

## NDP7052 / NDB7052

### N-Channel Enhancement Mode Field Effect Transistor

#### General Description

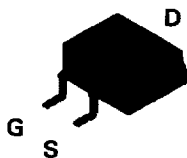
These N-Channel enhancement mode power field effect transistors are produced using National's proprietary, high cell density, DMOS technology. This very high density process is especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulses in the avalanche and commutation modes. These devices are particularly suited for low voltage applications such as automotive, DC/DC converters, PWM motor controls, and other battery powered circuits where fast switching, low in-line power loss, and resistance to transients are needed.

#### Features

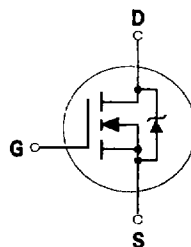
- 75A, 50V.  $R_{DS(ON)} = 0.01\Omega$  @  $V_{GS}=10V$ .
- Critical DC electrical parameters specified at elevated temperature.
- Rugged internal source-drain diode can eliminate the need for an external Zener diode transient suppressor.
- 175°C maximum junction temperature rating.
- High density cell design for extremely low  $R_{DS(ON)}$ .
- TO-220 and TO-263 (D<sup>2</sup>PAK) package for both through hole and surface mount applications.



TO-220  
NDP Series



TO-263AB  
NDB Series



#### Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	NDP7052	NDB7052	Units
$V_{DSS}$	Drain-Source Voltage	50		V
$V_{DGR}$	Drain-Gate Voltage ( $R_{GS} \leq 1\text{ M}\Omega$ )	50		V
$V_{GSS}$	Gate-Source Voltage - Continuous	$\pm 20$		V
	- Nonrepetitive ( $t_p < 50\text{ }\mu\text{s}$ )	$\pm 40$		
$I_D$	Drain Current - Continuous	75		A
	- Pulsed	225		
$P_D$	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	150		W
	Derate above $25^\circ\text{C}$	1		W/ $^\circ\text{C}$
$T_J, T_{STG}$	Operating and Storage Temperature Range	-65 to 175		$^\circ\text{C}$
$T_L$	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	275		$^\circ\text{C}$

# Electrical Characteristics (T<sub>c</sub> = 25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
DRAIN-SOURCE AVALANCHE RATINGS (Note 1)						
$W_{DSS}$	Single Pulse Drain-Source Avalanche Energy	$V_{DD} = 25\text{ V}$ , $I_D = 75\text{ A}$			550	mJ
$I_{AR}$	Maximum Drain-Source Avalanche Current				75	A
OFF CHARACTERISTICS						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$	50			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 40\text{ V}$ , $V_{GS} = 0\text{ V}$			10	$\mu\text{A}$
$I_{GSSF}$	Gate - Body Leakage, Forward	$V_{GS} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$			100	nA
$I_{GSSR}$	Gate - Body Leakage, Reverse	$V_{GS} = -20\text{ V}$ , $V_{DS} = 0\text{ V}$			-100	nA
ON CHARACTERISTICS (Note 1)						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	2		4	V
			$T_J = 125^\circ\text{C}$ 1.4		3.6	
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}$ , $I_D = 37.5\text{ A}$		0.008	0.01	$\Omega$
			$T_J = 150^\circ\text{C}$	0.014	0.018	
$I_{D(on)}$	On-State Drain Current	$V_{GS} = 10\text{ V}$ , $V_{DS} = 10\text{ V}$	60			A
DRAIN-SOURCE DIODE CHARACTERISTICS						
$I_S$	Maximum Continuous Drain-Source Diode Forward Current				75	A
$I_{SM}$	Maximum Pulsed Drain-Source Diode Forward Current				225	A
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}$ , $I_S = 37.5\text{ A}$ (Note 1)			1.3	V
			$T_J = 125^\circ\text{C}$		1.2	
THERMAL CHARACTERISTICS						
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case				1	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient				62.5	$^\circ\text{C/W}$

Note:

1. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .