

## Features

- AEC-Q101 Qualified
- Split Gate Trench Mosfet Technology
- Excellent Package for Heat Dissipation
- 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

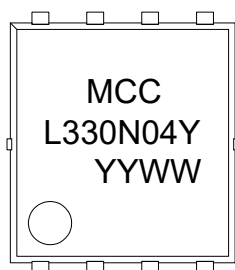
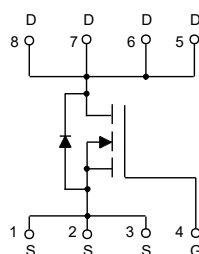
- Operating Junction Temperature Range : -55°C to +175°C
- Storage Temperature Range: -55°C to +175°C
- Thermal Resistance: 50°C/W Junction to Ambient (Note 2)
- Thermal Resistance: 0.8°C/W Junction to Case

| Parameter                        | Symbol                  | Rating | Unit |
|----------------------------------|-------------------------|--------|------|
| Drain-Source Voltage             | $V_{DS}$                | 40     | V    |
| Gate-Source Voltage              | $V_{GS}$                | ±20    | V    |
| Continuous Drain Current         | $I_D$                   | 330    | A    |
|                                  |                         | 233    |      |
|                                  | $T_C=25^\circ\text{C}$  |        |      |
|                                  | $T_C=100^\circ\text{C}$ |        |      |
| Pulsed Drain Current (Note 3)    | $I_{DM}$                | 1320   | A    |
| Total Power Dissipation (Note 4) | $P_D$                   | 187.5  | W    |
| Avalanche Energy (Note 5)        | $E_{AS}$                | 2053   | 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.  $T_J=25^\circ\text{C}$ ,  $V_{DD}=40\text{V}$ ,  $V_{GS}=10\text{V}$ ,  $L=3\text{mH}$ .

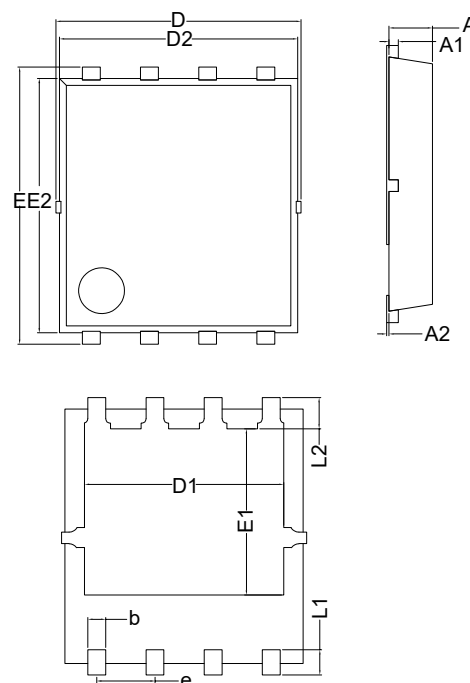
## Internal Structure and Marking Code



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

## N-CHANNEL MOSFET

### DFN5060-C



| DIMENSIONS |        |       |       |      |      |
|------------|--------|-------|-------|------|------|
| DIM        | INCHES |       | MM    |      | NOTE |
|            | 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       |
|---------------------------------|---------------|-------------------------------------------------------|-----|------|-----------|------------|
| Static Characteristics          |               |                                                       |     |      |           |            |
| Drain-Source Breakdown Voltage  | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=1mA$                                  | 40  |      |           | V          |
| Gate-Source Leakage Current     | $I_{GSS}$     | $V_{DS}=0V, V_{GS}=\pm 20V$                           |     |      | $\pm 100$ | nA         |
| Zero Gate Voltage Drain Current | $I_{DSS}$     | $V_{DS}=32V, V_{GS}=0V$                               |     |      | 1         | $\mu A$    |
| Gate-Threshold Voltage          | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=250\mu A$                         | 2.0 | 2.8  | 4.0       | V          |
| Drain-Source On-Resistance      | $R_{DS(on)}$  | $V_{GS}=10V, I_D=75A$                                 |     | 0.8  | 1.0       | m $\Omega$ |
|                                 |               | $V_{GS}=6V, I_D=20A$                                  |     | 1.6  | 2.4       |            |
| Gate Resistance                 | $R_g$         | $V_{GS}=0V, f=1MHz$                                   |     | 1.5  |           | $\Omega$   |
| Diode Characteristics           |               |                                                       |     |      |           |            |
| Continuous Body Diode Current   | $I_S$         |                                                       |     |      | 330       | A          |
| Diode Forward Voltage           | $V_{SD}$      | $V_{GS}=0V, I_S=20A$                                  |     |      | 1.3       | V          |
| Reverse Recovery Time           | $t_{rr}$      | $I_F=20A, dI_F/dt=100A/\mu s$                         |     | 61   |           | ns         |
| Reverse Recovery Charge         | $Q_{rr}$      |                                                       |     | 66   |           | nC         |
| Dynamic Characteristics         |               |                                                       |     |      |           |            |
| Input Capacitance               | $C_{iss}$     | $V_{DS}=30V, V_{GS}=0V, f=1MHz$                       |     | 8098 |           | pF         |
| Output Capacitance              | $C_{oss}$     |                                                       |     | 2091 |           |            |
| Reverse Transfer Capacitance    | $C_{rss}$     |                                                       |     | 246  |           |            |
| Total Gate Charge               | $Q_g$         | $V_{DS}=20V, V_{GS}=10V, I_D=165A$                    |     | 133  |           | nC         |
| Gate-Source Charge              | $Q_{gs}$      |                                                       |     | 45   |           |            |
| Gate-Drain Charge               | $Q_{gd}$      |                                                       |     | 39   |           |            |
| Turn-On Delay Time              | $t_{d(on)}$   | $V_{DD}=30V, V_{GS}=10V, I_{DS}=10A, R_{GEN}=3\Omega$ |     | 40   |           | ns         |
| Turn-On Rise Time               | $t_r$         |                                                       |     | 255  |           |            |
| Turn-Off Delay Time             | $t_{d(off)}$  |                                                       |     | 62   |           |            |
| Turn-Off Fall Time              | $t_f$         |                                                       |     | 71   |           |            |

## Curve Characteristics

Fig. 1 - Typical Output Characteristics

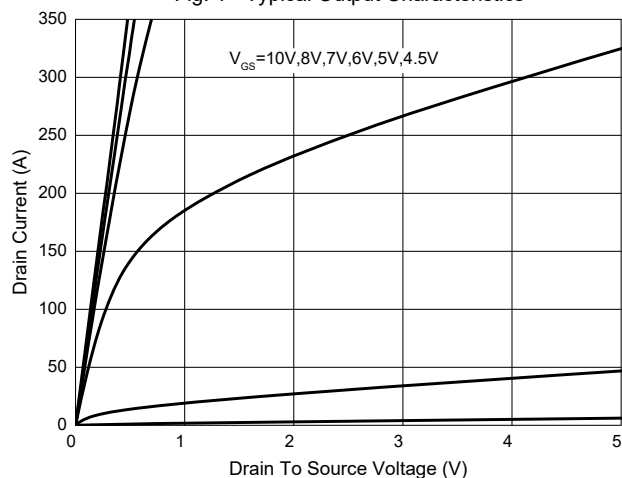


Fig. 2 - Transfer Characteristics

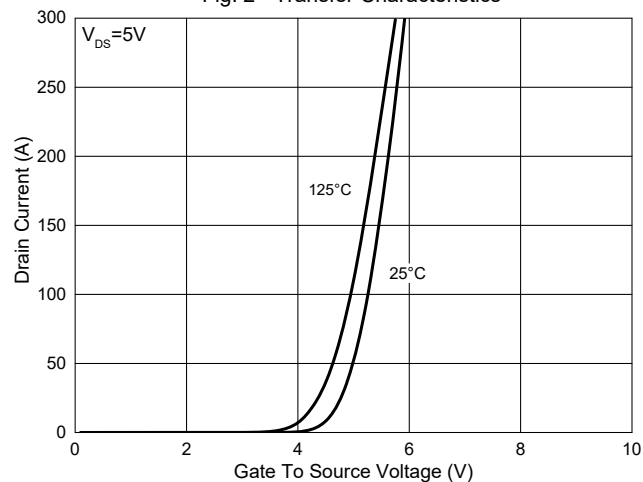


Fig. 3 -  $R_{DS(ON)} - V_{GS}$

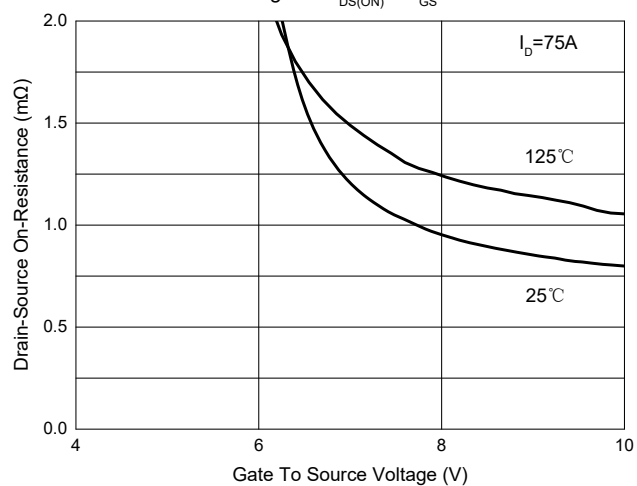


Fig. 4 -  $R_{DS(ON)} - I_D$

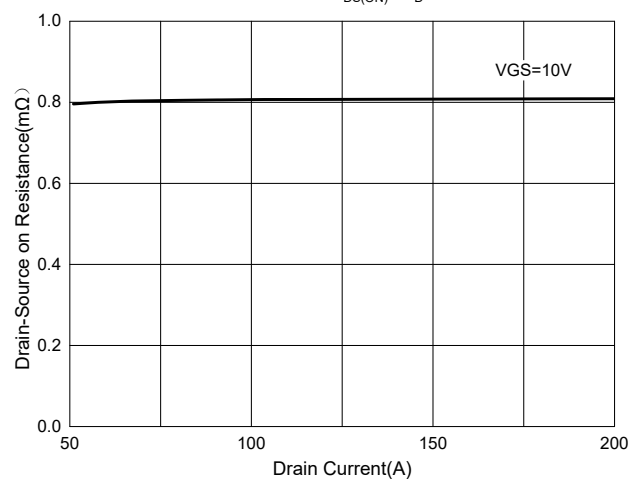


Fig. 5 - Capacitance Characteristics

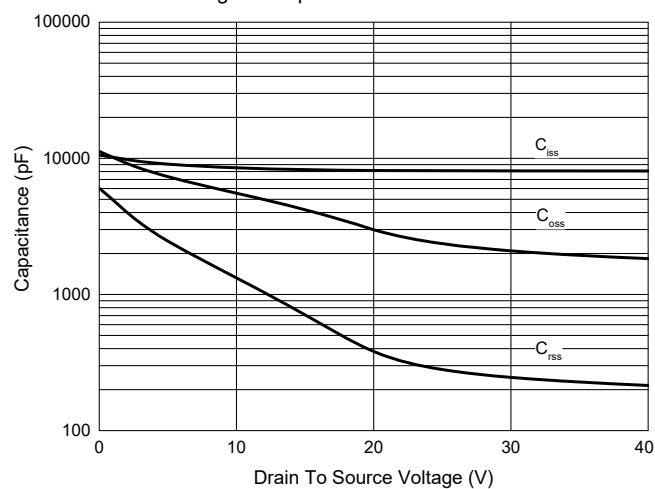
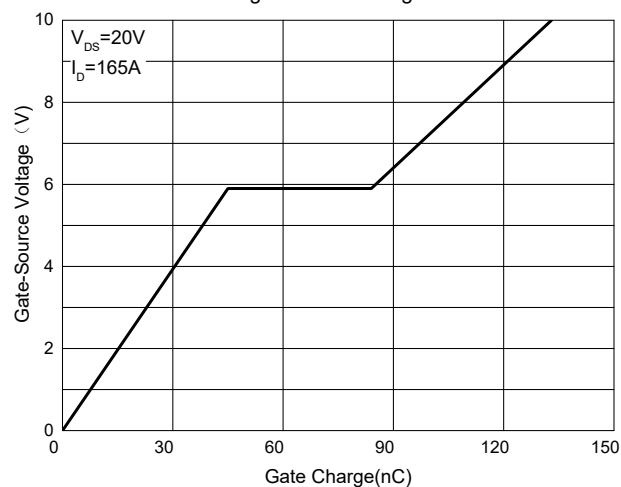


Fig. 6 - Gate Charge



## Curve Characteristics

Fig. 7 - Nomalized Threshold Voltage

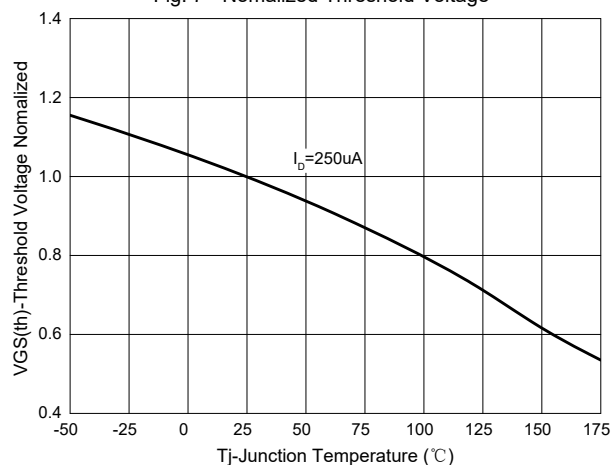


Fig.8-Normalized On Resistance Characteristics

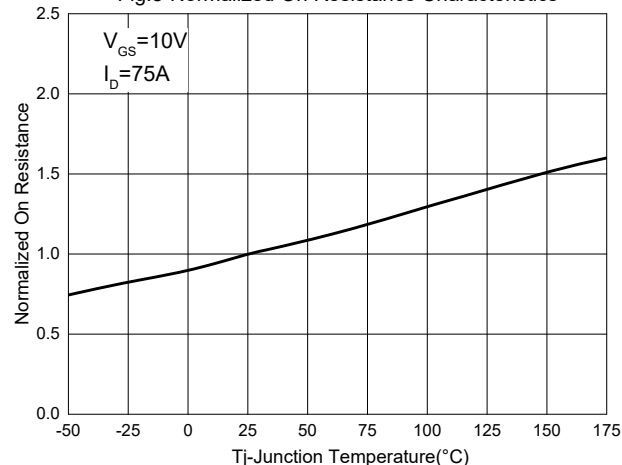


Fig.9 -  $I_S - V_{SD}$

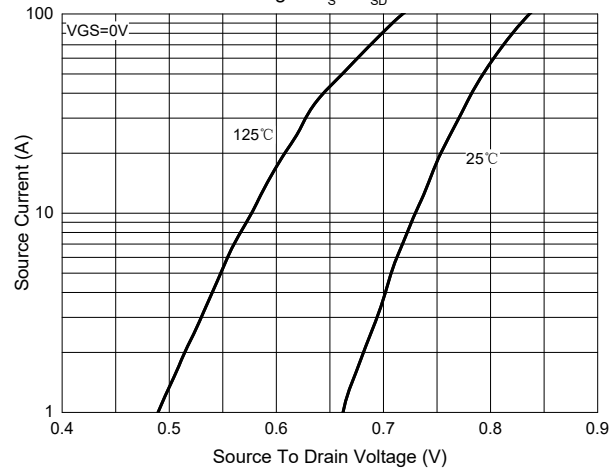


Fig. 10 - Drain Current

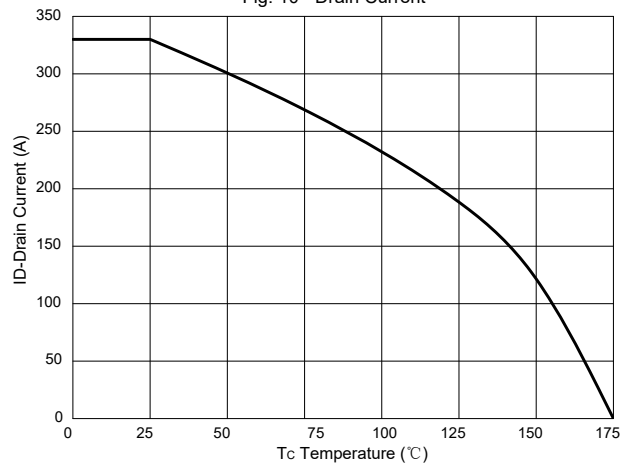
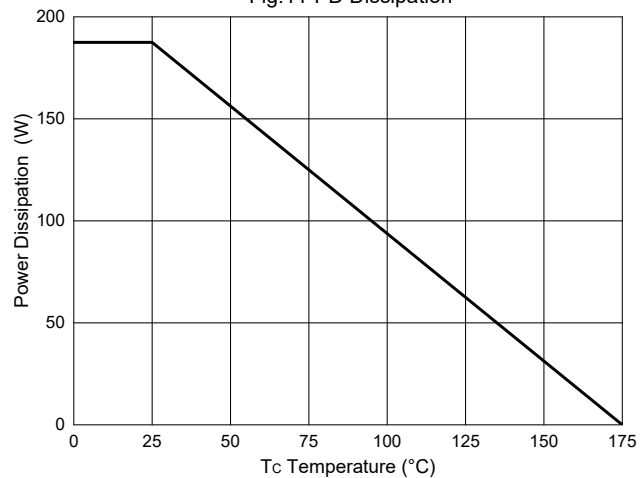


Fig.11-PD Dissipation



## Curve Characteristics

Fig. 12 - Safe Operation Area

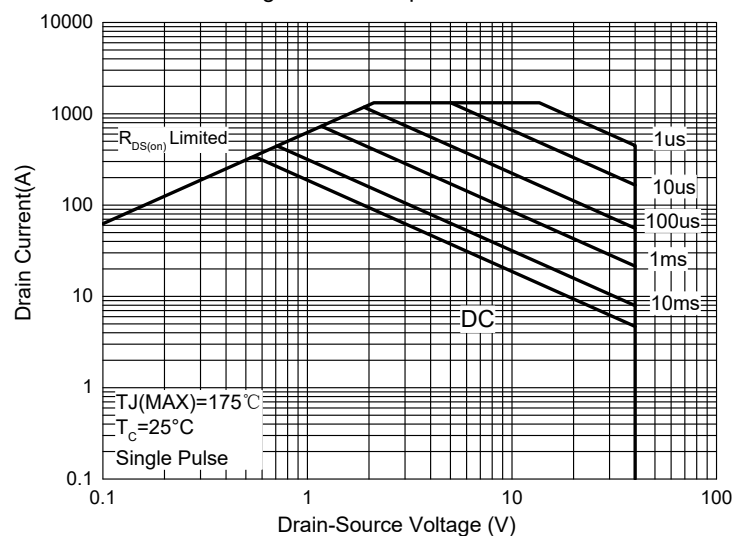
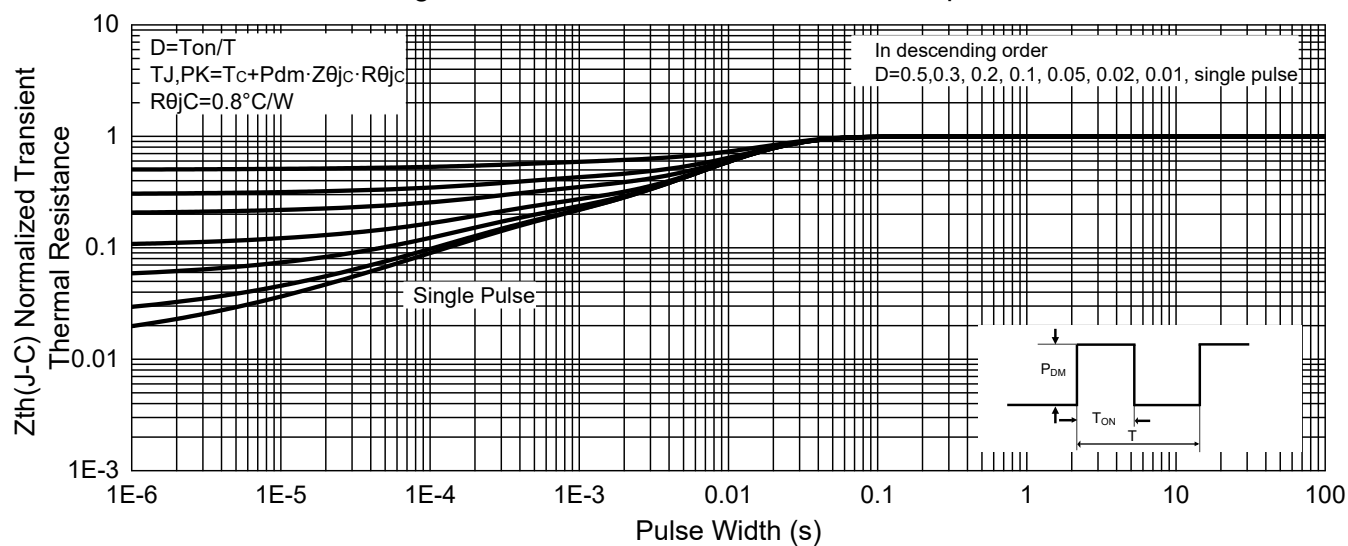


Fig. 13 -Normalized Transient Thermal Impedance



## Ordering Information

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

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