

General Description

The WSR58P06 is the highest performance trench P-Ch MOSFET with extreme high cell density, which provide excellent R_{DSON} and gate charge for most of the synchronous buck converter applications.

The WSR58P06 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

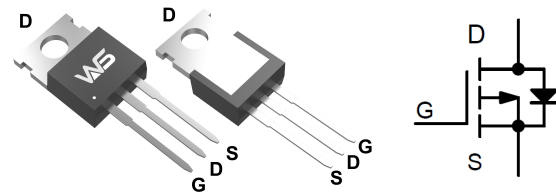
Product Summary

BV_{DSS}	R_{DSON}	I_D
-60V	30m Ω	-45A

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	± 25	V
I_D	Continuous Drain Current, V_{GS} @ -10V; $T_C=25^\circ\text{C}$	-45	A
	Continuous Drain Current, V_{GS} @ -10V; $T_C=100^\circ\text{C}$	-25	A
I_S	Diode Continuous Forward Current	-45	A
I_{AS}	Avalanche Energy, Single pulse ;L=1mH	-18	A
E_{AS}	Avalanche Energy, Single pulse;;L=1mH	81	mJ
I_{DP}	Pulse Drain Current Tested ; $T_C=25^\circ\text{C}$	-80	A
P_D	Maximum Power Dissipation; $T_C=25^\circ\text{C}$	54	W
	Maximum Power Dissipation; $T_C=100^\circ\text{C}$	21	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 ¹	---	62.5	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹ (t \leq 10s)	---	50	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	2.3	$^\circ\text{C/W}$

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_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	-60	---	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =-1mA	---	-0.018	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =-10V, I _D =-10A	---	30	47	mΩ
		V _{GS} =-4.5V, I _D =-5A	---	42	58	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	-1.4	-2.2	-3.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	5.04	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =-48V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =-48V, V _{GS} =0V, T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±25V, V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =-5V, I _D =-2A	---	18	---	S
Q _g	Total Gate Charge (-4.5V)	V _{DS} =-25V, V _{GS} =-4.5V, I _D =-10A	---	24	---	nC
Q _{gs}	Gate-Source Charge		---	5.3	---	
Q _{gd}	Gate-Drain Charge		---	6.4	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =-25V, V _{GS} =-10V, R _G =3.3Ω, I _D =-1A	---	9	---	ns
T _r	Rise Time		---	6	---	
T _{d(off)}	Turn-Off Delay Time		---	48	---	
T _f	Fall Time		---	27	---	
C _{iss}	Input Capacitance	V _{DS} =-25V, V _{GS} =0V, f=1MHz	---	1350	---	pF
C _{oss}	Output Capacitance		---	180	---	
C _{rss}	Reverse Transfer Capacitance		---	85	---	

Diode Characteristics

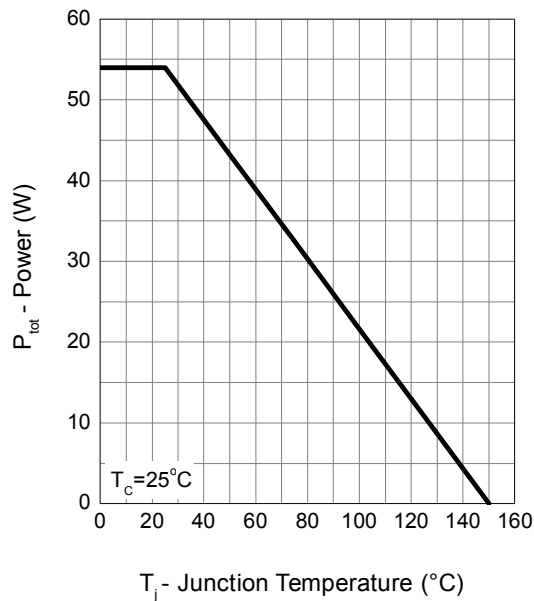
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,6}	V _G =V _D =0V, Force Current	---	---	-45	A
I _{SM}	Pulsed Source Current ^{2,6}		---	---	-80	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =-1A, T _J =25°C	---	---	-1.2	V
t _{rr}	Reverse Recovery Time	IF=-12A, dI/dt=100A/μs, T _J =25°C	---	31	---	nS
Q _{rr}	Reverse Recovery Charge		---	35	---	nC

Note :

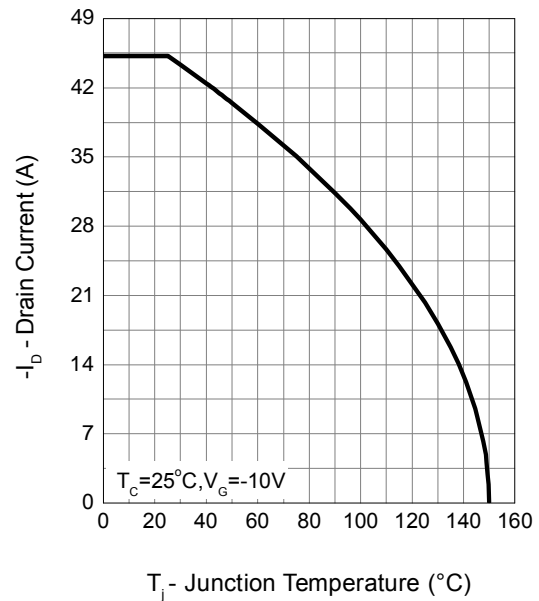
- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, t<10sec.
- 2.The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- 3.The EAS data shows Max. rating. The test condition is V_{DD}=-25V, V_{GS}=-10V, L=0.5mH, I_{AS}=-18A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The Min. value is 100% EAS tested guarantee.
- 6.The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

Typical Operating Characteristics

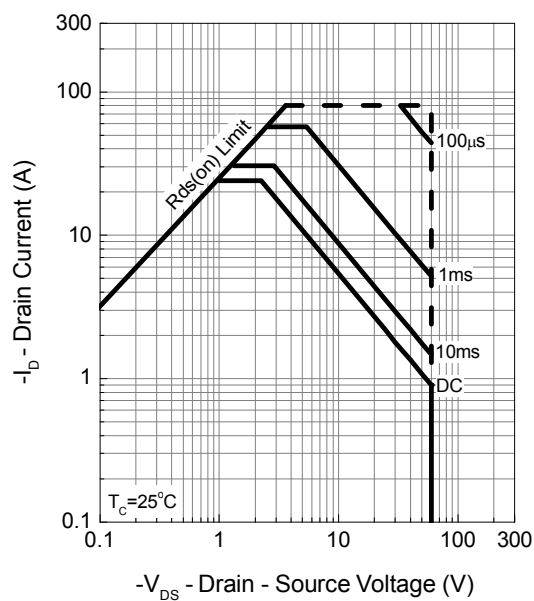
Power Dissipation



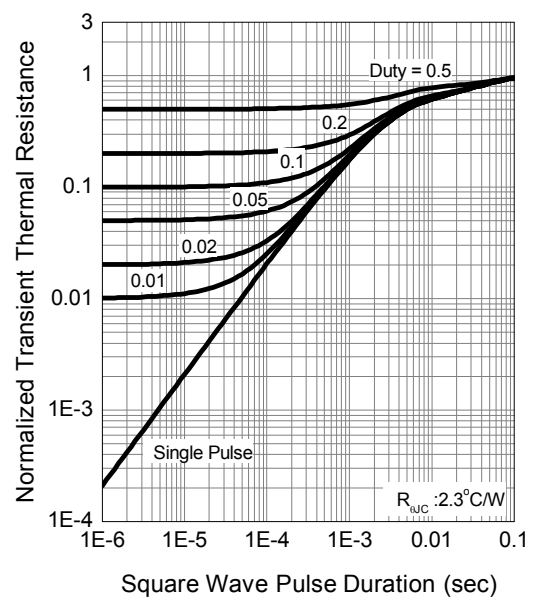
Drain Current



Safe Operation Area

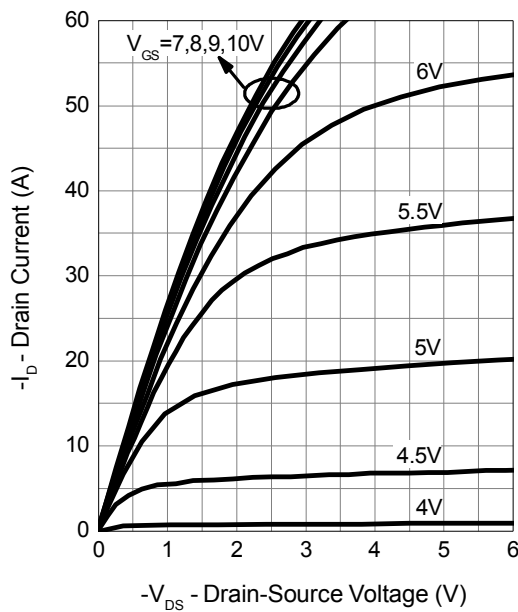


Thermal Transient Impedance

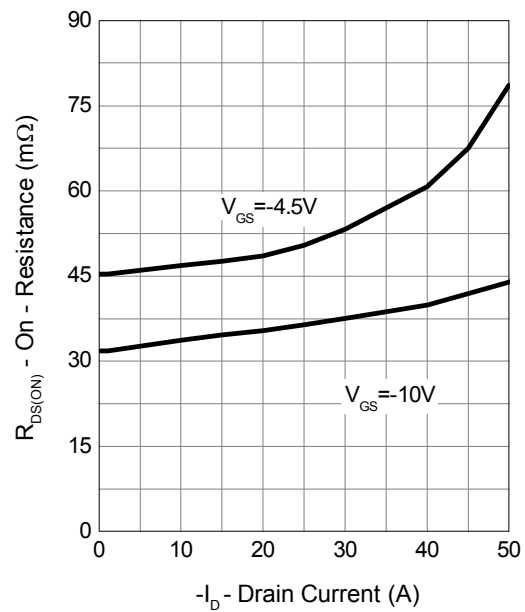


Typical Operating Characteristics

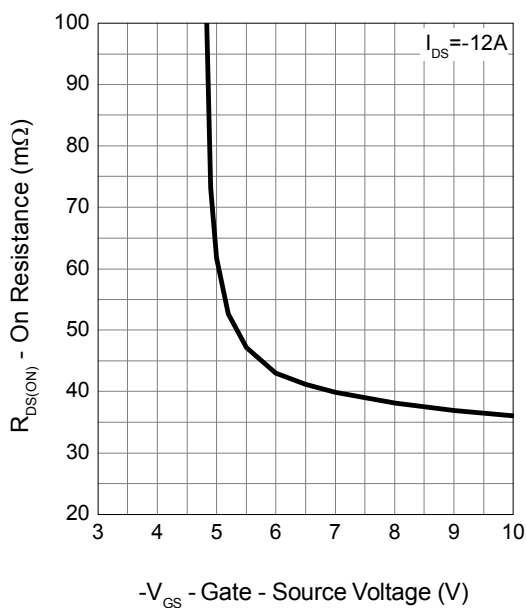
Output Characteristics



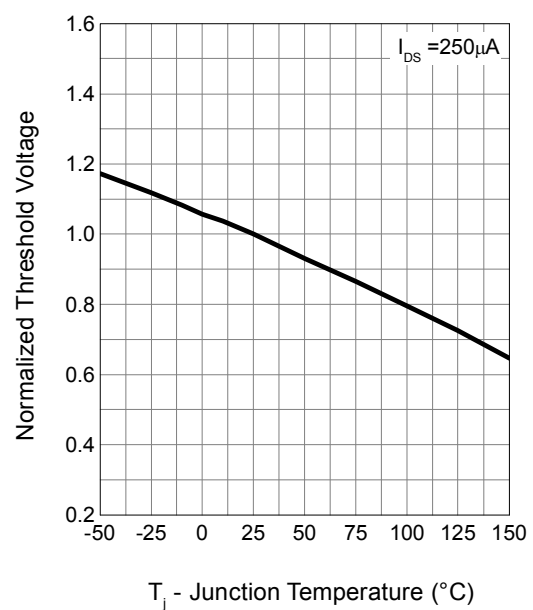
Drain-Source On Resistance



Gate-Source On Resistance

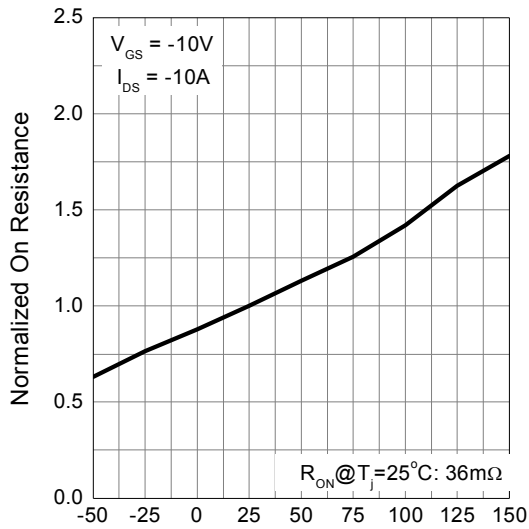


Gate Threshold Voltage



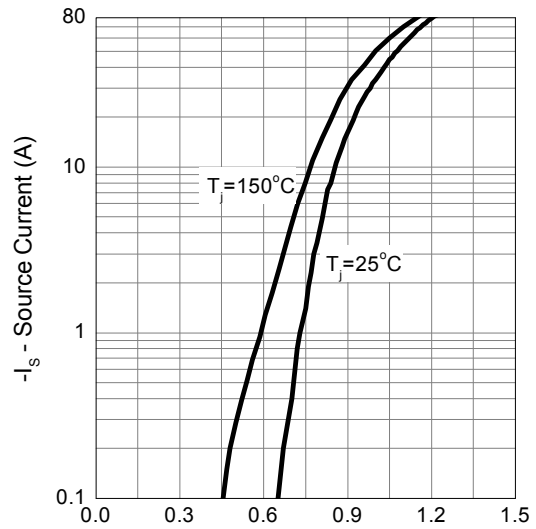
Typical Operating Characteristics

Drain-Source On Resistance



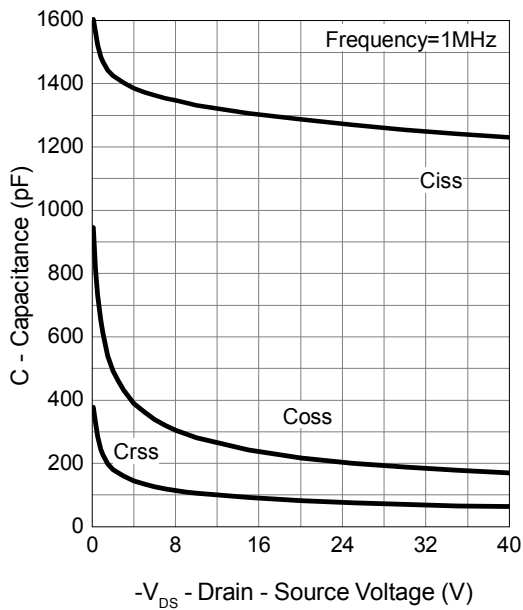
T_j - Junction Temperature (°C)

Source-Drain Diode Forward



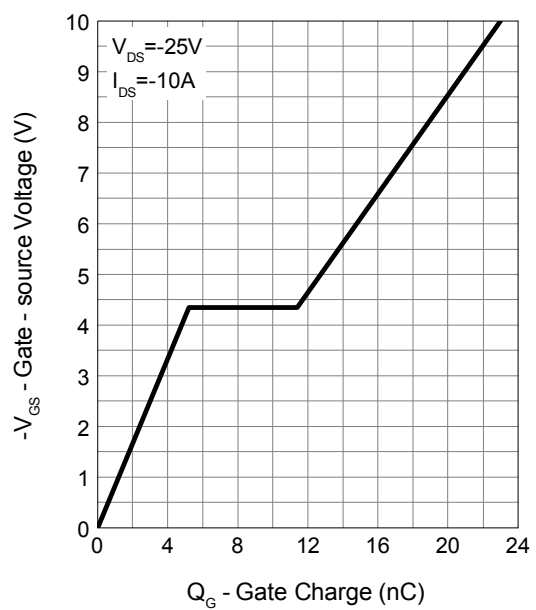
$-V_{SD}$ - Source - Drain Voltage (V)

Capacitance



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

Gate Charge



Q_g - Gate Charge (nC)



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