

## 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

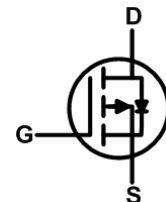
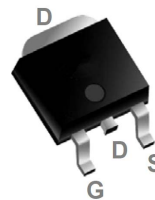
## Product Summary

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	$\pm 25$	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 1in<sup>2</sup> pad area.

**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

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

**Diode Characteristics**

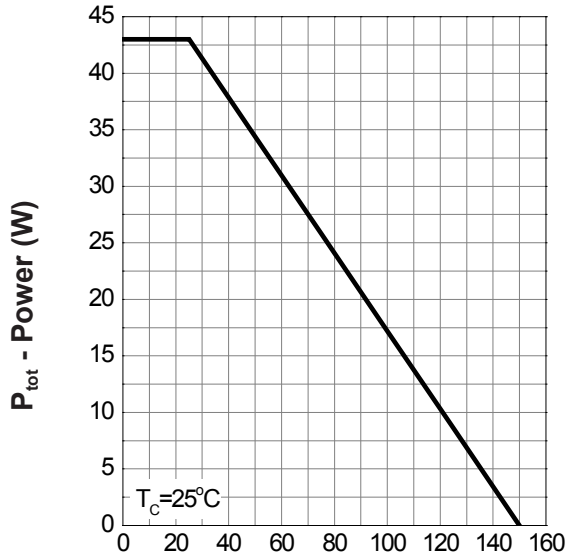
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	-20	A
V <sub>SD</sub> <sup>d</sup>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =-1A	---	---	-1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =-20A, dI/dt=100A/μs	---	12	---	nS
Q <sub>rr</sub>	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.

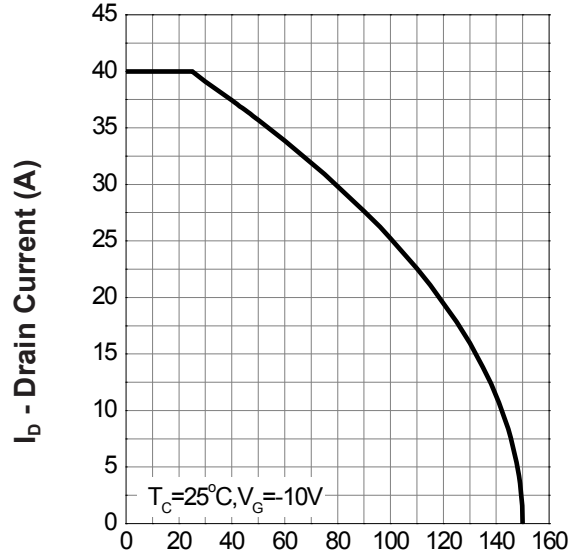
**Typical Operating Characteristics**

**Power Dissipation**



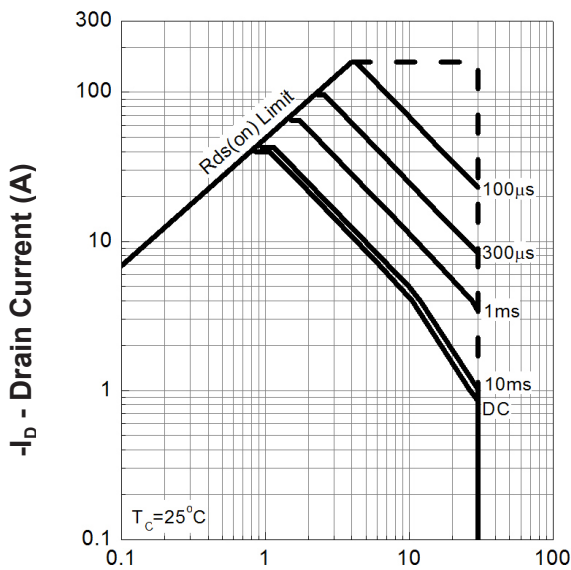
$T_j$  - Junction Temperature ( $^\circ\text{C}$ )

**Drain Current**



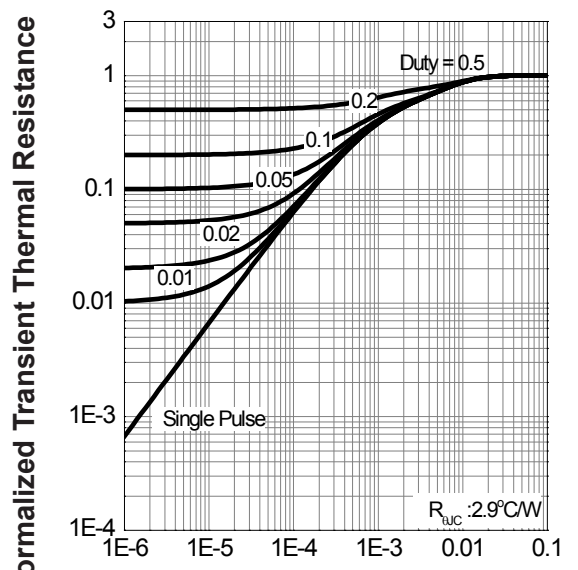
$T_j$  - Junction Temperature ( $^\circ\text{C}$ )

**Safe Operation Area**



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

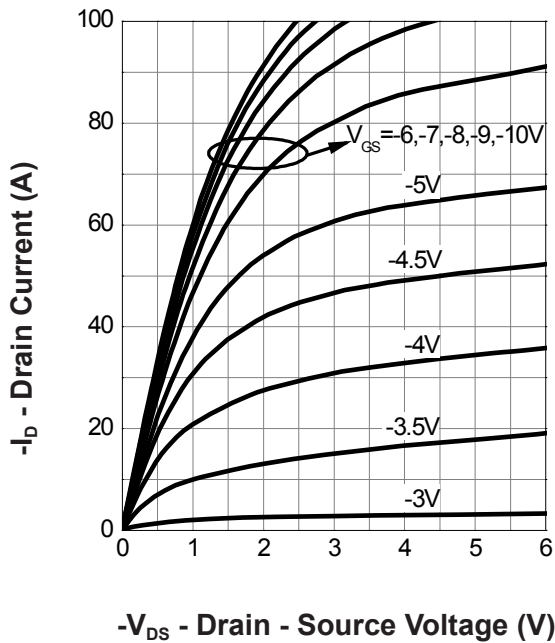
**Thermal Transient Impedance**



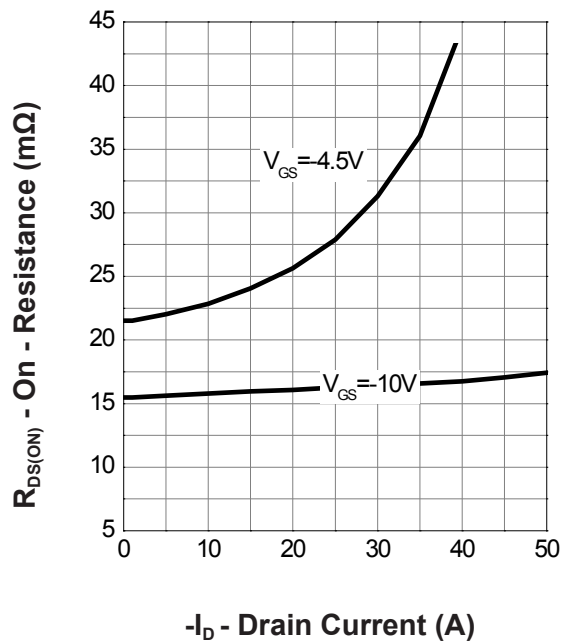
Square Wave Pulse Duration (sec)

**Typical Operating Characteristics(Cont.)**

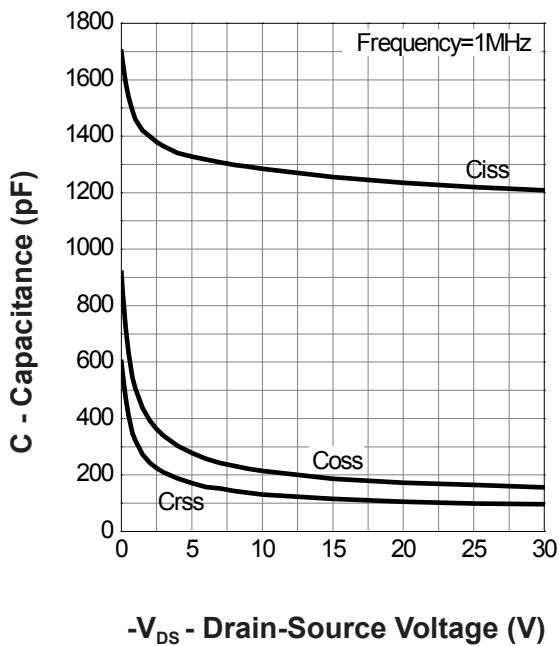
**Output Characteristics**



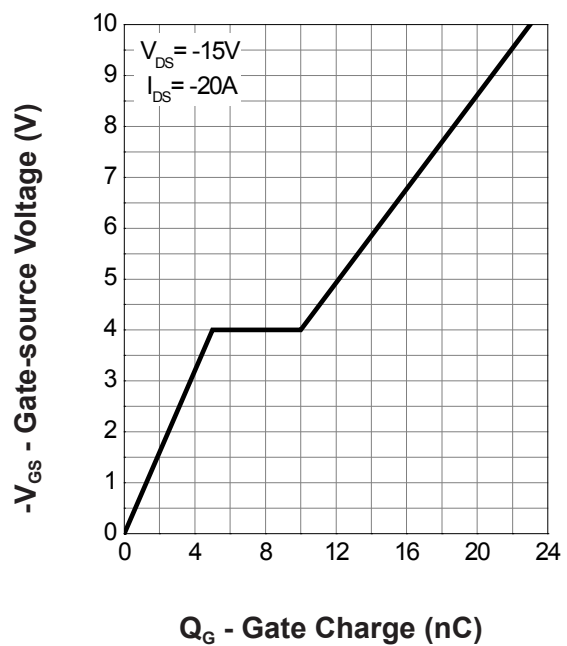
**Drain-Source On Resistance**



**Capacitance**

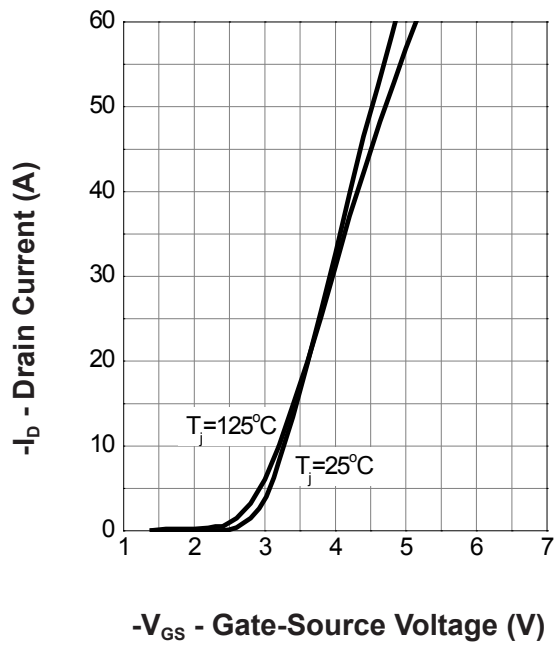


**Gate Charge**



**Typical Operating Characteristics(Cont.)**

**Transfer Characteristics**





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