

20V N-Channel Enhancement Mode Power MOSFET

Description

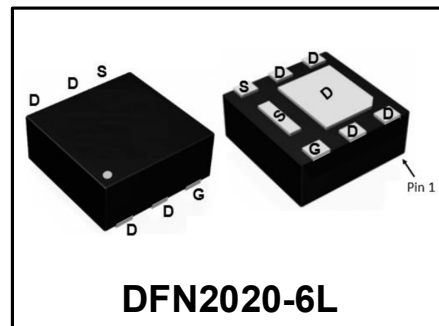
WMR09N02T1 uses advanced power trench technology that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Features

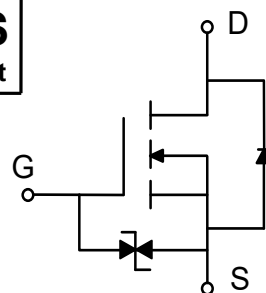
- $V_{DS} = 20V$, $I_D = 9A$
 $R_{DS(on)} < 17.5m\Omega$ @ $V_{GS} = 4.5V$
 $R_{DS(on)} < 21m\Omega$ @ $V_{GS} = 2.5V$
- Green Device Available
- High Power and Current Handling Capability
- ESD Protected

Applications

- Battery Protection
- Power Management
- Load Switch



RoHS
compliant

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	$R_{\theta JA}$	75	$^\circ C/W$

Electrical Characteristics ($T_J = 25^\circ\text{C}$, 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	T _J =25°C	I _{DSS}	V _{DS} = 20V, V _{GS} = 0V	-	-	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 Characteristics ⁵							
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 Characteristics ⁵							
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	T _C =25°C	I _S	-	-	-	9	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)} = 150^\circ\text{C}$
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 20Z copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Characteristics

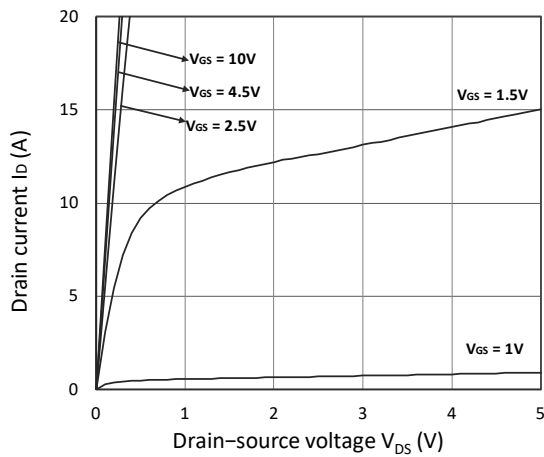


Figure 1. Output Characteristics

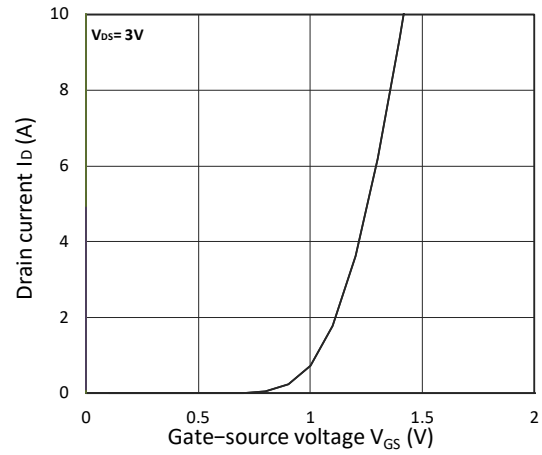


Figure 2. Transfer Characteristics

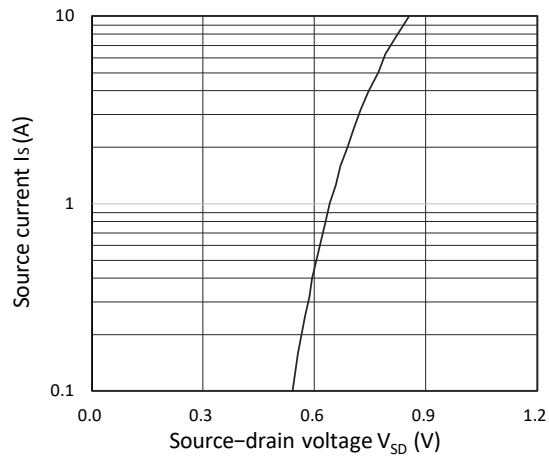
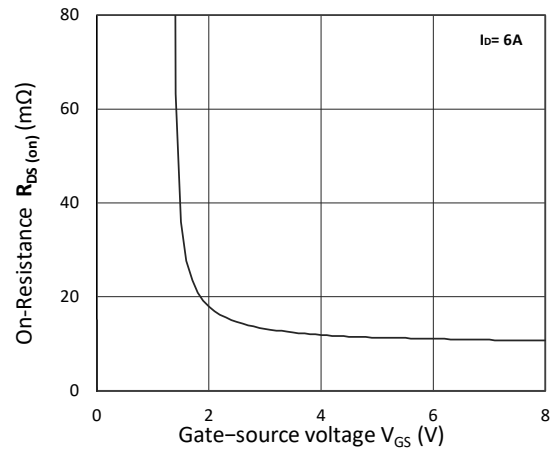
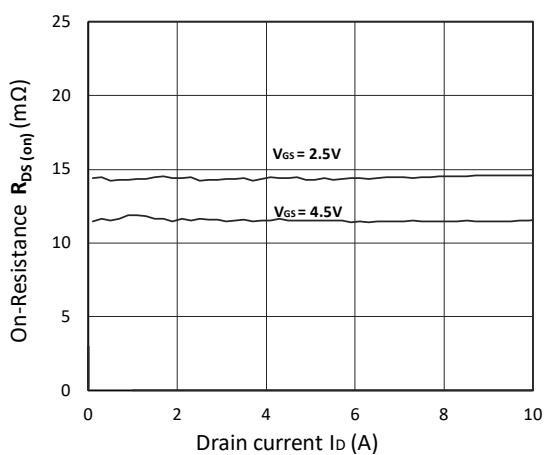
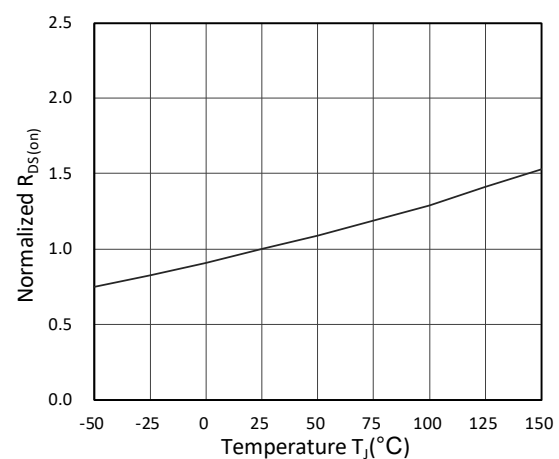


Figure 3. Forward Characteristics of Reverse

Figure 4. $R_{DS(on)}$ vs. V_{GS} Figure 5. $R_{DS(on)}$ vs. I_D Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

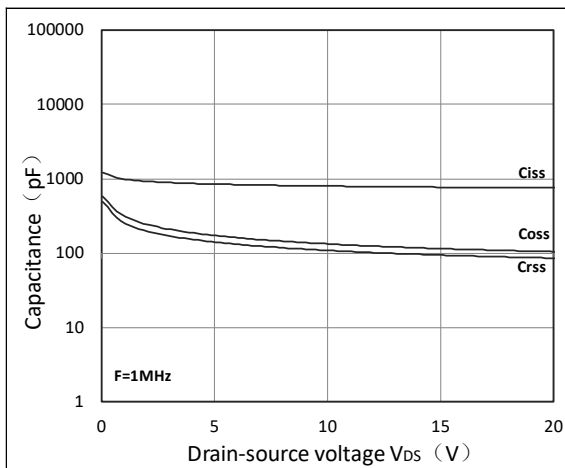


Figure 7. Capacitance Characteristics

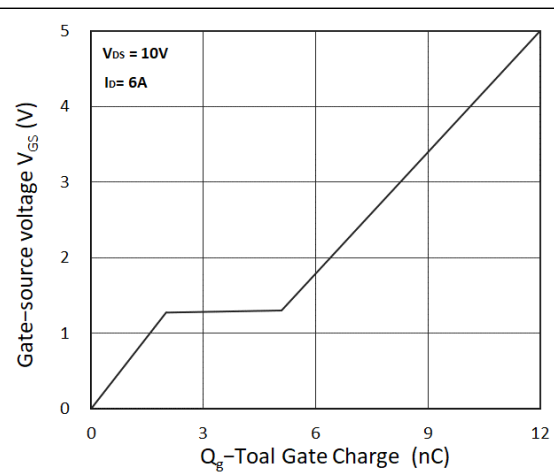


Figure 8. Gate Charge Characteristics

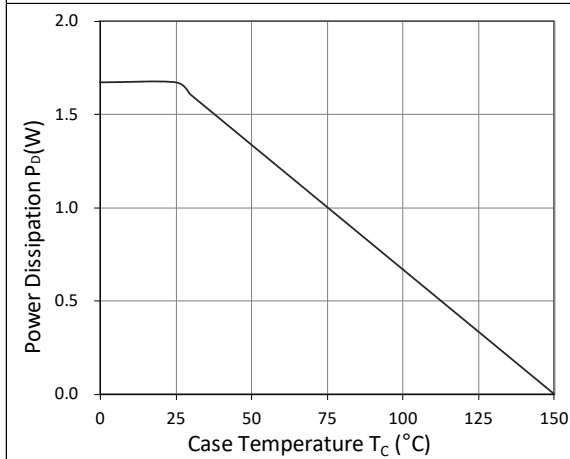


Figure 9. Power Dissipation

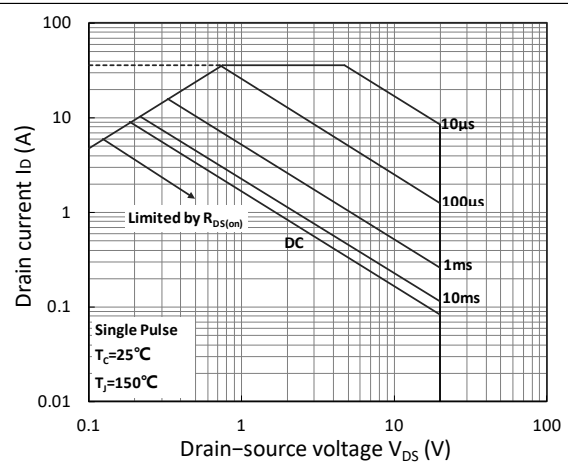


Figure 10. Safe Operating Area

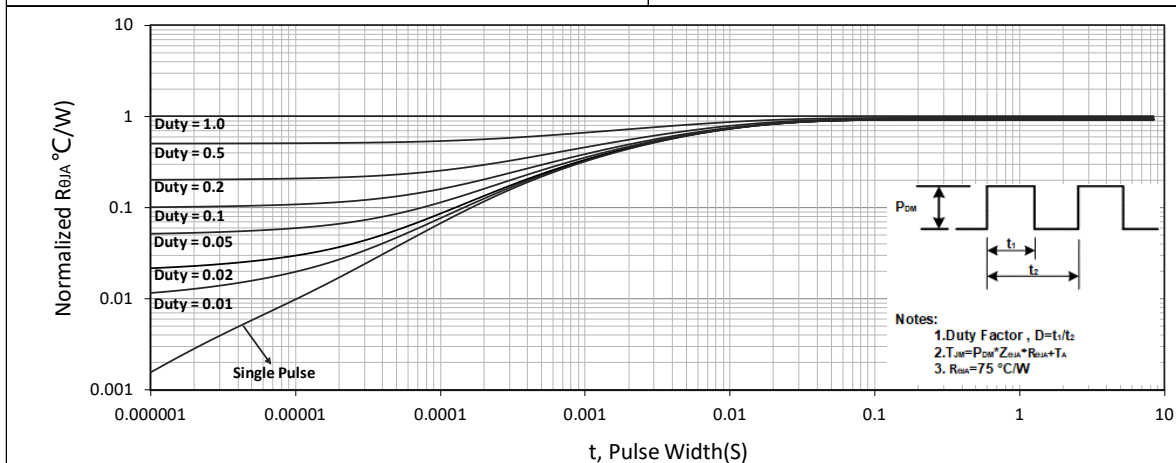


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

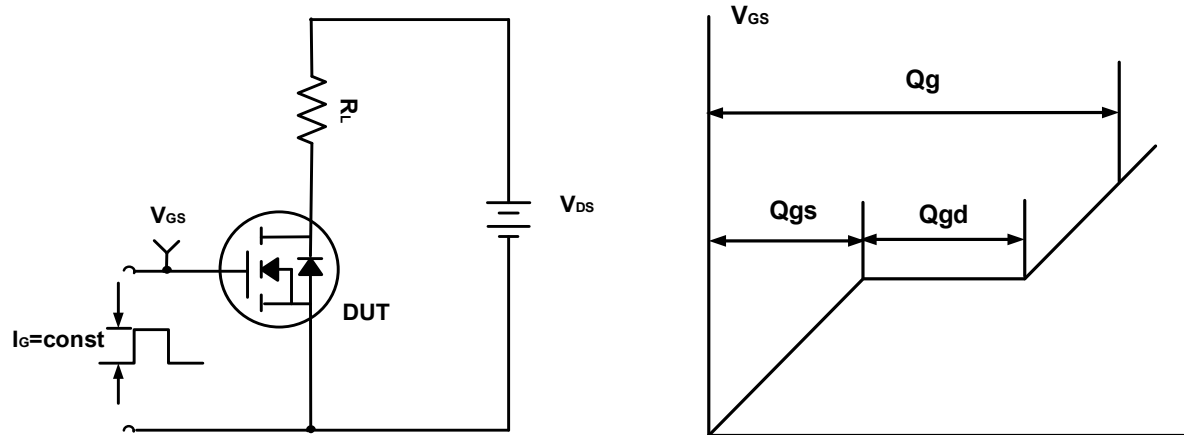


Figure A. Gate Charge Test Circuit & Waveforms

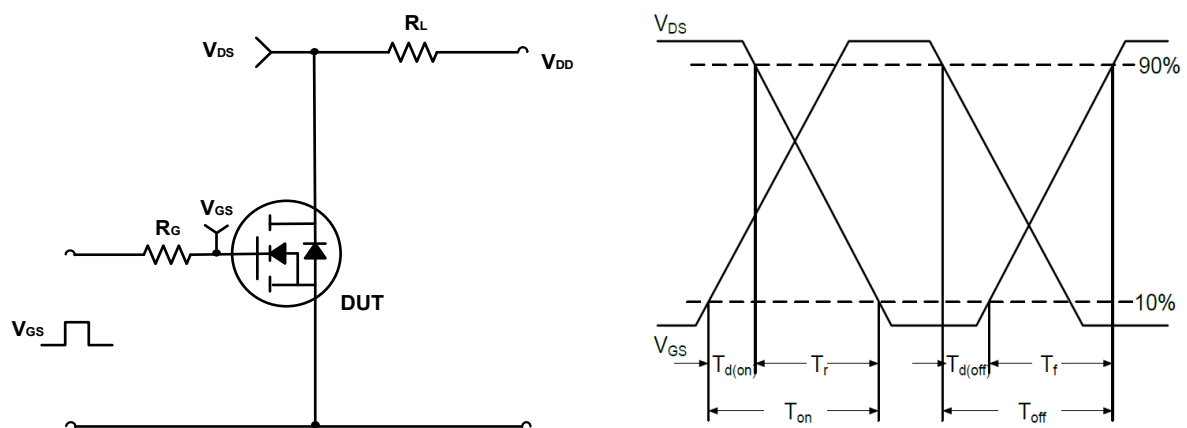


Figure B. Switching Test Circuit & Waveforms

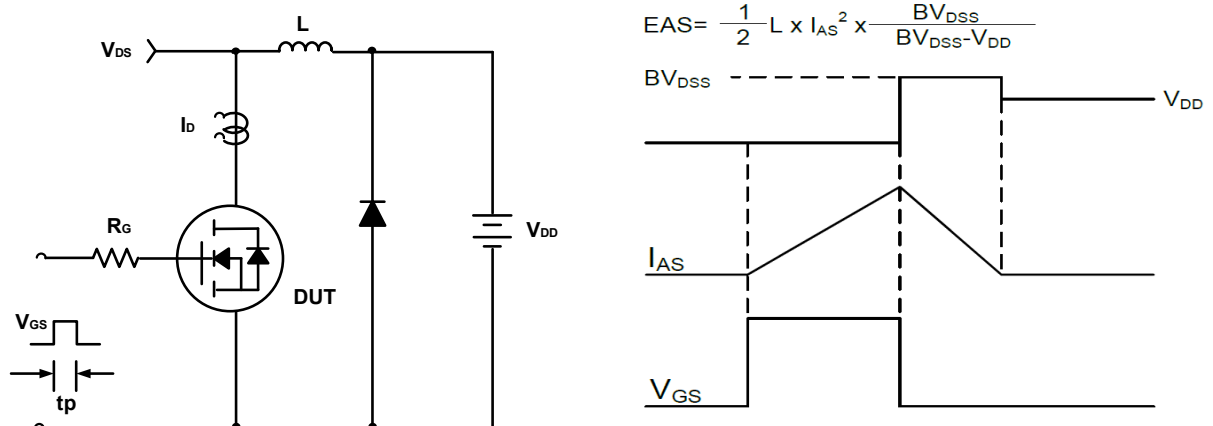
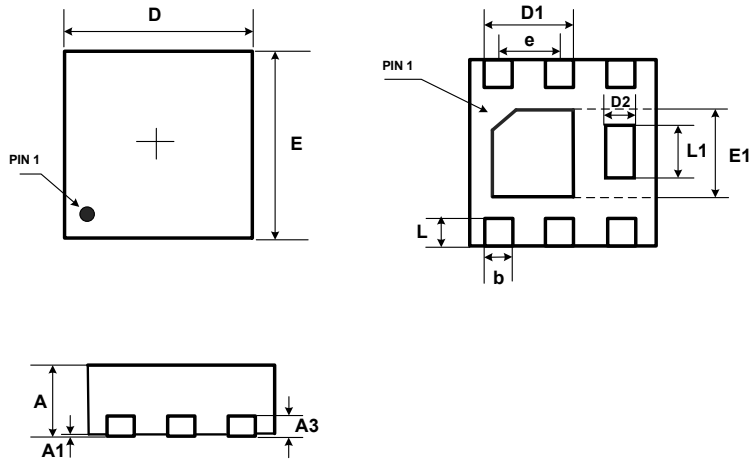


Figure C. Unclamped Inductive Switching Circuit & Waveforms

Mechanical Dimensions for DFN2020-6L

COMMON DIMENSIONS

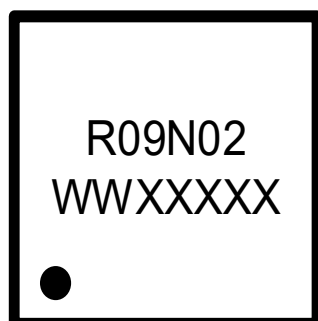


SYMBOL	MM	
	MIN	MAX
A	0.50	0.60
A1	0.00	0.05
A3	0.152REF	
b	0.25	0.35
D	1.90	2.10
D1	0.80	1.00
E	1.90	2.10
E1	0.80	1.00
L1	0.46	0.66
e	0.65BSC	
D2	0.25	0.35
L	0.25	0.35

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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