# P-Channel Power MOSFET

## Features

- Advanced Trench MOSFET Process Technology
- Epoxy Meets UL 94 V-0 Flammability Rating
- Moisture Sensitivity Level 1
- Halogen Free Available Upon Request By Adding Suffix "-HF"
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

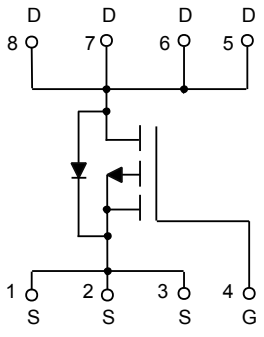
## Maximum Ratings

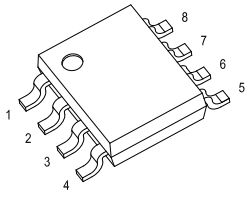
- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 89°C/W Junction to Ambient

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Drain -Source Voltage | $V_{DS}$ | -30 | V |
| Gate -Source Voltage | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous | $I_D$ | -9.1 | A |
| Drain Current-Pulsed | $I_{DM}$ | -36 | A |
| Power Dissipation | $P_D$ | 1.4 | W |
| Single Pulsed Avalanche Energy (Note1) | $E_{AS}$ | 20 | mJ |

Note:
1.EAS condition: $V_{DD}$=-50V,L=0.5mH, $R_G$=25Ω, Starting $T_J$ = 25°C

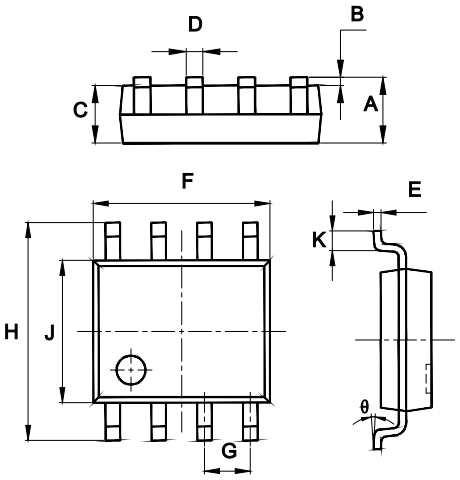
## Internal Structure



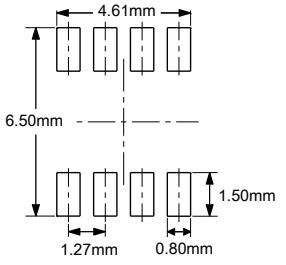

**Marking:Q4435**

## 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 (Ta=25℃ 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 | -30 | | | V |
| Gate-Threshold Voltage(Note1) | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=-250μA | -1.0 | -1.5 | -3.0 | V |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=± 20V, $V_{DS}$=0V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-30V, $V_{GS}$=0V | | | -1 | μA |
| Drain-Source On-Resistance(Note1) | $R_{DS(on)}$ | $V_{GS}$=-10V, $I_D$=-9.1A | | 14 | 24 | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-6.9A | | 23 | 35 | |
| Forward Transconductance(Note1) | $g_{FS}$ | $V_{DS}$=-10V, $I_D$=-9.1A | 20 | | | S |
| **Dynamic Characteristics(Note2)** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=-15V,$V_{GS}$=0V, f=1MHz | | 1350 | | pF |
| Output Capacitance | $C_{oss}$ | | | 215 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 185 | | |
| **Switching Characteristics(Note2)** | | | | | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$=-15V,$I_D$=-1.0A,$V_{GS}$=-10V , $R_{GEN}$=1Ω,, $R_L$=15Ω | | | 15 | nS |
| Turn-On Rise Time | $t_r$ | | | | 15 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | | 70 | |
| Turn-Off Fall Time | $t_f$ | | | | 25 | |
| Gate Resistance | $R_g$ | $V_{DS}$=0V,$V_{GS}$=0V, f=1MHz | | 5.8 | | Ω |
| Total Gate Charge | $Q_g$ | $V_{DS}$=-15V, $I_D$=-9.1A,$V_{GS}$=-10V | | | 50 | nC |
| | | $V_{DS}$=-15V, $I_D$=-9.1A,$V_{GS}$=-4.5V | | | 25 | |
| Gate-Source Charge | $Q_{gs}$ | | | 4.0 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 7.5 | | |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage(Note1) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=-2A | | | -1.2 | V |
| Continuous Drain-Source Diode Forward Current | $I_S$ | | | | -9.1 | A |
| Pulsed Drain-Source Diode Forward Current | $I_{SM}$ | | | | -36 | A |

Note:
1.Pulse Test : Pulse Width≤300μs, duty cycle ≤2%.
2.Guaranteed by design, not subject to production testing.

## Curve Characteristics

Fig. 1 - Output Characteristics

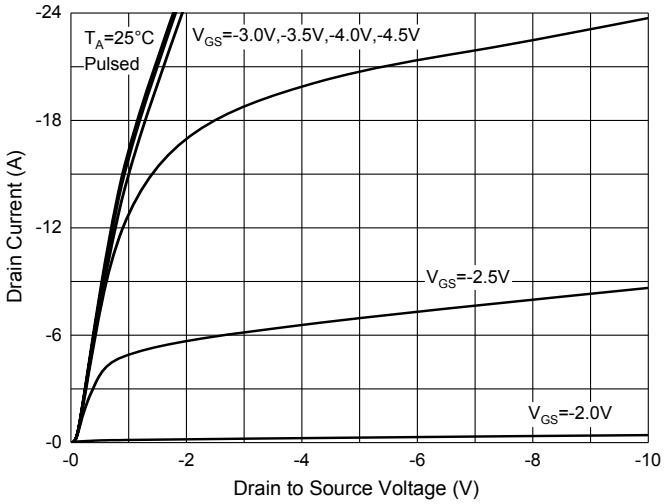



Fig. 2 - Transfer Characteristics

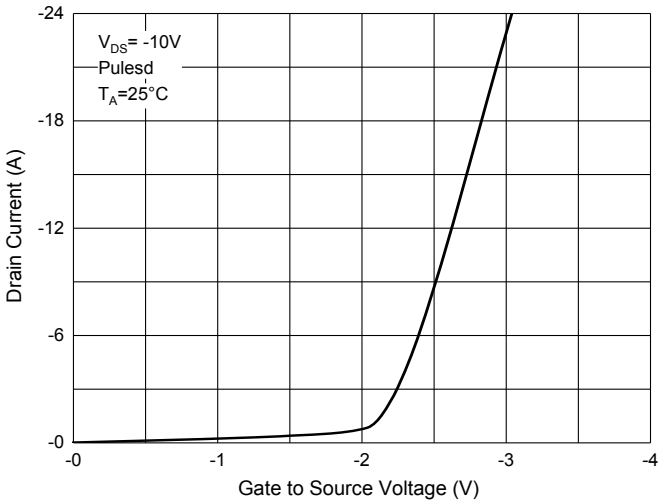



Fig. 3 - $R_{DS(ON)}$—$I_D$

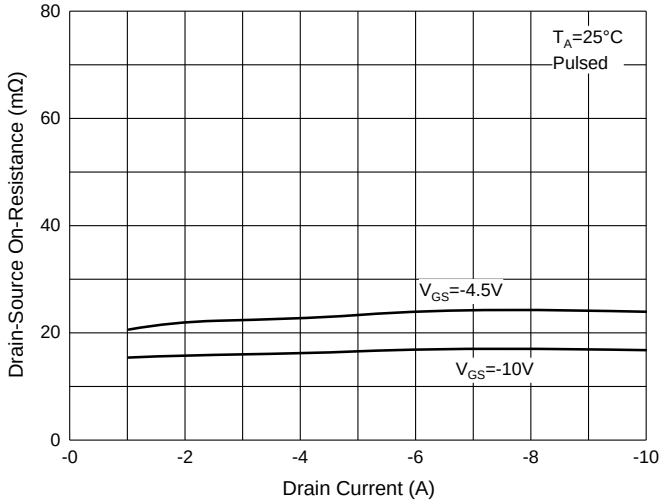



Fig. 4 - $R_{DS(ON)}$—$V_{GS}$

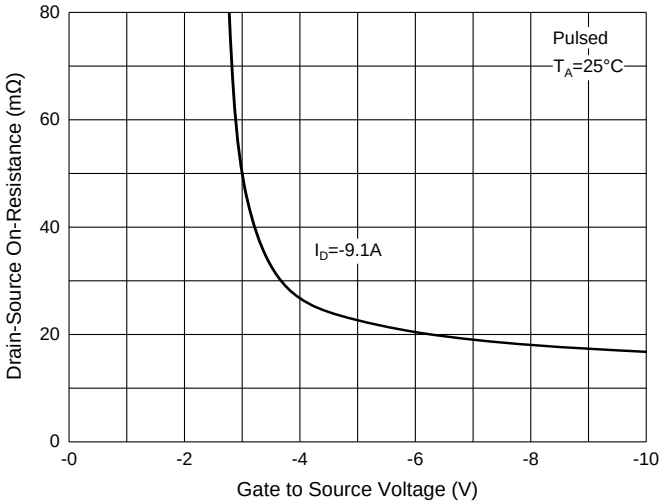



Fig. 5 - Threshold Voltage

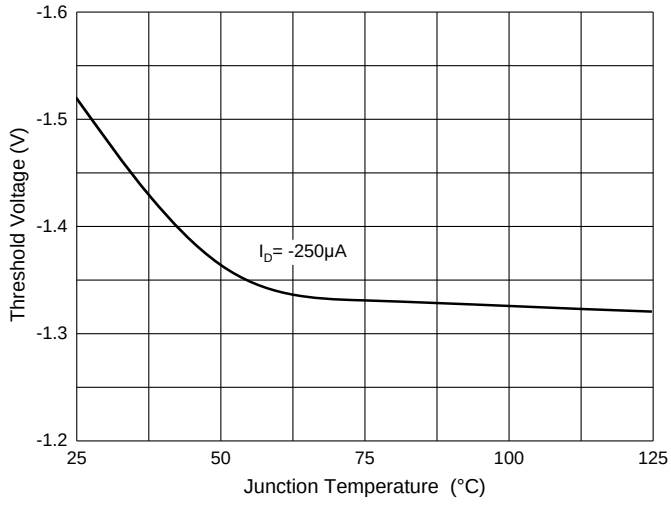
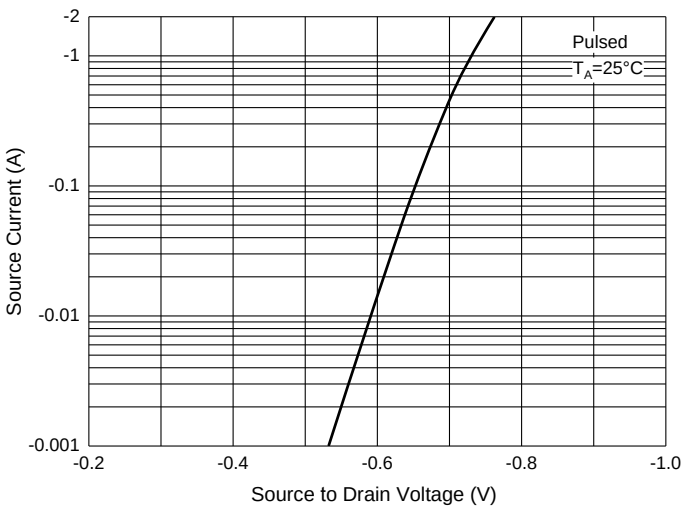



Fig. 6 - $I_S$—$V_{SD}$



## Ordering Information

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

Note : Adding "-HF" Suffix For Halogen Free, eg. Part Number-TP-HF


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