

General Description

The WSF40P03 is the highest performance trench P-Ch MOSFET with extreme high cell density, which provide excellent RDSON and gate charge for most of the small power switching and load switch applications.

The WSF40P03 meet the RoHS and Green Product requirement with full function reliability approved.

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

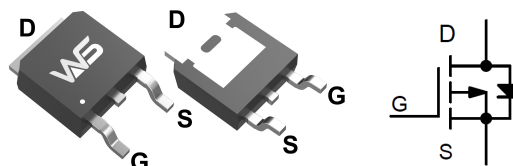
Product Summary

| BVDSS | RDSON | ID |
|-------|-------|------|
| -30V | 18mΩ | -40A |

Applications

- Power Magagement in Desktop
- DC/DC Converters.
- Load Switch

TO-252 Pin Configuration



Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|-----------------------|---|------------|------------|
| V_{DS} | Drain-Source Voltage | -30 | V |
| V_{GS} | Gate-Source Voltage | ± 25 | V |
| $I_D@T_C=25^\circ C$ | Continuous Drain Current, V_{GS} @ -10V | -40 | A |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, V_{GS} @ -10V | -25 | A |
| $I_D@T_A=25^\circ C$ | Continuous Drain Current, V_{GS} @ -10V | -9.6 | A |
| $I_D@T_A=70^\circ C$ | Continuous Drain Current, V_{GS} @ -10V | -7.7 | A |
| I_{DM}^a | Pulsed Drain Current | -160 | A |
| E_{AS}^b | Single Pulse Avalanche Energy | 28 | mJ |
| I_{AS}^b | Avalanche Current | -20 | A |
| $P_D@T_A=25^\circ C$ | Total Power Dissipation | 2.5 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ C$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ C$ |

Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|-------------------|-------------------------------------|------|------|--------------|
| $R_{\theta JA}^c$ | Thermal Resistance Junction-Ambient | --- | 50 | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case | --- | 2.9 | $^\circ C/W$ |

Note a : Pulse width limited by max. junction temperature.

Note b : UIS tested and pulse width limited by maximum junction temperature 150 $^\circ C$ (initial temperature $T_J=25^\circ C$).

Note c : Surface Mounted on 1in² pad area.

Electrical Characteristics (T_J=25 °C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|--|--|------|--------|------|------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =-250uA | -30 | --- | --- | V |
| ΔBV _{DSS} /ΔT _J | BV _{DSS} Temperature Coefficient | Reference to 25°C, I _D =-1mA | --- | -0.022 | --- | V/°C |
| R _{DS(ON)} ^d | Static Drain-Source On-Resistance ² | V _{GS} =-10V, I _D =-20A | --- | 15 | 18 | mΩ |
| | | V _{GS} =-4.5V, I _D =-15A | --- | 20 | 26 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =-250uA | -1.2 | -1.6 | -2.5 | V |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =-24V, V _{GS} =0V, T _J =25°C | --- | --- | -1 | uA |
| | | V _{DS} =-24V, V _{GS} =0V, T _J =55°C | --- | --- | -5 | |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 3.5 | --- | Ω |
| Q _g | Total Gate Charge | V _{DS} =-15V, V _{GS} =-4.5V, I _{DS} =-20A | --- | 11 | --- | nC |
| Q _{gs} | Gate-Source Charge | | --- | 5 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 5 | --- | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =-15V, R _L =15Ω, I _{DS} =-1A, V _{GEN} =-10V, R _G =6Ω | --- | 11 | 20 | ns |
| T _r | Rise Time | | --- | 10 | 18 | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 39 | 70 | |
| T _f | Fall Time | | --- | 29 | 53 | |
| C _{iss} ^e | Input Capacitance | V _{GS} =0V, V _{DS} =-15V, Frequency=1.0MHz | --- | 1256 | 1633 | pF |
| C _{oss} ^e | Output Capacitance | | --- | 187 | --- | |
| C _{riss} ^e | Reverse Transfer Capacitance | | --- | 115 | --- | |

Diode Characteristics

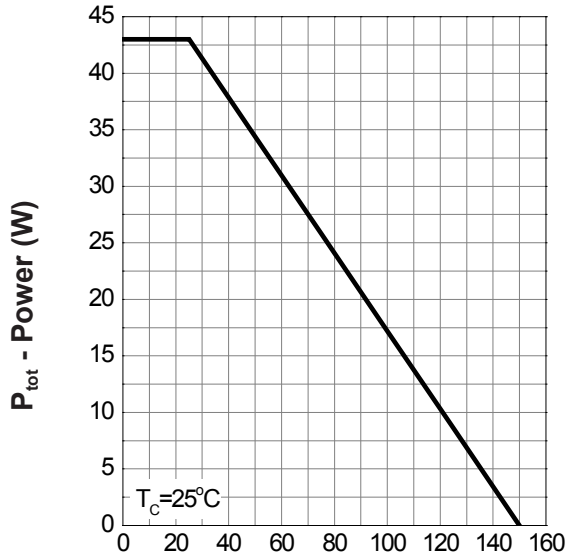
| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------------------------|---------------------------|---|------|------|------|------|
| I _S | Continuous Source Current | V _G =V _D =0V, Force Current | --- | --- | -20 | A |
| V _{SD} ^d | Diode Forward Voltage | V _{GS} =0V, I _S =-1A | --- | --- | -1.2 | V |
| t _{rr} | Reverse Recovery Time | I _F =-20A, dI/dt=100A/μs | --- | 12 | --- | nS |
| Q _{rr} | Reverse Recovery Charge | | --- | 3.5 | --- | nC |

Note d : Pulse test ; pulse width≤300μs, duty cycle≤2%.

Note e : Guaranteed by design, not subject to production testing.

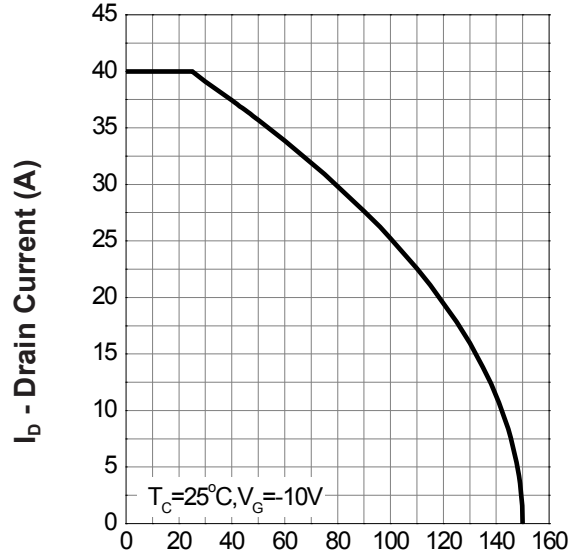
Typical Operating Characteristics

Power Dissipation



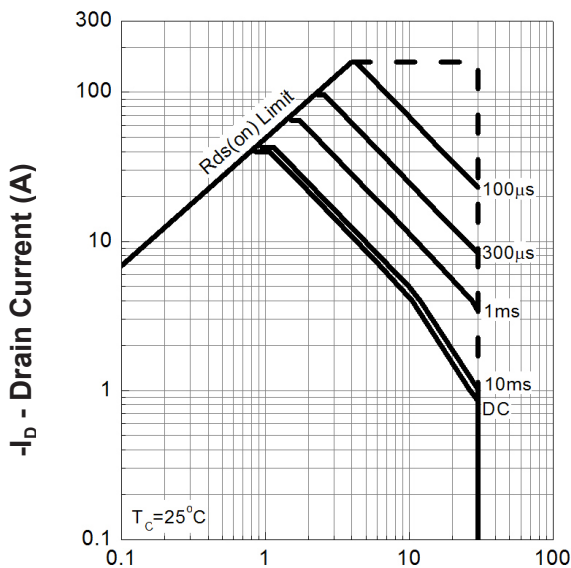
T_j - Junction Temperature (°C)

Drain Current



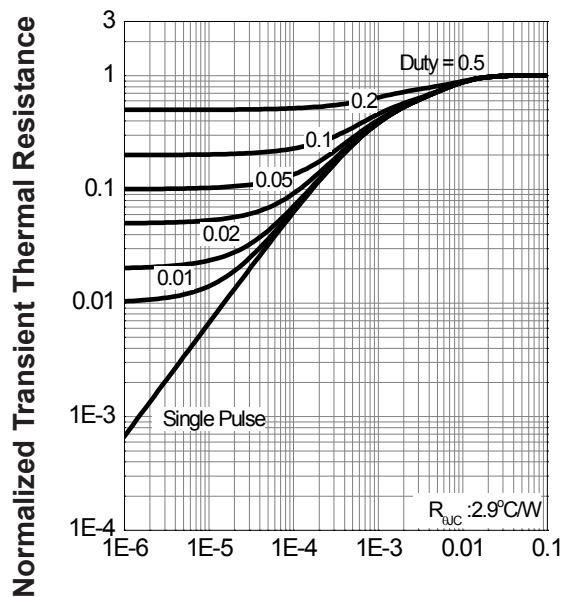
T_j - Junction Temperature (°C)

Safe Operation Area



-V_{DS} - Drain - Source Voltage (V)

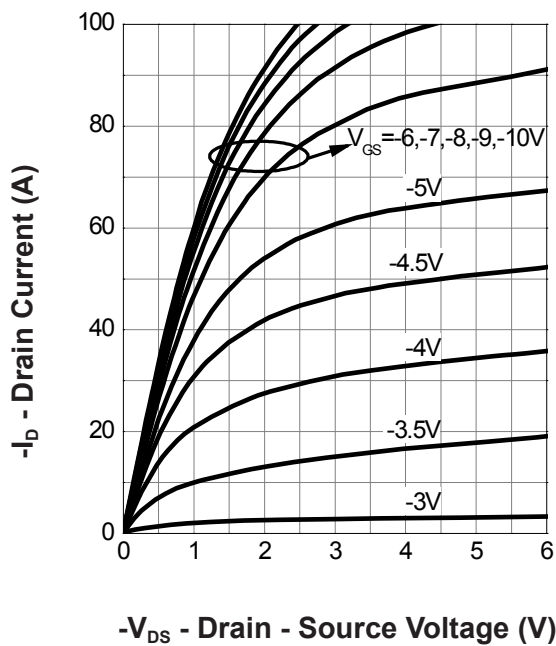
Thermal Transient Impedance



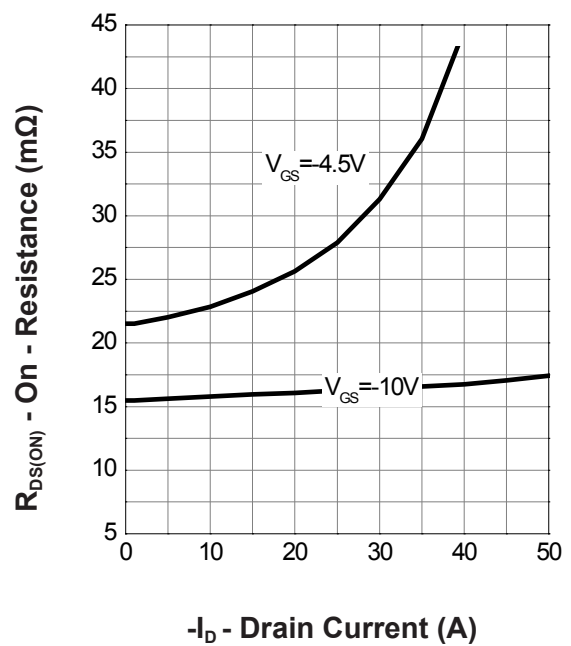
Square Wave Pulse Duration (sec)

Typical Operating Characteristics(Cont.)

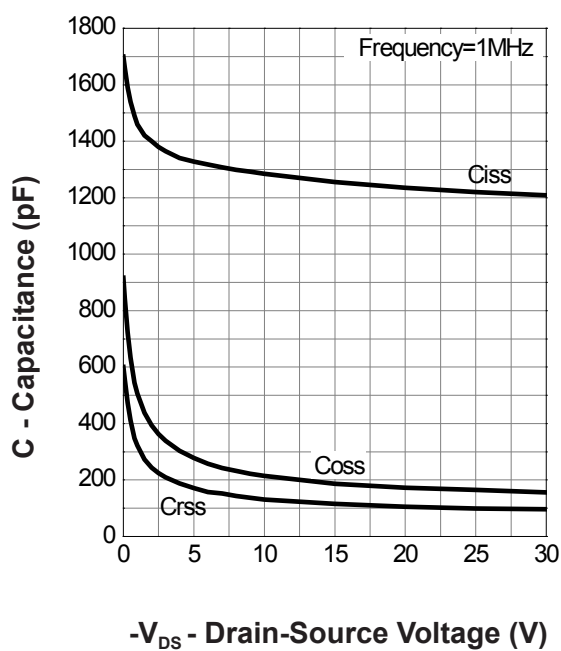
Output Characteristics



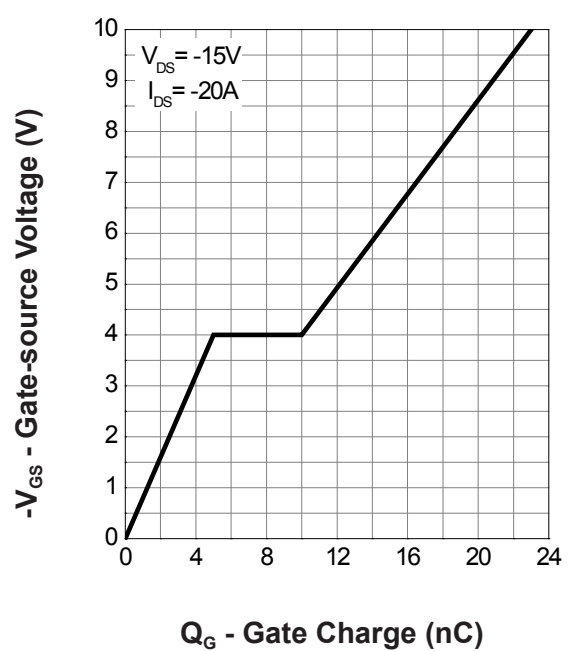
Drain-Source On Resistance



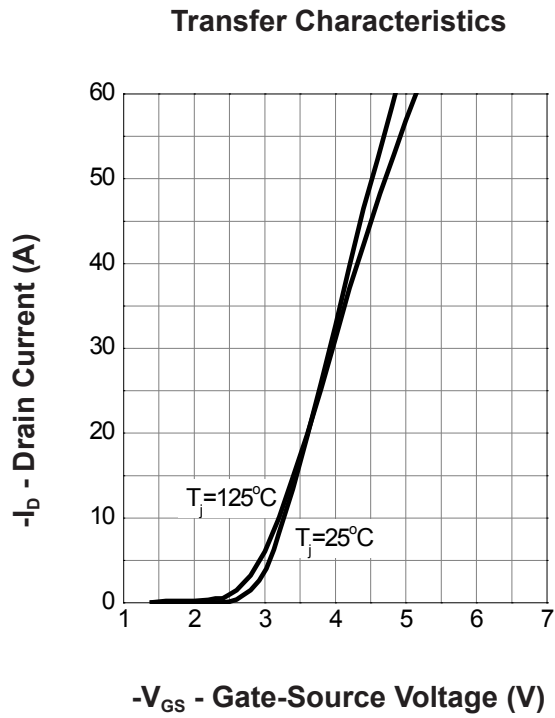
Capacitance



Gate Charge



Typical Operating Characteristics(Cont.)





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