## General Description

The WSF7N40 is N-channel Enhanced VDMOSFETs, is obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching .

performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency..

## Product Summery

| BVDSS | RDSON | ID |
|---|---|---|
| 400V | 0.8Ω | 7A |

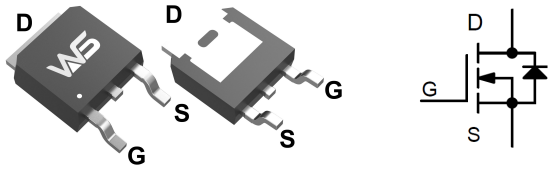
## Applications

- Uninterruptible Power Supply(UPS)
- Power Factor Correction (PFC)

## Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent Cdv/dt effect decline
- Green Device Available

## TO-252 Pin Configuration




## Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 400 | V |
| $V_{GS}$ | Gate-Source Voltage | ±30 | V |
| $I_D$@$T_C$=25℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1] | 7 | A |
| $I_D$@$T_C$=100℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1] | 4.0 | A |
| $I_{DM}$ | Pulsed Drain Current[2] | 28 | A |
| EAS | Single Pulse Avalanche Energy[3] | 176 | mJ |
| $I_{AR}$ | Avalanche Current | 7 | A |
| $P_D$@$T_C$=25℃ | Total Power Dissipation[3] | 33 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

## Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient [1] | --- | 60 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case[1] | --- | 3.8 | ℃/W |

## Electrical Characteristics ($T_J$=25℃, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250uA | 400 | --- | --- | V |
| $\triangle BV_{DSS}/\triangle T_J$ | BVDSS Temperature Coefficient | Reference to 25℃ , $I_D$=1mA | --- | 0.25 | --- | V/℃ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=10V , $I_D$=4A | --- | 0.8 | 1.1 | Ω |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | 2.0 | 3.5 | 4.0 | V |
| $\triangle V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | -4.63 | --- | mV/℃ |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=400V , $V_{GS}$=0V , $T_J$=25℃ | --- | --- | 1 | uA |
| | | $V_{DS}$=400V , $V_{GS}$=0V , $T_J$=125℃ | --- | --- | 10 | |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±30V , $V_{DS}$=0V | --- | --- | ±100 | nA |
| $R_g$ | Gate Resistance | $V_{DS}$=0V , $V_{GS}$=0V , f=1MHz | --- | 1.6 | --- | Ω |
| $Q_g$ | Total Gate Charge (10V) | $V_{DS}$=400V , $V_{GS}$=10V , $I_D$=7A | --- | 19 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 3.7 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 11 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=250V , $V_{GS}$=10V , $R_G$=25Ω,$I_D$=7A | --- | 13 | --- | ns |
| $T_r$ | Rise Time | | --- | 20 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 76 | --- | |
| $T_f$ | Fall Time | | --- | 40 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=25V , $V_{GS}$=0V , f=1MHz | --- | 700 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 94 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 12 | --- | |

## Guaranteed Avalanche Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| EAS | Single Pulse Avalanche Energy[5] | $V_{DD}$=50V , L=0.1mH , $I_{AS}$=4.5A | 90 | --- | --- | mJ |

## Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current[1,6] | $V_G$=$V_D$=0V , Force Current | --- | --- | 7 | A |
| $I_{SM}$ | Pulsed Source Current[2,6] | | --- | --- | 28 | A |
| $V_{SD}$ | Diode Forward Voltage[2] | $V_{GS}$=0V , $I_S$=7A , $T_J$=25℃ | --- | --- | 1.4 | V |
| $t_{rr}$ | Reverse Recovery Time | IF=7A , dI/dt=100A/μs , $T_J$=25℃ | --- | 260 | --- | nS |
| $Q_{rr}$ | Reverse Recovery Charge | | --- | 3.8 | --- | uC |

Note :
1.The data tested by surface mounted on a 1 inch$^2$ FR-4 board with 2OZ copper,t<10sec.
2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
3.The EAS data shows Max. rating . The test condition is $V_{DD}$=25V,$V_{GS}$=10V,L=0.1mH,$I_{AS}$=2.5A
4.The power dissipation is limited by 150℃ junction temperature
5.The Min. value is 100% EAS tested guarantee.
6.The data is theoretically the same as $I_D$ and $I_{DM}$ , in real applications , should be limited by total power dissipation.

## Typical Characteristics

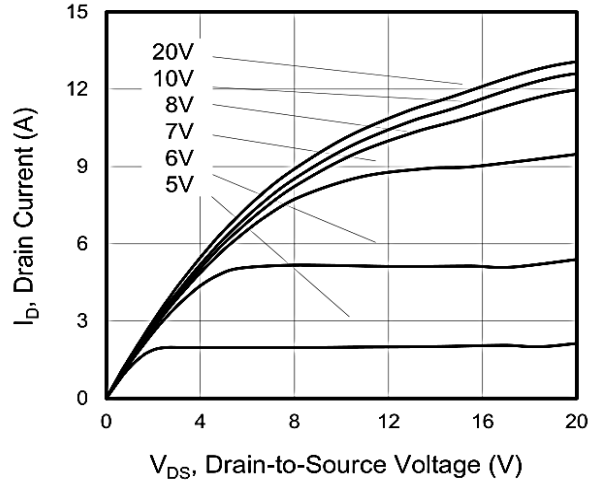



Figure 1. Output Characteristics (T J = 25ºC)

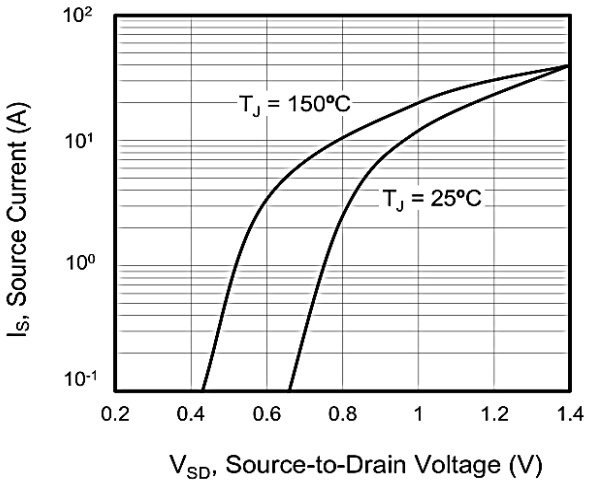



Figure 2. Body Diode Forward Voltage

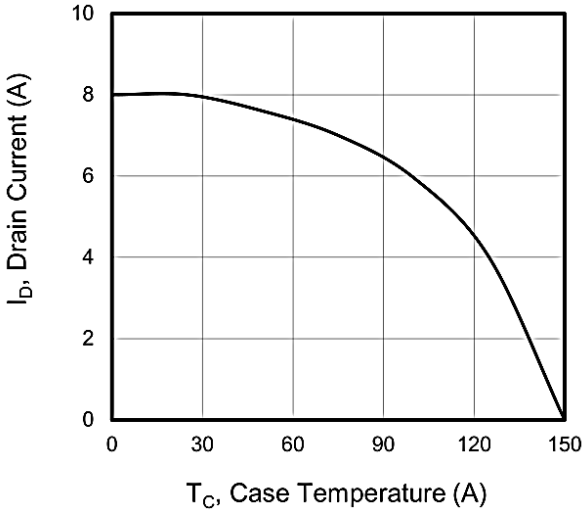



Figure 3. Drain Current vs. Temperature

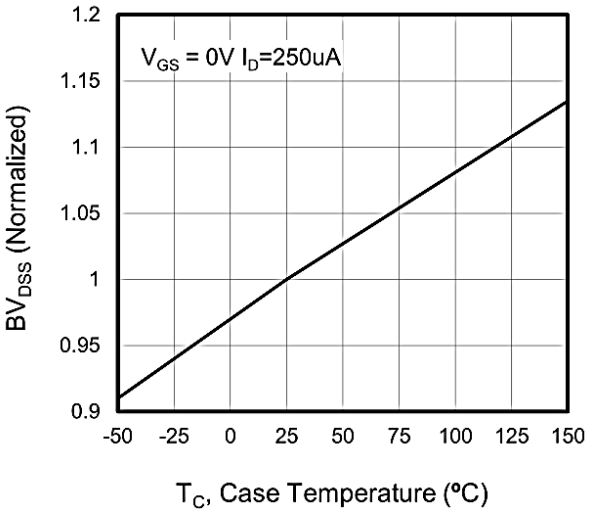



Figure 4. BV DSS Variation vs. Temperature

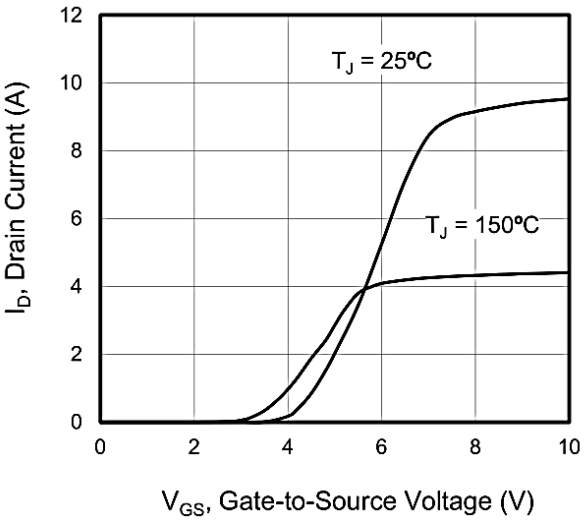



Figure 5. Transfer Characteristics

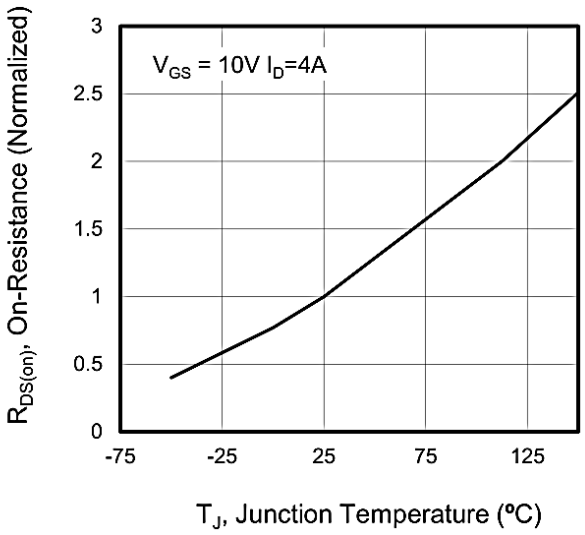



Figure 6. On-Resistance vs. Temperature

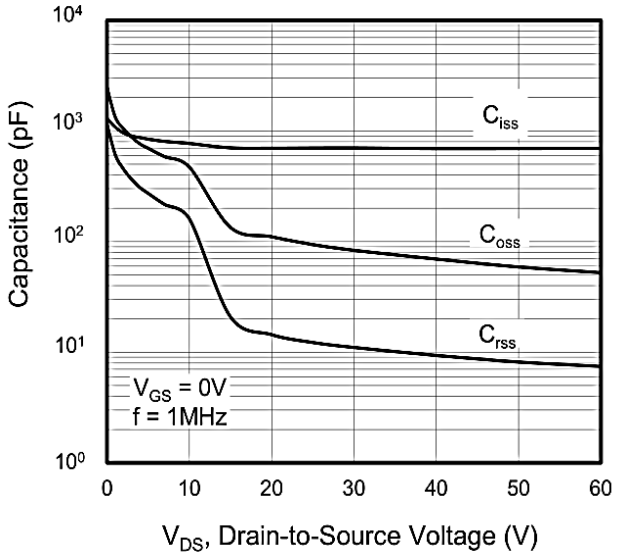



**Figure 7. Capacitance**

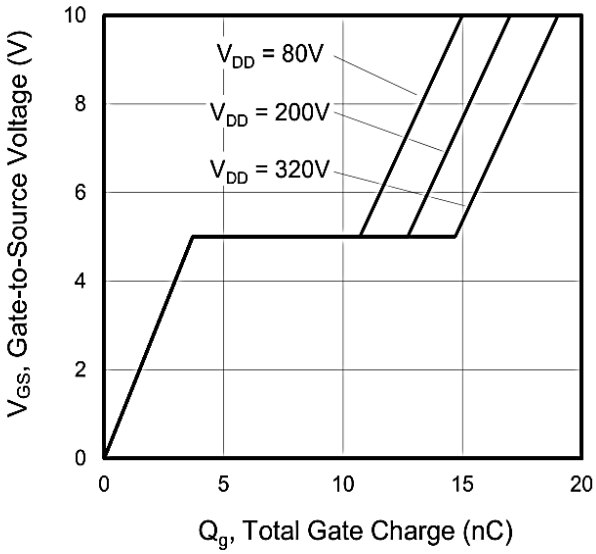



**Figure 8. Gate Charge**

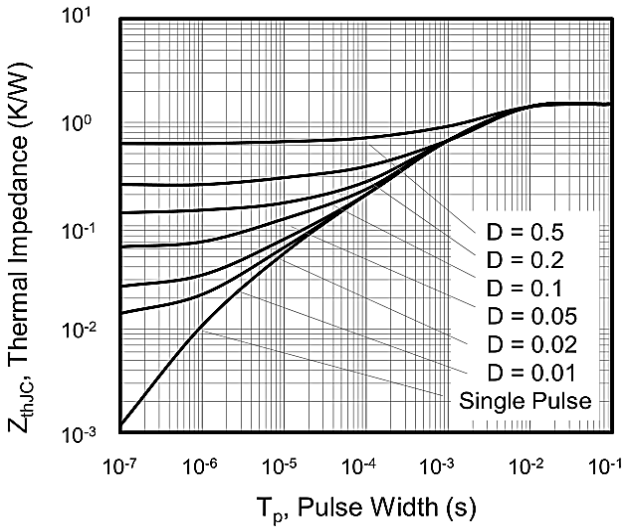



**Figure 9. Transient Thermal Impedance**

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