

**Features**

- Split Gate Trench MOSFET Technology
- Excellent Package for Heat Dissipation
- Moisture Sensitivity Level 1
- Halogen Free."Green" Device<sup>(Note1)</sup>
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant <sup>(Note2)</sup>("P" Suffix Designates RoHS Compliant. See Ordering Information)

**Maximum Ratings**

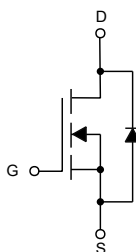
- Operating Junction Temperature Range : -55°C to +175°C
- Storage Temperature Range: -55°C to +175°C
- Thermal Resistance: 30°C/W Junction to Ambient <sup>(Note3)</sup>
- Thermal Resistance: 0.35°C/W Junction to Case

| 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                          | I <sub>D</sub>  | T <sub>C</sub> =25°C  | 360  |
|   |                 | T <sub>C</sub> =100°C | 254  |
| Pulsed Drain Current <sup>(Note4)</sup>           | I <sub>DM</sub> | 1440                  | A    |
| Total Power Dissipation <sup>(Note5)</sup>        | P <sub>D</sub>  | 429                   | W    |
| Single Pulsed Avalanche Energy <sup>(Note6)</sup> | E <sub>AS</sub> | 2016                  | mJ   |

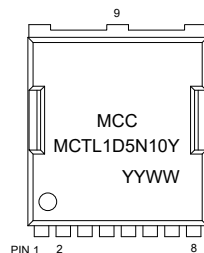
**Note:**

1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. High Temperature Solder Exemption Applied, see EU Directive Annex 7(a)-I.
3. The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C.
4. Repetitive rating; pulse width limited by max. junction temperature.
5. P<sub>D</sub> is based on max. junction temperature, using junction-case thermal resistance.
6. T<sub>J</sub>=25°C, V<sub>DD</sub>=50V, V<sub>GS</sub>=10V, R<sub>G</sub>=25Ω, L=1mH.

**Internal Structure and Marking Code**



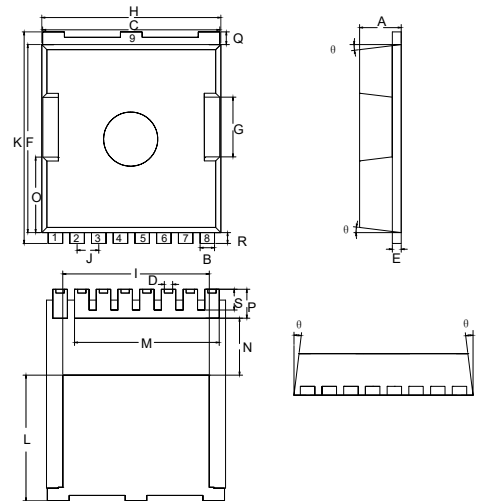
1. GATE
- 2,3,4,5,6,7,8. SOURCE
9. DRAIN



4 codes in total YY is the year WW is the week

**N-CHANNEL MOSFET**

**TOLL-8L**



**DIMENSIONS**

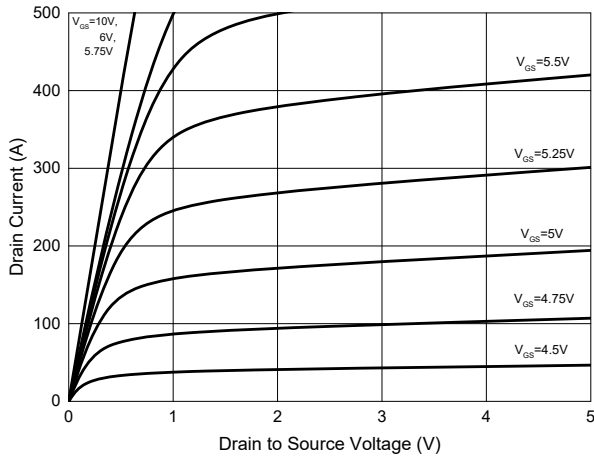
| DIM | INCHES |       | MM    |       | NOTE |
|-----|--------|-------|-------|-------|------|
|     | MIN    | MAX   | MIN   | MAX   |      |
| A   | 0.087  | 0.094 | 2.20  | 2.40  |      |
| B   | 0.028  | 0.035 | 0.70  | 0.90  |      |
| C   | 0.382  | 0.390 | 9.70  | 9.90  |      |
| D   | 0.017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

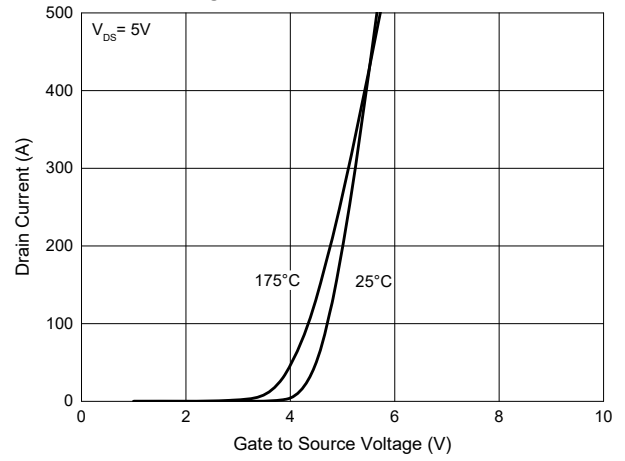
| Parameter                       | Symbol        | Test Conditions                                | Min | Typ  | Max       | Unit       |
|---------------------------------|---------------|--|-----|------|-----------|------------|
| <b>Static Characteristics</b>   |               |  |     |      |           |            |
| 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          | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=250\mu A$                  | 2.0 | 3.0  | 4.0       | V          |
| Drain-Source On-Resistance      | $R_{DS(on)}$  | $V_{GS}=10V, I_D=20A$                          |     | 1.2  | 1.5       | m $\Omega$ |
| Gate Resistance                 | $R_g$         | f=1MHz, Open Drain                             |     | 2    |           | $\Omega$   |
| <b>Diode Characteristics</b>    |               |  |     |      |           |            |
| Continuous Body Diode Current   | $I_S$         |  |     |      | 360       | A          |
| Diode Forward Voltage           | $V_{SD}$      | $V_{GS}=0V, I_S=20A$                           |     |      | 1.2       | V          |
| Reverse Recovery Time           | $t_{rr}$      | $I_F=20A, di_F/dt=100A/\mu s$                  |     | 105  |           | ns         |
| Reverse Recovery Charge         | $Q_{rr}$      |  |     | 216  |           | nC         |
| <b>Dynamic Characteristics</b>  |               |  |     |      |           |            |
| Input Capacitance               | $C_{iss}$     | $V_{DS}=50V, V_{GS}=0V, f=1MHz$                |     | 9660 |           | pF         |
| Output Capacitance              | $C_{oss}$     |  |     | 3480 |           |            |
| Reverse Transfer Capacitance    | $C_{rss}$     |  |     | 50   |           |            |
| Total Gate Charge               | $Q_g$         | $V_{DS}=50V, V_{GS}=10V, I_D=20A$              |     | 150  |           | nC         |
| Gate-Source Charge              | $Q_{gs}$      |  |     | 40   |           |            |
| Gate-Drain Charge               | $Q_{gd}$      |  |     | 32   |           |            |
| Turn-On Delay Time              | $t_{d(on)}$   | $V_{DD}=50V, V_{GS}=10V, R_G=3\Omega, I_D=20A$ |     | 38   |           | ns         |
| Turn-On Rise Time               | $t_r$         |  |     | 44   |           |            |
| Turn-Off Delay Time             | $t_{d(off)}$  |  |     | 98   |           |            |
| Turn-Off Fall Time              | $t_f$         |  |     | 60   |           |            |

## Curve Characteristics

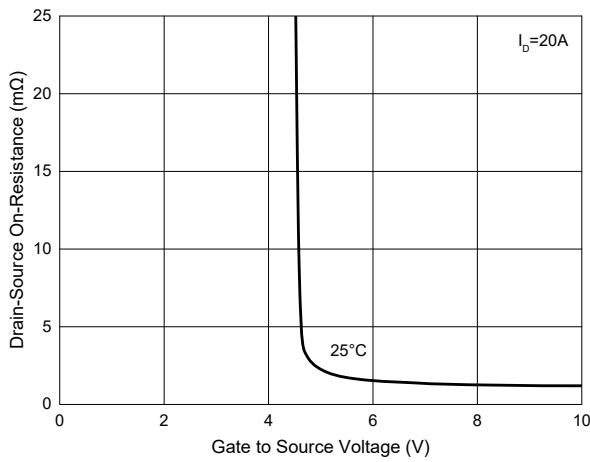
**Fig. 1 - Typical Output Characteristics**



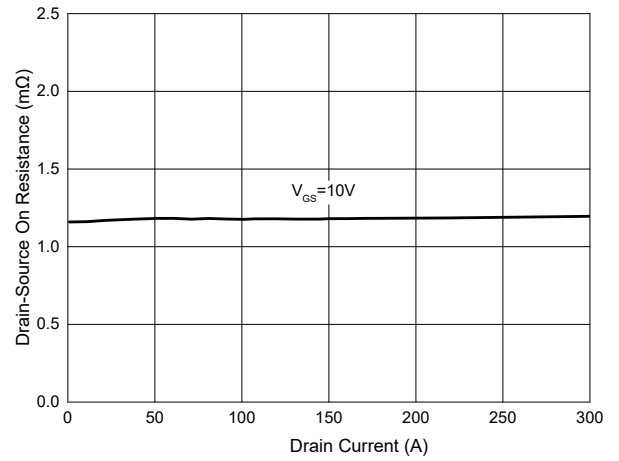
**Fig. 2 - Transfer Characteristics**



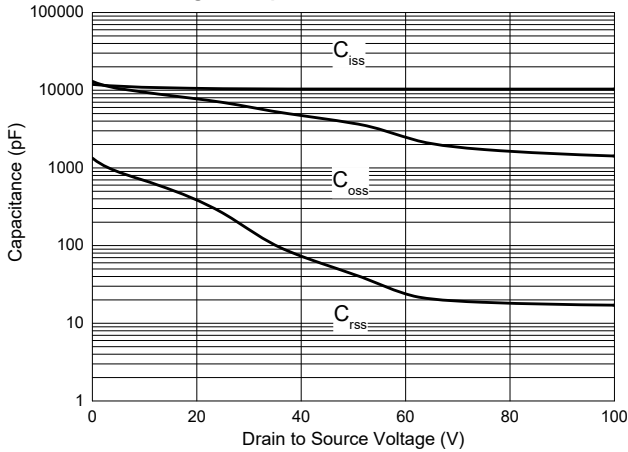
**Fig. 3 -  $R_{DS(ON)}$  vs  $V_{GS}$**



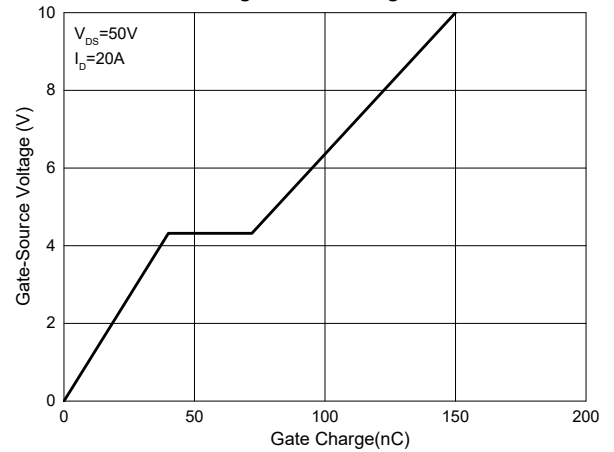
**Fig. 4 -  $R_{DS(ON)}$  vs  $I_D$**



**Fig. 5 - Capacitance Characteristics**

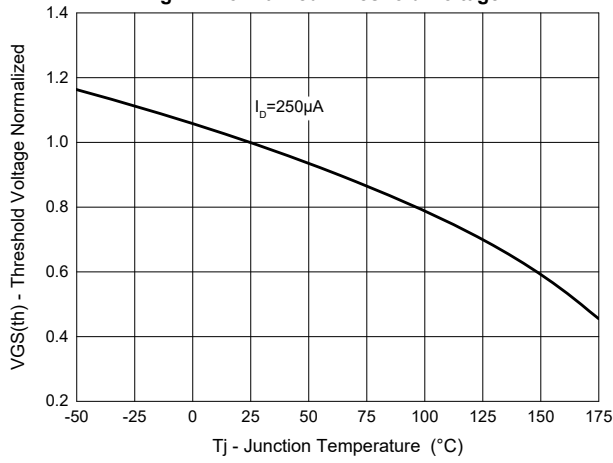


**Fig. 6 - Gate Charge**

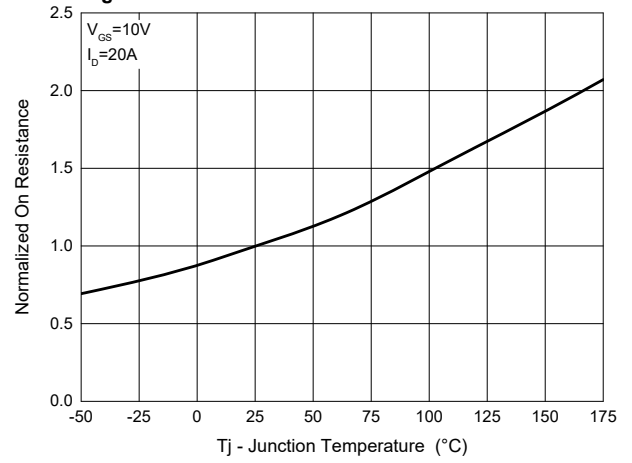


## Curve Characteristics

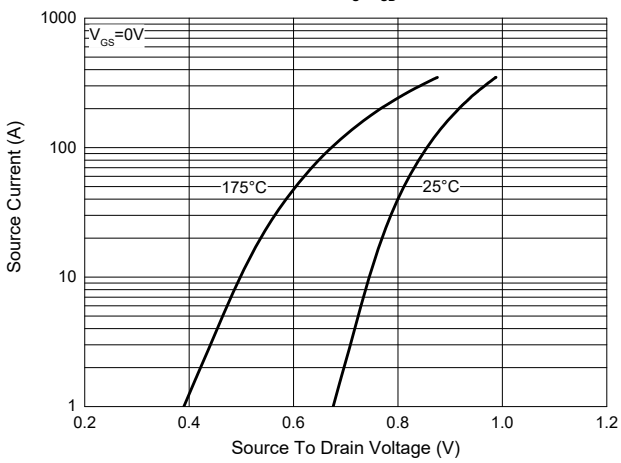
**Fig. 7 - Normalized Threshold Voltage**



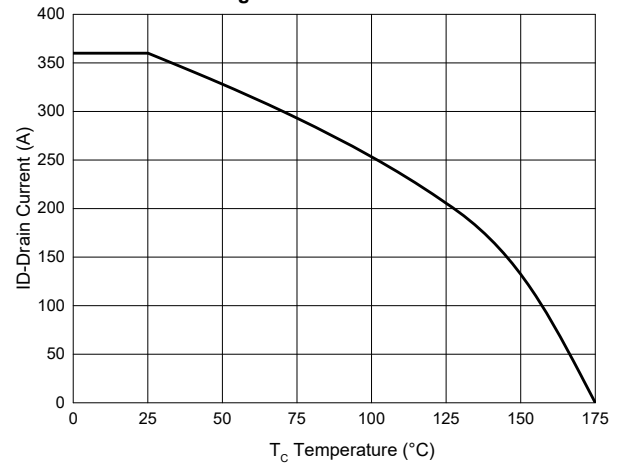
**Fig. 8 - Normalized On Resistance Characteristics**



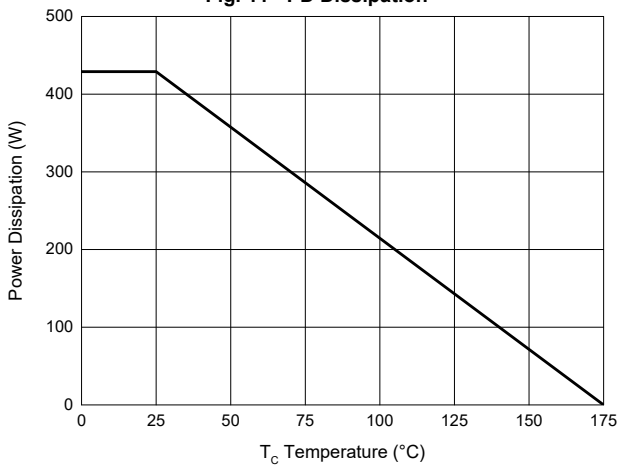
**Fig. 9 -  $I_S$ - $V_{SD}$**



**Fig. 10 - Drain Current**

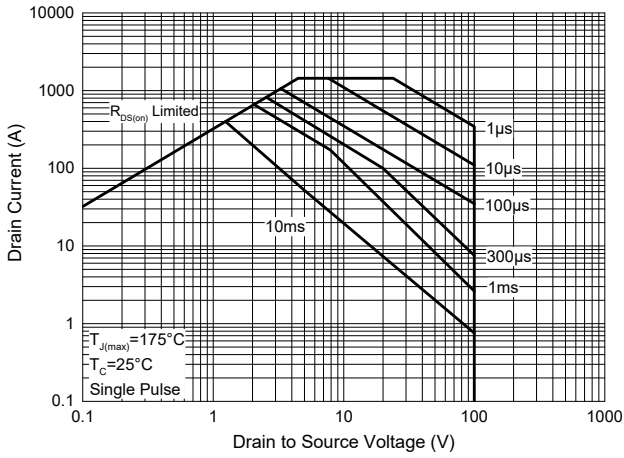


**Fig. 11 - PD Dissipation**

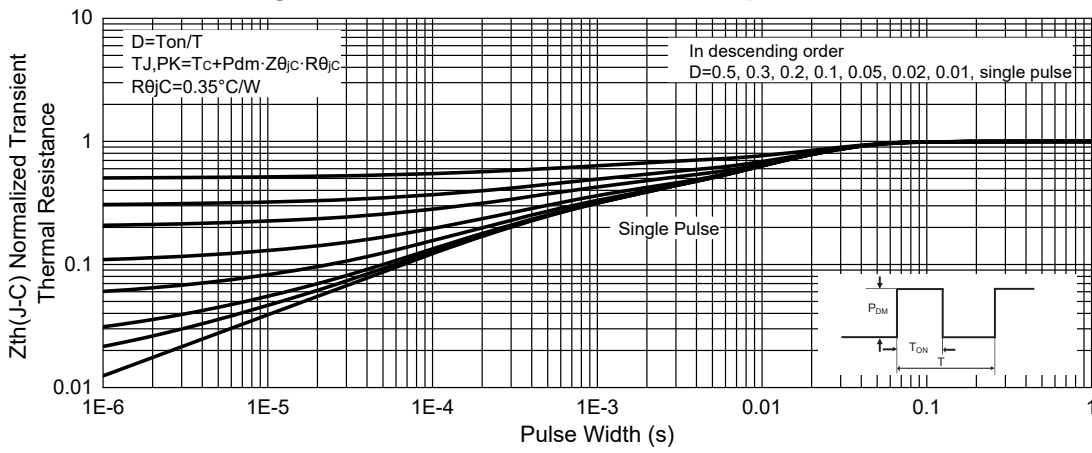


## Curve Characteristics

**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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