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# NUD3048

## FET Switch

100 V, 800 mΩ, N-Channel, TSOP-6

The NUD3048 provides a single device solution for a number of applications requiring a low power, high voltage, FET switch. The package includes a gate resistor and gate to source zener clamp. This switch can accommodate a wide range of input voltages, making it compatible with most current logic levels. Its 100 V rating makes it compatible with 48 V telecom applications.

### Features

- 100 V Rating On Gate 2
- Integrated 100 k R<sub>G</sub> Option
- Integrated ESD Diode Protection
- Low Threshold Voltage
- Pb-Free Package is Available

### Typical Applications

- FET Switch
- Inverter
- Level Shifter
- Inrush Limiter
- Relay Driver

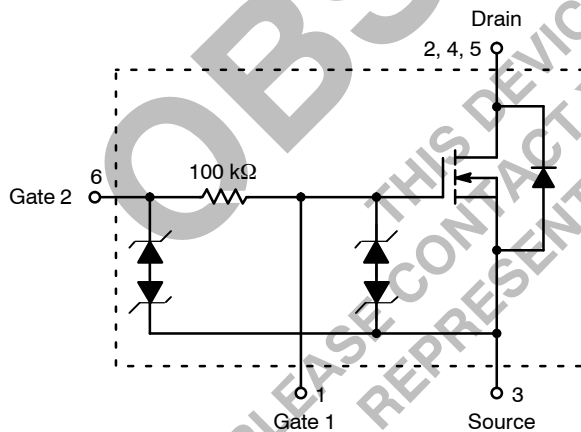


Figure 1. Block Diagram



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### MARKING DIAGRAM



JW7 = Specific Device Code  
M = Month Code  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

### ORDERING INFORMATION

Device	Package	Shipping†
NUD3048MT1	TSOP-6	3000 / Tape & Reel
NUD3048MT1G	TSOP-6 (Pb-Free)	3000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# NUD3048

## MAXIMUM RATINGS

Symbol	Rating	Value	Unit
$V_{DSS}$	Drain to Source Voltage – Continuous	100	V
$V_{G1SS}$	Gate to Source Voltage – Continuous @ 1.0 mA	15	V
$I_D$	Drain Current – Continuous ( $T_A = 25^\circ\text{C}$ ) (Note 1) (Note 2)	0.7 1.2	A
$P_D$	Power Dissipation ( $T_A = 25^\circ\text{C}$ ) (Note 1) (Note 2)	0.66 1.56	W
$V_{G2SS}$	Gate Resistor to Source Voltage – Continuous	100	V
$T_{Jmax}$	Maximum Junction Temperature	150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Impedance (Junction-to-Ambient) (Note 1) Thermal Impedance (Junction-to-Ambient) (Note 2)	190 80	$^\circ\text{C/W}$
ESD	Human Body Model (HBM) Class 2 Machine Model Class A According to EIA/JESD22/A114 Specification	2000	V
		160	V

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Drain to Source Leakage Current ( $V_{DS} = 80\text{ V}$ , $V_{GS} = 0\text{ V}$ )	$I_{DSS}$	–	20	100	$\mu\text{A}$
Gate Body Leakage Current ( $V_{GS} = 10\text{ V}$ , $V_{DS} = 0\text{ V}$ ) ( $V_{GS} = 10\text{ V}$ , $V_{DS} = 0\text{ V}$ , $T_J = 125^\circ\text{C}$ )	$I_{GSS}$	–	3.0	10	$\mu\text{A}$
	$I_{GSS}$	–	6.0	20	$\mu\text{A}$
<b>ON CHARACTERISTICS</b>					
Gate Threshold Voltage ( $I_D = 1.0\text{ mA}$ )	$V_{GS}$	1.3	1.7	2.0	V
Drain to Source Resistance ( $V_{GS} = 4.5\text{ V}$ , $I_D = 100\text{ mA}$ )	$R_{DS(on)}$	–	0.65	0.82	$\Omega$
Drain to Source Resistance ( $V_{GS} = 10\text{ V}$ , $I_D = 100\text{ mA}$ )	$R_{DS(on)}$	–	0.6	0.72	$\Omega$
<b>DYNAMIC CHARACTERISTICS</b>					
Input Capacitance ( $V_{DS} = 5.0\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 10\text{ kHz}$ )	$C_{iss}$	–	135	–	pF
Output Capacitance ( $V_{DS} = 5.0\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 10\text{ kHz}$ )	$C_{oss}$	–	75	–	pF
Transfer Capacitance ( $V_{DS} = 5.0\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 10\text{ kHz}$ )	$C_{rss}$	–	26	–	pF
<b>GATE BIAS CHARACTERISTICS</b>					
Gate Resistor	$R_G$	75	100	125	$\text{k}\Omega$
Gate Zener Breakdown Voltage ( $I_Z = 1.0\text{ mA}$ ) (Note 3)	$V_Z$	15	17	–	V
Gate Zener Breakdown Voltage ( $I_Z = 3.0\text{ mA}$ ) (Note 4)		100	115	–	

1. Min pad, 1 oz. Cu.
2. 1 inch pad, 1 oz Cu.
3. Measured from gate 1 to source.
4. Measured from gate 2 to source.

# NUD3048

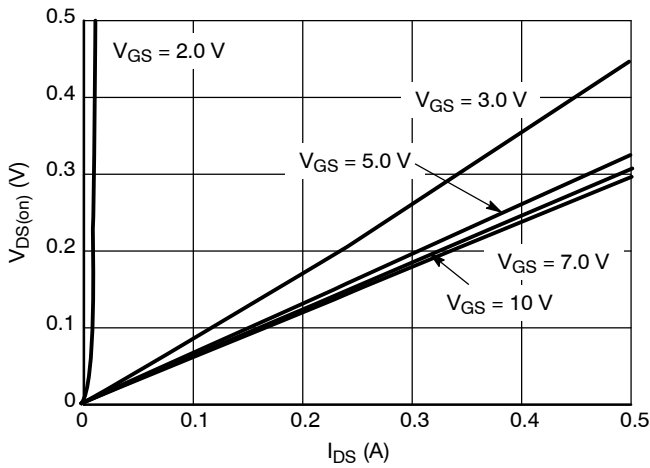


Figure 2.  $V_{DS(on)}$  Variation with  $I_{DS}$  and Gate Voltage

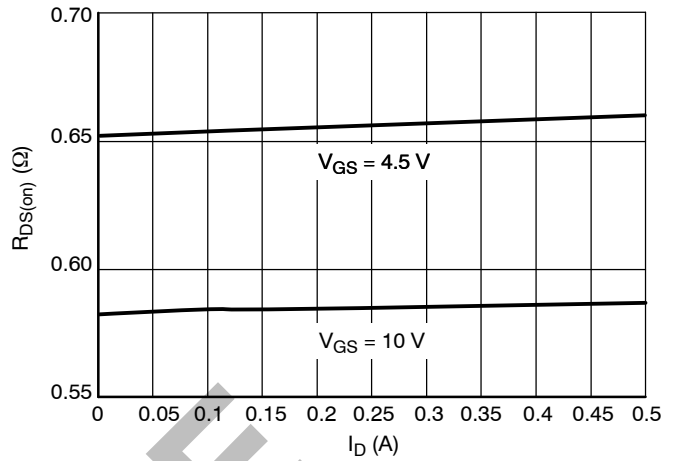


Figure 3. On Resistance Variation with Drain Current and Gate Voltage

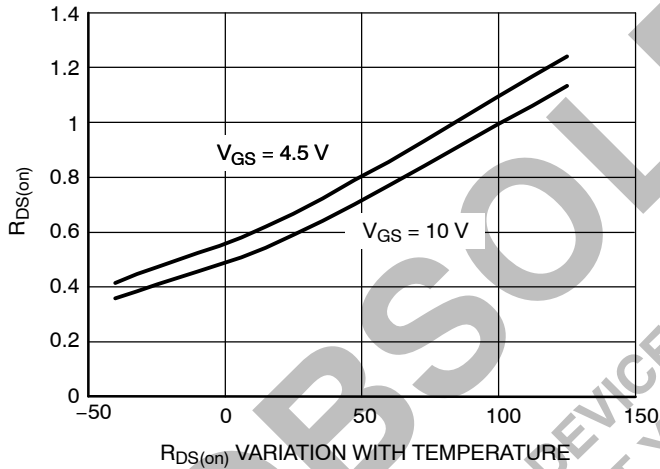


Figure 4. Variation of  $R_{DS(on)}$  with Temperature and Gate Voltage at  $I_D = 100 \text{ mA}$

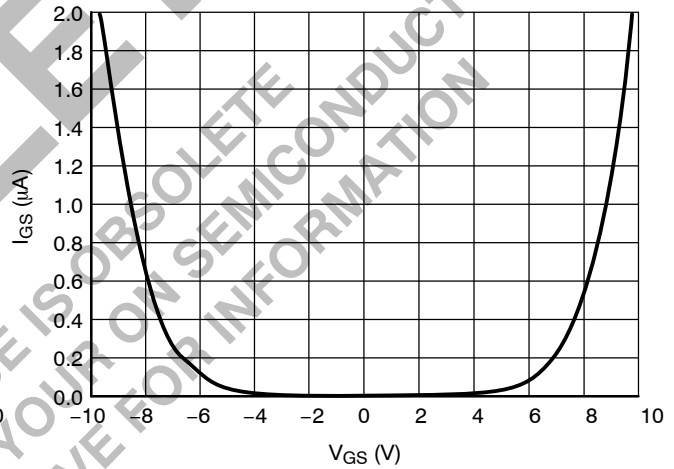


Figure 5. Gate Leakage Current Variation with Gate Voltage

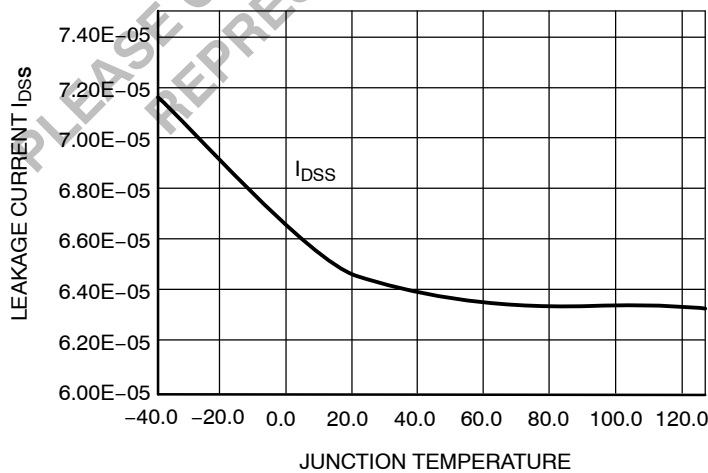
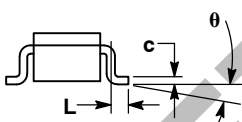
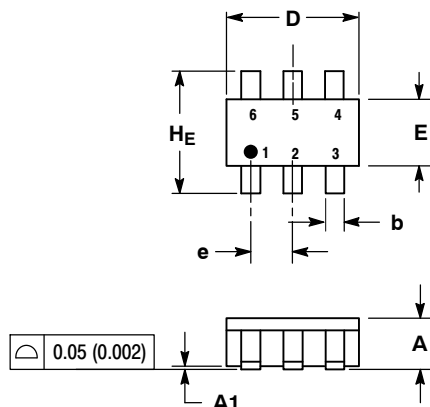


Figure 6. Variation of Leakage Current  $I_{DSS}$  (A) with  $V_{GS} = 0 \text{ V}$  and  $V_{DS} = 100 \text{ V}$

# NUD3048

## PACKAGE DIMENSIONS

TSOP-6  
CASE 318G-02  
ISSUE P



**NOTES:**

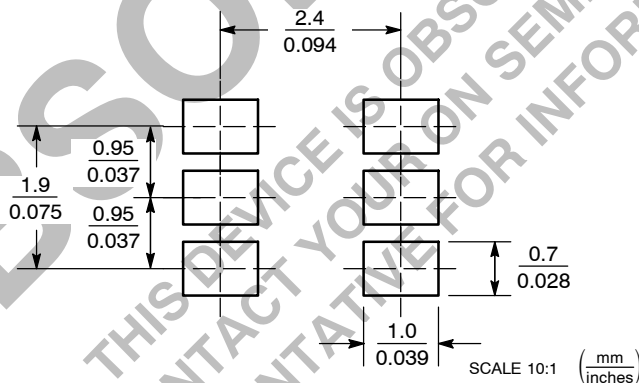
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	1.00	1.10	0.035	0.039	0.043
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.25	0.38	0.50	0.010	0.014	0.020
c	0.10	0.18	0.26	0.004	0.007	0.010
D	2.90	3.00	3.10	0.114	0.118	0.122
E	1.30	1.50	1.70	0.051	0.059	0.067
e	0.85	0.95	1.05	0.034	0.037	0.041
L	0.20	0.40	0.60	0.008	0.016	0.024
HE	2.50	2.75	3.00	0.099	0.108	0.118
θ	0°	-	10°	0°	-	10°

**STYLE 9:**

- PIN 1: LOW VOLTAGE GATE  
2. DRAIN  
3. SOURCE  
4. DRAIN  
5. DRAIN  
6. HIGH VOLTAGE GATE

**SOLDERING FOOTPRINT\***



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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