N-Channel Power MOSFET 500 V, 0.85 Ω

Features

- Low ON Resistance
- Low Gate Charge
- ESD Diode-Protected Gate
- 100% Avalanche Tested
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Rating	Symbol	NDF08N50Z	Unit
Drain-to-Source Voltage	V_{DSS}	500	V
Continuous Drain Current $R_{\theta JC}$ (Note 1)	I _D	8.5	Α
Continuous Drain Current $R_{\theta JC}$ $T_A = 100^{\circ}C$ (Note 1)	I _D	5.4	Α
Pulsed Drain Current, V _{GS} @ 10 V	I _{DM}	34	Α
Power Dissipation	P_{D}	35	W
Gate-to-Source Voltage	V _{GS}	±30	V
Single Pulse Avalanche Energy, I _D = 7.5 A	E _{AS}	190	mJ
ESD (HBM) (JESD 22-A114)	V _{esd}	3500	٧
RMS Isolation Voltage (t = 0.3 sec., R.H. \leq 30%, T _A = 25°C) (Figure 14)	V _{ISO}	4500	V
Peak Diode Recovery (Note 2)	dV/dt	4.5	V/ns
MOSFET dV/dt	dV/dt	60	V/ns
Continuous Source Current (Body Diode)	Is	7.5	Α
Maximum Temperature for Soldering Leads	TL	260	°C
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55 to 150	°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.

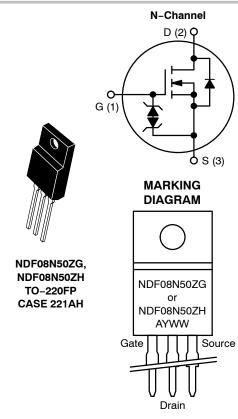
- 1. Limited by maximum junction temperature
- 2. $I_{SD} = 7.5 \text{ A}$, $di/dt \le 100 \text{ A/}\mu\text{s}$, $V_{DD} \le BV_{DSS}$, $T_J = +150 ^{\circ}\text{C}$



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V _{DSS}	R _{DS(ON)} (MAX) @ 3.6 A
500 V	0.85 Ω



A = Location Code Y = Year WW = Work Week

G, H = Pb-Free, Halogen-Free Package

ORDERING INFORMATION

Device	Package	Shipping
NDF08N50ZG	TO-220FP (Pb-Free, Halogen-Free)	50 Units / Rail
NDF08N50ZH	TO-220FP (Pb-Free, Halogen-Free)	50 Units / Rail

THERMAL RESISTANCE

Parameter	Symbol	NDF08N50Z	Unit
Junction-to-Case (Drain)	$R_{ heta JC}$	3.6	°C/W
Junction-to-Ambient Steady State (Note 3)	$R_{\theta JA}$	50	

^{3.} Insertion mounted

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

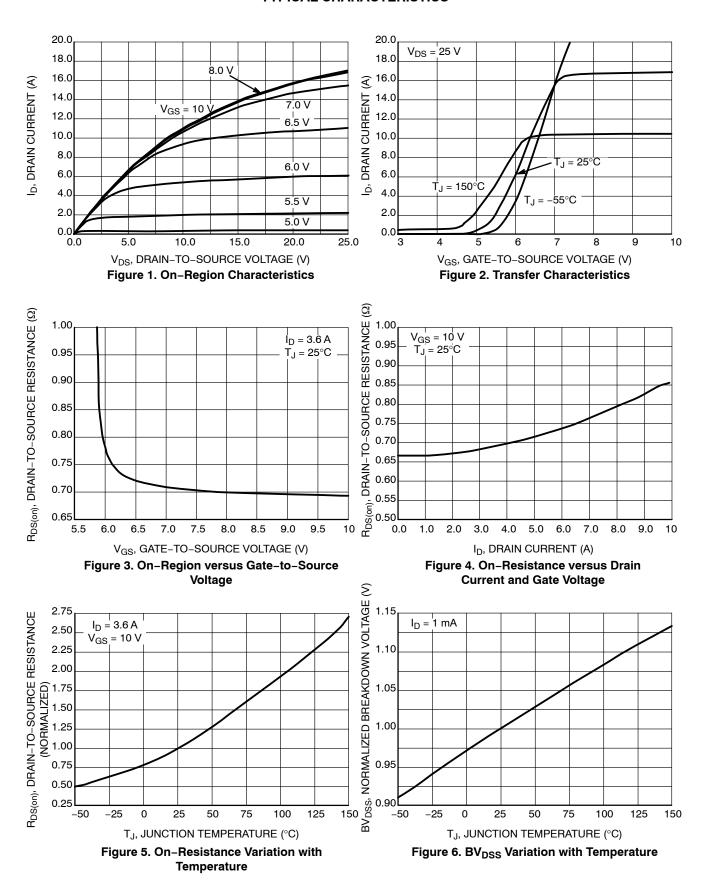
Characteristic	Test Conditions		Symbol	Min	Тур	Max	Unit
OFF CHARACTERISTICS						1	
Drain-to-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_D = 1 \text{ mA}$		BV _{DSS}	500			V
Breakdown Voltage Temperature Co- efficient	Reference to 25°C, I _D = 1 mA		$\Delta BV_{DSS} / \Delta T_{J}$		0.6		V/°C
Drain-to-Source Leakage Current	V _{DS} = 500 V, V _{GS} = 0 V	25°C 150°C	I _{DSS}			1 50	μΑ
Gate-to-Source Forward Leakage	V _{GS} = ±20 V		I _{GSS}			±10	μΑ
ON CHARACTERISTICS (Note 4)						1	
Static Drain-to-Source On-Resistance	V _{GS} = 10 V, I _D = 3.6 A		R _{DS(on)}		0.69	0.85	Ω
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = 100 \mu A$		V _{GS(th)}	3.0	3.9	4.5	V
Forward Transconductance	V _{DS} = 15 V, I _D = 3.75	A	9FS		6.0		S
DYNAMIC CHARACTERISTICS							
Input Capacitance (Note 5)	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz		C _{iss}	730	912	1095	pF
Output Capacitance (Note 5)			C _{oss}	95	120	140	
Reverse Transfer Capacitance (Note 5)			C _{rss}	15	27	35	
Total Gate Charge (Note 5)	V _{DD} = 250 V, I _D = 7.5 A, V _{GS} = 10 V		Q_g	16	31	46	nC
Gate-to-Source Charge (Note 5)			Q_{gs}	3	6.2	9	
Gate-to-Drain ("Miller") Charge (Note 5)			Q _{gd}	8	17	25	
Plateau Voltage			V_{GP}		6.3		V
Gate Resistance			R_{g}		3.0		Ω
RESISTIVE SWITCHING CHARACTEI	RISTICS						
Turn-On Delay Time	V_{DD} = 250 V, I_{D} = 7.5 A, V_{GS} = 10 V, R_{G} = 5 Ω		t _{d(on)}		13		ns
Rise Time			t _r		23		
Turn-Off Delay Time			t _{d(off)}		31		
Fall Time			t _f		29		
SOURCE-DRAIN DIODE CHARACTE	RISTICS (T _C = 25°C unless ot	herwise no	ted)				
Diode Forward Voltage	I _S = 7.5 A, V _{GS} = 0 \	/	V _{SD}			1.6	V
Reverse Recovery Time	V _{GS} = 0 V, V _{DD} = 30 V I _S = 7.5 A, di/dt = 100 A/μs		t _{rr}		295		ns
Reverse Recovery Charge			Q _{rr}		1.85		μC

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 Width ≤ 380 μs, Duty Cycle ≤ 2%.

5. Guaranteed by design.

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS

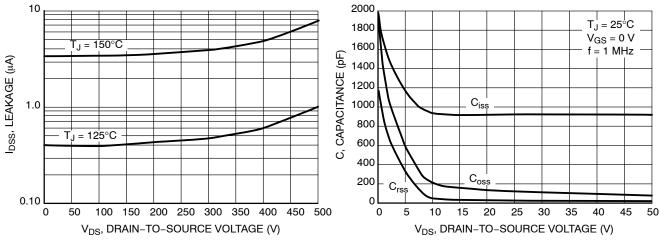


Figure 7. Drain-to-Source Leakage Current versus Voltage

Figure 8. Capacitance Variation

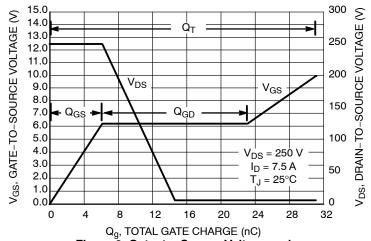


Figure 9. Gate-to-Source Voltage and Drain-to-Source Voltage versus Total Charge

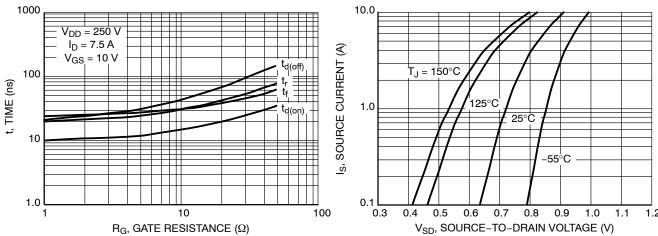


Figure 10. Resistive Switching Time Variation versus Gate Resistance

Figure 11. Diode Forward Voltage versus Current

TYPICAL CHARACTERISTICS

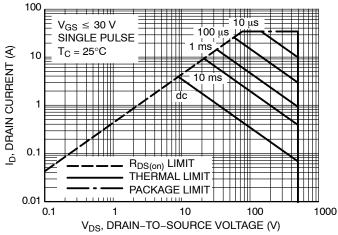


Figure 12. Maximum Rated Forward Biased Safe Operating Area NDF08N50Z

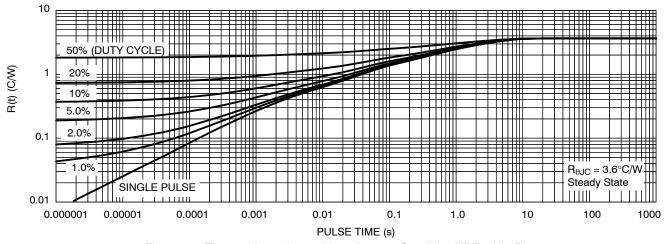


Figure 13. Thermal Impedance (Junction-to-Case) for NDF08N50Z

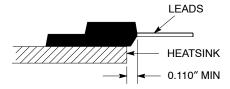


Figure 14. Isolation Test Diagram

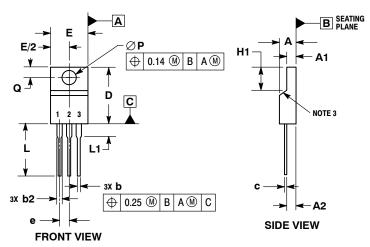
 $\label{lem:made_potential} \mbox{Measurement made between leads and heatsink with all leads shorted together.}$

*For additional mounting information, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PACKAGE DIMENSIONS

TO-220 FULLPACK, 3-LEAD

CASE 221AH ISSUE F

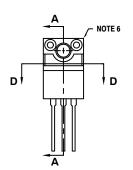


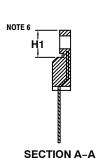
NOTES:

- DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
- 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. CONTOUR UNCONTROLLED IN THIS AREA.
- DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH AND GATE PROTRUSIONS. MOLD FLASH AND GATE PROTRUSIONS NOT TO PROTHOSIONS, MOLD PLASH AND GALE PROTHOSIONS NOT TO EXCEED 0.13 PER SIDE. THESE DIMENSIONS ARE TO BE MEASURED AT OUTERMOST EXTREME OF THE PLASTIC BODY. DIMENSION b2 DOES NOT INCLUDE DAMBAR PROTRUSION. LEAD WIDTH INCLUDING PROTRUSION SHALL NOT EXCEED 2.00.
- CONTOURS AND FEATURES OF THE MOLDED PACKAGE BODY MAY VARY WITHIN THE ENVELOP DEFINED BY DIMENSIONS AT AND H1 FOR MANUFACTURING PURPOSES.

	MILLIMETERS			
DIM	MIN	MAX		
Α	4.30	4.70		
A1	2.50	2.90		
A2	2.50	2.90		
b	0.54	0.84		
b2	1.10	1.40		
С	0.49	0.79		
D	14.70	15.30		
Е	9.70	10.30		
е	2.54	BSC		
H1	6.60	7.10		
L	12.50	14.73		
L1		2.80		
Р	3.00	3.40		
Q	2.80	3.20		







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