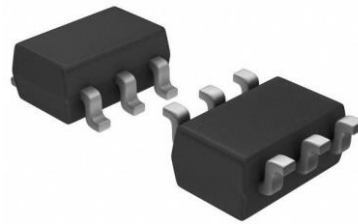


WNMD2176
Dual N-Channel, 20V, 2.6A, Power MOSFET
www.sh-willsemi.com

V_{DS} (V)	Typical $R_{DS(on)}$ (m Ω)
20	56@ $V_{GS}=4.5V$
	76@ $V_{GS}=2.5V$
ESD Protected	


Descriptions

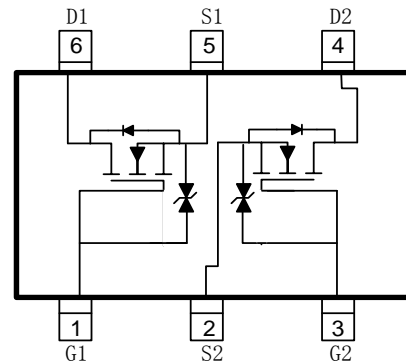
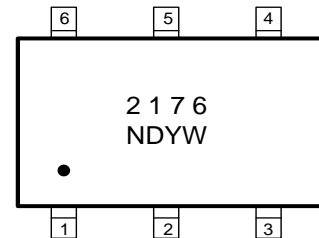
The WNMD2176 is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WNMD2176 is Pb-free.

Features

- Trench Technology
- Supper high density cell design
- Excellent ON resistance
- Extremely Low Threshold Voltage
- Small package SOT-23-6L

Applications

- Driver for Relay, Solenoid, Motor, LED etc.
- Power supply converters circuit
- Load/Power Switching for portable device

SOT-23-6L

Pin configuration (Top view)


2176 = Device Code
 ND = Special Code
 Y = Year
 W = Week(A~z)

Marking
Order information

Device	Package	Shipping
WNMD2176-6/TR	SOT-23-6L	3000/Tape&Reel

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	I_D	$T_A=25^\circ\text{C}$	2.8	2.6	A
		$T_A=70^\circ\text{C}$	2.3	2.1	
Maximum Power Dissipation ^a	P_D	$T_A=25^\circ\text{C}$	1.1	0.9	W
		$T_A=70^\circ\text{C}$	0.7	0.6	
Continuous Drain Current ^b	I_D	$T_A=25^\circ\text{C}$	2.6	2.3	A
		$T_A=70^\circ\text{C}$	2.0	1.9	
Maximum Power Dissipation ^b	P_D	$T_A=25^\circ\text{C}$	0.9	0.7	W
		$T_A=70^\circ\text{C}$	0.5	0.4	
Pulsed Drain Current ^c	I_{DM}	7		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

Single Operation					
Parameter	Symbol	Typical	Maximum	Unit	
Junction-to-Ambient Thermal Resistance ^a	$R_{\theta JA}$	$t \leq 10 \text{ s}$	90	108	$^\circ\text{C/W}$
		Steady State	110	130	
Junction-to-Ambient Thermal Resistance ^b	$R_{\theta JA}$	$t \leq 10 \text{ s}$	105	128	
		Steady State	133	158	
Junction-to-Case Thermal Resistance	$R_{\theta JC}$	60	75		

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

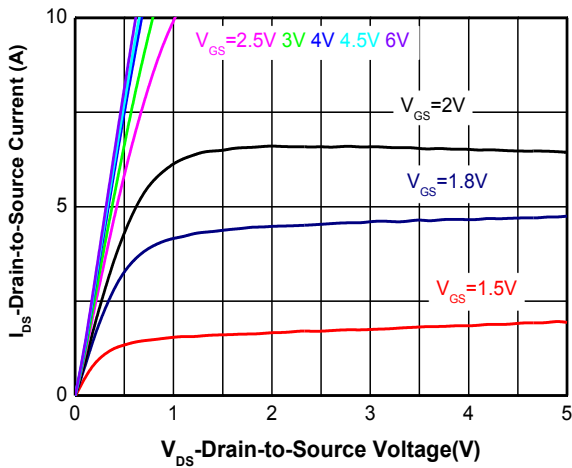
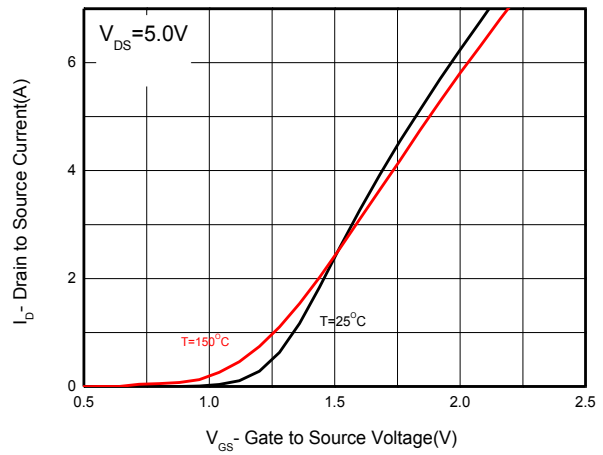
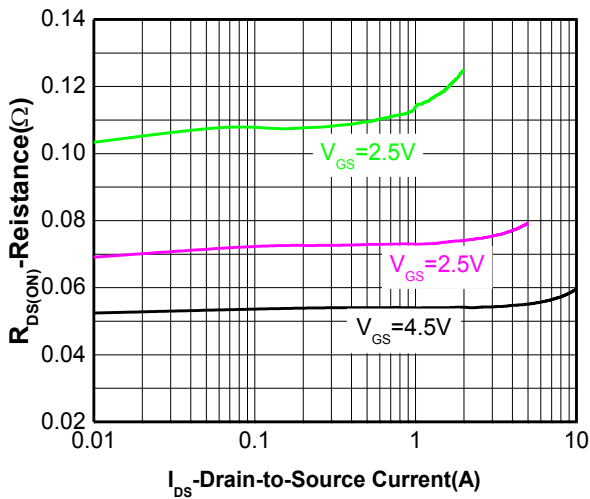
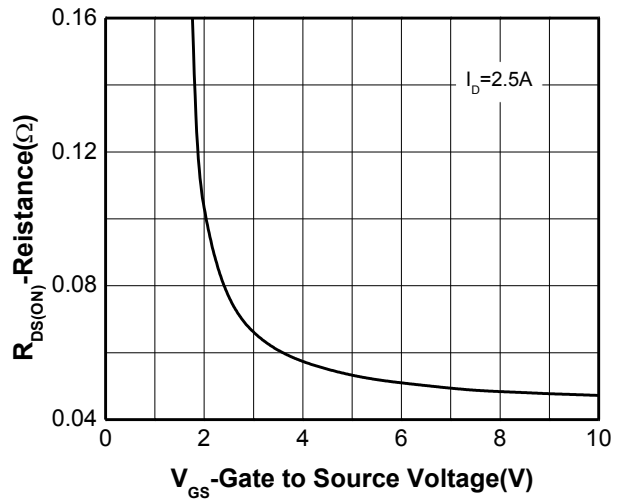
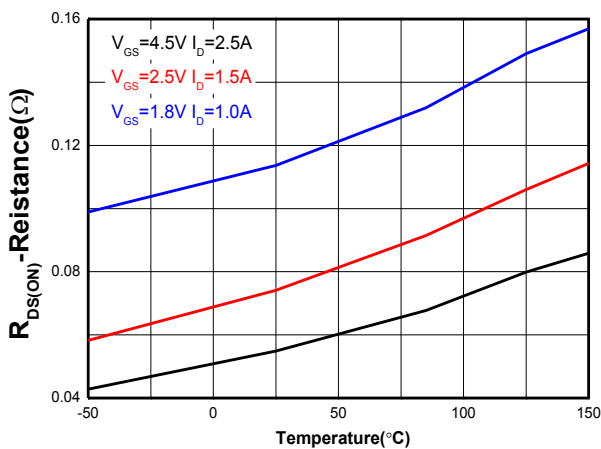
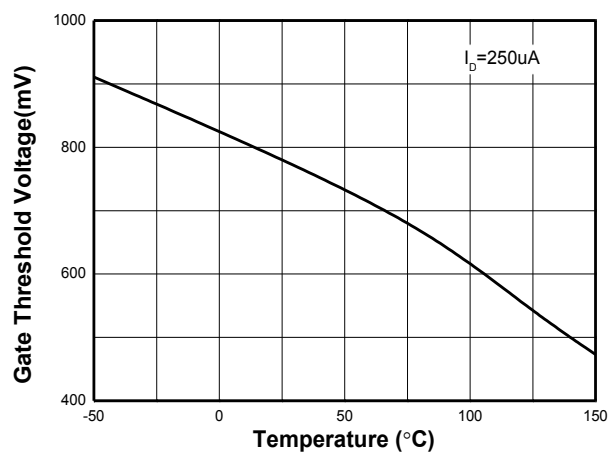
b Surface mounted on FR4 board using minimum pad size, 1oz copper

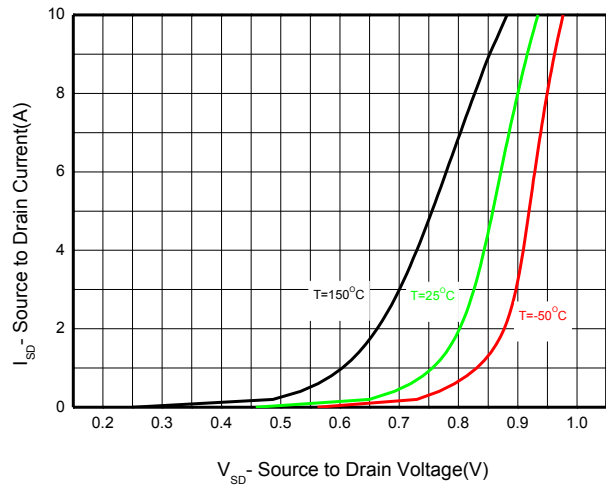
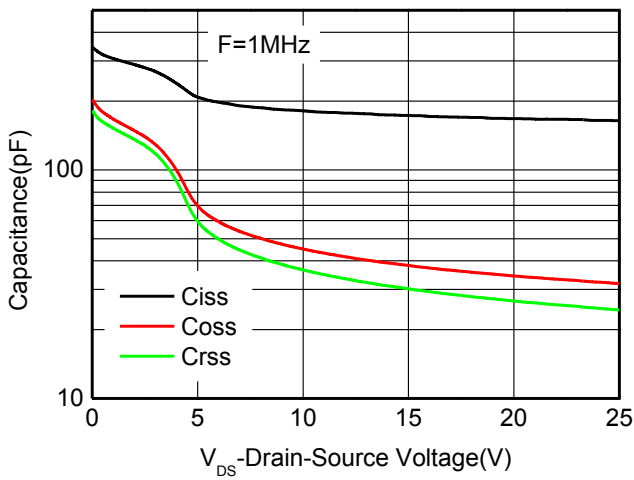
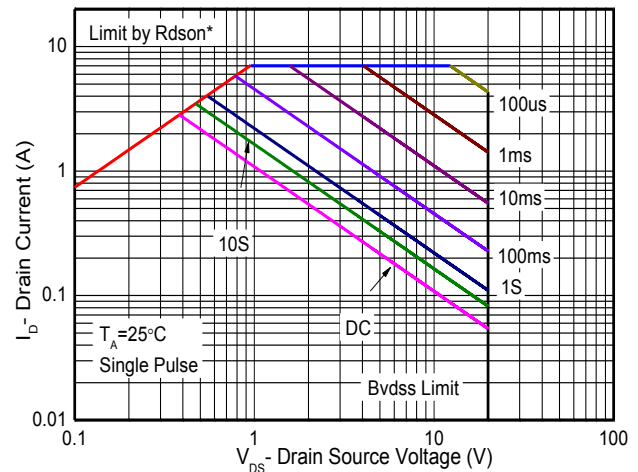
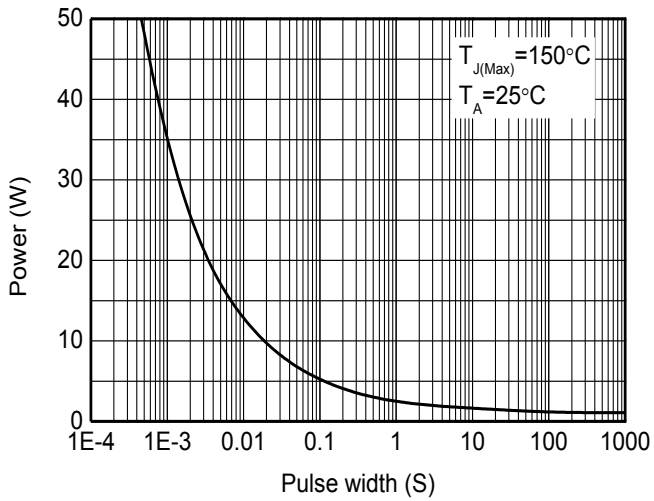
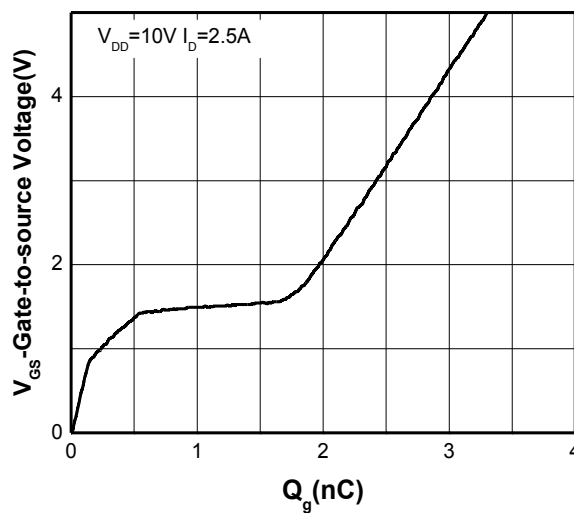
c Repetitive rating, pulse width limited by junction temperature, $t_p=10\mu\text{s}$, Duty Cycle=1%

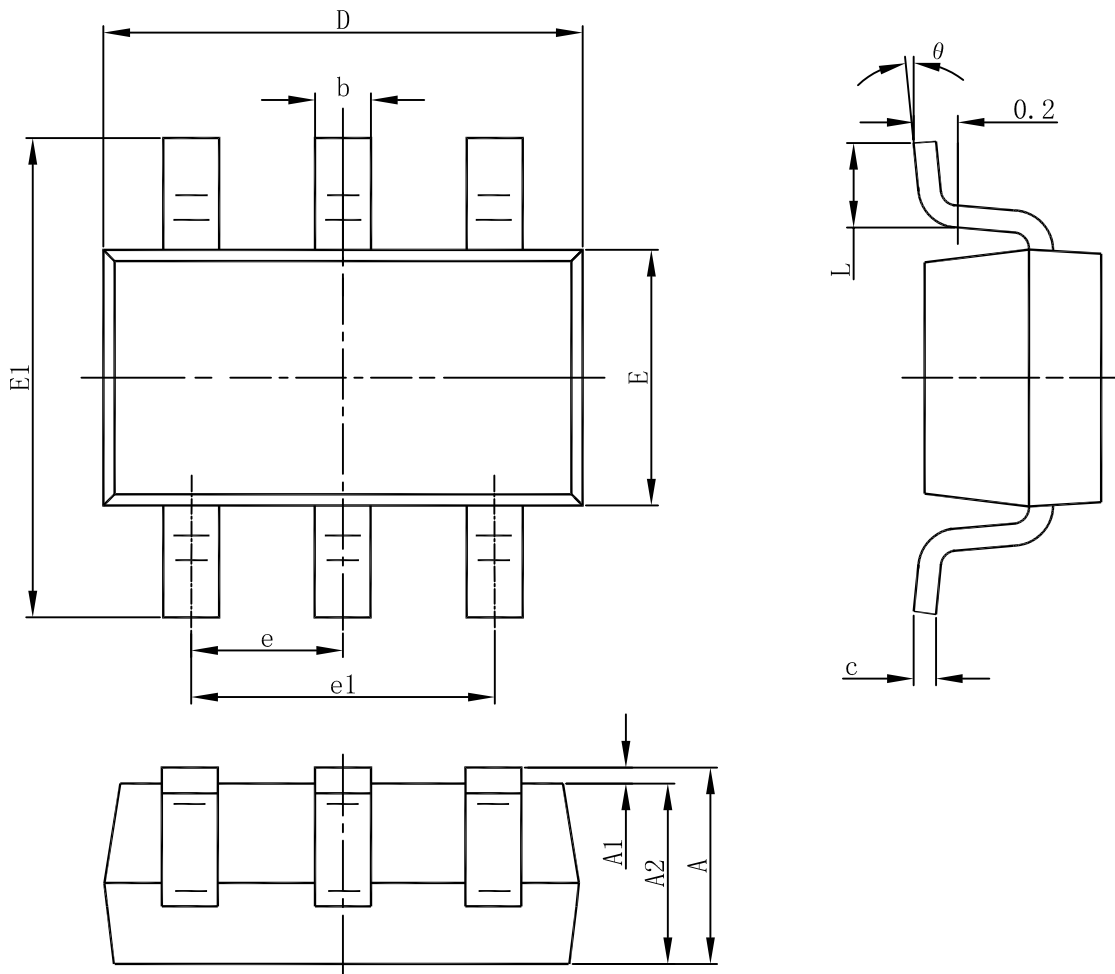
d Repetitive rating, pulse width limited by junction temperature $T_J=150^\circ\text{C}$.

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{ V}, I_D = 250\mu\text{A}$	20.5			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}$			100	nA
Gate-to-source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}$			± 5	μA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	0.5	0.78	1.0	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 2.5\text{ A}$	40	55	90	m Ω
		$V_{GS} = 3.1\text{ V}, I_D = 2.0\text{ A}$	45	66	110	
		$V_{GS} = 2.5\text{ V}, I_D = 1.5\text{ A}$	51	75	130	
Forward Transconductance	g_{FS}	$V_{DS} = 5.0\text{ V}, I_D = 7.0\text{ A}$		11	16	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, f = 1\text{ MHz}, V_{DS} = 10\text{ V}$		190		pF
Output Capacitance	C_{OSS}			45		
Reverse Transfer Capacitance	C_{RSS}			36		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V}, I_D = 2.5\text{ A}$		3.1		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.1		
Gate-to-Source Charge	Q_{GS}			0.55		
Gate-to-Drain Charge	Q_{GD}			1.1		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_d(ON)$	$V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V}, R_L = 10\Omega, R_G = 6\Omega$		12.2		ns
Rise Time	t_r			12.5		
Turn-Off Delay Time	$t_d(OFF)$			29.6		
Fall Time	t_f			9.8		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 1.0\text{ A}$			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


Capacitance
Body diode forward voltage

Single pulse power
Safe operating power

Transient thermal response (Junction-to-Ambient)

Package outline dimensions
SOT-23-6L


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [MOSFET](#) category:

Click to view products by [Will Semiconductor](#) manufacturer:

Other Similar products are found below :

[IRFD120](#) [JANTX2N5237](#) [2SK2267\(Q\)](#) [BUK455-60A/B](#) [TK100A10N1,S4X\(S](#) [MIC4420CM-TR](#) [VN1206L](#) [NDP4060](#) [SI4482DY](#)
[IRS2092STRPBF-EL](#) [IPS70R2K0CEAKMA1](#) [TK31J60W5,S1VQ\(O](#) [TK31J60W,S1VQ\(O](#) [TK16J60W,S1VQ\(O](#) [2SK2614\(TE16L1,Q\)](#)
[DMN1017UCP3-7](#) [EFC2J004NUZTDG](#) [P85W28HP2F-7071](#) [DMN1053UCP4-7](#) [NTE2384](#) [DMC2700UDMQ-7](#) [DMN2080UCB4-7](#)
[DMN61D9UWQ-13](#) [US6M2GTR](#) [DMN31D5UDJ-7](#) [DMP22D4UFO-7B](#) [IPS60R3K4CEAKMA1](#) [DMN1006UCA6-7](#) [DMN16M9UCA6-7](#)
[STF5N65M6](#) [IRF40H233XTMA1](#) [STU5N65M6](#) [DMN6022SSD-13](#) [DMN13M9UCA6-7](#) [DMTH10H4M6SPS-13](#) [IPS60R360PFD7SAKMA1](#)
[DMN2990UFB-7B](#) [SSM3K35CT,L3F](#) [IPLK60R1K0PFD7ATMA1](#) [2N7002W-G](#) [MCAC30N06Y-TP](#) [IPWS65R035CFD7AXKSA1](#)
[MCQ7328-TP](#) [SSM3J143TU,LXHF](#) [DMN12M3UCA6-7](#) [PJMF280N65E1_T0_00201](#) [PJMF380N65E1_T0_00201](#)
[PJMF280N60E1_T0_00201](#) [PJMF600N65E1_T0_00201](#) [PJMF900N65E1_T0_00201](#)