

## Features

- Trench Power MV MOSFET Technology
- High Density Cell Design For Low  $R_{DS(on)}$
- Moisture Sensitivity Level 1
- Halogen Free. "Green" Device (Note1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Maximum Ratings

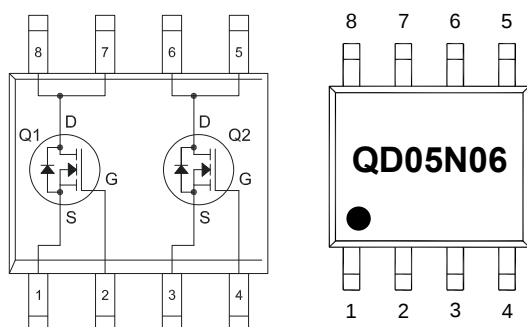
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 78°C/W Junction to Ambient (Note2)

| Parameter                               | Symbol                  | Rating | Unit |
|-----------------------------------------|-------------------------|--------|------|
| Drain-Source Voltage                    | $V_{DS}$                | 60     | V    |
| Gate-Source Voltage                     | $V_{GS}$                | ±20    | V    |
| Continuous Drain Current                | $T_A=25^\circ\text{C}$  | 5      | A    |
|                                         | $T_A=100^\circ\text{C}$ | 3.1    |      |
| Pulsed Drain Current (Note 3)           | $I_{DM}$                | 20     | A    |
| Total Power Dissipation (Note 4)        | $P_D$                   | 1.6    | W    |
| Single Pulsed Avalanche Energy (Note 5) | $E_{AS}$                | 30     | mJ   |

Note:

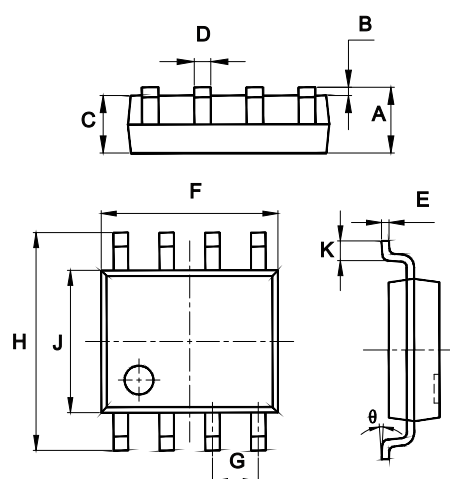
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment 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-ambient thermal resistance.
5.  $T_J=25^\circ\text{C}$ ,  $V_{DD}=40\text{V}$ ,  $V_{GS}=10\text{V}$ ,  $R_G=25\Omega$ ,  $L=0.5\text{mH}$ .

## Internal Structure and Marking Code



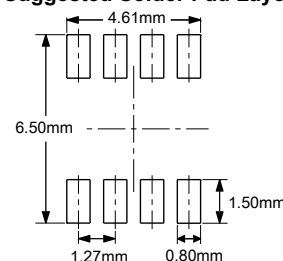
# Dual N-CHANNEL MOSFET

## SOP-8



| DIM | INCHES |       | MM    |      | NOTE |
|-----|--------|-------|-------|------|------|
|     | MIN    | MAX   | MIN   | MAX  |      |
| A   | 0.053  | 0.069 | 1.35  | 1.75 |      |
| B   | 0.004  | 0.010 | 0.10  | 0.25 |      |
| C   | 0.053  | 0.061 | 1.35  | 1.55 |      |
| D   | 0.013  | 0.020 | 0.33  | 0.51 |      |
| E   | 0.007  | 0.010 | 0.17  | 0.25 |      |
| F   | 0.185  | 0.200 | 4.70  | 5.10 |      |
| G   | 0.050  |       | 1.270 |      | TYP. |
| H   | 0.228  | 0.244 | 5.80  | 6.20 |      |
| J   | 0.150  | 0.157 | 3.80  | 4.00 |      |
| K   | 0.016  | 0.050 | 0.40  | 1.27 |      |
| θ   | 0°     | 8°    | 0°    | 8°   |      |

### Suggested Solder Pad Layout

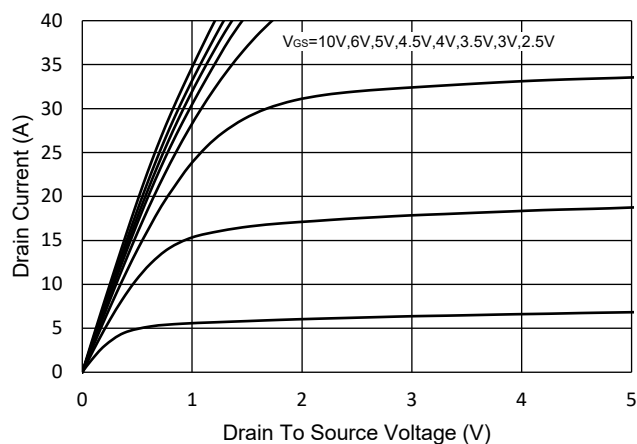


# Electrical Characteristics @ 25°C (Unless Otherwise Specified)

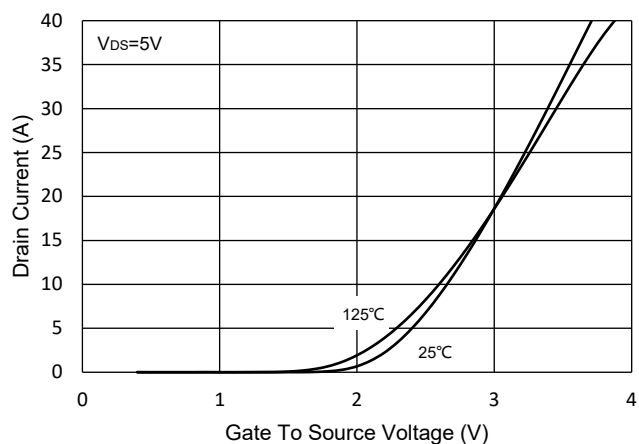
| Parameter                       | Symbol               | Test Conditions                                                                        | Min | Typ  | Max  | Unit |
|---------------------------------|----------------------|----------------------------------------------------------------------------------------|-----|------|------|------|
| Static Characteristics          |                      |                                                                                        |     |      |      |      |
| Drain-Source Breakdown Voltage  | V <sub>(BR)DSS</sub> | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                             | 60  |      |      | 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> =60V, 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   | 1.5  | 2.5  | V    |
| Drain-Source On-Resistance      | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =5A                                               |     | 27   | 35   | mΩ   |
|                                 |                      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A                                              |     | 30   | 45   |      |
| Gate Resistance                 | R <sub>g</sub>       | f=1 MHz, Open drain                                                                    |     | 1.8  |      | Ω    |
| Diode Characteristics           |                      |                                                                                        |     |      |      |      |
| Continuous Body Diode Current   | I <sub>S</sub>       |                                                                                        |     |      | 5    | A    |
| Diode Forward Voltage           | V <sub>SD</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =5A                                                |     | 0.8  | 1.2  | V    |
| Reverse Recovery Time           | t <sub>rr</sub>      | I <sub>F</sub> =2A, di/dt=100A/us                                                      |     | 17   |      | ns   |
| Reverse Recovery Charge         | Q <sub>rr</sub>      |                                                                                        |     | 12   |      | nC   |
| Dynamic Characteristics         |                      |                                                                                        |     |      |      |      |
| Input Capacitance               | C <sub>iss</sub>     | V <sub>DS</sub> =30V,V <sub>GS</sub> =0V,f=1MHz                                        |     | 1152 |      | pF   |
| Output Capacitance              | C <sub>oss</sub>     |                                                                                        |     | 68   |      |      |
| Reverse Transfer Capacitance    | C <sub>rss</sub>     |                                                                                        |     | 56   |      |      |
| Total Gate Charge               | Q <sub>g</sub>       | V <sub>DS</sub> =30V,V <sub>GS</sub> =10V,I <sub>D</sub> =5A                           |     | 22.8 |      | nC   |
| Gate-Source Charge              | Q <sub>gs</sub>      |                                                                                        |     | 2.4  |      |      |
| Gate-Drain Charge               | Q <sub>gd</sub>      |                                                                                        |     | 4.6  |      |      |
| Turn-On Delay Time              | t <sub>d(on)</sub>   | V <sub>GS</sub> =10V,V <sub>DD</sub> =30V,<br>I <sub>D</sub> =2A, R <sub>GEN</sub> =3Ω |     | 6    |      | ns   |
| Turn-On Rise Time               | t <sub>r</sub>       |                                                                                        |     | 3.3  |      |      |
| Turn-Off Delay Time             | t <sub>d(off)</sub>  |                                                                                        |     | 24   |      |      |
| Turn-Off Fall Time              | t <sub>f</sub>       |                                                                                        |     | 4    |      |      |

## Curve Characteristics

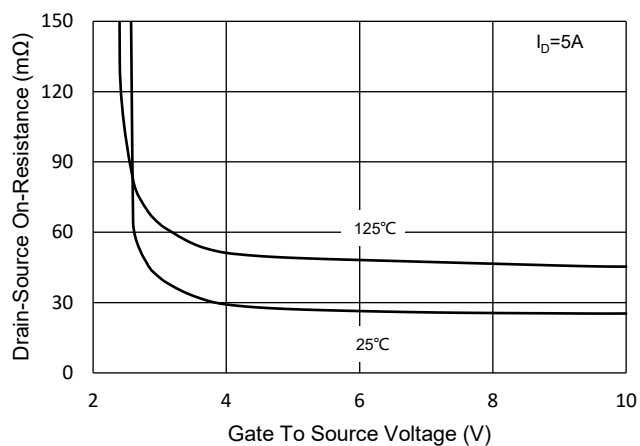
**Fig.1 - Typical Output Characteristics**



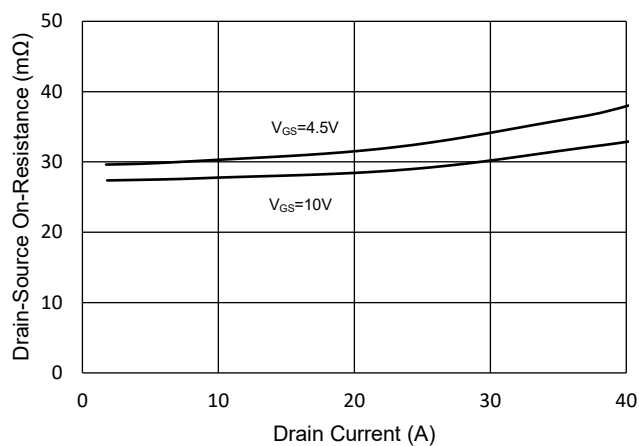
**Fig.2 - Transfer Characteristic**



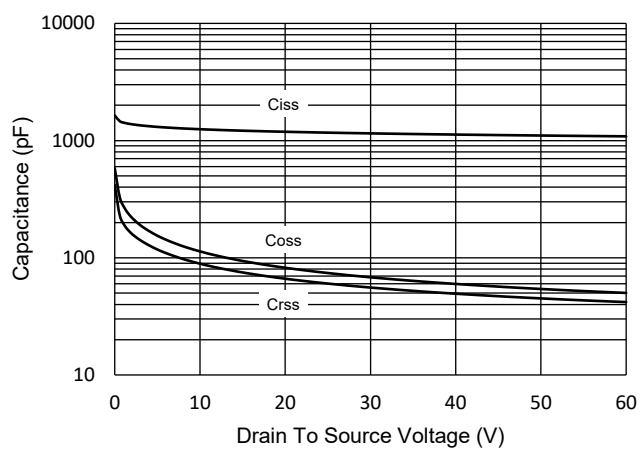
**Fig.3 -  $R_{DS(ON)}$  -  $V_{GS}$**



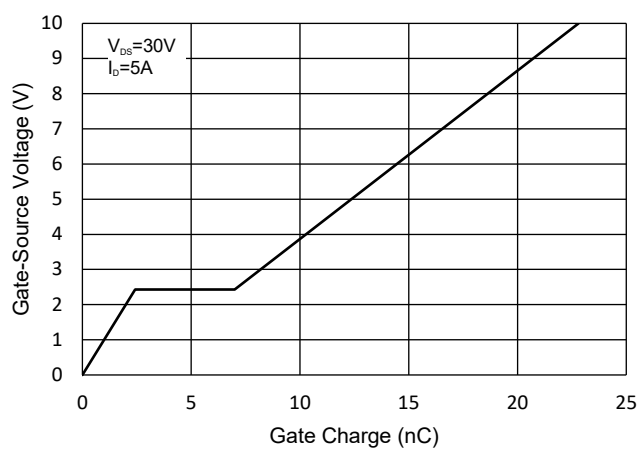
**Fig.4 -  $R_{DS(ON)}$  -  $I_D$**



**Fig.5 - Capacitance Characteristics**



**Fig.6 - Gate Charge**



## Curve Characteristics

Fig.7 - Normalized Threshold Voltage

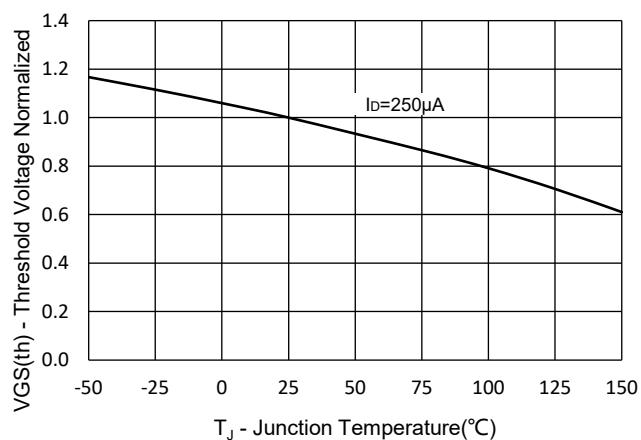


Fig.8 - Normalized On Resistance Characteristics

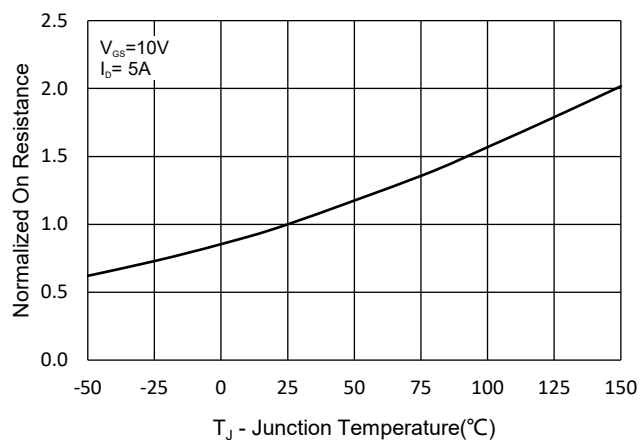


Fig.9 -  $I_S - V_{SD}$

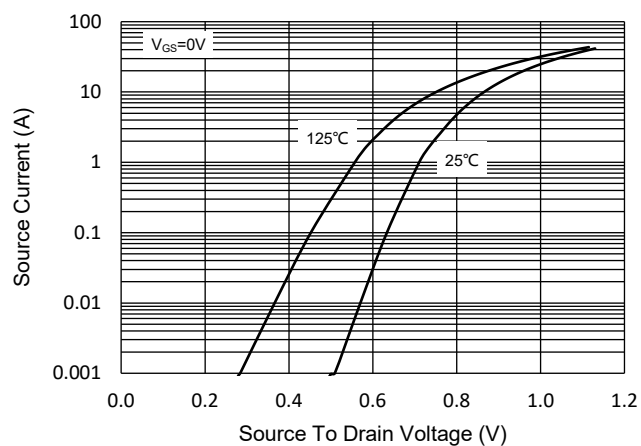


Fig.10 - Drain Current

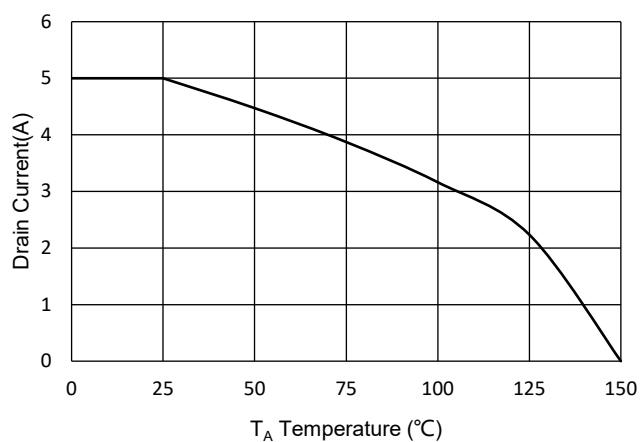
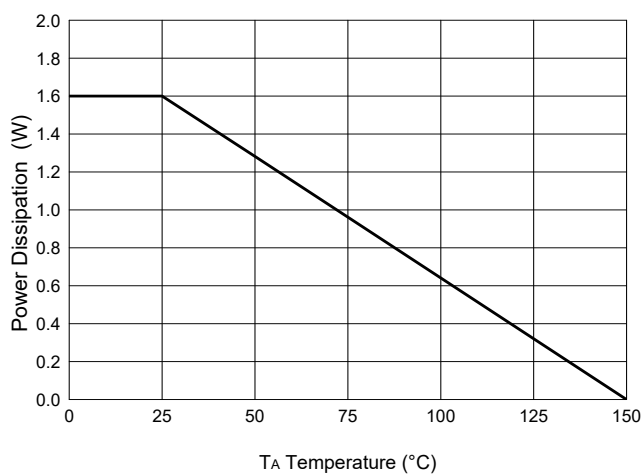


Fig.11-PD Dissipation



## Curve Characteristics

Fig. 12 - Safe Operation Area

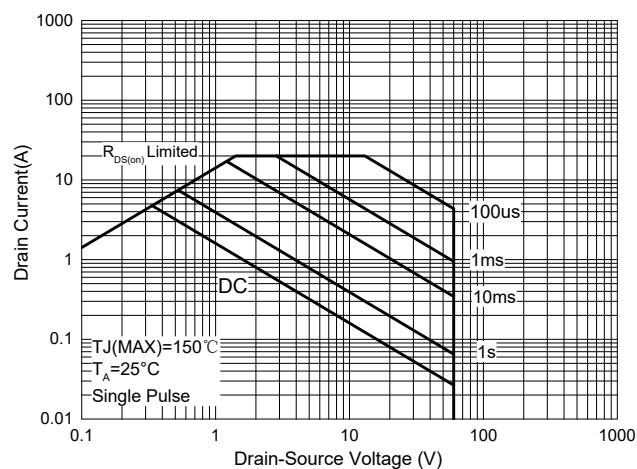
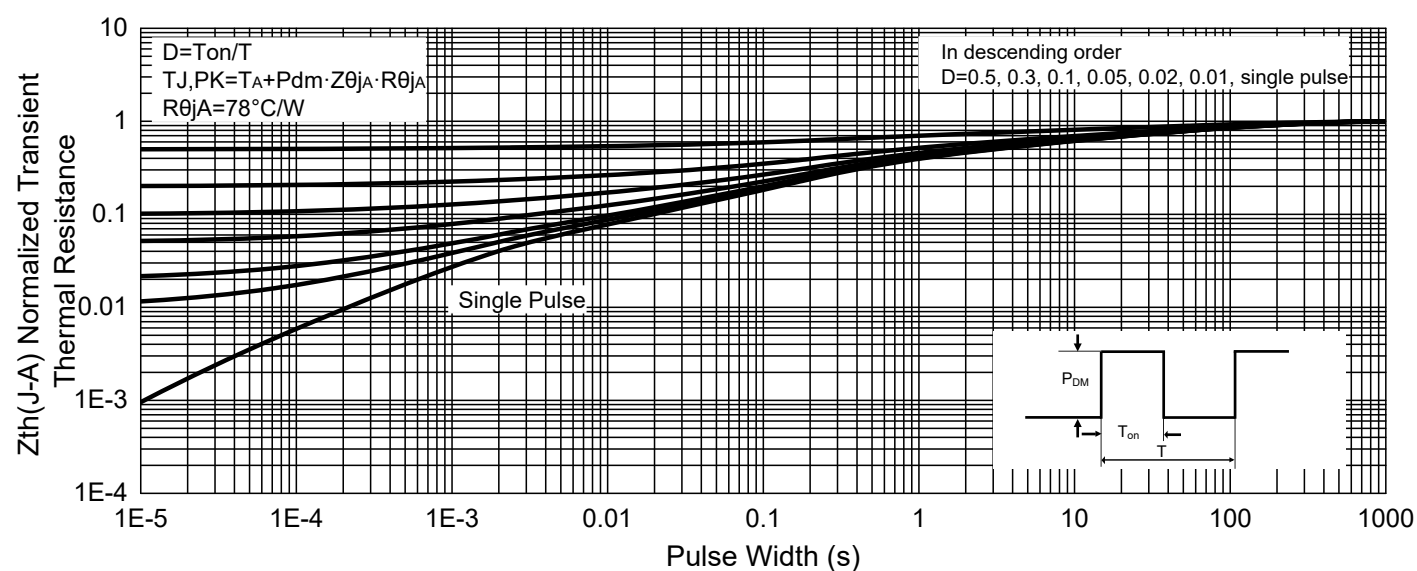


Fig. 13 - Normalized Transient Thermal Impedance



## Ordering Information

| Device         | Packing               |
|----------------|-----------------------|
| Part Number-TP | Tape&Reel: 4Kpcs/Reel |

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