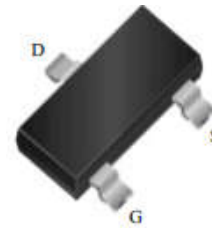


## WNM2020A

Single N-Channel, 20V, 1.0A, Power MOSFET

[Http://www.sh-willsemi.com](http://www.sh-willsemi.com)

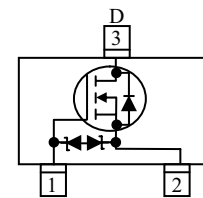
V <sub>DS</sub> (V)	Max.R <sub>DS(on)</sub> (mΩ)
20	580 @ V <sub>GS</sub> =4.5V
	710 @ V <sub>GS</sub> =3.1V
	900 @ V <sub>GS</sub> =2.5V
	1400 @ V <sub>GS</sub> =1.8V
ESD Rating: 2000V HBM	



SOT-23

### Description

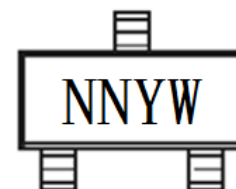
The WNM2020A is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R<sub>DS(ON)</sub> with low gate charge. This device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WNM2020A is Pb-free.



Pin configuration (Top view)

### Features

- Trench Technology
- Supper high density cell design
- Excellent ON resistance
- Extremely Low Threshold Voltage
- Small package SOT-23



NN = Device Code  
Y = Year  
W = Month (A~z)

### Marking

### Applications

- DC/DC converters
- Power supply converters circuit
- Load/Power Switching for portable device

### Order information

Device	Package	Shipping
WNM2020A-3/TR	SOT-23	3000/Tape&Reel

**Absolute Maximum ratings**

Parameter	Symbol	Maximum	Unit	
Drain-Source Voltage	$V_{DS}$	20	V	
Gate-Source Voltage	$V_{GS}$	$\pm 10$		
Continuous Drain Current	$I_D$	$T_A=25^\circ\text{C}$	1.0	A
		$T_A=70^\circ\text{C}$	0.8	
Pulsed Drain Current <sup>c</sup>	$I_{DM}$	3.0	A	
Power Dissipation <sup>a</sup>	$P_D$	$T_A=25^\circ\text{C}$	1.0	W
		$T_A=70^\circ\text{C}$	0.7	
Operating Junction Temperature	$T_J$	-55 to 150	$^\circ\text{C}$	
Storage Temperature Range	$T_{STG}$	-55 to 150	$^\circ\text{C}$	

**Thermal resistance ratings**

Single Operation				
Parameter		Symbol	Maximum	Unit
Junction-to-Ambient Thermal Resistance <sup>a</sup>	$t \leq 10 \text{ s}$	$R_{\theta JA}$	90	$^\circ\text{C/W}$
	Steady State		122	
Junction-to-Ambient Thermal Resistance <sup>b</sup>	$t \leq 10 \text{ s}$	$R_{\theta JA}$	141	
	Steady State		208	
Junction-to-Lead Thermal Resistance	Steady State	$R_{\theta JL}$	52	

a FR-4 board (38mm X 38mm X t1.6mm, 70um Copper) partially covered with copper (645mm<sup>2</sup> area).

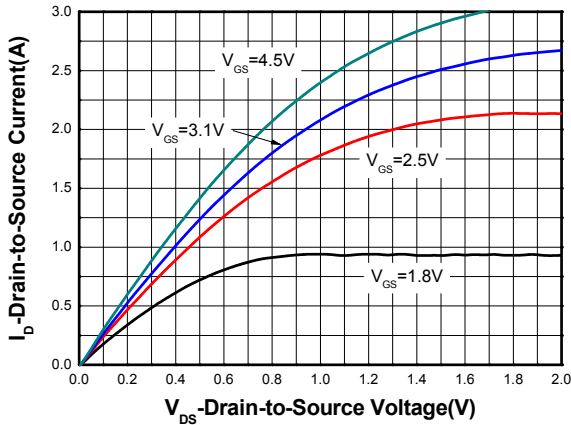
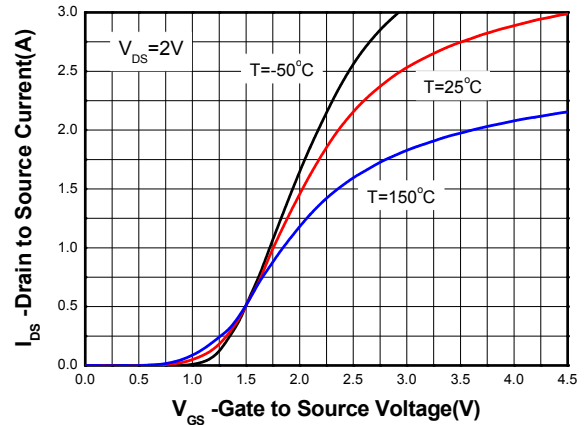
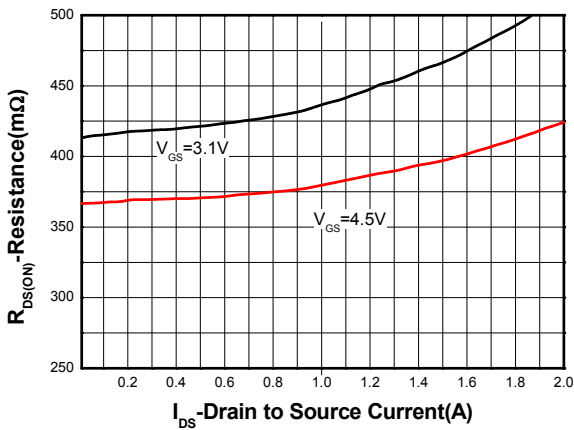
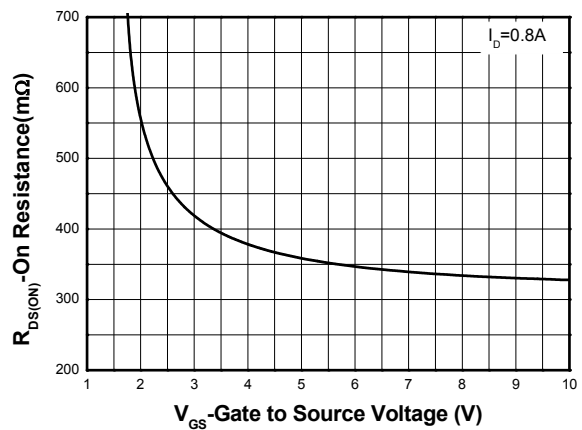
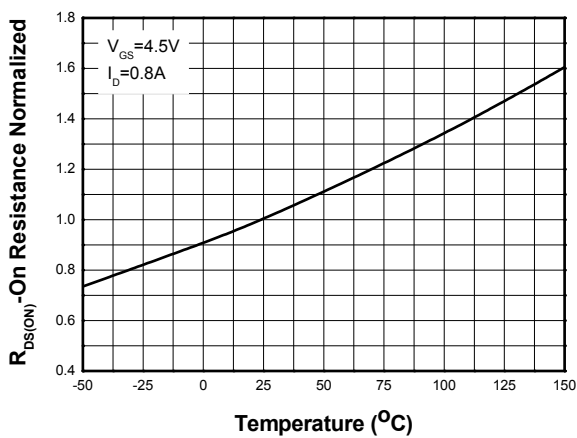
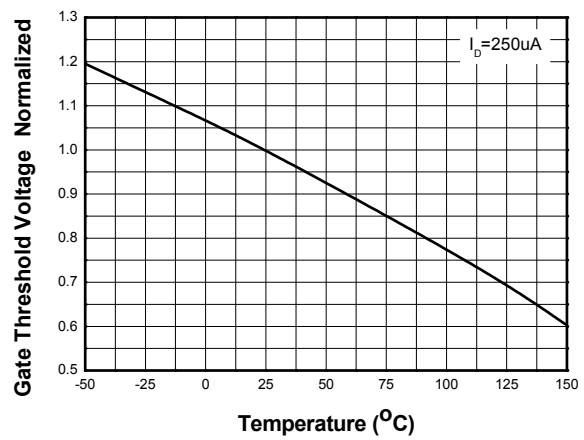
b FR-4 board (38mm X 38mm X t1.6mm, 70um Copper) minimum pad covered with copper.

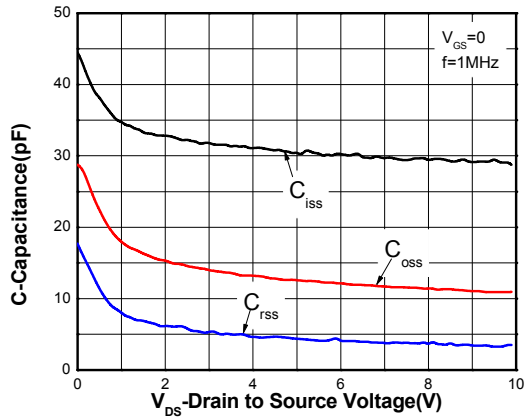
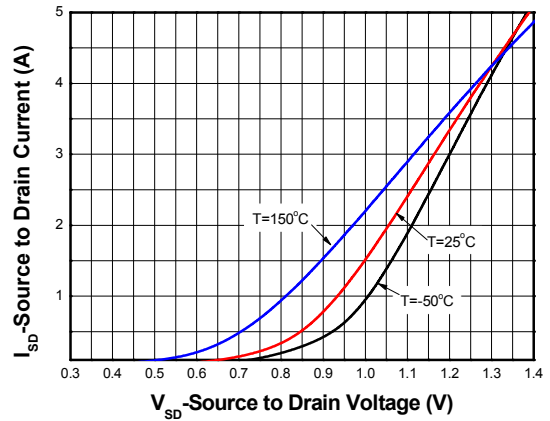
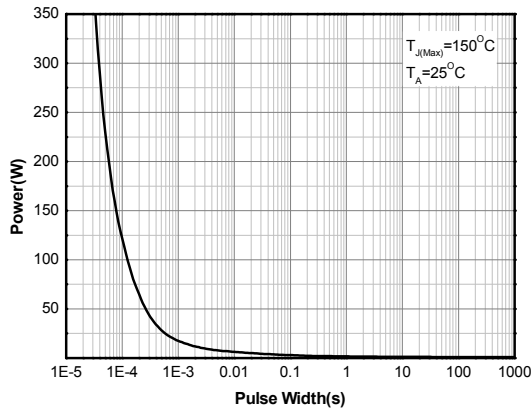
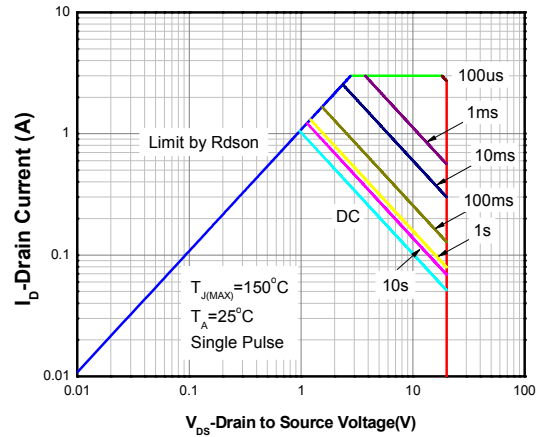
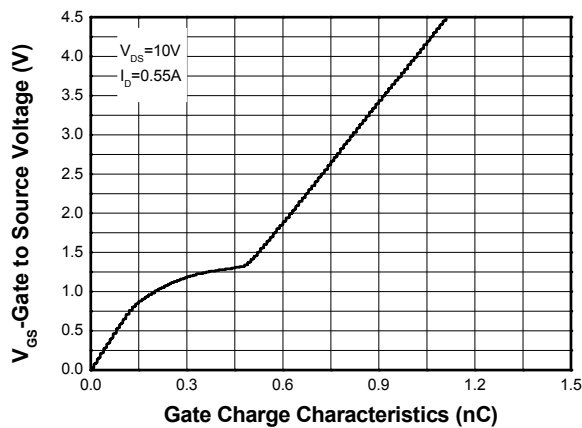
c Repetitive rating, ~10us pulse width, duty cycle ~1%, keep initial  $T_J = 25^\circ\text{C}$ , the maximum allowed junction temperature of  $150^\circ\text{C}$ .

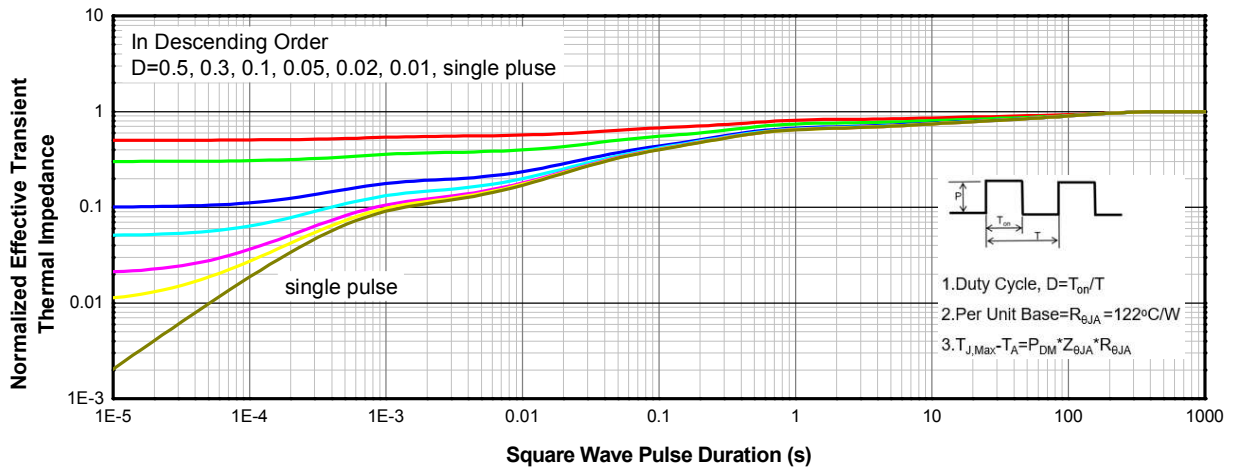
d The static characteristics are obtained using ~380us pulses, duty cycle ~1%.

**Electronics Characteristics (Ta=25°C, unless otherwise noted)**

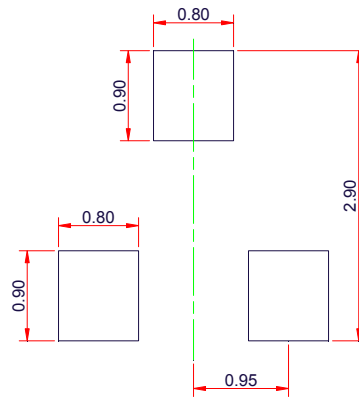
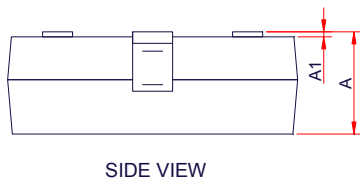
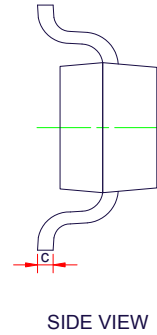
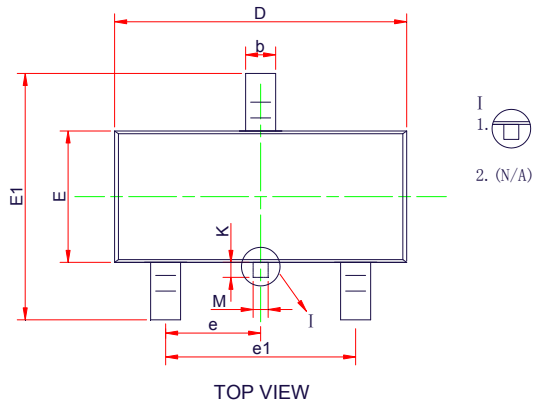
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\mu\text{A}$	20			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 16\text{V}, V_{GS} = 0\text{V}$			1	$\mu\text{A}$
Gate-to-source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{V}$			$\pm 10$	$\mu\text{A}$
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	0.4	0.7	1.0	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS} = 4.5\text{V}, I_D = 0.8\text{A}$		387	580	m $\Omega$
		$V_{GS} = 3.1\text{V}, I_D = 0.6\text{A}$		432	710	
		$V_{GS} = 2.5\text{V}, I_D = 0.3\text{A}$		472	900	
		$V_{GS} = 1.8\text{V}, I_D = 0.2\text{A}$		616	1400	
<b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b>						
Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{ V}, f = 1.0\text{MHz}, V_{DS} = 10\text{ V}$		29		pF
Output Capacitance	$C_{OSS}$			11		
Reverse Transfer Capacitance	$C_{RSS}$			4		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{V}, I_D = 0.55\text{ A}$		1.1		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.11		
Gate-to-Source Charge	$Q_{GS}$			0.15		
Gate-to-Drain Charge	$Q_{GD}$			0.32		
Gate Resistance	$R_g$	$f = 1\text{MHz}$		6		$\Omega$
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Delay Time	$t_d(ON)$	$V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V}, I_D = 0.55\text{A}, R_G = 6\Omega$		5		ns
Rise Time	$t_r$			5.8		
Turn-Off Delay Time	$t_d(OFF)$			15.4		
Fall Time	$t_f$			3.6		
<b>BODY DIODE CHARACTERISTICS</b>						
Forward Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 0.8\text{A}$		0.9	1.1	V

**Typical Characteristics (Ta=25°C, unless otherwise noted)**

**Output Characteristics <sup>e</sup>**

**Transfer Characteristics <sup>e</sup>**

**On-Resistance vs. Drain Current <sup>e</sup>**

**On-Resistance vs. Gate-to-Source Voltage <sup>e</sup>**

**On-Resistance vs. Junction Temperature <sup>e</sup>**

**Threshold Voltage vs. Temperature**

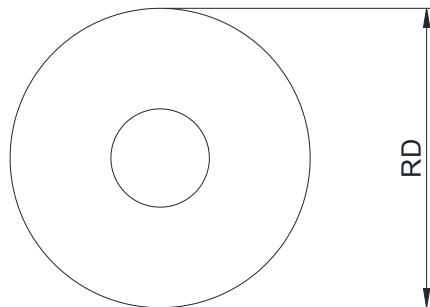
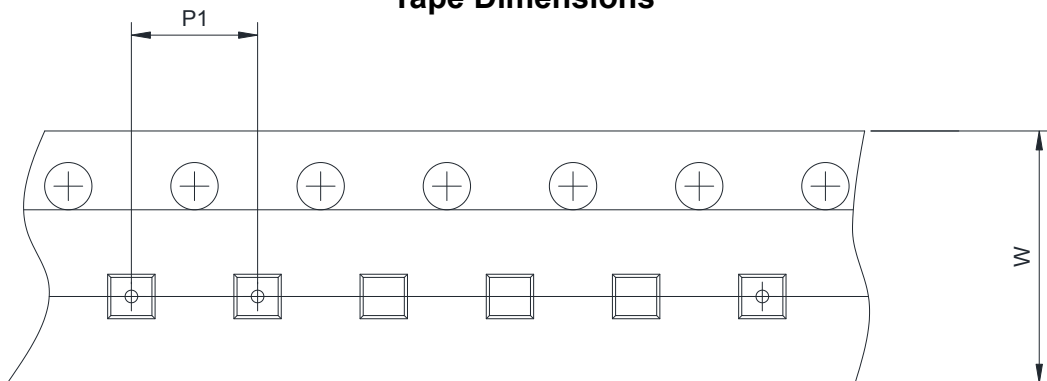
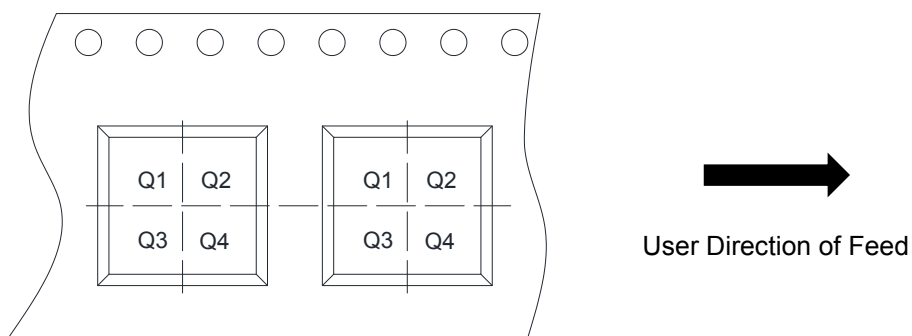

**Capacitance**

**Body Diode Forward Voltage<sup>e</sup>**

**Single Pulse power**

**Safe Operating Power**

**Gate Charge Characteristics**



**Transient Thermal Response (Junction-to-Ambient)**

**PACKAGE OUTLINE DIMENSIONS**
**SOT-23**


Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.89	1.10	1.30
A1	0.00	-	0.10
b	0.30	0.43	0.55
c	0.05	-	0.21
D	2.70	2.90	3.10
E	1.15	1.33	1.50
E1	2.10	2.40	2.70
e	0.95 Typ.		
e1	1.70	1.90	2.10
M	0.10	0.15	0.25
K	0.00	-	0.25

**TAPE AND REEL INFORMATION**
**Reel Dimensions**

**Tape Dimensions**

**Quadrant Assignments For PIN1 Orientation In Tape**


RD	Reel Dimension	<input checked="" type="checkbox"/> 7inch	<input type="checkbox"/> 13inch
W	Overall width of the carrier tape	<input checked="" type="checkbox"/> 8mm	<input type="checkbox"/> 12mm <input type="checkbox"/> 16mm
P1	Pitch between successive cavity centers	<input type="checkbox"/> 2mm	<input checked="" type="checkbox"/> 4mm <input type="checkbox"/> 8mm
Pin1	Pin1 Quadrant	<input type="checkbox"/> Q1	<input type="checkbox"/> Q2 <input checked="" type="checkbox"/> Q3 <input type="checkbox"/> Q4



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[PJMF280N60E1\\_T0\\_00201](#) [PJMF600N65E1\\_T0\\_00201](#) [PJMF900N65E1\\_T0\\_00201](#)