

### Features

- High Density Cell Design for Ultra Low  $R_{DS(on)}$
- Fully Characterized Avalanche Voltage and Current
- Excellent Package for Good Heat Dissipation
- Special Process Technology for High ESD Capability
- 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)

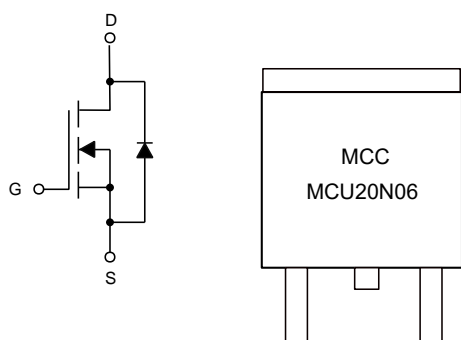
### Maximum Ratings

- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 100°C/W Junction to Ambient

| Parameter                              | Symbol   | Rating | Unit |
|--|----------|--------|------|
| Drain-Source Voltage                   | $V_{DS}$ | 60     | V    |
| Gate-Source Voltage                    | $V_{GS}$ | ±20    | V    |
| Continuous Drain Current               | $I_D$    | 20     | A    |
| Pulsed Drain Current                   | $I_{DM}$ | 60     | A    |
| Single Pulse Avalanche Energy (Note 1) | $E_{AS}$ | 72     | mJ   |

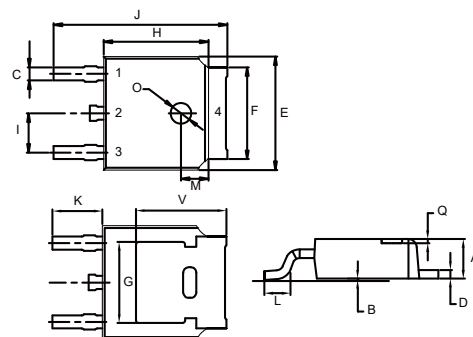
Note: 1.  $V_{DD}=30V$ ,  $L=0.5mH$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ C$ .

⊠hYfbU`Glf i Wi fY`UbX`A Uf\_]b[ `7 cXY



## N-CHANNEL MOSFET

### DPAK(TO-252)



1. Gate
- 2,4. Drain
3. Source

| DIM | DIMENSIONS |       |      |       | NOTE |
|-----|------------|-------|------|-------|------|
|     | INCHES     |       | MM   |       |      |
|     | MIN        | MAX   | MIN  | MAX   |      |
| A   | 0.087      | 0.094 | 2.20 | 2.40  |      |
| B   | 0.000      | 0.005 | 0.00 | 0.13  |      |
| C   | 0.026      | 0.034 | 0.66 | 0.86  |      |
| D   | 0.018      | 0.023 | 0.46 | 0.58  |      |
| E   | 0.256      | 0.264 | 6.50 | 6.70  |      |
| F   | 0.201      | 0.215 | 5.10 | 5.46  |      |
| G   | 0.190      |       | 4.83 |       | TYP. |
| H   | 0.236      | 0.244 | 6.00 | 6.20  |      |
| I   | 0.086      | 0.094 | 2.18 | 2.39  |      |
| J   | 0.386      | 0.409 | 9.80 | 10.40 |      |
| K   | 0.114      |       | 2.90 |       | TYP. |
| L   | 0.055      | 0.067 | 1.40 | 1.70  |      |
| M   | 0.063      |       | 1.60 |       | TYP. |
| O   | 0.043      | 0.051 | 1.10 | 1.30  |      |
| Q   | 0.000      | 0.012 | 0.00 | 0.30  |      |
| V   | 0.211      |       | 5.35 |       | TYP. |

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

| Parameter   | Symbol        | Test Conditions                               | Min | Typ  | Max       | Unit       |
|---|---------------|---|-----|------|-----------|------------|
| <b>Static Characteristics</b>                     |               |   |     |      |           |            |
| Drain-Source Breakdown Voltage                    | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$                     | 60  |      |           | V          |
| Gate-Source Leakage Current                       | $I_{GSS}$     | $V_{DS}=0V, V_{GS}=\pm 20V$                   |     |      | $\pm 100$ | nA         |
| Zero Gate Voltage Drain Current                   | $I_{DSS}$     | $V_{DS}=60V, V_{GS}=0V$                       |     |      | 1         | $\mu A$    |
| Gate-Threshold Voltage <sup>(Note 2)</sup>        | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=250\mu A$                 | 1   | 2    | 3         | V          |
| Drain-Source On-Resistance <sup>(Note 2)</sup>    | $R_{DS(on)}$  | $V_{GS}=10V, I_D=20A$                         |     | 37   | 45        | m $\Omega$ |
| <b>Dynamic Characteristics<sup>(Note 3)</sup></b> |               |   |     |      |           |            |
| Input Capacitance                                 | $C_{iss}$     | $V_{DS}=30V, V_{GS}=0V, f=1MHz$               |     | 500  |           | pF         |
| Output Capacitance                                | $C_{oss}$     |   |     | 60   |           |            |
| Reverse Transfer Capacitance                      | $C_{rss}$     |   |     | 25   |           |            |
| Total Gate Charge                                 | $Q_g$         | $V_{DS}=48V, V_{GS}=10V, I_D=15A$             |     | 12   |           | nC         |
| Gate-Source Charge                                | $Q_{gs}$      |   |     | 4.1  |           |            |
| Gate-Drain Charge                                 | $Q_{gd}$      |   |     | 4.5  |           |            |
| Turn-On Delay Time                                | $t_{d(on)}$   | $V_{DD}=30V, R_G=3\Omega, I_D=2A, V_{GS}=10V$ |     | 5    |           | ns         |
| Turn-On Rise Time                                 | $t_r$         |   |     | 2.6  |           |            |
| Turn-Off Delay Time                               | $t_{d(off)}$  |   |     | 16.1 |           |            |
| Turn-Off Fall Time                                | $t_f$         |   |     | 2.3  |           |            |
| <b>Drain-Source Body Diode Characteristics</b>    |               |   |     |      |           |            |
| Continuous Body Diode Current                     | $I_S$         |   |     |      | 20        | A          |
| Pulsed Diode Forward Current                      | $I_{SM}$      |   |     |      | 60        |            |
| Body Diode Voltage                                | $V_{SD}$      | $I_S=20A, V_{GS}=0V$                          |     |      | 1.2       | V          |

Note 2. Pulse Test : Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .

3. Guaranteed by Design, Not Subject to Production Testing.

Curve Characteristics

Fig. 1 - Output Characteristics

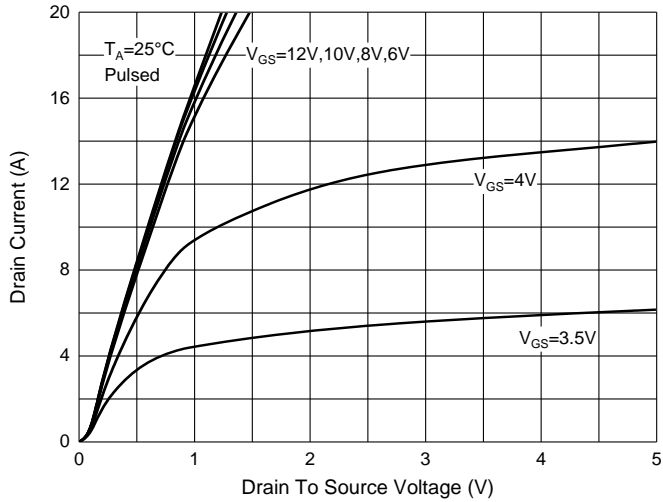


Fig. 2 - Transfer Characteristics

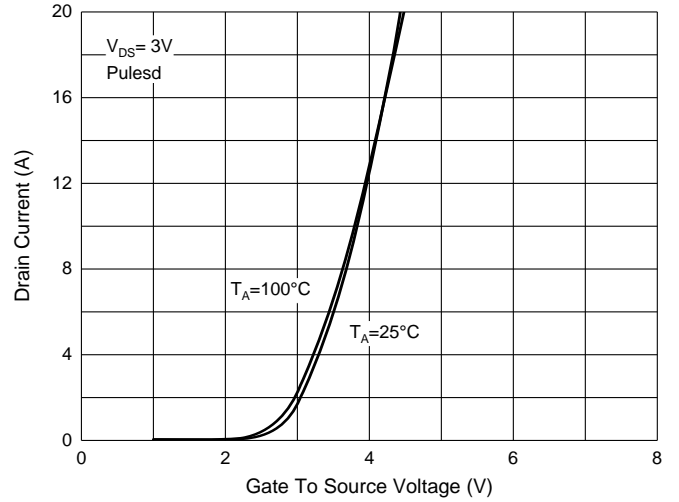


Fig. 3 -  $R_{DS(ON)} - I_D$

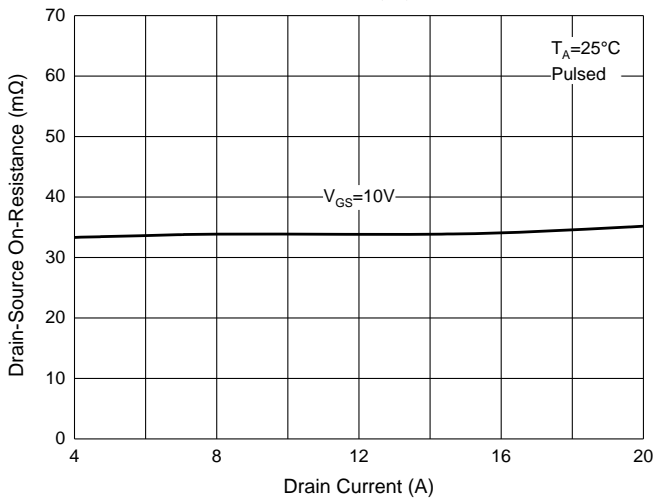


Fig. 4 -  $R_{DS(ON)} - V_{GS}$

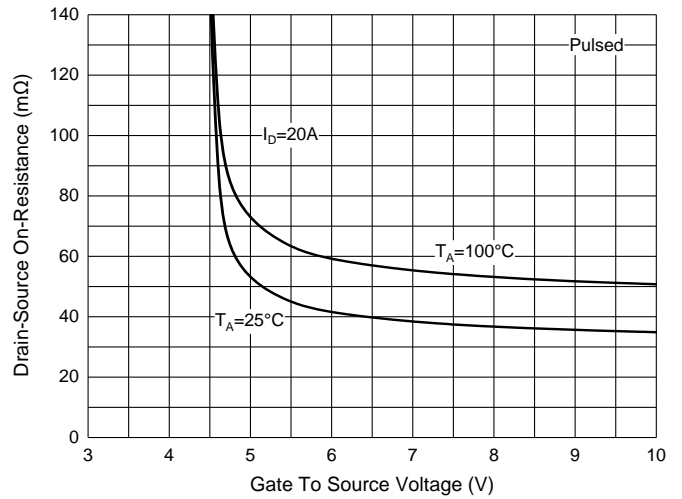


Fig. 5 -  $I_S - V_{SD}$

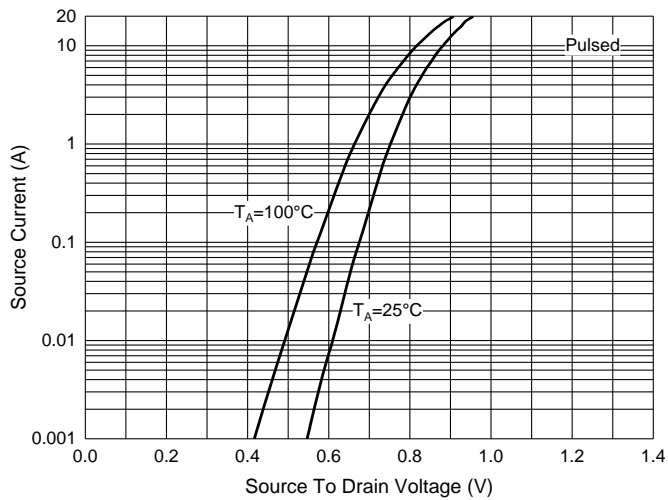
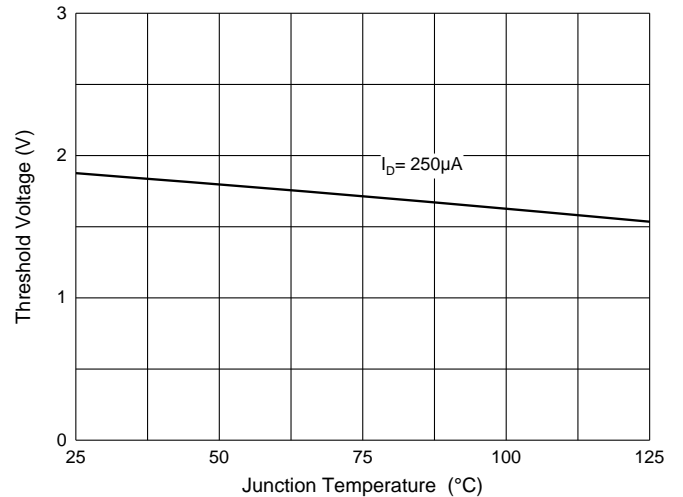


Fig. 6 - Threshold Voltage



## Ordering Information

| Device         | Packing                 |
|----------------|-------------------------|
| Part Number-TP | Tape&Reel: 2.5Kpcs/Reel |

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

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