

## Features

- Split Gate Trench Mosfet Technology
- High Density Cell Design For Low RDS(on)
- Moisture Sensitivity Level 1
- Halogen Free."Green" Device<sup>(Note1)</sup>
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Maximum Ratings

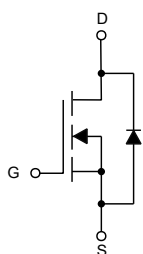
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 40°C/W Junction to Ambient<sup>(Note2)</sup>
- Thermal Resistance: 0.42°C/W Junction to Case

| Parameter  | Symbol   | Rating                  | Unit |
|--|----------|-------------------------|------|
| Drain-Source Voltage                               | $V_{DS}$ | 100                     | V    |
| Gate-Source Voltage                                | $V_{GS}$ | ±20                     | V    |
| Continuous Drain Current                           | $I_D$    | $T_C=25^\circ\text{C}$  | 300  |
|  |          | $T_C=100^\circ\text{C}$ | 189  |
| Pulsed Drain Current <sup>(Note 3)</sup>           | $I_{DM}$ | 1200                    | A    |
| Total Power Dissipation <sup>(Note 4)</sup>        | $P_D$    | 297                     | W    |
| Single Pulsed Avalanche Energy <sup>(Note 5)</sup> | $E_{AS}$ | 1800                    | mJ   |

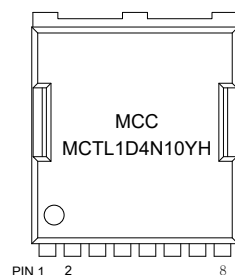
Note:

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.  $T_J=25^\circ\text{C}$ ,  $V_{DD}=80\text{V}$ ,  $V_{GS}=10\text{V}$ ,  $R_G=25\Omega$ ,  $L=2\text{mH}$ .

## Internal Structure and Marking Code

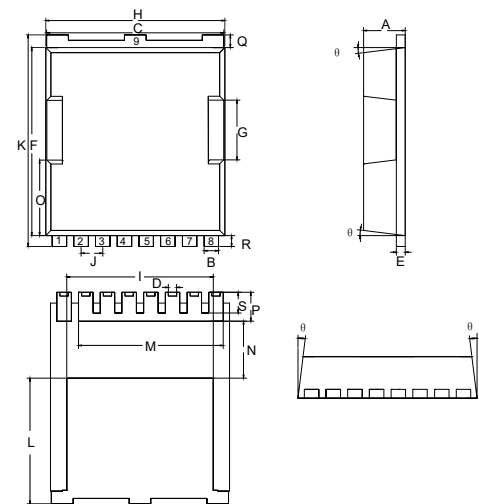


1. GATE
- 2,3,4,5,6,7,8. SOURCE
9. DRAIN



# N-CHANNEL MOSFET

## TOLL-8L



### DIMENSIONS

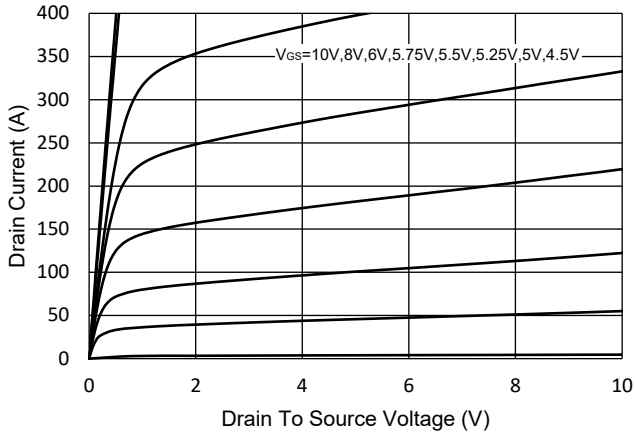
| DIM | INCHES |       | MM    |       | NOTE |
|-----|--------|-------|-------|-------|------|
|     | MIN    | MAX   | MIN   | MAX   |      |
| A   | 0.087  | 0.094 | 2.20  | 2.40  |      |
| B   | 0.028  | 0.035 | 0.70  | 0.90  |      |
| C   | 0.382  | 0.390 | 9.70  | 9.90  |      |
| D   | 0.017  | 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)

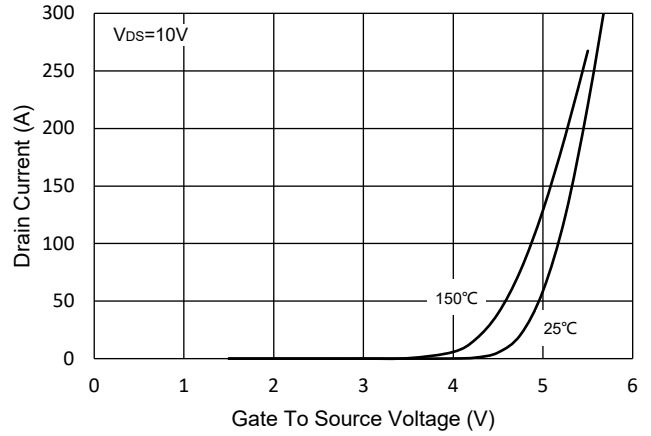
| Parameter                       | Symbol        | Test Conditions                                   | Min | Typ   | Max       | Unit       |
|---------------------------------|---------------|---|-----|-------|-----------|------------|
| <b>Static Characteristics</b>   |               |   |     |       |           |            |
| Drain-Source Breakdown Voltage  | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$                         | 100 |       |           | V          |
| Gate-Source Leakage Current     | $I_{GSS}$     | $V_{DS}=0V, V_{GS}=\pm 20V$                       |     |       | $\pm 100$ | nA         |
| Zero Gate Voltage Drain Current | $I_{DSS}$     | $V_{DS}=100V, V_{GS}=0V$                          |     |       | 1         | $\mu A$    |
| Gate-Threshold Voltage          | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=250\mu A$                     | 2.5 | 3.4   | 4.5       | V          |
| Drain-Source On-Resistance      | $R_{DS(on)}$  | $V_{GS}=10V, I_D=50A$                             |     | 1.1   | 1.4       | m $\Omega$ |
| Gate Resistance                 | $R_g$         | f=1MHz, Open Drain                                |     | 0.6   |           | $\Omega$   |
| <b>Diode Characteristics</b>    |               |   |     |       |           |            |
| Continuous Body Diode Current   | $I_S$         |   |     |       | 300       | A          |
| Diode Forward Voltage           | $V_{SD}$      | $V_{GS}=0V, I_S=50A$                              |     |       | 1.3       | V          |
| Reverse Recovery Time           | $t_{rr}$      | $I_F=50A, di_F/dt=100A/\mu s$                     |     | 75    |           | ns         |
| Reverse Recovery Charge         | $Q_{rr}$      |   |     | 125   |           | nC         |
| <b>Dynamic Characteristics</b>  |               |   |     |       |           |            |
| Input Capacitance               | $C_{iss}$     | $V_{DS}=50V, V_{GS}=0V, f=1MHz$                   |     | 10768 |           | pF         |
| Output Capacitance              | $C_{oss}$     |   |     | 3830  |           |            |
| Reverse Transfer Capacitance    | $C_{rss}$     |   |     | 63    |           |            |
| Total Gate Charge               | $Q_g$         | $V_{DS}=50V, V_{GS}=10V, I_D=50A$                 |     | 152   |           | nC         |
| Gate-Source Charge              | $Q_{gs}$      |   |     | 49.6  |           |            |
| Gate-Drain Charge               | $Q_{gd}$      |   |     | 34.4  |           |            |
| Turn-On Delay Time              | $t_{d(on)}$   | $V_{DD}=50V, V_{GS}=10V, R_G=3\Omega, I_{DS}=50A$ |     | 46    |           | ns         |
| Turn-On Rise Time               | $t_r$         |   |     | 105   |           |            |
| Turn-Off Delay Time             | $t_{d(off)}$  |   |     | 68    |           |            |
| Turn-Off Fall Time              | $t_f$         |   |     | 27    |           |            |

**Curve Characteristics**

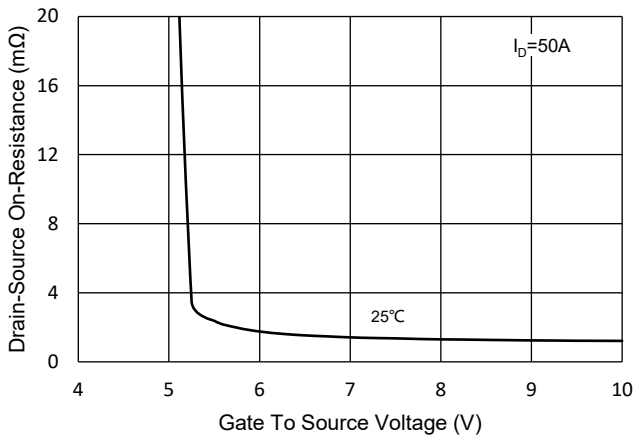
**Fig.1 - Typical Output Characteristics**



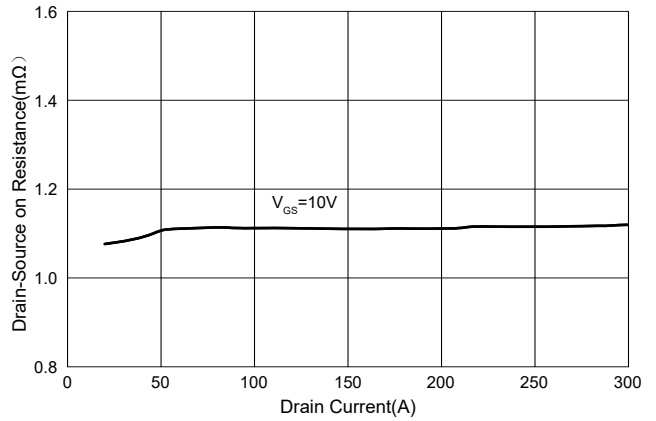
**Fig.2 - Transfer Characteristic**



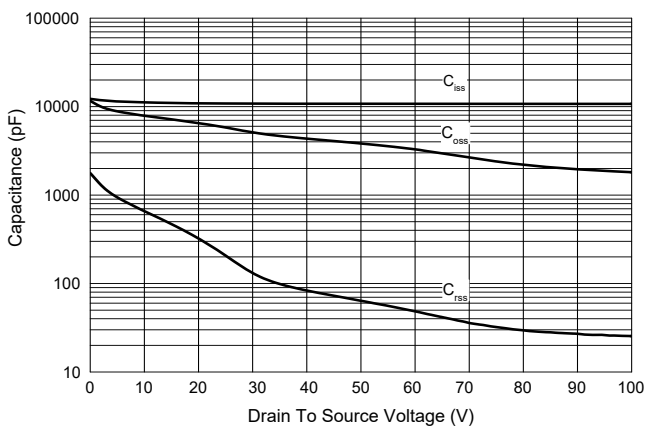
**Fig.3 -  $R_{DS(ON)}$  -  $V_{GS}$**



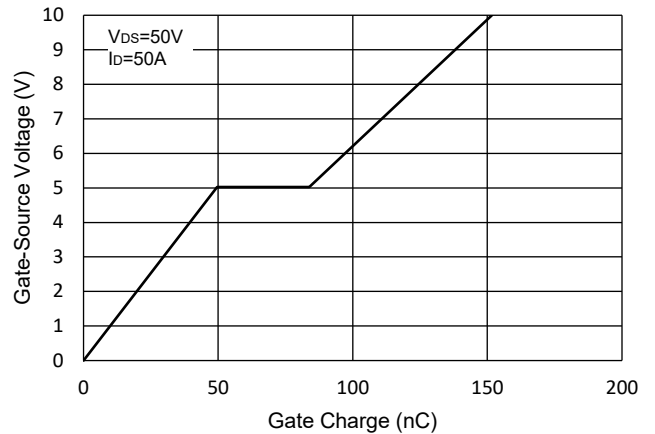
**Fig. 4 -  $R_{DS(ON)}$  -  $I_D$**



**Fig. 5 - Capacitance Characteristics**

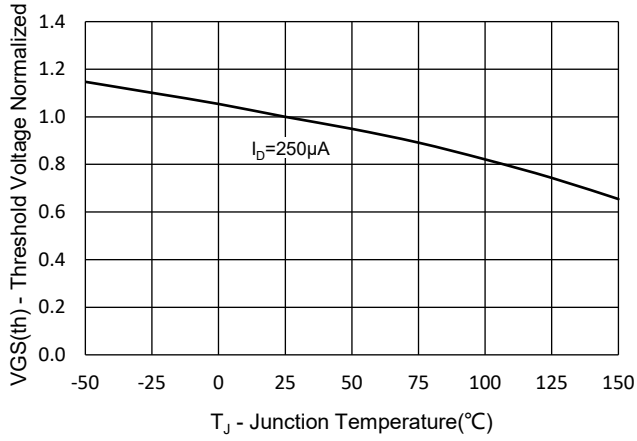


**Fig.6 - Gate Charge**

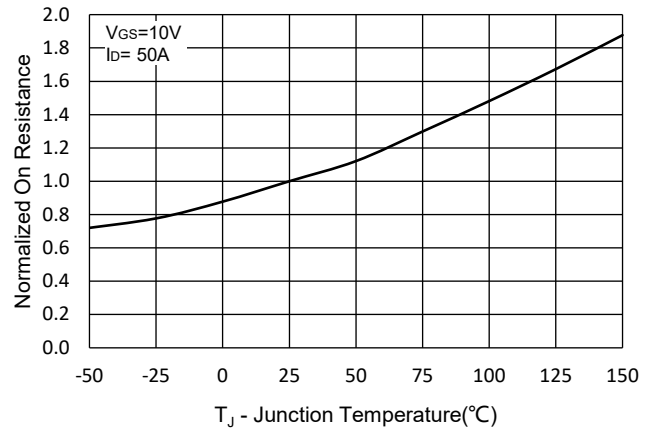


**Curve Characteristics**

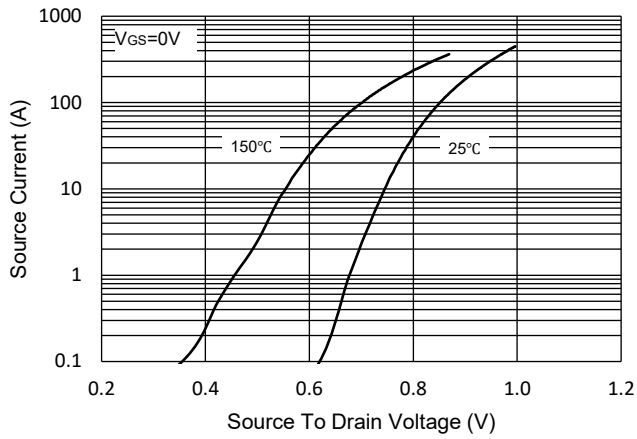
**Fig.7 - Normalized Threshold Voltage**



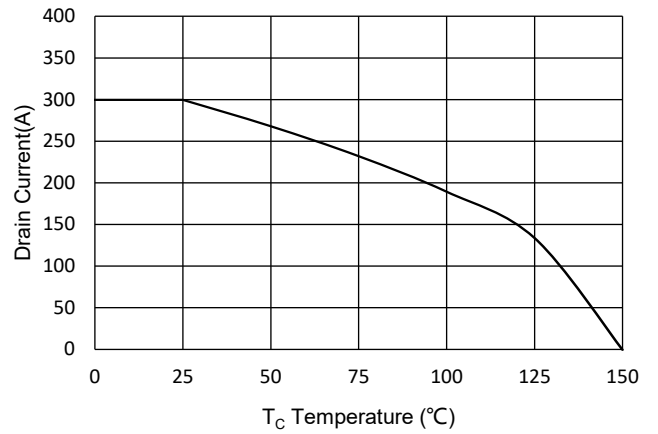
**Fig.8 - Normalized On Resistance Characteristics**



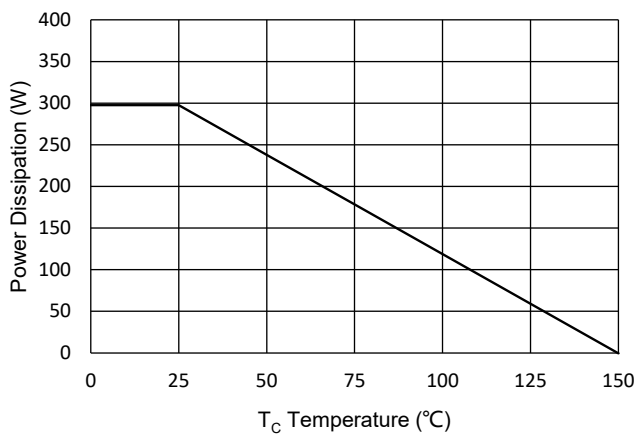
**Fig.9 - I<sub>S</sub> - V<sub>SD</sub>**



**Fig.10 - Drain Current**



**Fig.11 - PD Dissipation**



Curve Characteristics

Fig. 12 - Safe Operation Area

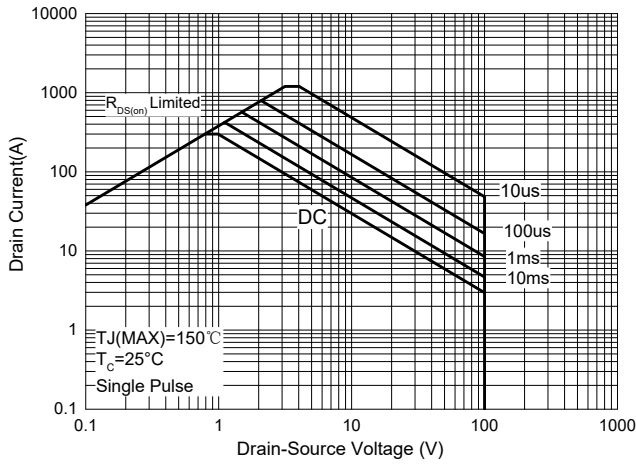
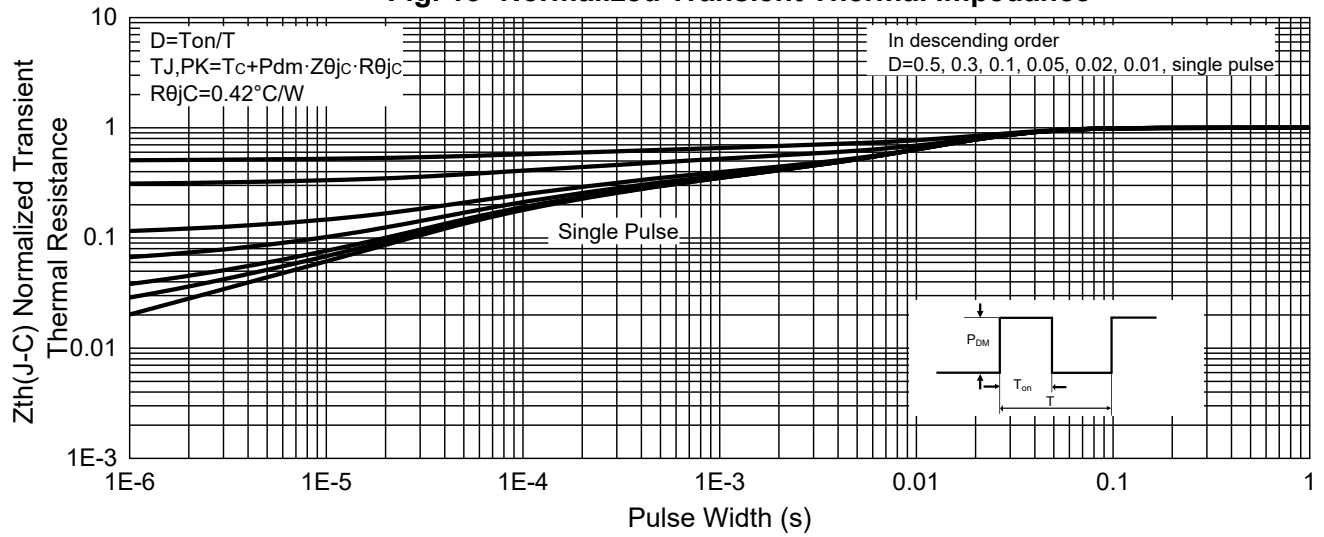


Fig. 13 - Normalized Transient Thermal Impedance



## Ordering Information

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

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