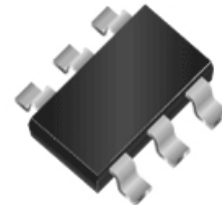


WNMD2166

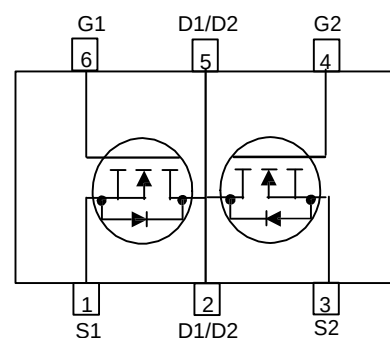
Dual N-Channel, 20V, 4.0A, Power MOSFET

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

V_{DS} (V)	$R_{ds(on)}$ (Ω)	I_D (A)
20	0.022@ $V_{GS}=4.5V$	4.0
	0.024@ $V_{GS}=3.1V$	2.5
	0.027@ $V_{GS}=2.5V$	2.0



Package



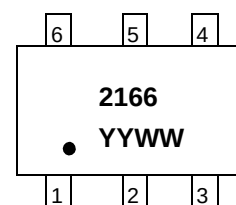
Pin configuration (Top view)

Features

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

Applications

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



2166 = Device Code

YY = Year

WW = Week

Marking

Order information

Device	Package	Shipping
WNMD2166	SOT-23-6L	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°C	I _D	5.0	4.0	A
	T _A =70°C		3.8	3.5	
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	4.0	3.5	A
	T _A =70°C		3.5	3.0	
Maximum Power Dissipation ^b	T _A =25°C	P _D	0.9	0.7	W
	T _A =70°C		0.55	0.45	
Pulsed Drain Current ^c		I _{DM}	25		A
Operating Junction Temperature		T _J	-55~+150		°C
Lead Temperature		T _L	260		°C
Storage Temperature Range		T _{stg}	-55~+150		°C

Thermal resistance ratings

Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance ^a	$t \leq 10 \text{ s}$	$R_{\theta JA}$	90	112	$^{\circ}\text{C/W}$
	Steady State		115	132	
Junction-to-Ambient Thermal Resistance ^b	$t \leq 10 \text{ s}$	$R_{\theta JA}$	105	135	
	Steady State		138	162	
Junction-to-Case Thermal Resistance		$R_{\theta JC}$	63	78	

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

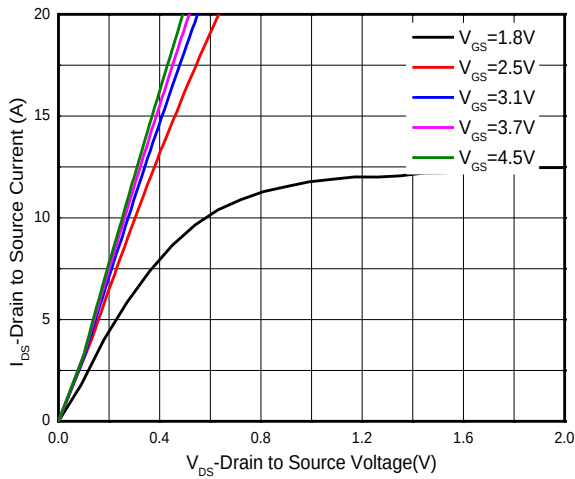
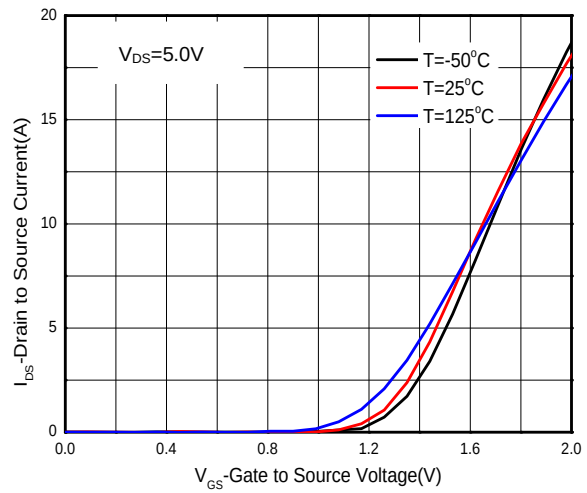
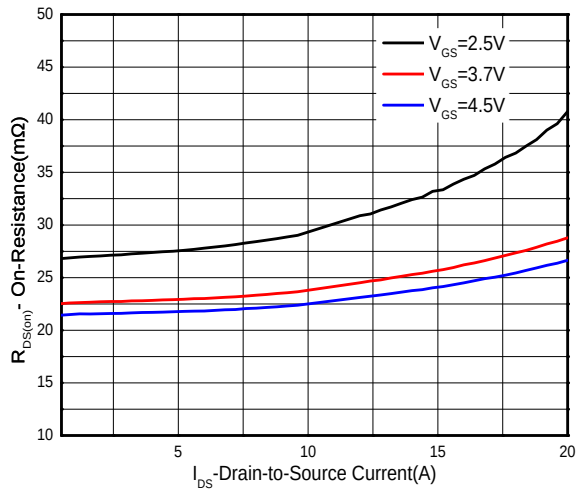
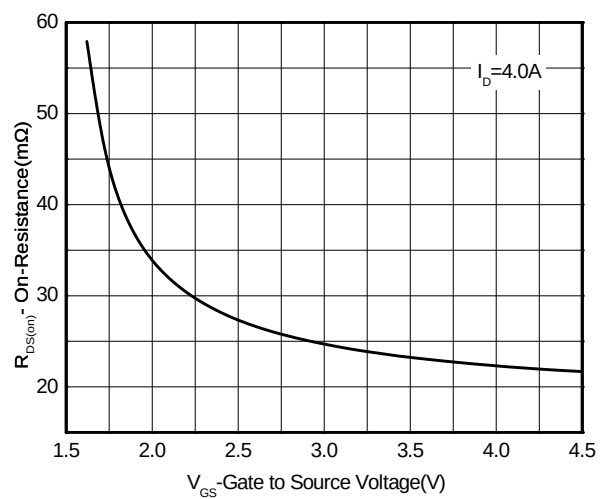
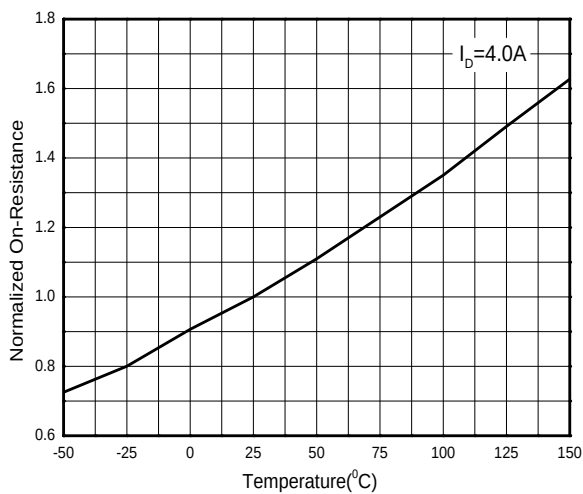
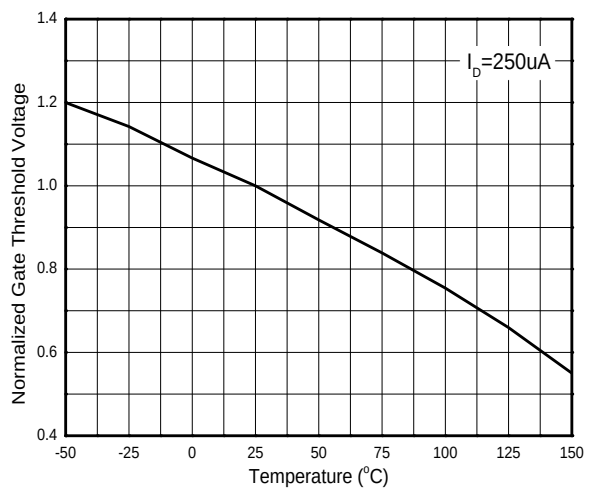
b Surface mounted on FR-4 board using minimum pad size, 1oz copper

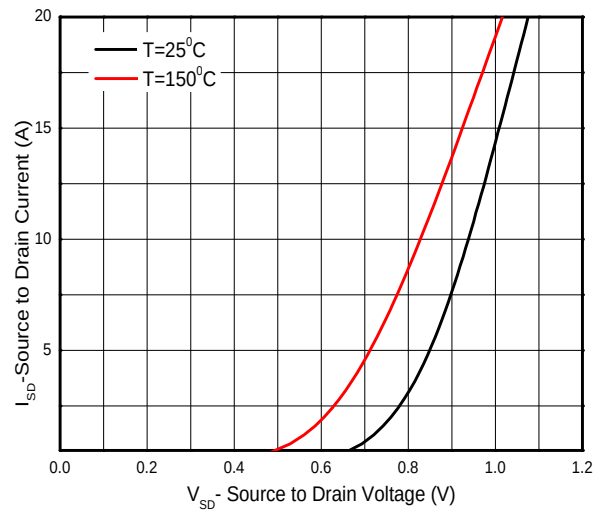
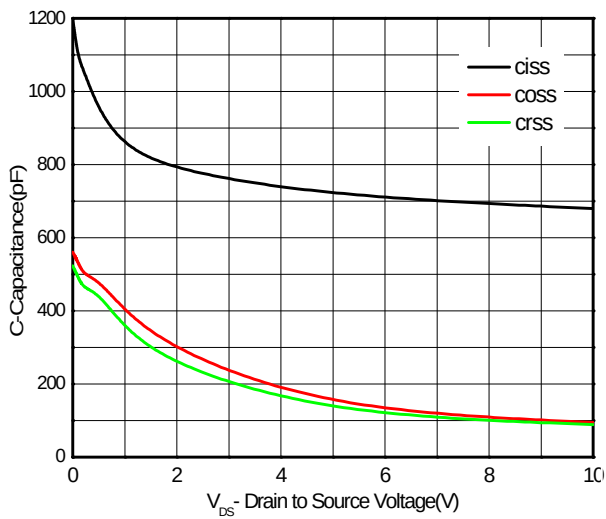
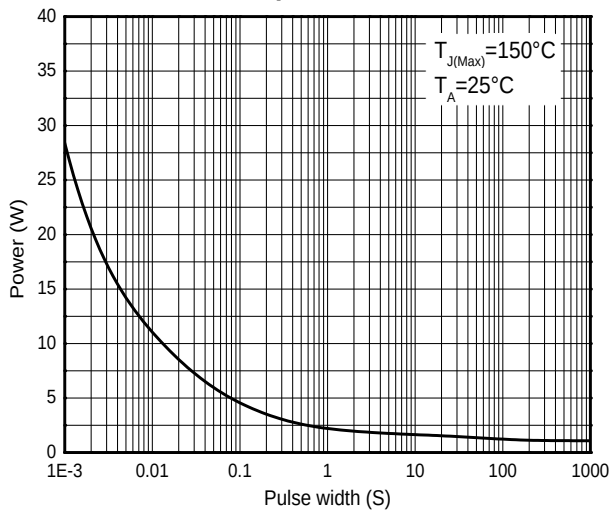
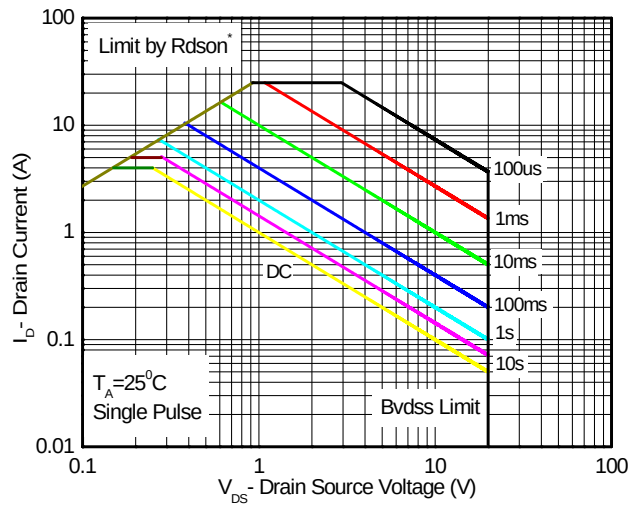
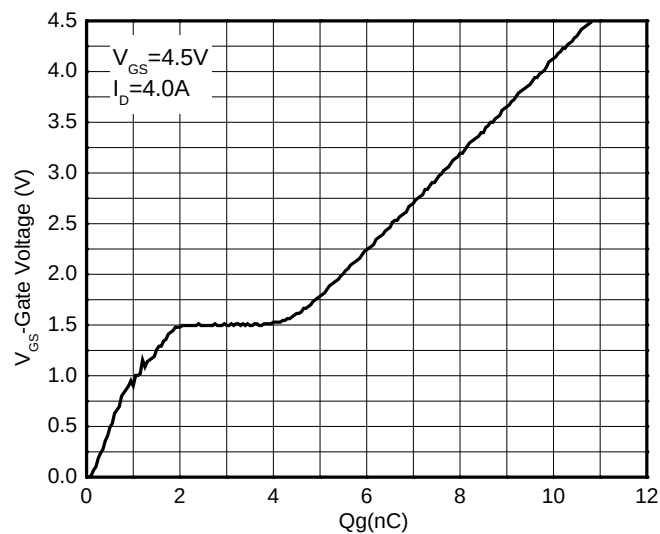
c Pulse width<380 μs , Duty Cycle<2%

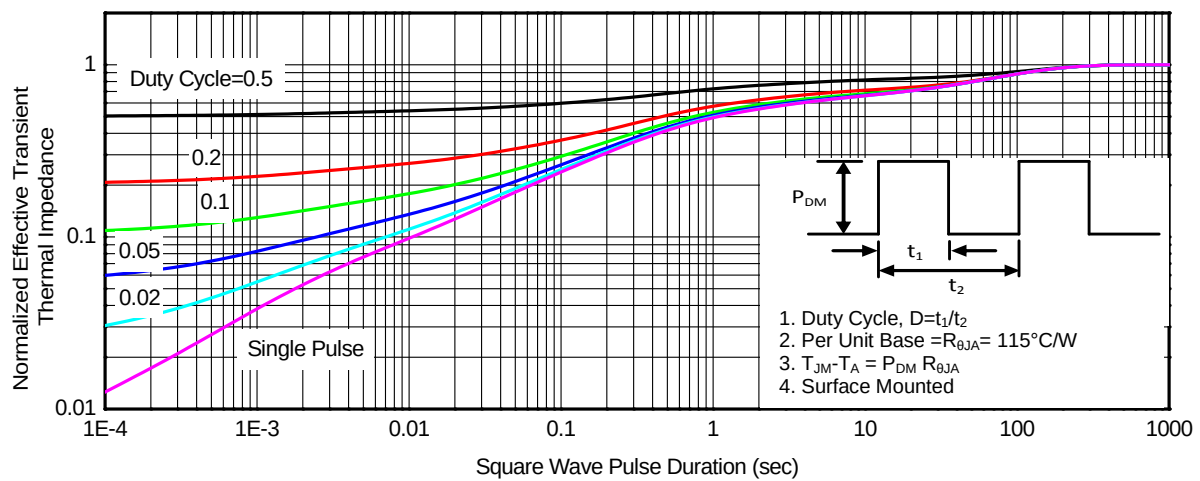
d Maximum junction temperature $T_J=150^{\circ}\text{C}$.

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

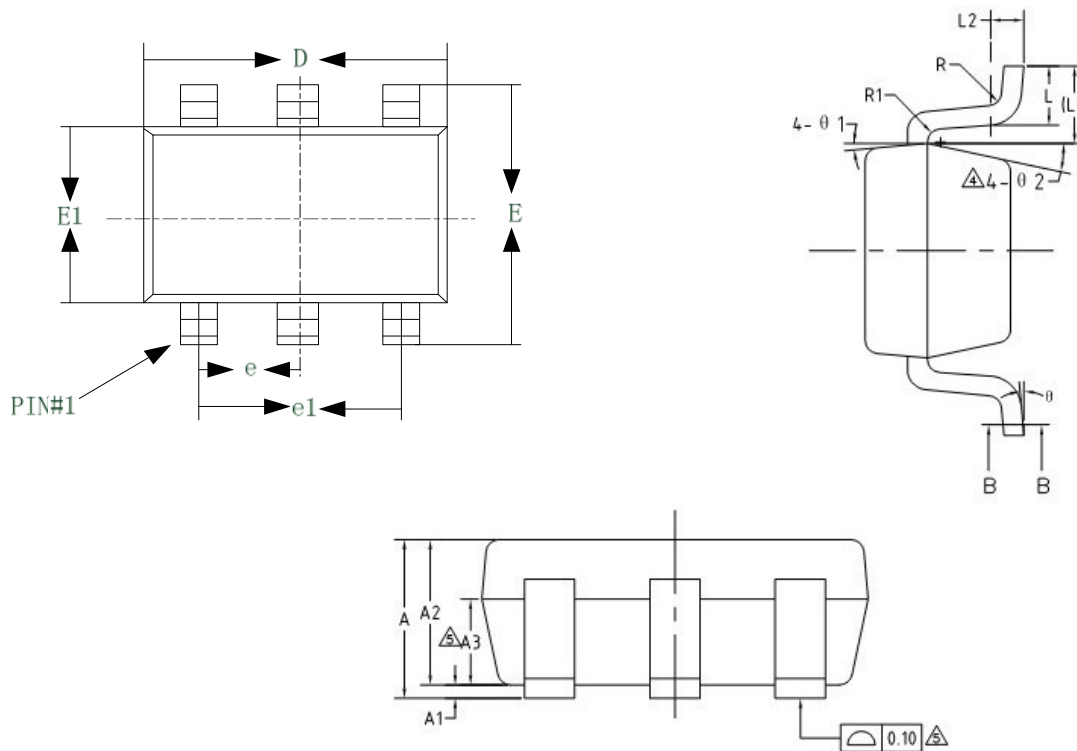
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0 V, I _D = 250uA	20			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 16V, V _{GS} = 0V			1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±10 V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 250uA	0.45	0.75	1.0	V
Drain-to-source On-resistance ^{b, c}	R _{DS(on)}	V _{GS} = 4.5V, I _D = 4.0A	15	22	27	mΩ
		V _{GS} = 3.7V, I _D = 4.0A	17	23	30	
		V _{GS} = 3.1V, I _D = 2.5A	18	24	35	
		V _{GS} = 2.5V, I _D = 2.0A	20	27	37	
Forward Trans conductance	g _{fs}	V _{DS} = 5.0V, I _D = 4.0 A		11		S
CAPACITANCES, CHARGES						
Input Capacitance	C _{ISS}	V _{GS} = 0 V,		680		pF
Output Capacitance	C _{OSS}	f = 1.0 MHz,				
Reverse Transfer Capacitance	C _{RSS}	V _{DS} = 10 V				
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 4.5 V, V _{DS} = 10 V, I _D = 4.0A		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	td(ON)	V _{GS} = 4.5 V,		22		ns
Rise Time	tr	V _{DS} = 10 V,		32		
Turn-Off Delay Time	td(OFF)	I _D = 4.0 A,		60		
Fall Time	tf	R _G =6 Ω		23		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} = 0 V, I _S = 1.0A		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

Body diode forward voltage

Single pulse power
Safe operating power

Gate charge Characteristics



Transient thermal response (Junction-to-Ambient)

Package outline dimensions
SOT-23-6L


Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
A	-	-	1.25
A1	0	-	0.15
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.36	-	0.50
b1	0.36	0.38	0.45
c	0.14	-	0.20
c1	0.14	0.15	0.16
D	2.826	2.926	3.026
E	2.60	2.80	3.00
E1	1.526	1.626	1.726
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
L	0.35	0.45	0.60
L1	0.59REF		
L2	0.25BSC		
R	0.10	-	-
R1	0.10	-	0.20
θ	0°		8°
θ1	3°	5°	7°
θ2	6°		14°