

Dual N-Channel, 20V, 6.3A, Power MOSFET

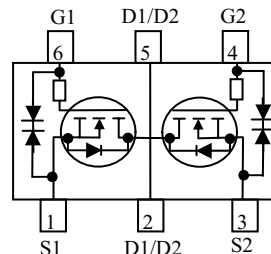
V _{DS} (V)	R _{ds(on)} (Ω)
20	0.0157@ V _{GS} =4.5V
	0.018@ V _{GS} =3.1V
	0.020@ V _{GS} =2.5V
ESD Rating: 2000V HBM	



SOT-23-6L

Descriptions

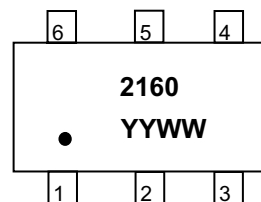
The WNMD2160 is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R_{DS (ON)} with low gate charge. This device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WNMD2160 is Pb-free.



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

Marking

Applications

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

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	I_D	$T_A=25^\circ\text{C}$	6.3	5.7	A
		$T_A=70^\circ\text{C}$	5.0	4.6	
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	$T_A=25^\circ\text{C}$	5.8	5.2	A
		$T_A=70^\circ\text{C}$	4.6	4.1	
Maximum Power Dissipation ^b	P_D	$T_A=25^\circ\text{C}$	0.9	0.7	W
		$T_A=70^\circ\text{C}$	0.6	0.5	
Pulsed Drain Current ^c	I_{DM}	30		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	$t \leq 10 \text{ s}$	$R_{\theta JA}$	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

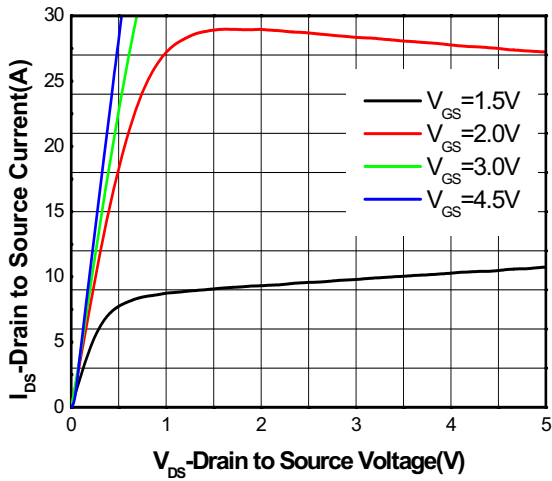
c Repetitive rating, pulse width limited by junction temperature, $t_p=10\mu\text{s}$, Duty Cycle=1%

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

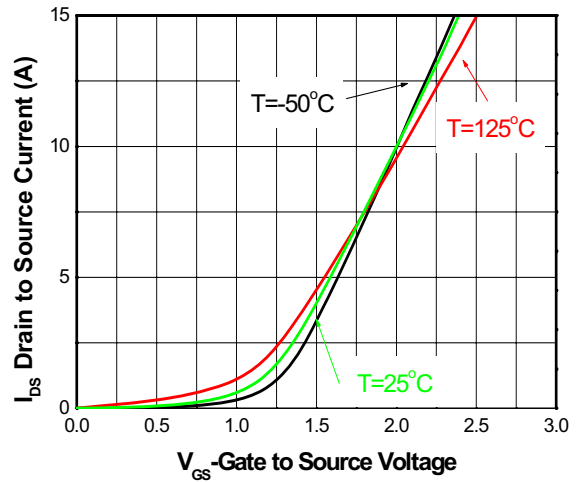
Electronics Characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{ V}, I_D = 250\mu\text{A}$	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}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}$			± 5	μA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	0.5	0.7	1.0	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 6.3\text{ A}$		15.7	21	m Ω
		$V_{GS} = 3.1\text{ V}, I_D = 6.0\text{ A}$		18	23	
		$V_{GS} = 2.5\text{ V}, I_D = 5.5\text{ A}$		20	26	
Forward Transconductance	g_{FS}	$V_{DS} = 5.0\text{ V}, I_D = 6.3\text{ A}$		16		S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, f = 100\text{ KHz}, V_{DS} = 10\text{ V}$		800		pF
Output Capacitance	C_{OSS}			108		
Reverse Transfer Capacitance	C_{RSS}			93		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V}, I_D = 6.3\text{ A}$		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	$t_d(ON)$	$V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V}, R_L = 2.0\ \Omega, R_G = 6\ \Omega$		410		ns
Rise Time	t_r			1200		
Turn-Off Delay Time	$t_d(OFF)$			6100		
Fall Time	t_f			3500		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 1.0\text{ A}$		0.65	1.5	V

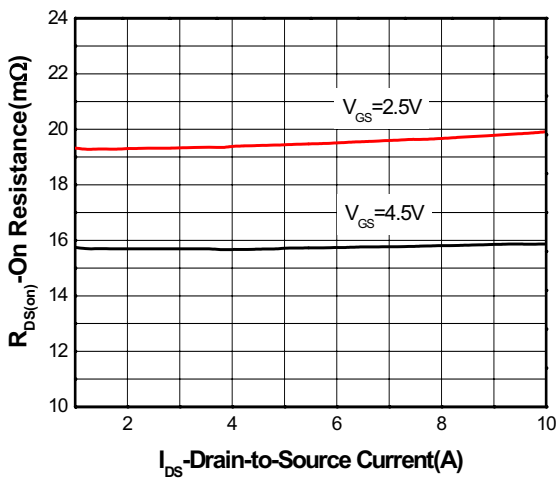
Typical Characteristics (Ta=25°C, unless otherwise noted)



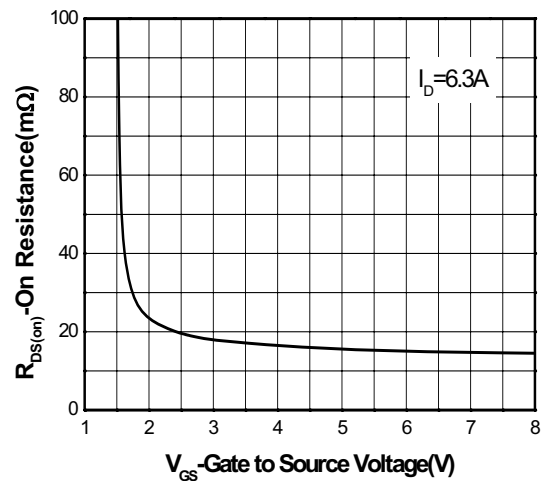
Output characteristics



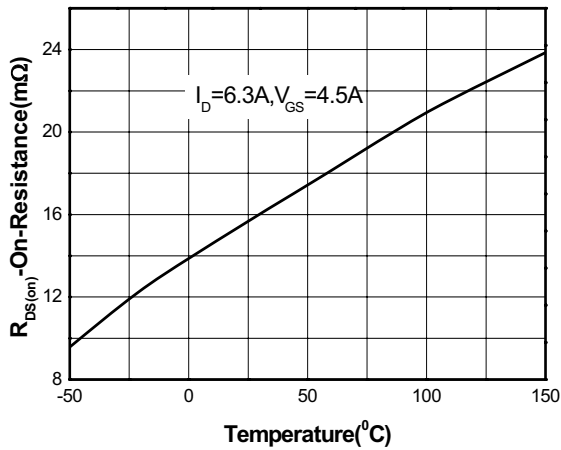
Transfer characteristics



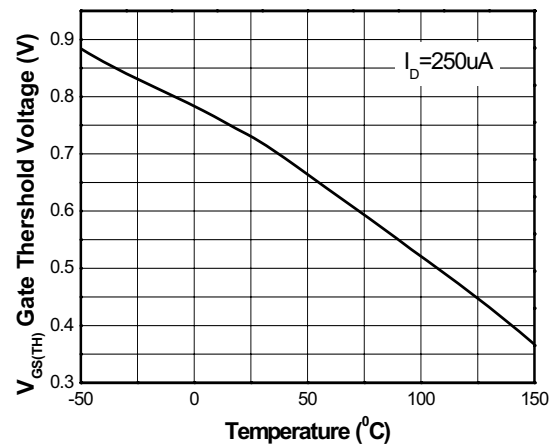
On-Resistance vs. Drain current



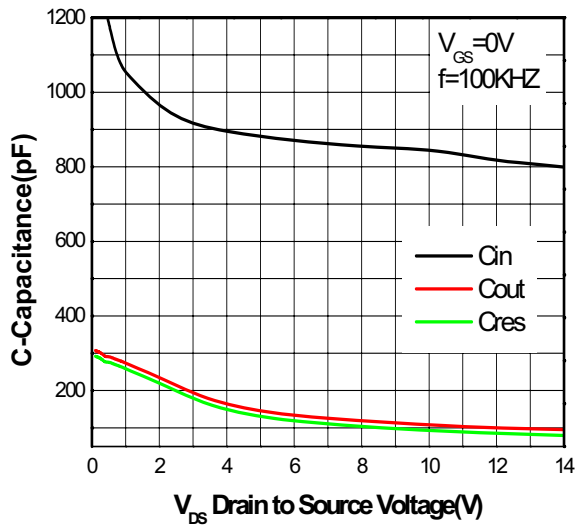
On-Resistance vs. Gate-to-Source voltage



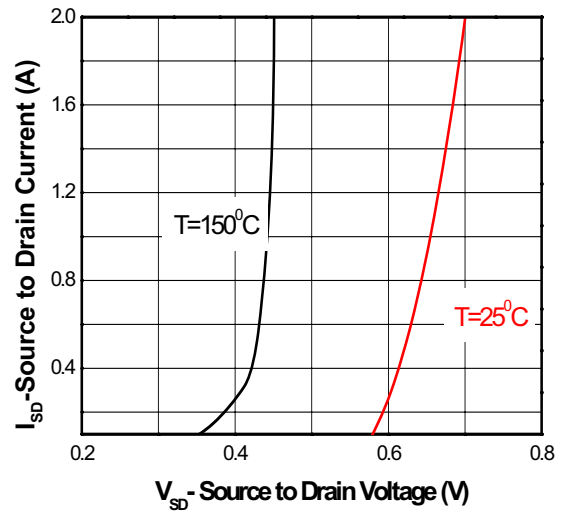
On-Resistance vs. Junction temperature



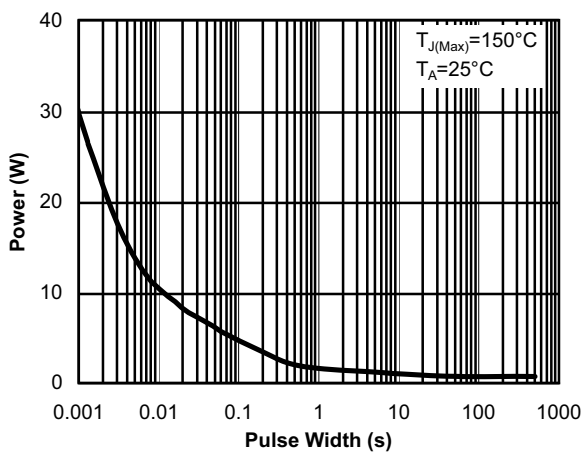
Threshold voltage vs. Temperature



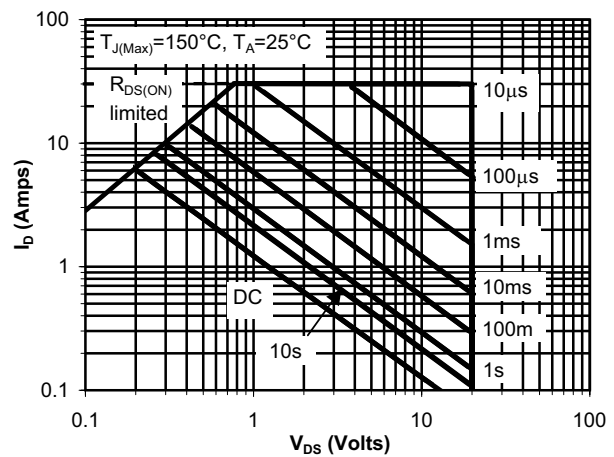
Capacitance



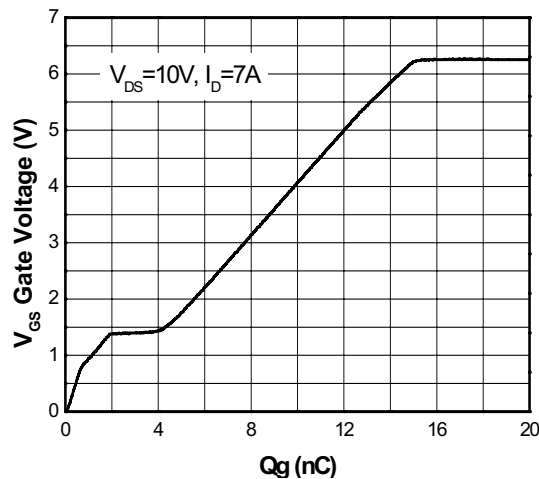
Body diode forward voltage



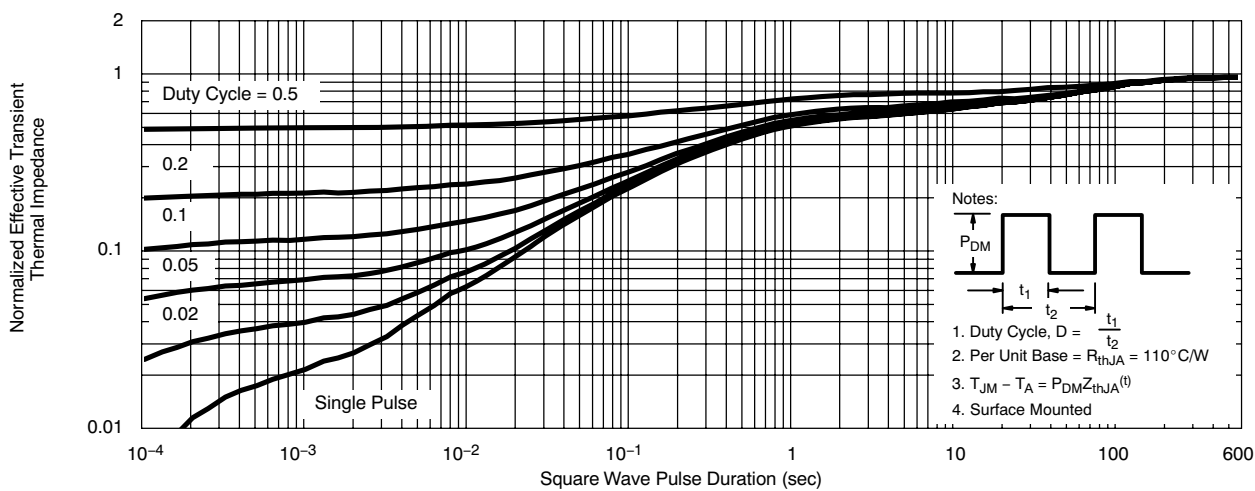
Single pulse power



Safe operating power



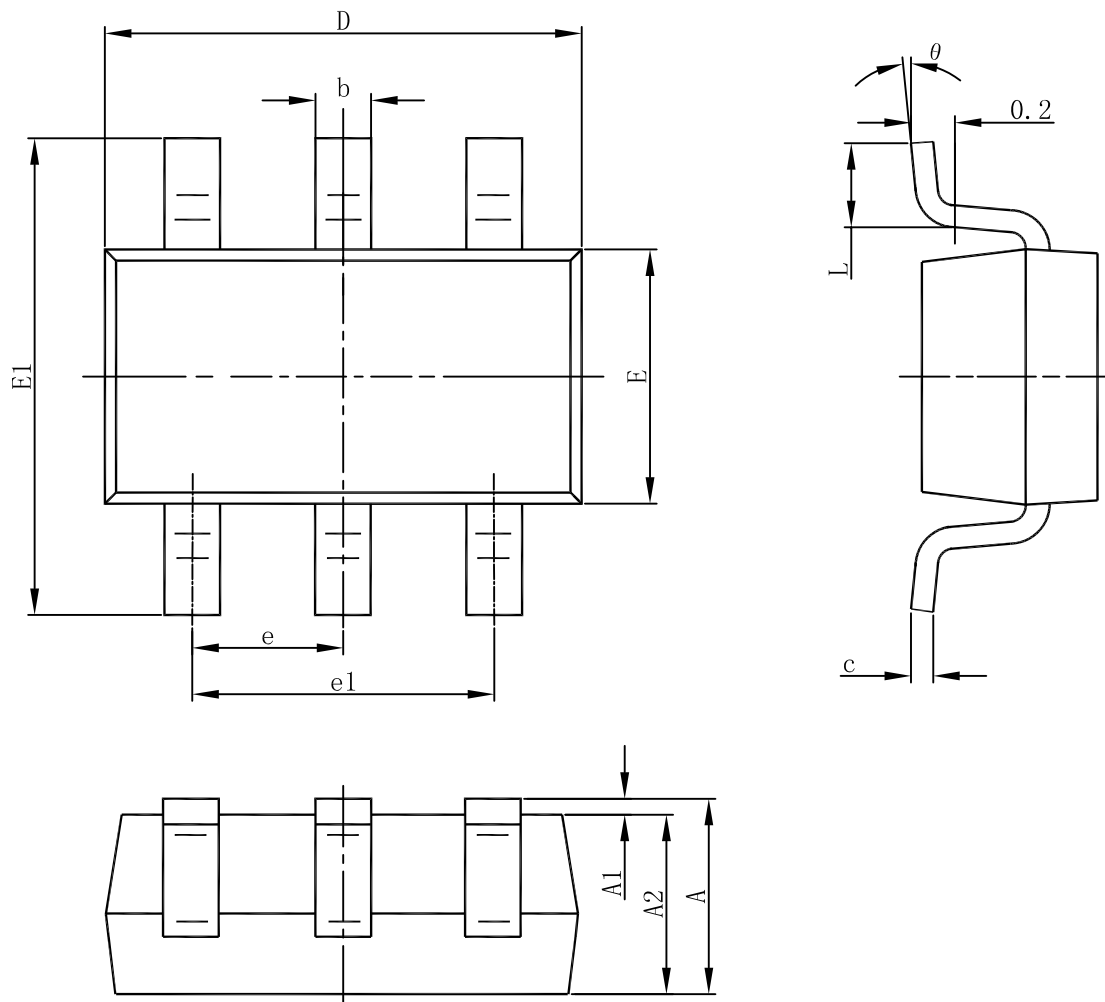
Gate Charge Characteristics



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
theta	0°		8°