Power MOSFET 40 V, 9.0 mΩ, 41 A, Single N–Channel

Features

- Small Footprint (3.3 x 3.3 mm) for Compact Design
- Low R_{DS(on)} to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- These Devices are Pb-Free and are RoHS Compliant

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

Parar	Symbol	Value	Unit			
Drain-to-Source Voltage			V _{DSS}	40	V	
Gate-to-Source Voltage	Gate-to-Source Voltage			±20	V	
Continuous Drain		$T_{C} = 25^{\circ}C$	۱ _D	41	А	
Current $R_{\theta JC}$ (Notes 1, 2, 3, 4)	Steady	$T_{C} = 100^{\circ}C$		27		
Power Dissipation	State	T _C = 25°C	PD	30	W	
$R_{\theta JC}$ (Notes 1, 2, 3)		$T_{C} = 100^{\circ}C$		15		
Continuous Drain		T _A = 25°C	I _D	12	А	
Current $R_{\theta JA}$ (Notes 1 & 3, 4)	Steady State	$T_A = 100^{\circ}C$		10		
Power Dissipation		T _A = 25°C	PD	3.0	W	
$R_{\theta JA}$ (Notes 1, 3)		$T_A = 100^{\circ}C$		2.0		
Pulsed Drain Current	T _A = 25	°C, t _p = 10 μs	I _{DM}	163	А	
Operating Junction and Storage Temperature			T _J , T _{stg}	–55 to +175	°C	
Source Current (Body Diode)			I _S	24	А	
Single Pulse Drain–to–Source Avalanche Energy ($I_{L(pk)} = 2.2 \text{ A}$)			E _{AS}	66	mJ	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			ΤL	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-Case - Steady State (Note 3)	$R_{\theta JC}$	5.2	°C/W
Junction-to-Ambient - Steady State (Note 3)	R_{\thetaJA}	50	

1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.

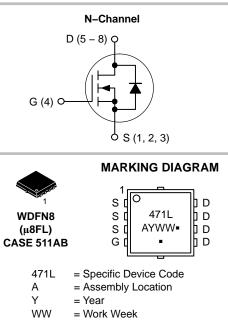
- 2. Psi (Ψ) is used as required per JESD51–12 for packages in which substantially less than 100% of the heat flows to single case surface.
- 3. Surface-mounted on FR4 board using a 650 mm², 2 oz. Cu pad.
- Continuous DC current rating. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.



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V _{(BR)DSS}	R _{DS(on)} MAX	I _D MAX
40 V	9.0 mΩ @ 10 V	41 A
	15.5 mΩ @ 4.5 V	417



= Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

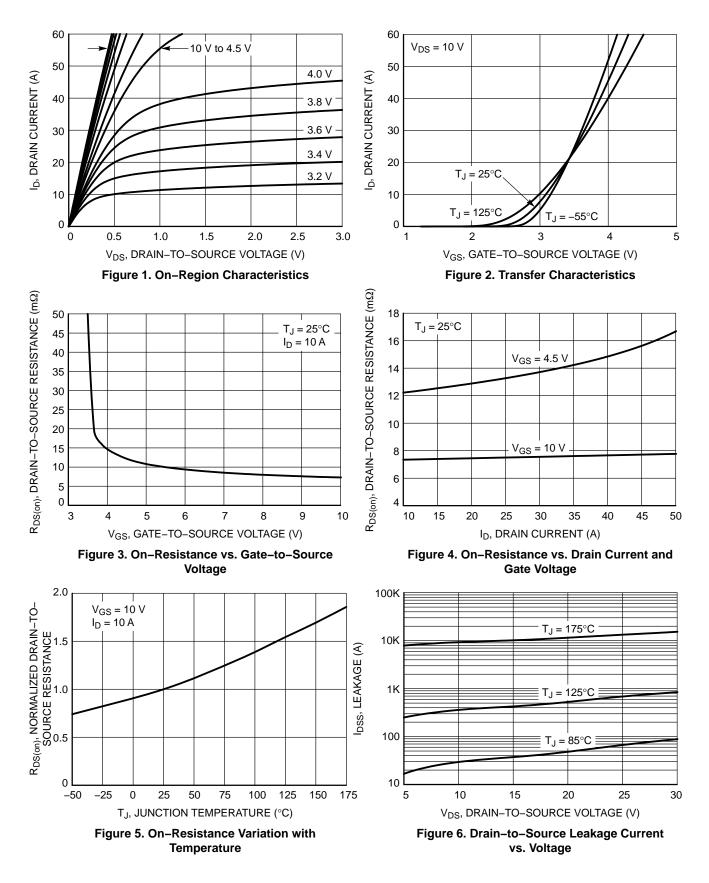
See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

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

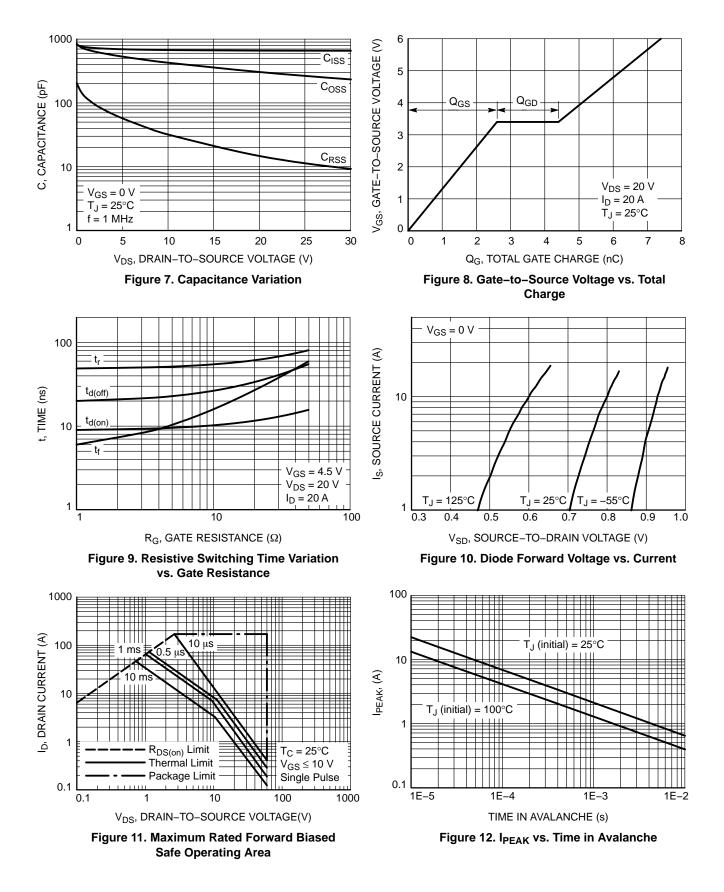
Parameter	Symbol	Test Condition		Min	Тур	Max	Unit
OFF CHARACTERISTICS	-	•			•	-	
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	V_{GS} = 0 V, I_D = 250 μ A		40			V
Zero Gate Voltage Drain Current	I _{DSS}	$V_{GS} = 0 V_{c}$	$T_J = 25^{\circ}C$			10	μΑ
		V _{GS} = 0 V, V _{DS} = 40 V	T _J = 125°C			250	
Gate-to-Source Leakage Current	I _{GSS}	$V_{DS} = 0 V, V_{G}$				100	nA
ON CHARACTERISTICS (Note 5)							-
Gate Threshold Voltage	V _{GS(TH)}	$V_{GS} = V_{DS}, I_{D}$	= 20 μA	1.2	1.7	2.2	V
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V, I	_D = 10 A		7.4	9.0	mΩ
		V _{GS} = 4.5 V, I	_D = 10 A		12.3	15.5	1
Forward Transconductance	9FS	V _{DS} = 15 V, I	_D = 20 A		36		S
CHARGES AND CAPACITANCES	-	-			-	-	-
Input Capacitance	C _{iss}				660		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V, f = V _{DS} = 2	1.0 MHz, 5 V		270		1
Reverse Transfer Capacitance	C _{rss}	• DS = 23 •			12		
Output Charge	Q _{OSS}	V _{GS} = 0 V, V _{DD} = 20 V			9.0		nC
Total Gate Charge	Q _{G(TOT)}				5.5		nC
Threshold Gate Charge	Q _{G(TH)}				1.4		nC
Gate-to-Source Charge	Q _{GS}	V_{GS} = 4.5 V, V_{DS} = 20 V, I_{D} = 20 A			2.6		1
Gate-to-Drain Charge	Q _{GD}				1.8		1
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 2	20 V, I _D = 20 A		12		nC
Gate Resistance	R _G	T _A = 25	0°C		1.3		Ω
SWITCHING CHARACTERISTICS (N	ote 6)						
Turn–On Delay Time	t _{d(on)}				9.0		ns
Rise Time	t _r	V _{GS} = 4.5 V. Vr	ns = 20 V.		49		
Turn–Off Delay Time	t _{d(off)}	V _{GS} = 4.5 V, V _E I _D = 20 A, R _G	= 1.0 Ω		20		
Fall Time	t _f	1			6		
DRAIN-SOURCE DIODE CHARACTE	RISTICS						
Forward Diode Voltage	V _{SD}	$V_{GS} = 0 V,$	$T_J = 25^{\circ}C$		0.8	1.2	V
		$I_{\rm S} = 10 {\rm A}$	T _J = 125°C		0.7		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, dl _S /dt = 100 A/µs, I _S = 20 A			23		ns
Charge Time	t _a				11		1
Discharge Time	t _b				11		1
Reverse Recovery Charge	Q _{RR}				10		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. 5. Pulse Test: Pulse Width \leq 300 µs, Duty Cycle \leq 2%. 6. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS

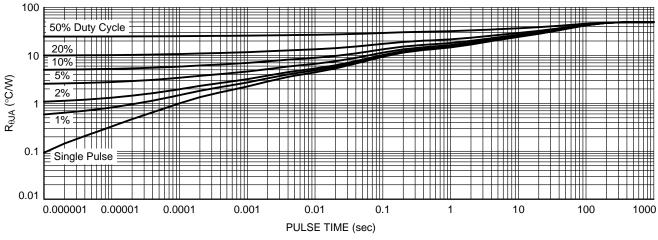


Figure 13. Thermal Characteristics

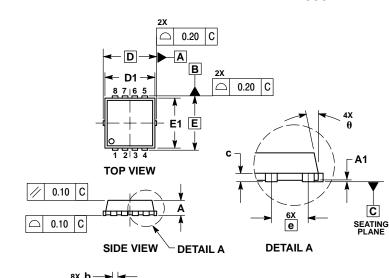
DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping [†]
NTTFS5C471NLTAG	471L	WDFN8 (Pb–Free)	1500 / 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.

PACKAGE DIMENSIONS

WDFN8 3.3x3.3, 0.65P CASE 511AB ISSUE D



e/2

D2

BOTTOM VIEW

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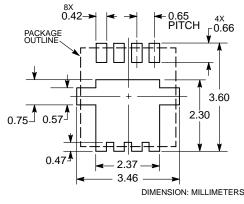
NOTES:

DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
CONTROLLING DIMENSION: MILLIMETERS.

DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH 3.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
Α	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00		0.05	0.000		0.002
b	0.23	0.30	0.40	0.009	0.012	0.016
С	0.15	0.20	0.25	0.006	0.008	0.010
D		3.30 BSC		0.130 BSC		
D1	2.95	3.05	3.15	0.116	0.120	0.124
D2	1.98	2.11	2.24	0.078	0.083	0.088
Е		3.30 BSC		0.130 BSC		
E1	2.95	3.05	3.15	0.116	0.120	0.124
E2	1.47	1.60	1.73	0.058	0.063	0.068
E3	0.23	0.30	0.40	0.009	0.012	0.016
е	0.65 BSC			0.026 BSC		
G	0.30	0.41	0.51	0.012	0.016	0.020
к	0.65	0.80	0.95	0.026	0.032	0.037
L	0.30	0.43	0.56	0.012	0.017	0.022
L1	0.06	0.13	0.20	0.002	0.005	0.008
м	1.40	1.50	1.60	0.055	0.059	0.063
θ	0 °		12 °	0 °		12 °

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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