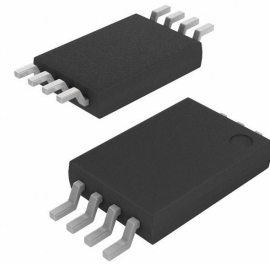


WNMD2168

Dual N-Channel, 20V, 4.1A, Power MOSFET

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

V _{DS} (V)	R _{ds(on)} (Ω)
20	0.022@ V _{GS} =4.5V
	0.024@ V _{GS} =3.1V
	0.027@ V _{GS} =2.5V



Descriptions

The WNMD2168 is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R_{DS(ON)} with low gate charge. This device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WNMD2168 is Pb-free.

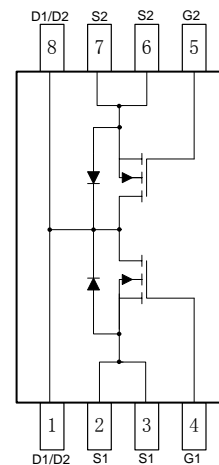
Features

- Trench Technology
- Supper high density cell design
- Excellent ON resistance for higher DC current
- Extremely Low Threshold Voltage
- Small package TSSOP-8L

Applications


- Driver for Relay, Solenoid, Motor, LED etc.
- DC-DC converter circuit
- Power Switch
- Load Switch
- Charging

TSSOP-8L



Pin configuration (Top view)



 =Logo
 2168 =Device Code
 YY = Year
 WW = Week

Marking

Order information

Device	Package	Shipping
WNMD2168-8/TR	TSSOP-8L	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}	± 10		
Continuous Drain Current ^a	$T_A=25^\circ\text{C}$	I_D	5.1	4.1	A
	$T_A=70^\circ\text{C}$		3.8	3.5	
Maximum Power Dissipation ^a	$T_A=25^\circ\text{C}$	P_D	1.1	0.9	W
	$T_A=70^\circ\text{C}$		0.7	0.6	
Continuous Drain Current ^b	$T_A=25^\circ\text{C}$	I_D	4.1	3.6	A
	$T_A=70^\circ\text{C}$		3.5	3.0	
Maximum Power Dissipation ^b	$T_A=25^\circ\text{C}$	P_D	0.9	0.7	W
	$T_A=70^\circ\text{C}$		0.55	0.45	
Pulsed Drain Current ^c		I_{DM}	25		A
Operating Junction Temperature		T_J	-55~+150		$^\circ\text{C}$
Lead Temperature		T_L	260		$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-55~+150		$^\circ\text{C}$

Thermal resistance ratings

Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance ^a	$t \leq 10 \text{ s}$	$R_{\theta JA}$	87	110	$^\circ\text{C/W}$
	Steady State		113	129	
Junction-to-Ambient Thermal Resistance ^b	$t \leq 10 \text{ s}$	$R_{\theta JA}$	102	132	
	Steady State		136	161	
Junction-to-Case Thermal Resistance		$R_{\theta JC}$	61	75	

a Surface mounted on FR-4 Board using 1 square inch pad size, 1oz copper

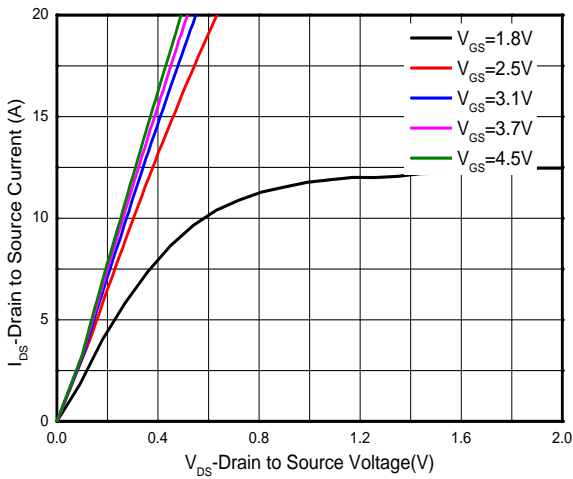
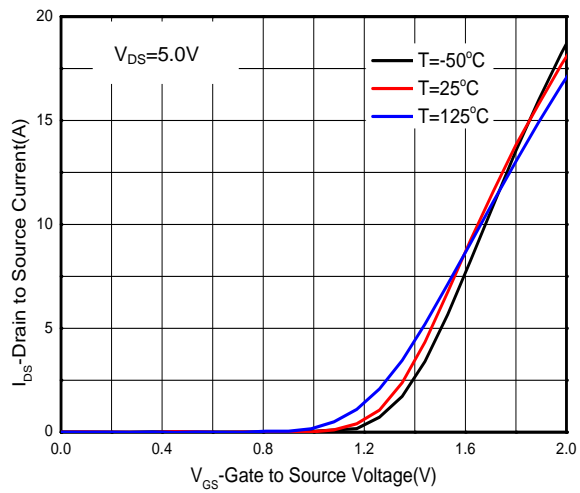
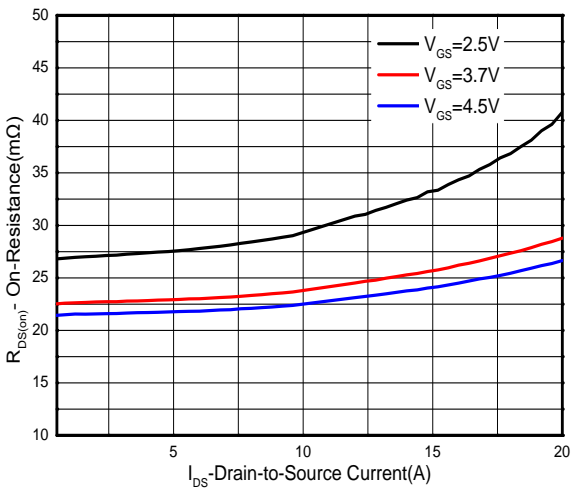
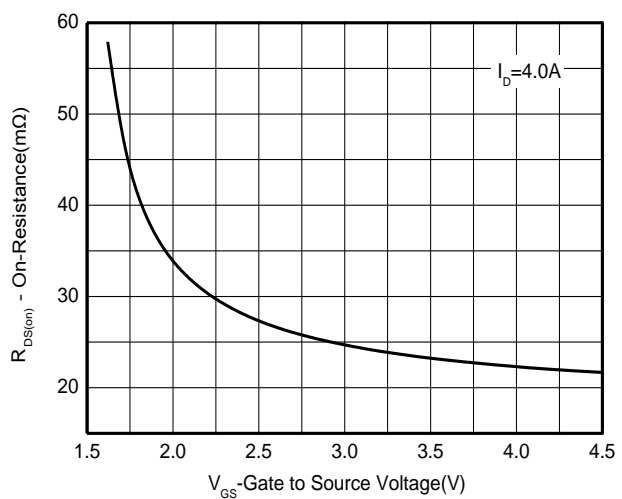
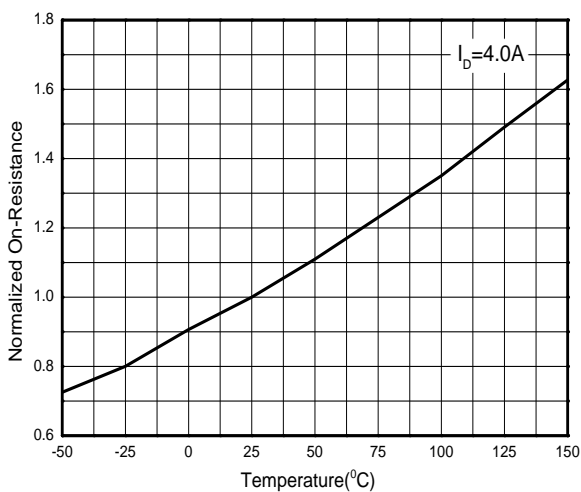
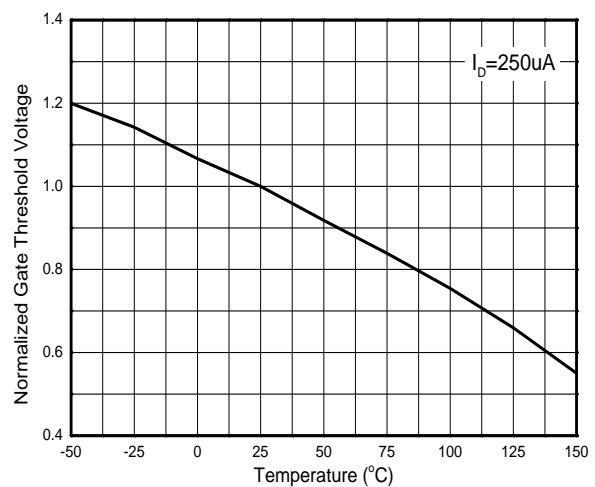
b Surface mounted on FR-4 board using minimum pad size, 1oz copper

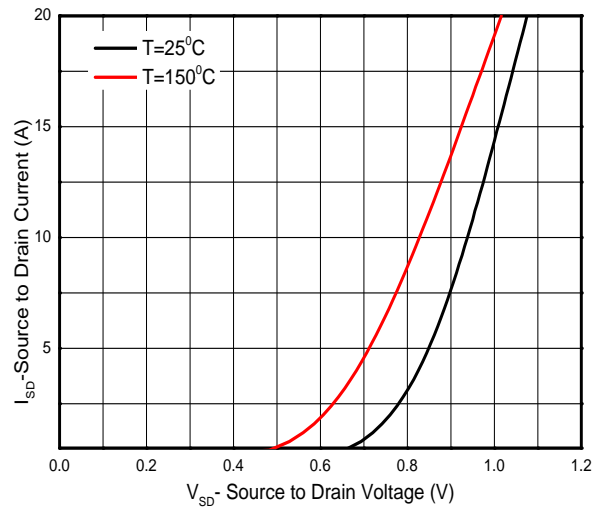
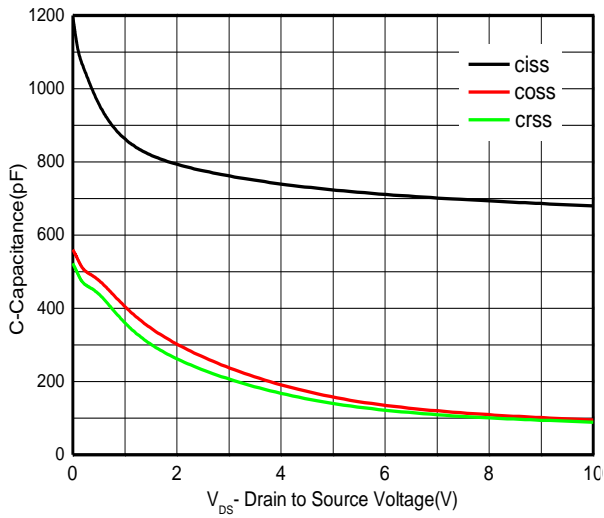
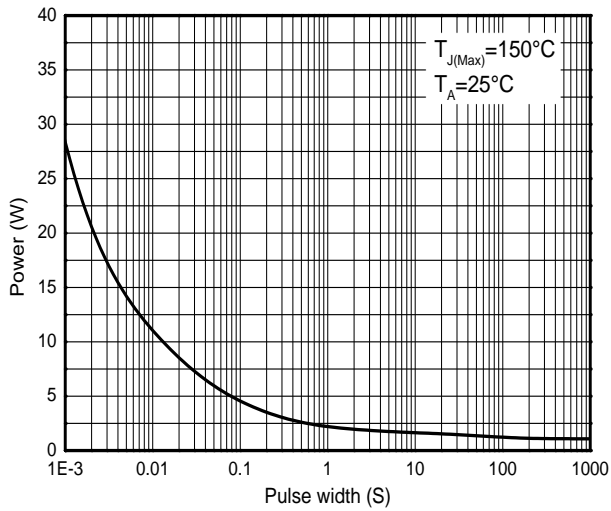
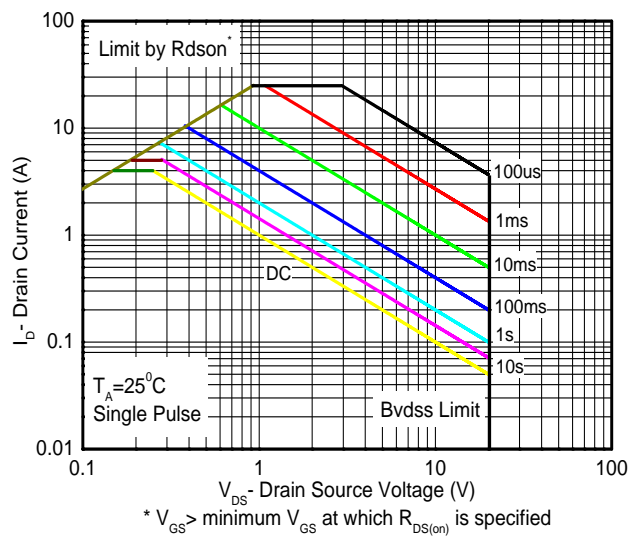
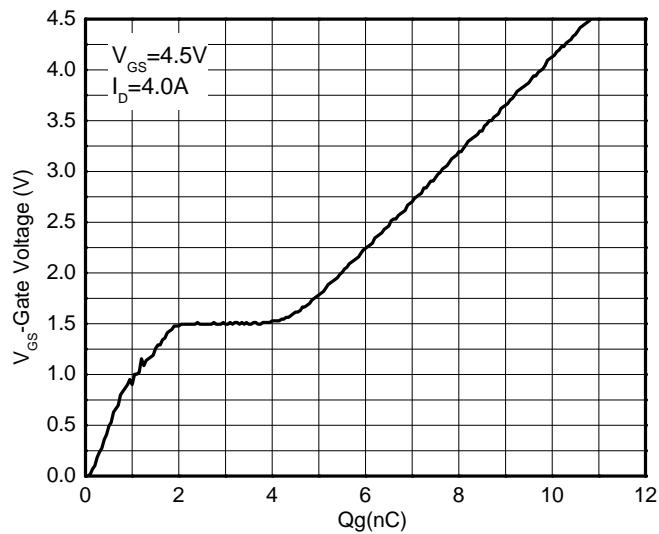
c Pulse width<380 μs , Duty Cycle<2%

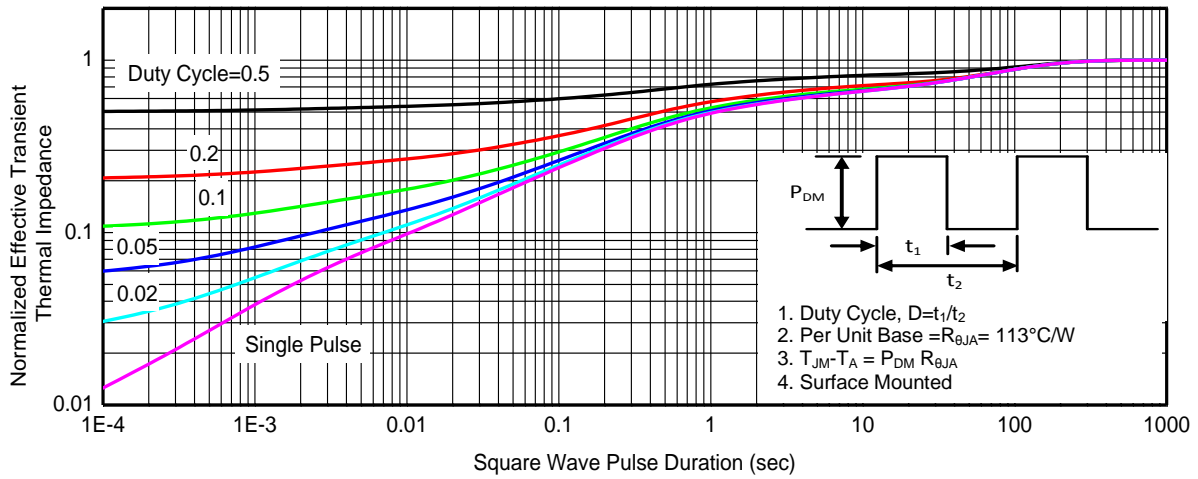
d Maximum junction temperature $T_J=150^\circ\text{C}$.

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

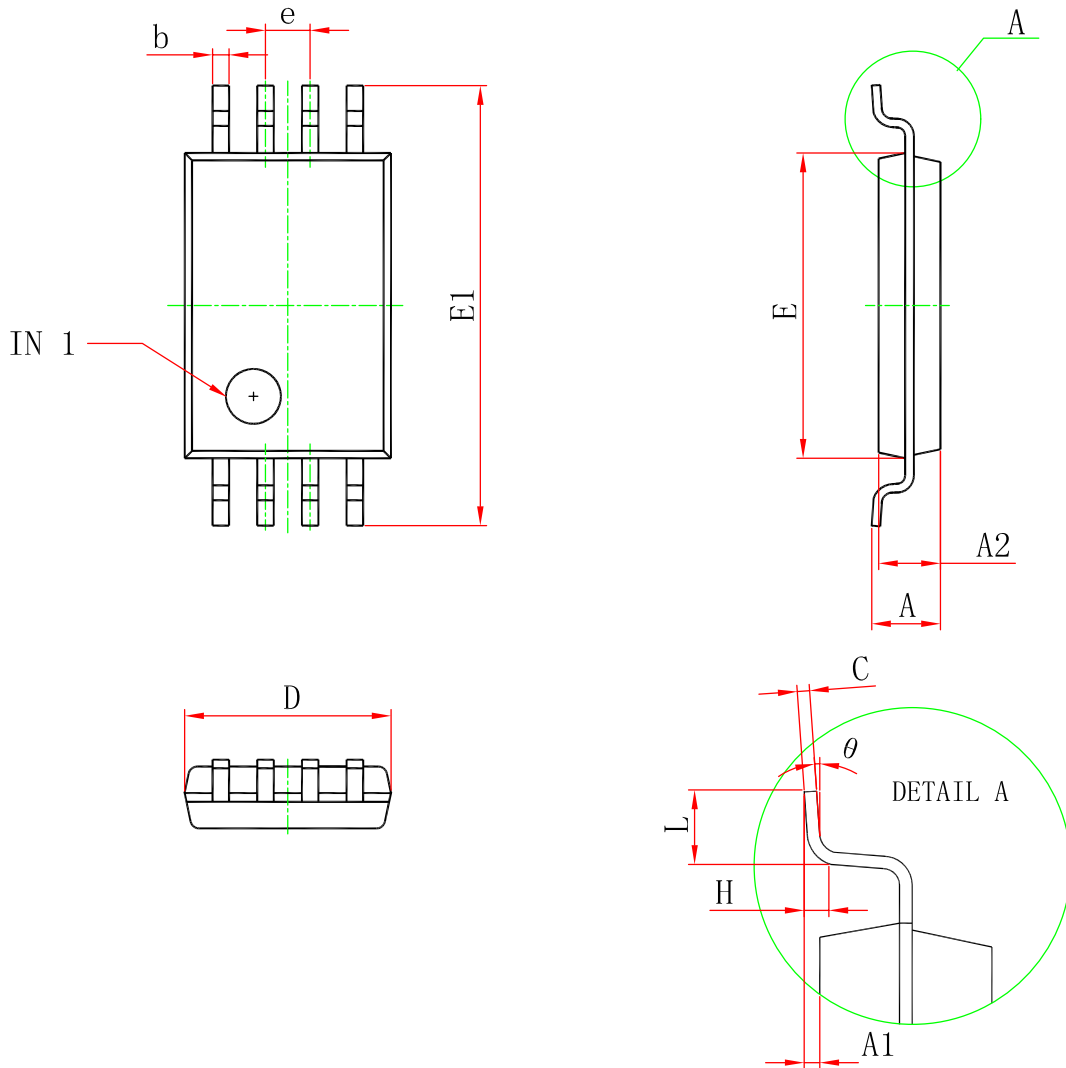
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{ V}, I_D = 250\mu\text{A}$	20			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}$			1	μA
Gate-to-source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	0.45	0.75	1.0	V
Drain-to-source On-resistance ^{b, c}	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 4.0\text{ A}$	15	22	28	m Ω
		$V_{GS} = 3.7\text{ V}, I_D = 4.0\text{ A}$	17	23	30	
		$V_{GS} = 3.1\text{ V}, I_D = 2.5\text{ A}$	18	24	35	
		$V_{GS} = 2.5\text{ V}, I_D = 2.0\text{ A}$	20	27	38	
Forward Trans conductance	g_{fs}	$V_{DS} = 5.0\text{ V}, I_D = 4.0\text{ A}$		11		S
CAPACITANCES, CHARGES						
Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz},$ $V_{DS} = 10\text{ V}$		680		pF
Output Capacitance	C_{OSS}			95		
Reverse Transfer Capacitance	C_{RSS}			89		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V},$ $V_{DS} = 10\text{ V},$ $I_D = 4.0\text{ A}$		10.8		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.8		
Gate-to-Source Charge	Q_{GS}			2.3		
Gate-to-Drain Charge	Q_{GD}			2.5		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_d(ON)$	$V_{GS} = 4.5\text{ V},$ $V_{DS} = 10\text{ V},$ $I_D = 4.0\text{ A},$ $R_G = 6\ \Omega$		22		ns
Rise Time	t_r			32		
Turn-Off Delay Time	$t_d(OFF)$			60		
Fall Time	t_f			23		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 1.0\text{ A}$		0.78	1.50	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


Capacitance

Single pulse power
Body diode forward voltage

Safe operating power

Gate charge Characteristics



Transient thermal response (Junction-to-Ambient)

Package outline dimensions
TSSOP-8L


Symbol	Dimensions in millimeter	
	Min.	Max.
D	2.900	3.100
E	4.300	4.500
b	0.190	0.300
c	0.090	0.200
E1	6.250	6.550
A		1.200
A2	0.800	1.000
A1	0.050	0.150
e	0.65(BSC)	
L	0.500	0.700
H	0.25(TYP)	
θ	1°	7°