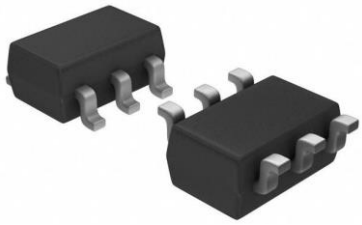
WNMD2176

Dual N-Channel, 20V, 2.6A, Power MOSFET

www.sh-willsemi.com

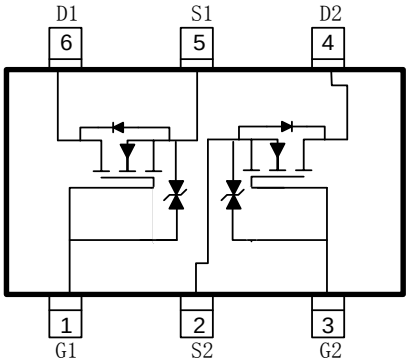
V_{DS} (V)	Typical $R_{DS(on)}$ (mΩ)
20	56@ V_{GS}=4.5V
	76@ V_{GS}=2.5V
ESD Protected	



SOT-23-6L

Descriptions

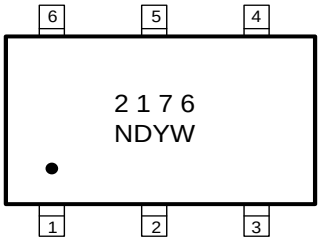
The WNMD2176 is N-Channel enhancement MOS Field Effect Transistor.Uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge.This device is suitable for use in DC-DC conversion,power switch and charging circuit. Standard Product WNMD2176 is Pb-free.



Pin configuration (Top view)

Features

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



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

Marking

Applications

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

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]	T_A=25°C	I_D	2.8	2.6	A
	T_A=70°C		2.3	2.1	
Maximum Power Dissipation [a]	T_A=25°C	P_D	1.1	0.9	W
	T_A=70°C		0.7	0.6	
Continuous Drain Current [b]	T_A=25°C	I_D	2.6	2.3	A
	T_A=70°C		2.0	1.9	
Maximum Power Dissipation [b]	T_A=25°C	P_D	0.9	0.7	W
	T_A=70°C		0.5	0.4	
Pulsed Drain Current [c]		I_{DM}	7		A
Operating Junction Temperature		T_J	150		°C
Lead Temperature		T_L	260		°C
Storage Temperature Range		T_{stg}	-55 to 150		°C

Thermal resistance ratings

Single Operation					
Parameter		**Symbol**	**Typical**	**Maximum**	**Unit**
Junction-to-Ambient Thermal Resistance [a]	t ≤ 10 s	$R_{\theta JA}$	90	108	°C/W
	Steady State		110	130	
Junction-to-Ambient Thermal Resistance [b]	t ≤ 10 s	$R_{\theta JA}$	105	128	
	Steady State		133	158	
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	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

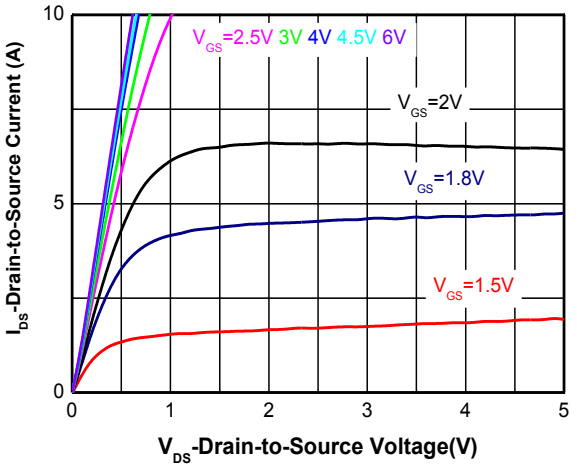
c Repetitive rating, pulse width limited by junction temperature, t_p=10μs, Duty Cycle=1%

d Repetitive rating, pulse width limited by junction temperature T_J=150°C.

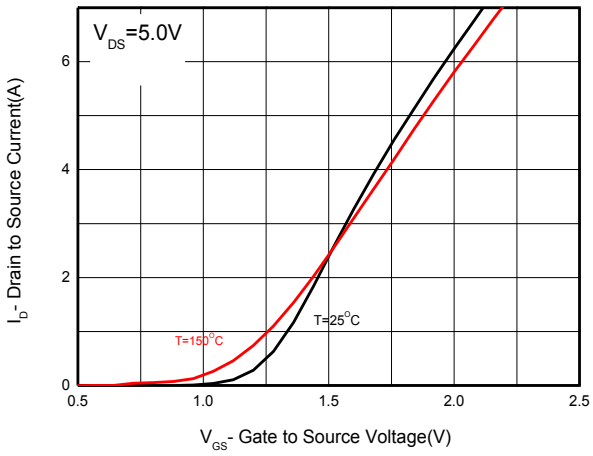
Electronics Characteristics (Ta=25°C, unless otherwise noted)

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

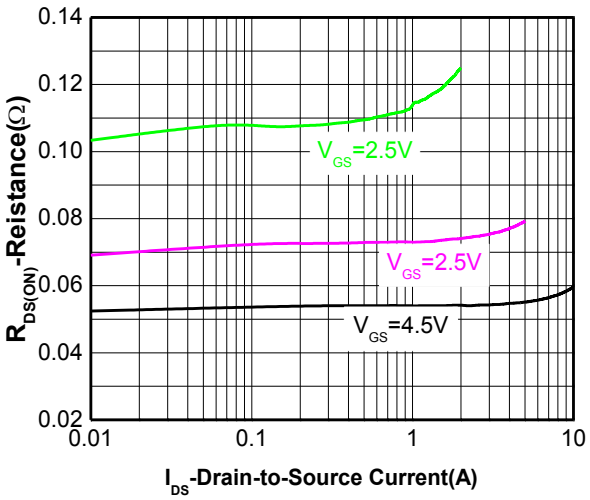
Typical Characteristics (Ta=25°C, unless otherwise noted)



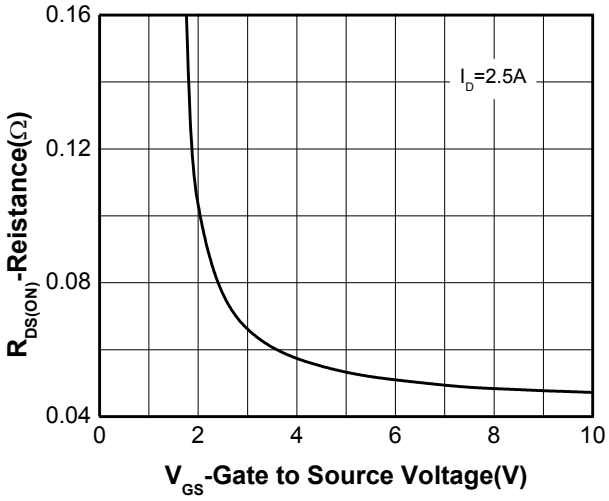
Output characteristics



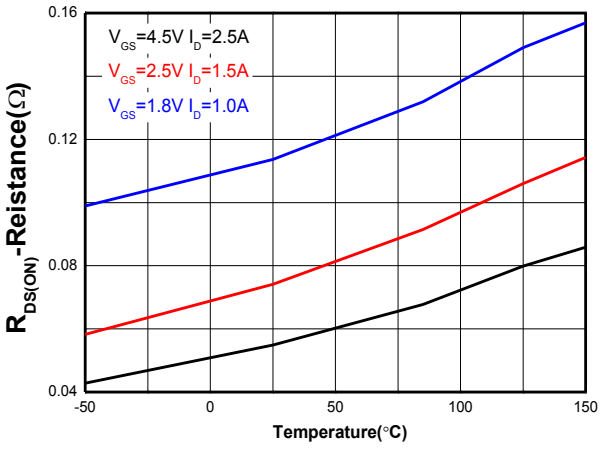
Transfer characteristics



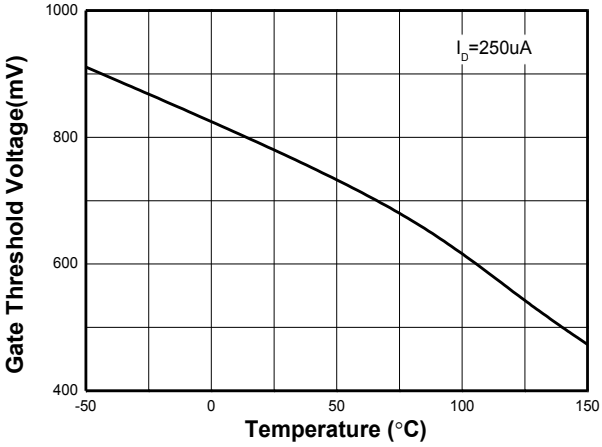
On-Resistance vs. Drain current



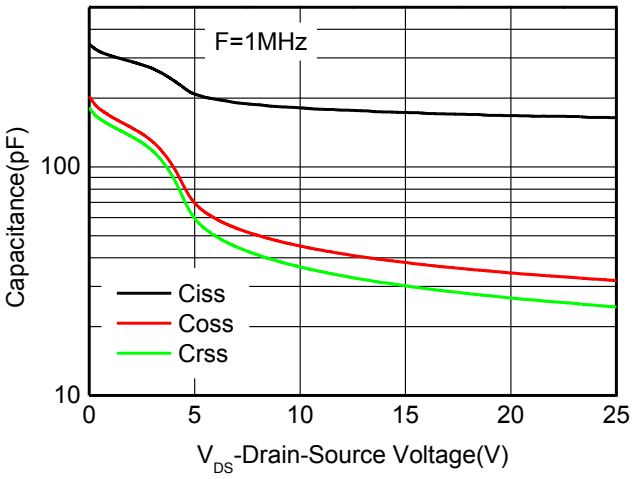
On-Resistance vs. Gate-to-Source voltage



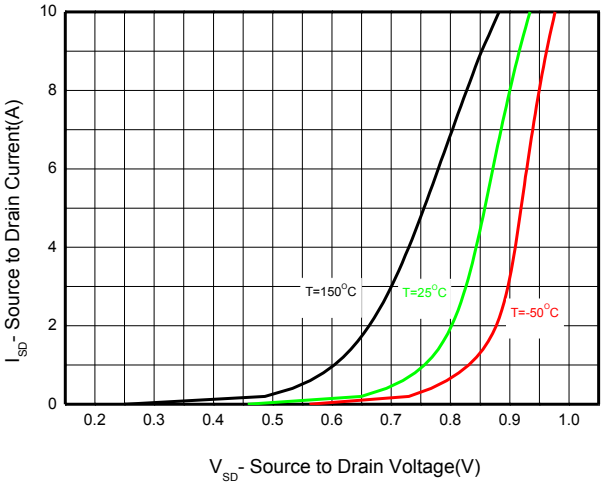
On-Resistance vs. Junction temperature



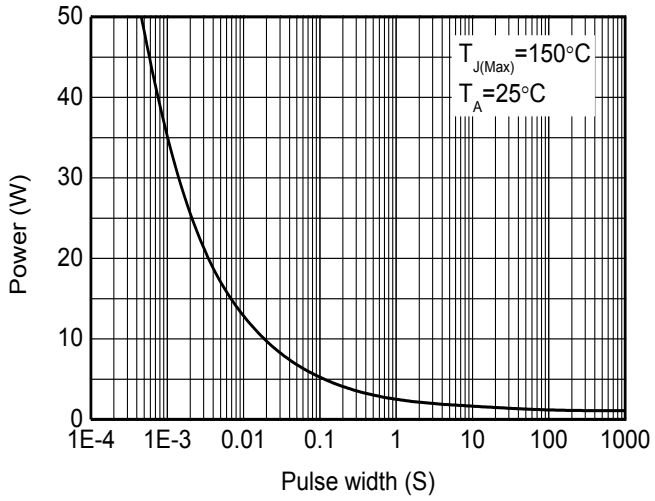
Threshold voltage vs. Temperature



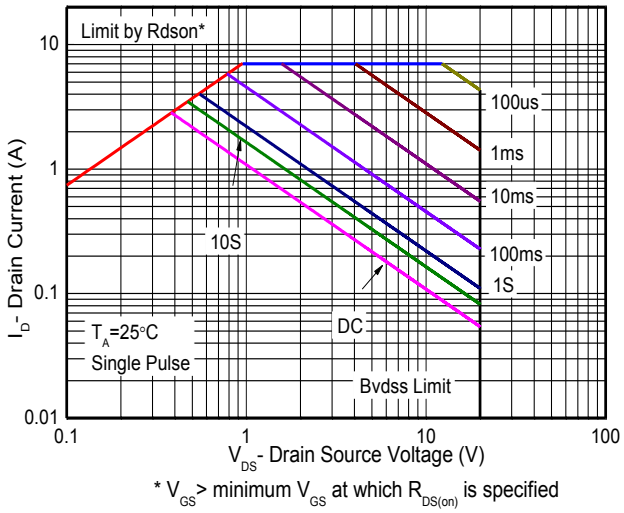
Capacitance



Body diode forward voltage

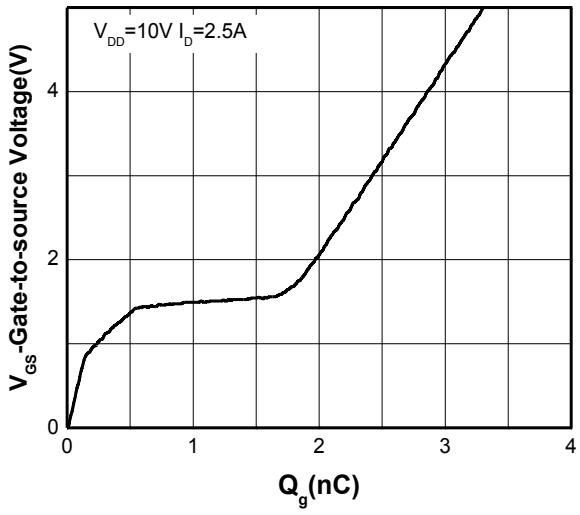


Single pulse power



* V_{GS}> minimum V_{GS} at which $R_{DS(on)}$ is specified

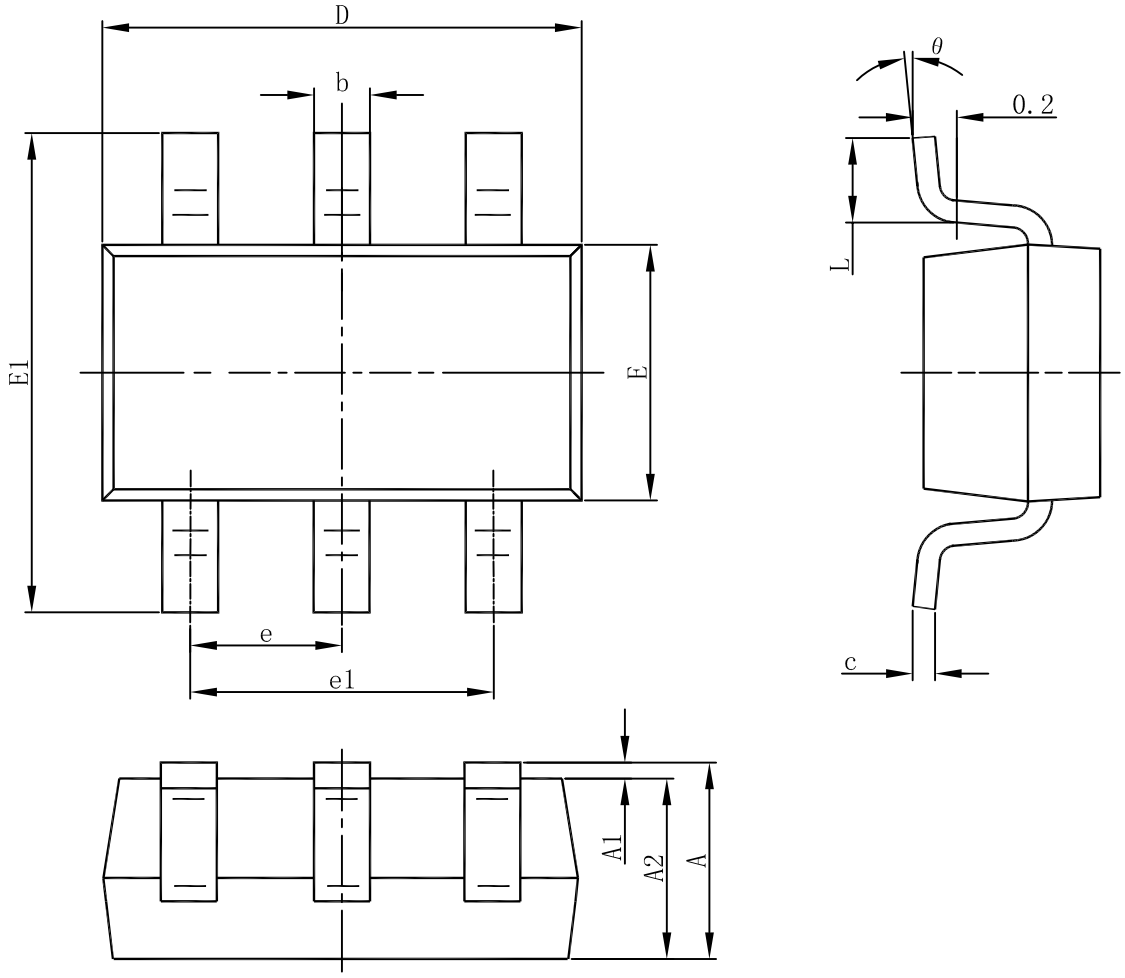
Safe operating power



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°