

20V N-Channel Enhancement Mode Power MOSFET

Description

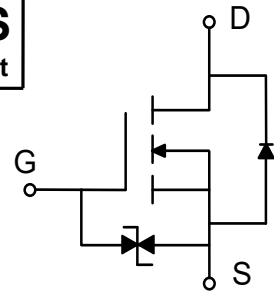
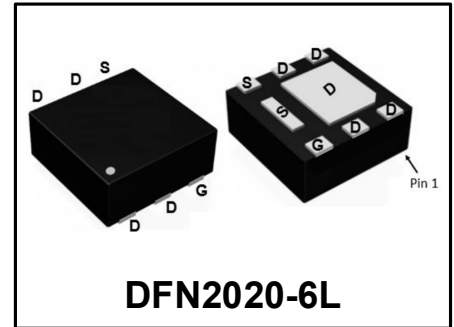
WMR09N02T1 uses advanced power trench technology that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Features

- $V_{DS} = 20V$, $I_D = 9A$
 $R_{DS(on)} < 17.5m\Omega @ V_{GS} = 4.5V$
 $R_{DS(on)} < 21m\Omega @ V_{GS} = 2.5V$
- Green Device Available
- High Power and Current Handling Capability
- ESD Protected

Applications

- Battery Protection
- Power Management
- Load Switch



Absolute Maximum Ratings ($T_A = 25^\circ C$, unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	± 12	V
Continuous Drain Current	$T_C = 25^\circ C$	I_D	9	A
	$T_C = 100^\circ C$		5	
Pulsed Drain Current ¹		I_{DM}	36	A
Single Pulse Avalanche Energy ²		EAS	5	mJ
Total Power Dissipation	$T_C = 25^\circ C$	P_D	1.67	W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient ³	R_{θJA}	75	$^\circ C/W$

Electrical Characteristics (T_J = 25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Static Characteristics							
Drain-Source Breakdown Voltage	V_{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	20	-	-	V	
Gate-body Leakage current	I_{GSS}	V _{DS} = 0V, V _{GS} = ±10V	-	-	±10	μA	
Zero Gate Voltage Drain Current	I_{DSS}	V _{DS} = 20V, V _{GS} = 0V	T _J =25°C	-	-	1	μA
			T _J =100°C	-	-	100	
Gate-Threshold Voltage	V_{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	0.4	0.65	1	V	
Drain-Source On-Resistance ⁴	R_{DS(on)}	V _{GS} = 4.5V, I _D = 6A	-	11.5	17.5	mΩ	
		V _{GS} = 2.5V, I _D = 4A	-	14.5	21		
Forward Transconductance ⁴	g_{fs}	V _{DS} = 4.5V, I _D = 6A	-	28	-	S	
Dynamic Characteristics⁵							
Input Capacitance	C_{iss}	V _{DS} = 10V, V _{GS} = 0V, f = 1MHz	-	850	-	pF	
Output Capacitance	C_{oss}		-	140	-		
Reverse Transfer Capacitance	C_{rss}		-	105	-		
Gate Resistance	R_g	f = 1MHz	-	2.4	-	Ω	
Switching Characteristics⁵							
Total Gate Charge	Q_g	V _{GS} = 4.5V, V _{DS} = 10V, I _D = 6A	-	11	-	nC	
Gate-Source Charge	Q_{gs}		-	2	-		
Gate-Drain Charge	Q_{gd}		-	3.1	-		
Turn-On Delay Time	t_{d(on)}	V _{GS} = 4.5V, V _{DD} = 10V, I _D = 6A, R _G = 3Ω	-	5.2	-	ns	
Rise Time	t_r		-	14	-		
Turn-Off Delay Time	t_{d(off)}		-	23	-		
Fall Time	t_f		-	15	-		
Drain-Source Body Diode Characteristics							
Diode Forward Voltage ⁴	V_{SD}	I _S = 1A, V _{GS} = 0V	-	-	1.2	V	
Continuous Source Current	I_S	T _C = 25°C	-	-	9	A	

Notes:

1. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)} = 150°C
2. The EAS data shows Max. rating . The test condition is V_{DD} = 25V, V_{GS} = 10V, L = 0.1mH, I_{AS} = 10A.
3. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Characteristics

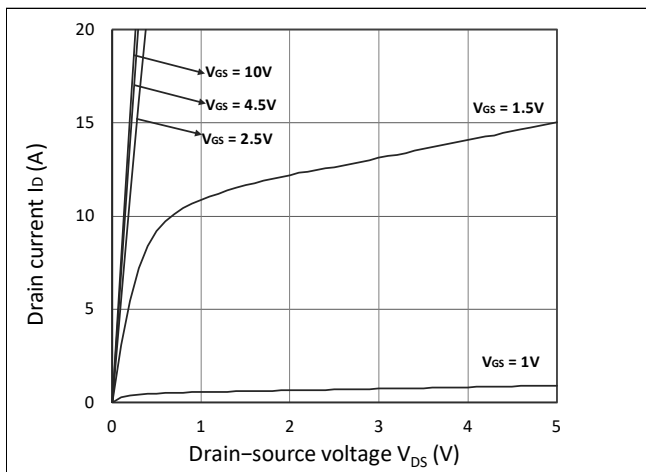


Figure 1. Output Characteristics

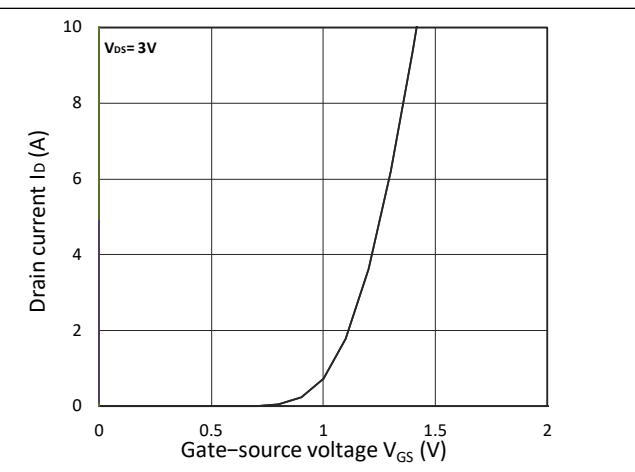


Figure 2. Transfer Characteristics

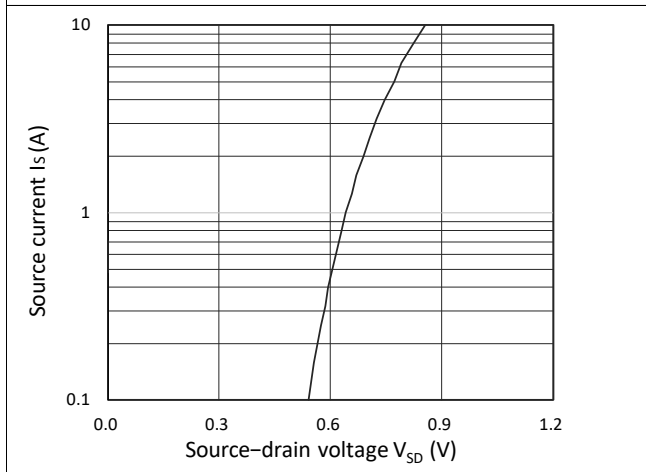


Figure 3. Forward Characteristics of Reverse

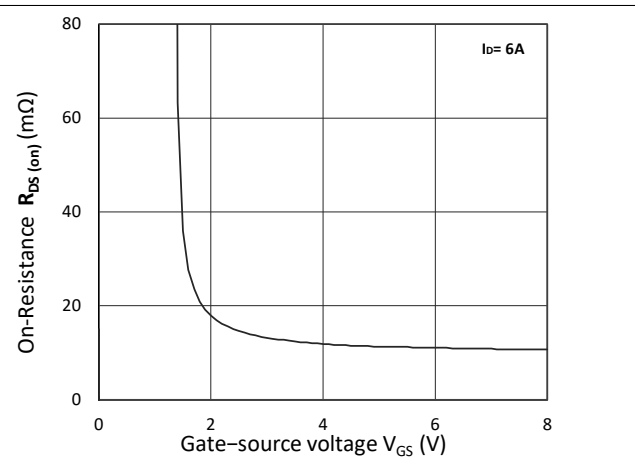


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

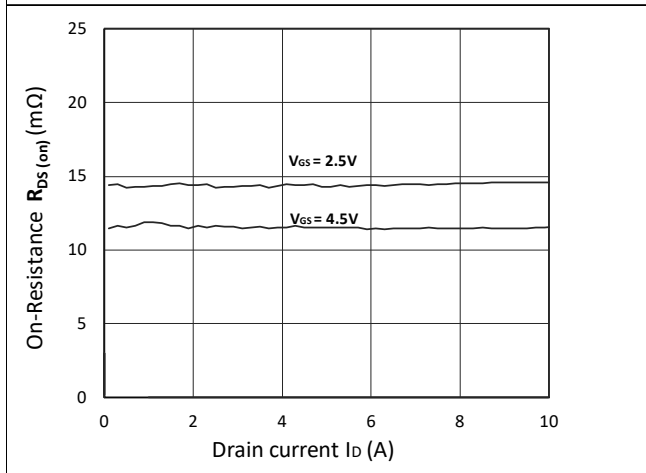


Figure 5. $R_{DS(ON)}$ vs. I_D

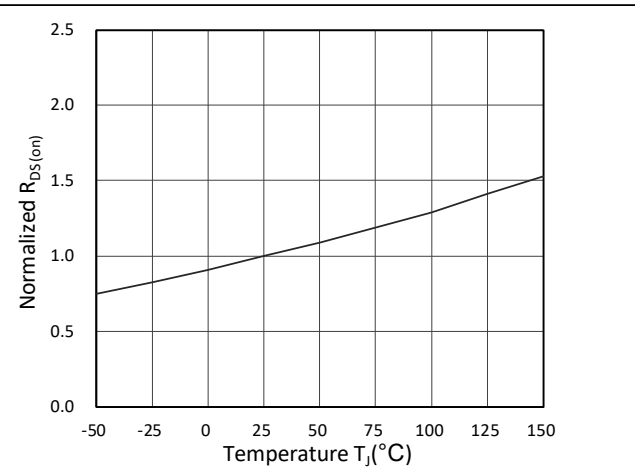


Figure 6. Normalized $R_{DS(ON)}$ vs. Temperature

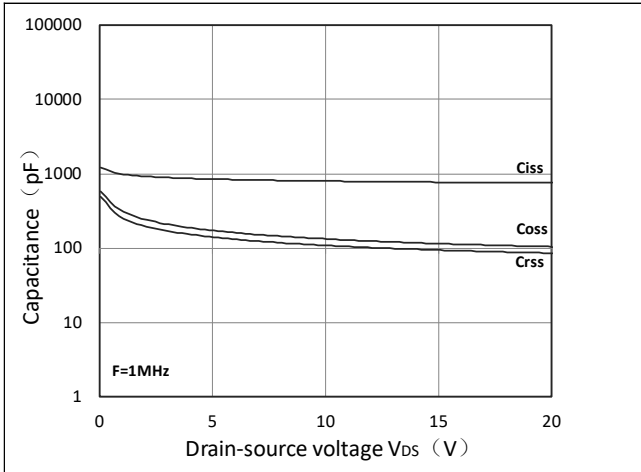


Figure 7. Capacitance Characteristics

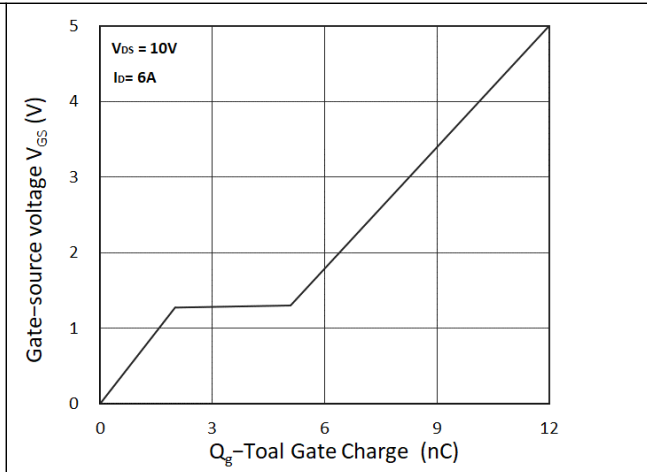


Figure 8. Gate Charge Characteristics

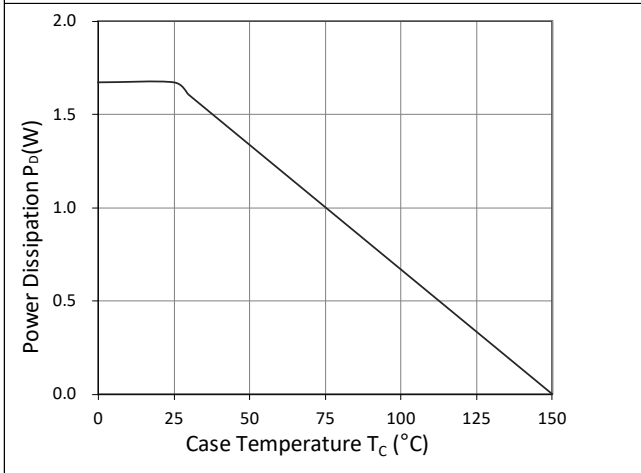


Figure 9. Power Dissipation

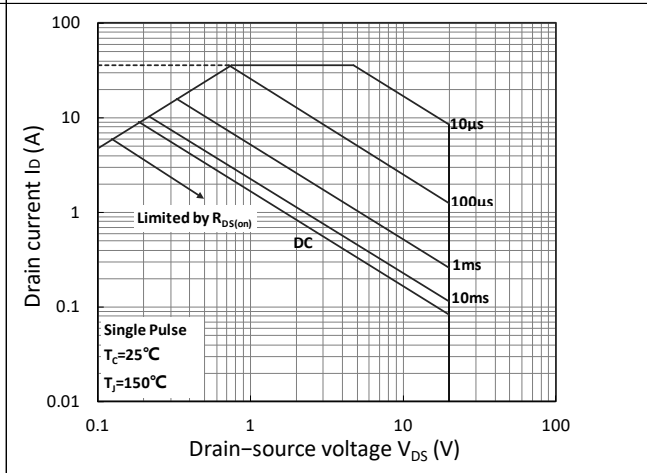


Figure 10. Safe Operating Area

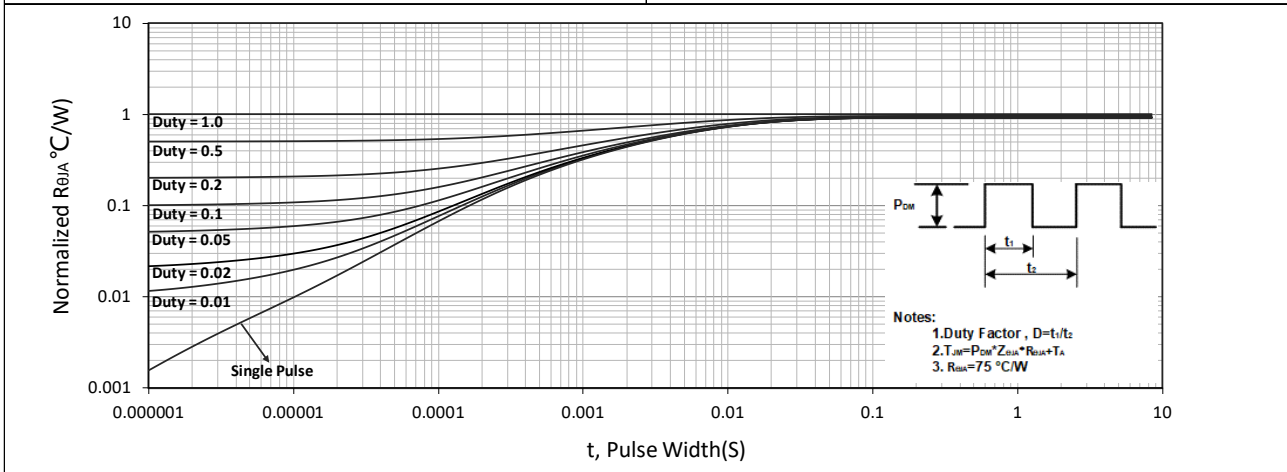


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

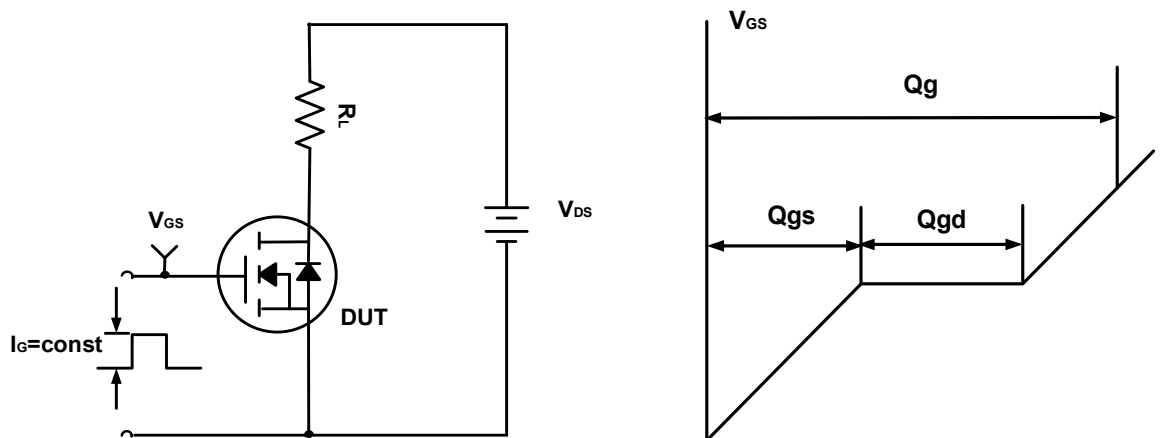


Figure A. Gate Charge Test Circuit & Waveforms

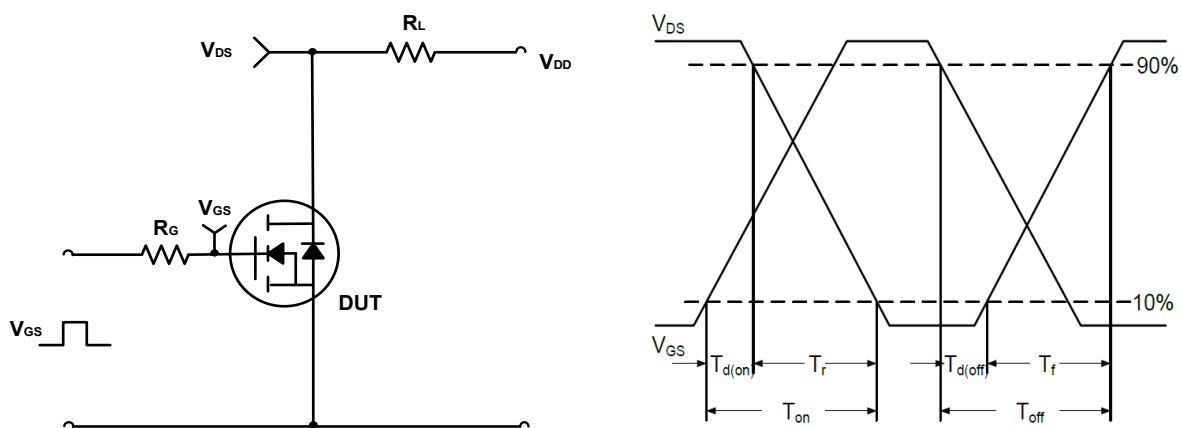


Figure B. Switching Test Circuit & Waveforms

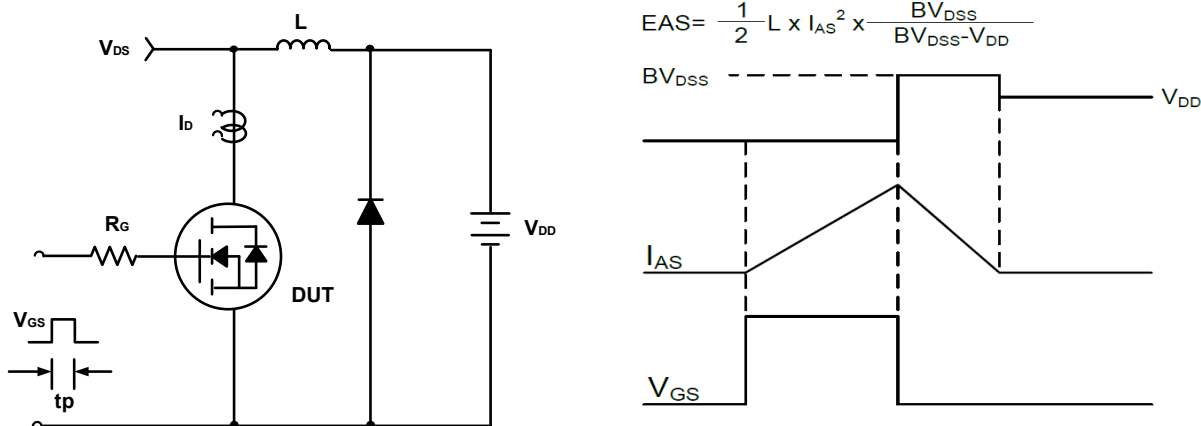
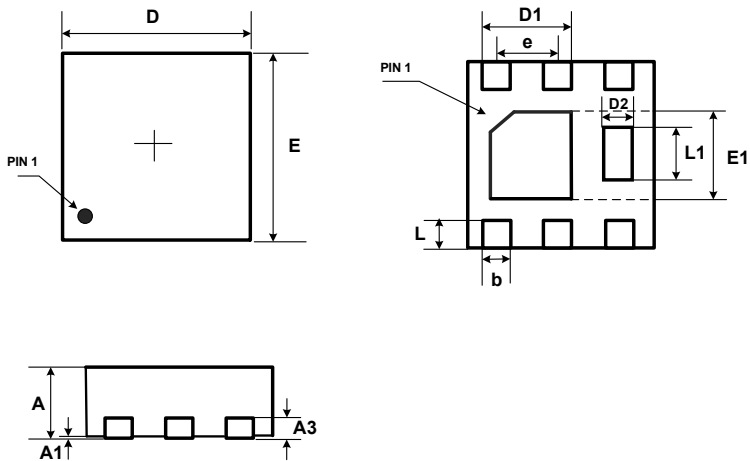


Figure C. Unclamped Inductive Switching Circuit & Waveforms

Mechanical Dimensions for DFN2020-6L

COMMON DIMENSIONS



SYMBOL	MM	
	MIN	MAX
A	0.50	0.60
A1	0.00	0.05
A3	0.152REF	
b	0.25	0.35
D	1.90	2.10
D1	0.80	1.00
E	1.90	2.10
E1	0.80	1.00
L1	0.46	0.66
e	0.65BSC	
D2	0.25	0.35
L	0.25	0.35

Ordering Information

Part	Package	Marking	Packing method
WMR09N02T1	DFN2020-6L	R09N02	Tape and Reel

Marking Information



R09N02= Device code

WWXXXXX= Date code

Contact Information

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