

## General Description

The WSP4068 is the highest performance trench N-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 WSP4068 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

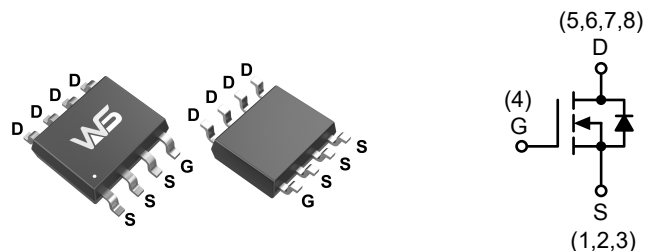
## Product Summary

$BV_{DSS}$	$R_{DS(on)}$	$I_D$
40V	13.5m $\Omega$	10A

## Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch

## SOP-8L Pin Configuration



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	40	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	10	A
$I_D@T_C=70^{\circ}C$	Continuous Drain Current, $V_{GS} @ 10V^1$	9	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	30	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	26	mJ
$I_{AS}$	Avalanche Current	23	A
$P_D@T_A=25^{\circ}C$	Total Power Dissipation <sup>4</sup>	2.08	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
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	---	65	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	20	$^{\circ}C/W$

**Electrical Characteristics ( $T_J=25^\circ\text{C}$ , unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	$BV_{DSS}$ Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=1mA$	---	0.024	---	V/ $^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=10V, I_D=12A$	---	13.5	16.5	m $\Omega$
		$V_{GS}=4.5V, I_D=10A$	---	19	24.5	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.5	1.8	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5.07	---	mV/ $^\circ\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=24V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	$\mu A$
		$V_{DS}=24V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	30	
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA
$g_{fs}$	Forward Transconductance	$V_{DS}=5V, I_D=8A$	---	31	---	S
$R_g$	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1MHz$	---	1.1	1.8	$\Omega$
$Q_g$	Total Gate Charge (4.5V)	$V_{DS}=15V, V_{GS}=4.5V, I_D=12A$	---	9.4	---	nC
$Q_{gs}$	Gate-Source Charge		---	3.9	---	
$Q_{gd}$	Gate-Drain Charge		---	3.0	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=15V, V_{GS}=10V, R_G=6\Omega$ $I_D=1A, R_L=15\Omega$	---	10	14	ns
$T_r$	Rise Time		---	12	17	
$T_{d(off)}$	Turn-Off Delay Time		---	6	12	
$T_f$	Fall Time		---	23	42	
$C_{iss}$	Input Capacitance	$V_{DS}=15V, V_{GS}=0V, f=1MHz$	---	1125	1200	pF
$C_{oss}$	Output Capacitance		---	132	183	
$C_{rss}$	Reverse Transfer Capacitance		---	70	110	

**Guaranteed Avalanche Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy <sup>5</sup>	$V_{DD}=25V, L=0.1mH, I_{AS}=23A$	---	26	---	mJ

**Diode Characteristics**

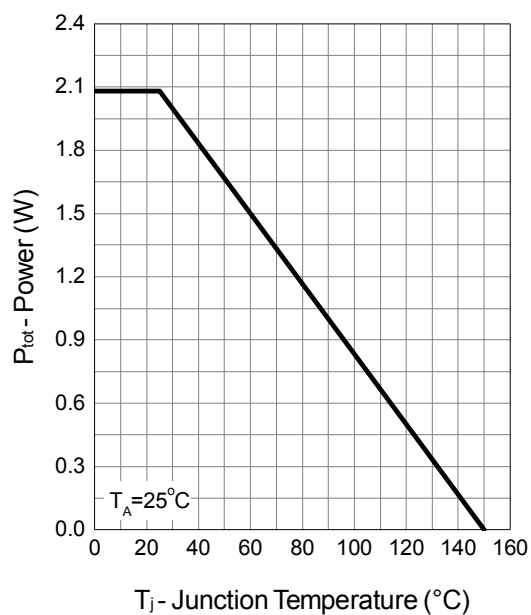
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current <sup>1,6</sup>	$V_G=V_D=0V$ , Force Current	---	---	8	A
$I_{SM}$	Pulsed Source Current <sup>2,6</sup>		---	---	38	A
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1.1	V
$t_{rr}$	Reverse Recovery Time	$I_F=12A, dI/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	15	---	nS
$Q_{rr}$	Reverse Recovery Charge		---	9.5	---	nC

Note :

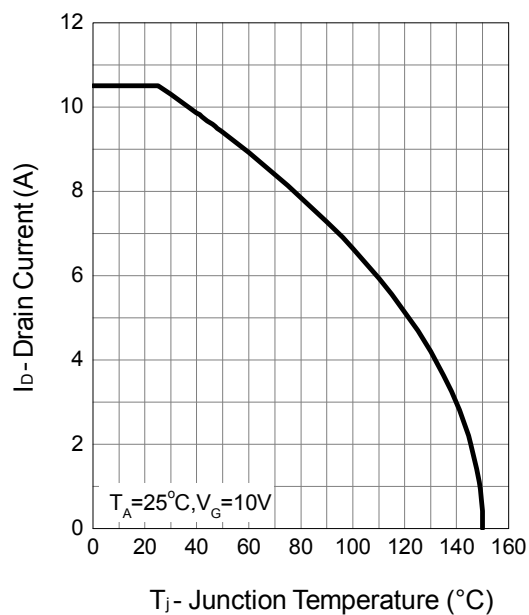
- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper,  $t<10\text{sec}$ .
- 2.The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is  $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=23A$
- 4.The power dissipation is limited by  $150^\circ\text{C}$  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 Characteristics

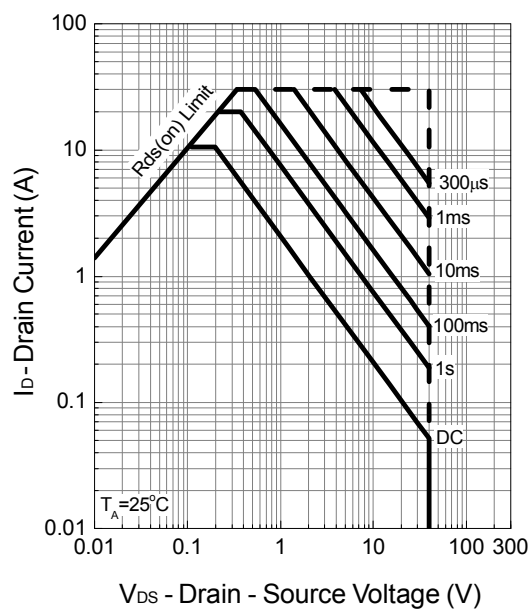
**Power Dissipation**



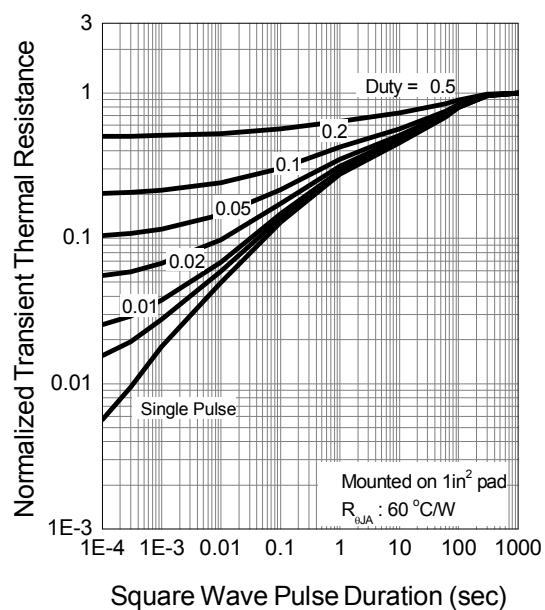
**Drain Current**



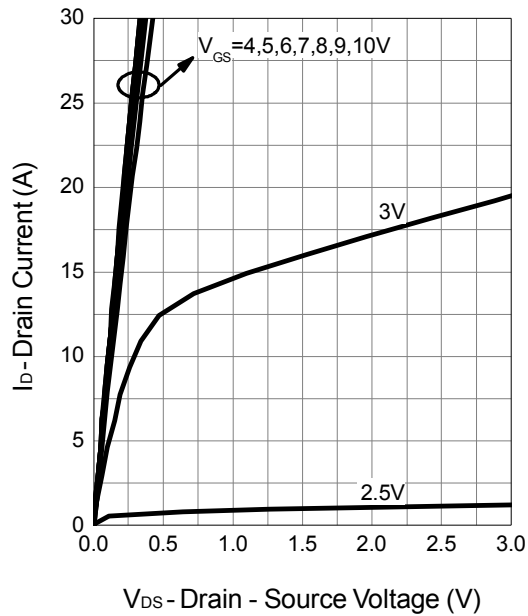
**Safe Operation Area**



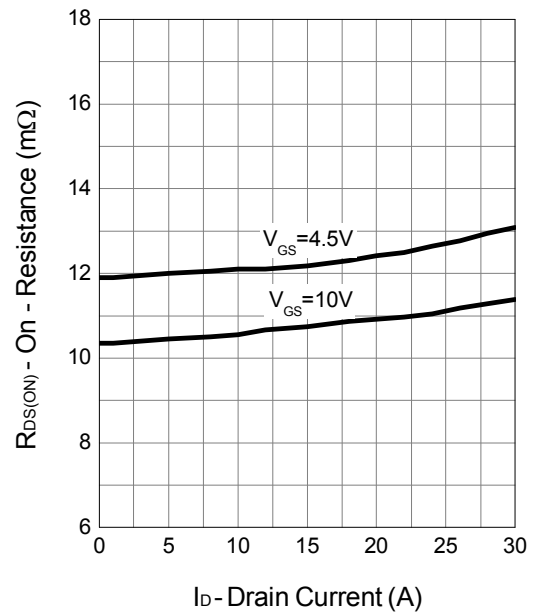
**Thermal Transient Impedance**



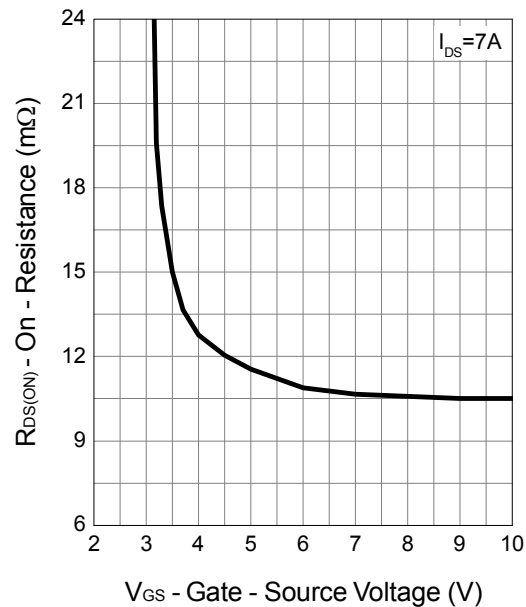
**Output Characteristics**



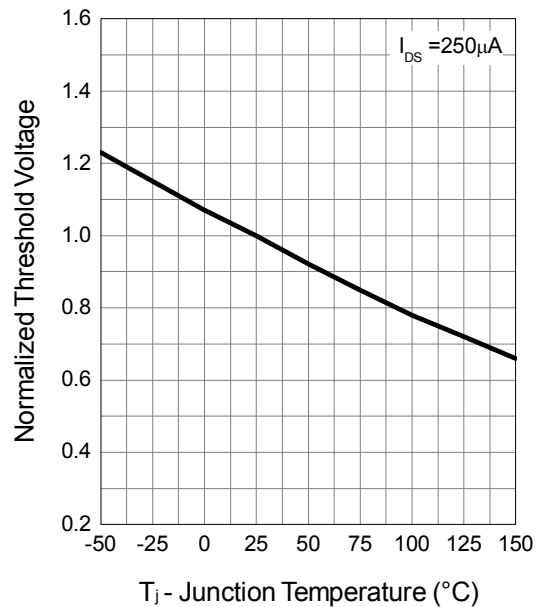
**Drain-Source On Resistance**



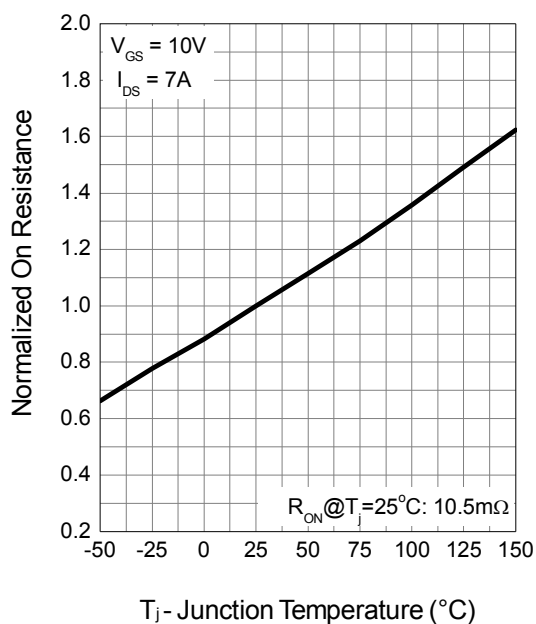
**Gate-Source On Resistance**



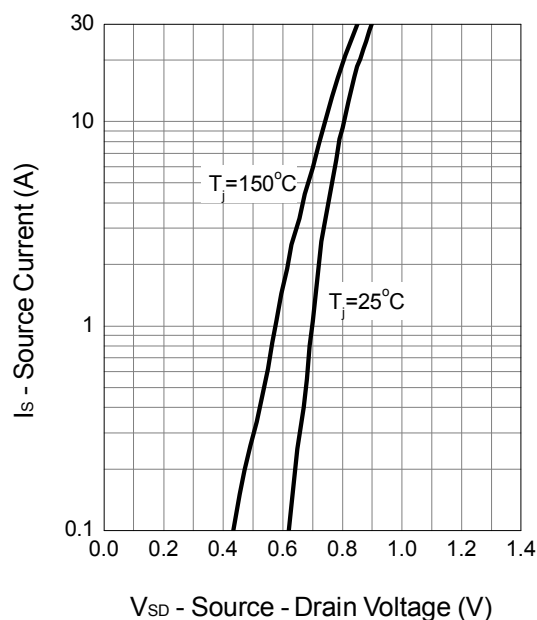
**Gate Threshold Voltage**



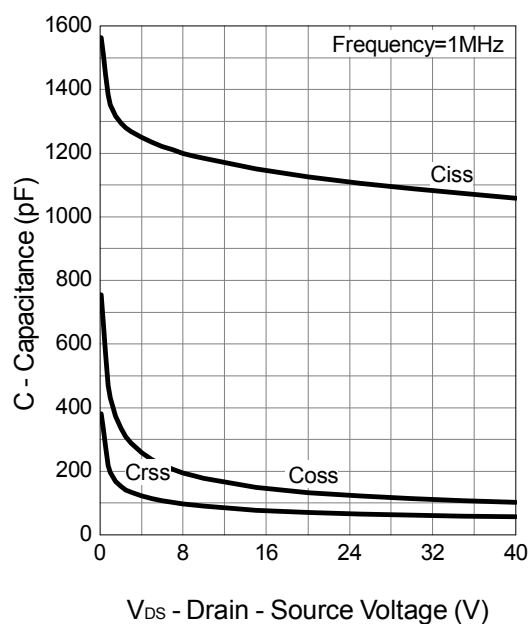
**Drain-Source On Resistance**



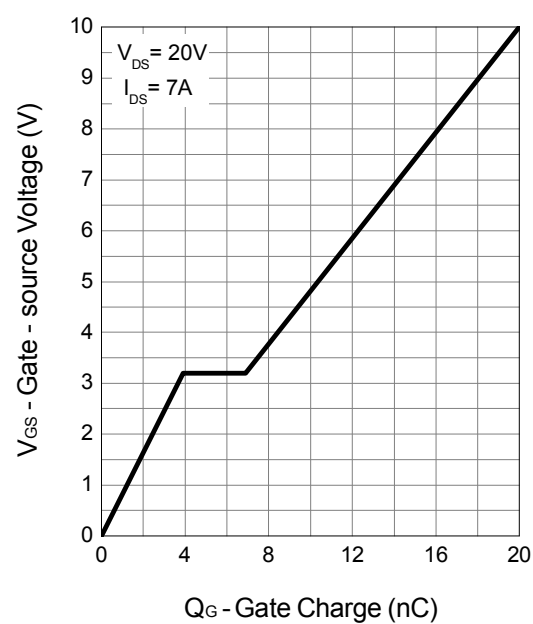
**Source-Drain Diode Forward**

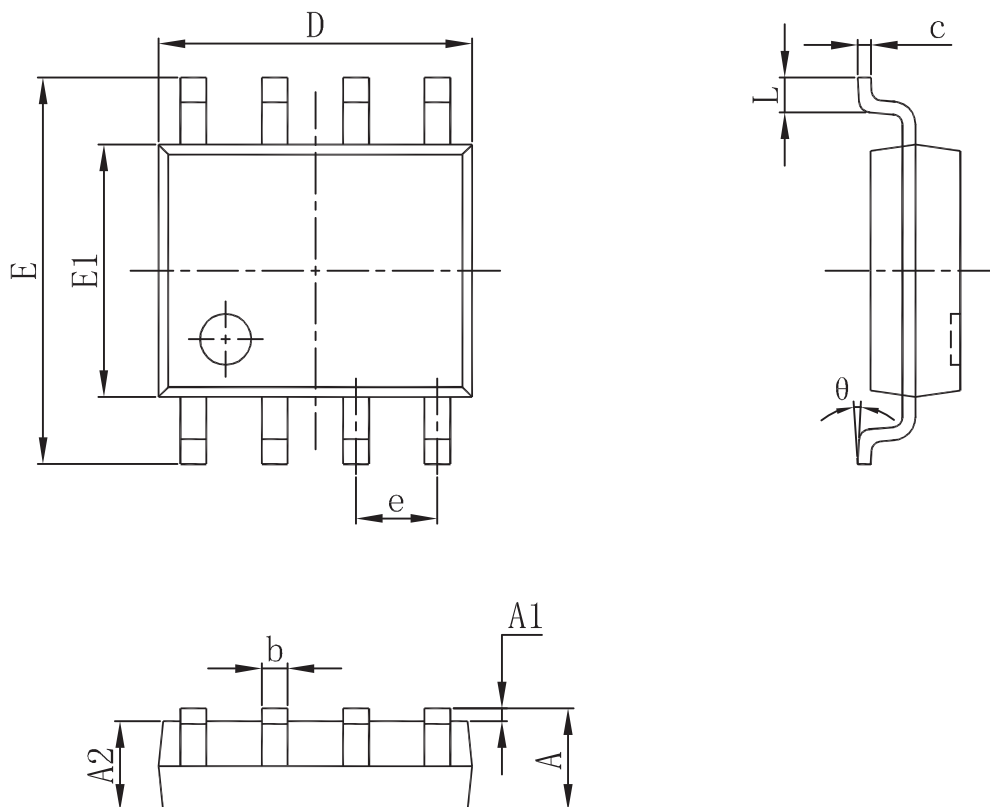


**Capacitance**



**Gate Charge**



**Packaging information**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

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