

## General Description

The WSR98P06 is the highest performance trench P-Ch MOSFET with extreme high cell density, which provide excellent  $R_{DS(on)}$  and gate charge for most of the synchronous buck converter applications.

The WSR98P06 meet the RoHS and Green Product requirement, 100% EAS guaranteed 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

$BV_{DSS}$	$R_{DS(on)}$	$I_D$
-60V	5.2m $\Omega$	-132A

## Applications

- Power Management in Desktop Computer or DC/DC Converters

## TO-220AB Pin Configuration

## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-60	V
$V_{GS}$	Gate-Source Voltage	$\pm 25$	V
$I_D$	Continuous Drain Current, $V_{GS}$ @ -10V; $T_C=25^\circ\text{C}$	-132	A
	Continuous Drain Current, $V_{GS}$ @ -10V; $T_C=100^\circ\text{C}$	-83	A
$I_S$	Diode Continuous Forward Current	-80	A
$I_{AS}$	Avalanche Energy, Single pulse ;L=1mH	49	A
$E_{AS}$	Avalanche Energy, Single pulse;;L=1mH	1200	mJ
$I_{DP}$	Pulse Drain Current Tested ; $T_C=25^\circ\text{C}$	-264	A
$P_D$	Maximum Power Dissipation; $T_C=25^\circ\text{C}$	250	W
	Maximum Power Dissipation; $T_C=100^\circ\text{C}$	100	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

## Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	---	55	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup> (t $\leq$ 10s)	---	20	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	0.5	$^\circ\text{C/W}$

Note : \*Current limited by bond wire.

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

**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> =-250uA	-60	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =-1mA	---	-0.018	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A	---	5.2	6.5	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A	---	8.5	11.5	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-1.3	-1.8	-2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	5.04	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-48V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =-48V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±25V, V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-20A	---	26.4	---	S
Q <sub>g</sub>	Total Gate Charge (-4.5V)	V <sub>DS</sub> =-30V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-20A	---	136	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	20	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	33	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =-15V, V <sub>GS</sub> =-10V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =-20A	---	18	---	ns
T <sub>r</sub>	Rise Time		---	20	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	200	---	
T <sub>f</sub>	Fall Time		---	120	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz	---	6095	---	pF
C <sub>oss</sub>	Output Capacitance		---	1080	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	430	---	

**Diode Characteristics**

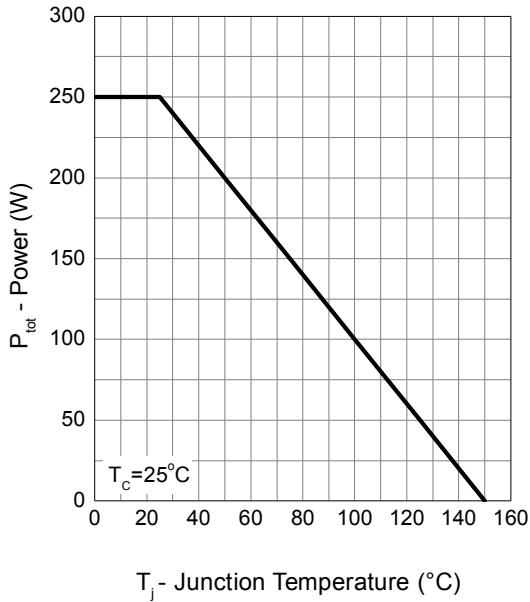
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,6</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	-80	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,6</sup>		---	---	-160	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, T <sub>J</sub> =25°C	---	---	-1.2	V
t <sub>rr</sub>	Reverse Recovery Time	IF=-20A, dI/dt=100A/μs, T <sub>J</sub> =25°C	---	30	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	20	---	nC

Note :

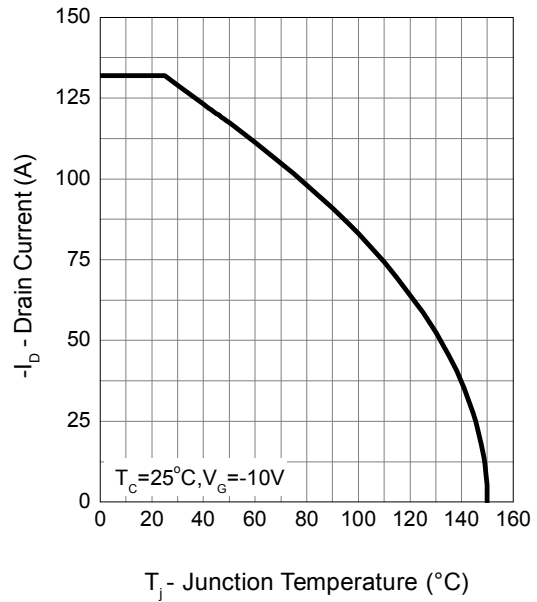
- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper, t<10sec.
- 2.The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- 3.The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=-25V, V<sub>GS</sub>=-10V, L=0.1mH, I<sub>AS</sub>=-30A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The Min. value is 100% EAS tested guarantee.
- 6.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

**Typical Characteristics**

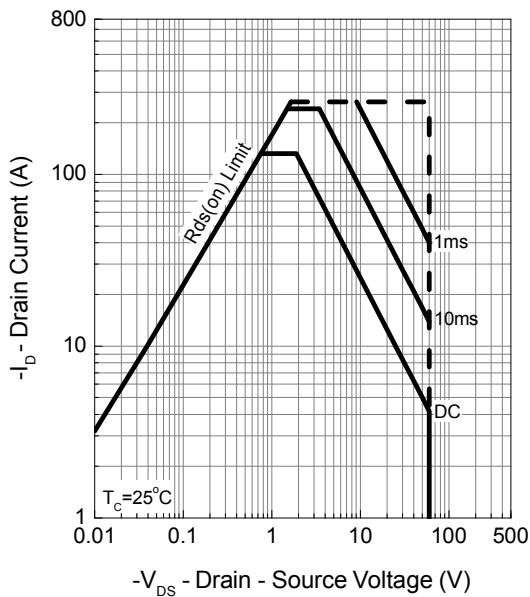
**Power Dissipation**



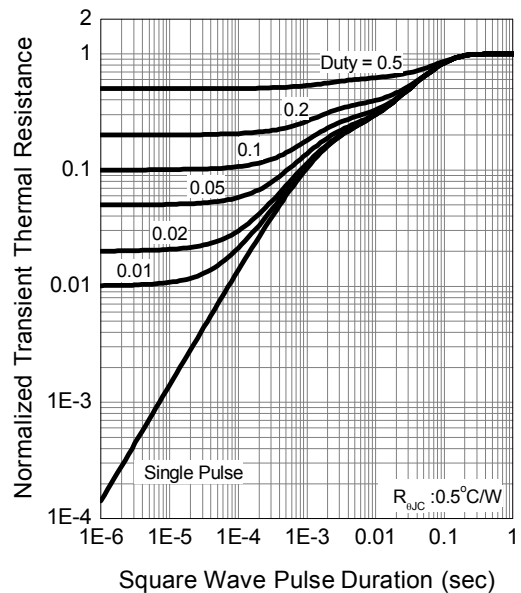
**Drain Current**



**Safe Operation Area**

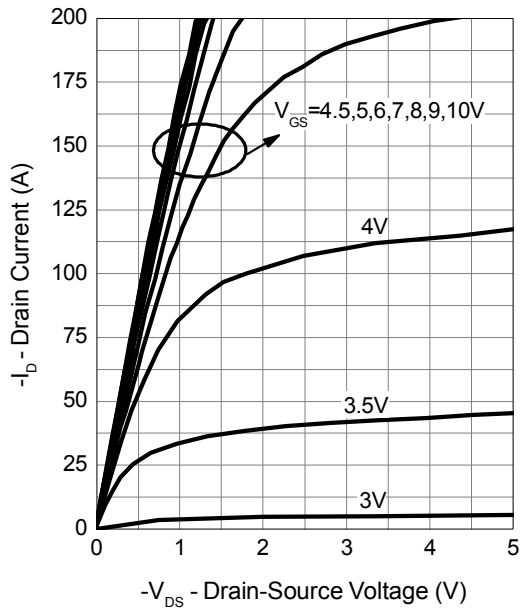


**Thermal Transient Impedance**

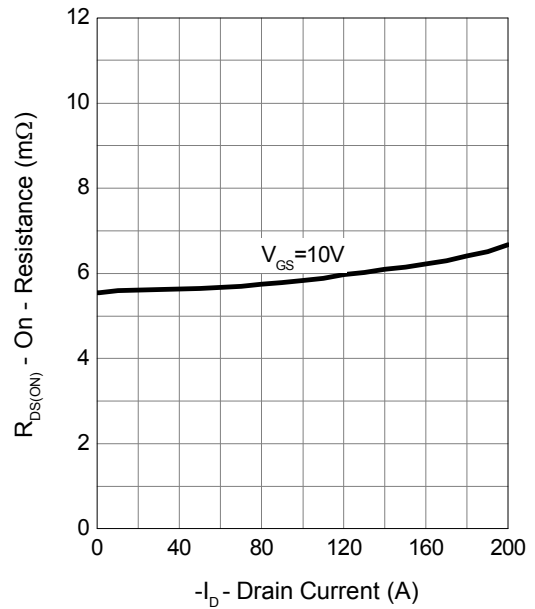


**Typical Characteristics**

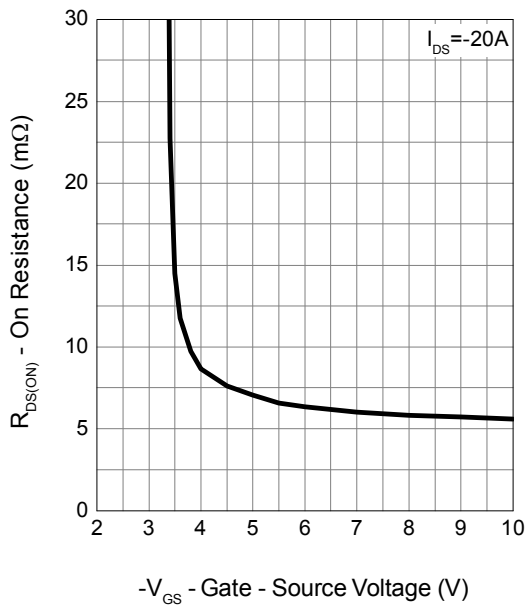
**Output Characteristics**



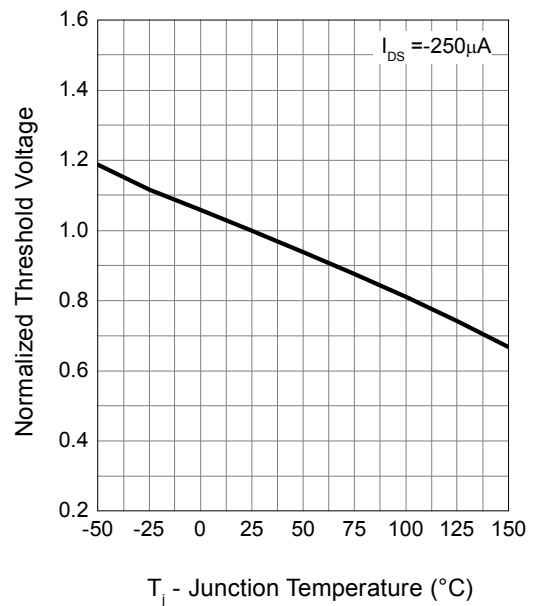
**Drain-Source On Resistance**



**Gate-Source On Resistance**

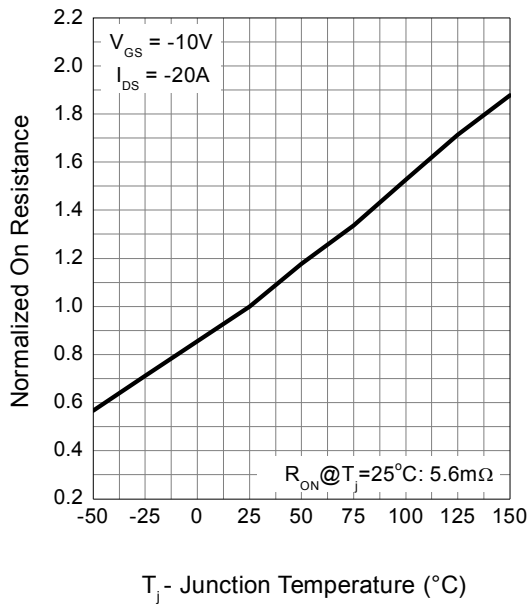


**Gate Threshold Voltage**

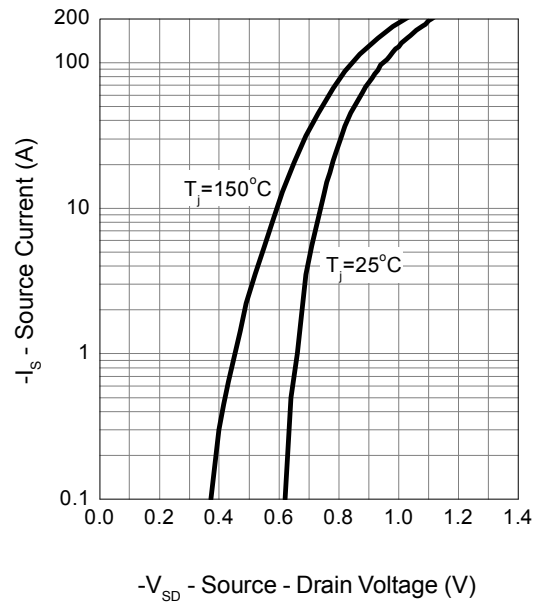


**Typical Characteristics**

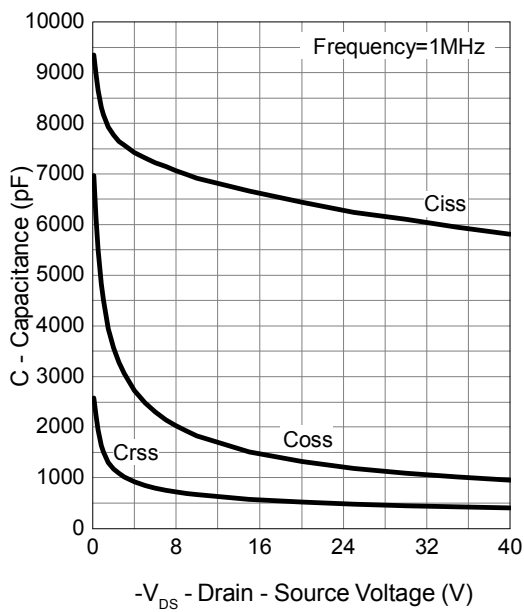
**Drain-Source On Resistance**



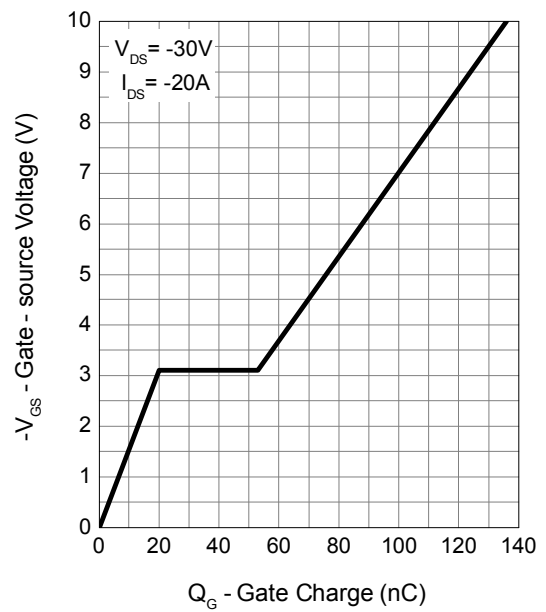
**Source-Drain Diode Forward**



**Capacitance**



**Gate Charge**





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