

### Description

The HSSN3139 is the high cell density trenched P-ch MOSFETs, which provide excellent  $R_{DS(ON)}$  and gate charge for most of the synchronous buck converter applications.

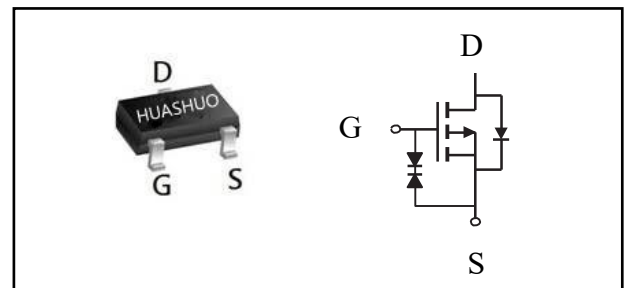
The HSSN3139 meet the RoHS and Green Product requirement with full function reliability approved.

- Super Low Gate Charge
- Low Threshold
- High-Side Switching
- Advanced high cell density Trench technology

### Product Summary

$V_{DS}$	-20	V
$R_{DS(ON),Max}$	630	m $\Omega$
$I_D$	-0.5	A

### SOT 323 Pin Configurations



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 8$	V
$I_D@T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V_1$	-0.5	A
$I_{DM}$	Pulsed Drain Current <sub>2</sub>	-2	A
$P_D@T_A=25^\circ C$	Total Power Dissipation <sub>3</sub>	0.35	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 <sub>1</sub>	---	357	$^\circ C/W$



**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	-20	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =-1mA	---	-0.014	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-0.5A	---	560	630	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-0.3A	---	790	900	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-0.5	-0.67	-1.1	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	3.95	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	-1	uA
		V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	-5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±10V, V <sub>DS</sub> =0V	---	---	±20	nA
Q <sub>g</sub>	Total Gate Charge (-4.5V)	V <sub>DS</sub> =-10V, V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-0.5A	---	1	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	0.2	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	0.26	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =-10V, V <sub>GS</sub> =-4.5V, R <sub>G</sub> =1Ω, I <sub>D</sub> =-0.5A	---	9	---	ns
T <sub>r</sub>	Rise Time		---	10	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	10	---	
T <sub>f</sub>	Fall Time		---	8	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V, f=1MHz	---	45	---	pF
C <sub>oss</sub>	Output Capacitance		---	15	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	10	---	

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
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

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The power dissipation is limited by 150°C junction temperature
- 4.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.

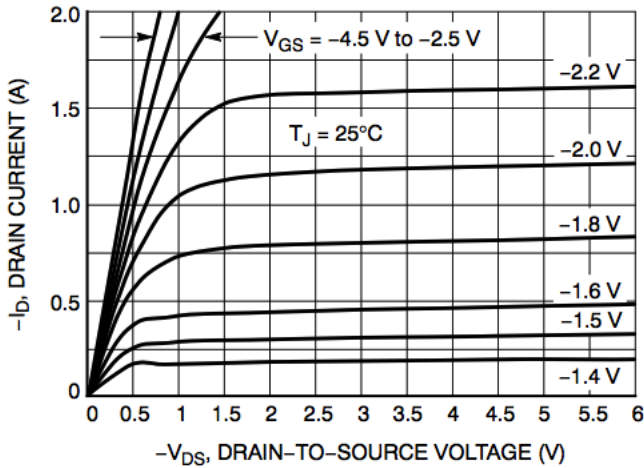


Figure 1. On-Region Characteristics

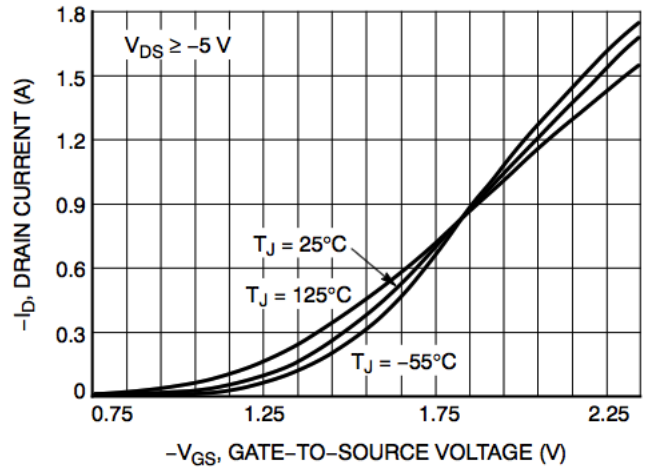


Figure 2. Transfer Characteristics

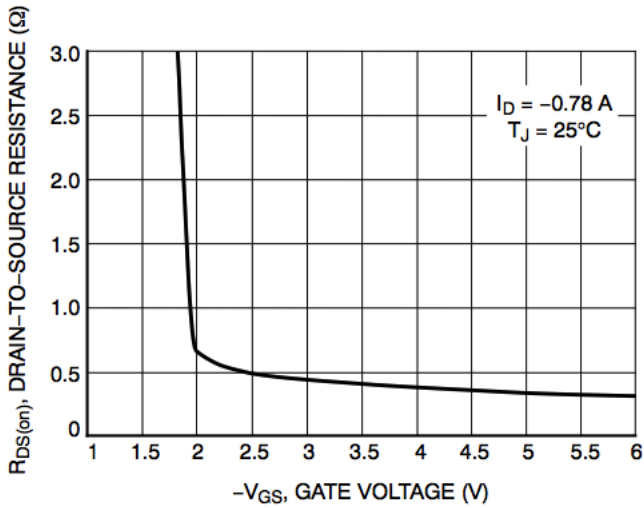


Figure 3. On-Resistance vs. Gate-to-Source Voltage

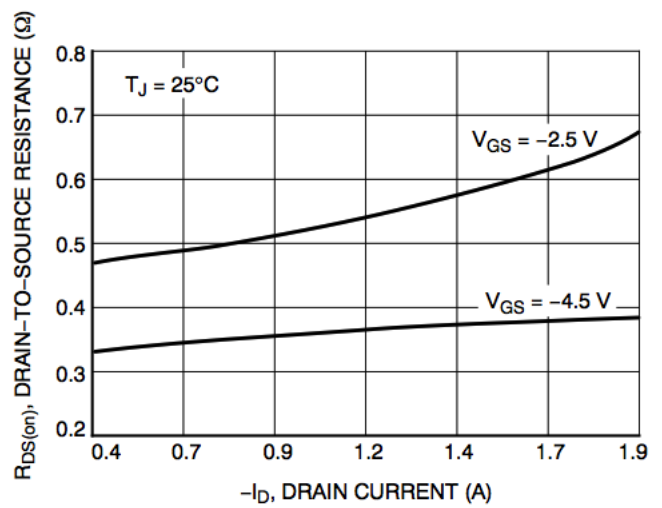


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

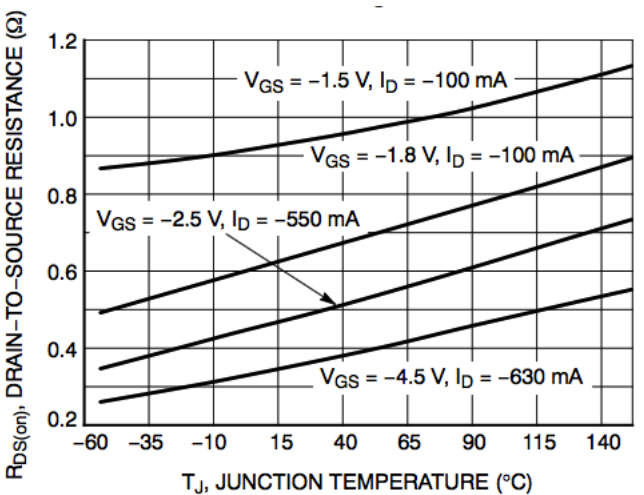


Figure 5. On-Resistance Variation with Temperature

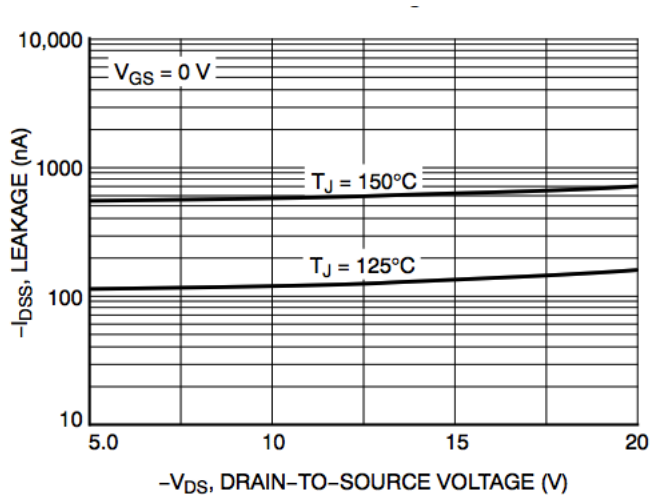
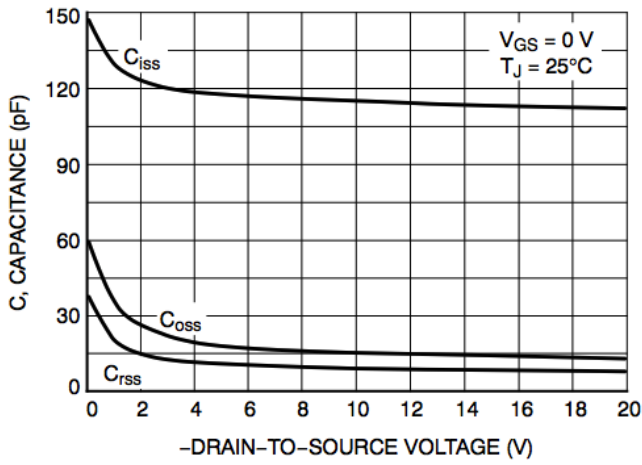
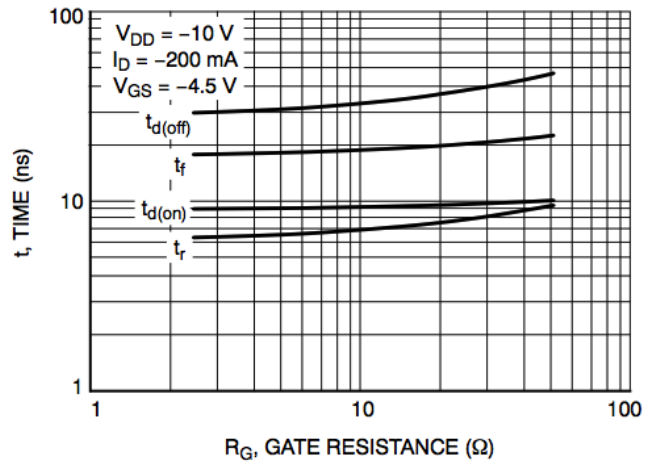


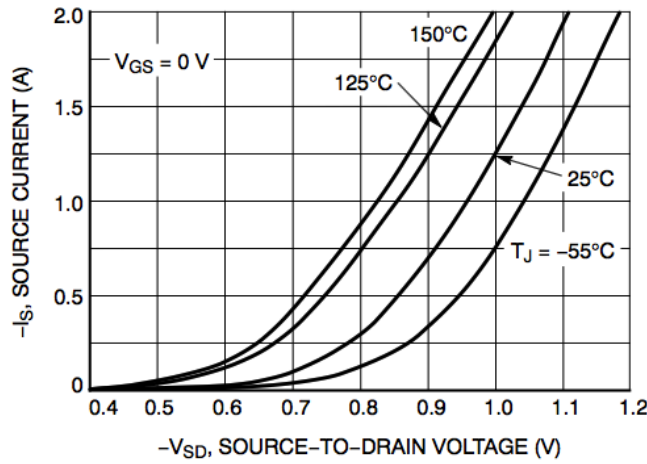
Figure 6. Drain-to-Source Leakage Current vs. Voltage



**Figure 7. Capacitance Variation**



**Figure 8. Resistive Switching Time Variation vs. Gate Resistance**

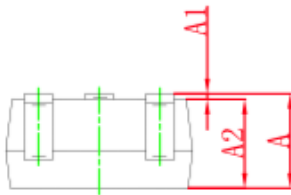
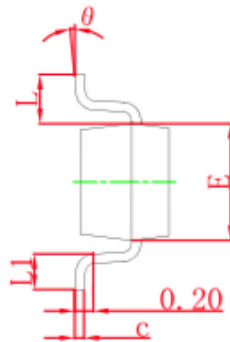
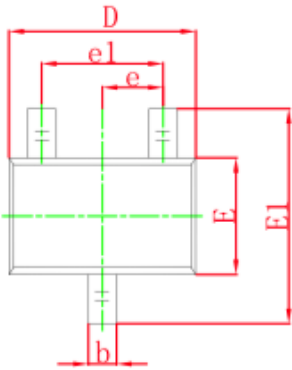


**Figure 9. Diode Forward Voltage vs. Current**



## Ordering Information

Part Number	Package code	Packaging
HSSN3139	SOT-323	3000/Tape&Reel



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.200	0.400	0.008	0.016
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
$\theta$	0°	8°	0°	8°