

## General Description

The WSE9978 is the highest performance trench P-Channel MOSFET with extreme high cell density, which provide excellent  $R_{DS(ON)}$  and gate charge for most of the synchronous buck converter applications.

The WSE9978 meet the RoHS and Green Product requirement, 100%  $E_{AS}$  guaranteed with full function reliability approved.

## Features

- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

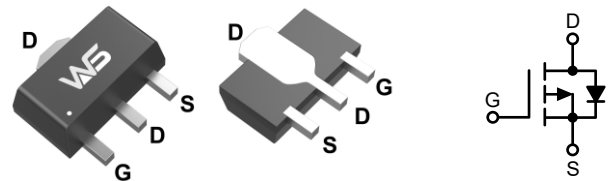
## Product Summary

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$
-100V	135m $\Omega$	-7A

## Applications

- Power Management in Desktop Computer or DC/DC Converters.

## SOT-89-3L Pin Configuration



## Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$ , Unless Otherwise Noted)

Symbol	Parameter	Rating	Units	
$V_{DS}$	Drain-Source Voltage	-100	V	
$V_{GS}$	Gate-Source Voltage	$\pm 20$		
$I_D$	Continuous Drain Current	$T_C=25^\circ\text{C}$	-7	A
		$T_C=100^\circ\text{C}$	-5	
$I_{DP}$	300 $\mu\text{s}$ Pulse Drain Current Tested	$T_C=25^\circ\text{C}$	-21	A
		$T_C=100^\circ\text{C}$	-15	
$P_D$	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	25	W
		$T_C=100^\circ\text{C}$	1.0	
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
$T_J$	Maximum Junction Temperature	150		
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	$t \leq 10\text{s}$	50	$^\circ\text{C/W}$
		Steady state	75	

**Electrical Characteristics (T<sub>A</sub>=25°C, Unless Otherwise Noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	-100	---	---	V
R <sub>DS(ON)</sub> <sup>2</sup>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-7A	---	135	150	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-5A	---	145	170	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250μA	-1.0	-1.7	-2.5	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-80V, V <sub>GS</sub> =0V	---	---	-1.0	μA
		T <sub>J</sub> =85°C	---	---	-30	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =-50V, V <sub>GS</sub> =-10V, I <sub>DS</sub> =-2.5A	---	20	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	3.3	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	3.3	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =-30V, R <sub>L</sub> =30Ω, I <sub>DS</sub> =-1A, V <sub>GEN</sub> =-10V, R <sub>G</sub> =6Ω	---	10	---	ns
T <sub>r</sub>	Turn-On Rise Time		---	5	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	68	---	
T <sub>f</sub>	Turn-Off Fall Time		---	58	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V, f=1.0MHz	---	1050	---	pF
C <sub>oss</sub>	Output Capacitance		---	65	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	35	---	

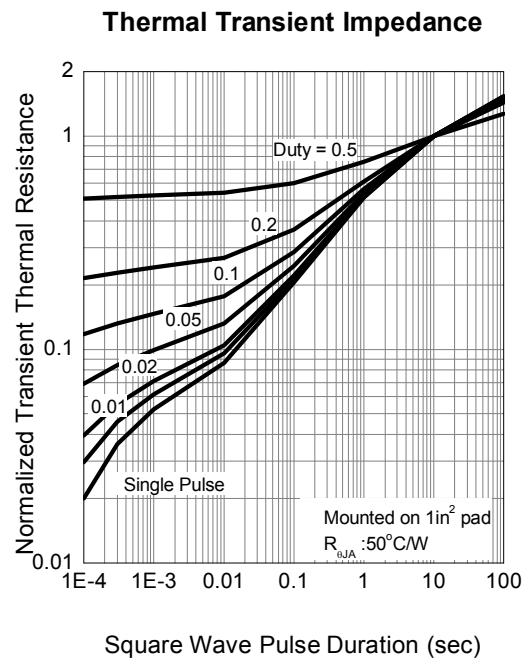
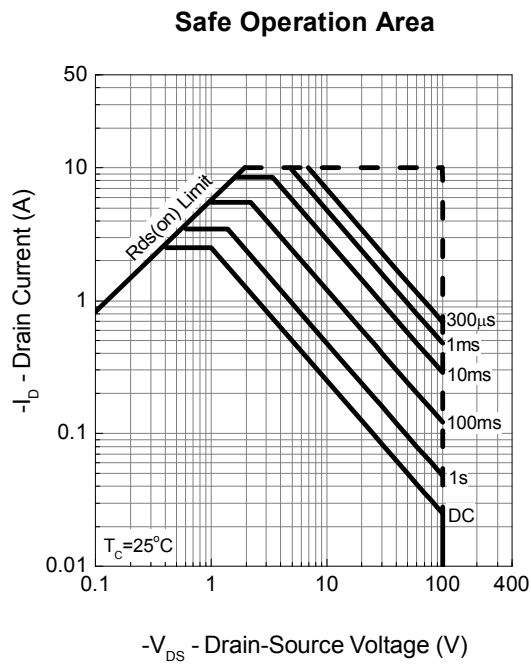
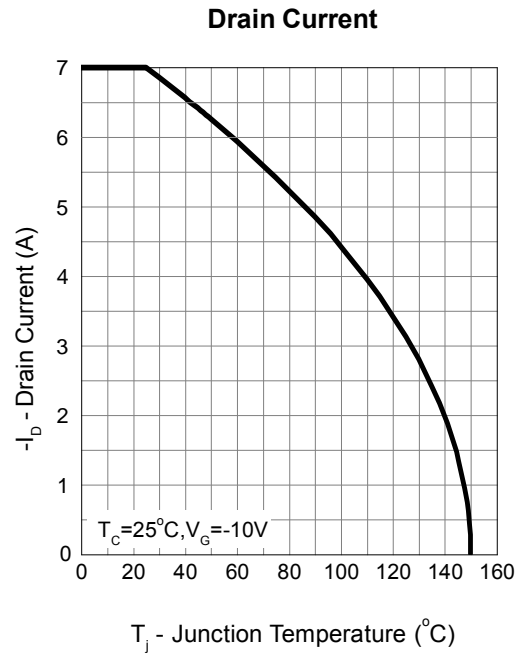
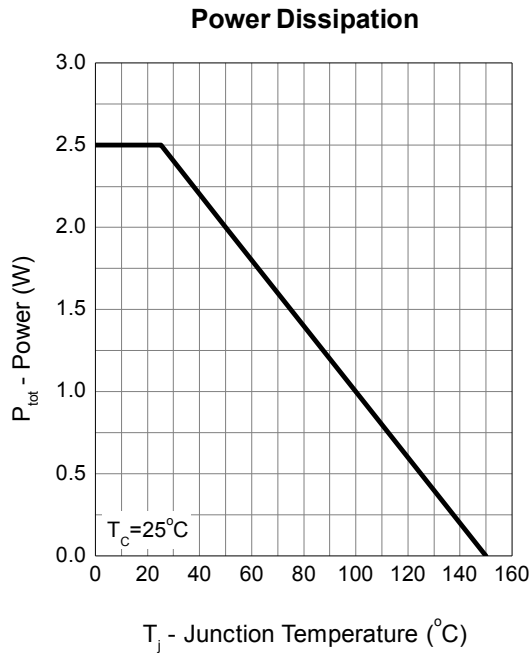
**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I <sub>S</sub>	Diode Continuous Forward Current		---	---	-7	A
V <sub>SD</sub> <sup>2</sup>	Diode Forward Voltage	I <sub>SD</sub> =-1A, V <sub>GS</sub> =0V	---	-0.75	-1.1	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>DS</sub> =-2.5A, di <sub>SD</sub> /dt=100A/μs	---	30	---	ns
Q <sub>rr</sub>	Reverse Recovery Charge		---	33	---	nC

Note:

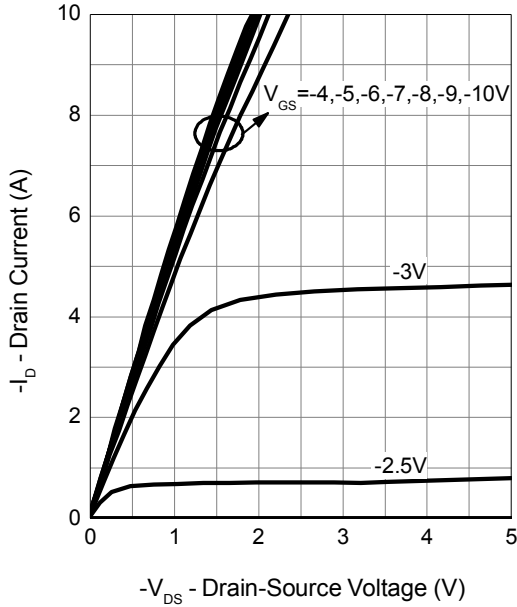
1. Current limited by bond wire.
2. Pulse test ; pulse width≤300μs, duty cycle≤2%.
3. Guaranteed by design, not subject to production testing.

**Typical Characteristics**

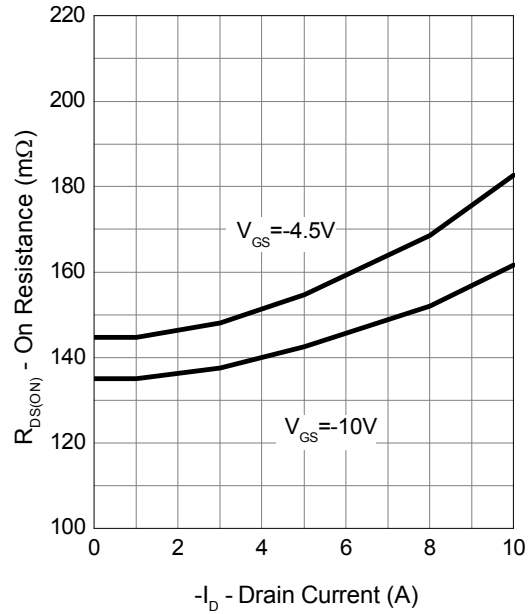


**Typical Characteristics (Cont.)**

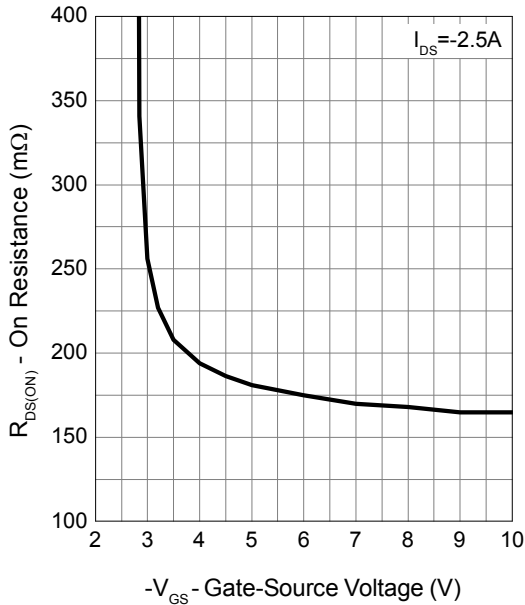
**Output Characteristics**



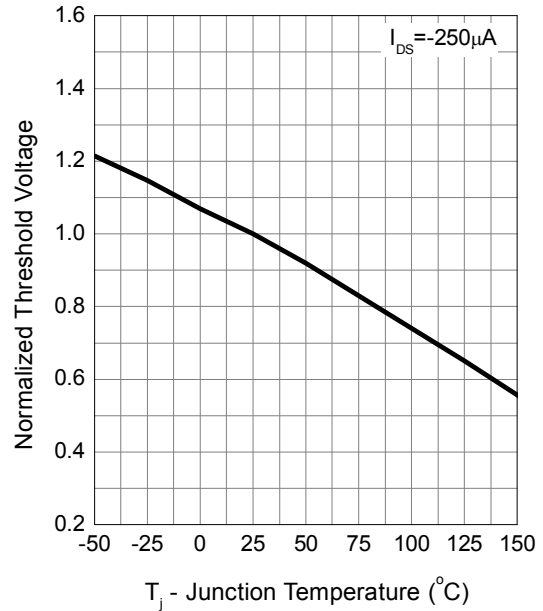
**Drain-Source On Resistance**



**Gate-Source On Resistance**

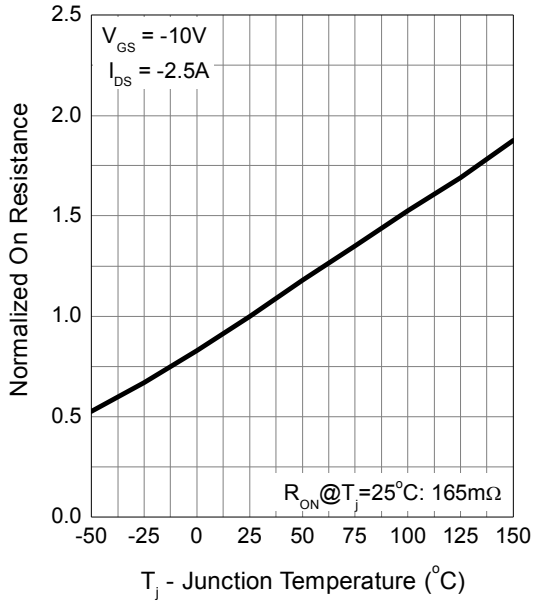


**Gate Threshold Voltage**

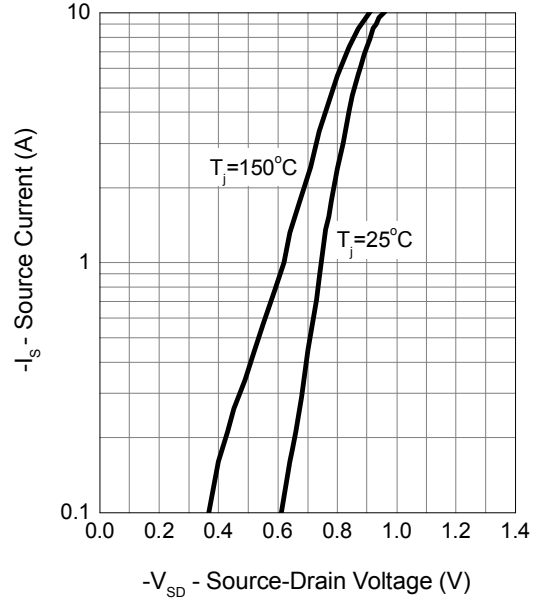


**Typical Characteristics (Cont.)**

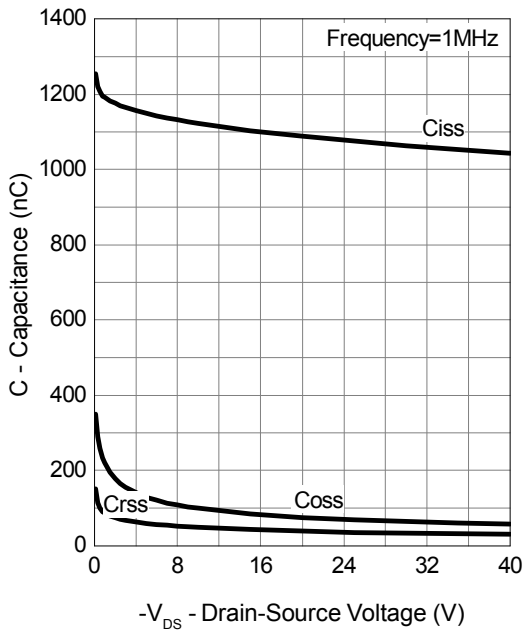
**Drain-Source On Resistance**



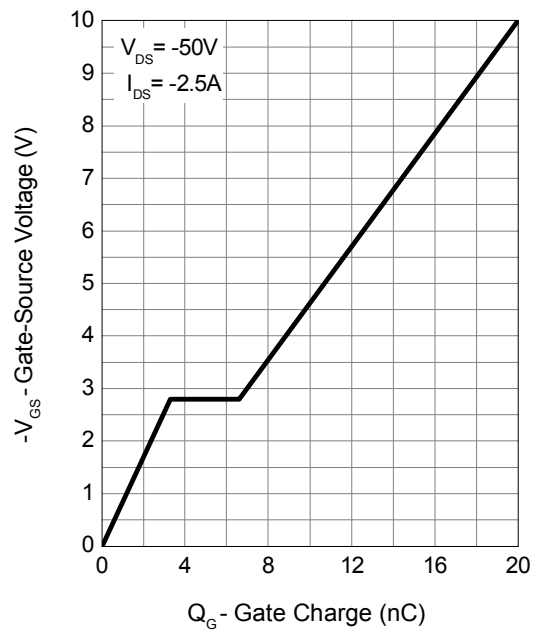
**Source-Drain Diode Forward**

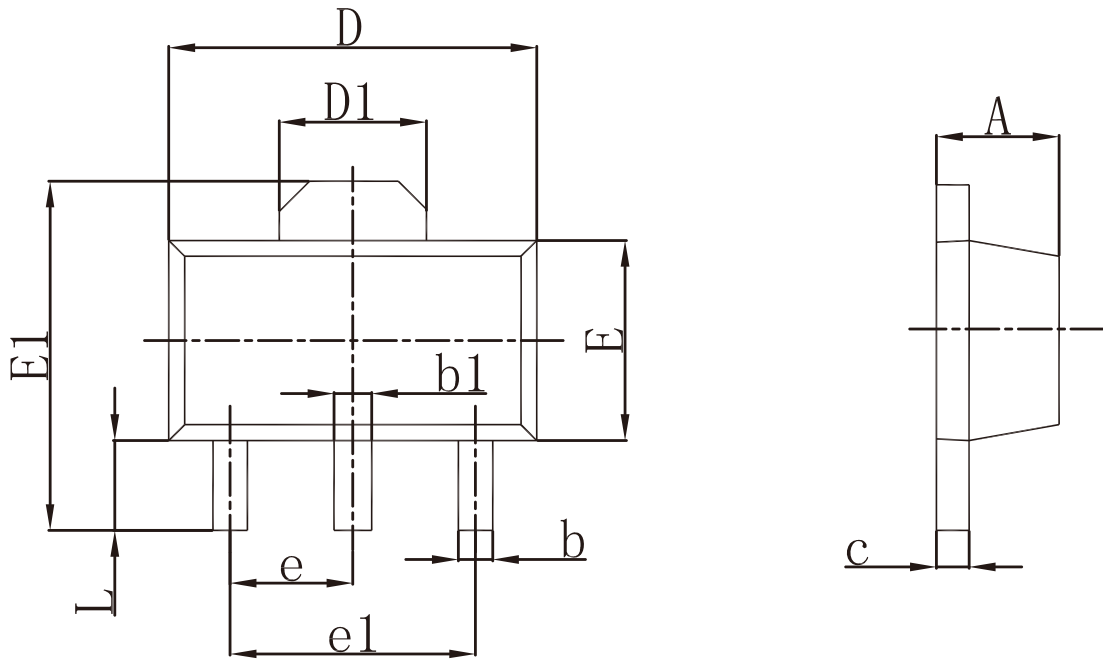


**Capacitance**



**Gate Charge**



**Packaging information**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047

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