

500V 5A 1.35Ω N-ch Power MOSFET

Description

WMOS™ D1 is Wayon's 1st generation VDMOS family that is dramatic reduction in on-resistance and ultra-low gate charge for applications requiring high power density and high efficiency. And it is very robust and RoHS compliant.

TO-252

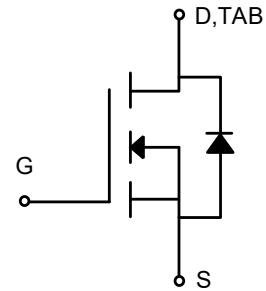


Features

- Typ. $R_{DS(on)}=1.35\Omega@V_{GS}=10V$
- 100% avalanche tested
- Pb-free, Halogen free

Applications

- SMPS
- Charger
- DC-DC



Absolute Maximum Ratings ($T_c=25^\circ\text{C}$)

Parameter	Symbol	WMO5N50D1B	Unit
Drain-source voltage	V_{DS}	500	V
Gate-source voltage	V_{GS}	± 30	V
Continuous drain current	I_D	5	A
Pulsed drain current ¹	I_{DM}	20	A
Avalanche energy, single pulse ²	E_{AS}	125	mJ
Power dissipation	P_D	45	W
Derate above 25°C		0.36	W/°C
Operating junction temperature	T_j	-55~150	°C
Storage temperature	T_{stg}	-55~150	°C
Continuous diode forward current	I_S	5	A
Diode pulse current	I_{Spulse}	20	A

Thermal Characteristic

Thermal resistance,junction-to-case	$R_{\theta JC}$	2.8	°C/W
Thermal resistance,junction-to-ambient	$R_{\theta JA}$	62.5	°C/W

Electrical Characteristics of MOSFET

				Min.	Typ.	Max.	
Drain-source break down voltage	BV_{DSS}	$I_D=250\mu A, V_{GS}=0V$	$T_C=25^\circ C$	500	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\mu A, V_{DS}=V_{GS}$	$T_J=25^\circ C$	2.0	3.0	4.0	V
Drain-source leakage current	I_{DSS}	$V_{DS}=500V, V_{GS}=0V$	$T_J=25^\circ C$	-	-	1	μA
		$V_{DS}=400V, V_{GS}=0V$	$T_J=125^\circ C$	-	-	100	μA
Gate-source leakage current,forward	I_{GSSF}	$V_{DS}=0V, V_{GS}=30V$	$T_J=25^\circ C$	-	-	100	nA
Gate-source leakage current,reverse	I_{GSSR}	$V_{DS}=0V, V_{GS}=-30V$	$T_J=25^\circ C$	-	-	-100	nA
Drain-source on-state resistance ³	$R_{DS(on)}$	$V_{GS}=10V, I_D=2.5A$	$T_J=25^\circ C$	-	1.35	1.6	Ω

Dynamic Characteristics of MOSFET ($T_C=25^\circ C$)

				Min.	Typ.	Max.	
Input capacitance	C_{iss}	$f=1MHz, V_{DS}=25V, V_{GS}=0V$		-	597	-	pF
Output capacitance	C_{oss}			-	63	-	pF
Reverse transfer capacitance	C_{rss}			-	6	-	pF
Gate to source charge	Q_{gs}	$V_{DD}=400V$		-	7	-	nC
Gate to drain charge	Q_{gd}	$I_D=5A$		-	6	-	nC
Total gate charge	Q_g	$V_{GS}=0$ to 10V		-	23	-	nC

Switching Characteristics of MOSFET ($T_C=25^\circ C$)

				Min.	Typ.	Max.	
Turn-on delay time	$t_{d on}$	$V_{DS}=250V, I_D=5A,$ $R_G=25\Omega, V_{GS}=0$ to 10V		-	12	-	ns
Rise time	t_r			-	17	-	ns
Turn-off delay time	$t_{d off}$			-	40	-	ns
Fall time	t_f			-	19	-	ns

Characteristics of Body Diode ($T_C=25^\circ C$)

				Min.	Typ.	Max.	
Forward voltage	V_{SD}	$I_{SD}=5A, V_{GS}=0V$		-	-	1.4	V
Reverse recovery time	t_{rr}	$I_S=5A, V_{GS}=0V$ $di/dt=100A/\mu s$		-	168	-	ns
Reverse recovery current	I_{rr}			-	7.7	-	A
Recovery charge	Q_{rr}			-	0.7	-	μC

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150^\circ C$.
2. The EAS data shows Max. rating . The test condition is $V_{DD}=50V, V_{GS}=10V, L=10mH, I_{AS}=5A, T_C=25^\circ C$.
3. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

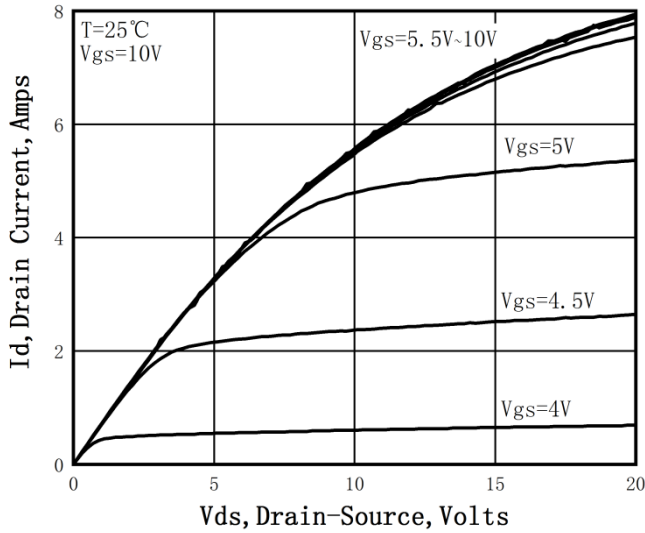


Figure 1. On-Region Characteristics

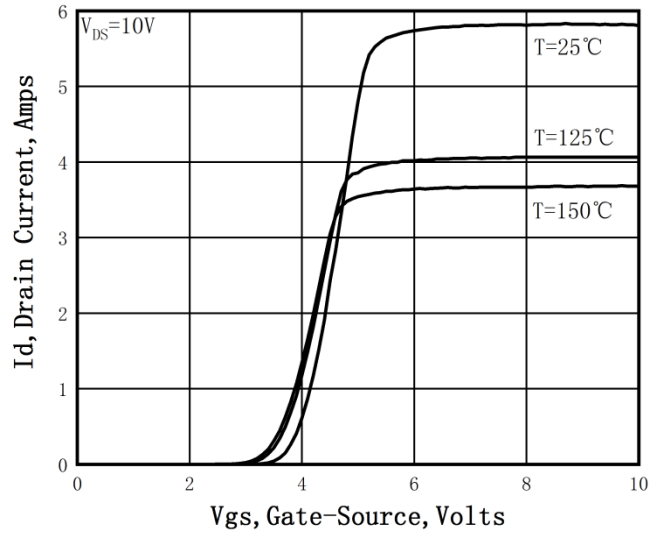


Figure 2. Transfer Characteristics

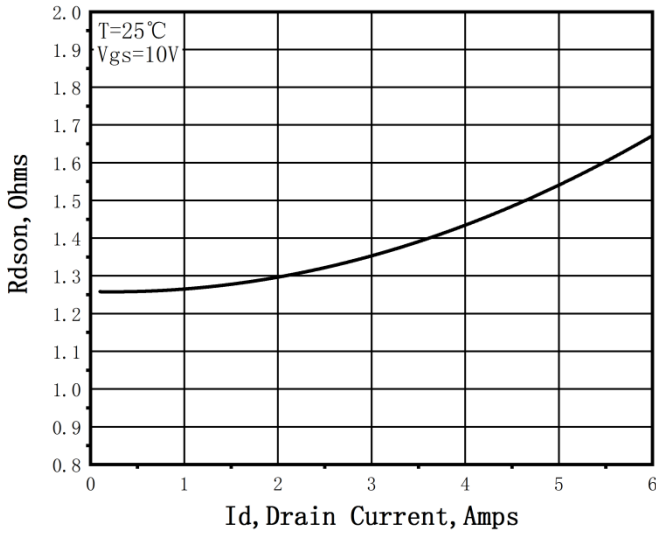


Figure 3. Static Drain-Source On Resistance

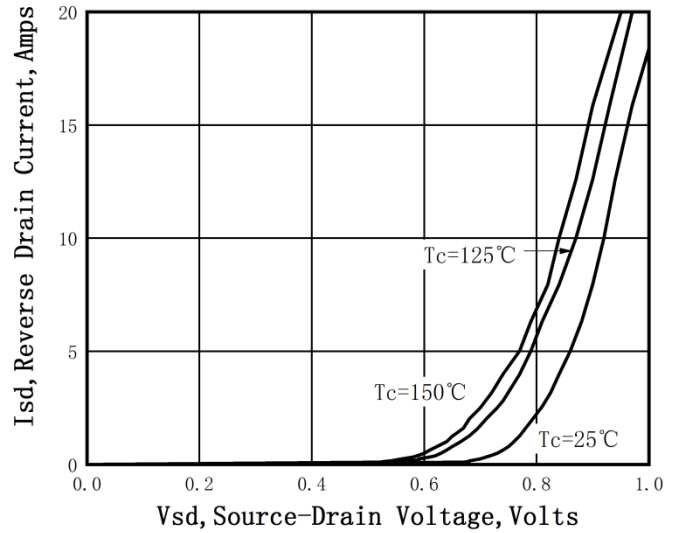


Figure 4. Typical Body Diode Transfer Characteristics

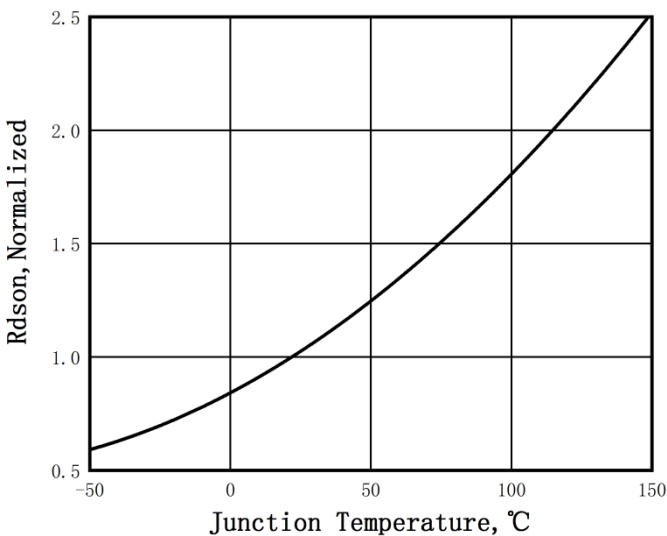


Figure 5. Normalized $R_{DS(on)}$ vs. Temperature

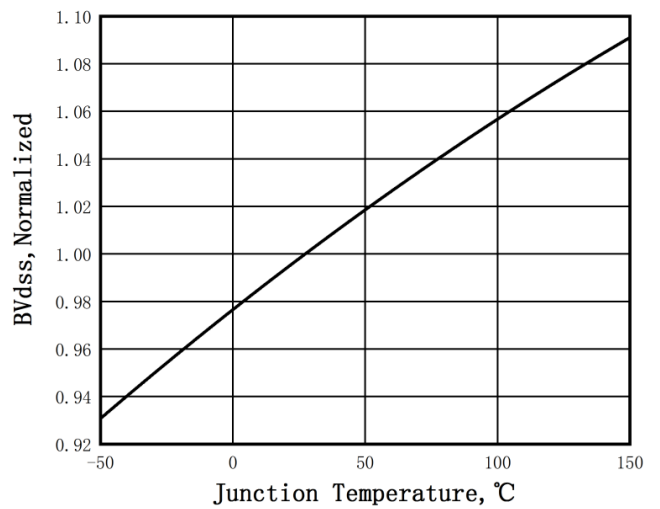
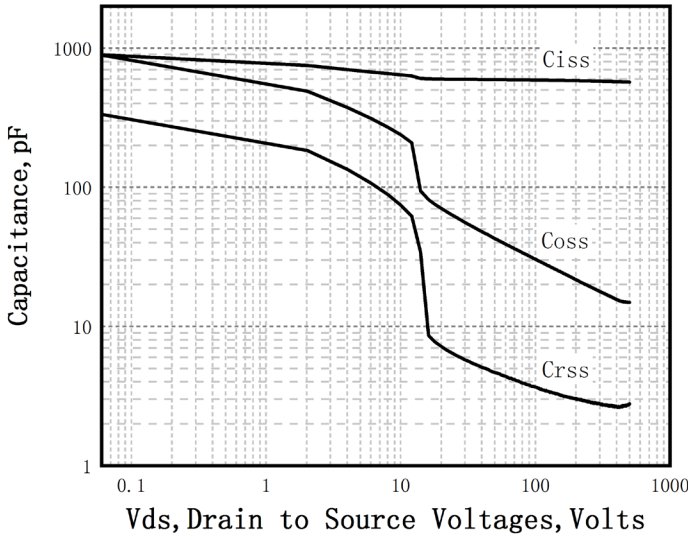
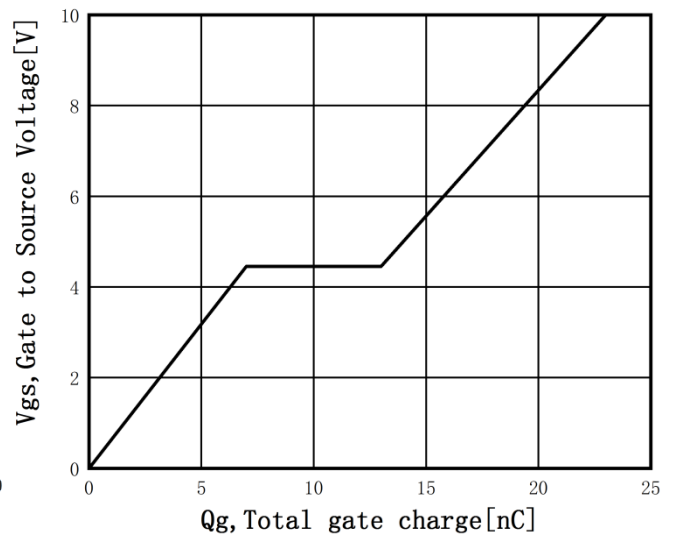


Figure 6. Normalized BV_{DSS} vs. Temperature



Vds, Drain to Source Voltages, Volts
Figure 7. Capacitance Characteristics



Qg, Total gate charge [nC]
Figure 8. Gate Charge Characteristics

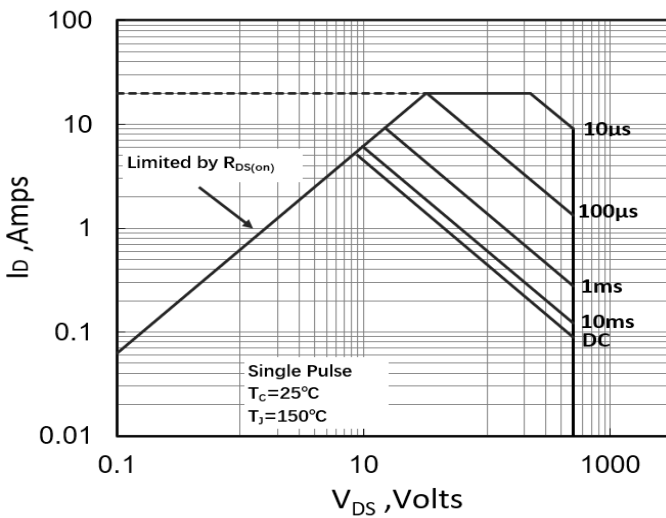


Figure 9. Maximum Safe Operating Area

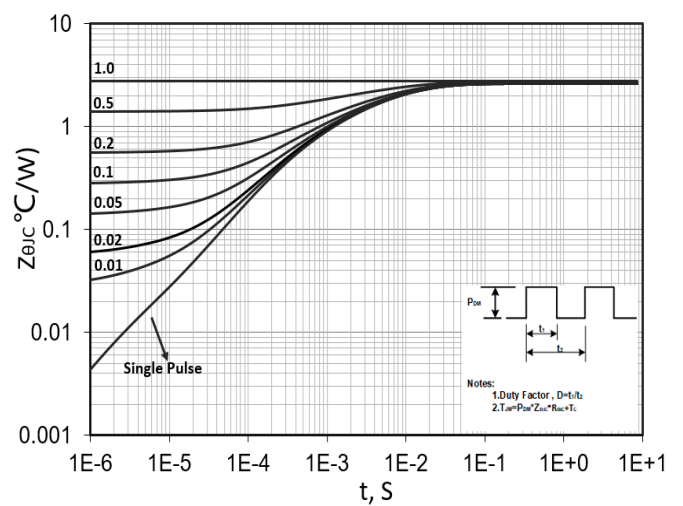
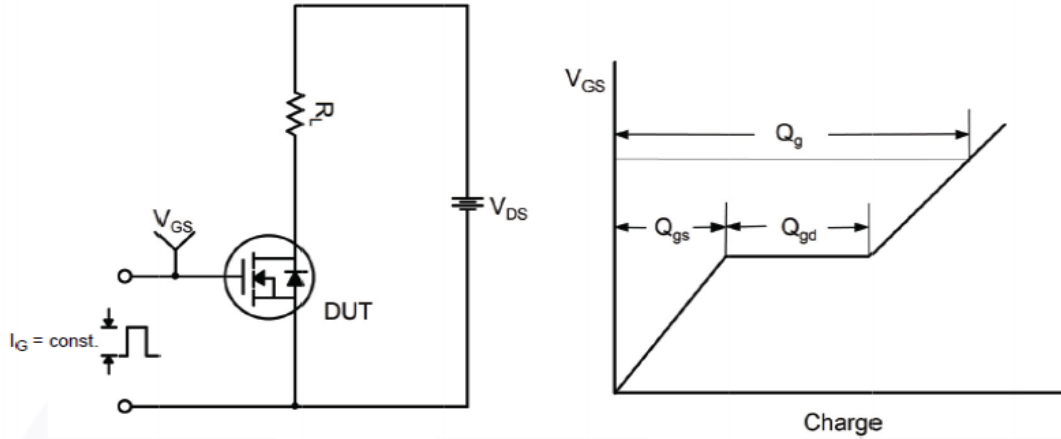
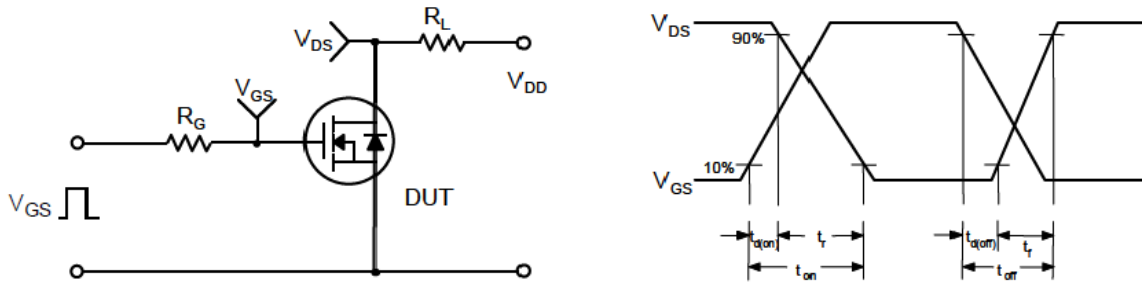


Figure 10. Transient Thermal Response Curve

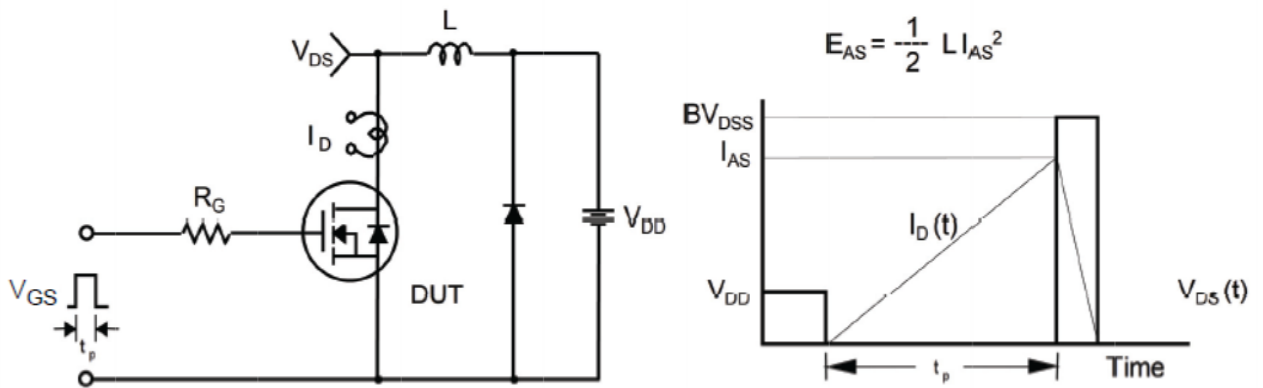
Gate Charge Test Circuit & Waveform



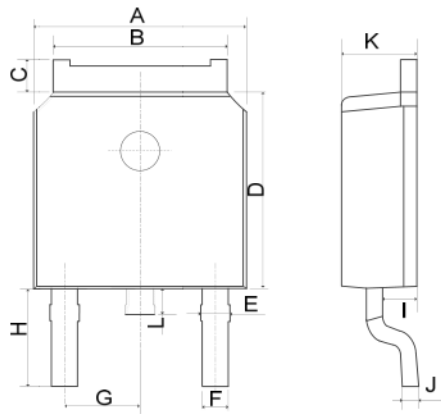
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions for TO-252



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	6.40	6.80
B	5.13	5.50
C	0.88	1.28
D	5.90	6.22
E	0.68	1.10
F	0.68	0.91
G	2.29REF	
H	2.90REF	
I	0.85	1.17
J	0.51REF	
K	2.10	2.50
L	0.40	1.00

Ordering Information

Part	Package	Marking	Packing method
WMO5N50D1B	TO-252	WMO5N50D1B	Tape and reel

Contact Information

No.1001, Shiwan(7) Road, Pudong District, Shanghai, P.R.China.201202

Tel: 86-21-50310888 Fax: 86-21-50757680 Email: market@way-on.com

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

For additional information, please contact your local Sales Representative.

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