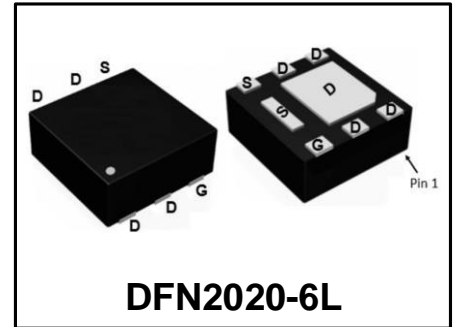


20V N-Channel Enhancement Mode Power MOSFET

Description

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

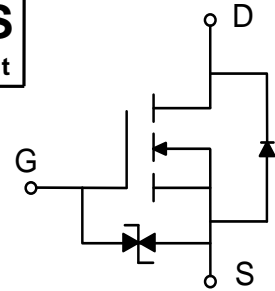


Features

- $V_{DS} = 20V$, $I_D = 9A$
 $R_{DS(on)} < 22m\Omega @ V_{GS} = 4.5V$
 $R_{DS(on)} < 28m\Omega @ V_{GS} = 2.5V$
- Green Device Available
- High Power and Current Handling Capability
- ESD Protected



RoHS
compliant



Applications

- Battery Protection
- Power Management
- Load Switch

Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	± 12	V
Continuous Drain Current ¹	$T_C = 25^\circ C$	I_D	9	A
	$T_C = 100^\circ C$		5	
Pulsed Drain Current ²		I_{DM}	22	A
Single Pulse Avalanche Energy ³		EAS	5	mJ
Avalanche Current		I_{AS}	10	A
Total Power Dissipation ⁴	$T_C = 25^\circ C$	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 ¹	R_{θJA}	75	$^\circ C/W$

Electrical Characteristics $T_c = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	20	-	-	V
Gate-body Leakage current	I_{GSS}	$V_{DS} = 0V, V_{GS} = \pm 10V$	-	-	± 10	μA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 20V, V_{GS} = 0V$	-	-	1	μA
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	0.4	0.6	1	V
Drain-Source On-Resistance ²	$R_{DS(on)}$	$V_{GS} = 4.5V, I_D = 6A$	-	14	22	m Ω
		$V_{GS} = 2.5V, I_D = 4A$	-	17	28	
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 10V, V_{GS} = 0V,$ $f = 1.0 \text{ MHz}$	-	850	-	pF
Output Capacitance	C_{oss}		-	140	-	
Reverse Transfer Capacitance	C_{rss}		-	105	-	
Switching Characteristics						
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	$t_{d(on)}$	$V_{GS} = 4.5V, V_{DS} = 10V,$ $I_D = 6A, R_G = 3\Omega$	-	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 ²	V_{SD}	$I_S = 1A, V_{GS} = 0V$	-	-	1.2	V
Continuous Source Current ^{1,5}	I_S	$V_G = V_D = 0V$, Force Current	-	-	9	A

Notes:

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper
2. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
3. The EAS data shows Max. rating. The test condition is $V_{DD} = 25V, V_{GS} = 10V, L = 0.1mH, I_{AS} = 10A$
4. The power dissipation is limited by 150°C junction temperature
5. The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation

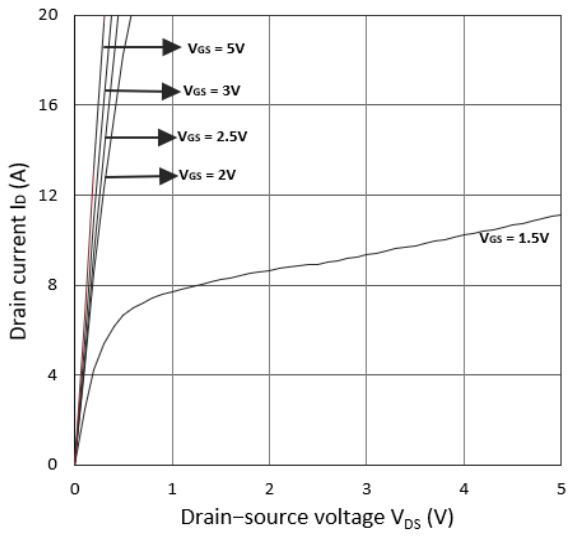


Figure 1. Output Characteristics

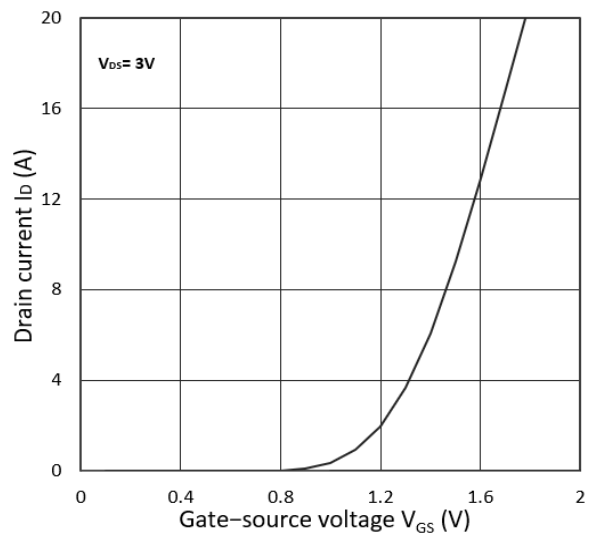


Figure 2. Transfer Characteristic

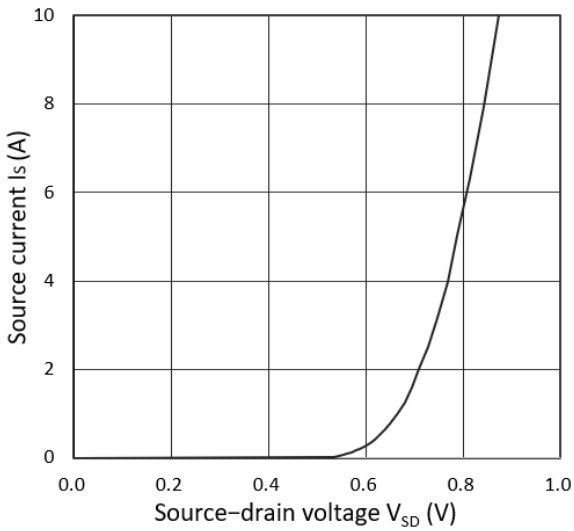


Figure 3. Forward Characteristics of Reverse

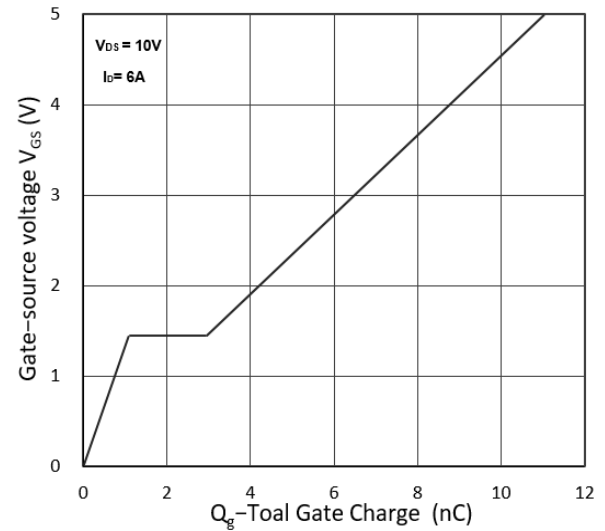


Figure 4. Gate Charge Characteristics

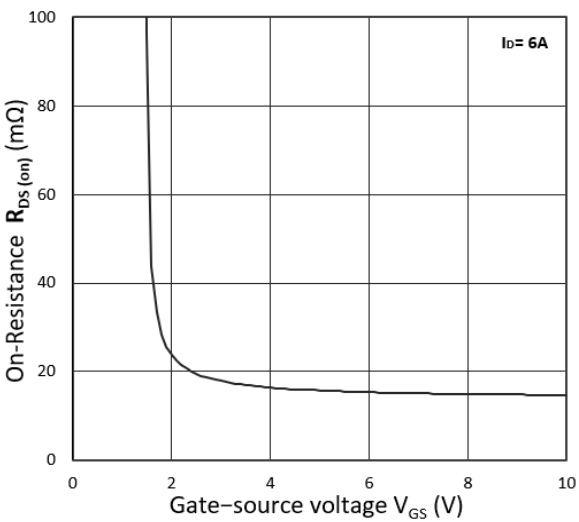


Figure 5. $R_{DS(on)}$ vs. V_{GS}

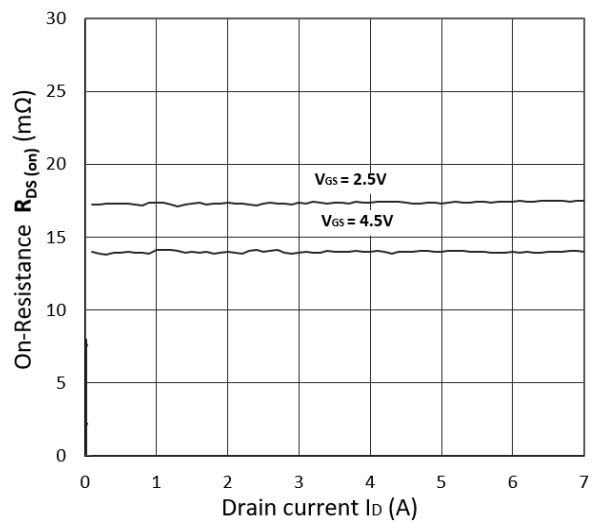


Figure 6. $R_{DS(on)}$ vs. I_D

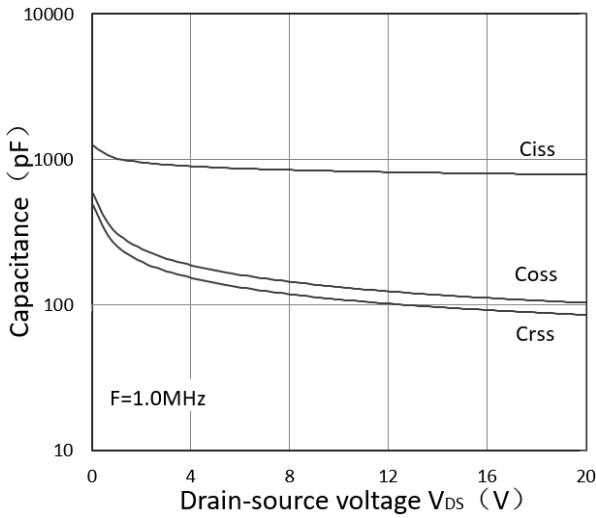


Figure 7. Capacitance Characteristics

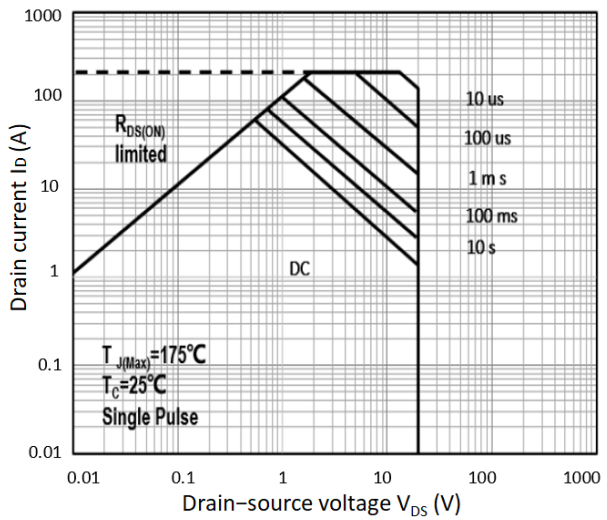


Figure 8. Safe Operating Area

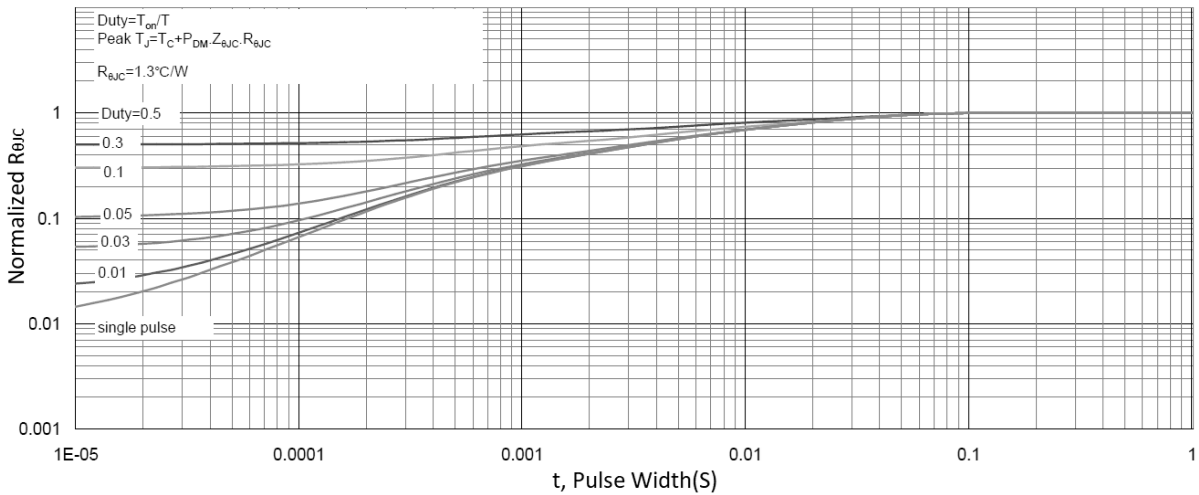


Figure 9. Normalized Maximum Transient Thermal Impedance

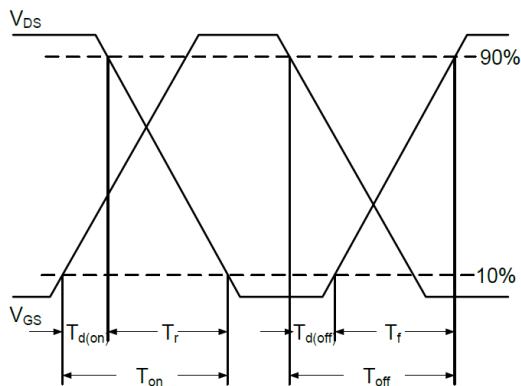


Figure 10. Switching Time Waveform

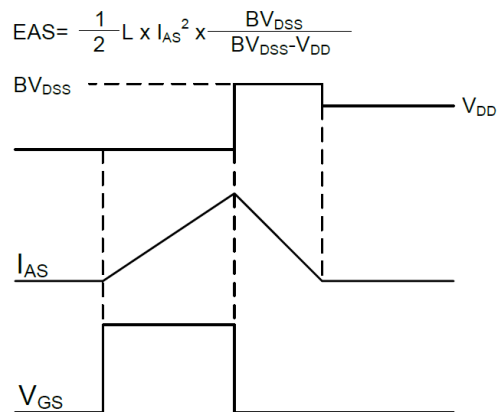
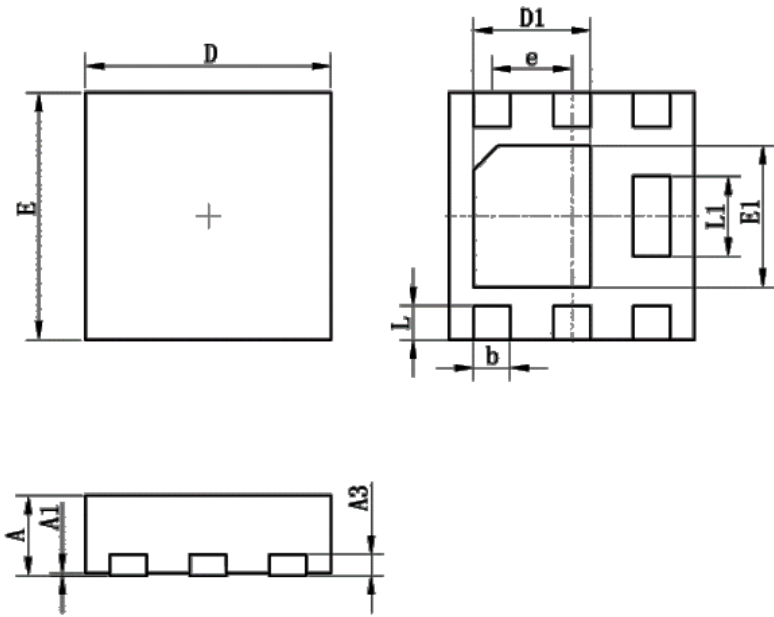


Figure 11. Unclamped Inductive Switching Waveform

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	1.95	2.05
D1	0.80	1.00
E	1.95	2.05
E1	0.80	1.00
L1	0.46	0.66
e	0.65BSC	
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

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WAYON website: <http://www.way-on.com>

For additional information, please contact your local Sales Representative.

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