

## Features

- Split Gate Trench MOSFET Technology
- Low Thermal Resistance
- Moisture Sensitivity Level 3
- 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

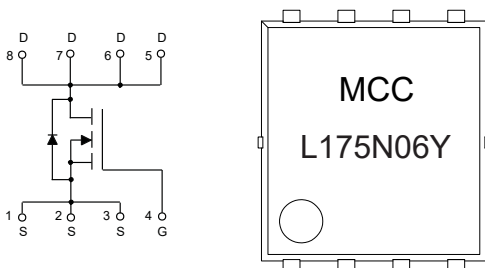
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 50°C/W Junction to Ambient(Steady-State)(Note 2)
- Thermal Resistance: 0.9°C/W Junction to Case

| Parameter                               | Symbol   | Rating                  | Unit |
|---|----------|-------------------------|------|
| Drain-Source Voltage                    | $V_{DS}$ | 60                      | V    |
| Gate-Source Voltage                     | $V_{GS}$ | $\pm 20$                | V    |
| Continuous Drain Current                | $I_D$    | $T_C=25^\circ\text{C}$  | 175  |
|   |          | $T_C=100^\circ\text{C}$ | 110  |
| Pulsed Drain Current (Note 3)           | $I_{DM}$ | 700                     | A    |
| Total Power Dissipation (Note 4)        | $P_D$    | 138                     | W    |
| Single Pulsed Avalanche Energy (Note 5) | $E_{AS}$ | 992                     | mJ   |

Note:

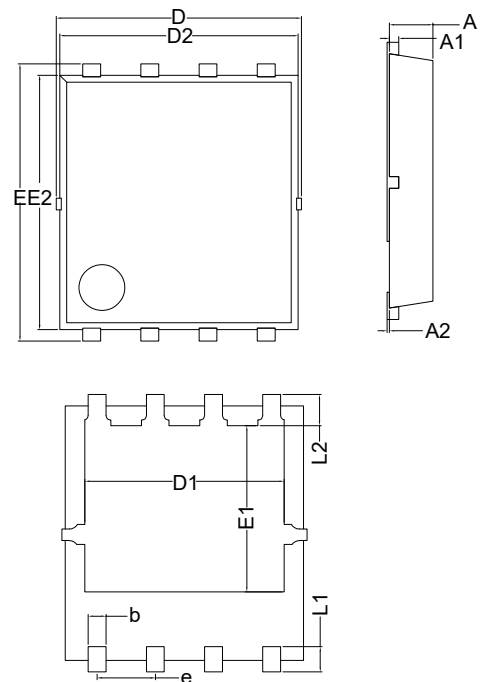
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The Power dissipation PDSM is based on  $R_{\theta JA} t \leq 10\text{s}$  and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
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.  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ ,  $V_G=10\text{V}$ ,  $L=2\text{mH}$ .

## Internal Structure and Marking Code



# N-CHANNEL MOSFET

## DFN5060-C



| DIM | DIMENSIONS |       |       |      | NOTE |
|-----|------------|-------|-------|------|------|
|     | INCHES     |       | MM    |      |      |
|     | MIN        | MAX   | MIN   | MAX  |      |
| D   | 0.203      | 0.218 | 5.15  | 5.55 |      |
| D2  | 0.201      | 0.209 | 5.10  | 5.30 |      |
| E   | 0.234      | 0.242 | 5.95  | 6.15 |      |
| E2  | 0.215      | 0.222 | 5.45  | 5.65 |      |
| A   | 0.033      | 0.041 | 0.85  | 1.05 |      |
| A1  | 0.008      |       | 0.203 |      | BSC  |
| A2  | 0.000      | 0.004 | 0.00  | 0.10 |      |
| D1  | 0.167      | 0.175 | 4.25  | 4.45 |      |
| E1  | 0.139      | 0.147 | 3.52  | 3.73 |      |
| L1  | 0.018      | 0.026 | 0.45  | 0.65 |      |
| L2  | 0.027      |       | 0.68  |      | BSC  |
| b   | 0.012      | 0.020 | 0.30  | 0.50 |      |
| e   | 0.050      |       | 1.27  |      | BSC  |

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

| Parameter                       | Symbol        | Test Conditions  | Min | Typ  | Max       | Unit       |
|---------------------------------|---------------|--|-----|------|-----------|------------|
| <b>Static Characteristics</b>   |               |  |     |      |           |            |
| Drain-Source Breakdown Voltage  | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$                              | 60  |      |           | V          |
| Gate-Source Leakage Current     | $I_{GSS}$     | $V_{DS}=0V, V_{GS}=\pm 20V$                            |     |      | $\pm 100$ | nA         |
| Zero Gate Voltage Drain Current | $I_{DSS}$     | $V_{DS}=60V, V_{GS}=0V$                                |     |      | 1         | $\mu A$    |
| Gate-Threshold Voltage          | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=250\mu A$                          | 1.0 | 1.65 | 2.5       | V          |
| Drain-Source On-Resistance      | $R_{DS(on)}$  | $V_{GS}=10V, I_D=20A$                                  |     | 1.8  | 2.25      | m $\Omega$ |
|                                 |               | $V_{GS}=4.5V, I_D=20A$                                 |     | 2.4  | 3.0       |            |
| Gate Resistance                 | $R_g$         | F=1 MHz, Open drain                                    |     | 2.0  |           | $\Omega$   |
| <b>Diode Characteristics</b>    |               |  |     |      |           |            |
| Continuous Body Diode Current   | $I_S$         |  |     |      | 175       | A          |
| Diode Forward Voltage           | $V_{SD}$      | $V_{GS}=0V, I_S=87.5A$                                 |     |      | 1.2       | V          |
| Reverse Recovery Time           | $t_{rr}$      | $I_F=87.5A, di_F/dt=100A/\mu s$                        |     | 51   |           | ns         |
| Reverse Recovery Charge         | $Q_{rr}$      |  |     | 57   |           | nC         |
| <b>Dynamic Characteristics</b>  |               |  |     |      |           |            |
| Input Capacitance               | $C_{iss}$     | $V_{DS}=30V, V_{GS}=0V, f=1MHz$                        |     | 5084 |           | pF         |
| Output Capacitance              | $C_{oss}$     |  |     | 1105 |           |            |
| Reverse Transfer Capacitance    | $C_{rss}$     |  |     | 16   |           |            |
| Total Gate Charge               | $Q_g$         | $V_{DS}=30V, V_{GS}=10V, I_D=87.5A$                    |     | 76.5 |           | nC         |
| Gate-Source Charge              | $Q_{gs}$      |  |     | 13   |           |            |
| Gate-Drain Charge               | $Q_{gd}$      |  |     | 14   |           |            |
| Turn-On Delay Time              | $t_{d(on)}$   | $V_{DS}=30V, V_{GEN}=10V, R_G=2.2\Omega, I_{DS}=87.5A$ |     | 12.6 |           | ns         |
| Turn-On Rise Time               | $t_r$         |  |     | 12.5 |           |            |
| Turn-Off Delay Time             | $t_{d(off)}$  |  |     | 52   |           |            |
| Turn-Off Fall Time              | $t_f$         |  |     | 21.6 |           |            |

## Curve Characteristics

Fig. 1 - Typical Output Characteristics

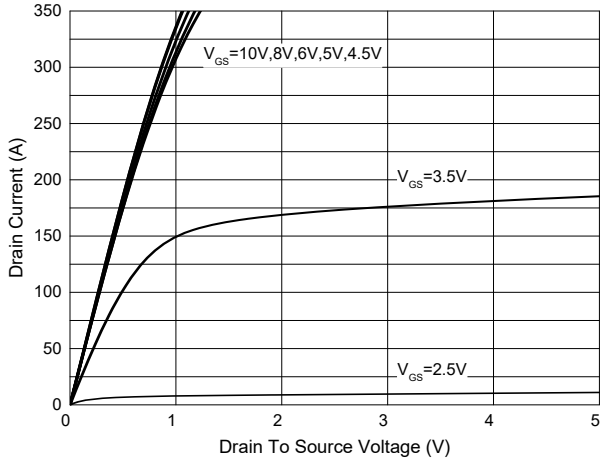


Fig. 2 - Transfer Characteristics

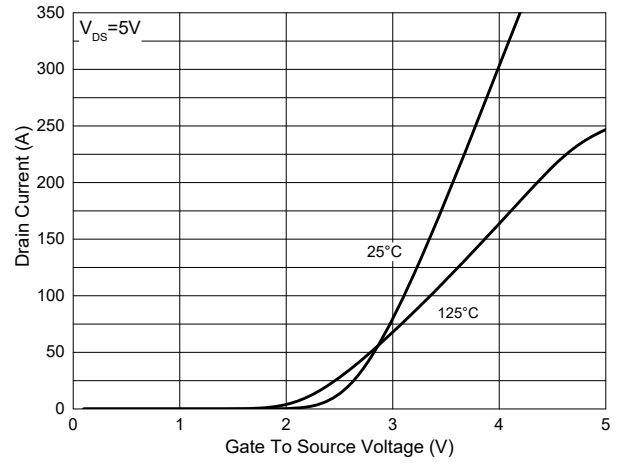


Fig. 3 -  $R_{DS(ON)} - V_{GS}$

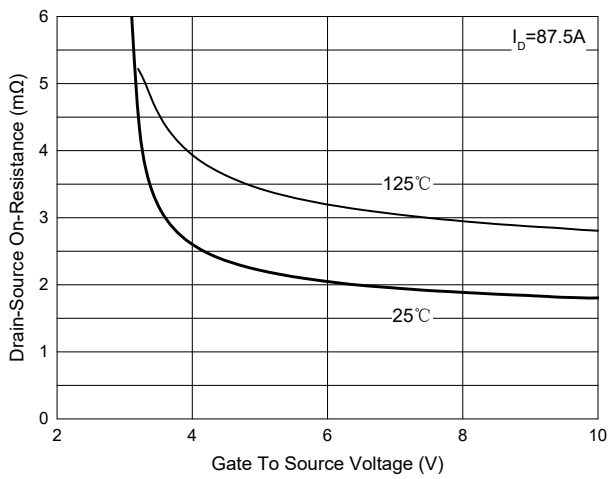


Fig. 4 -  $R_{DS(ON)} - I_D$

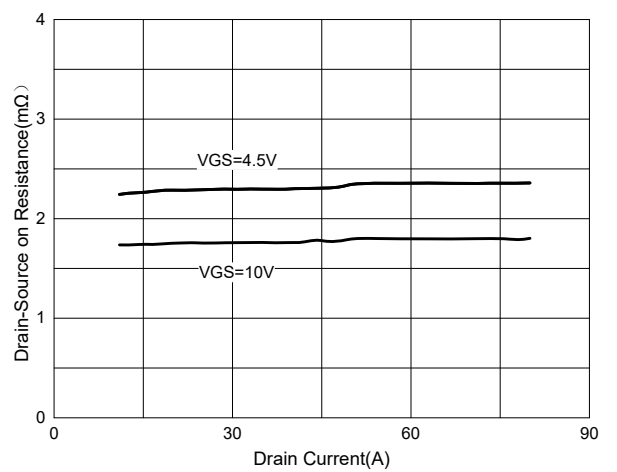


Fig. 5 - Capacitance Characteristics

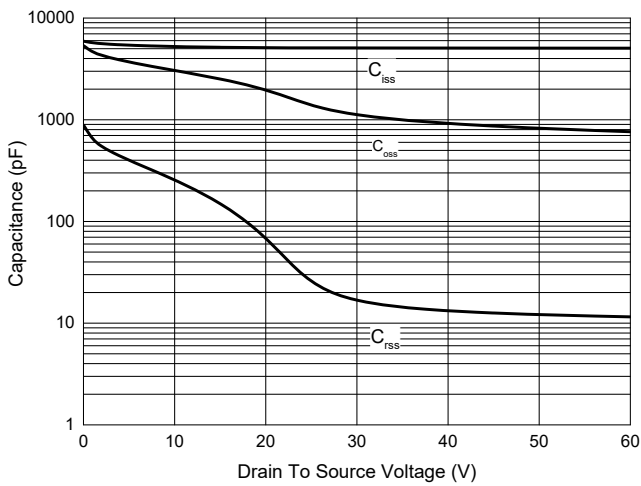
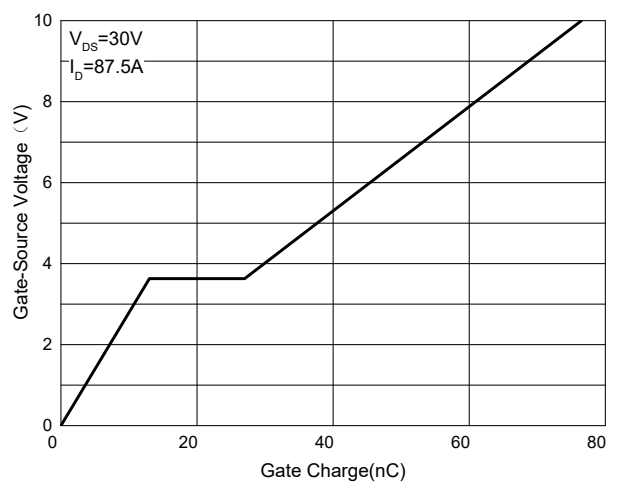


Fig. 6 - Gate Charge



Curve Characteristics

Fig. 7 - Normalized Threshold voltage

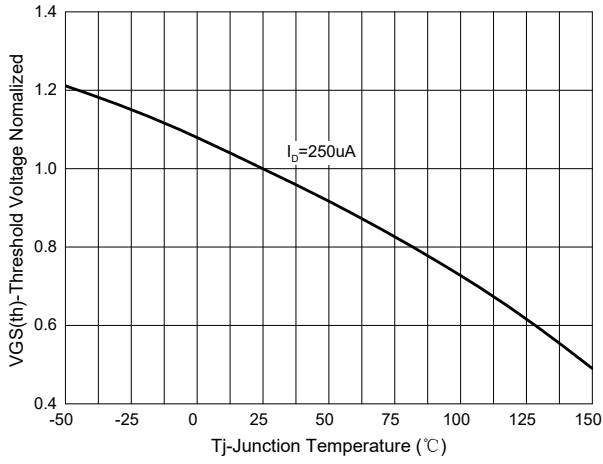


Fig.8-Normalized On Resistance Characteristics

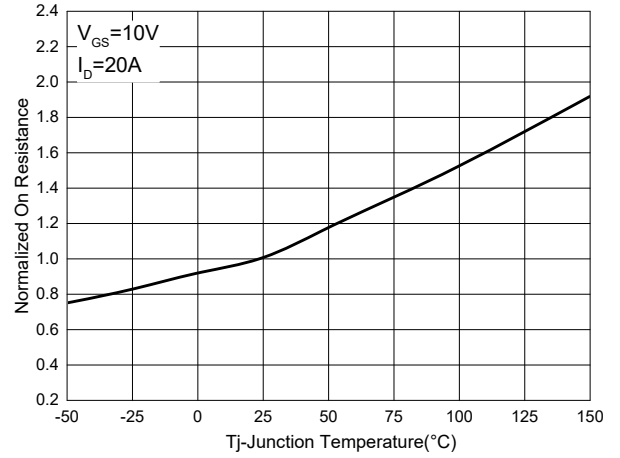


Fig.9 -  $I_S - V_{SD}$

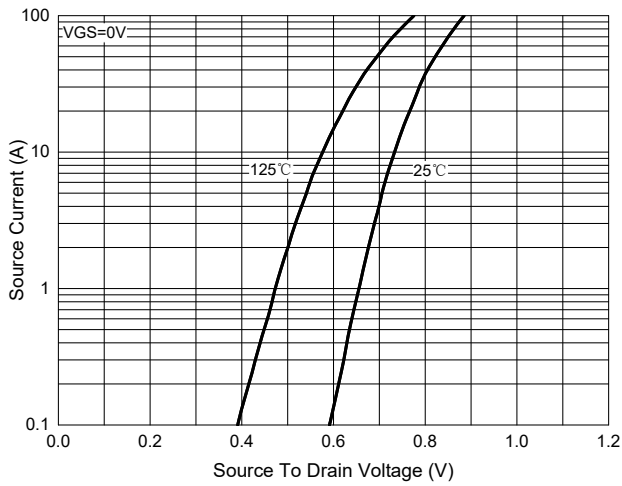


Fig. 10 - Drain Current

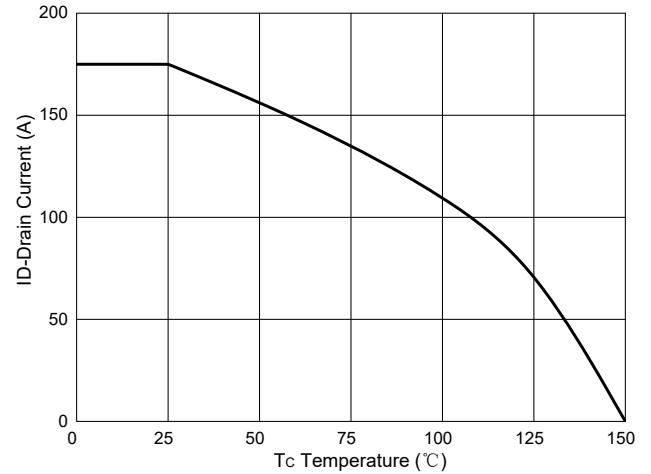
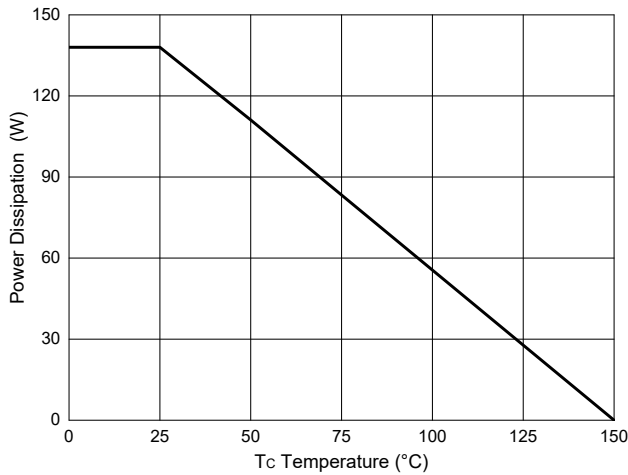


Fig.11-PD Dissipation



Curve Characteristics

Fig. 12 - Safe Operation Area

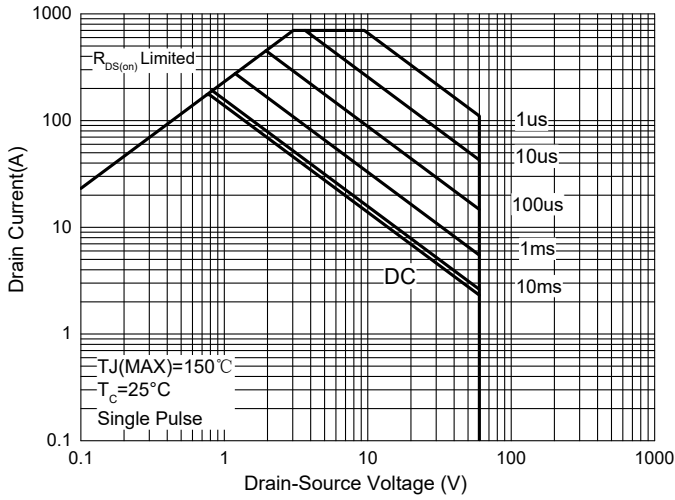
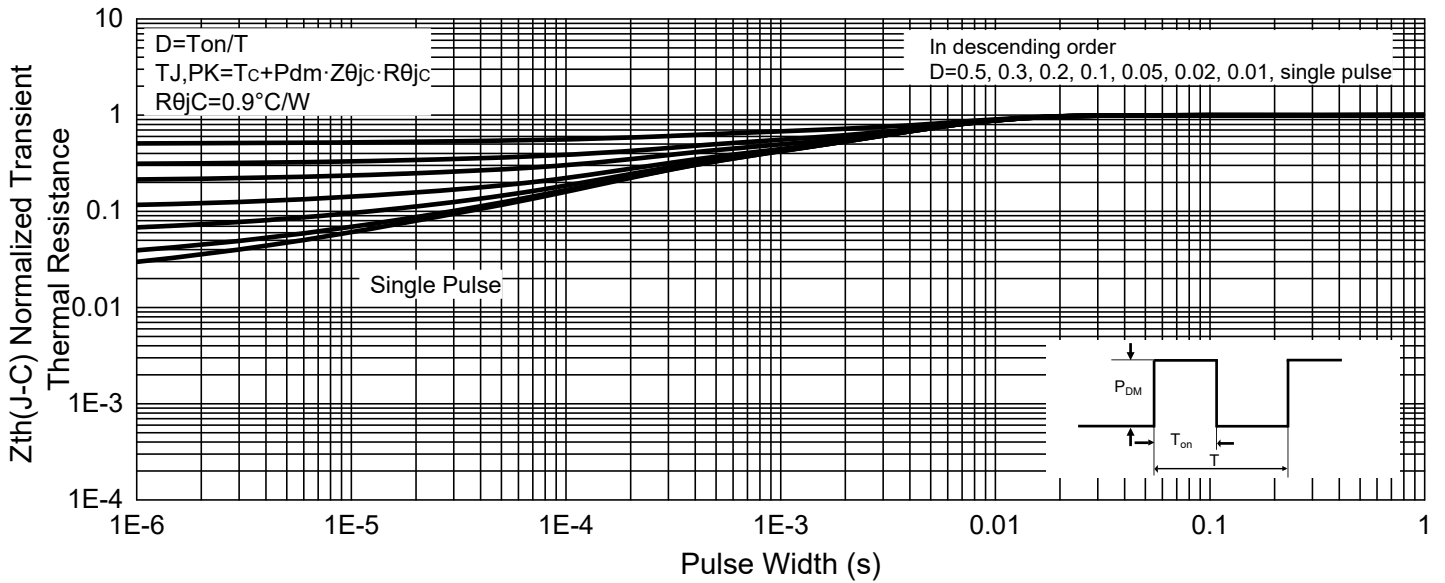


Fig. 13 - Normalized Transient Thermal Impedance



## Ordering Information

| Device         | Packing               |
|----------------|-----------------------|
| Part Number-TP | Tape&Reel: 5Kpcs/Reel |

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