## Features

- Split Gate Trench MOSFET Technology
- Low $R_{DS(on)}$ & FOM
- Low Crss
- Extremely Low Switching Loss
- Excellent Stability and Uniformity
- 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)

# P-CHANNEL MOSFET

## Maximum Ratings

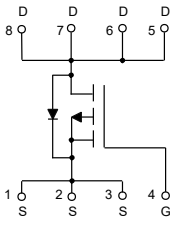
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 56°C/W Junction to Ambient(Note 2)

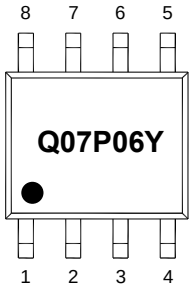
| Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | -60 | V |
| Gate-Source Volltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current | $T_A$=25°C | $I_D$ | -7 | A |
| | $T_A$=100°C | | -4.4 | |
| Pulsed Drain Current(Note 3) | | $I_{DM}$ | -28 | A |
| Total Power Dissipation(Note 4) | | $P_D$ | 2.2 | W |
| Single Pulsed Avalanche Energy(Note 5) | | $E_{AS}$ | 90 | mJ |

Note:

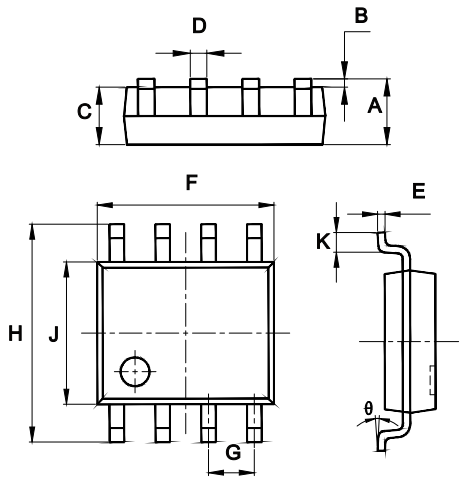
1. Halogen free "Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of RθJA is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with TA =25°C.
3. Repetitive rating; pulse width limited by max. junction temperature.
4. $P_D$ is based on max. junction temperature, using junction-ambient thermal resistance.
5. $V_{DD}$=-50V, $R_G$=25Ω, $V_G$=-10V,L=0.5mH.

## Internal Structure and Marking Code



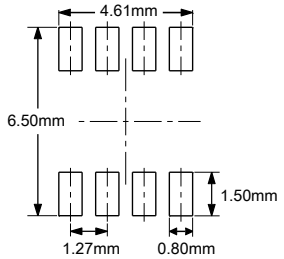




## SOP-8




| DIMENSIONS | | | | | |
|---|---|---|---|---|---|
| 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 | $V_{(BR)DSS}$ | $V_{GS}$=0V, $I_D$=-250μA | -60 | | | V |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{DS}$=0V, $V_{GS}$ =±20V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-60V, $V_{GS}$=0V | | | -1 | μA |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=-250μA | -1.3 | -1.8 | -2.5 | V |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$=-10V, $I_D$=-6A | | 35 | 47 | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-3A | | 45 | 60 | |
| Gate Resistance | $R_g$ | f=1MHz, Open drain | | 12 | | Ω |
| **Diode Characteristics** | | | | | | |
| Continuous Body Diode Current | $I_S$ | | | | -7 | A |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_S$=-6A | | | -1.3 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_S$=-3A,di/dt=100A/μs | | 24.8 | | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | | 16.7 | | nC |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=-30V,$V_{GS}$=0V,f=1MHz | | 1052 | | pF |
| Output Capacitance | $C_{oss}$ | | | 353 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 10 | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=-30V,$V_{GS}$=-10V,$I_D$=-3A | | 18 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 3.4 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 2.8 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DS}$=-30V, $V_{GS}$=-10V, $R_G$=6Ω, $I_D$=-3.5A | | 9 | | ns |
| Turn-On Rise Time | $t_r$ | | | 4.7 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 58 | | |
| Turn-Off Fall Time | $t_f$ | | | 20 | | |

## Curve Characteristics

**Fig. 1 - Typical Output Characteristics**

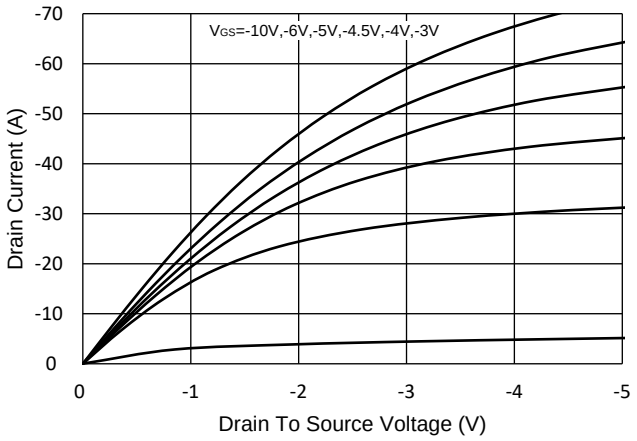



**Fig.2 - Transfer Characteristic**

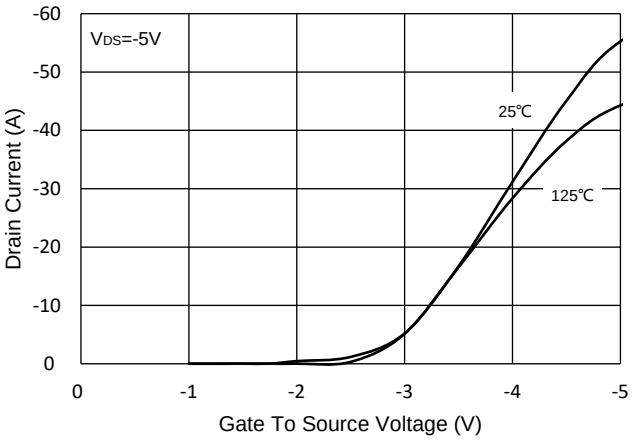



**Fig.3 - $R_{DS(ON)}$ - $V_{GS}$**

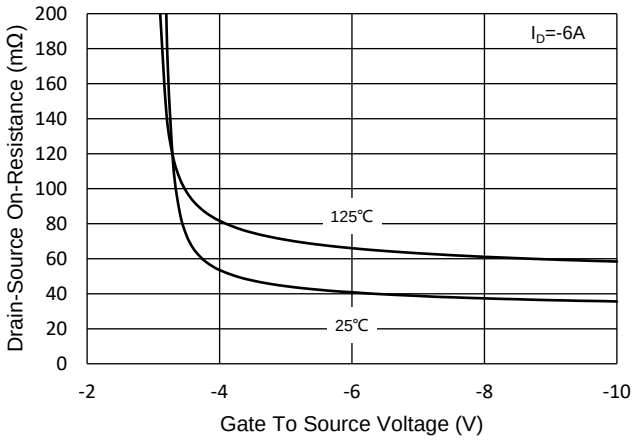



**Fig.4 - $R_{DS(ON)}$ - $I_D$**

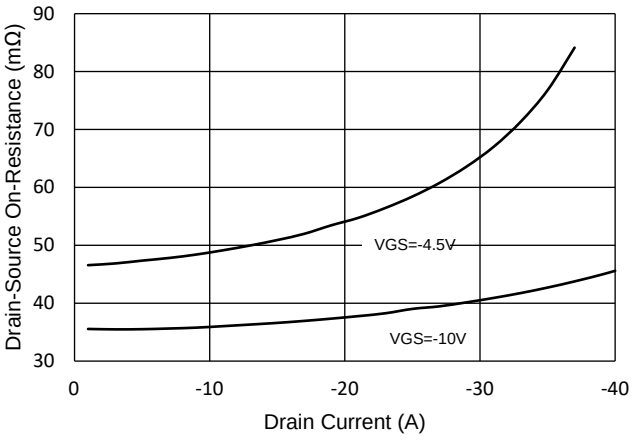



**Fig.5 - Capacitance Characteristics**

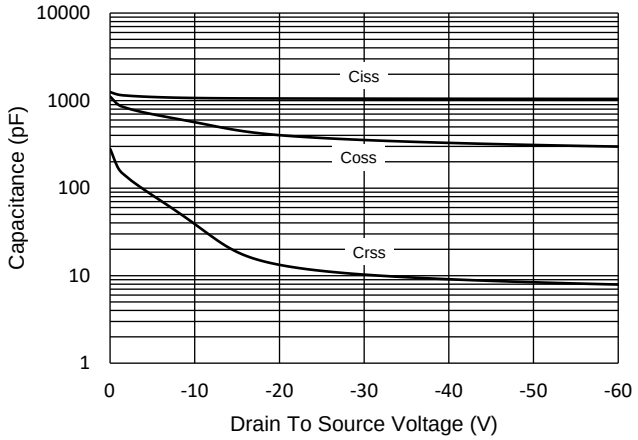
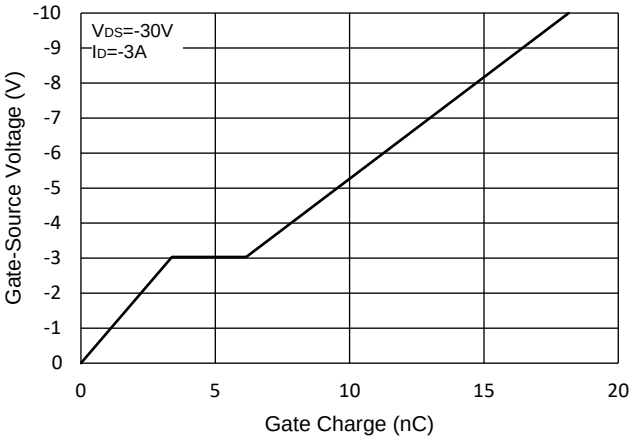



**Fig.6 - Gate Charge**



## Curve Characteristics

**Fig.7 - Normalized Threshold Voltage**

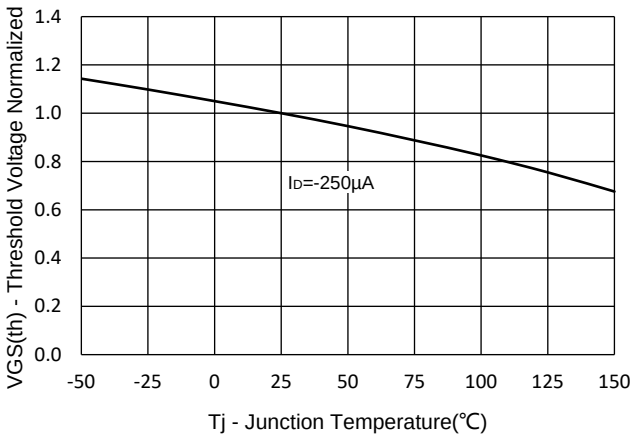



**Fig.8 - Normalized On Resistance Characteristics**

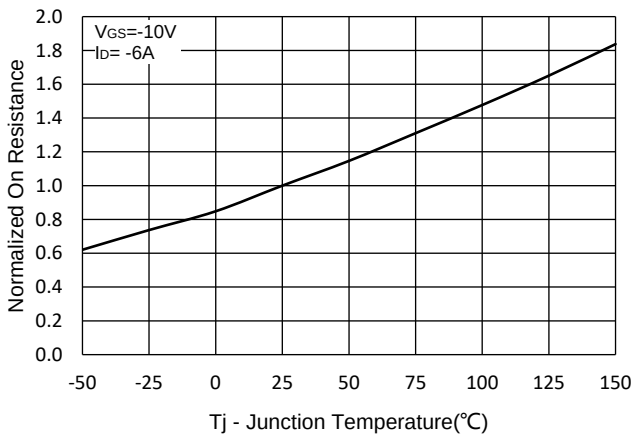



**Fig.9 - $I_S$ - $V_{SD}$**

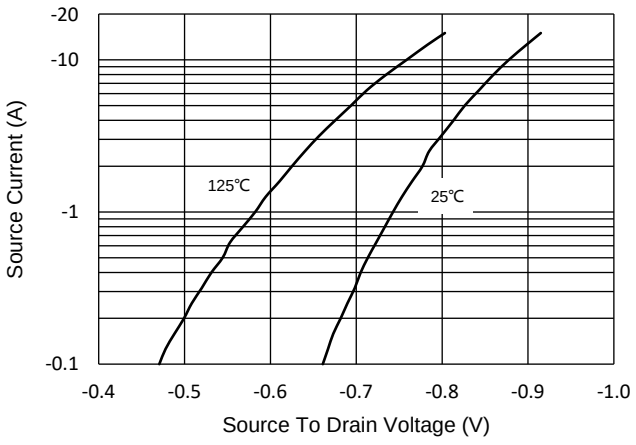



**Fig.10 - Drain Current**

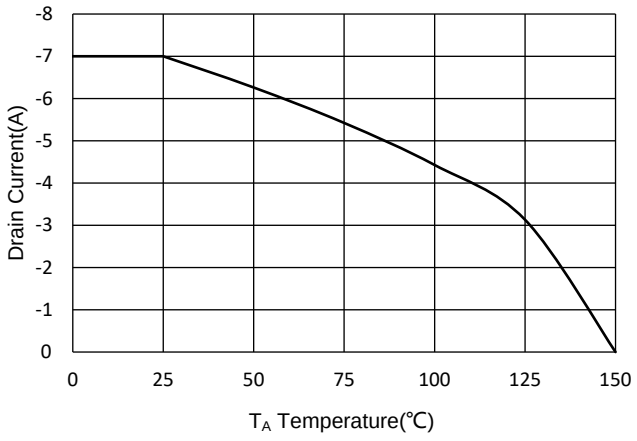
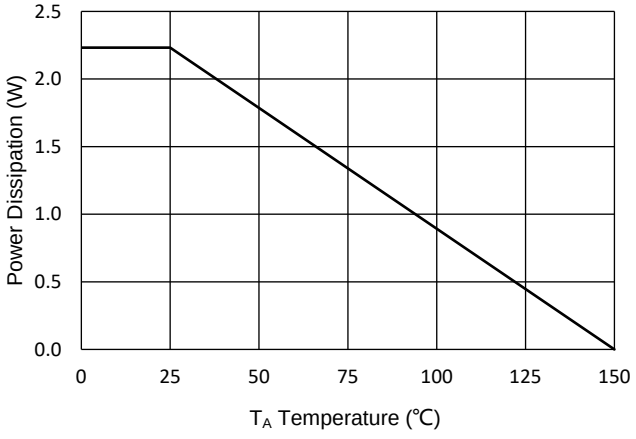



**Fig.11 - PD Dissipation**



## Curve Characteristics

**Fig.12 - Safe Operation Area**

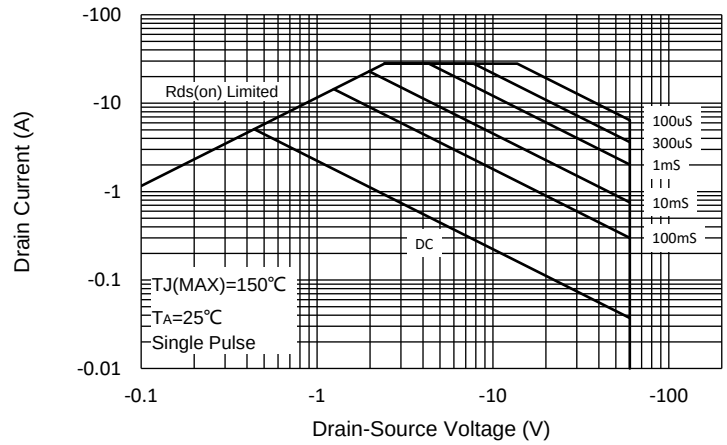
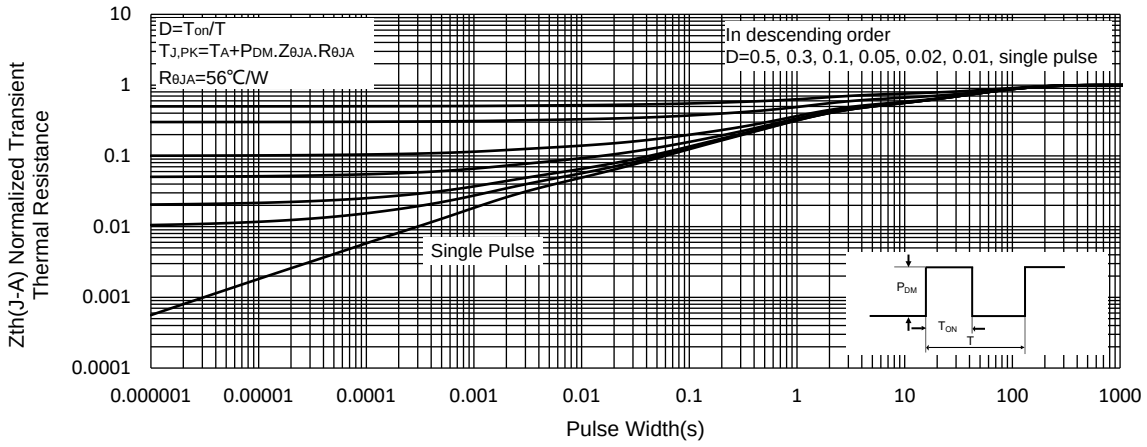



**Fig.13 - Normalized Transient Thermal Impedance**



## Ordering Information

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


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