**Preliminary Specification: Subject to Change without Notice**

# N-Channel 100 V MOSFET

## Product summary

| $V_{DS}$ (V) | $R_{DS(on),max}$ (mΩ) | $I_D$ (A) |
|---|---|---|
| 100 | 1.4 @ $V_{GS}$ = 10V | 280 (1) |

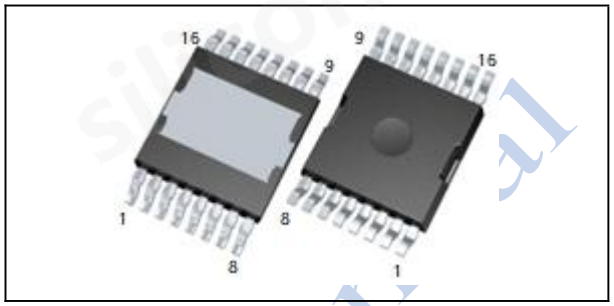
## Features

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

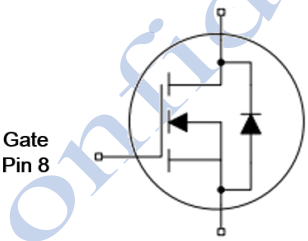
## Applications

- DC/DC conversion
- Power switch
- Motor drives

TOLT




Drain
Pin 9-16



Gate
Pin 8

Source
Pin 1-7

Pb-free
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HALOGEN
FREE

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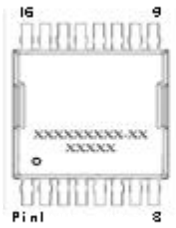
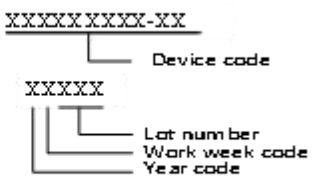



## Package and ordering information

| Ordering code | Package | Device code |
|---|---|---|
| SDN10N1P4QN-AA | TOLT | N10N1P4QN-AA |

## 1. Maximum ratings

| Absolute maximum ratings ($T_A$ = 25℃ unless otherwise noted) | | | | |
|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Limit** | **Unit** |
| Drain-source voltage | | $V_{DS}$ | 100 | V |
| Gate-source voltage | | $V_{GS}$ | ±20 | |
| Continuous drain current | $T_C$=25℃ (1) | $I_D$ | 280 | A |
| | $T_C$=100℃ | | 248 | |
| | $T_A$=25℃ (4) | | 28 | |
| Pulsed drain current(2) | | $I_{D,pulse}$ | 1120 | |
| Avalanche energy, single pulse(3) | | $E_{AS}$ | 1600 | mJ |
| Power dissipation | $T_C$=25℃ | $P_D$ | 375 | W |
| | $T_A$=25℃ (4) | | 2.4 | |
| Operating junction and storage temperature range | | $T_J$, $T_{stg}$ | -55 to 175 | ℃ |

## 2. Thermal resistance ratings

| Thermal resistance ratings | | | | |
|---|---|---|---|---|
| **Parameter** | | **Symbol** | **Max.** | **Unit** |
| Thermal resistance, junction-to-case | Steady state | $R_{\theta JC}$ | 0.4 | °C/W |
| Thermal resistance, junction-to-ambient (4) | Steady state | $R_{\theta JA}$ | 62 | |

## 3. Electrical Characteristics

| Electrical characteristics ($T_J$ = 25°C unless otherwise noted) | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Test conditions** | **Min.** | **Typ.** | **Max.** | **Unit** |
| **Static parameter** | | | | | | |
| Drain to source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0 V, $I_D$ = 250 μA | 100 | | | V |
| Gate-source threshold voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 μA | 2.5 | 3.3 | 4.1 | V |
| Gate-body leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±20 V | | | ±100 | nA |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$ = 100 V, $V_{GS}$ = 0 V | | | 1 | μA |
| Drain-source on-resistance | $R_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 20 A | | 1.22 | 1.4 | mΩ |
| Forward transconductance(5) | $g_{fs}$ | $V_{DS}$ = 5 V, $I_D$ = 20 A | | 70 | | S |
| Gate resistance | $R_g$ | f = 1 MHz | | 2 | | Ω |
| **Dynamic(5)** | | | | | | |
| Total gate charge | $Q_g$ | $V_{DS}$ = 50 V, $I_D$ = 100 A, $V_{GS}$ = 10 V | | 231 | | nC |
| Gate-source charge | $Q_{gs}$ | | | 73 | | |
| Gate-drain charge | $Q_{gd}$ | | | 70 | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DS}$ = 50 V, $I_D$ = 100 A, $V_{GS}$ = 10 V, $R_{GEN}$ = 1.6 Ω | | 83 | | ns |
| Rise time | $t_r$ | | | 116 | | |
| Turn-off delay time | $t_{d(off)}$ | | | 48 | | |
| Fall time | $t_f$ | | | 57 | | |
| Input capacitance | $C_{iss}$ | $V_{DS}$ = 50 V, $V_{GS}$ = 0 V, f = 1 MHz | | 13960 | | pF |
| Output capacitance | $C_{oss}$ | | | 2900 | | |
| Reverse transfer capacitance | $C_{rss}$ | | | 125 | | |
| **Reverse Diode Characteristics(5)** | | | | | | |
| Diode forward voltage | $V_{SD}$ | $V_{GS}$ = 0 V, $I_F$ = 20 A | | 0.8 | 1.1 | V |
| Reverse recovery time | $t_{rr}$ | $V_{DS}$ = 50 V, $I_F$ = 20 A, di/dt = 100 A/μs | | 92 | | ns |
| Reverse recovery charge | $Q_{rr}$ | | | 236 | | nC |

Notes

(1) Package limited.

(2) Pulse width limited by maximum junction temperature.

(3) $V_{DS}$ = vdshalf V, $V_{GS}$ = 10 V, L = 10 mH.

(4) $R_{\theta JA}$ is determined with the device mounted on a 1 $in^2$ 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.1 Typ. transfer characteristics

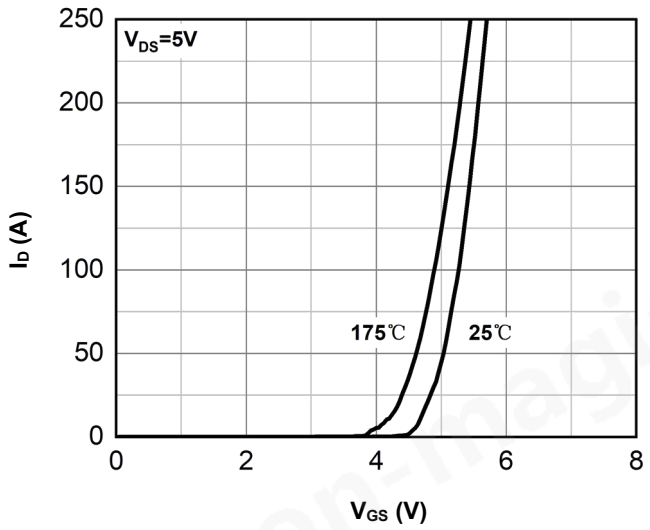



Fig.2 Typ. output characteristics

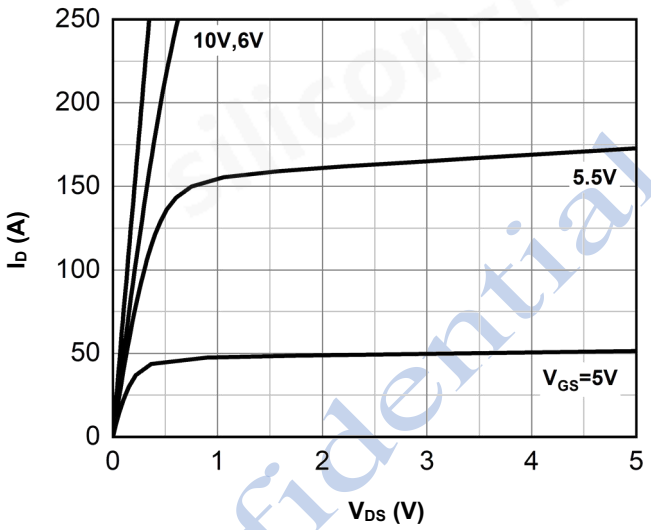



Fig.3 Normalized on-resistance vs drain current

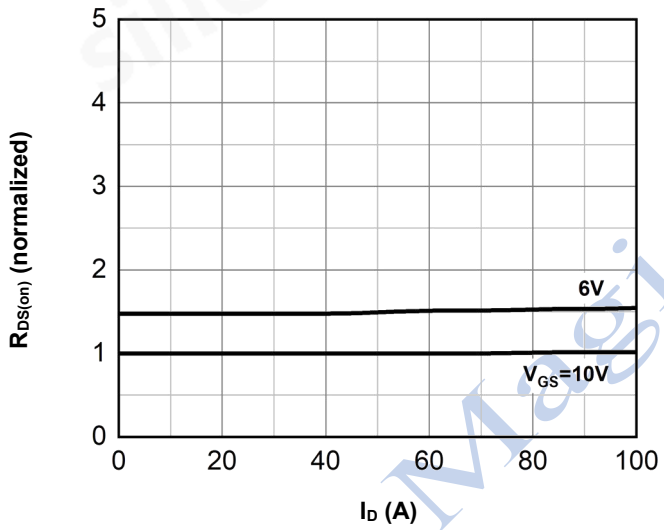



Fig.4 Typ. on-resistance vs gate-source voltage

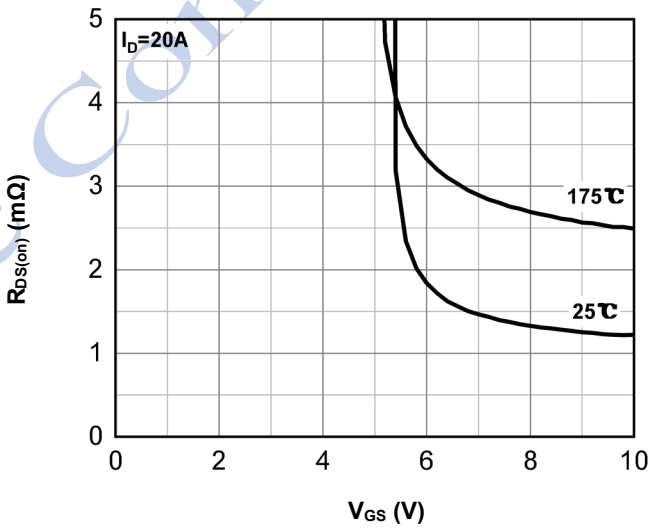



Fig.5 Normalized on-resistance vs junction temperature

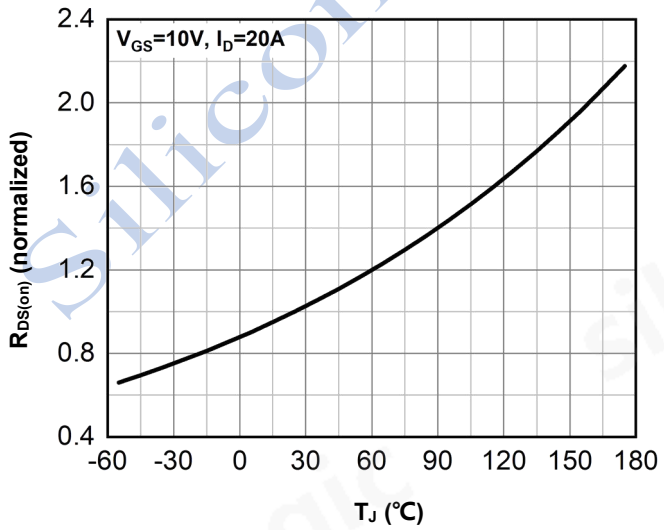



Fig.6 Typ. gate charge

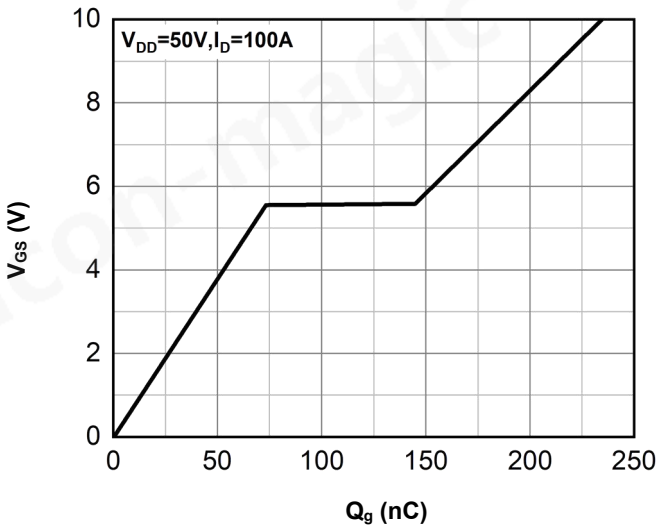


Fig.7 Typ. forward characteristics of body diode

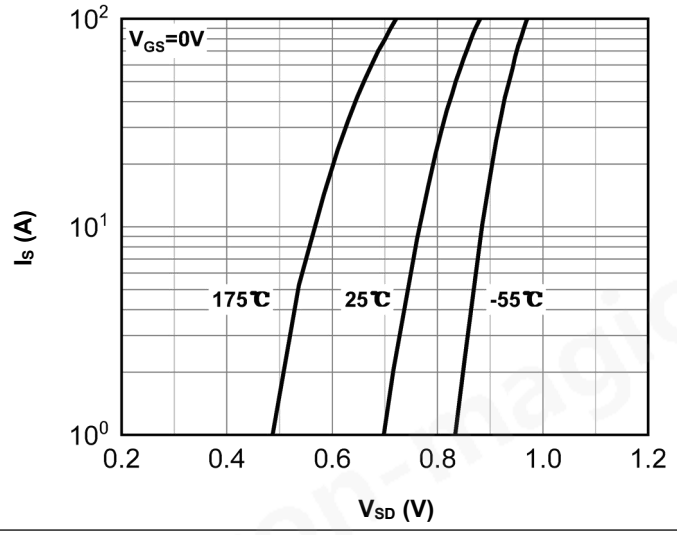



Fig.8 Safe operating area

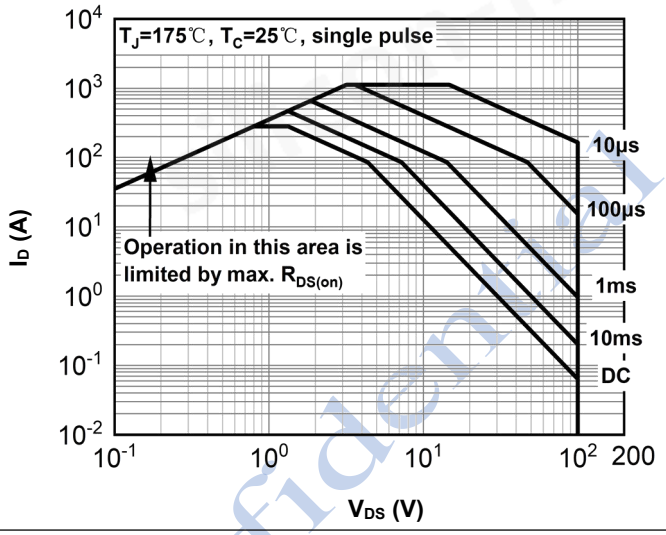



Fig.9 Typ. Capacitance

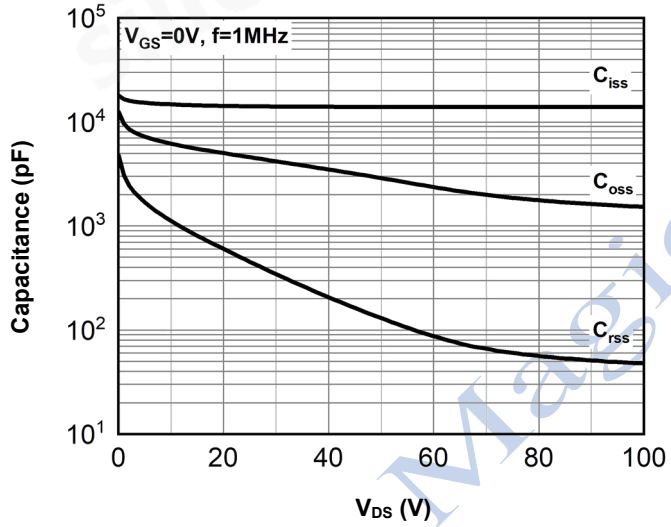



Fig.10 Single pulse maximum power dissipation

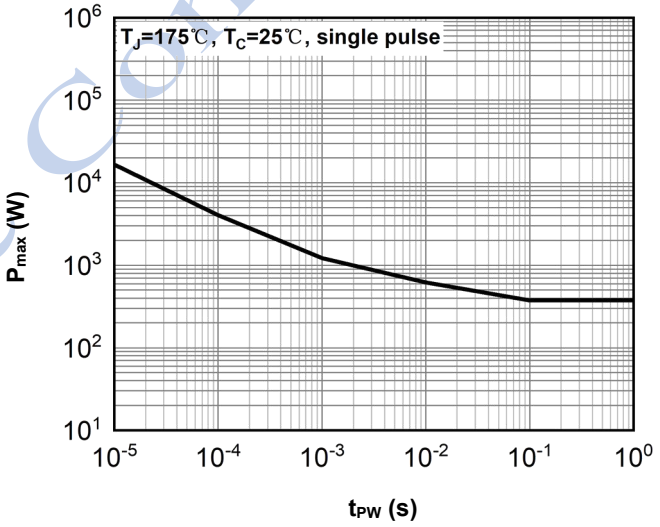



Fig.11 Max. power dissipation vs case temperature

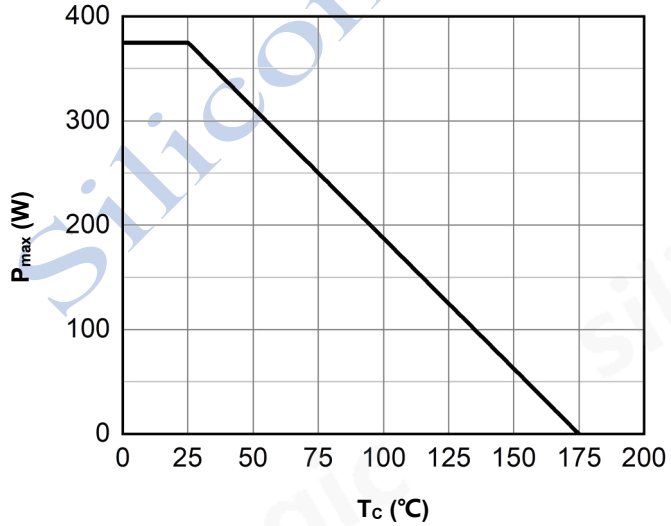



Fig.12 Max. continuous drain current vs case temperature

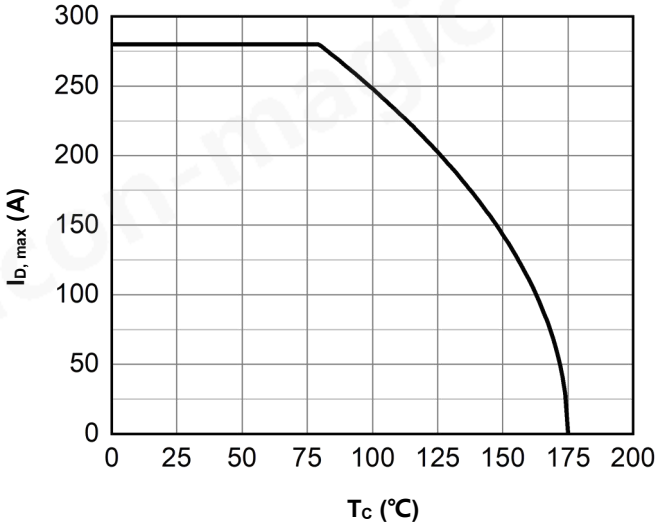


Fig.13 Normalized $V_{(BR)DSS}$ vs junction temperature

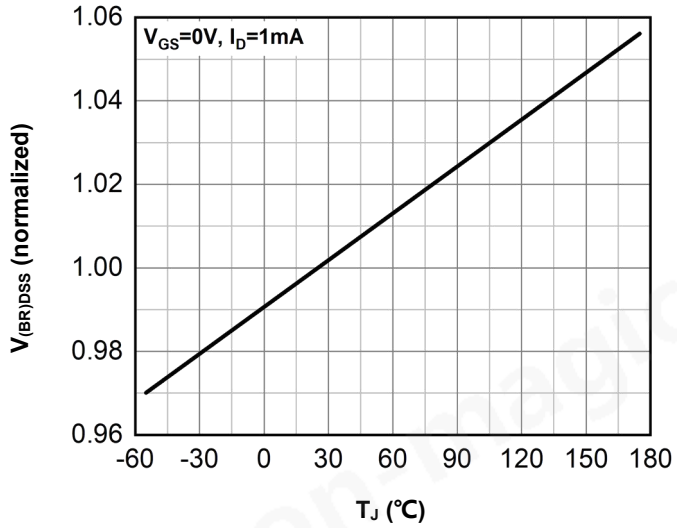



Fig.14 Normalized $V_{GS(th)}$ vs junction temperature

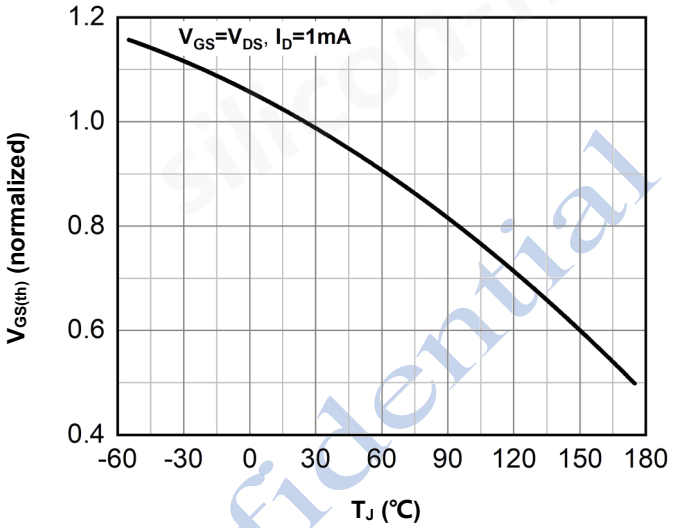
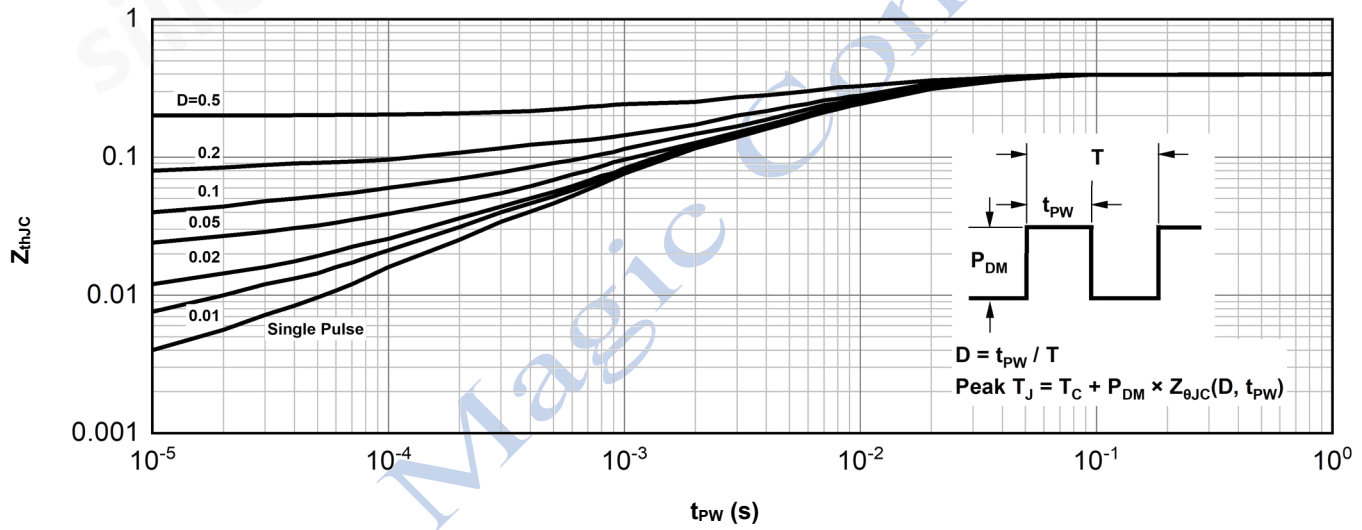
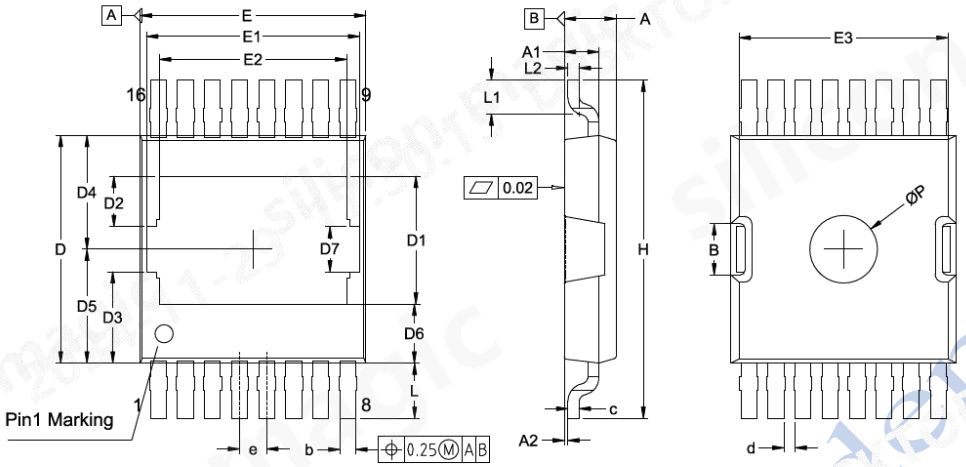



Fig.15 Transient thermal impedance from junction to case



## 5. Package outline dimensions




| Dim | Millimeters | | |
|---|---|---|---|
| | Min | Nom | Max |
| A | 2.250 | 2.300 | 2.350 |
| A1 | 1.440 | 1.540 | 1.640 |
| A2 | 0.010 | — | 0.160 |
| b | 0.600 | 0.700 | 0.800 |
| c | 0.400 | 0.500 | 0.600 |
| d | 0.400 | 0.500 | 0.600 |
| e | | 1.200 BSC | |
| D | 10.000 | 10.100 | 10.300 |
| D1 | 5.470 | 5.670 | 5.870 |
| D2 | 2.040 | 2.240 | 2.440 |
| D3 | | 4.050 REF | |
| D4 | | 5.050 REF | |
| D5 | | 5.050 REF | |
| D6 | | 2.620 REF | |
| D7 | | 2.000 REF | |
| E | 9.700 | 10.000 | 10.100 |
| E1 | | 9.460 REF | |
| E2 | 8.100 | 8.300 | 8.500 |
| E3 | 9.070 | 9.270 | 9.470 |
| H | 14.800 | 15.000 | 15.200 |
| L | 2.250 | 2.450 | 2.650 |
| L1 | 1.350 | 1.500 | 1.650 |
| L2 | | 0.500 BSC | |
| P | 2.900 | 3.000 | 3.100 |
| B | 2.180 | 2.280 | 2.380 |

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