WANSEMI
万芯半导体

**WP5N50CD**

# Enhancement Mode N-Channel Power MOSFET

TO-252/NMOS/500V/±30V/3V/5A/4.2Ω

Rev1.1

# Enhancement Mode N-Channel Power MOSFET

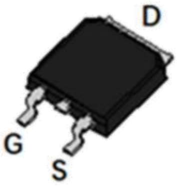
## 1.Features

- Fast Switching
- Improved dv/dt Capability

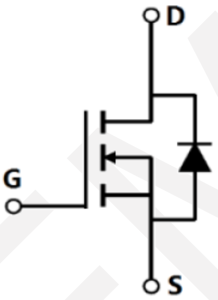
| $V_{DS}$ | $R_{DS(on)}$ Typ. | $I_D$ Max. |
|---|---|---|
| 500V | 4.2Ω @ 10V | 5A |

## 2.Applications

- Load Switch
- PWM Application
- Power management



Pin Description
TO-252



Schematic Diagram

## 3.Package Marking and Ordering Information

| Part no. | Marking | Package | PCS/Reel | PCS/CTN. |
|---|---|---|---|---|
| WP5N50CD | WP5N50C | TO-252 | 2,500 | 25,000 |

## 4.Absolute Max Ratings at Ta=25℃ (Note1)

| Parameter | Symbol | Value | Units |
|---|---|---|---|
| Drain to Source Voltage | $V_{DS}$ | 500 | V |
| Gate to Source Voltage | $V_{GS}$ | ±30 | V |
| Drain Current (DC) | $I_D$ | 5 | A |
| Drain Current (Pulse), PW≤300μs | $I_{DP}$ | 20 | A |
| Total Dissipation | $P_D$ | 104 | W |
| Avalanche Energy, Single Pulsed | $E_{AS}$ | 40 | mJ |
| Junction Temperature | $T_j$ | 150 | ℃ |
| Storage Temperature | $T_{stg}$ | -55 to +150 | ℃ |

Note 1: Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### 5.Thermal Resistance Ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Junction to case | $R_{\theta JC}$ | 1 | ℃/W |
| Junction to ambient | $R_{\theta JA}$ | 43 | ℃/W |

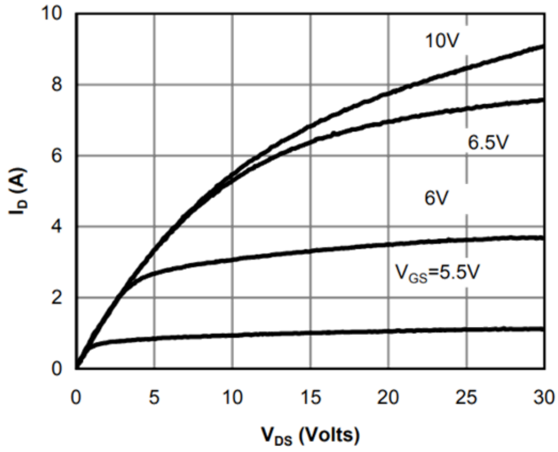
Note 2： When mounted on 1 inch square copper board t ≤ 10sec The value in any given application depends on the user's specific board design.

### 6.Electrical Characteristics at Ta=25℃ (Note 3)

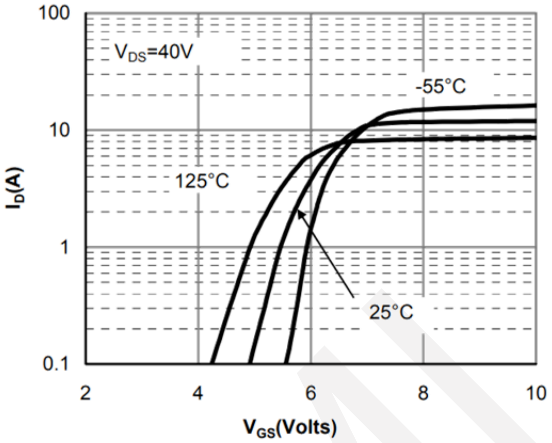
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| Drain to Source Breakdown Voltage | $V_{(BR)DSS}$ | $I_D$ = 250μA, $V_{GS}$ = 0V | 475 | - | - | V |
| Zero-Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 450V, $V_{GS}$ = 0V | - | - | 1 | μA |
| Gate to Source Leakage Current | $I_{GSS}$ | $V_{GS}$ = ±30V | - | - | ±100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_{DS}$=250μA | 2 | 3 | 4 | V |
| Static Drain to Source On-State Resistance | $R_{DS(on)}$ | $I_D$ = 2A, $V_{GS}$ = 10V | - | 4.2 | 5.5 | Ω |
| Input Capacitance | $C_{iss}$ | $V_{GS}$=0V,<br>$V_{DS}$=25V,<br>Frequency=1.0MHz | - | 538 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 58 | - | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 4.5 | - | pF |
| Turn-ON Delay Time | $t_{d(on)}$ | $V_{GS}$=10V,<br>$V_{DS}$ = 250V, $I_D$ = 5A,<br>$R_G$ = 25Ω | - | 18 | - | ns |
| Rise Time | $t_r$ | | - | 32 | - | ns |
| Turn-OFF Delay Time | $t_{d(off)}$ | | - | 34 | - | ns |
| Fall Time | $t_f$ | | - | 22 | - | ns |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 450V,<br>$V_{GS}$ = 10V,<br>$I_D$ = 5A | - | 11.5 | - | nC |
| | $Q_{gs}$ | | - | 3.8 | - | nC |
| | $Q_{gd}$ | | - | 4.1 | - | nC |
| Diode Forward Voltage | $V_{FSD}$ | $I_S$ = 5A, $V_{GS}$ = 0 | - | 0.85 | 1.2 | V |

Note 3： Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

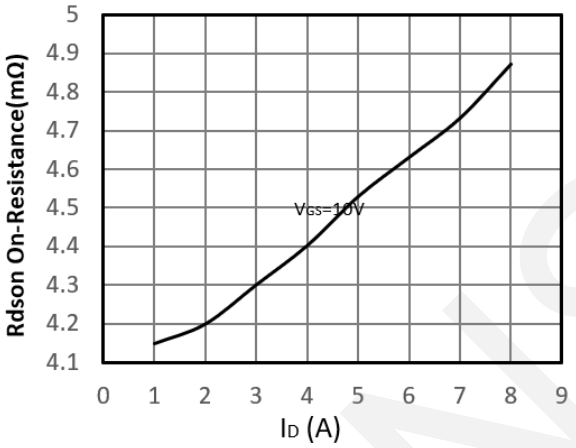
## 7.Typical electrical and thermal characteristics



On-Region Characteristics

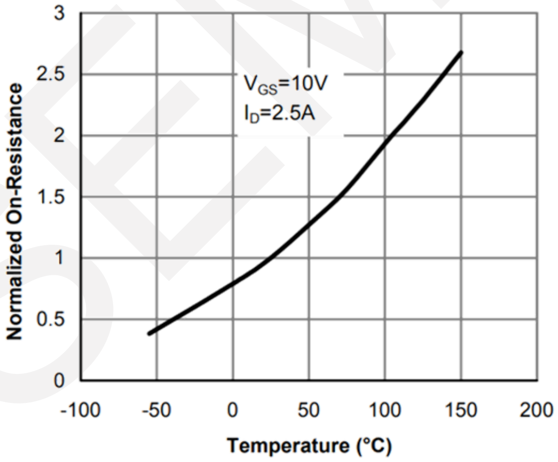


Transfer Characteristics

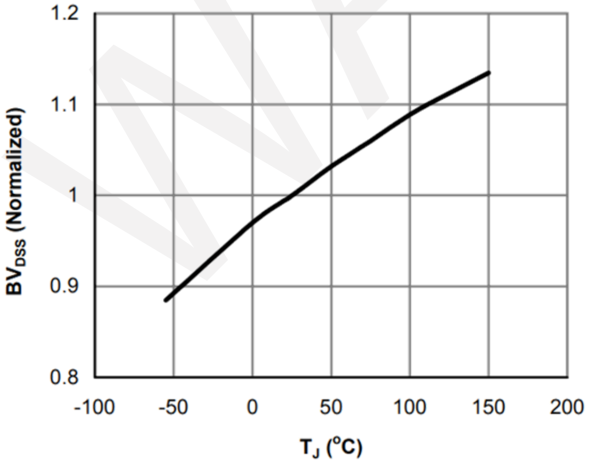


On-Resistance vs. Drain Current

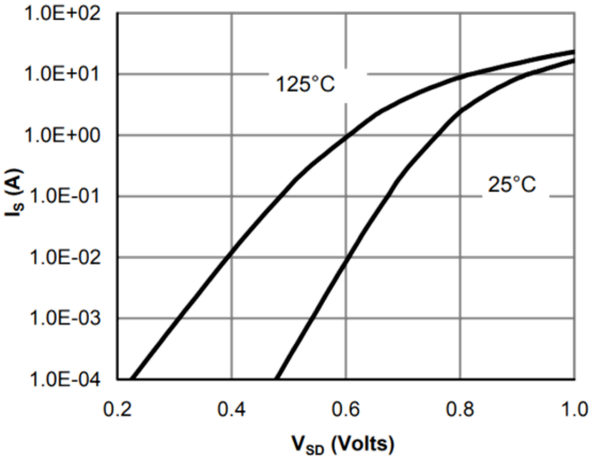
and Gate Voltage



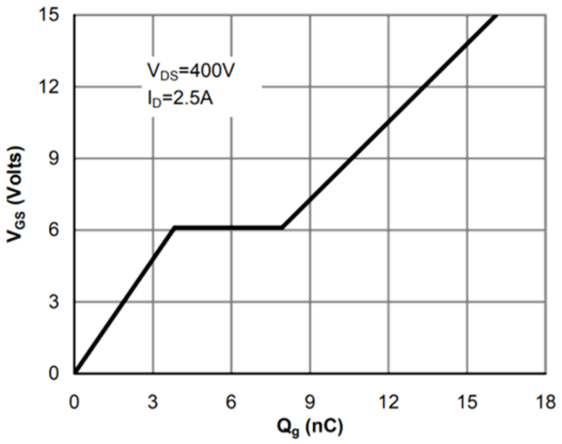
On-Resistance vs. Junction Temperature



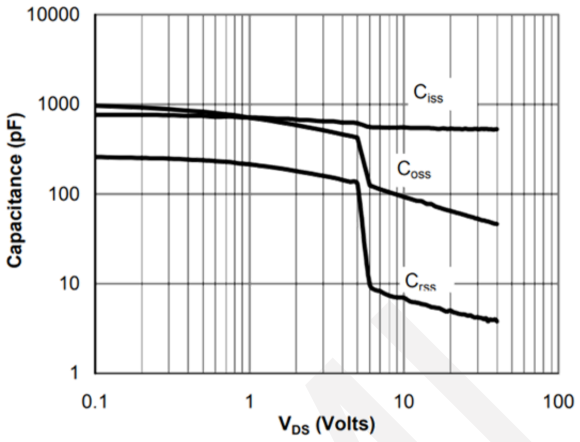
Break Down vs. Junction Temperature



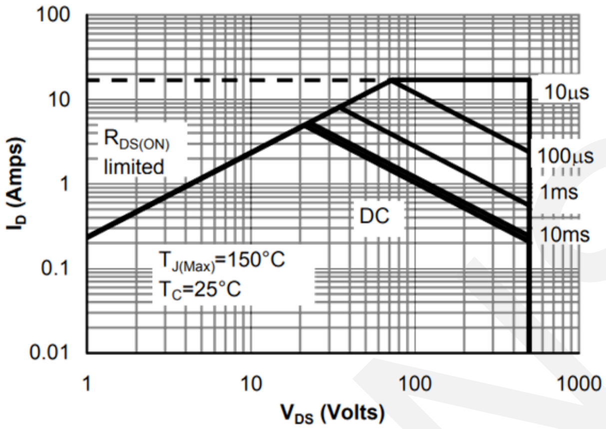
Body-Diode Characteristics



Gate-Charge Characteristics

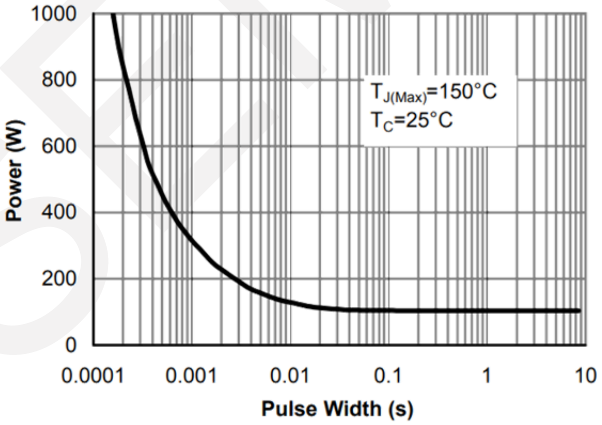


Capacitance Characteristics



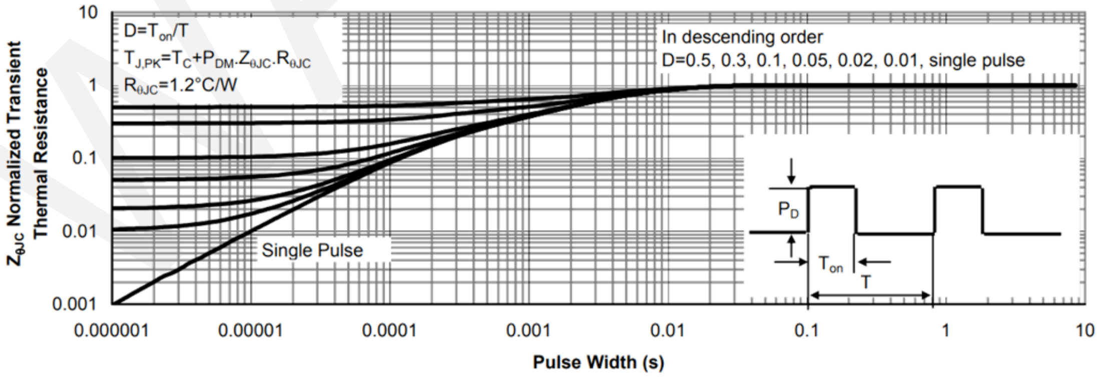
Maximum Forward Biased Safe

Operating Area



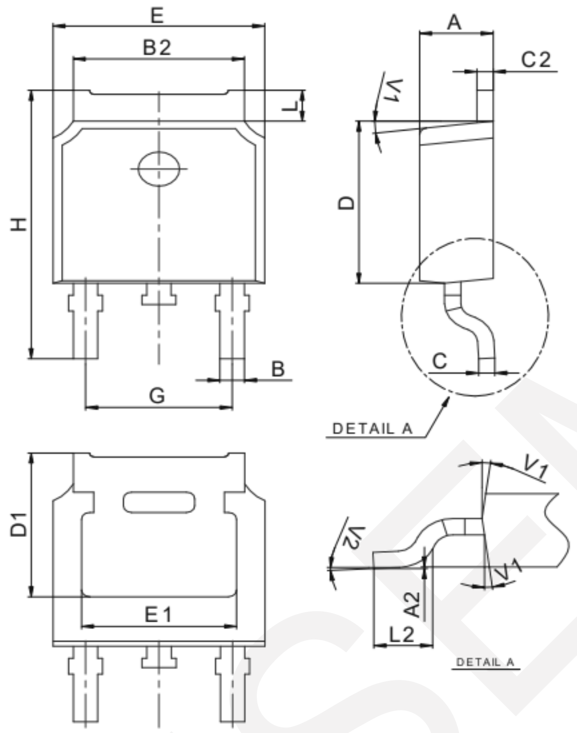
Single Pulse Power Rating

Junction-to-Case



Normalized Maximum Transient Thermal Impedance

## 8.Package Dimensions



| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.10 | | 2.50 | 0.083 | | 0.098 |
| A2 | 0 | | 0.10 | 0 | | 0.004 |
| B | 0.66 | | 0.86 | 0.026 | | 0.034 |
| B2 | 5.18 | | 5.48 | 0.202 | | 0.216 |
| C | 0.40 | | 0.60 | 0.016 | | 0.024 |
| C2 | 0.44 | | 0.58 | 0.017 | | 0.023 |
| D | 5.90 | | 6.30 | 0.232 | | 0.248 |
| D1 | | 5.30REF | | | 0.209REF | |
| E | 6.40 | | 6.80 | 0.252 | | 0.268 |
| E1 | 4.63 | | | 0.182 | | |
| G | 4.47 | | 4.67 | 0.176 | | 0.184 |
| H | 9.50 | | 10.70 | 0.374 | | 0.421 |
| L | 1.09 | | 1.21 | 0.043 | | 0.048 |
| L2 | 1.35 | | 1.65 | 0.053 | | 0.065 |
| V1 | | 7° | | | 7° | |
| V2 | 0° | | 6° | 0° | | 6° |

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