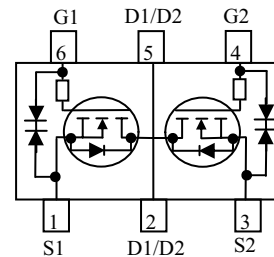


WNMD2160
Dual N-Channel, 20V, 6.3A, Power MOSFET
[Http://www.willsemi.com](http://www.willsemi.com)

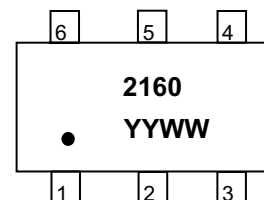
V_{DS} (V)	$R_{ds(on)}$ (Ω)
20	0.0157@ $V_{GS}=4.5V$
	0.018@ $V_{GS}=3.1V$
	0.020@ $V_{GS}=2.5V$
ESD Rating: 2000V HBM	


SOT-23-6L
Descriptions

The WNMD2160 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 WNMD2160 is Pb-free.


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



2160 = Device Code
YY = Year
WW = Week

Applications

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

Marking
Order information

Device	Package	Shipping
WNMD2160-6/TR	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	6.3	5.7	A
	T _A =70°C		5.0	4.6	
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	5.8	5.2	A
	T _A =70°C		4.6	4.1	
Maximum Power Dissipation ^b	T _A =25°C	P _D	0.9	0.7	W
	T _A =70°C		0.6	0.5	
Pulsed Drain Current ^c		I _{DM}	30		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	$t \leq 10 \text{ s}$	$R_{\theta JA}$	90	108	$^{\circ}\text{C/W}$
	Steady State		110	130	
Junction-to-Ambient Thermal Resistance ^b	$t \leq 10 \text{ s}$	$R_{\theta JA}$	105	128	
	Steady State		133	158	
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	60	75	
Dual Operation					
Junction-to-Ambient Thermal Resistance ^a	$t \leq 10 \text{ s}$	$R_{\theta JA}$	94	112	$^{\circ}\text{C/W}$
	Steady State		115	132	
Junction-to-Ambient Thermal Resistance ^b	$t \leq 10 \text{ s}$	$R_{\theta JA}$	110	132	
	Steady State		138	162	
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	63	78	

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

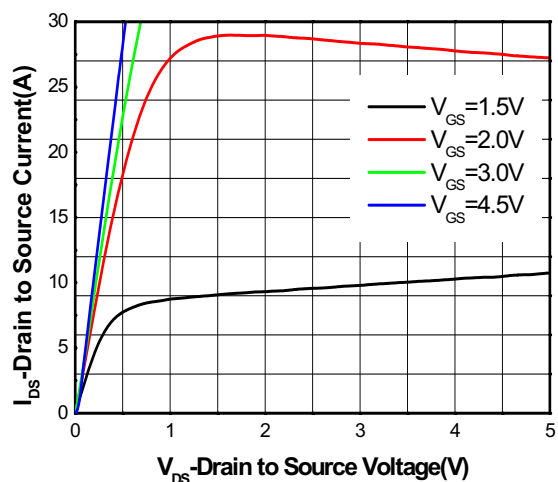
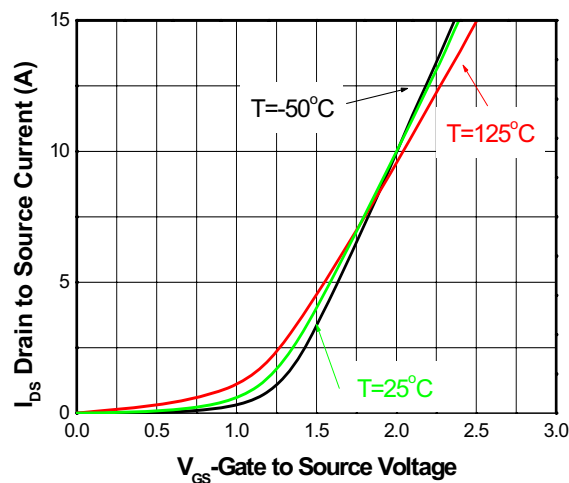
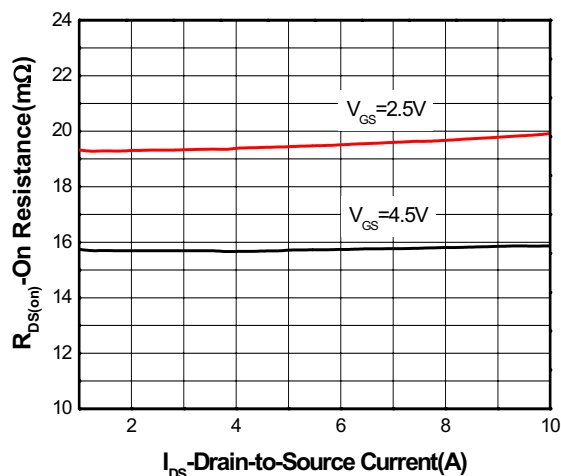
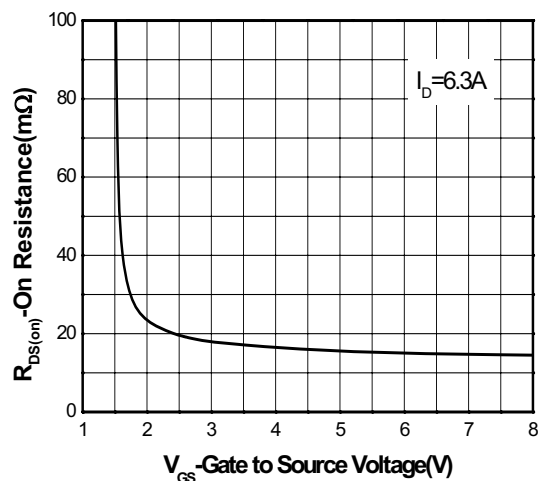
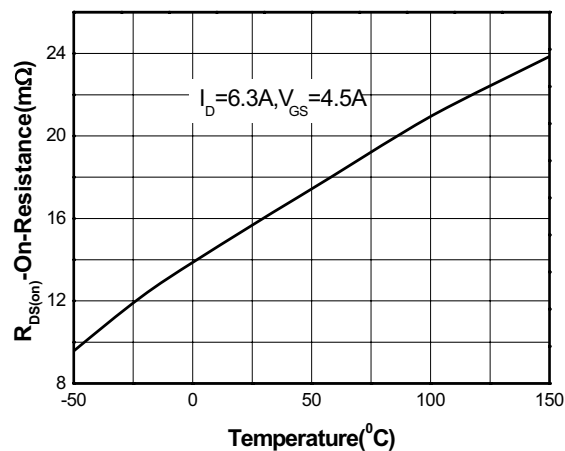
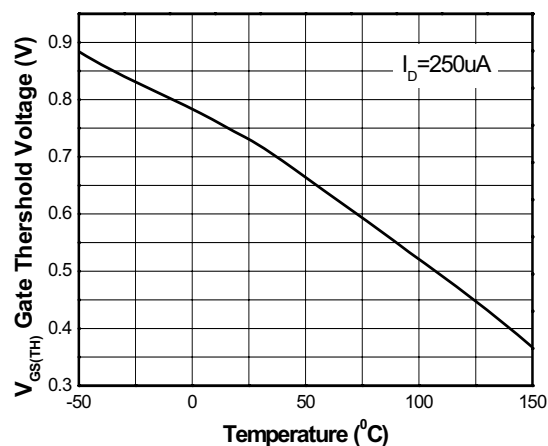
b Surface mounted on FR4 board using minimum pad size, 1oz copper

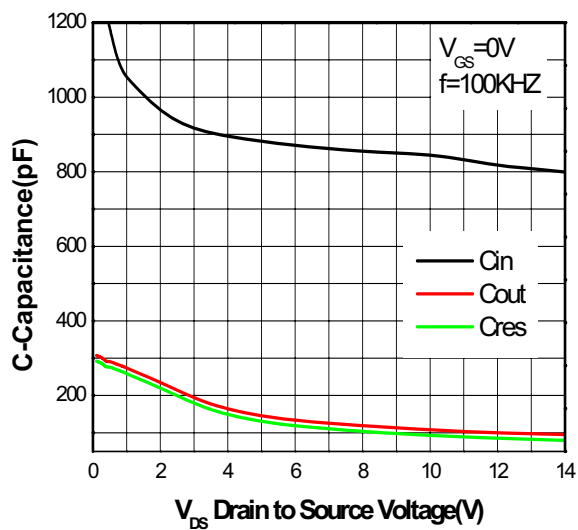
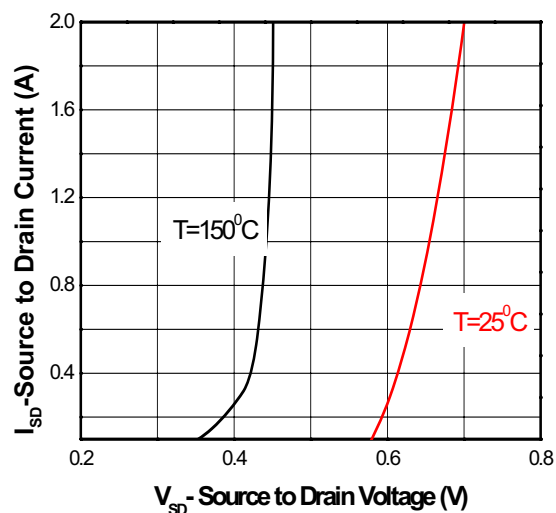
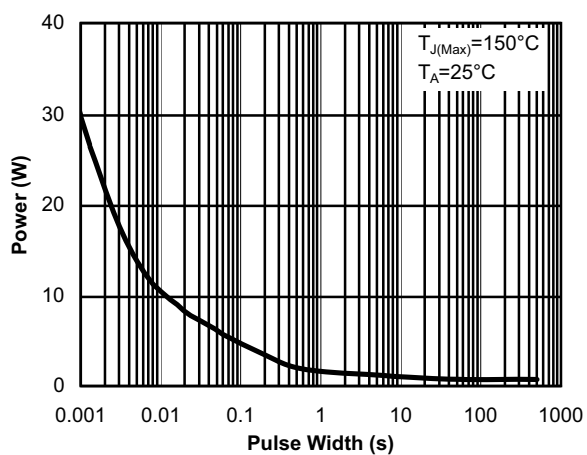
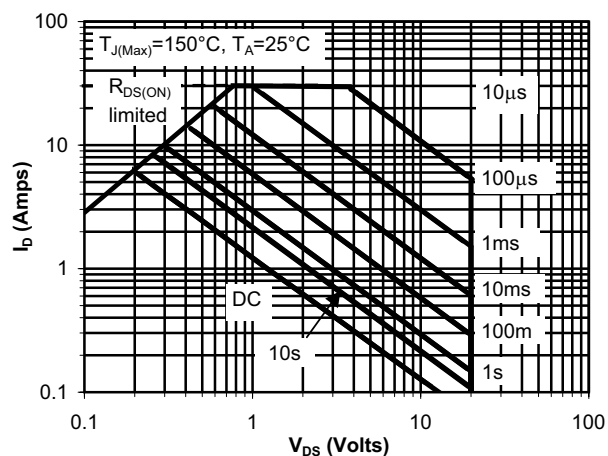
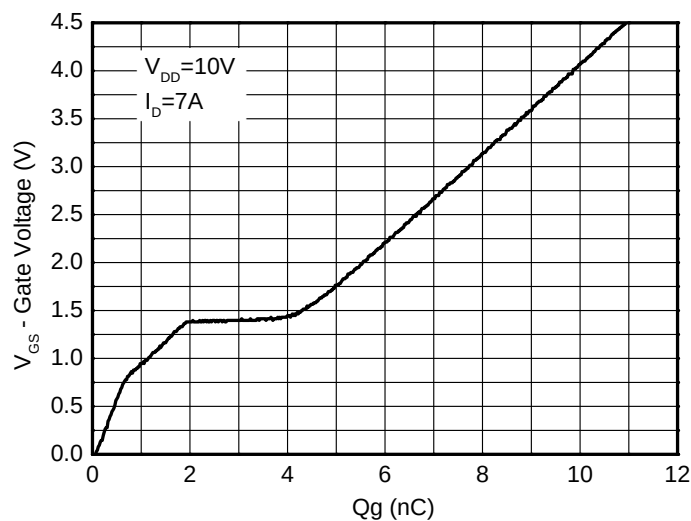
c Repetitive rating, pulse width limited by junction temperature, $t_p=10\mu\text{s}$, Duty Cycle=1%

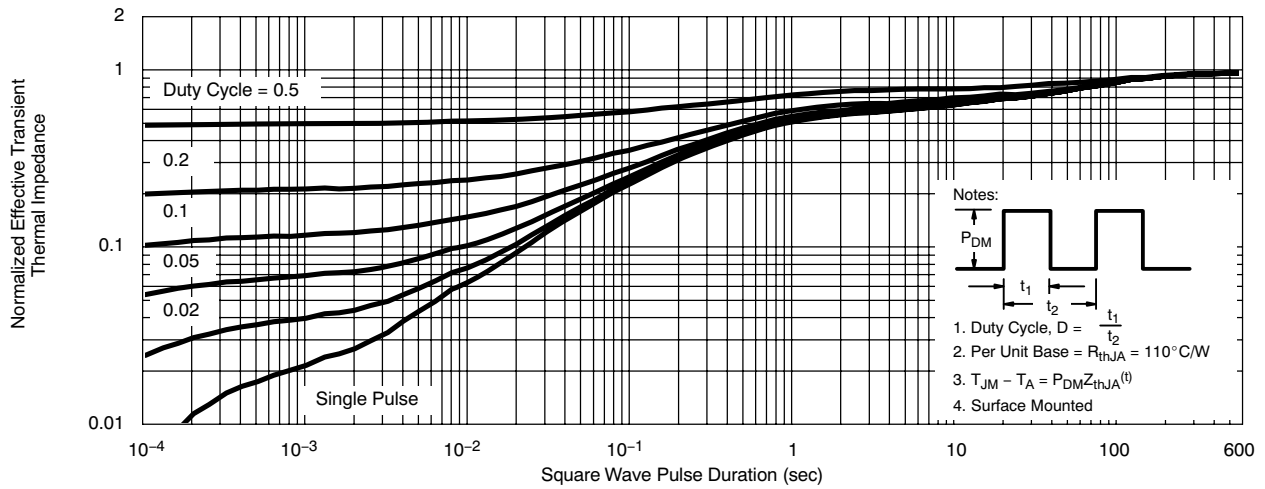
d Repetitive rating, pulse width limited by junction temperature $T_J=150^{\circ}\text{C}$.

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

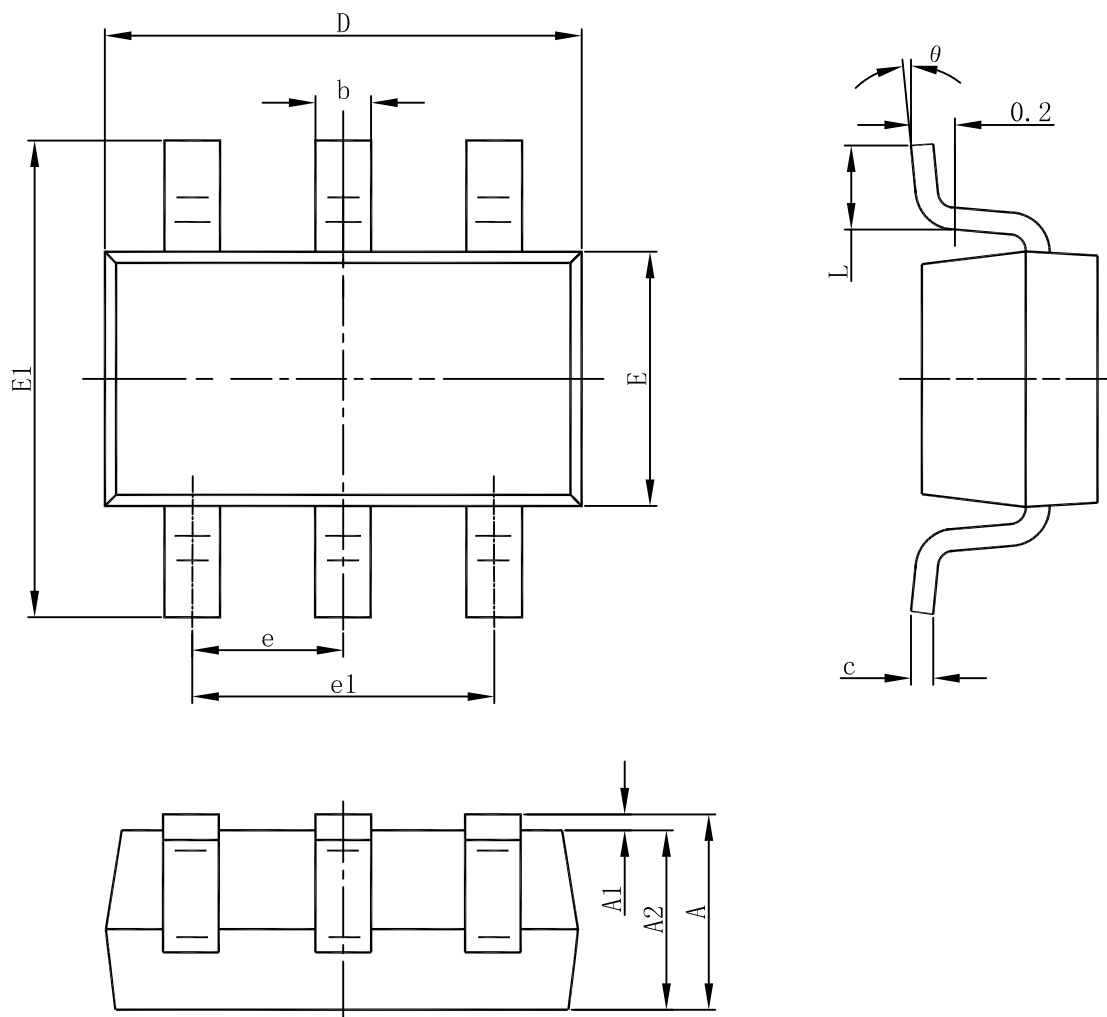
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0 V, I _D = 250uA	20			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =16 V, V _{GS} = 0V			1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±10V			±5	uA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 250uA	0.5	0.7	1.0	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} = 4.5V, I _D = 6.3A	11	15.7	21	mΩ
		V _{GS} = 3.1V, I _D = 6.0A	12	18	23	
		V _{GS} = 2.5V, I _D = 5.5A	14	20	26	
Forward Transconductance	g _{FS}	V _{DS} = 5.0 V, I _D = 6.3A		16		S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 100KHz, V _{DS} = 10 V		800		pF
Output Capacitance	C _{OSS}			108		
Reverse Transfer Capacitance	C _{RSS}			93		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 4.5 V, V _{DS} = 10 V, I _D = 6.3 A		10.9		nC
Threshold Gate Charge	Q _{G(TH)}			0.62		
Gate-to-Source Charge	Q _{GS}			1.92		
Gate-to-Drain Charge	Q _{GD}			2.0		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	td(ON)	V _{GS} = 4.5 V, V _{DS} =10 V, R _L =2.0 Ω, R _G =6 Ω		410		ns
Rise Time	tr			1200		
Turn-Off Delay Time	td(OFF)			6100		
Fall Time	tf			3500		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} = 0 V, I _S = 1.0A		0.65	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

Gate Charge Characteristics



Transient thermal response (Junction-to-Ambient)

Package outline dimensions
SOT-23-6L


Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
A	1.050	1.150	1.250
A1	0.000	0.050	0.100
A2	1.050	1.100	1.150
b	0.300	0.400	0.500
c	0.100	0.150	0.200
D	2.820	2.920	3.020
E	1.500	1.600	1.700
E1	2.650	2.800	2.950
e	0.950(BSC)		
e1	1.800	1.900	2.000
L	0.300		0.600
θ	0°		8°