



WANSEMI  
万晶半导体

WX038N04PA

# Enhancement Mode N-Channel Power MOSFET

PDFN5x6/NMOS/40V/±20V/70A/1.8V/4.1mΩ

Rev0.5

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## 40V, 4.1mΩ, 70A, Single N-Channel

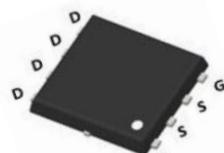
### 1. Features

- ◆ 40V MOSFET technology
- ◆ Low on-state resistance
- ◆ Fast switching
- ◆  $V_{GS} \pm 20V$
- ◆ 100% RG Tested
- ◆ 100% UIS Tested

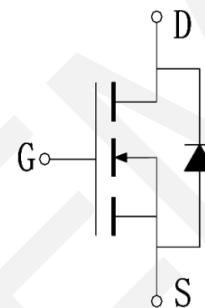
$V_{DS}$	$R_{DS(on)}$ Typ.	$I_D$ Max.
40V	4.1mΩ @ 10V	70A
	6.0mΩ @ 4.5V	

### 2. Applications

- ◆ Power Switching Application
- ◆ Load Switching



PDFN5X6  
Pin Description



Schematic Diagram

### 3. Package Marking and Ordering Information

Part no.	Marking	Package	PCS/Reel	PCS/CTN.
WX038N04PA	038N04	PDFN5X6	5,000	50,000

### 4. Absolute Max Ratings at $T_a=25^\circ C$ (Note1)

Parameter	Symbol	Maximum	Units
Drain to Source Voltage	$V_{DSS}$	40	V
Gate to Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current (DC)	$I_D$	70	A
Drain Current (Pulse), $PW \leq 300\mu s$	$I_{DP}$	280	A
Total Dissipation	$P_D$	42	W
Avalanche Energy, Single Pulsed	$E_{AS}$	126	mJ
Junction Temperature	$T_j$	150	°C
Storage Temperature	$T_{stg}$	-55 to +150	°C

Note 1: 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.



## 5.Thermal Resistance Ratings

Parameter	Symbol	Value	Unit
Junction to case	R <sub>AJC</sub>	1.4	°C/W

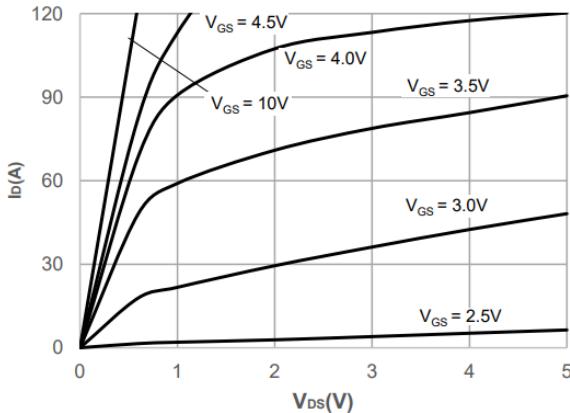
Note 2: When mounted on 1 inch square copper board  $t \leq 10\text{sec}$  The value in any given application depends on the user's specific board design.

## 6.Electrical Characteristics at $T_a=25^\circ\text{C}$ (Note 3)

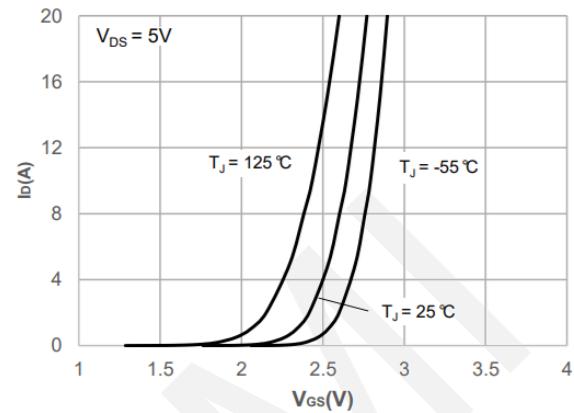
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain to Source Breakdown Voltage	V <sub>(BR)DSS</sub>	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V	40	-	-	V
Zero-Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 40V, V <sub>GS</sub> = 0V	-	-	1	μA
Gate to Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	-	-	±100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	1.8	2.5	V
Static Drain to Source On-State Resistance	R <sub>DS(on)</sub>	I <sub>D</sub> = 30A, V <sub>GS</sub> = 10V	-	4.1	5.0	mΩ
		I <sub>D</sub> = 20A, V <sub>GS</sub> = 4.5V	-	6.0	8.0	mΩ
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =20V, Frequency=1.0MHz	-	1098	-	pF
Output Capacitance	C <sub>oss</sub>		-	515	-	pF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	14	-	pF
Turn-ON Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 20V, I <sub>D</sub> = 20A V <sub>GS</sub> = 10V, R <sub>G</sub> = 3Ω	-	4.8	-	ns
Rise Time	t <sub>r</sub>		-	8.6	-	ns
Turn-OFF Delay Time	t <sub>d(off)</sub>		-	23	-	ns
Fall Time	t <sub>f</sub>		-	15.2	-	ns
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A	-	17.9	-	nC
	Q <sub>gs</sub>		-	3.2	-	nC
	Q <sub>gd</sub>		-	4.0	-	nC
Diode Forward Voltage	V <sub>FSD</sub>	I <sub>S</sub> = 30A, V <sub>GS</sub> = 0	-	-	1.2	V

Note 3: 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.

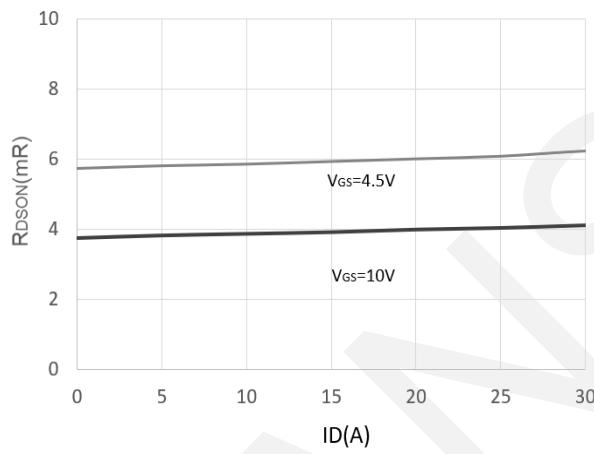
## 7.Typical electrical and thermal characteristics



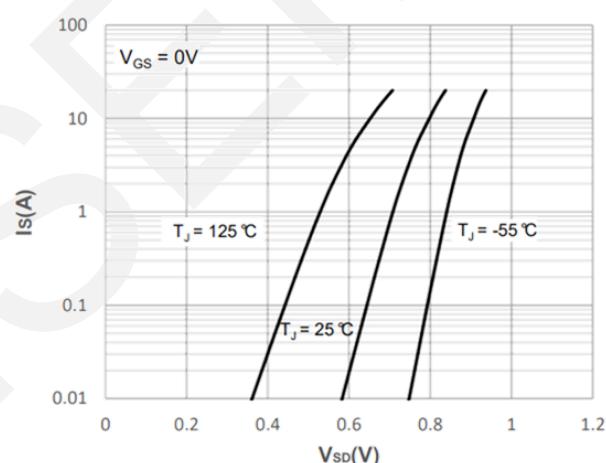
**Output Characteristics**



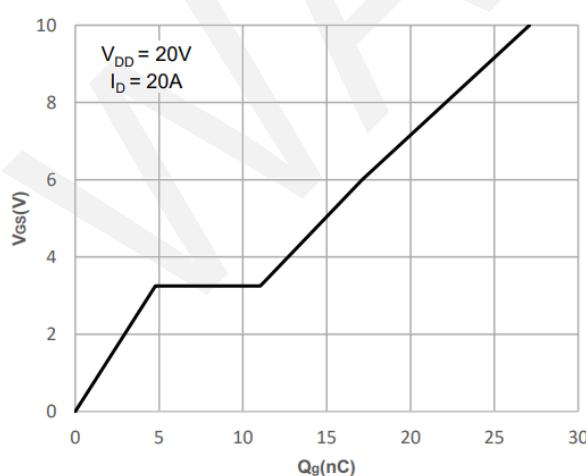
**Transfer Characteristics**



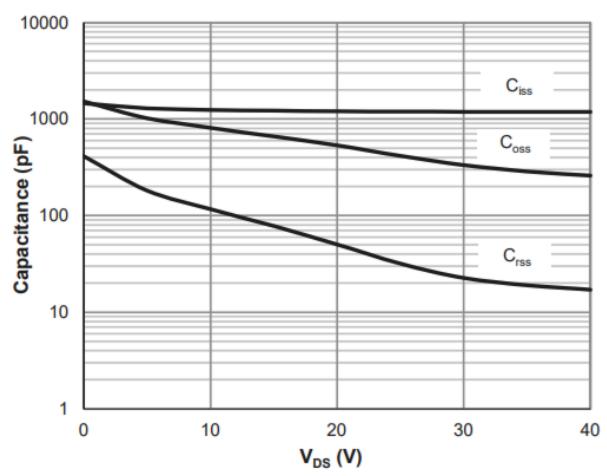
**Drain Current**



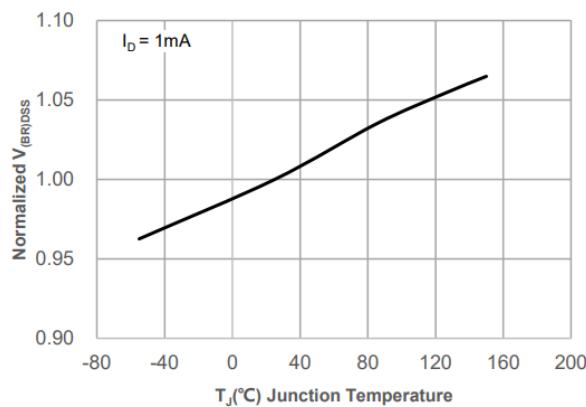
**Body Diode Characteristics**



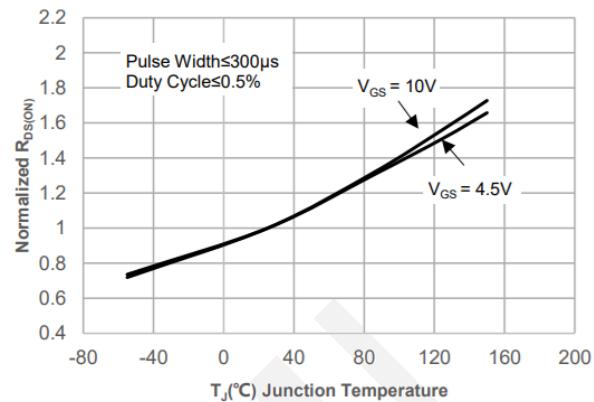
**Gate Charge Characteristics**



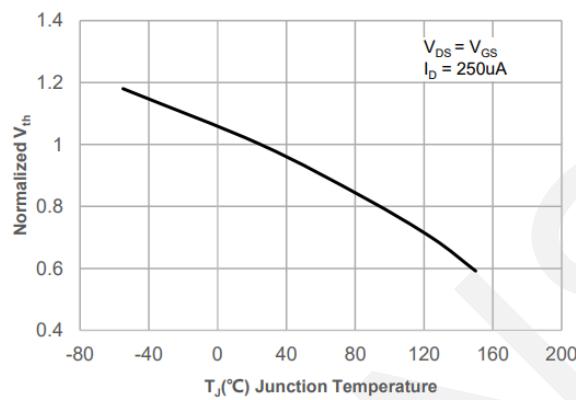
**Capacitance Characteristics**



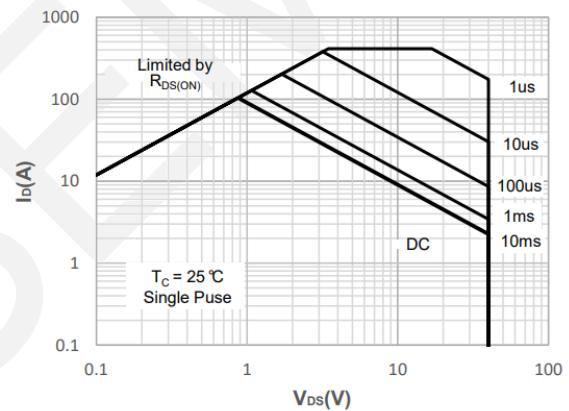
**Normalized Breakdown voltage vs.  
Junction Temperature**



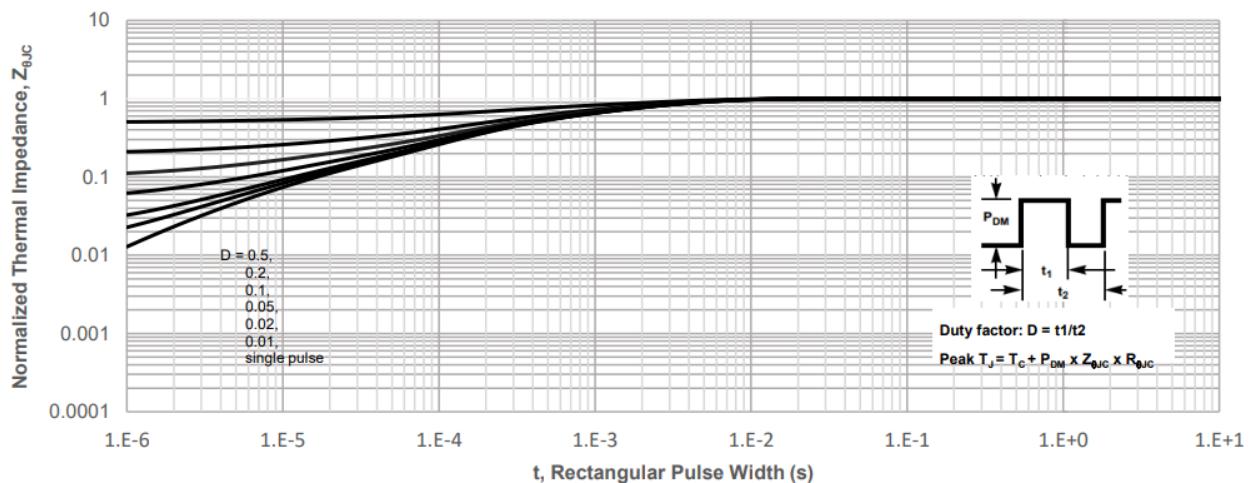
**Normalized on Resistance vs.  
Junction Temperature**



**Normalized Threshold Voltage  
vs. Junction Temperature**



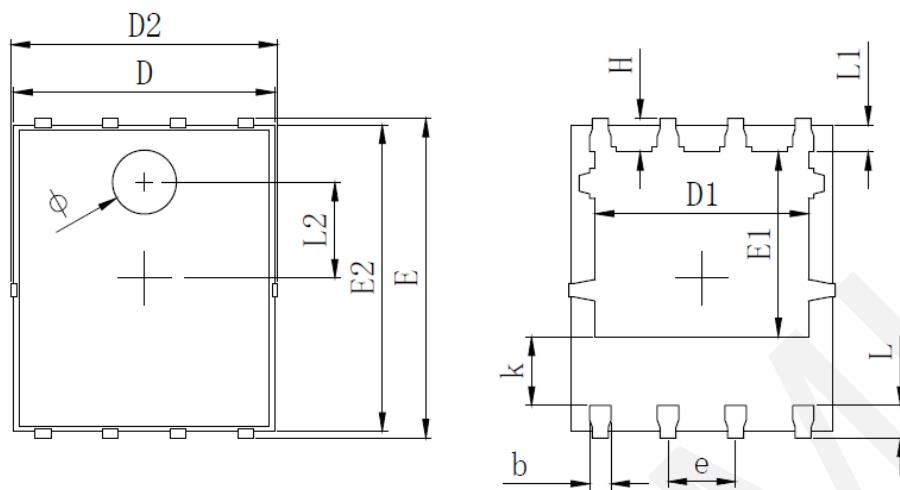
**Maximum Safe Operating Area**



**Normalized Maximum Transient Thermal Impedance**



## 8. Package Dimensions



SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	0.900	1.000	1.100
A1	0.254 REF.		
A2	0~0.05		
D	4.824	4.900	4.976
D1	3.910	4.010	4.110
D2	4.924	5.000	5.076
E	5.924	6.000	6.076
E1	3.375	3.475	3.575
E2	5.674	5.750	5.826
b	0.350	0.400	0.450
e	1.270 TYP.		
L	0.534	0.610	0.686
L1	0.424	0.500	0.576
L2	1.800 REF.		
k	1.190	1.290	1.390
H	0.549	0.625	0.701
$\theta$	8°	10°	12°
$\phi$	1.100	1.200	1.300
d			0.100

## 9. Important Notice

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