onsemi

DIE DATA SHEET
www.onsemi.com

MOSFET – Power, N-Channel

80 V, 1.0 mΩ

NVCW4LS001N08HA

Features

- Typical $R_{DS(on)}$ = 0.82 mΩ at V_{GS} = 10 V
- Typical $Q_{g(tot)}$ = 166 nC at V_{GS} = 10 V
- AEC−Q101 Qualified
- RoHS Compliant

DIMENSION (μm)

Die Size	6604 x 4445
Scribe Width	80
Source Attach Area	(6362 x 2059) x 2
Gate Attach Area	330 x 600
Die Thickness	101.6

Gate and Source : AlCu
Drain : Ti−Ni−Ag (back side of die)
Passivation : Polyimide
Wafer Diameter : 8 inch
Wafer Unsawn on UV Tape
Bad dice identified in Inking
Gross Die Count : 806

ORDERING INFORMATION

Device	Package
NVCW4LS001N08HA	Unsawn Wafer on Ring Frame

RECOMMENDED STORAGE CONDITIONS

Temperature	22 to 28°C
RH	40% to 66%

ELECTRICAL CHARACTERISTICS

The Chip is 100% Probed to Meet the Conditions and Limits Specified at T_J = 25°C

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	80	–	–	V
I_{DSS}	Drain to Source Leakage Current	V_{DS} = 80 V, V_{GS} = 0 V	–	–	10	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = 20 V, V_{DS} = 0 V	–	–	100	nA
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 650 μA	2.0	–	4.0	V
*$R_{DS(on)}$	Bare Die Drain to Source On Resistance	I_D = 50 A, V_{GS} = 10 V	–	0.82	1.0	mΩ

*Accurate RDS(on) test at die level is not feasible for this thin die as limited by the test contact precision attainable in a die form. The max RDS(on) specification is defined from the historical performance of the die in package but is not guaranteed by test in production. The die RDS(on) performance depends on the Source wire/ribbon bonding layout.

June, 2022 − Rev. 0

Publication Order Number:
NVCW4LS001N08HA/D

ABSOLUTE MAXIMUM RATINGS

in Reference to the NVBLS1D1N08H electrical data in TOLL (T_J = 25°C unless otherwise noted)

Symbol	Parameter		Ratings	Unit
V_{DSS}	Drain to Source Voltage		80	V
V_{GS}	Gate to Source Voltage		±20	V
I_D	Continuous Drain Current $R_{\theta JC}$ (Note 1, 2)	T_C = 25°C	351	A
		T_C = 100°C	248	A
P_D	Power Dissipation $R_{\theta JC}$ (Note 1)	T_C = 25°C	311	W
		T_C = 100°C	156	W
E_{AS}	Single Pulse Avalanche Energy ($I_{L(pk)}$ = 31.9 A)		1580	mJ
T_J, T_{STG}	Operating and Storage Temperature		–55 to +175	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case Steady State	0.48	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient Steady State (Note 3)	35.8	°C/W

3. Surface−mounted on FR4 board using a 650 mm^2, 2 oz. Cu pad.

ELECTRICAL CHARACTERISTICS

in Reference to the NVBLS1D1N08H electrical data in TOLL (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	80	–	–	V
I_{DSS}	Drain to Source Leakage Current	V_{DS} = 80 V, V_{GS} = 0 V	–	–	10	μA
I_{GSS}	Gate to Source Leakage Current	V_{DS} = 0 V, V_{GS} = 20 V	–	–	100	nA
ON CHARACTERISTICS (Note 4)						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = $V_{DS,}$ I_D = 650 μA	2.0	–	4.0	V
$R_{DS(on)}$	Drain to Source On−Resistance	V_{GS} = 10 V, I_D = 50 A	–	0.92	1.05	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 50 A	–	213	–	S
CHARGES, CAPACITANCE						
C_{iss}	Input Capacitance	V_{DS} = 40 V, V_{GS} = 0 V, f = 1 MHz	–	11200	–	pF
C_{oss}	Output Capacitance		–	1600	–	pF
C_{rss}	Reverse Transfer Capacitance		–	49	–	pF
$Q_{g(ToT)}$	Total Gate Charge	V_{GS} = 10 V, V_{DS} = 64 V, I_D = 50 A	–	166	–	nC
$Q_{g(th)}$	Threshold Gate Charge		–	29	–	nC
Q_{gs}	Gate to Source Gate Charge		–	44	–	nC
Q_{gd}	Gate to Drain “Miller” Charge		–	35	–	nC
SWITCHING CHARACTERISTICS (Note 5)						
$t_{d(on)}$	Turn−On Delay Time	V_{DS} = 64 V, I_D = 50 A, V_{GS} = 10 V, R_G = 6 Ω	–	45	–	ns
t_r	Rise Time		–	43	–	ns
$t_{d(off)}$	Turn−Off Delay Time		–	141	–	ns
t_f	Fall Time		–	43	–	ns
DRAIN – SOURCE DIODE CHARACTERISTICS						
V_{SD}	Source to Drain Diode Voltage	I_S = 50 A, V_{GS} = 0 V	–	–	1.2	V
t_{rr}	Reverse Recovery Time	I_S = 50 A, V_{GS} = 0 V, dI_S/dt = 100 A/μs	–	92	–	ns
Q_{rr}	Reverse Recovery Charge		–	234	–	nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
5. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

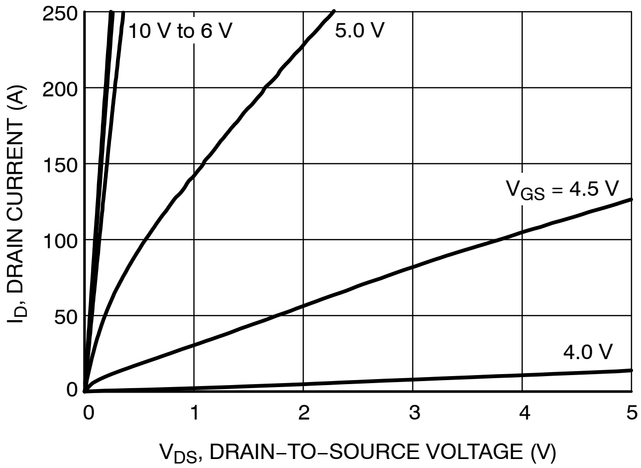

Figure 1. On−Region Characteristics

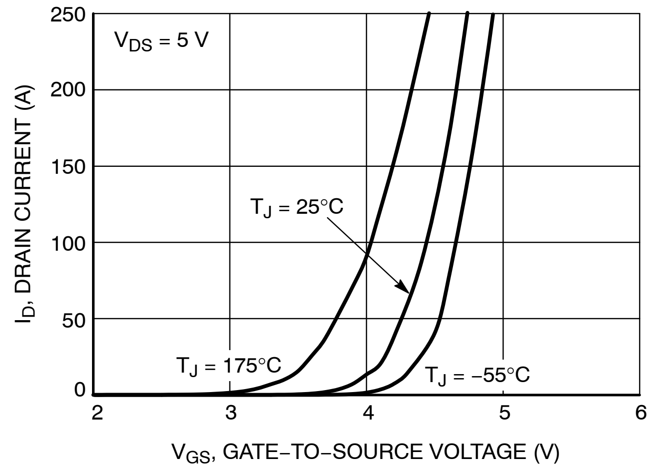

Figure 2. Transfer Characteristics

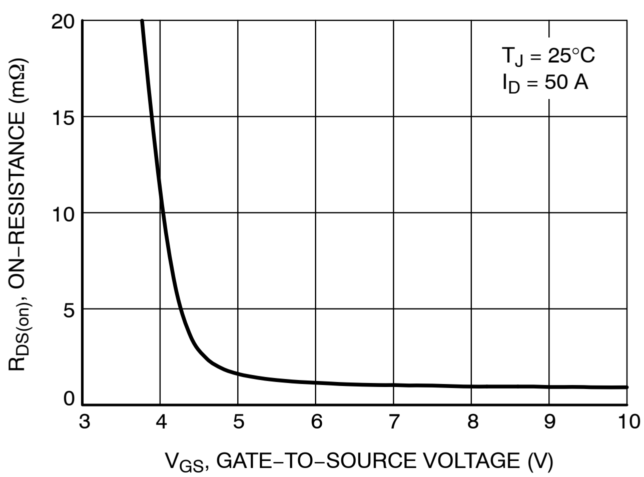

Figure 3. On−Resistance vs. Gate−to−Source Voltage

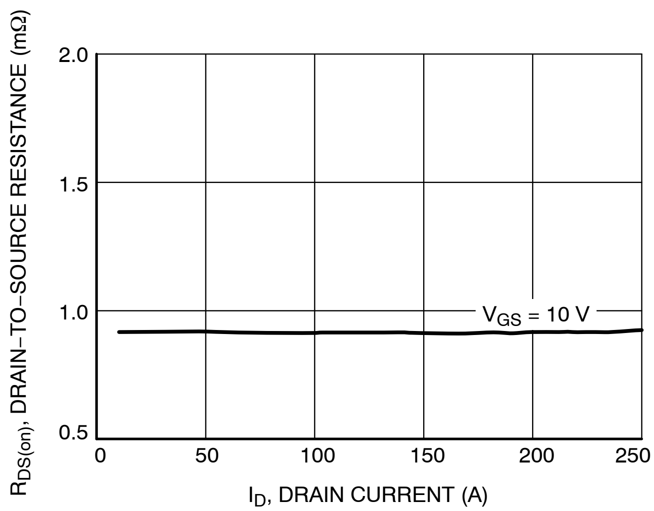

Figure 4. On−Resistance vs. Drain Current and Gate Voltage

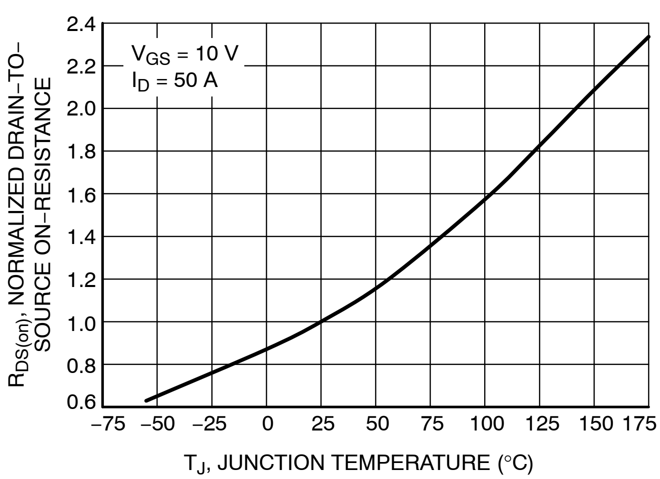

Figure 5. On−Resistance Variation with Temperature

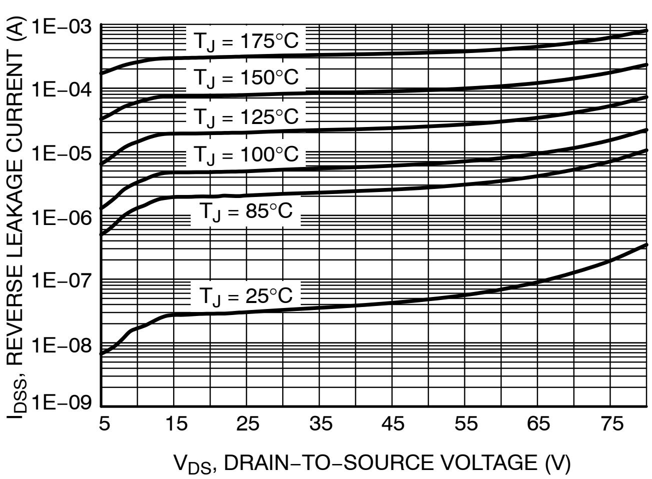

Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

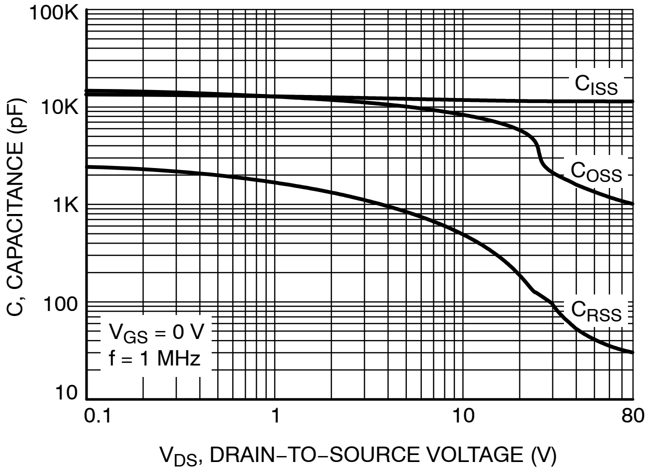

Figure 7. Capacitance Variation

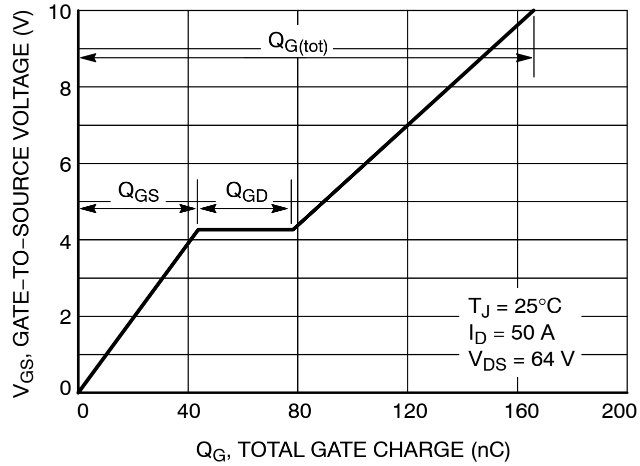

Figure 8. Gate−to−Source Voltage vs. Total Charge

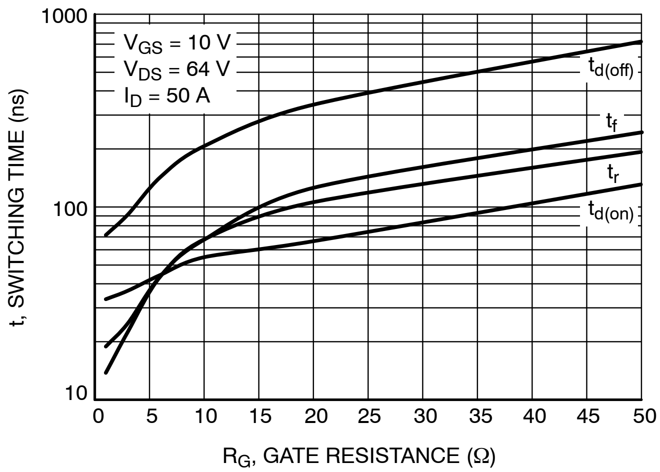

Figure 9. Resistive Switching Time Variation vs. Gate Resistance

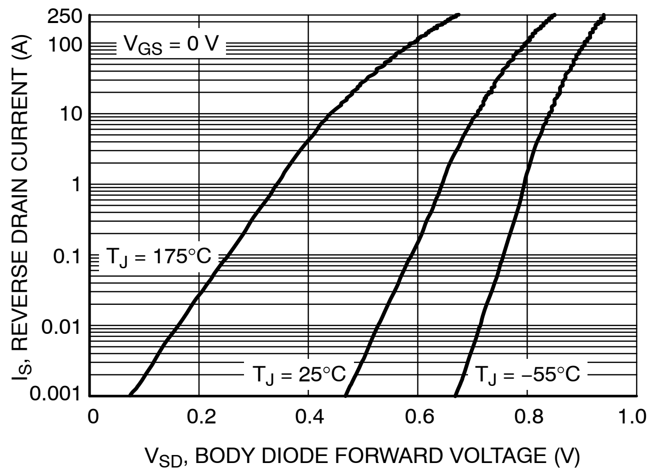

Figure 10. Diode Forward Voltage vs. Current

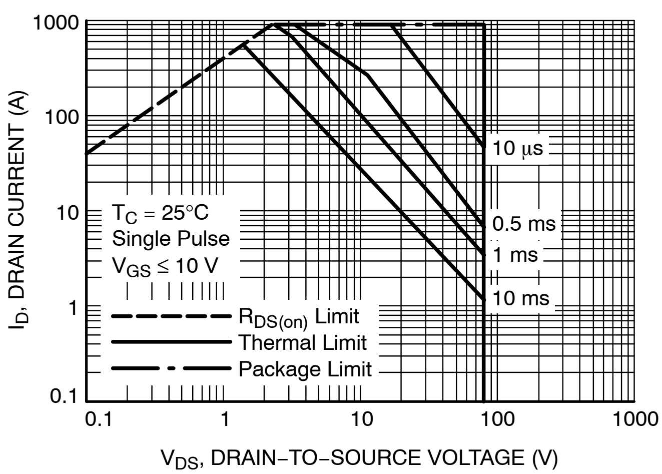

Figure 11. Maximum Rated Forward Biased Safe Operating Area

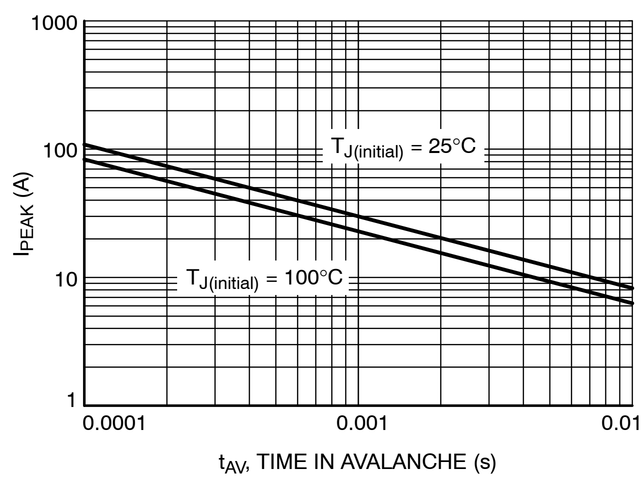

Figure 12. Maximum Drain Current vs. Time in Avalanche

TYPICAL CHARACTERISTICS

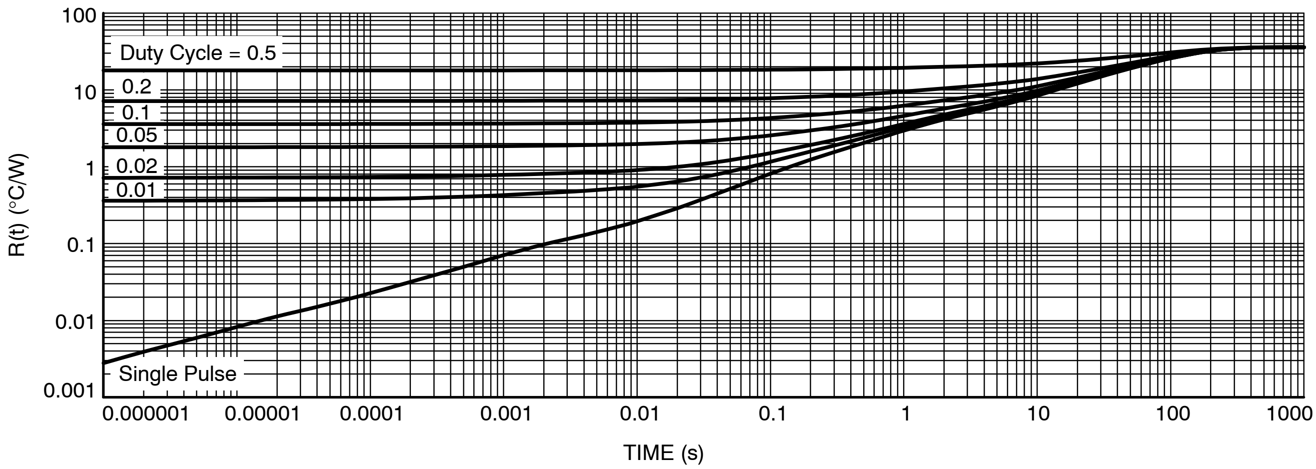

Figure 13. Transient Thermal Impedance

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Email Requests to: orderlit@onsemi.com

onsemi Website: www.onsemi.com

TECHNICAL SUPPORT
North American Technical Support:
Voice Mail: 1 800−282−9855 Toll Free USA/Canada
Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:
Phone: 00421 33 790 2910
For additional information, please contact your local Sales Representative