



MPD04N65

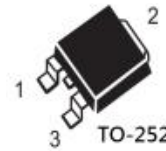
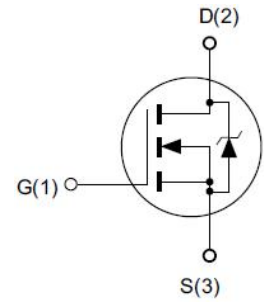
N-Channel Power MOSFET

Features

- ◆ 650V, 4A, $R_{DS(ON)}(Max.) = 2.7\Omega @ V_{GS} = 10V$.
- ◆ Low Crss
- ◆ Fast Switching
- ◆ 100% Avalanche Tested

Application

- ◆ Charger
- ◆ Standby Power



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

| Symbol | Parameter | Limit | Unit |
|----------------|--|------------|------------------|
| | | TO-252 | |
| V_{DS} | Drain-Source Voltage ^a | 650 | V |
| V_{GS} | Gate-Source Voltage | ± 30 | V |
| I_D | Drain Current-Continuous, $T_c = 25^\circ\text{C}$ | 4 | A |
| | Drain Current-Continuous, $T_c = 100^\circ\text{C}$ | 2.5 | A |
| I_{DM} | Drain Current-Pulsed ^b | 16 | A |
| P_D | Maximum Power Dissipation @ $T_J = 25^\circ\text{C}$ | 77 | W |
| E_{AS} | Single Pulsed Avalanche Energy ^c | 180 | mJ |
| T_J, T_{STG} | Operating and Store Temperature Range | -55 to 150 | $^\circ\text{C}$ |

Thermal Characteristics

| Symbol | Parameter | Value | Unit |
|-----------------|---|-------|--------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-Case Max. | 1.62 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient Max | 110 | $^\circ\text{C/W}$ |

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 | $V_{GS} = 0V, I_D = 250\mu\text{A}$ | 650 | - | - | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 650V, V_{GS} = 0V$ | - | - | 1 | μA |
| I_{GSS} | Forward Gate Body Leakage Current | $V_{DS} = 0V, V_{GS} = \pm 30V$ | - | - | ± 100 | nA |



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■ On Characteristics

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|--------------|-----------------------------------|-----------------------------------|------|------|------|----------|
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 2 | - | 4 | V |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance | $V_{GS} = 10V, I_D = 2A$ | - | 2.3 | 2.7 | Ω |

■ Dynamic Characteristics

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|-----------|------------------------------|---|------|------|------|------|
| C_{iss} | Input Capacitance | $V_{DS} = 25V,$ $V_{GS} = 0V,$ $f = 1.0MHz$ | - | 610 | - | pF |
| C_{oss} | Output Capacitance | | - | 53 | - | pF |
| C_{rss} | Reverse Transfer Capacitance | | - | 3.5 | - | pF |

■ On Characteristics

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|--------------|---------------------|--|------|------|------|------|
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD} = 325V, I_D = 4A,$ $R_G = 25\Omega, V_{GS} = 10V$ | - | 12.7 | - | ns |
| t_r | Turn-On Rise Time | | - | 17.4 | - | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | - | 30.9 | - | ns |
| t_f | Turn-Off Fall Time | | - | 10.5 | - | ns |
| Q_g | Total Gate Charge | $V_{DS} = 520V, I_D = 4A,$ $V_{GS} = 10V$ | - | 14.2 | - | nC |
| Q_{gs} | Gate-Source Charge | | - | 5.5 | - | nC |
| Q_{gd} | Gate-Drain Charge | | - | 3.8 | - | nC |

■ Drain-Source Diode Characteristics

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|----------|---|------------------------------------|------|------|------|------|
| I_S | Drain-Source Diode Forward Continuous Current | $V_{GS} = 0V$ | - | - | 4 | A |
| I_{SM} | Maximum Pulsed Current | $V_{GS} = 0V$ | - | - | 16 | A |
| V_{SD} | Drain-Source Diode Forward Voltage | $V_{GS} = 0V, I_S = 4A$ | - | - | 1.4 | V |
| T_{rr} | Body Diode Reverse Recovery Time | $di/dt = 100A/\mu s$ $I_F = 4A$ | - | 264 | - | ns |

Notes:

- $T_J = +25^\circ C$ to $+150^\circ C$.
- Repetitive rating; pulse width limited by maximum junction temperature.
- $L = 10mH, V_{DD} = 50V, I_{AS} = 6A, R_G = 25\Omega$ Starting $T_J = 25^\circ C$.



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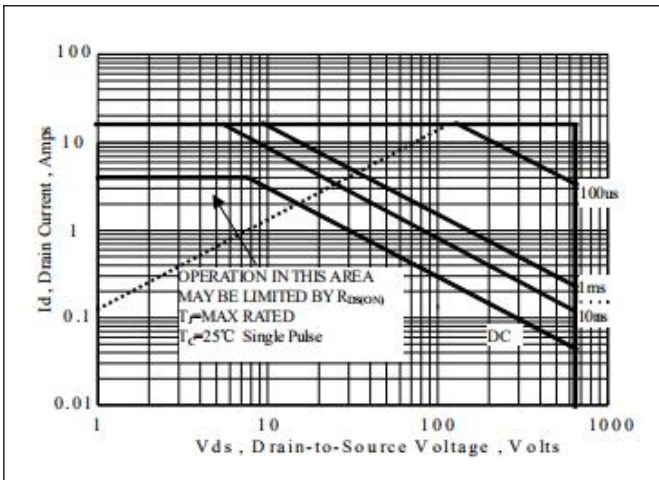


Figure 1 Maximum Safe Operating Area

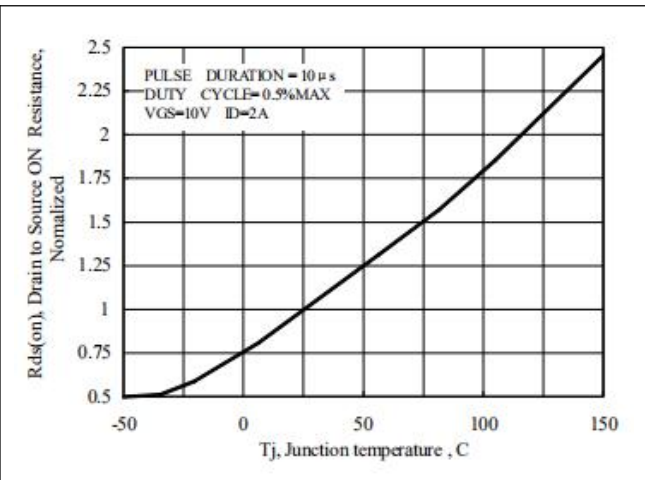


Figure 2. Normalized On-Resistance Variation with Temperature

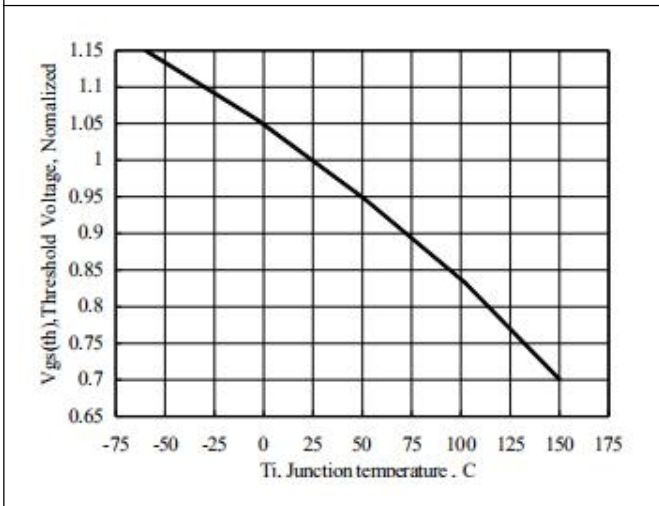


Figure 3. Typical Theshold Voltage vs Junction Temperature

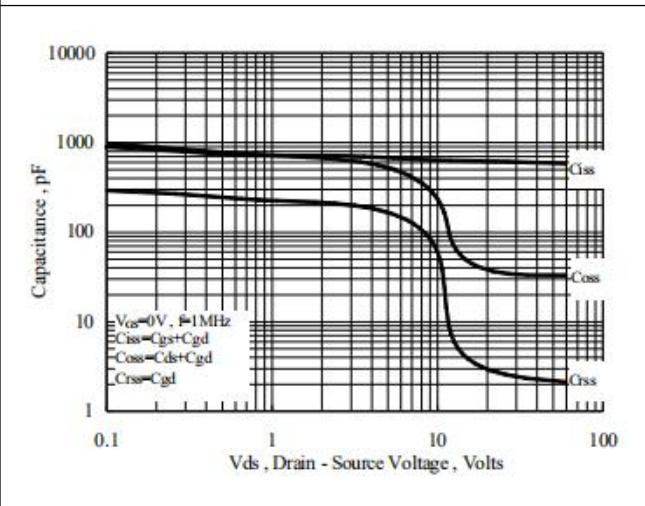


Figure 4. Capacitance Characteristics

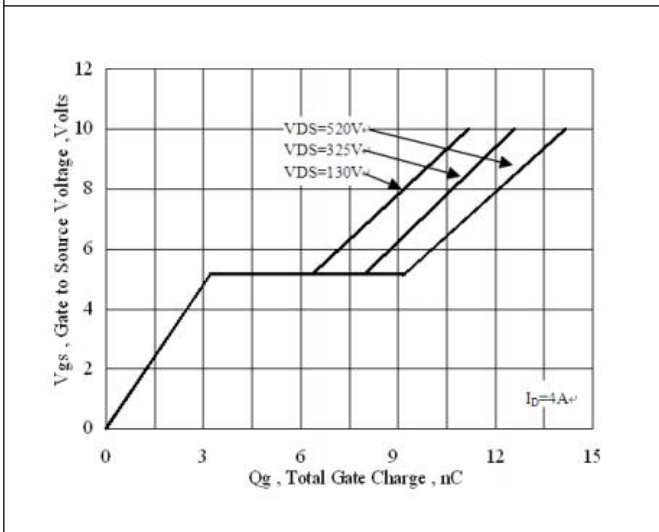


Figure 5. Gate Charge Characteristics

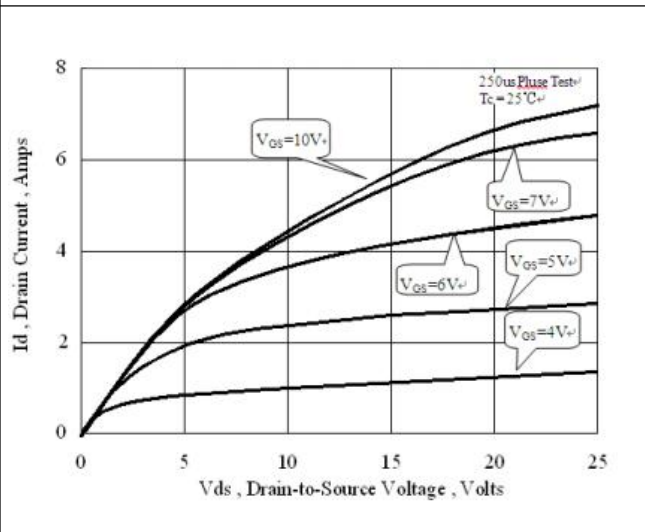


Figure 6. On-State Characteristics

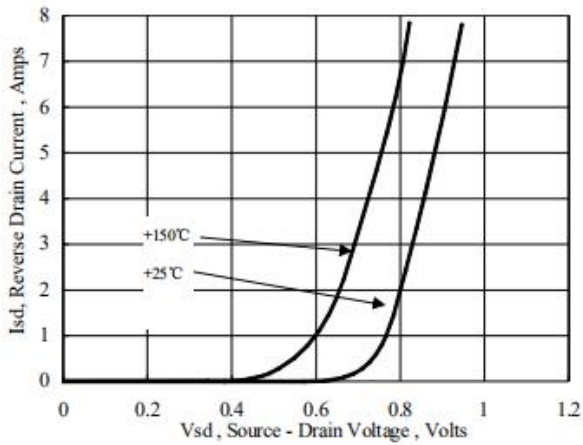


Figure 7. Typical Body Diode Transfer Characteristics

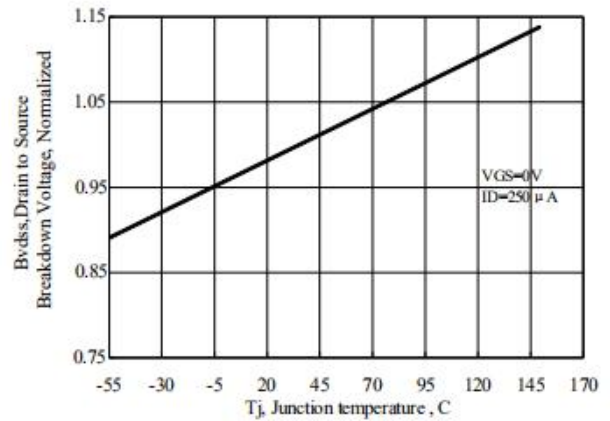


Figure 8. Typical Breakdown Voltage vs Junction Temperature

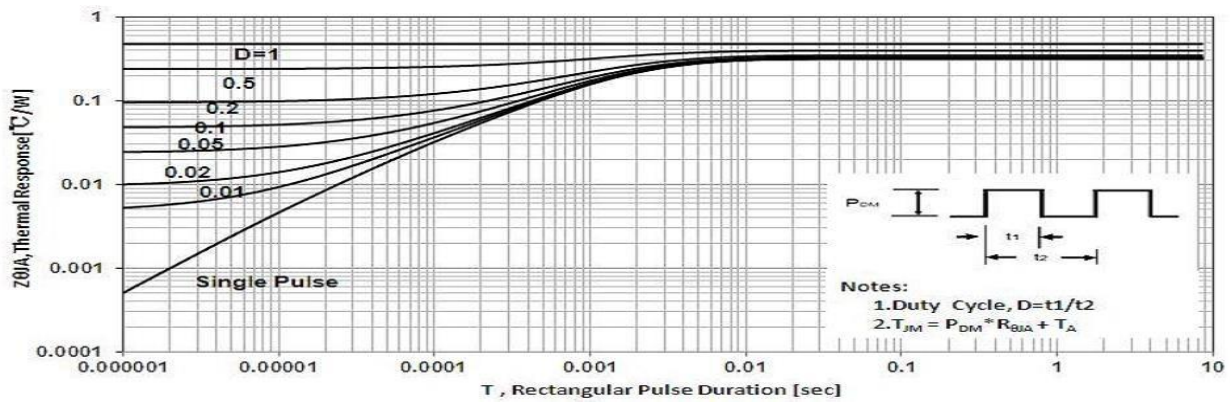


Figure 9. Normalized Effective Transient Thermal Impedance With Pulse Duration(TO-252)

■ Package Information

