



**WANSEMI**  
万芯半导体

**WX021N04S3**

# **Enhancement Mode N-Channel Power MOSFET**

**SOT23-3/NMOS/40V/ $\pm 20V$ /1.5V/7A/21m $\Omega$**

**Rev0.1**

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## 40V, 21mΩ, 7A, Single N-Channel

### 1.Features

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

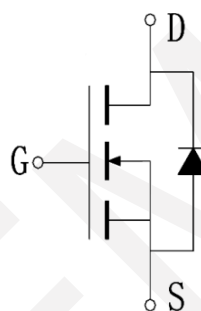
$V_{DS}$	$R_{DS(on)}$ Typ.	$I_D$ Max.
40V	21mΩ @ 10V	7A
	25mΩ @ 4.5V	

### 2.Applications

- ◆ Power Switching Application
- ◆ Load Switching



SOT23-3  
Pin Description



Schematic Diagram

### 3.Package Marking and Ordering Information

Part no.	Marking	Package	PCS/Reel	PCS/CTN.
WX021N04S3	021N04	SOT23-3	3,000	180,000

### 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)	$I_D$	7	A
Drain Current (Pulse), $PW \leq 300\mu s$	$I_{DP}$	28	A
Total Dissipation	$P_D$	2.0	W
Junction Temperature	$T_j$	150	$^{\circ}C$
Storage Temperature	$T_{stg}$	-55 to +150	$^{\circ}C$

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 (Note 2)

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	48	$^{\circ}\text{C/W}$

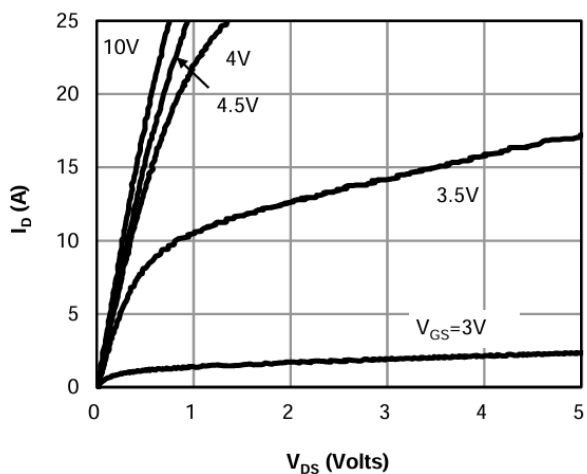
Note 2: When mounted on 1 inch square copper board  $t \leq 10\text{sec}$  The value in any given application depends on the user's specific board design.

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

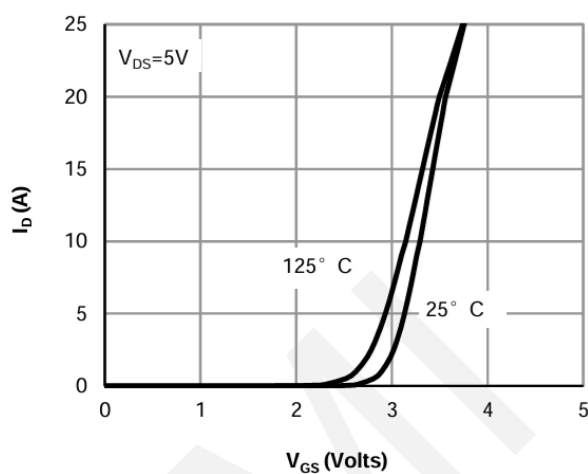
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$	40	-	-	V
Zero-Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 40\text{V}$ , $V_{GS} = 0\text{V}$	-	-	1	$\mu\text{A}$
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20\text{V}$ , $V_{DS} = 0\text{V}$	-	-	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_{DS} = 250\mu\text{A}$	1.0	1.5	2.5	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D = 5\text{A}$ , $V_{GS} = 10\text{V}$	-	21	28	$\text{m}\Omega$
		$I_D = 3\text{A}$ , $V_{GS} = 4.5\text{V}$	-	25	35	$\text{m}\Omega$
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{V}$ , $V_{DS} = 20\text{V}$ , Frequency = 1.0MHz	-	520	-	pF
Output Capacitance	$C_{oss}$		-	65	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	32	-	pF
Turn-ON Delay Time	$t_{d(on)}$	$V_{DS} = 20\text{V}$ , $R_L = 3.3\Omega$ $V_{GS} = 10\text{V}$ , $R_G = 3\Omega$	-	5.5	-	ns
Rise Time	$t_r$		-	2.5	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	20.5	-	ns
Fall Time	$t_f$		-	7	-	ns
Total Gate Charge	$Q_g$	$V_{DS} = 20\text{V}$ , $V_{GS} = 10\text{V}$ , $I_D = 6\text{A}$	-	9	-	nC
	$Q_{gs}$		-	2	-	nC
	$Q_{gd}$		-	1.5	-	nC
Diode Forward Voltage	$V_{FSD}$	$I_S = 5\text{A}$ , $V_{GS} = 0$	0.5	-	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.

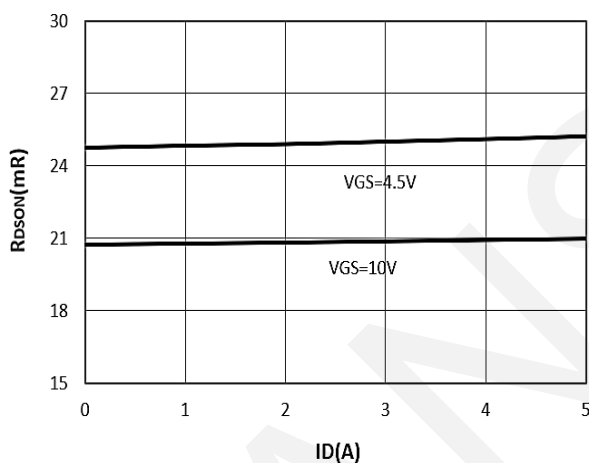
## 7. Typical Electrical and Thermal Characteristics



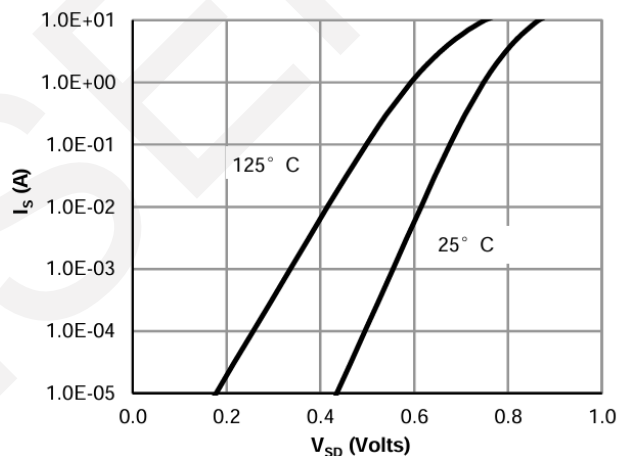
Output Characteristics



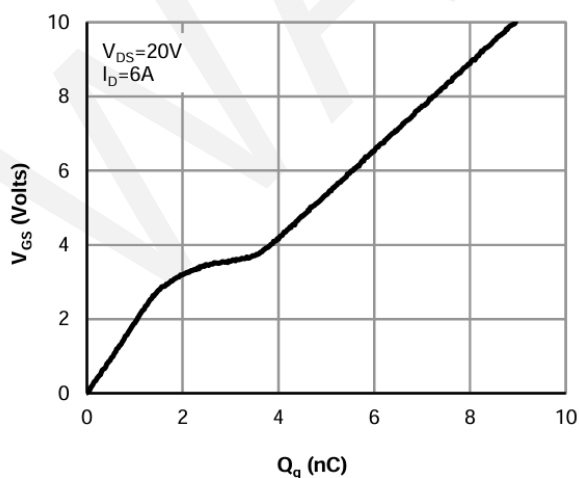
Typical Transfer Characteristics



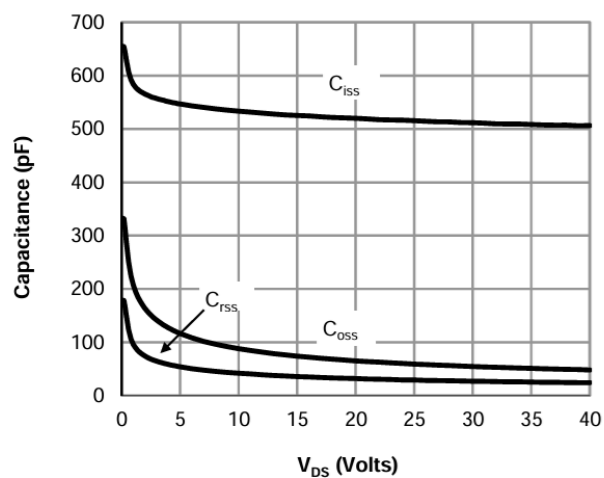
On-resistance vs. Drain Current



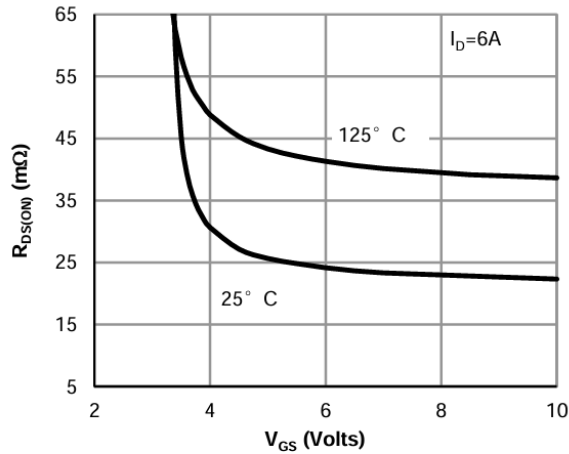
Body Diode Characteristics



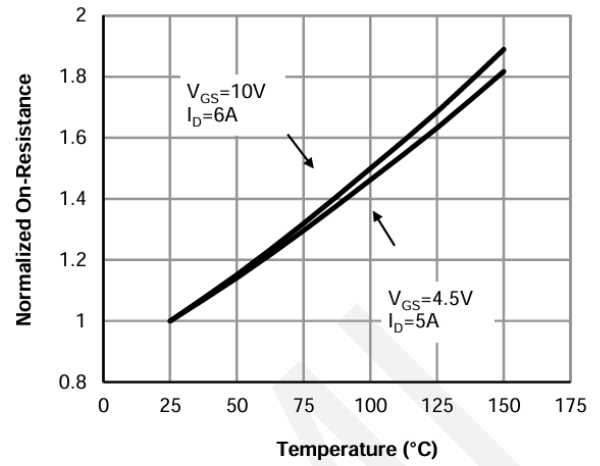
Gate Charge Characteristics



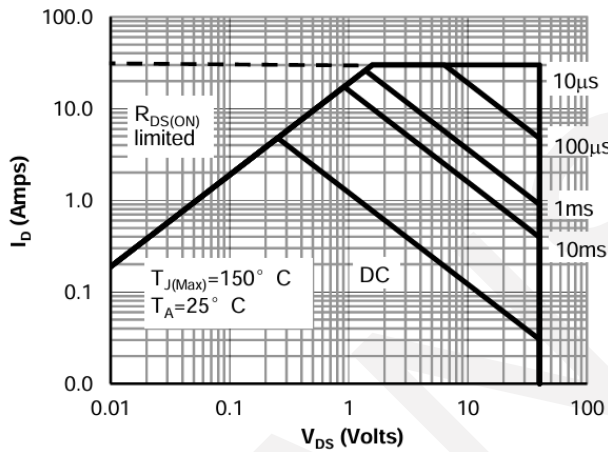
Capacitance Characteristics



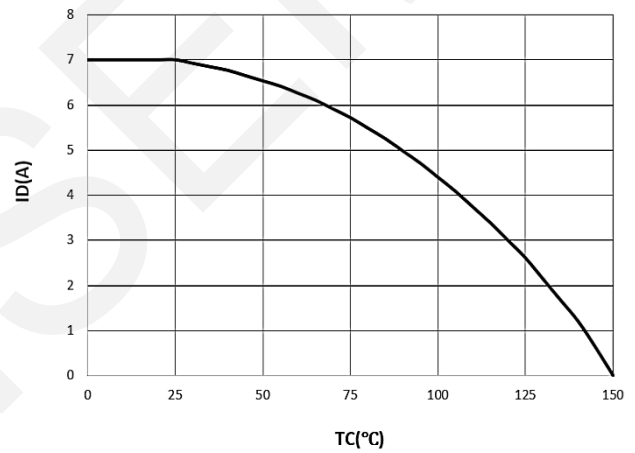
RDS(ON) vs. VGS



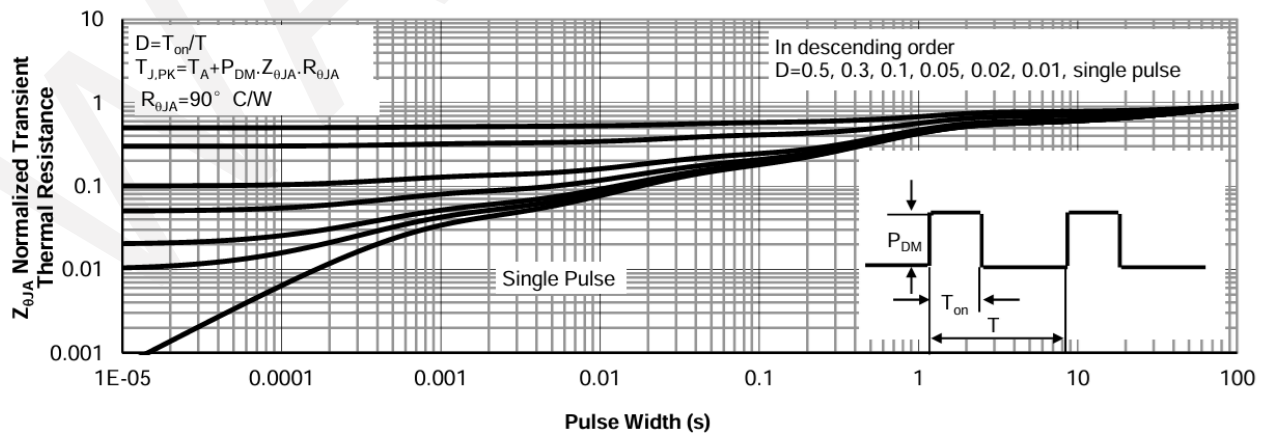
Normalized on Resistance vs.  
Junction Temperature



Maximum Safe Operating Area

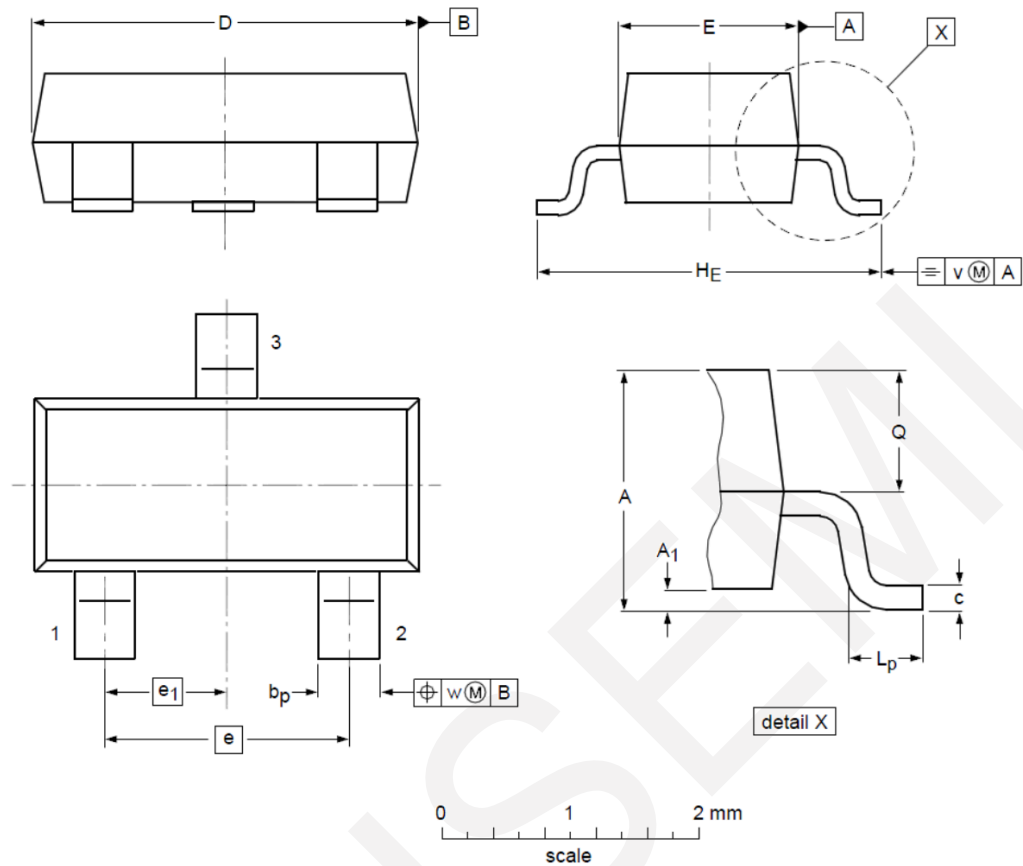


Maximum Continuous Drain Current vs.  
Case Temperature



Maximum Effective Transient  
Thermal Impedance, Junction-to-Case

## 8.Package Dimensions



**DIMENSIONS** ( unit : mm )

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
<b>A</b>	1.00	1.17	1.30	<b>A<sub>1</sub></b>	0.01	0.05	0.10
<b>b<sub>p</sub></b>	0.35	0.39	0.50	<b>c</b>	0.10	0.20	0.26
<b>D</b>	2.70	2.90	3.10	<b>E</b>	1.30	1.58	1.70
<b>e</b>	--	1.90	--	<b>e<sub>1</sub></b>	--	0.95	--
<b>H<sub>E</sub></b>	2.50	2.78	3.00	<b>L<sub>p</sub></b>	0.20	0.32	0.60
<b>Q</b>	0.23	0.27	0.33	<b>v</b>	--	0.20	--
<b>w</b>	--	0.20	--				

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