

## Features

- 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

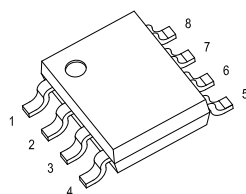
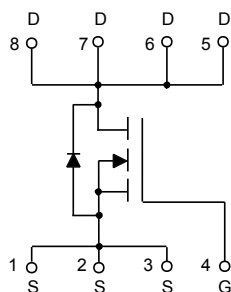
- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 89°C/W Junction to Ambient

| Parameter                                         | Symbol   | Rating   | Unit |
|---------------------------------------------------|----------|----------|------|
| Drain -Source Voltage                             | $V_{DS}$ | 30       | V    |
| Gate -Source Voltage                              | $V_{GS}$ | $\pm 20$ | V    |
| Drain Current-Continuous                          | $I_D$    | 10       | A    |
| Single Pulsed Avalanche Energy <sup>(Note1)</sup> | $E_{AS}$ | 105      | mJ   |
| Pulsed Drain Current                              | $I_{DM}$ | 40       | A    |
| Power Dissipation                                 | $P_D$    | 1.4      | W    |

### Notes :

1.  $E_{AS}$  condition:  $V_{DD}=50V, L=0.5mH, R_G=25\Omega$ , Starting  $T_J = 25^\circ C$

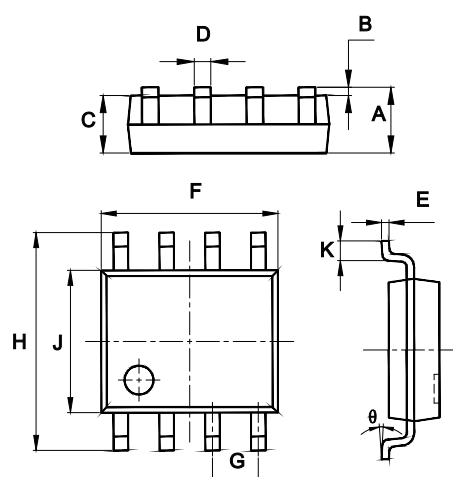
## Internal Structure



Marking: Q4406

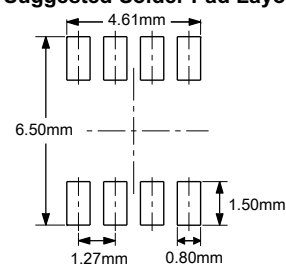
# N-Channel Enhancement Mode Field Effect Transistor

## 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 |      |
| $\theta$ | 0°     | 8°    | 0°    | 8°   |      |

### Suggested Solder Pad Layout



**ELECTRICAL CHARACTERISTICS (Ta=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-Threshold Voltage <sup>(Note1)</sup>     | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                                       | 1.0 | 1.5  | 3.0  | V    |
| Gate-Body Leakage Current                     | I <sub>GSS</sub>     | V <sub>GS</sub> =± 20V, V <sub>DS</sub> =0V                                                                    |     |      | ±100 | nA   |
| Zero Gate Voltage Drain Current               | I <sub>DSS</sub>     | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V                                                                      |     |      | 1    | μA   |
| Drain-Source On-Resistance <sup>(Note1)</sup> | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =12A                                                                      |     | 7.6  | 12   | mΩ   |
|                                               |                      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A                                                                     |     | 11   | 16   |      |
| Forward Transconductance                      | g <sub>FS</sub>      | V <sub>DS</sub> =5V, I <sub>D</sub> =10A                                                                       | 15  |      |      | S    |
| Dynamic Characteristics <sup>(Note2)</sup>    |                      |                                                                                                                |     |      |      |      |
| Input Capacitance                             | C <sub>iss</sub>     | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz                                                              |     | 1550 |      | pF   |
| Output Capacitance                            | C <sub>oss</sub>     |                                                                                                                |     | 300  |      |      |
| Reverse Transfer Capacitance                  | C <sub>rss</sub>     |                                                                                                                |     | 180  |      |      |
| Switching Characteristics <sup>(Note2)</sup>  |                      |                                                                                                                |     |      |      |      |
| Turn-On Delay Time                            | t <sub>d(on)</sub>   | V <sub>DD</sub> =25V, V <sub>GS</sub> =10V, I <sub>D</sub> =1A ,<br>R <sub>GEN</sub> =6Ω, R <sub>L</sub> =6.7Ω |     | 30   |      | ns   |
| Turn-On Rise Time                             | t <sub>r</sub>       |                                                                                                                |     | 20   |      |      |
| Turn-Off Delay Time                           | t <sub>d(off)</sub>  |                                                                                                                |     | 100  |      |      |
| Turn-Off Fall Time                            | t <sub>f</sub>       |                                                                                                                |     | 80   |      |      |
| Total Gate Charge                             | Q <sub>g</sub>       | V <sub>DS</sub> =15V, I <sub>D</sub> =10A, V <sub>GS</sub> =5.0V                                               |     | 13   |      | nC   |
| Gate-Source Charge                            | Q <sub>gs</sub>      |                                                                                                                |     | 5.5  |      |      |
| Gate-Drain Charge                             | Q <sub>gd</sub>      |                                                                                                                |     | 3.5  |      |      |
| Source-Drain Diode characteristics            |                      |                                                                                                                |     |      |      |      |
| Drain-Source Diode Forward Current            | I <sub>S</sub>       |                                                                                                                |     |      | 10   | A    |
| Diode Forward voltage <sup>(Note1)</sup>      | V <sub>SD</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =10A                                                                       |     |      | 1.2  | V    |
| Pulsed drain-source diode forward current     | I <sub>SM</sub>      |                                                                                                                |     |      | 40   | A    |

Notes:

- 1.Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
- 2.Guaranteed by design, not subject to production testing.

## Curve Characteristics

Fig. 1 - Output Characteristics

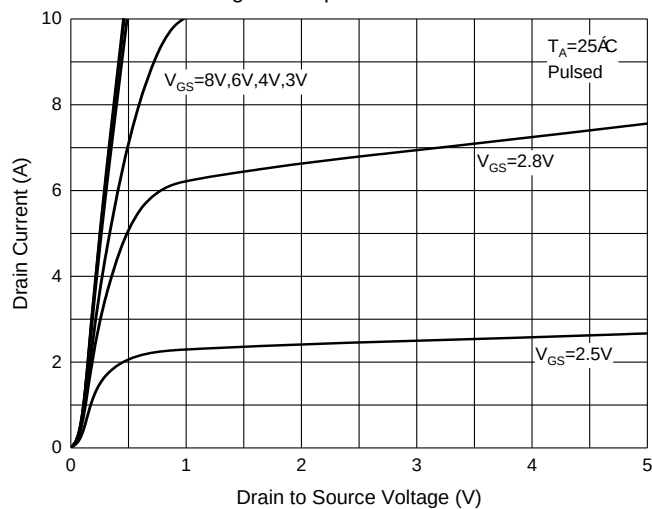


Fig. 2 - Transfer Characteristics

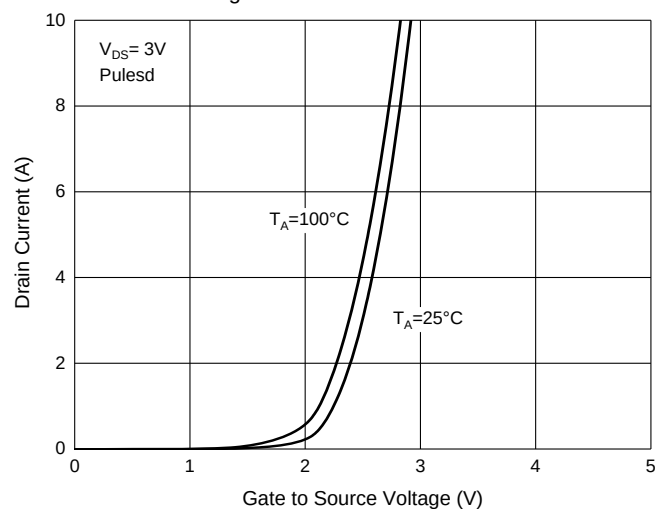


Fig. 3 -  $R_{DS(ON)} - I_D$

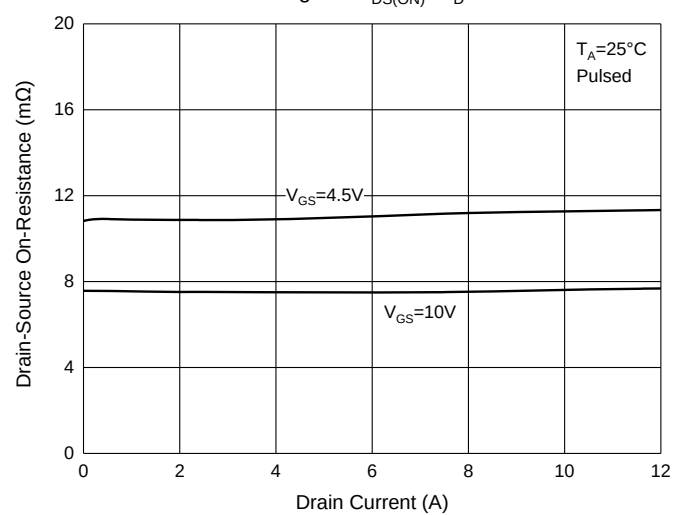


Fig. 4 -  $R_{DS(ON)} - V_{GS}$

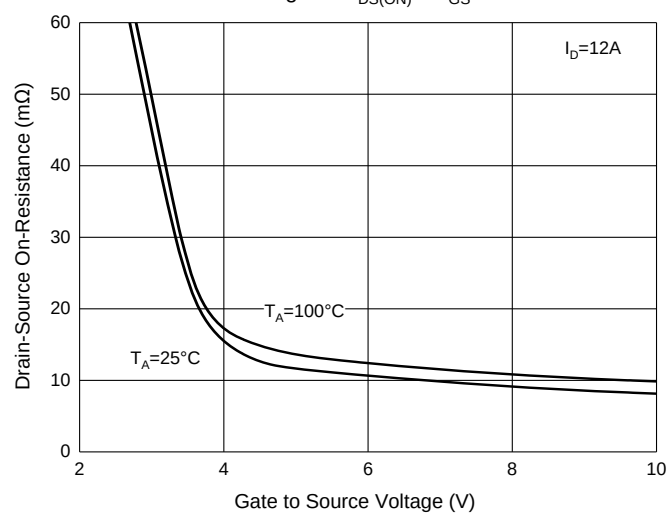


Fig. 5 -  $I_S - V_{SD}$

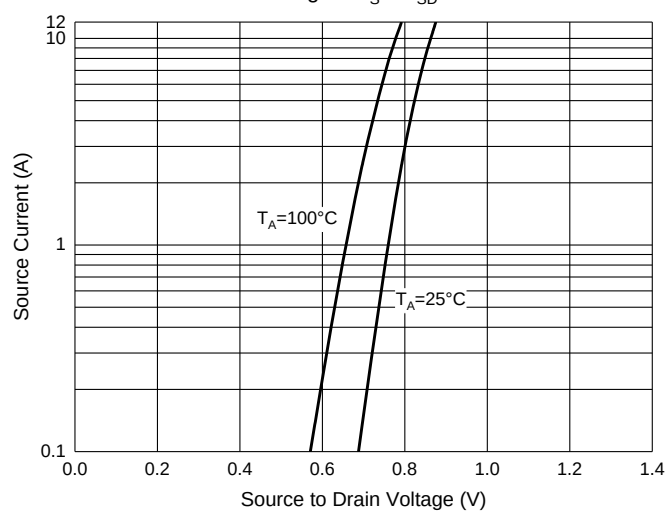
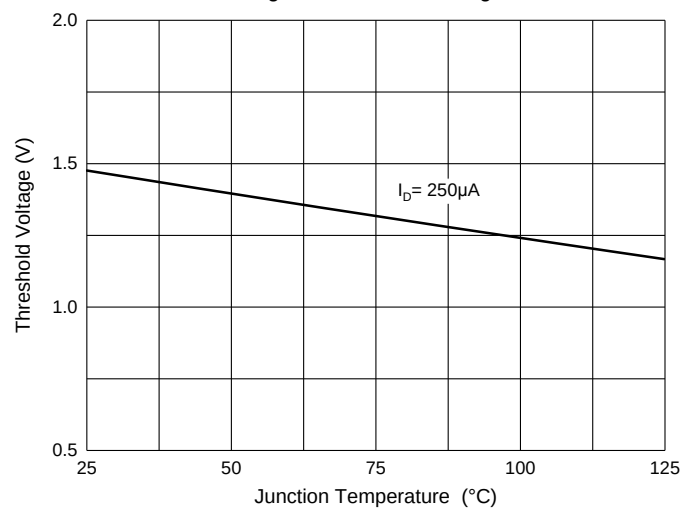


Fig. 6 - Threshold Voltage



# 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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