

## Features

- Split Gate Trench MOSFET Technology
- Wide Safe Operating Area SOA
- Excellent Package for Heat Dissipation
- High Density Cell Design for Low  $R_{DS(on)}$
- Moisture Sensitivity Level 1
- Halogen Free. "Green" Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Maximum Ratings

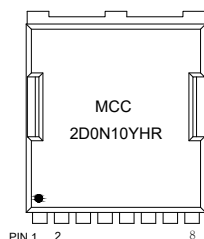
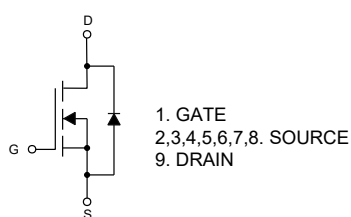
- Operating Junction Temperature Range : -55°C to +175°C
- Storage Temperature Range: -55°C to +175°C
- Thermal Resistance: 40°C/W Junction to Ambient (Note 2)
- Thermal Resistance: 0.45°C/W Junction to Case

| Parameter                                          |                       | Symbol           | Rating | Unit |
|----------------------------------------------------|-----------------------|------------------|--------|------|
| Drain-Source Voltage                               |                       | V <sub>DS</sub>  | 100    | V    |
| Gate-Source Voltage                                |                       | V <sub>GS</sub>  | ±20    | V    |
| Continuous Drain Current                           | T <sub>C</sub> =25°C  | I <sub>D</sub>   | 300    | A    |
|                                                    | T <sub>C</sub> =100°C |                  | 212    |      |
| Pulsed Drain Current <sup>(Note 3)</sup>           |                       | I <sub>DM</sub>  | 1200   | A    |
| Total Power Dissipation <sup>(Note 4)</sup>        |                       | P <sub>D</sub>   | 333    | W    |
| Single Pulsed Avalanche Energy <sup>(Note 5)</sup> |                       | E <sub>AS</sub>  | 2025   | mJ   |
| I <sub>pulse</sub> (V <sub>DS</sub> =50V, tp=10ms) |                       | I <sub>SOA</sub> | 3.5    | A    |

Note:

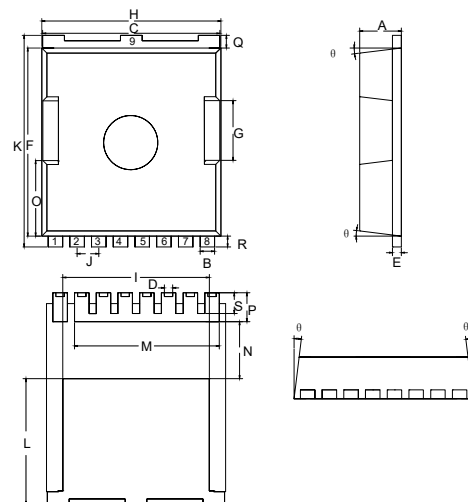
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ .
3. Repetitive rating; pulse width limited by max. junction temperature.
4.  $P_D$  is based on max. junction temperature, using junction-case thermal resistance.
5.  $T_J=25^\circ\text{C}$ ,  $V_{DD}=50\text{V}$ ,  $V_{GS}=10\text{V}$ ,  $R_G=25\Omega$ ,  $L=2\text{mH}$ .

## Internal Structure and Marking Code



# N-CHANNEL MOSFET

## TOLL-8L



### DIMENSIONS

| DIM | INCHES |       | MM    |       | NOTE |
|-----|--------|-------|-------|-------|------|
|     | MIN    | MAX   | MIN   | MAX   |      |
| A   | 0.087  | 0.094 | 2.20  | 2.40  |      |
| B   | 0.028  | 0.035 | 0.70  | 0.90  |      |
| C   | 0.382  | 0.390 | 9.70  | 9.90  |      |
| D   | 0.017  | 0.020 | 0.42  | 0.50  |      |
| E   | 0.016  | 0.024 | 0.40  | 0.60  |      |
| F   | 0.405  | 0.417 | 10.28 | 10.58 |      |
| G   | 0.122  | 0.138 | 3.10  | 3.50  |      |
| H   | 0.382  | 0.398 | 9.70  | 10.10 |      |
| I   | 0.311  | 0.327 | 7.90  | 8.30  |      |
| J   | 0.047  |       | 1.20  |       | BSC  |
| K   | 0.452  | 0.468 | 11.48 | 11.88 |      |
| L   | 0.266  | 0.281 | 6.75  | 7.15  |      |
| M   | 0.315  |       | 8.00  |       |      |
| N   | 0.118  | 0.130 | 3.00  | 3.30  |      |
| O   | 0.157  | 0.172 | 3.98  | 4.38  |      |
| P   | 0.055  | 0.071 | 1.40  | 1.80  |      |
| Q   | 0.024  | 0.031 | 0.60  | 0.80  |      |
| R   | 0.020  | 0.028 | 0.50  | 0.70  |      |
| S   | 0.039  | 0.051 | 1.00  | 1.30  |      |
| θ   | 4°     | 10°   | 4°    | 10°   |      |

**Electrical Characteristics @ 25°C (Unless Otherwise Specified)**

| Parameter                       | Symbol               | Test Conditions                                                                     | Min | Typ  | Max  | Unit |
|---------------------------------|----------------------|-------------------------------------------------------------------------------------|-----|------|------|------|
| Static Characteristics          |                      |                                                                                     |     |      |      |      |
| Drain-Source Breakdown Voltage  | V <sub>(BR)DSS</sub> | V <sub>GS</sub> =0V, I <sub>D</sub> =1mA                                            | 100 |      |      | V    |
| Gate-Source Leakage Current     | I <sub>GSS</sub>     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                          |     |      | ±100 | nA   |
| Zero Gate Voltage Drain Current | I <sub>DSS</sub>     | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V                                           |     |      | 1    | μA   |
| Gate-Threshold Voltage          | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                            | 2.2 | 3    | 3.8  | V    |
| Drain-Source On-Resistance      | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =20A                                           |     | 1.6  | 2.0  | mΩ   |
| Gate Resistance                 | R <sub>g</sub>       | f=1MHz, Open drain                                                                  |     | 1.5  |      | Ω    |
| Diode Characteristics           |                      |                                                                                     |     |      |      |      |
| Continuous Body Diode Current   | I <sub>S</sub>       |                                                                                     |     |      | 300  | A    |
| Diode Forward Voltage           | V <sub>SD</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =20A                                            |     |      | 1.2  | V    |
| Reverse Recovery Time           | t <sub>rr</sub>      | I <sub>F</sub> =20A, dI <sub>F</sub> /dt=100A/μs                                    |     | 175  |      | ns   |
| Reverse Recovery Charge         | Q <sub>rr</sub>      |                                                                                     |     | 257  |      | nC   |
| Dynamic Characteristics         |                      |                                                                                     |     |      |      |      |
| Input Capacitance               | C <sub>iss</sub>     | V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz                                   |     | 6775 |      | pF   |
| Output Capacitance              | C <sub>oss</sub>     |                                                                                     |     | 2150 |      |      |
| Reverse Transfer Capacitance    | C <sub>rss</sub>     |                                                                                     |     | 66   |      |      |
| Total Gate Charge               | Q <sub>g</sub>       | V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =20A                     |     | 89   |      | nC   |
| Gate-Source Charge              | Q <sub>gs</sub>      |                                                                                     |     | 25   |      |      |
| Gate-Drain Charge               | Q <sub>gd</sub>      |                                                                                     |     | 22   |      |      |
| Turn-On Delay Time              | t <sub>d(on)</sub>   | V <sub>GS</sub> =10V, V <sub>DS</sub> =50V, R <sub>G</sub> =3Ω, I <sub>D</sub> =20A |     | 29   |      | ns   |
| Turn-On Rise Time               | t <sub>r</sub>       |                                                                                     |     | 47   |      |      |
| Turn-Off Delay Time             | t <sub>d(off)</sub>  |                                                                                     |     | 53   |      |      |
| Turn-Off Fall Time              | t <sub>f</sub>       |                                                                                     |     | 34   |      |      |

## Curve Characteristics

Fig. 1 - Typical Output Characteristics

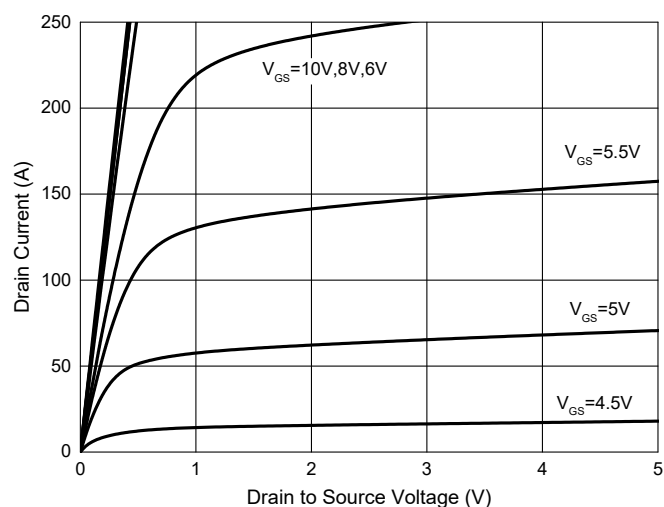


Fig. 2 - Transfer Characteristics

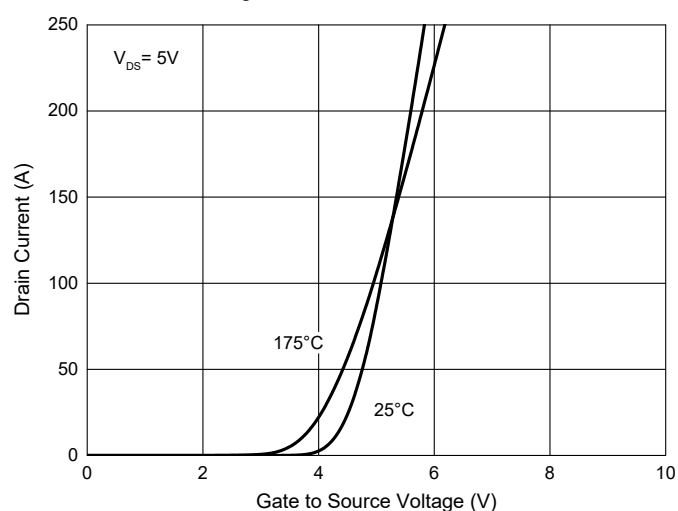


Fig. 3 -  $R_{DS(ON)} - V_{GS}$

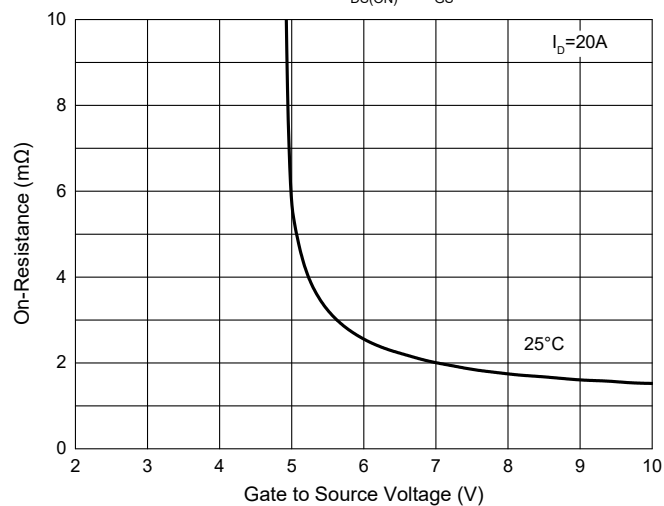


Fig. 4 -  $R_{DS(ON)} - I_D$

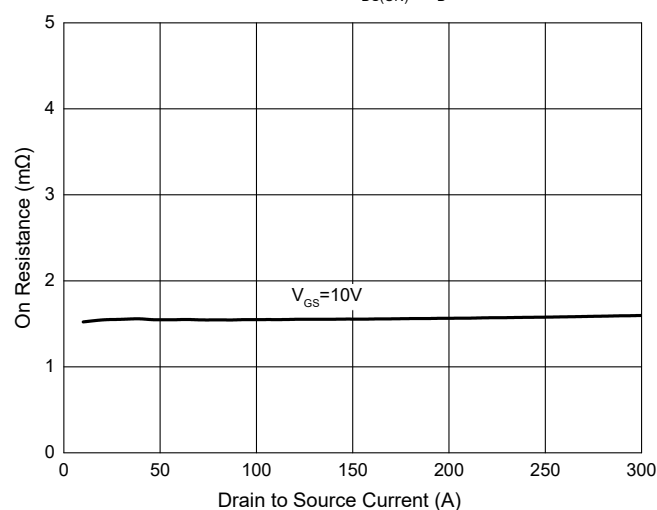


Fig. 5 - Capacitance Characteristics

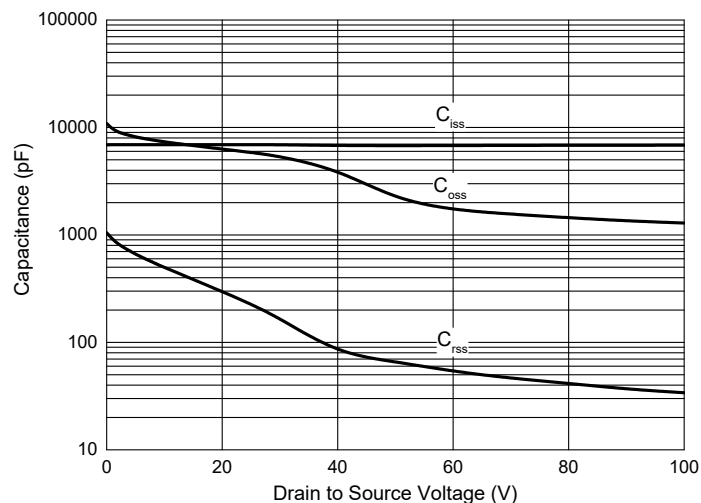
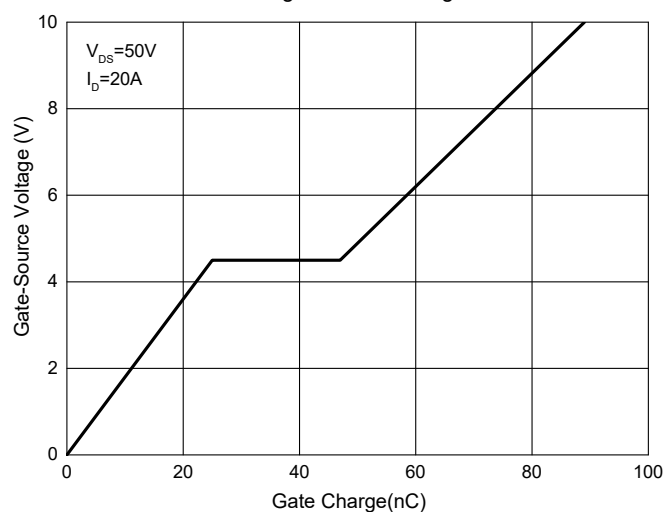


Fig. 6 - Gate Charge



## Curve Characteristics

Fig. 7 - Normalized Threshold Voltage

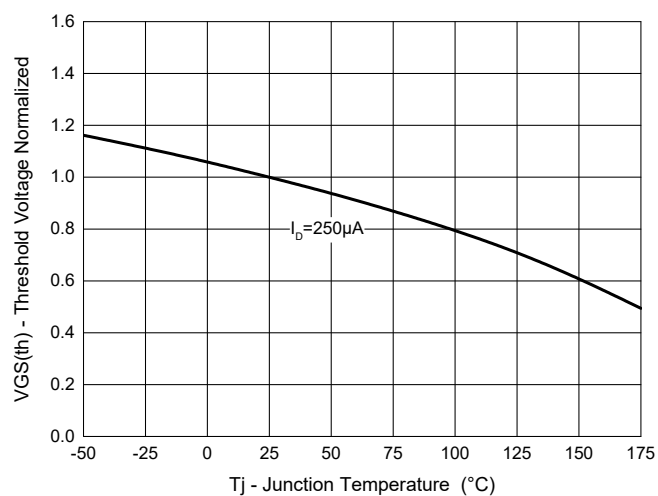


Fig. 8 - Normalized On Resistance Characteristics

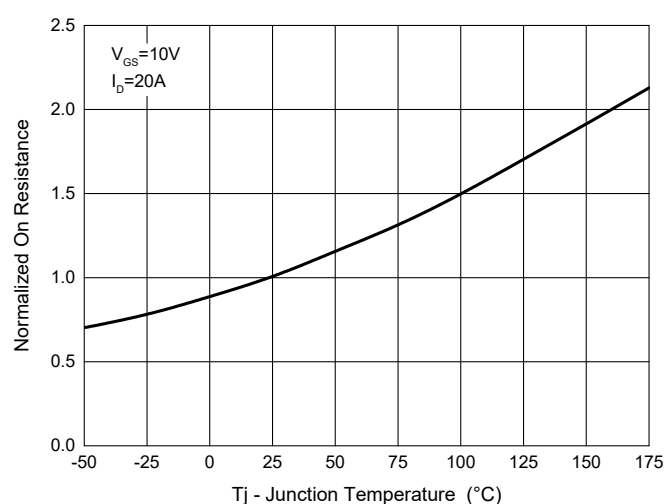


Fig. 9 -  $I_S - V_{SD}$

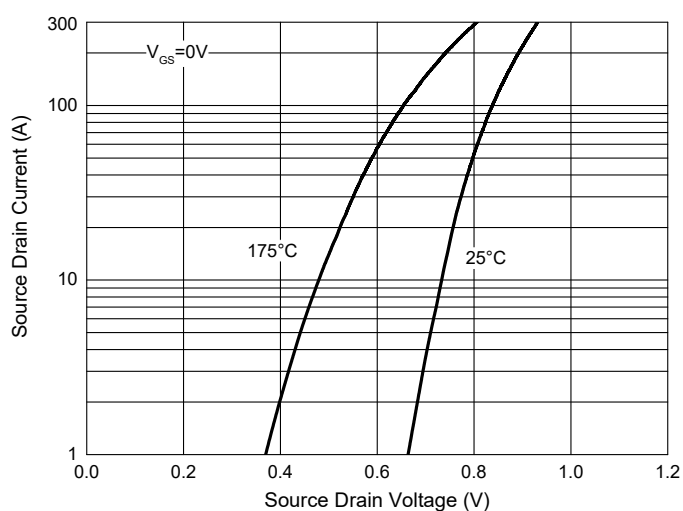


Fig. 10 - Drain Current

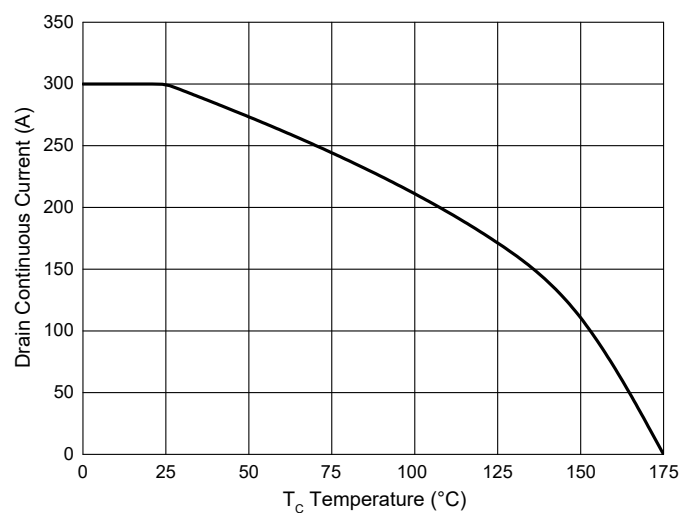
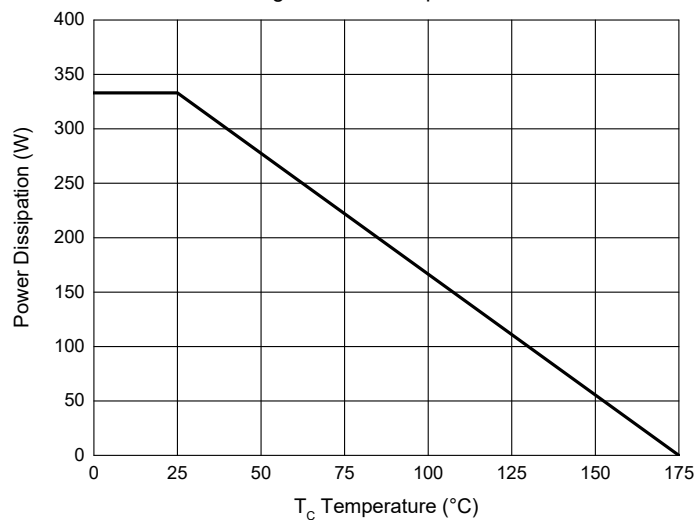


Fig. 11 - PD Dissipation



## Curve Characteristics

Fig. 12 - Safe Operation Area

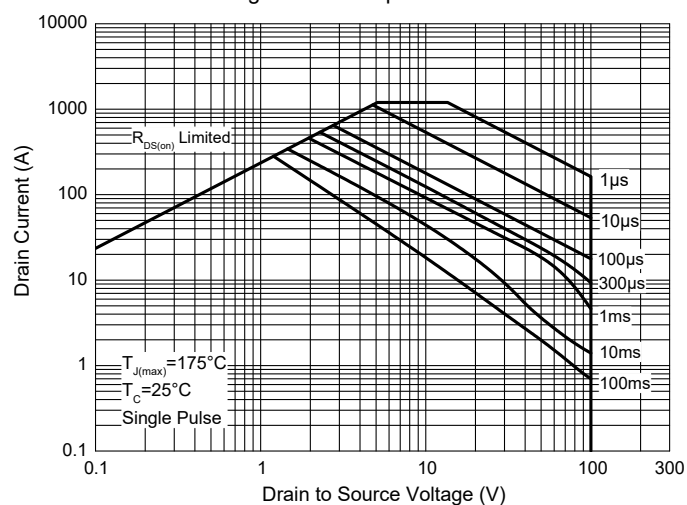
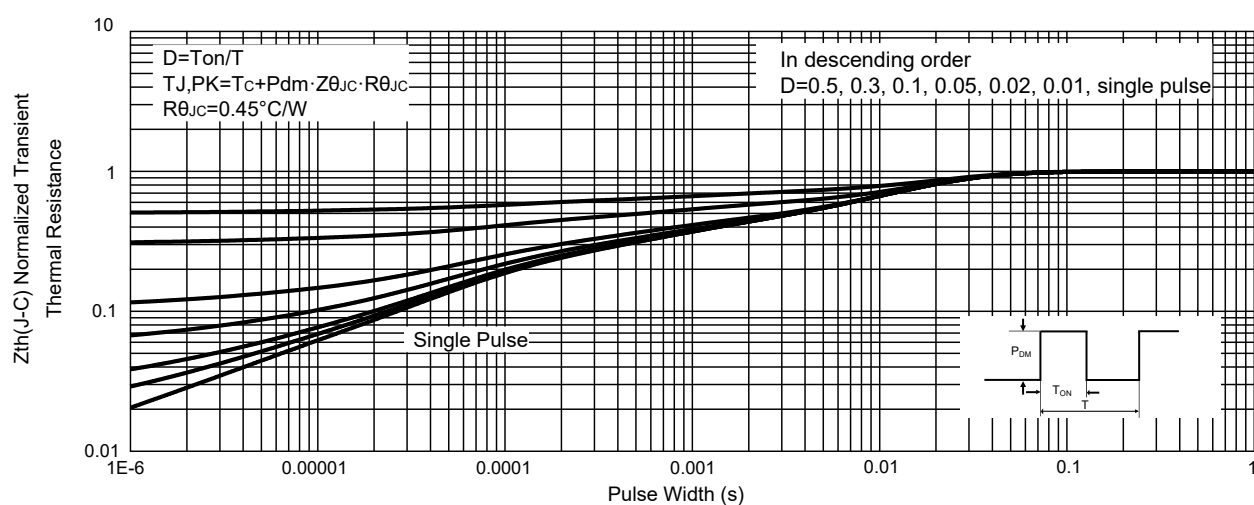


Fig. 13 - Normalized Transient Thermal Impedance



## Ordering Information

| Device         | Packing              |
|----------------|----------------------|
| Part Number-TP | Tape&Reel:2Kpcs/Reel |

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