

MOSFET - Power, Single N-Channel, WDFN6

20 V

NTLJS3D0N02P8Z

Features

- Small Footprint (4 mm²) for Compact Design
- Ultra-Low $R_{DS(on)}$ to Minimize Conduction Losses
- These Devices are Pb-Free, Halogen-Free/BFR-Free and are RoHS Compliant

Applications

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

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V_{DSS}	20	V
Gate-to-Source Voltage			V_{GS}	± 12	V
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 3)	Steady State	$T_A = 25^{\circ}\text{C}$	I_D	20.2	A
		$T_A = 85^{\circ}\text{C}$		14.6	
Power Dissipation $R_{\theta JA}$ (Notes 1, 3)		$T_A = 25^{\circ}\text{C}$	P_D	2.40	W
Continuous Drain Current $R_{\theta JA}$ (Notes 2, 3)	Steady State	$T_A = 25^{\circ}\text{C}$	I_D	12.1	A
		$T_A = 85^{\circ}\text{C}$		8.7	
Power Dissipation $R_{\theta JA}$ (Notes 2, 3)		$T_A = 25^{\circ}\text{C}$	P_D	0.86	W
Pulsed Drain Current	$T_A = 25^{\circ}\text{C}$, $t_p = 10\ \mu\text{s}$		I_{DM}	81	A
Operating Junction and Storage Temperature Range			T_J , T_{stg}	-55 to +150	$^{\circ}\text{C}$
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	$^{\circ}\text{C}$

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	$^\circ\text{C/W}$
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	145	

1. Surface-mounted on FR4 board using 1 in² 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.

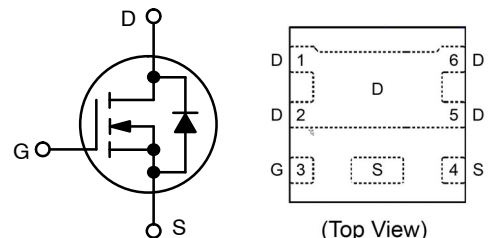


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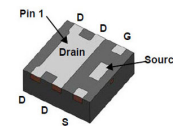
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$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
20 V	3.8 m Ω @ 4.5 V	20.2 A
	5.5 m Ω @ 2.5 V	
	14.2 m Ω @ 1.8 V	

ELECTRICAL CONNECTION



N-CHANNEL MOSFET



WDFN6 (2.05x2.05)
CASE 483AV

MARKING DIAGRAM



YW = Date Code
ZZ = Assembly Lot Code
D3D0 = Specific Device Code

ORDERING INFORMATION

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

NTLJS3D0N02P8Z

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	20			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J	I _D = 250 μA, ref to 25°C		16.1		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = 16 V	T _J = 25°C		1	μA
			T _J = 125°C		10	
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±12 V			±10	μA

ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 250 μA	0.6		1.2	V
Threshold Temperature Coefficient	V _{GS} /T _J	I _D = 250 μA, ref to 25°C		-3.97		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 4.5 V, I _D = 10 A		3.1	3.8	mΩ
		V _{GS} = 2.5 V, I _D = 10 A		4.5	5.5	
		V _{GS} = 1.8 V, I _D = 5 A		10	14.2	
Forward Transconductance	g _{FS}	V _{DS} = 5 V, I _D = 10 A		80		S

CHARGES AND CAPACITANCES

Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 10 V, f = 1.0 MHz		2165		pF
Output Capacitance	C _{oss}			417		
Reverse Transfer Capacitance	C _{rss}			396		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 4.5 V, V _{DS} = 10 V, I _D = 10 A		21		nC
Threshold Gate Charge	Q _{G(TH)}			1.6		nC
Gate-to-Source Charge	Q _{GS}			3.2		
Gate-to-Drain Charge	Q _{GD}			7.0		

SWITCHING CHARACTERISTICS, V_{GS} = 4.5 V (Note 5)

Turn-On Delay Time	t _{d(on)}	V _{GS} = 4.5 V, V _{DD} = 15 V, I _D = 10 A, R _G = 6 Ω		14		ns
Rise Time	t _r			22		
Turn-Off Delay Time	t _{d(off)}			54		
Fall Time	t _f			46		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = 10 A	T _J = 25°C		0.74	1.2	V
			T _J = 125°C		0.6		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, dI _S /dt = 100 A/μs, I _S = 10 A			23		ns
Reverse Recovery Charge	Q _{RR}				6.9		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

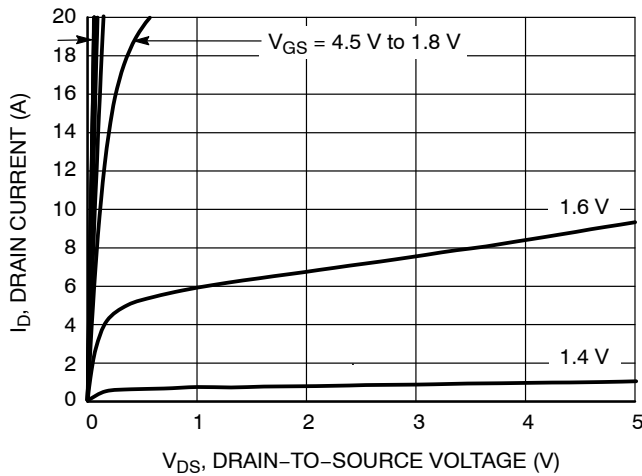


Figure 1. On-Region Characteristics

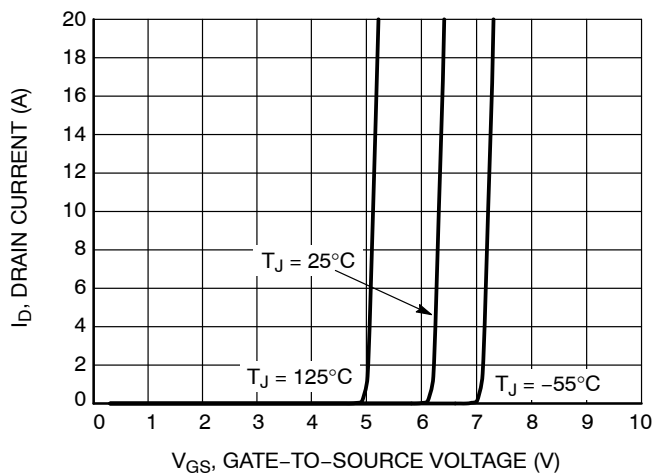


Figure 2. Transfer Characteristics

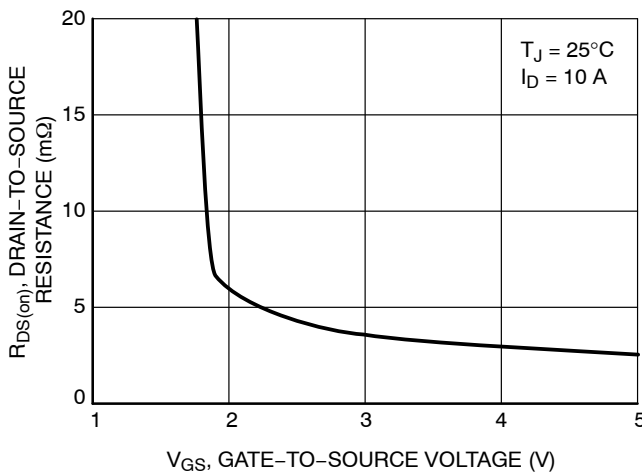


Figure 3. On-Resistance vs. Gate-to-Source Voltage (V)

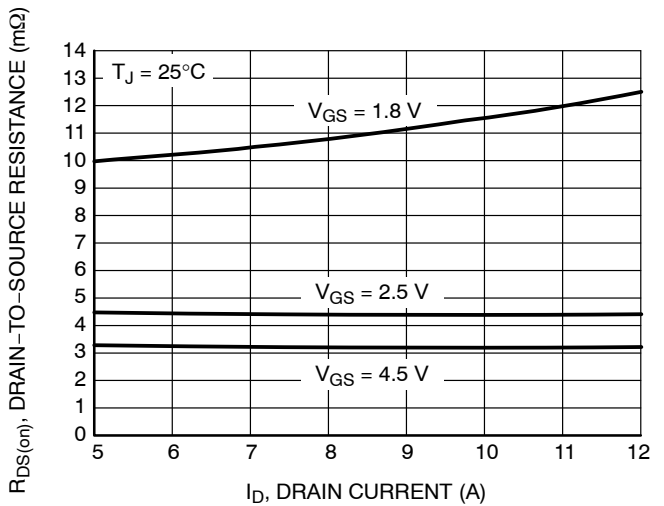


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

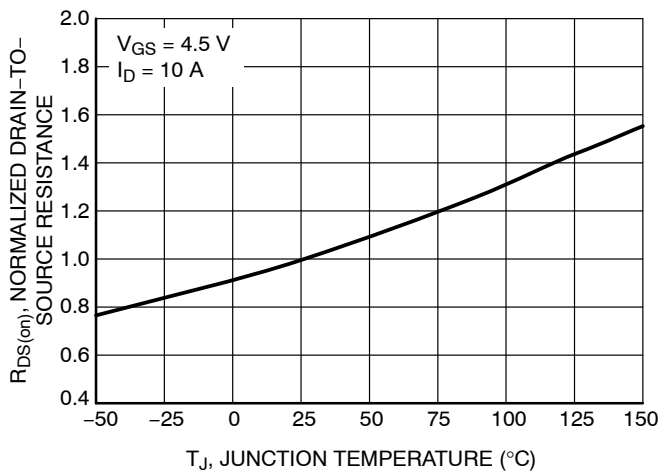


Figure 5. On-Resistance Variation with Temperature

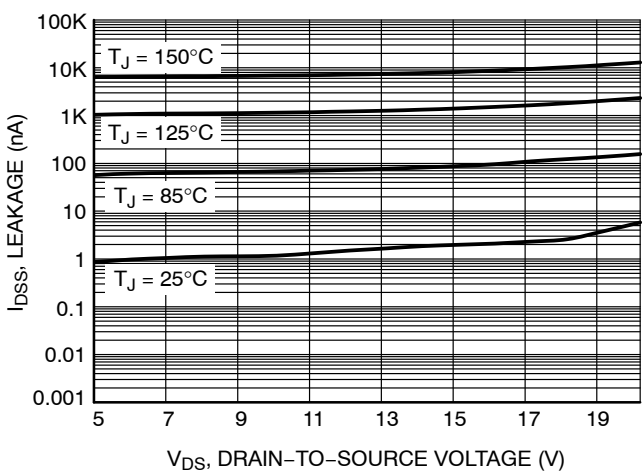


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

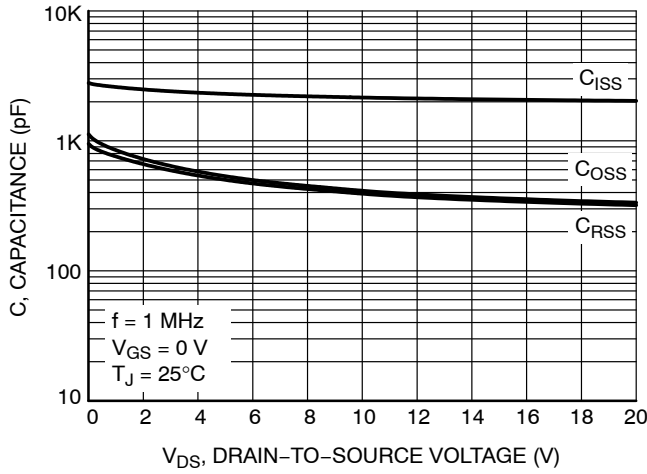


Figure 7. Capacitance Variation

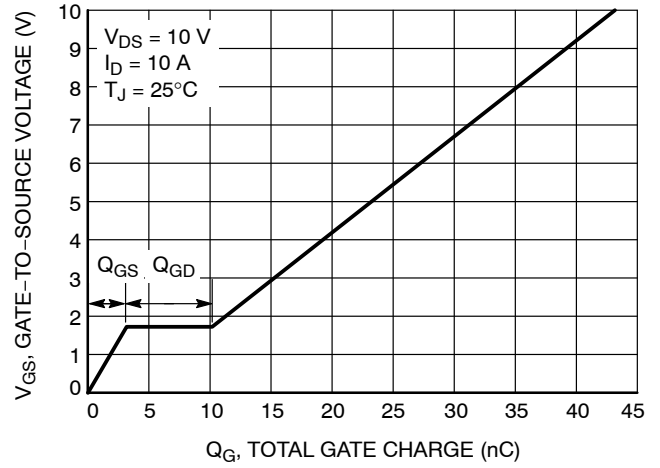


Figure 8. Gate-to-Source vs. Total Charge

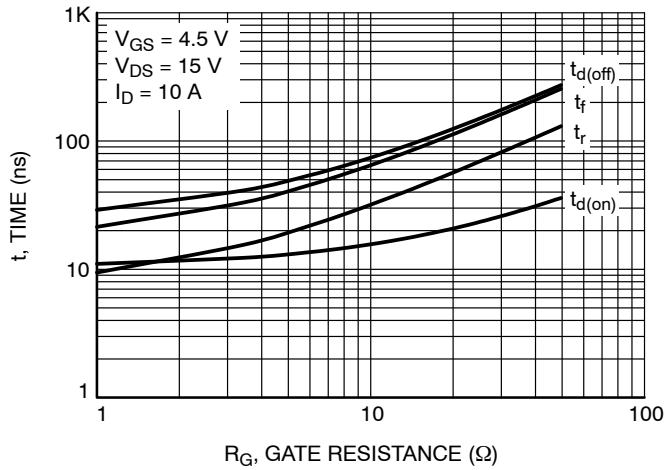


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

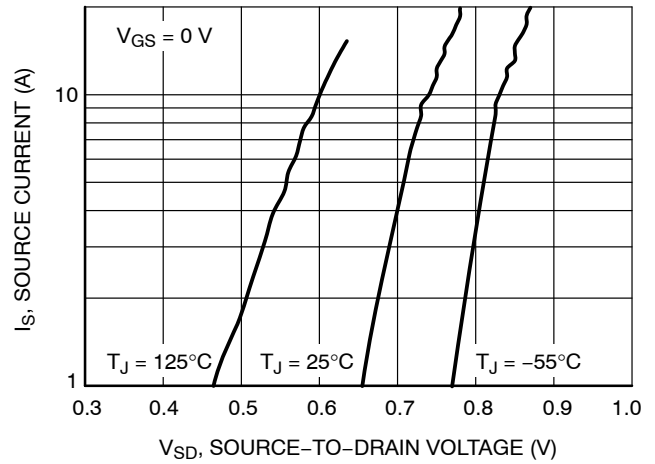


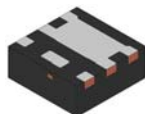
Figure 10. Diode Forward Voltage vs. Current

DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping [†]
NTLJS3D0N02P8ZTAG	D3D0	WDFN6 (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.

ON



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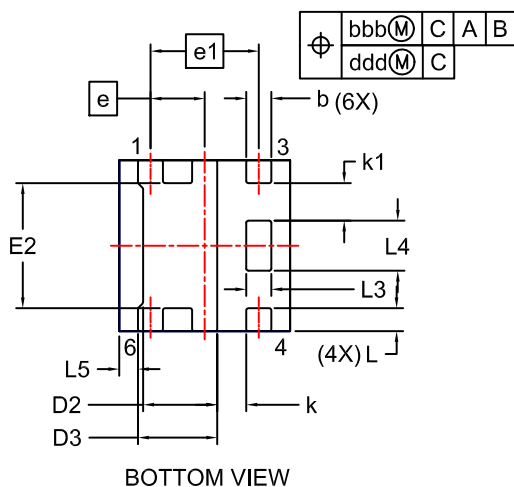
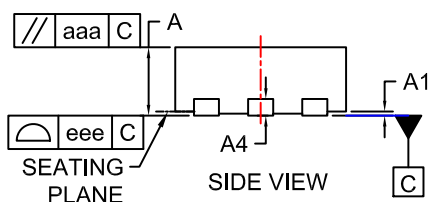
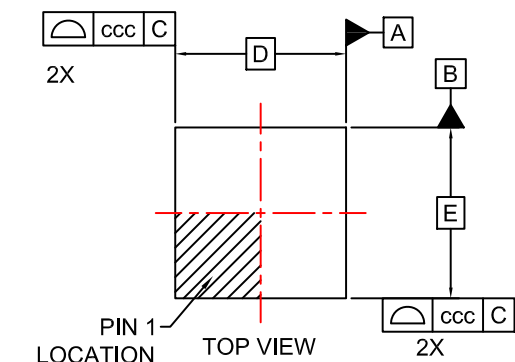


Figure 1 is a detailed cross-sectional diagram of a multi-layered composite structure. The diagram shows a central vertical core (1) with a cross-hatched pattern, flanked by two side layers (2 and 3). The top layer (4) is a thin, solid layer. The bottom layer (5) is a thick, solid layer. The diagram is divided into three main sections: a top section (6), a middle section (7), and a bottom section (8). Dimensions are given in inches. The total height is 1.825 inches. The total width is 1.300 inches. The top section (6) has a height of 0.250 inches. The middle section (7) has a height of 1.050 inches. The bottom section (8) has a height of 0.475 inches. The side layers (2 and 3) have a thickness of 0.370 inches. The top layer (4) has a thickness of 0.040 inches. The bottom layer (5) has a thickness of 0.660 inches. The central core (1) has a width of 0.650 inches. The side layers (2 and 3) have a width of 0.345 inches. The top layer (4) has a width of 0.400 inches. The bottom layer (5) has a width of 0.400 inches. The diagram is labeled with various dimensions and section numbers.

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		
	MIN.	NOM.	MAX.
A	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)		
E	1.95	2.05	2.15
E2	1.45	1.50	1.55
e	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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