



Micro Commercial Components



Micro Commercial Components  
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## MCQ4503

### Features

- Halogen free available upon request by adding suffix "-HF"
- Lead Free Finish/Rohs Compliant ("P" Suffix designates RoHS Compliant. See ordering information)
- Epoxy meets UL 94 V-0 flammability rating
- Moisture Sensitivity Level 1
- Marking: Q4503

### N and P-Channel Enhancement Mode Field Effect Transistor

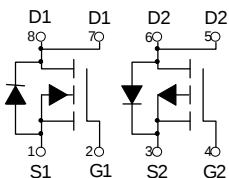
#### Maximum ratings ( $T_a=25^\circ\text{C}$ unless otherwise noted)

| Parameter                                                                             | Symbol           | N-Channel  | P-Channel  | Unit |
|---------------------------------------------------------------------------------------|------------------|------------|------------|------|
| Drain-Source Voltage                                                                  | V <sub>DS</sub>  | 30         | -30        | V    |
| Gate-Source Voltage                                                                   | V <sub>GS</sub>  | ±20        | ±20        | V    |
| Continuous Drain Current <sup>a</sup><br>T <sub>a</sub> =25°C<br>T <sub>a</sub> =70°C | I <sub>D</sub>   | 6.9<br>5.5 | -6.3<br>-5 | A    |
| Pulsed Drain Current <sup>b</sup>                                                     | I <sub>DM</sub>  | 20         | -20        | A    |
| Power Dissipation                                                                     | P <sub>D</sub>   | 1.4        |            | W    |
| Thermal Resistance from Junction to Ambient                                           | R <sub>θJA</sub> | 89         |            | °C/W |
| Operating Junction Temperature                                                        | T <sub>J</sub>   | 150        |            | °C   |
| Storage Temperature                                                                   | T <sub>STG</sub> | -55 ~+150  |            |      |

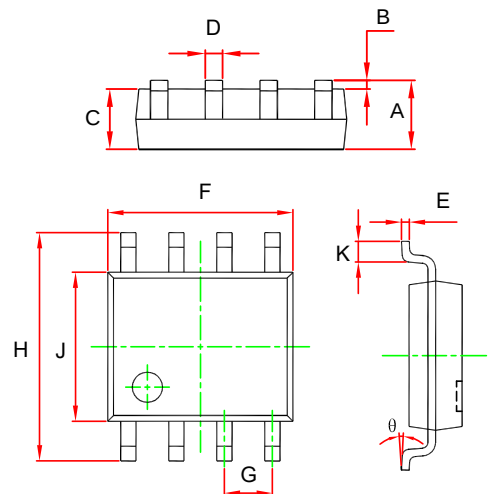
#### Notes :

- a. These tests are performed with infinite heat sink.  
b. Pulse width by Max. junction temperature.

#### Equivalent Circuit



### SOP-8



| DIM      | INCHES |       | MM    |       | NOTE |
|----------|--------|-------|-------|-------|------|
|          | MIN    | MAX   | MIN   | MAX   |      |
| A        | 0.053  | 0.069 | 1.350 | 1.750 |      |
| B        | 0.004  | 0.010 | 0.100 | 0.250 |      |
| C        | 0.053  | 0.061 | 1.350 | 1.550 |      |
| D        | 0.013  | 0.020 | 0.330 | 0.510 |      |
| E        | 0.007  | 0.010 | 0.170 | 0.250 |      |
| F        | 0.189  | 0.197 | 4.800 | 5.000 |      |
| G        | 0.050  | (BSC) | 1.270 | (BSC) |      |
| H        | 0.228  | 0.244 | 5.800 | 6.200 |      |
| J        | 0.150  | 0.157 | 3.800 | 4.000 |      |
| K        | 0.016  | 0.050 | 0.400 | 1.270 |      |
| $\theta$ | 0°     | 8°    | 0°    | 8°    |      |

**Electrical characteristics (T<sub>a</sub>=25°C unless otherwise noted)**

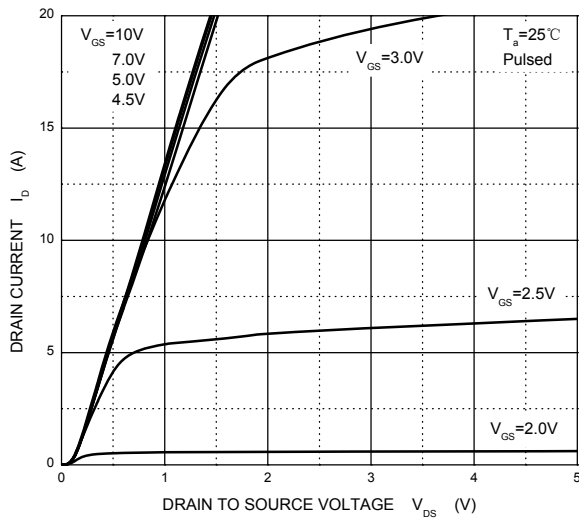
| Parameter                                 | Symbol               | Test Condition                                                                                                             |      | Min | Typ  | Max  | Units |
|-------------------------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------|------|-----|------|------|-------|
| Static                                    |                      |                                                                                                                            |      |     |      |      |       |
| Drain-source breakdown voltage            | V <sub>(BR)DSS</sub> | V <sub>GS</sub> =0, I <sub>D</sub> =250μA                                                                                  | N-Ch | 30  |      |      | V     |
|                                           |                      | V <sub>GS</sub> =0, I <sub>D</sub> =-250μA                                                                                 | P-Ch | -30 |      |      |       |
| Gate-threshold voltage                    | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                                                   | N-Ch | 1   | 1.5  | 3    | V     |
|                                           |                      | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                                                  | P-Ch | -1  | -1.7 | -3   |       |
| Gate-body leakage                         | I <sub>GSS</sub>     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                                                                 | N-Ch |     |      | ±100 | nA    |
|                                           |                      |                                                                                                                            | P-Ch |     |      |      |       |
| Zero gate voltage drain current           | I <sub>DSS</sub>     | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V                                                                                  | N-Ch |     |      | 1    | μA    |
|                                           |                      | V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V                                                                                 | P-Ch |     |      | -1   |       |
| Drain-source on-resistance <sup>c</sup>   | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =6A                                                                                   | N-Ch |     | 10   | 28   | mΩ    |
|                                           |                      | V <sub>GS</sub> =-10V, I <sub>D</sub> =-6A                                                                                 | P-Ch |     | 16   | 36   |       |
|                                           |                      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A                                                                                  | N-Ch |     | 14   | 42   |       |
|                                           |                      | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4A                                                                                | P-Ch |     | 25   | 55   |       |
| Forward transconductance                  | g <sub>fs</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =6A                                                                                   | N-Ch | 4   |      |      | S     |
|                                           |                      | V <sub>DS</sub> =-10V, I <sub>D</sub> =-6A                                                                                 | P-Ch |     |      |      |       |
| Diode forward voltage <sup>c</sup>        | V <sub>SD</sub>      | I <sub>S</sub> =1.7A,V <sub>GS</sub> =0V                                                                                   | N-Ch |     |      | 1.2  | V     |
|                                           |                      | I <sub>S</sub> =-1.7A,V <sub>GS</sub> =0V                                                                                  | P-Ch |     |      | -1.2 |       |
| Dynamic                                   |                      |                                                                                                                            |      |     |      |      |       |
| Total gate charge <sup>c</sup>            | Q <sub>g</sub>       | N-Channel                                                                                                                  | N-Ch |     |      | 13.5 | nC    |
|                                           |                      |                                                                                                                            | P-Ch |     |      | 20   |       |
| Gate-source charge <sup>d</sup>           | Q <sub>gs</sub>      | V <sub>DS</sub> =24V,V <sub>GS</sub> =4.5V,I <sub>D</sub> =6A<br>P-Channel                                                 | N-Ch |     | 1.4  |      |       |
|                                           |                      |                                                                                                                            | P-Ch |     | 2    |      |       |
| Gate-drain charge <sup>d</sup>            | Q <sub>gd</sub>      | V <sub>DS</sub> =-24V,V <sub>GS</sub> =-4.5V,I <sub>D</sub> =-6A                                                           | N-Ch |     | 4.7  |      |       |
|                                           |                      |                                                                                                                            | P-Ch |     | 7    |      |       |
| Turn-on delay time <sup>c</sup>           | t <sub>d(on)</sub>   | N-Channel                                                                                                                  | N-Ch |     | 5    |      | ns    |
|                                           |                      |                                                                                                                            | P-Ch |     | 8    |      |       |
| Rise time <sup>d</sup>                    | t <sub>r</sub>       | V <sub>DS</sub> =20V,R <sub>D</sub> =20Ω, I <sub>D</sub> =1A,<br>V <sub>GS</sub> =10V,R <sub>G</sub> =3.3Ω                 | N-Ch |     | 8    |      |       |
|                                           |                      |                                                                                                                            | P-Ch |     | 7    |      |       |
| Turn-off delay time <sup>d</sup>          | t <sub>d(off)</sub>  | P-Channel<br>V <sub>DS</sub> =-15V,R <sub>D</sub> =15Ω, I <sub>D</sub> =-1A,<br>V <sub>GS</sub> =-10V,R <sub>G</sub> =3.3Ω | N-Ch |     | 18.5 |      |       |
|                                           |                      |                                                                                                                            | P-Ch |     | 34   |      |       |
| Fall time <sup>d</sup>                    | t <sub>f</sub>       |                                                                                                                            | N-Ch |     | 9    |      |       |
|                                           |                      |                                                                                                                            | P-Ch |     | 26   |      |       |
| Input Capacitance <sup>d</sup>            | C <sub>iss</sub>     | N-Channel                                                                                                                  | N-Ch |     |      | 770  | pF    |
|                                           |                      |                                                                                                                            | P-Ch |     |      | 1380 |       |
| Output Capacitance <sup>d</sup>           | C <sub>oss</sub>     | V <sub>DS</sub> =25V,V <sub>GS</sub> =0V,f =1MHz<br>P-Channel                                                              | N-Ch |     | 80   |      |       |
|                                           |                      |                                                                                                                            | P-Ch |     | 150  |      |       |
| Reverse Transfer Capacitance <sup>d</sup> | C <sub>rss</sub>     | V <sub>DS</sub> =-25V,V <sub>GS</sub> =0V,f =1MHz                                                                          | N-Ch |     | 75   |      |       |
|                                           |                      |                                                                                                                            | P-Ch |     | 140  |      |       |

**Notes :**

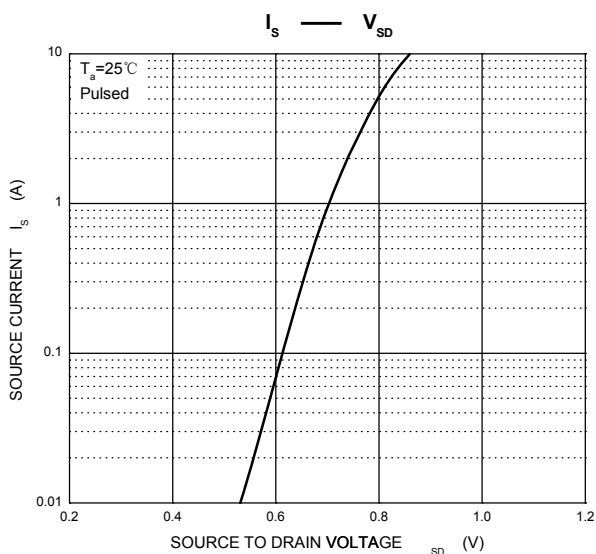
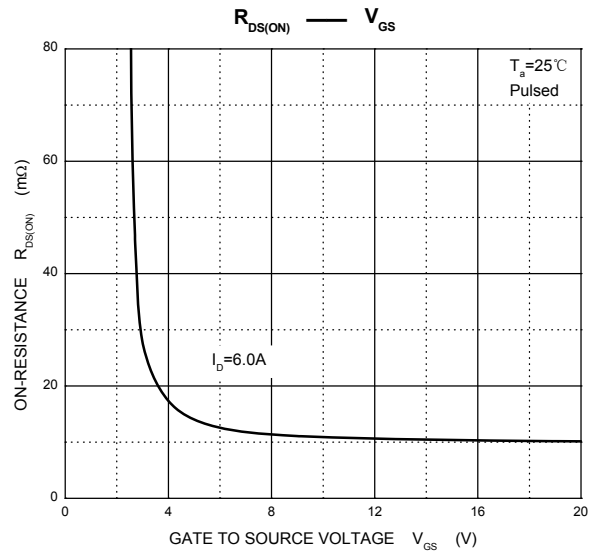
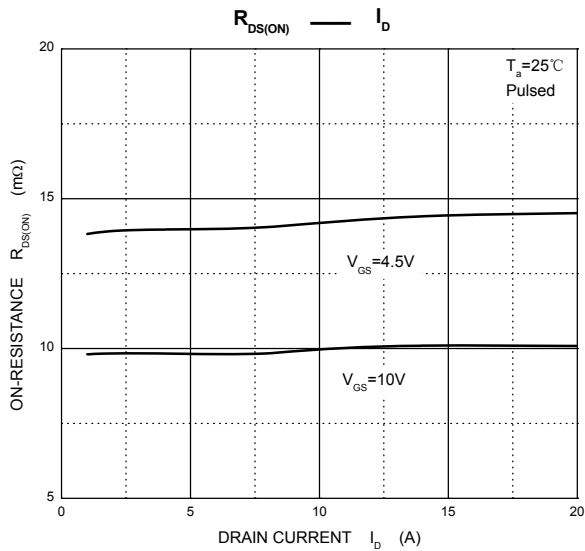
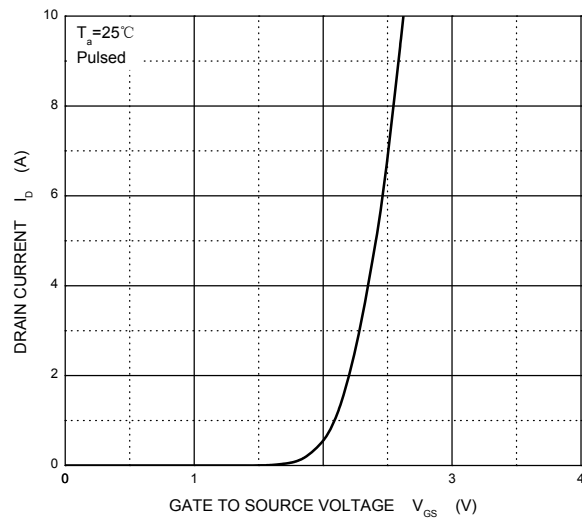
- c. Pulse Test : Pulse width≤300μs, duty cycle ≤2%.
- d. Guaranteed by design, not subject to production testing.

## Typical Characteristics

Output Characteristics

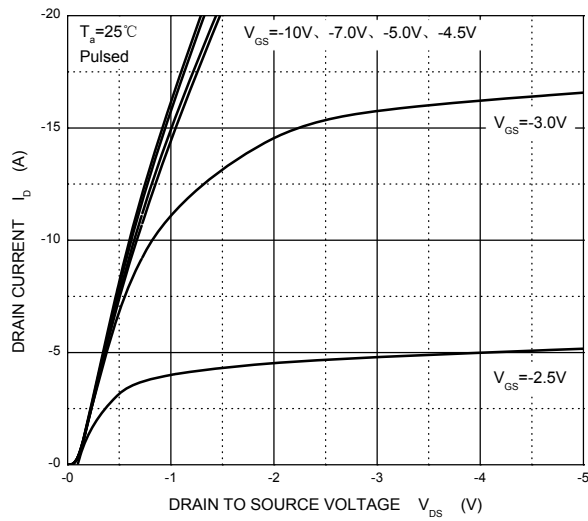


Transfer Characteristics

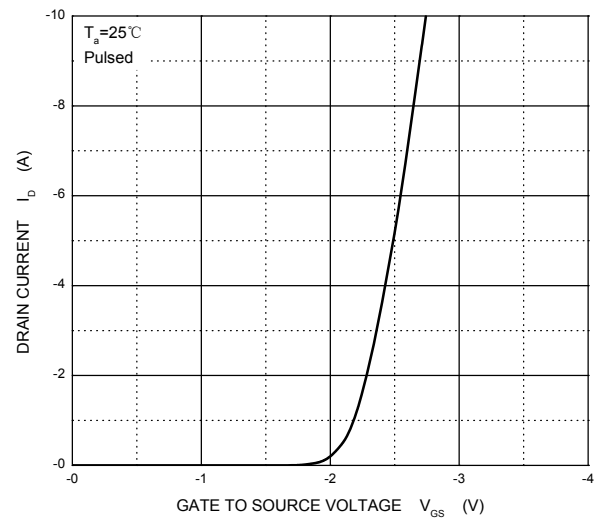


## Typical Characteristics

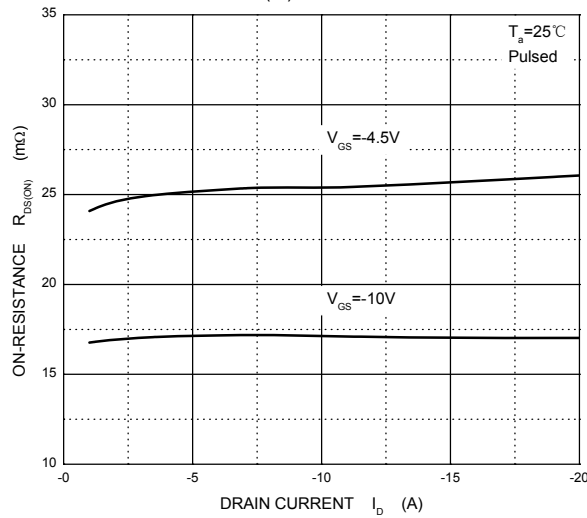
Output Characteristics



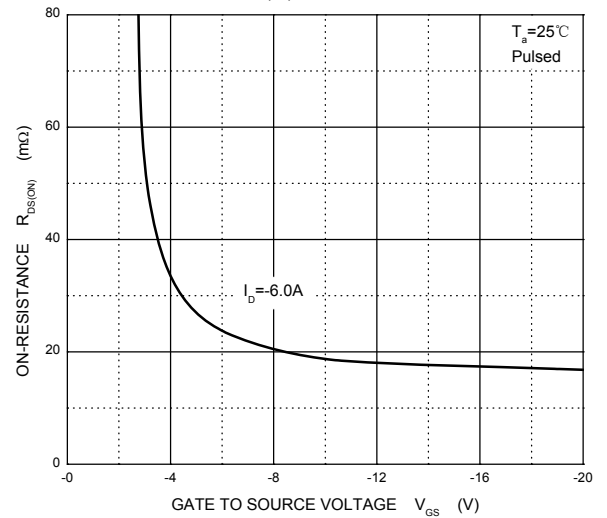
Transfer Characteristics



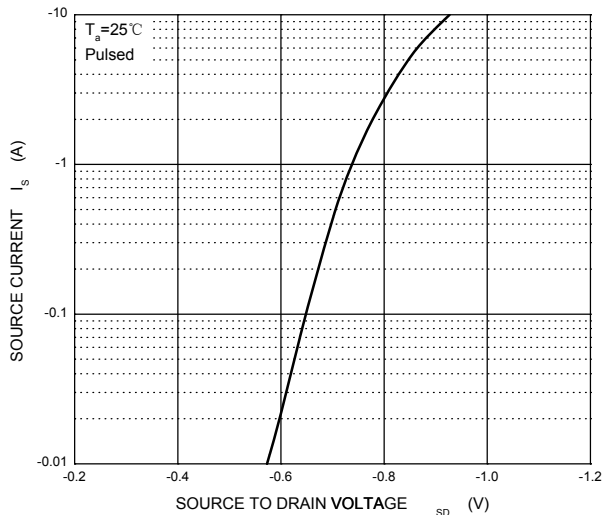
$R_{DS(ON)}$  —  $I_D$



$R_{DS(ON)}$  —  $V_{GS}$



$I_S$  —  $V_{SD}$





## 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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