NTLUF4189NZ

Product Preview

Power MOSFET and Schottky Diode

30 V, N−Channel with 0.5 A Schottky Barrier Diode, 1.6 x 1.6 x 0.55 mm μCool™ Package

Features

- Low Qg and Capacitance to Minimize Switching Losses
- Low Profile UDFN 1.6 x 1.6 x 0.55 mm for Board Space Saving
- Low VF Schottky diode
- Halide Free
- Lead Free Package
- ESD Protected Gate

Applications

- DC-DC Boost Converter
- Color Display and Camera Flash Regulators
- Optimized for Power Management Applications for Portable Products, such as Cell Phones, PMP, DSC, GPS, and others

MAXIMUM RATINGS (T_J = 25°C unless otherwise stated)

Parameter			Symbol	Value	Units
Drain-to-Source Voltage			V_{DSS}	30	V
Gate-to-Source Voltage			V_{GS}	±8.0	V
Continuous Drain Current (Note 1)	Steady State	T_A = 25°C	I_D	1.3	A
		T_A = 85°C		1.0	
	t ≤ 5 s	T_A = 25°C		1.4	
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	1.0	W
	t ≤ 5 s	T_A = 25°C		1.1	
Continuous Drain Current (Note 2)	Steady State	T_A = 25°C	I_D	0.8	A
		T_A = 85°C		0.6	
Power Dissipation (Note 2)		T_A = 25°C	P_D	0.4	W
Pulsed Drain Current		tp = 10 μs	I_{DM}	5.6	A
MOSFET Operating Junction and Storage Temperature			T_J, T_{STG}	-55 to 150	°C
Schottky Operating Junction & Storage Temperature			T_J, T_{STG}	-55 to 125	°C
Source Current (Body Diode) (Note 2)			I_S	1.5	A
Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)			T_L	260	°C

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.

1. Surface Mounted on FR4 Board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces).
2. Surface-mounted on FR4 board using the minimum recommended pad size of 30 mm^2, 2 oz. Cu.

This document contains information on a product under development. ON Semiconductor reserves the right to change or discontinue this product without notice.

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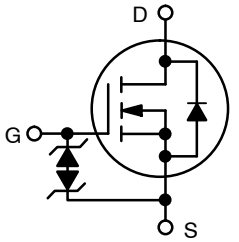
MOSFET

$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
30 V	250 mΩ @ 4.5 V	1.4 A
	350 mΩ @ 3.0 V	
	425 mΩ @ 2.5 V	

SCHOTTKY DIODE

V_R MAX	V_F TYP	I_F MAX
30 V	0.52 V	0.5 A

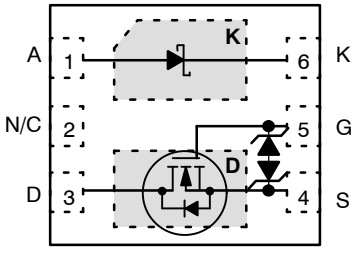


N−Channel MOSFET

Schottky Diode

UDFN6
CASE 517AT
μCOOL™

PIN CONNECTIONS



(Top View)

MARKING DIAGRAM

AA = Specific Device Code
M = Date Code
▪ = Pb−Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

DEVICE ORDERING INFORMATION

Device	Package	Shipping†
NTLUF4189NZTAG	UDFN6 (Pb−Free)	3000 / Tape & Reel
NTLUF4189NZTBG	UDFN6 (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.

Schottky Diode Maximum Ratings (T_J = 25°C unless otherwise stated)

Parameter	Symbol	Value	Units
Peak Repetitive Reverse Voltage	V_{RRM}	30	V
DC Blocking Voltage	V_R	30	V
Average Rectified Forward Current	I_F	0.5	A

Thermal Resistance Ratings

Parameter	Symbol	Max	Units
Junction-to-Ambient − Steady State (Note 3)	$R_{\theta JA}$	125	°C/W
Junction-to-Ambient − t ≤ 5 s (Note 3)	$R_{\theta JA}$	115	
Junction-to-Ambient − Steady State min Pad (Note 4)	$R_{\theta JA}$	310	

MOSFET Electrical Characteristics (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition		Min	Typ	Max	Units
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA		30			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	I_D = 250 μA, ref to 25°C			22		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 24 V	T_J = 25°C			1.0	μA
			T_J = 85°C			10	
Gate-to-Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 8.0 V				10	μA
ON CHARACTERISTICS (Note 5)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		0.4	1.1	1.5	V
Negative Threshold Temp. Coefficient	$V_{GS(TH)}/T_J$				3.0		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 0.5 A			130	250	mΩ
		V_{GS} = 3.0 V, I_D = 0.5 A			170	350	
		V_{GS} = 2.5 V, I_D = 0.5 A			205	425	
Forward Transconductance	g_{FS}	V_{DS} = 4.0 V, I_D = 0.15 A			TBD		S
CHARGES & CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 15 V			95		pF
Output Capacitance	C_{OSS}				15		
Reverse Transfer Capacitance	C_{RSS}				10		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 15 V; I_D = 0.5 A			1.5	3.0	nC
Threshold Gate Charge	$Q_{G(TH)}$				0.2		
Gate-to-Source Charge	Q_{GS}				0.4		
Gate-to-Drain Charge	Q_{GD}				0.4		

3. Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces)
4. Surface-mounted on FR4 board using the minimum recommended pad size of 30 mm^2, 2 oz. Cu.
5. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%
6. Switching characteristics are independent of operating junction temperatures

MOSFET Electrical Characteristics (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition		Min	Typ	Max	Units
SWITCHING CHARACTERISTICS, VGS = 4.5 V (Note 6)							
Turn-On Delay Time	$t_{d(ON)}$	V_{GS} = 4.5 V, V_{DD} = 15 V, I_D = 1A, R_G = 6 Ω			7.0		ns
Rise Time	t_r				5.0		
Turn-Off Delay Time	$t_{d(OFF)}$				10		
Fall Time	t_f				1.0		
DRAIN-SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 1A	T_J = 25°C		0.8	1.2	V
			T_J = 85°C		0.75		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_{SD}/dt = 100 A/μs, I_S = 1 A			7.0		ns
Charge Time	t_a				5.0		
Discharge Time	t_b				2.0		
Reverse Recovery Charge	Q_{RR}				2.0		nC

SCHOTTKY DIODE ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Maximum Instantaneous Forward Voltage	V_F	I_F = 10 mA		0.28	0.37	V
		I_F = 100 mA		0.37	0.46	
		I_F = 500 mA		0.52	0.62	
Maximum Instantaneous Reverse Current	I_R	V_R = 10 V		1.4	10	μA
		V_R = 20 V		6.0	TBD	
		V_R = 30 V		20	200	

SCHOTTKY DIODE ELECTRICAL CHARACTERISTICS (T_J = 85°C unless otherwise specified)

Maximum Instantaneous Forward Voltage	V_F	I_F = 10 mA		0.2		V
		I_F = 100 mA		0.31		
		I_F = 500 mA		0.51		
Maximum Instantaneous Reverse Current	I_R	V_R = 10 V		70		μA
		V_R = 20 V		180		
		V_R = 30 V		500		

SCHOTTKY DIODE ELECTRICAL CHARACTERISTICS (T_J = 125°C unless otherwise specified)

Maximum Instantaneous Forward Voltage	V_F	I_F = 10 mA		0.15		V
		I_F = 100 mA		0.28		
		I_F = 500 mA		0.50		
Maximum Instantaneous Reverse Current	I_R	V_R = 10 V		600		μA
		V_R = 20 V		1300		
		V_R = 30 V		3000		

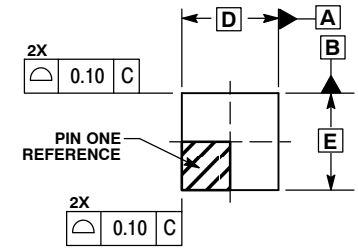
SCHOTTKY DIODE ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Capacitance	C	V_R = 5 V, f = 1.0 MHz		6.0		pF

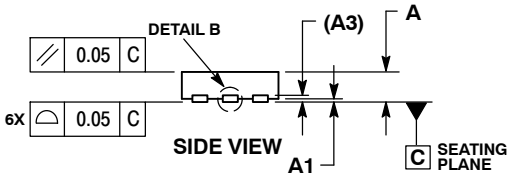
3. Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces)
4. Surface-mounted on FR4 board using the minimum recommended pad size of 30 mm^2, 2 oz. Cu.
5. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%
6. Switching characteristics are independent of operating junction temperatures

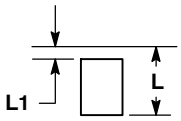
PACKAGE DIMENSIONS

UDFN6 1.6x1.6, 0.5P
CASE 517AT−01
ISSUE O

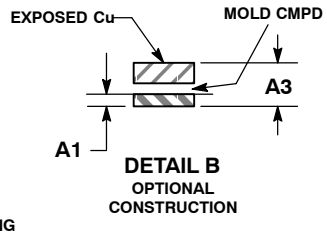


TOP VIEW





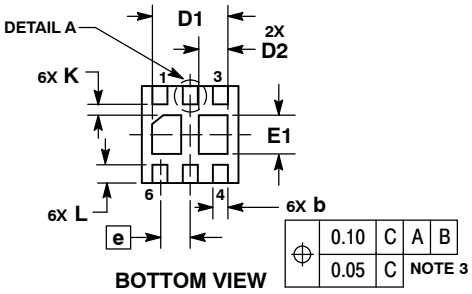
DETAIL A
OPTIONAL
CONSTRUCTION



DETAIL B
OPTIONAL
CONSTRUCTION

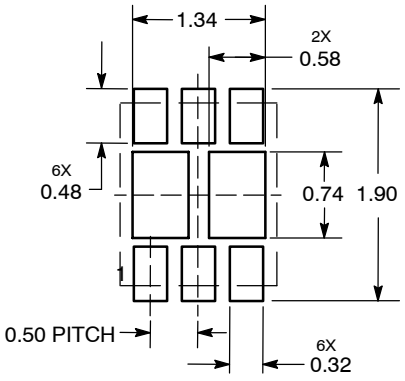
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

	MILLIMETERS	
DIM	MIN	MAX
A	0.45	0.55
A1	0.00	0.05
A3	0.13 REF	
b	0.20	0.30
D	1.60 BSC	
E	1.60 BSC	
e	0.50 BSC	
D1	1.14	1.34
D2	0.38	0.58
E1	0.54	0.74
K	0.20	−−−
L	0.15	0.35
L1	−−−	0.10



BOTTOM VIEW

SOLDERMASK DEFINED MOUNTING FOOTPRINT*



DIMENSIONS: MILLIMETERS

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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
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