

**N-Channel, 20V, 0.89A, Small Signal MOSFET**

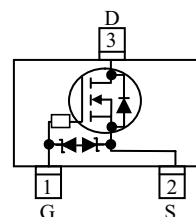
V <sub>DS</sub> (V)	R <sub>ds(on)</sub> (Ω)
20	0.220@ V <sub>GS</sub> =4.5V
	0.260@ V <sub>GS</sub> =2.5V
	0.320@ V <sub>GS</sub> =1.8V



SOT-323

**Descriptions**

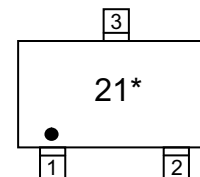
The WNM2021 is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R<sub>DS (ON)</sub> with low gate charge. This device is suitable for use in DC-DC conversion, load switch and level shift. Standard Product WNM2021 is Pb-free.



Pin configuration (Top view)

**Features**

- Trench Technology
- Supper high density cell design
- Excellent ON resistance
- Extremely Low Threshold Voltage
- Small package SOT-323



21 = Device Code  
\* = Month (A~Z)

**Marking**

**Applications**

- DC-DC converter circuit
- Small Signal Switch
- Load Switch
- Level Shift
- 

**Order information**

Device	Package	Shipping
WNM2021-3/TR	SOT-323	3000/Reel&Tape

**Absolute Maximum ratings**

Parameter		Symbol	10 S	Steady State	Unit
Drain-Source Voltage		$V_{DS}$	20		V
Gate-Source Voltage		$V_{GS}$	$\pm 6$		
Continuous Drain Current <sup>a</sup>	$T_A=25^\circ\text{C}$	$I_D$	0.89	0.82	A
	$T_A=70^\circ\text{C}$		0.71	0.65	
Maximum Power Dissipation <sup>a</sup>	$T_A=25^\circ\text{C}$	$P_D$	0.37	0.31	W
	$T_A=70^\circ\text{C}$		0.23	0.20	
Continuous Drain Current <sup>b</sup>	$T_A=25^\circ\text{C}$	$I_D$	0.78	0.70	A
	$T_A=70^\circ\text{C}$		0.62	0.56	
Maximum Power Dissipation <sup>b</sup>	$T_A=25^\circ\text{C}$	$P_D$	0.29	0.23	W
	$T_A=70^\circ\text{C}$		0.18	0.14	
Pulsed Drain Current <sup>c</sup>		$I_{DM}$	1.4		A
Operating Junction Temperature		$T_J$	150		$^\circ\text{C}$
Lead Temperature		$T_L$	260		$^\circ\text{C}$
Storage Temperature Range		$T_{stg}$	-55 to 150		$^\circ\text{C}$

**Thermal resistance ratings**

Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance <sup>a</sup>	$t \leq 10 \text{ s}$	$R_{\theta JA}$	275	335	$^\circ\text{C/W}$
	Steady State		325	395	
Junction-to-Ambient Thermal Resistance <sup>b</sup>	$t \leq 10 \text{ s}$	$R_{\theta JA}$	375	430	
	Steady State		445	535	
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	260	300	

a Surface mounted on FR4 Board using 1 square inch pad size, 1oz copper

b Surface mounted on FR4 board using minimum pad size, 1oz copper

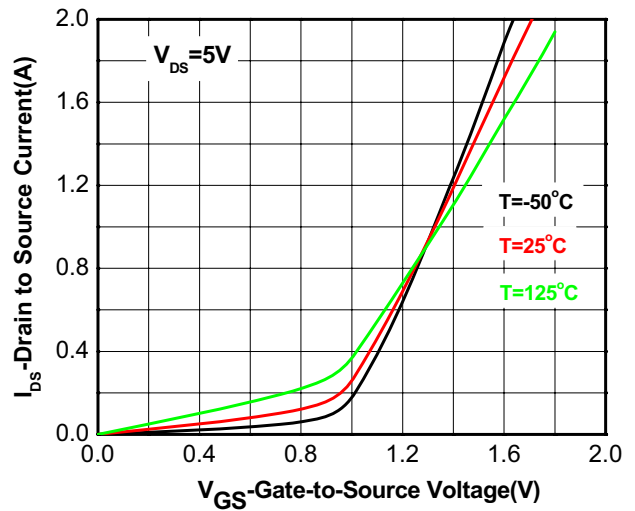
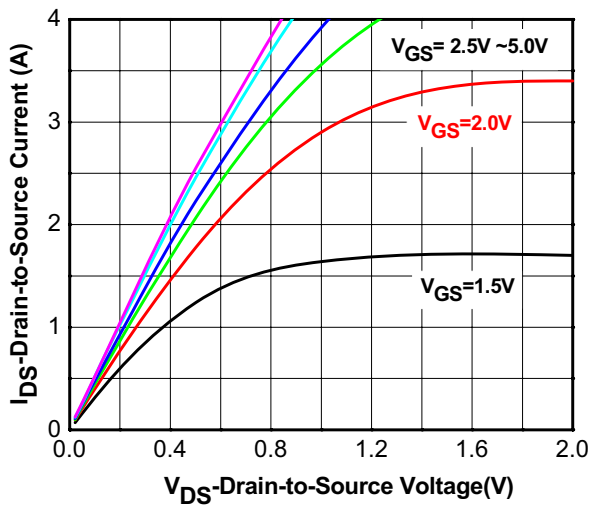
c Repetitive rating, pulse width limited by junction temperature,  $t_p=10\mu\text{s}$ , Duty Cycle=1%

d Repetitive rating, pulse width limited by junction temperature  $T_J=150^\circ\text{C}$ .

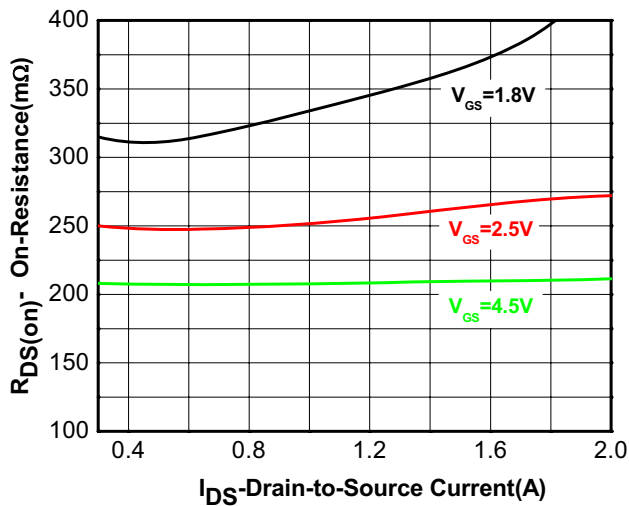
**Electronics Characteristics (Ta=25°C, unless otherwise noted)**

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	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 5\text{ V}$			5	$\mu\text{A}$
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	0.45	0.58	0.85	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 0.55\text{ A}$		220	310	m $\Omega$
		$V_{GS} = 2.5\text{ V}, I_D = 0.45\text{ A}$		260	360	
		$V_{GS} = 1.8\text{ V}, I_D = 0.35\text{ A}$		320	460	
Forward Transconductance	$g_{FS}$	$V_{DS} = 5\text{ V}, I_D = 0.55\text{ A}$		2.0		S
<b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b>						
Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{ V}, f = 100\text{ kHz}, V_{DS} = 10\text{ V}$		50		pF
Output Capacitance	$C_{OSS}$			13		
Reverse Transfer Capacitance	$C_{RSS}$			8		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V}, I_D = 0.55\text{ A}$		1.15		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.06		
Gate-to-Source Charge	$Q_{GS}$			0.15		
Gate-to-Drain Charge	$Q_{GD}$			0.23		
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Delay Time	$t_d(ON)$	$V_{DD} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 0.55\text{ A}, R_G = 6\Omega$		22		ns
Rise Time	$t_r$			80		
Turn-Off Delay Time	$t_d(OFF)$			700		
Fall Time	$t_f$			380		
<b>BODY DIODE CHARACTERISTICS</b>						
Forward Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 0.35\text{ A}$	0.5	0.7	1.5	V

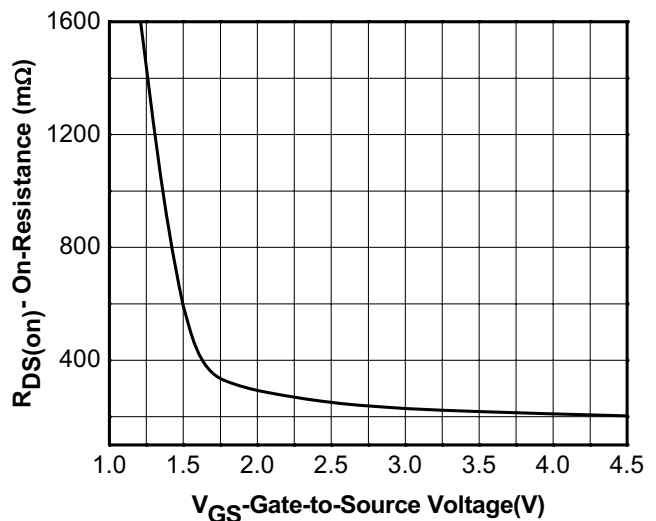
Typical Characteristics (Ta=25°C, unless otherwise noted)



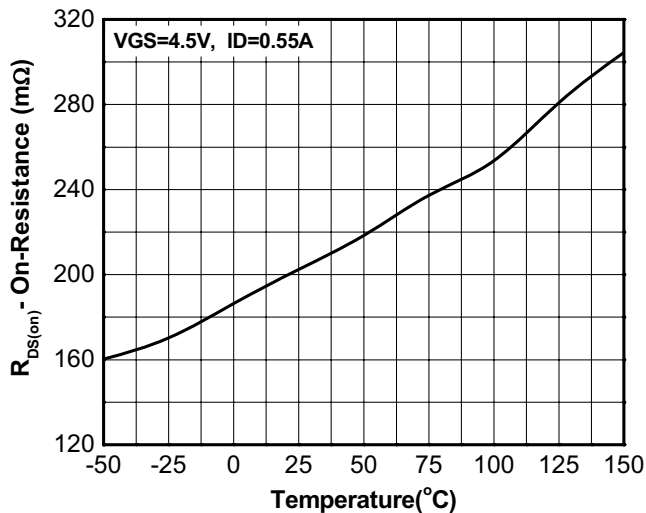
Output characteristics



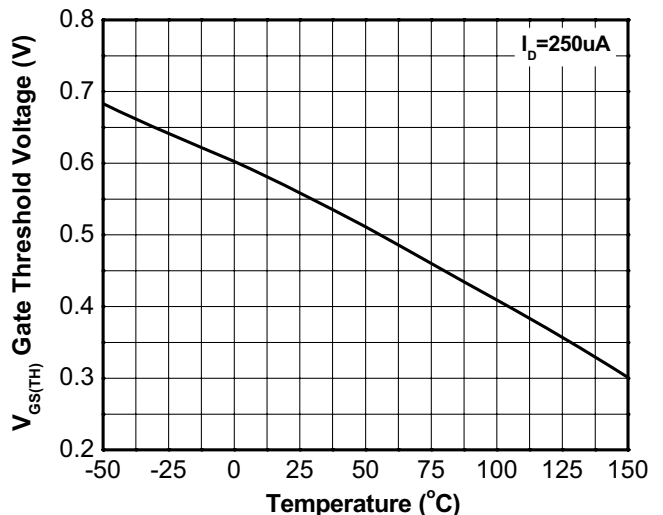
Transfer characteristics



On-Resistance vs. Drain current

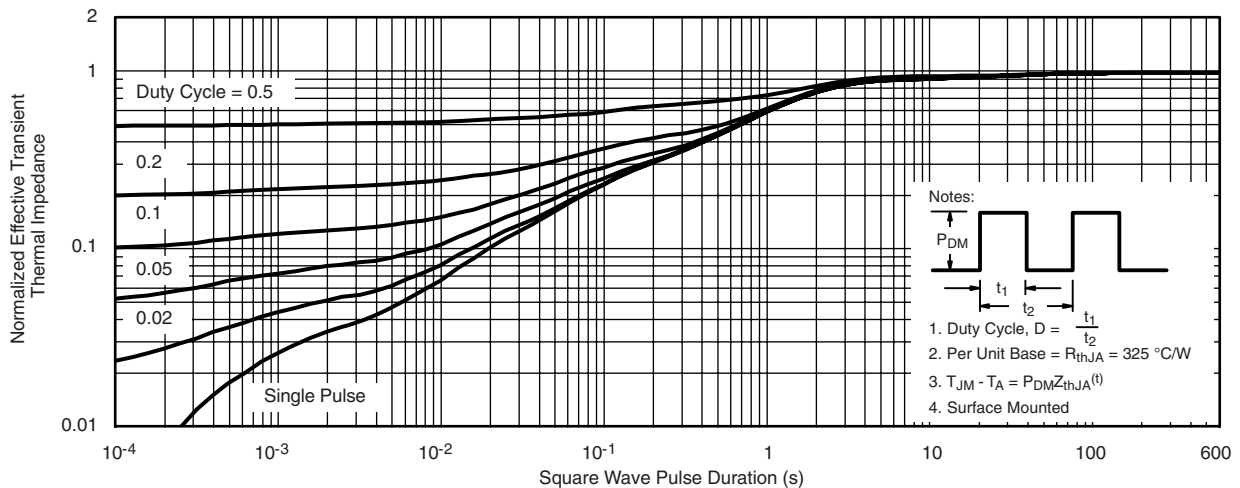
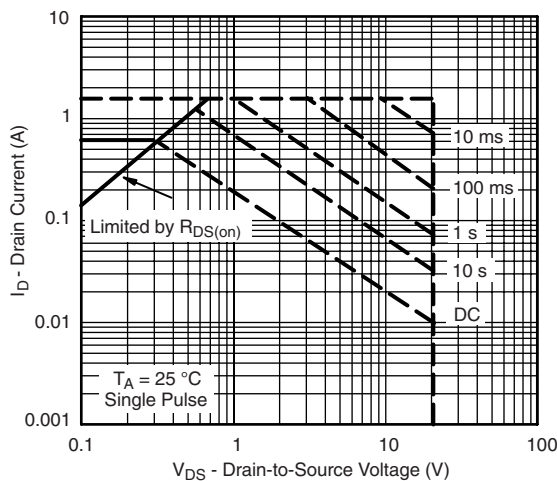
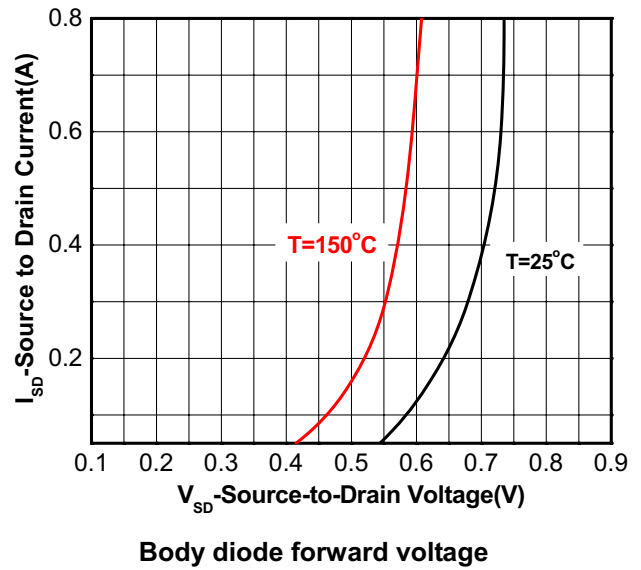
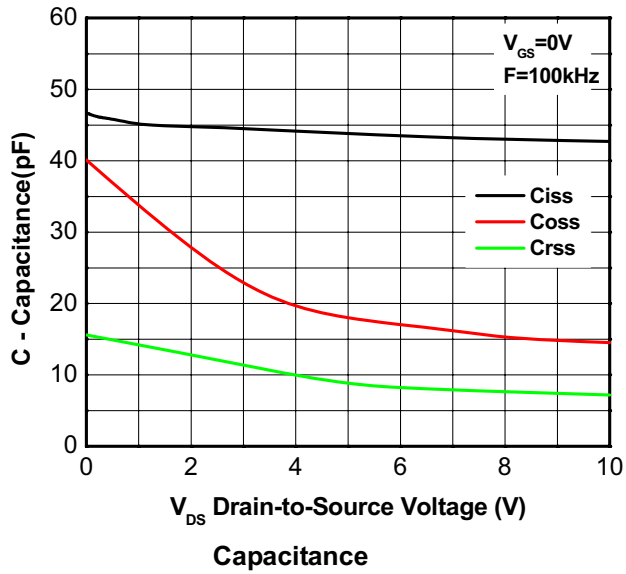


On-Resistance vs. Gate-to-Source voltage



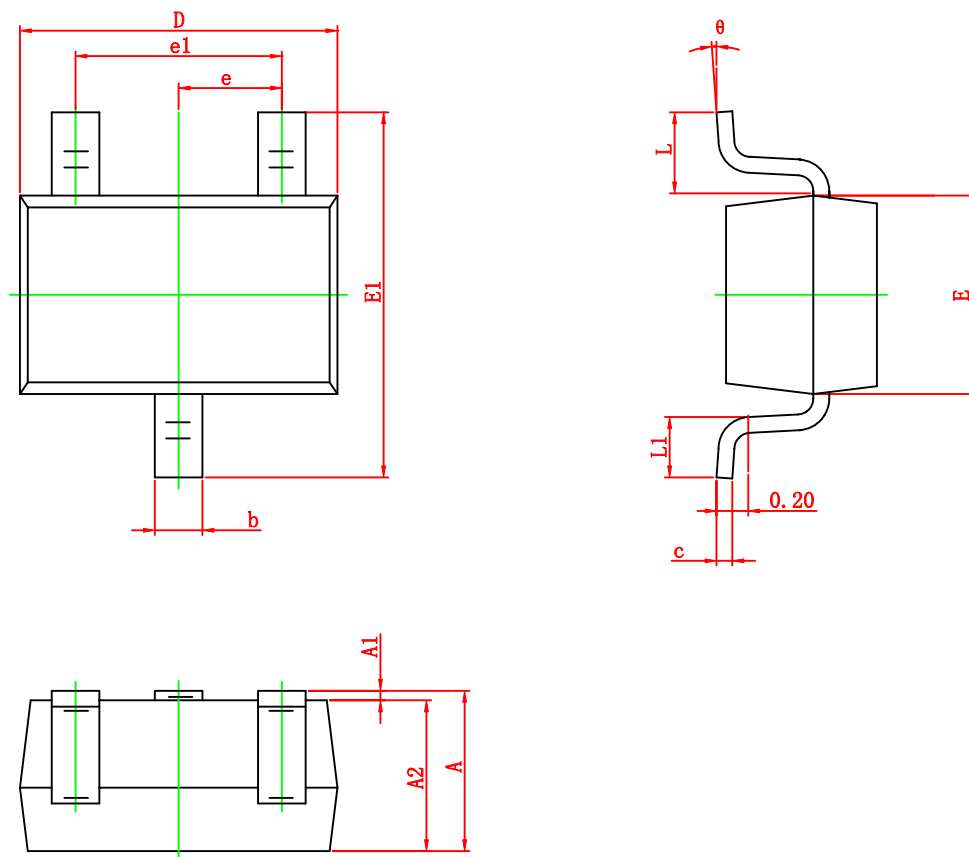
On-Resistance vs. Junction temperature

Threshold voltage vs. Temperature



Package outline dimensions

SOT-323



Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
A	0.900	1.000	1.100
A1	0.000	0.050	0.100
A2	0.900	0.950	1.000
b	0.200	0.300	0.400
c	0.080	0.115	0.150
D	2.000	2.100	2.200
E	1.150	1.250	1.350
E1	2.150	2.300	2.450
e	0.650TYP		
e1	1.200	1.300	1.400
L	0.525REF		
L1	0.260		0.460
$\theta$	0°		8°