# **MOSFET** - Power, Single N-Channel, WDFN6

30 V, 4.38 mΩ, 18.8 A

# NTLJS5D0N03C

#### **Features**

- Small Footprint (4 mm<sup>2</sup>) for Compact Design
- Low R<sub>DS(on)</sub> to Minimize Conduction Losses
- Low Q<sub>G</sub> and Capacitance to Minimize Driver Losses
- These Devices are Pb-Free, Halogen-Free/BFR-Free and are RoHS Compliant

## **Applications**

- DC-DC Converters
- Wireless Chargers
- Power Load Switch
- Power Management and Protection
- Battery Management

## MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise noted)

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V <sub>DSS</sub>	30	V
Gate-to-Source Voltage			V <sub>GS</sub>	±20	V
Continuous Drain	Steady T <sub>A</sub> = 25°C		I <sub>D</sub>	18.8	Α
Current R <sub>0JA</sub> (Notes 1, 3)	State	T <sub>A</sub> = 85°C		13.5	
Power Dissipation R <sub>θJA</sub> (Notes 1, 3)		T <sub>A</sub> = 25°C	P <sub>D</sub>	2.40	W
Continuous Drain Current R <sub>0.1A</sub>	Steady State	T <sub>A</sub> = 25°C	I <sub>D</sub>	11.2	Α
(Notes 2, 3)	State	T <sub>A</sub> = 85°C		8.1	
Power Dissipation R <sub>θJA</sub> (Notes 2, 3)		T <sub>A</sub> = 25°C	P <sub>D</sub>	0.86	W
Pulsed Drain Current	$T_A = 25^{\circ}C, t_p = 10 \mu s$		I <sub>DM</sub>	75	Α
Operating Junction and Storage Temperature Range			T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			TL	260	°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.

## THERMAL RESISTANCE MAXIMUM RATINGS (Note 1)

Parameter	Symbol	Value	Unit
Junction-to-Ambient - Steady State (Note 1)	$R_{\theta JA}$	52	°C/W
Junction-to-Ambient - Steady State (Note 2)	$R_{\theta JA}$	145	

- 1. Surface-mounted on FR4 board using 1 in<sup>2</sup> pad size, 2 oz. Cu pad.
- 2. Surface-mounted on FR4 board using minimum pad size, 2 oz. Cu pad.
- 3. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted. Actual continuous current will be limited by thermal & electro–mechanical application board design.  $R_{\theta CA}$  is determined by the user's board design.

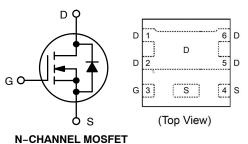


## ON Semiconductor®

#### www.onsemi.com

V <sub>(BR)DSS</sub>	R <sub>DS(on)</sub> MAX	I <sub>D</sub> MAX	
30 V	4.38 mΩ @ 10 V	18.8 A	
	7.25 mΩ @ 4.5 V	10.0 A	

#### **ELECTRICAL CONNECTION**





WDFN6 (2.05x2.05) CASE 483AV MARKING DIAGRAM



YW = Date Code

ZZ = Assembly Lot Code

A = Assembly Site Code 5D0 = Specific Device Code

## **ORDERING INFORMATION**

See detailed ordering, marking and shipping information in the package dimensions section on page 4 of this data sheet.

## NTLJS5D0N03C

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

Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
OFF CHARACTERISTICS	· · · · · · · · · · · · · · · · · · ·				-		-
Drain-to-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$		30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V <sub>(BR)DSS</sub> / T <sub>J</sub>	I <sub>D</sub> = 250 μA, ref to 25°C			18.5		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	Voc = 0 V TJ	T <sub>J</sub> = 25°C			1	μΑ
		$V_{GS} = 0 V$ , $V_{DS} = 24 V$	T <sub>J</sub> = 125°C			10	
Gate-to-Source Leakage Current	I <sub>GSS</sub>	$V_{DS} = 0 \text{ V}, V_{GS}$	<sub>S</sub> = ±20 V			±100	nA
ON CHARACTERISTICS (Note 4)							
Gate Threshold Voltage	V <sub>GS(TH)</sub>	$V_{GS} = V_{DS}, I_{D}$	= 250 μΑ	1.2		2.2	V
Threshold Temperature Coefficient	V <sub>GS</sub> /T <sub>J</sub>	I <sub>D</sub> = 250 μA, re	ef to 25°C		-5.43		mV/°C
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I	<sub>D</sub> = 10 A		3.94	4.38	mΩ
		V <sub>GS</sub> = 4.5 V, I	<sub>D</sub> = 10 A		5.96	7.25	
Forward Transconductance	9FS	V <sub>DS</sub> = 5 V, I <sub>E</sub>	) = 10 A		44		S
Gate Resistance	$R_{G}$	T <sub>A</sub> = 25	°C		0.7		Ω
CHARGES AND CAPACITANCES							
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 15 V, f = 1.0 MHz			1255		pF
Output Capacitance	C <sub>oss</sub>				625		1
Reverse Transfer Capacitance	C <sub>rss</sub>				20		1
Total Gate Charge	Q <sub>G(TOT)</sub>	$V_{GS} = 4.5 \text{ V}, V_{DS} = 15 \text{ V},$ $I_{D} = 10 \text{ A}$			8		nC
Threshold Gate Charge	Q <sub>G(TH)</sub>				2		nC
Gate-to-Source Charge	$Q_{GS}$				3		1
Gate-to-Drain Charge	$Q_{GD}$				2		1
Total Gate Charge	Q <sub>G(TOT)</sub>	$V_{GS} = 10 \text{ V}, V_{DS} = 15 \text{ V},$ $I_{D} = 10 \text{ A}$			18		nC
SWITCHING CHARACTERISTICS, V	GS = <b>4.5 V</b> (Note	5)					•
Turn-On Delay Time	t <sub>d(on)</sub>				12		ns
Rise Time	t <sub>r</sub>	$V_{GS} = 4.5 \text{ V}, V_{E}$	nn = 15 V.		5.5		1
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D = 10 \text{ A}, R_0$	$_{\rm G} = 6  \Omega$		16.5		1
Fall Time	t <sub>f</sub>				5.7		
SWITCHING CHARACTERISTICS, V	GS = 10 V (Note	5)					
Turn-On Delay Time	t <sub>d(on)</sub>				8.2		ns
Rise Time	t <sub>r</sub>	V <sub>GS</sub> = 10 V. V <sub>G</sub>	nn = 15 V.		2.2		1
Turn-Off Delay Time	t <sub>d(off)</sub>	$V_{GS}$ = 10 V, $V_{DD}$ = 15 V, $I_{D}$ = 10 A, $R_{G}$ = 6 $\Omega$			23.2		1
Fall Time	t <sub>f</sub>				3.5		1
PRAIN-SOURCE DIODE CHARACTE	RISTICS						•
Forward Diode Voltage	$V_{SD}$	V <sub>GS</sub> = 0 V,	T <sub>J</sub> = 25°C		0.79	1.2	V
		$I_S = 10 \text{ A}$	T <sub>J</sub> = 125°C		0.65		1
Reverse Recovery Time	t <sub>RR</sub>	$V_{GS} = 0 \text{ V, dl}_S/dt = 100 \text{ A}/\mu\text{s,}$ $I_S = 10 \text{ A}$			31		ns
Reverse Recovery Charge	Q <sub>RR</sub>				12.5		nC

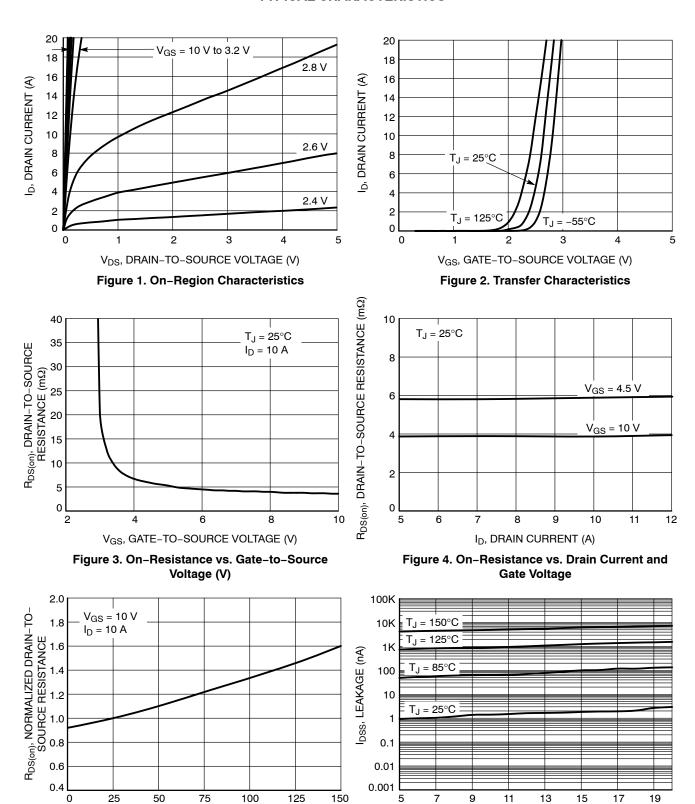
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. Pulse Test: Pulse Width  $\leq 300~\mu s$ , Duty Cycle  $\leq 2\%$ .

5. Switching characteristics are independent of operating junction temperatures.

## NTLJS5D0N03C

## **TYPICAL CHARACTERISTICS**



T<sub>J</sub>, JUNCTION TEMPERATURE (°C)

Figure 5. On-Resistance Variation with

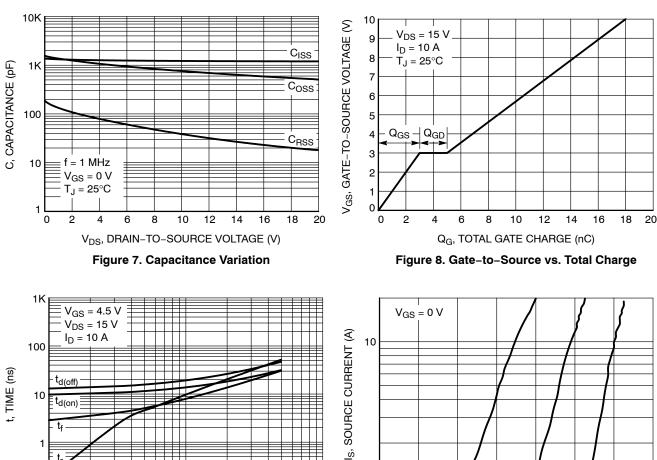
Temperature

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

V<sub>DS</sub>, DRAIN-TO-SOURCE VOLTAGE (V)

## NTLJS5D0N03C

## **TYPICAL CHARACTERISTICS**



 $R_G$ , GATE RESISTANCE ( $\Omega$ ) Figure 9. Resistive Switching Time Variation vs. Gate Resistance

10

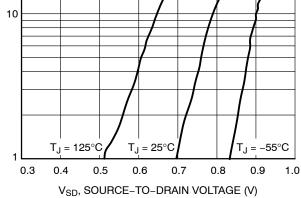


Figure 10. Diode Forward Voltage vs. Current

## **DEVICE ORDERING INFORMATION**

t, TIME (ns)

t<sub>d(off)</sub>

t<sub>d(on)</sub>

10

0.1

Device	Package	Shipping <sup>†</sup>
NTLJS5D0N03CTAG	WDFN6 (Pb-Free)	3000 / Tape & Reel

100

<sup>†</sup>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.

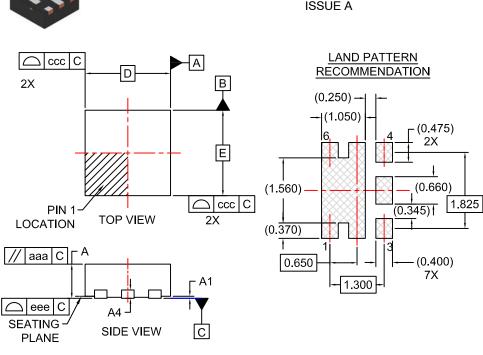
e1

**BOTTOM VIEW** 

е

E2

L5 D2 -D3 -



bbbM|C|A|B

ddd(M)

b (6X)

۲k1

L3

(4X) L 🕹

## WDFN6 2.05X2.05, 0.65P CASE 483AV ISSUE A

**DATE 02 APR 2019** 

#### NOTES:

1. CONTROLLING DIMENSION: MILLIMETERS.

2. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.

3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

4. SEATING PLANE IS DEFINED BY THE TERMINALS. "A1" IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.

DIM	MILLIMETERS				
5	MIN.	NOM.	MAX.		
Α	0.60	0.70	0.80		
A1	0.00	-	0.05		
A4		(0.20)			
b	0.25	0.30	0.35		
D	1.95	2.05	2.15		
D2	0.84	0.89	0.94		
D3		(0.95)			
Е	1.95 2.05 2.15				
E2	1.45 1.50 1.59				
е	0.65 BSC				
e1	1.30 BSC				
k	(0.35)				
k1		(0.45)			
L	0.18	0.28	0.38		
L3	0.25	0,30	0.35		
L4	0.55	0.60	0.65		
L5	(0.23)				
aaa	0.10				
bbb	0.10				
ccc	0.05				
ddd	0.05				
eee	0.05				

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