

## Features

- 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

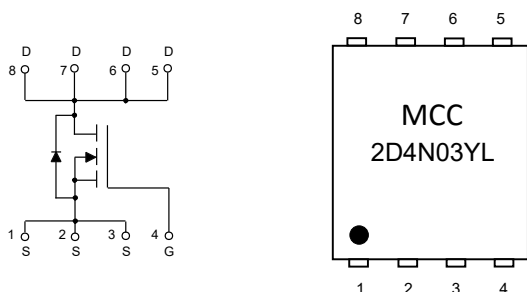
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 55°C/W Junction to Ambient (Note2)
- Thermal Resistance: 2°C/W Junction to Case

| Parameter                              |                         | Symbol   | Rating | Unit |
|----------------------------------------|-------------------------|----------|--------|------|
| Drain-Source Voltage                   |                         | $V_{DS}$ | 30     | V    |
| Gate-Source Voltage                    |                         | $V_{GS}$ | ±20    | V    |
| Continuous Drain Current               | $T_C=25^\circ\text{C}$  | $I_D$    | 125    | A    |
|                                        | $T_C=100^\circ\text{C}$ |          | 79     |      |
| Pulsed Drain Current (Note3)           |                         | $I_{DM}$ | 500    | A    |
| Total Power Dissipation (Note4)        |                         | $P_D$    | 62.5   | W    |
| Single Pulse Avalanche Energy (Note 5) |                         | $E_{AS}$ | 110    | mJ   |

Note:

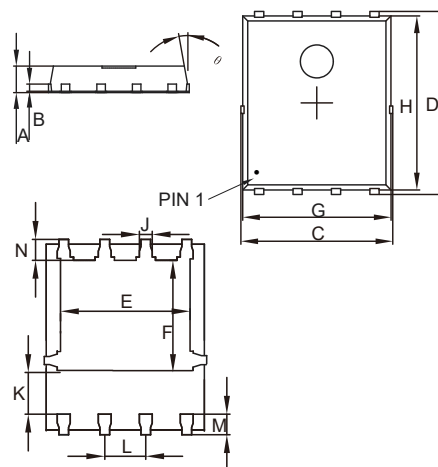
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment 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.  $T_J=25^\circ\text{C}$ ,  $V_{DD}=30\text{V}$ ,  $V_{GS}=10\text{V}$ ,  $R_G=25\Omega$ ,  $L=0.5\text{mH}$ .

## Internal Structure and Marking Code



## N-CHANNEL MOSFET

### DFN5060



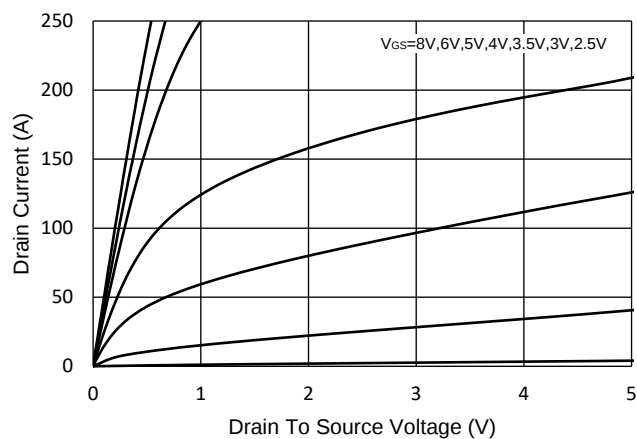
| DIM | INCHES |       | MM    |      | NOTE |
|-----|--------|-------|-------|------|------|
|     | MIN    | MAX   | MIN   | MAX  |      |
| A   | 0.039  | 0.047 | 0.80  | 1.20 |      |
| B   | 0.010  |       | 0.254 |      | TYP. |
| C   | 0.203  | 0.219 | 5.15  | 5.55 |      |
| D   | 0.234  | 0.250 | 5.95  | 6.35 |      |
| E   | 0.154  | 0.170 | 3.92  | 4.32 |      |
| F   | 0.139  | 0.154 | 3.52  | 3.92 |      |
| G   | 0.197  | 0.213 | 5.00  | 5.40 |      |
| H   | 0.223  | 0.239 | 5.66  | 6.06 |      |
| K   | 0.0444 | 0.052 | 1.12  | 1.32 |      |
| J   | 0.016  | 0.020 | 0.41  | 0.51 |      |
| L   | 0.046  | 0.054 | 1.17  | 1.37 |      |
| M   | 0.022  | 0.030 | 0.56  | 0.76 |      |
| N   | 0.016  | 0.024 | 0.40  | 0.60 |      |

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

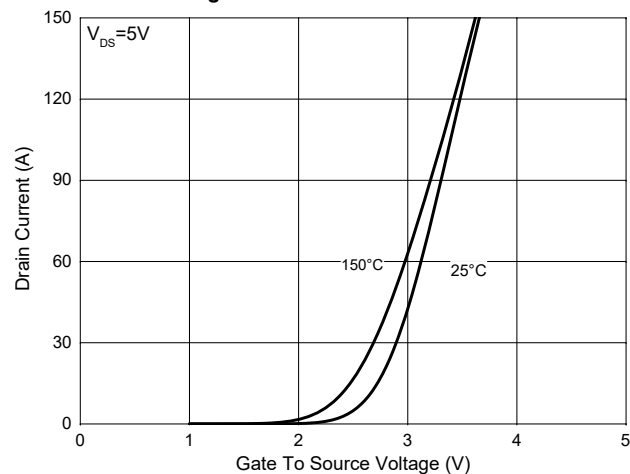
| Parameter                       | Symbol               | Test Conditions                                                                       | Min | Typ  | Max  | Unit |
|---------------------------------|----------------------|---------------------------------------------------------------------------------------|-----|------|------|------|
| Static Characteristics          |                      |                                                                                       |     |      |      |      |
| Drain-Source Breakdown Voltage  | V <sub>(BR)DSS</sub> | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                            | 30  |      |      | 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> =30V, 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                              | 1.2 | 1.7  | 2.2  | V    |
| Drain-Source On-Resistance      | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =50A                                             |     | 1.8  | 2.4  | mΩ   |
|                                 |                      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =25A                                            |     | 3.1  | 4.2  |      |
| Gate Resistance                 | R <sub>G</sub>       | f=1MHz, Open drain                                                                    |     | 1.1  |      | Ω    |
| Diode Characteristics           |                      |                                                                                       |     |      |      |      |
| Continuous Body Diode Current   | I <sub>S</sub>       |                                                                                       |     |      | 125  | A    |
| Diode Forward Voltage           | V <sub>SD</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =50A                                              |     |      | 1.2  | V    |
| Reverse Recovery Time           | t <sub>rr</sub>      | I <sub>F</sub> =50A, di/dt=100A/μs                                                    |     | 23   |      | ns   |
| Reverse Recovery Charge         | Q <sub>rr</sub>      |                                                                                       |     | 11   |      | nC   |
| Dynamic Characteristics         |                      |                                                                                       |     |      |      |      |
| Input Capacitance               | C <sub>iss</sub>     | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz                                     |     | 1525 |      | pF   |
| Output Capacitance              | C <sub>oss</sub>     |                                                                                       |     | 1200 |      |      |
| Reverse Transfer Capacitance    | C <sub>rss</sub>     |                                                                                       |     | 85   |      |      |
| Total Gate Charge               | Q <sub>g</sub>       | V <sub>DS</sub> =15V, V <sub>GS</sub> =10V, I <sub>D</sub> =50A                       |     | 31   |      | nC   |
| Gate-Source Charge              | Q <sub>gs</sub>      |                                                                                       |     | 5.4  |      |      |
| Gate-Drain Charge               | Q <sub>gd</sub>      |                                                                                       |     | 7.4  |      |      |
| Turn-On Delay Time              | t <sub>d(on)</sub>   | V <sub>DD</sub> =15V, V <sub>GS</sub> =10V, R <sub>G</sub> =2.7Ω, I <sub>D</sub> =50A |     | 11   |      | ns   |
| Turn-On Rise Time               | t <sub>r</sub>       |                                                                                       |     | 158  |      |      |
| Turn-Off Delay Time             | t <sub>d(off)</sub>  |                                                                                       |     | 24.5 |      |      |
| Turn-Off Fall Time              | t <sub>f</sub>       |                                                                                       |     | 8    |      |      |

## Curve Characteristics

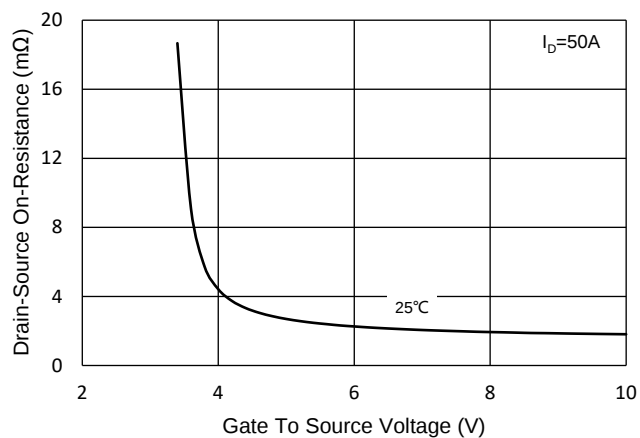
**Fig.1 - Typical Output Characteristics**



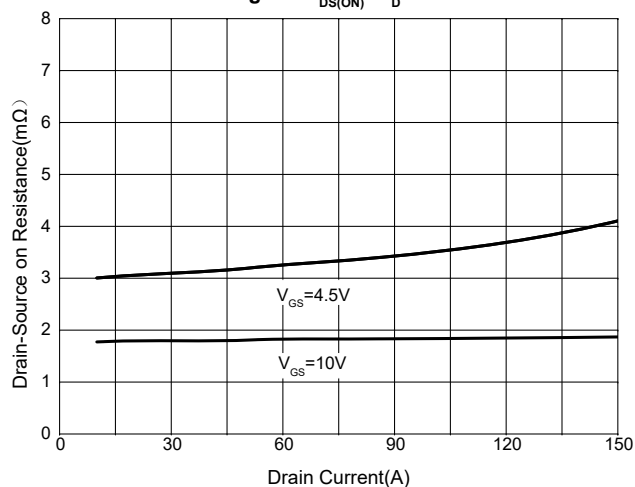
**Fig. 2 - Transfer Characteristics**



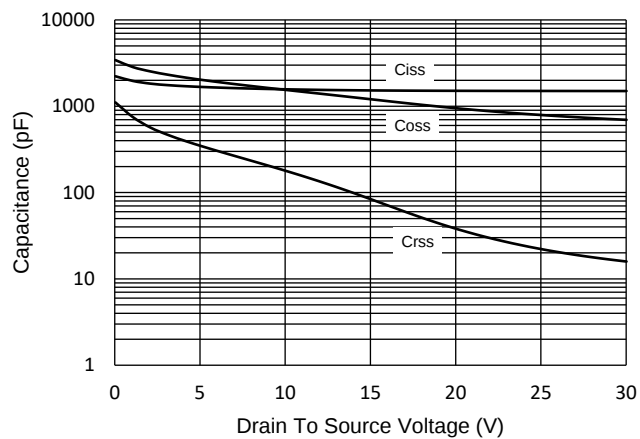
**Fig.3 -  $R_{DS(ON)}$  -  $V_{GS}$**



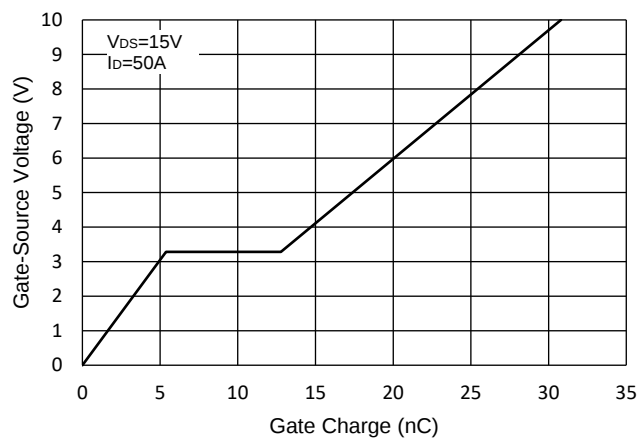
**Fig. 4 -  $R_{DS(ON)}$  -  $I_D$**



**Fig.5 - Capacitance Characteristics**

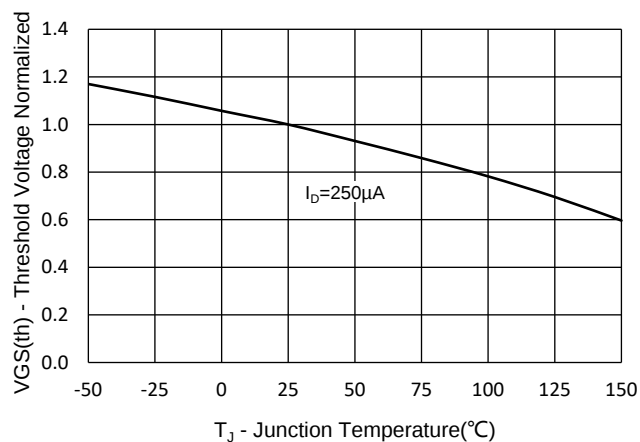


**Fig.6 - Gate Charge**

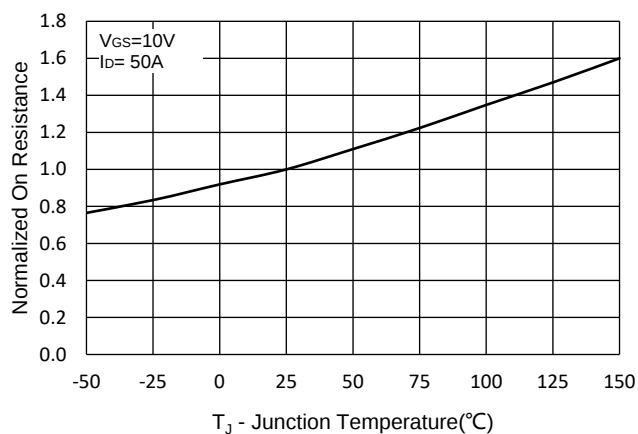


## Curve Characteristics

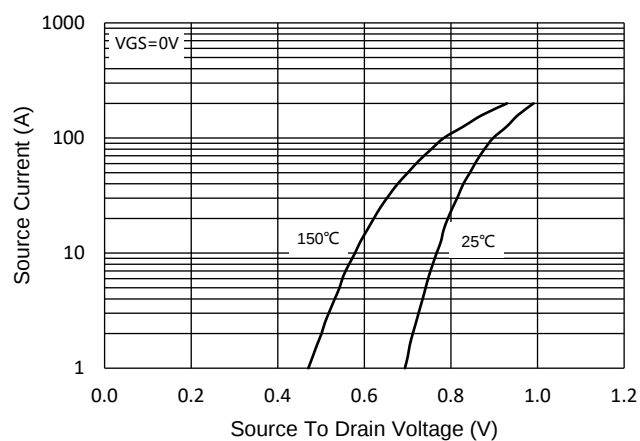
**Fig.7 - Normalized Threshold Voltage**



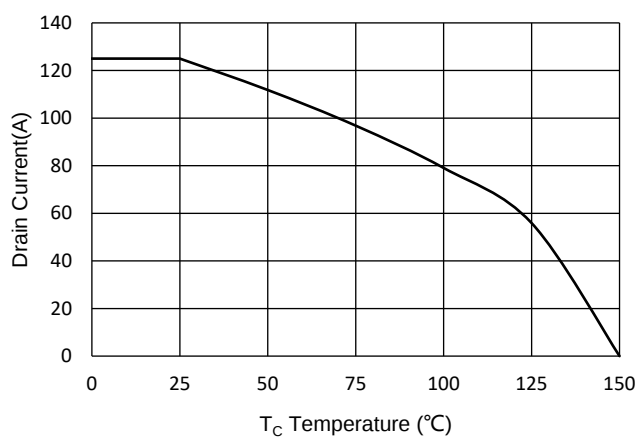
**Fig.8 - Normalized On Resistance Characteristics**



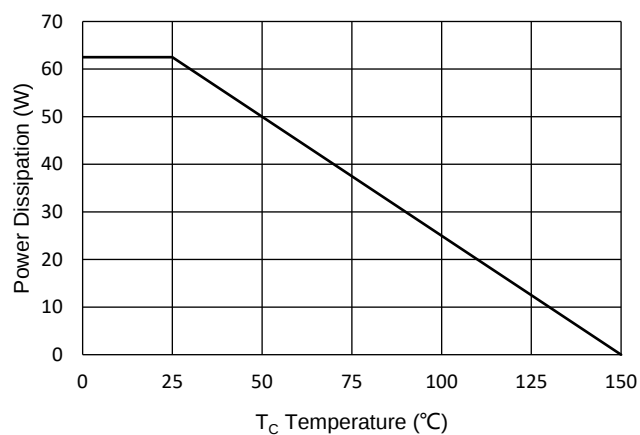
**Fig.9 -  $I_S - V_{SD}$**



**Fig.10 - Drain Current**



**Fig.11 - PD Dissipation**



## Curve Characteristics

Fig.12 - Safe Operation Area

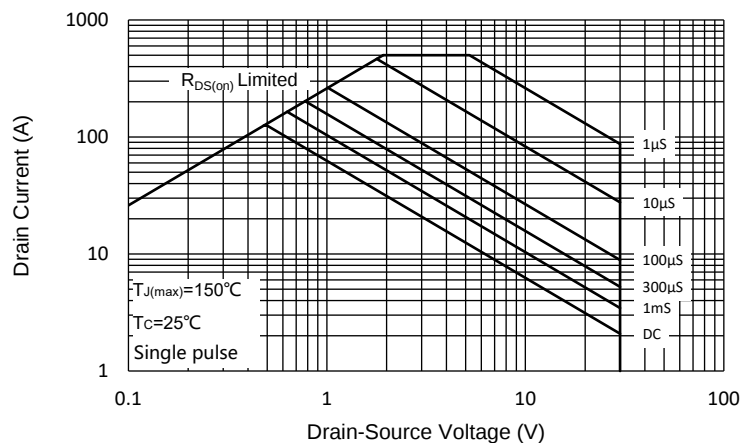
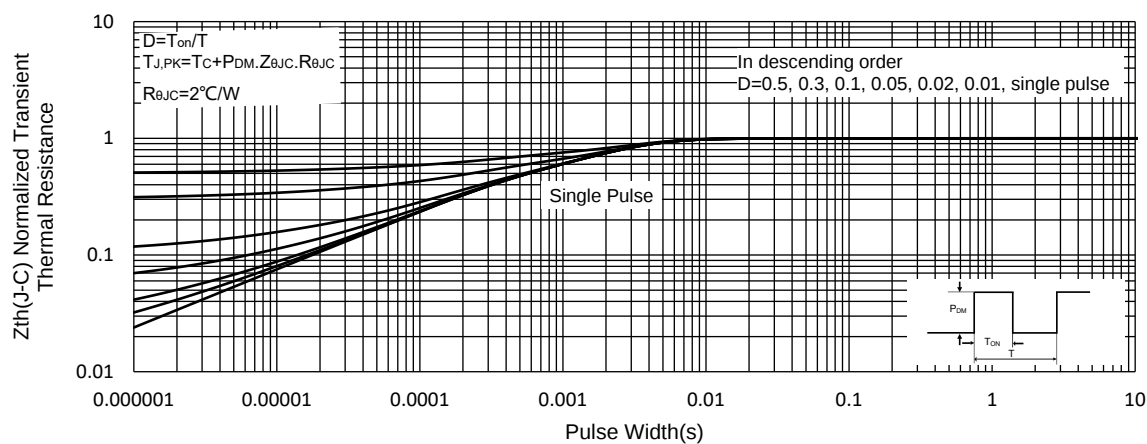


Fig.13 - Normalized Transient Thermal Impedance



## Ordering Information

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

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