

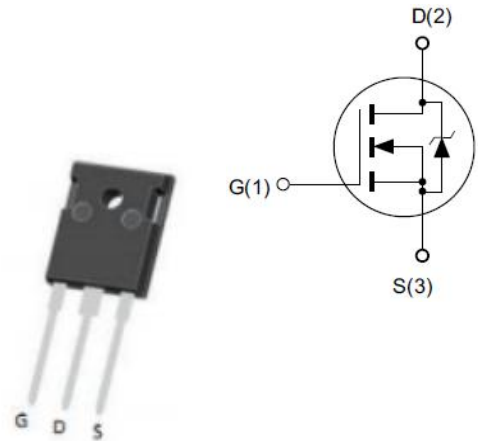
### Features

- ◆ 500V, 25A,  $R_{DS(ON)}(Typ.) = 0.18\Omega @ V_{GS} = 10V$ .
- ◆ Low  $C_{rss}$
- ◆ Fast Switching
- ◆ 100% Avalanche Tested

### Application

- ◆ Adaptor
- ◆ Standby Power
- ◆ Switching power supply
- ◆ LED Power

TO-247



### Absolute Maximum Ratings $T_c = 25^\circ \text{C}$ unless otherwise noted

| Symbol         | Parameter                                             | Rating          | Unit              |
|----------------|-------------------------------------------------------|-----------------|-------------------|
| $V_{DS}$       | Drain-Source Voltage <sup>a</sup>                     | 500             | V                 |
| $V_{GS}$       | Gate-Source Voltage                                   | $\pm 30$        | V                 |
| $I_D$          | Drain Current-Continuous, $T_c = 25^\circ \text{C}$   | 25              | A                 |
|                | Drain Current-Continuous, $T_c = 100^\circ \text{C}$  | 15.7            | A                 |
| $I_{DM}$       | Drain Current-Pulsed <sup>b</sup>                     | 100             | A                 |
| $P_D$          | Maximum Power Dissipation @ $T_J = 25^\circ \text{C}$ | 300             | W                 |
| $dv/dt$        | Peak Diode Recovery $dv/dt$ <sup>c</sup>              | 5.0             | V/ns              |
| $E_{AS}$       | Single Pulsed Avalanche Energy <sup>d</sup>           | 1445            | mJ                |
| $T_J, T_{STG}$ | Operating and Store Temperature Range                 | 150, -55 to 150 | $^\circ \text{C}$ |

### Thermal Characteristics

| Symbol          | Parameter                               | Value | Unit                |
|-----------------|-----------------------------------------|-------|---------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case    | 0.42  | $^\circ \text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 40    | $^\circ \text{C/W}$ |

### Electrical Characteristics $T_J = 25^\circ \text{C}$ unless otherwise noted

#### ■ Off Characteristics

| Symbol       | Parameter                         | Test Condition                    | Min. | Typ. | Max.      | Unit    |
|--------------|-----------------------------------|-----------------------------------|------|------|-----------|---------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage    | $V_{GS} = 0V, I_D = 250\mu A$     | 500  | -    | -         | V       |
| $I_{DSS}$    | Zero Gate Voltage Drain Current   | $V_{DS} = 500V, V_{GS} = 0V$      | -    | -    | 1         | $\mu A$ |
| $I_{GSS}$    | Forward Gate Body Leakage Current | $V_{DS} = 0V, V_{GS} = \pm 30V$   | -    | -    | $\pm 100$ | nA      |
| $V_{GS(th)}$ | Gate Threshold Voltage            | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 2    |      | 4         | V       |



# MPQ25N50

## N-Channel Power MOSFET

### ■ On Characteristics

| Symbol       | Parameter                         | Test Condition              | Min. | Typ. | Max. | Unit     |
|--------------|-----------------------------------|-----------------------------|------|------|------|----------|
| $R_{DS(on)}$ | Static Drain-Source On-Resistance | $V_{GS} = 10V, I_D = 12.5A$ | -    | 0.18 | 0.22 | $\Omega$ |
| $g_{fs}$     | Forward Transconductance          | $V_{DS}=15V, I_D=12.5A$     | -    | 18   | -    | S        |

### ■ Dynamic Characteristics

| Symbol    | Parameter                    | Test Condition                                    | Min. | Typ. | Max. | Unit |
|-----------|------------------------------|---------------------------------------------------|------|------|------|------|
| $C_{iss}$ | Input Capacitance            | $V_{DS} = 25V,$<br>$V_{GS} = 0V,$<br>$f = 1.0MHz$ | -    | 3487 | -    | pF   |
| $C_{oss}$ | Output Capacitance           |                                                   | -    | 214  | -    | pF   |
| $C_{rss}$ | Reverse Transfer Capacitance |                                                   | -    | 10   | -    | pF   |

### ■ On Characteristics

| Symbol       | Parameter           | Test Condition                                | Min. | Typ. | Max. | Unit |
|--------------|---------------------|-----------------------------------------------|------|------|------|------|
| $t_{d(on)}$  | Turn-On Delay Time  | $V_{DD} = 250V, I_D = 25A,$<br>$V_{GS}=10V$   | -    | 37.2 | -    | ns   |
| $t_r$        | Turn-On Rise Time   |                                               | -    | 64.4 | -    | ns   |
| $t_{d(off)}$ | Turn-Off Delay Time |                                               | -    | 86.8 | -    | ns   |
| $t_f$        | Turn-Off Fall Time  |                                               | -    | 46   | -    | ns   |
| $Q_g$        | Total Gate Charge   | $V_{DS} = 400V, I_D = 25A,$<br>$V_{GS} = 10V$ | -    | 64   | -    | nC   |
| $Q_{gs}$     | Gate-Source Charge  |                                               | -    | 17   | -    | nC   |
| $Q_{gd}$     | Gate-Drain Charge   |                                               | -    | 23   | -    | nC   |

### ■ Drain-Source Diode Characteristics

| Symbol   | Parameter                                     | Test Condition                              | Min. | Typ. | Max. | Unit |
|----------|-----------------------------------------------|---------------------------------------------|------|------|------|------|
| $I_S$    | Drain-Source Diode Forward Continuous Current | $V_{GS} = 0V$                               | -    | -    | 25   | A    |
| $I_{SM}$ | Maximum Pulsed Current                        | $V_{GS} = 0V$                               | -    | -    | 100  | A    |
| $V_{SD}$ | Drain-Source Diode Forward Voltage            | $V_{GS} = 0V, I_S = 25A$                    | -    | -    | 1.5  | V    |
| $T_{rr}$ | Body Diode Reverse Recovery Time              | $I_S=25A, V_{GS} = 0V$<br>$dI_F/dt=100A/us$ | -    | 490  | -    | ns   |
| $Q_{rr}$ | Body Diode Reverse Recovery Charge            | $I_S=25A, V_{GS} = 0V$<br>$dI_F/dt=100A/us$ | -    | 6246 | -    | nC   |

Notes:

- $T_J=+25\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$
- Repetitive rating; pulse width limited by maximum junction temperature.
- $I_{SD} = 25A, dI_F/dt \leq 100A/us, V_{DD} \leq BV_{DS}, \text{ Start } T_J=25^{\circ}\text{C}$  .
- $L = 10mH, V_{DD}=50V, I_{AS} = 17A, R_G=25\Omega$  Starting  $T_J=25\text{ }^{\circ}\text{C}$  .

### Characteristic Curve

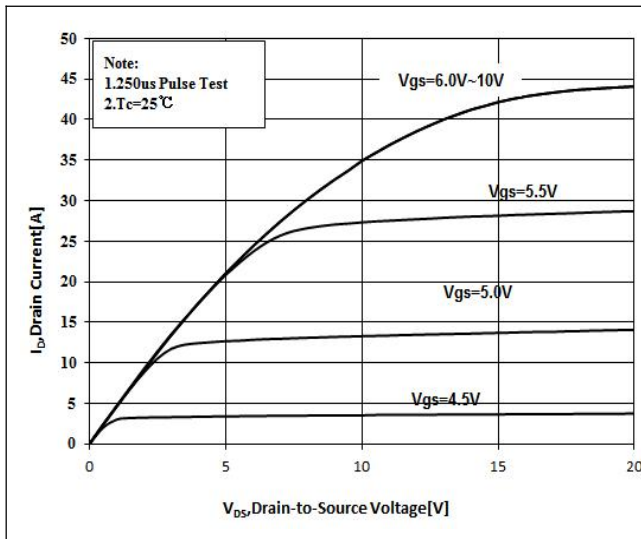


Figure 1. Typical Output Characteristics

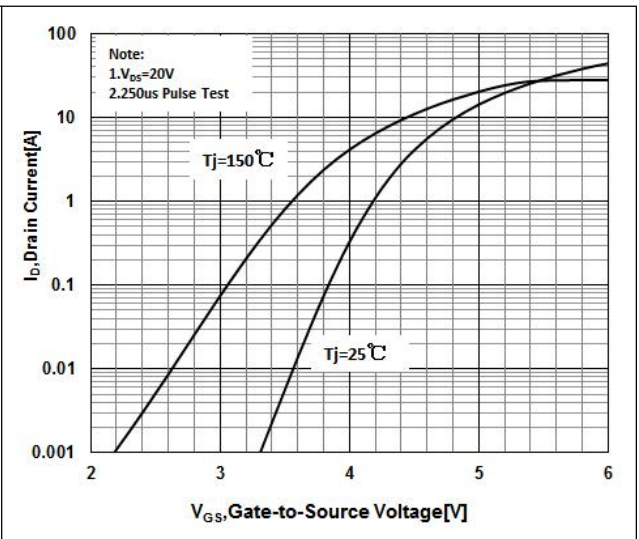


Figure 2. Typical Transfer Characteristics

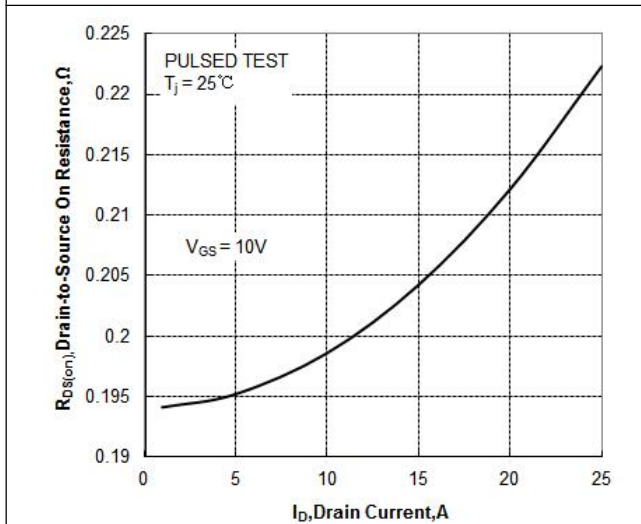


Figure 3. On- Resistance vs. Drain Current

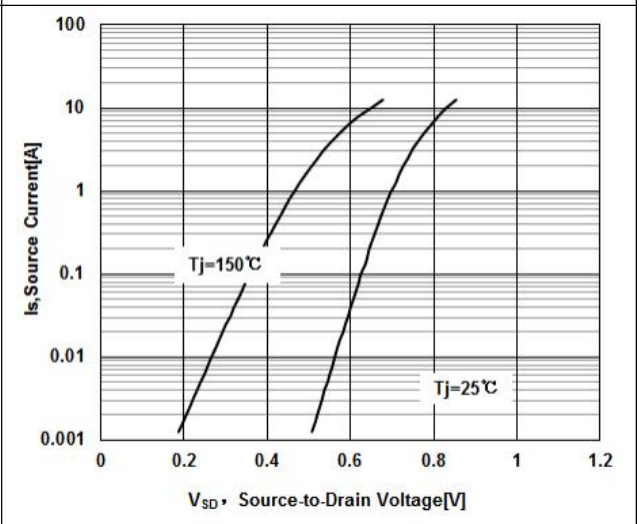


Figure 4. Body-Diode Characteristics

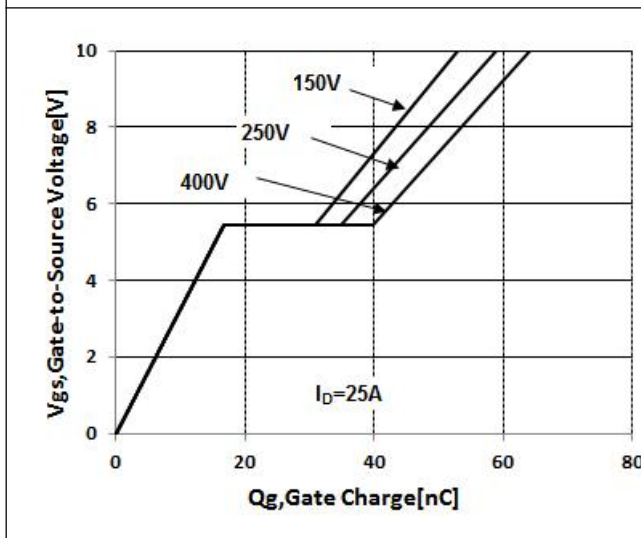


Figure 5. Gate-Charge Characteristics

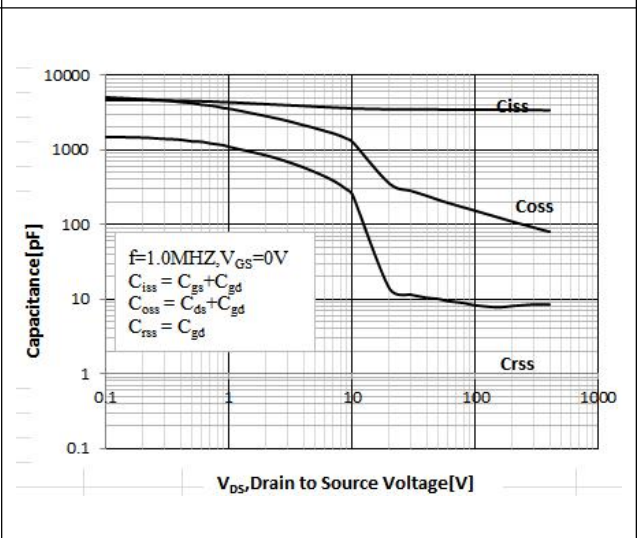


Figure 6. Capacitance Characteristics

### ■ Characteristic Curve

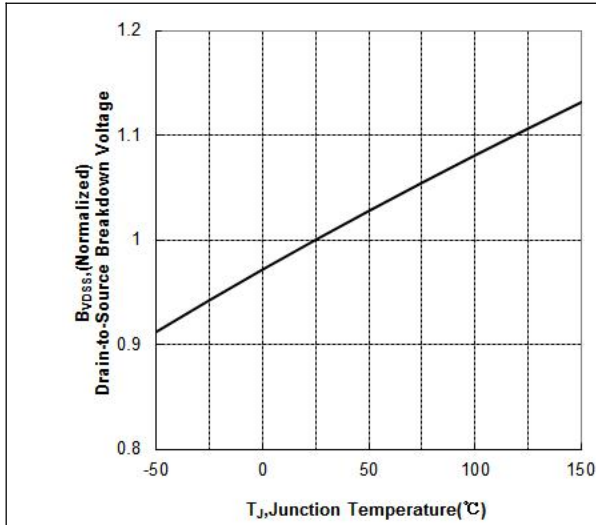


Figure 7. Normalized Breakdown voltage vs. Junction Temperature

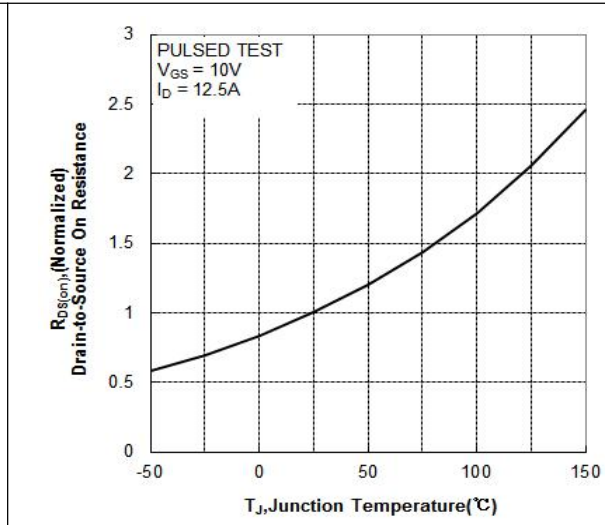


Figure 8. Normalized on Resistance vs. Junction Temperature

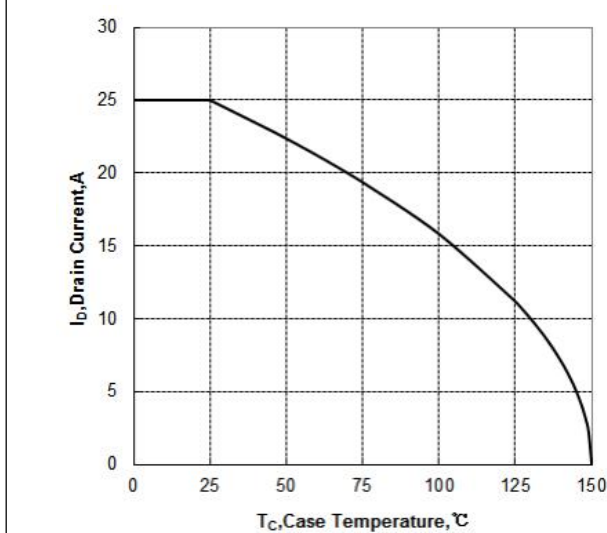


Figure 9: Maximum Continuous Drain Current vs. Case Temperature

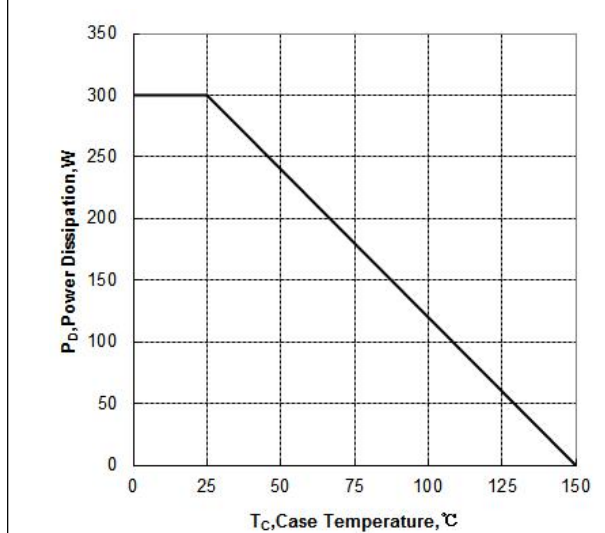


Figure 10: Maximum Power Dissipation vs Case Temperature

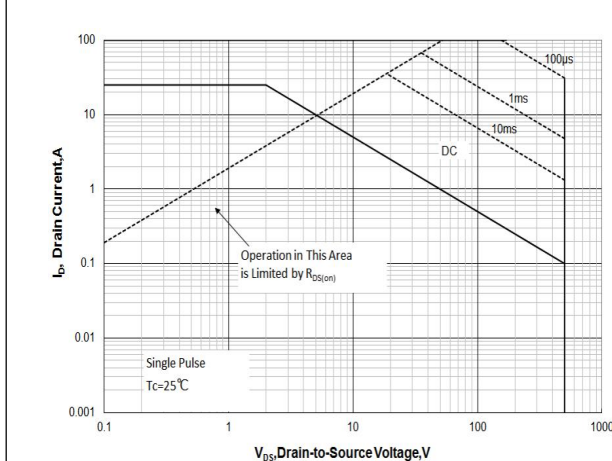


Figure 11. Maximum Safe Operating Area

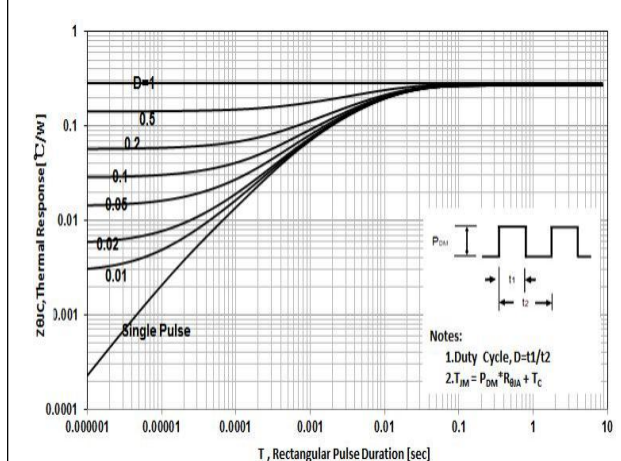


Figure 12: Normalized Maximum Transient Thermal Impedance

### ■ Package information

#### TO-247-3L

