2  | 1.93        | 2.03 | 2.23 |
| D3  | 1.35        | 1.45 | 1.55 |
| E   | 3.20        | 3.30 | 3.40 |
| E1  | 2.31        | 2.41 | 2.51 |
| E2  | 1.95        | 2.05 | 2.25 |
| e   | 0.55        | 0.65 | 0.75 |
| L   | 0.40        | 0.50 | 0.60 |
| L1  | 0.35        | 0.45 | 0.55 |
| L2  | 0.77        | 0.87 | 0.97 |
| L3  | 0.10        | 0.20 | 0.30 |

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