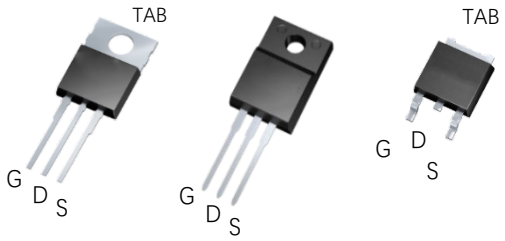
500V 9A 0.68Ω N-ch Power MOSFET

Description

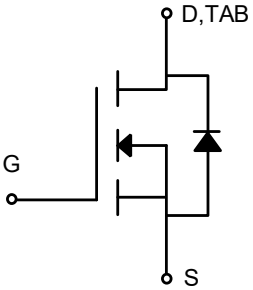
WMOS™ D1 is Wayon's 1st generation VDMOS family that is dramatic reduction in on-resistance and ultra-low gate charge for applications requiring high power density and high efficiency. And it is very robust and RoHS compliant.

TO-220 TO-220F TO-252



Features

- Typ.$R_{DS(on)}$=0.68Ω@V_{GS}=10V
- 100% avalanche tested
- Pb-free, Halogen free



Applications

- SMPS
- Charger
- DC-DC

Absolute Maximum Ratings (Tc=25℃)

Parameter	Symbol	WMK	WML	WMO	Unit
Drain-source voltage	V_{DSS}	500			V
Gate-source voltage	V_{GS}	±30			V
Continuous drain current	I_D	9			A
Pulsed drain current [1]	I_{DM}	36			A
Avalanche energy, single pulse [2]	E_{AS}	405			mJ
Power dissipation	P_D	150	45	104	W
Derate above 25°C		1.2	0.4	0.8	W/℃
Operating junction temperature	T_j	-55~150			℃
Storage temperature	T_{stg}	-55~150			℃
Continuous diode forward current	I_S	9			A
Diode pulse current	I_{Spulse}	36			A

Thermal Characteristic

Thermal resistance,junction-to-case	$R_{\theta JC}$	0.83	2.8	1.2	℃/W
Thermal resistance,junction-to-ambient	$R_{\theta JA}$	62.5	62.5	62	℃/W

Electrical Characteristics of MOSFET

				Min.	Typ.	Max.	
Drain-source break down voltage	BV_{DSS}	I_D=250uA, V_{GS}=0V	T_C=25℃	500	-	-	V
Gate threshold voltage	$V_{GS(th)}$	I_D=250uA, V_{DS}=V_{GS}	T_J=25℃	2.0	3.2	4.0	V
Drain-source leakage current	I_{DSS}	V_{DS}=500V, V_{GS}=0V	T_J=25℃	-	-	1	uA
		V_{DS}=400V, V_{GS}=0V	T_J=125℃	-	-	400	uA
Gate-source leakage current,forward	I_{GSSF}	V_{DS}=0V, V_{GS}=30V	T_J=25℃	-	-	100	nA
Gate-source leakage current,reverse	I_{GSSR}	V_{DS}=0V, V_{GS}=-30V	T_J=25℃	-	-	-100	nA
Drain-source on-state resistance [3]	$R_{DS(ON)}$	V_{GS}=10V, I_D=4.5A	T_J=25℃	-	0.68	0.8	Ω
Transconductance [3]	G_{fs}	V_{DS}=20V	T_J=25℃	-	10.6	-	S

Dynamic Characteristics of MOSFET (TC=25℃)

			Min.	Typ.	Max.	
Input capacitance	C_{iss}	f=1MHz, V_{DS}=25V, V_{GS}=0V	-	1135	-	pF
Output capacitance	C_{oss}		-	110	-	pF
Reverse transfer capacitance	C_{rss}		-	12	-	pF
Gate to source charge	Q_{gs}	V_{DD}=400V	-	26	-	nC
Gate to drain charge	Q_{gd}	I_D=9A	-	19	-	nC
Total gate charge	Q_g	V_{GS}= 0 to 10V	-	72	-	nC

Switching Characteristics of MOSFET (TC=25℃)

			Min.	Typ.	Max.	
Turn-on delay time	$t_{d\ on}$	V_{DS}=400V, I_D=9A, R_G=25Ω, V_{GS}=0 to 10V	-	18	-	ns
Rise time	t_r		-	36	-	ns
Turn-off delay time	$t_{d\ off}$		-	70	-	ns
Fall time	t_f		-	39	-	ns

Characteristics of Body Diode (TC=25℃)

			Min.	Typ.	Max.	
Forward voltage	V_{SD}	I_{SD}=9A, V_{GS}=0V	-	-	1.4	V
Reverse recovery time	t_{rr}	V_{DS}=400V, I_S=9A, V_{GS}=10V di/dt=100A/us	-	276	-	ns
Reverse recovery current	I_{rr}		-	21	-	A
Recovery charge	Q_{rr}		-	2.9	-	uC

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} =50V, V_{GS} =10V, L=10mH, I_{AS} =9A,Tc=25℃.
3. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.

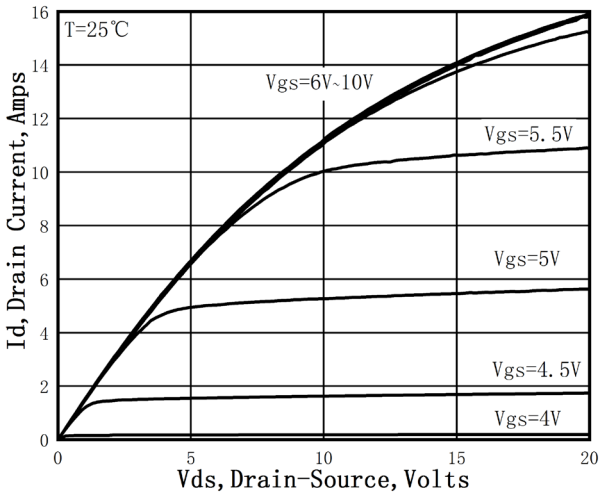


Figure 1.On-Region Characteristics

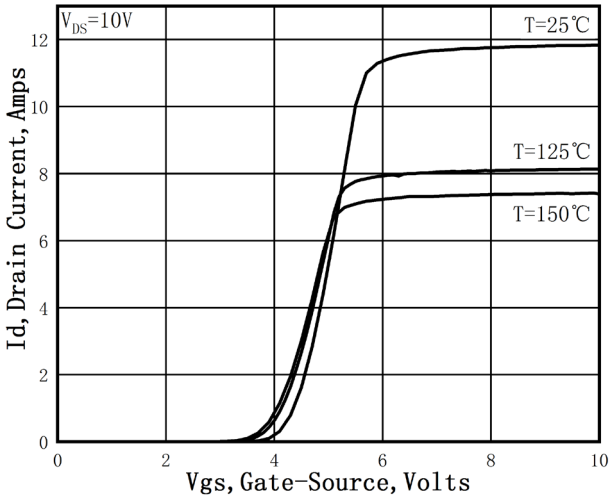


Figure 2. Transfer Characteristics

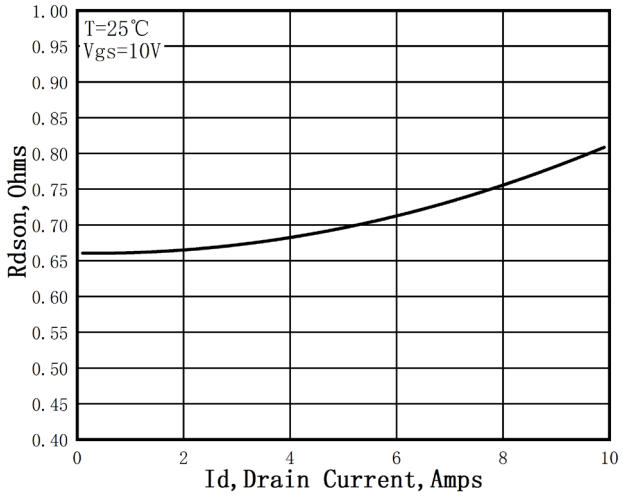


Figure 3.Static Drain-Source On Resistance

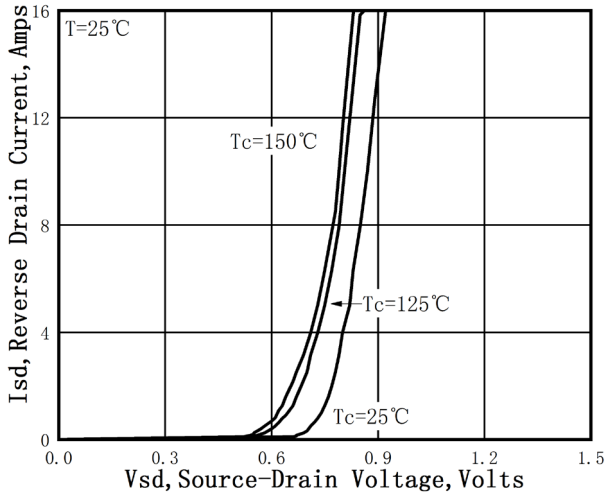


Figure 4. Typical Body Diode Transfer Characteristics

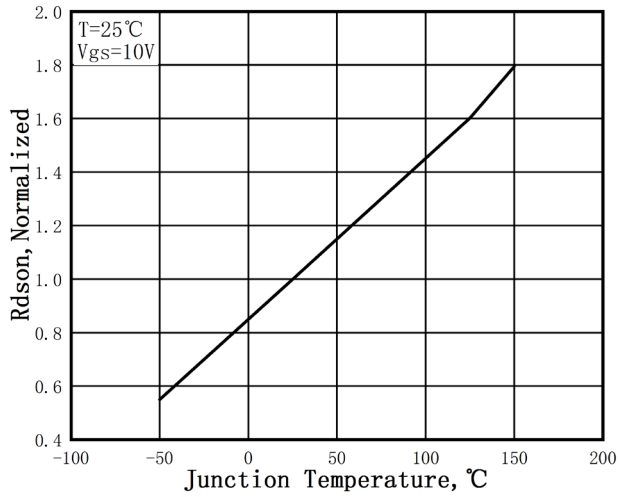


Figure 5. Normalized $R_{DS(on)}$ vs.Temperature

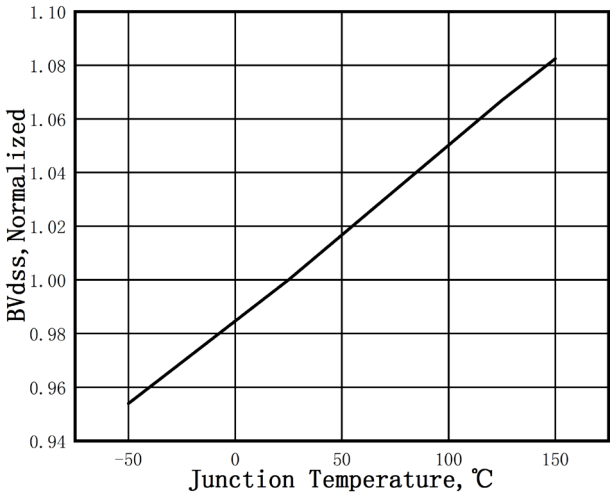


Figure 6. Normalized BV_{DSS} vs.Temperature

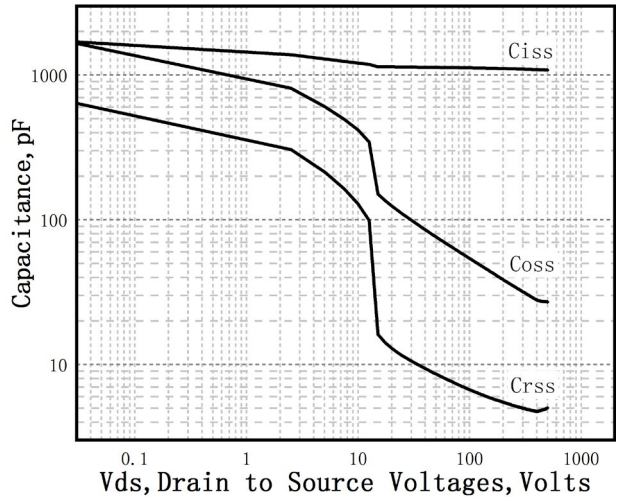


Figure 7. Capacitance Characteristics

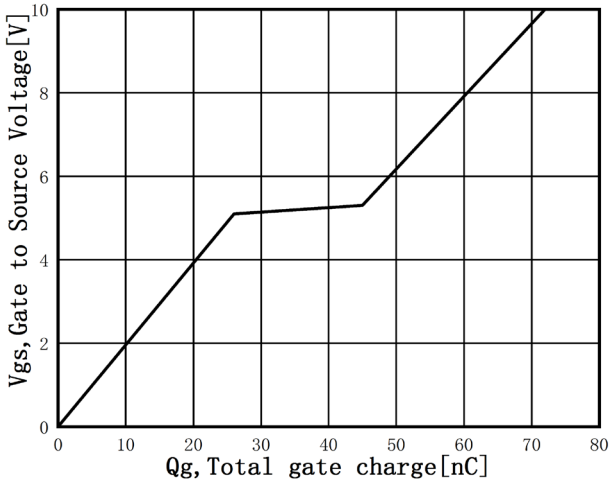


Figure 8. Gate Charge Characteristics

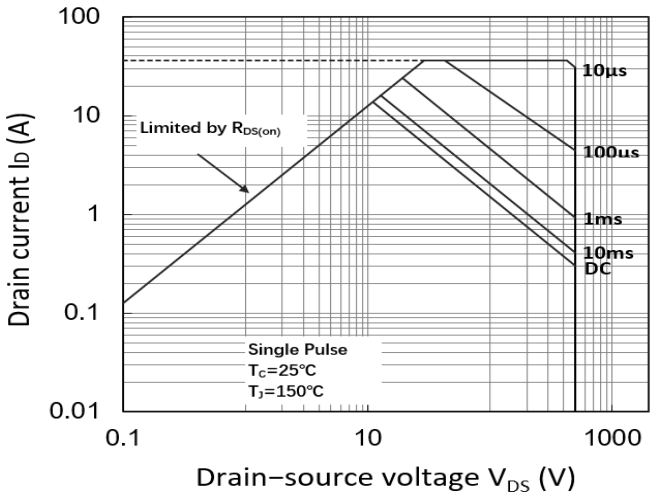


Figure 9. Maximum Safe Operating Area
(TO-220)

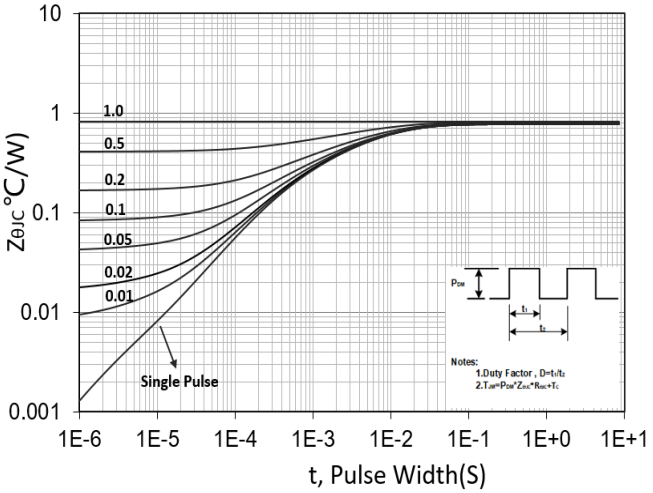


Figure 10. Transient Thermal Response Curve
(TO-220)

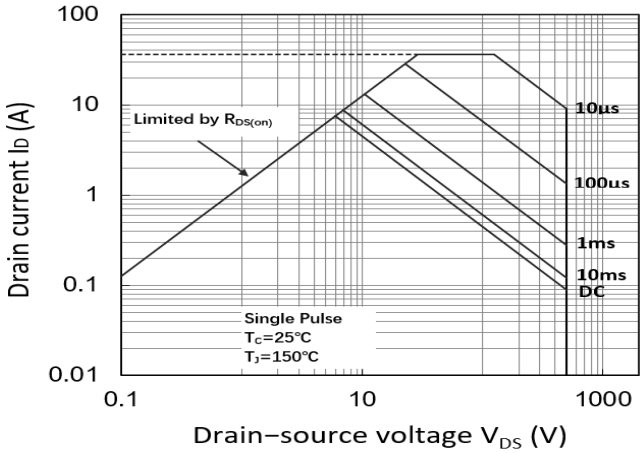


Figure11. Maximum Safe Operating Area
(TO-220F)

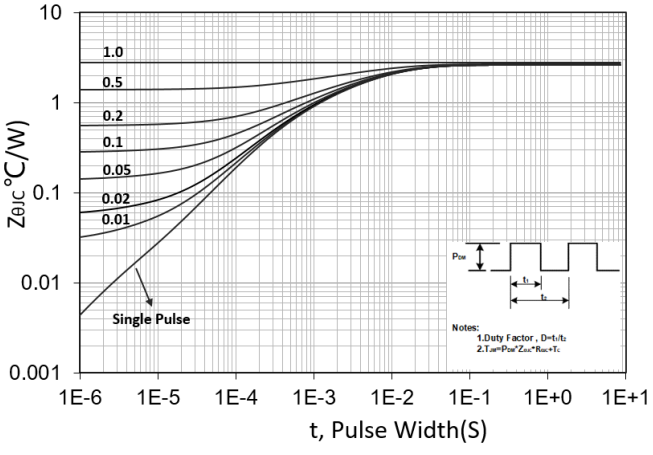


Figure 12. Transient Thermal Response Curve
(TO-220F)

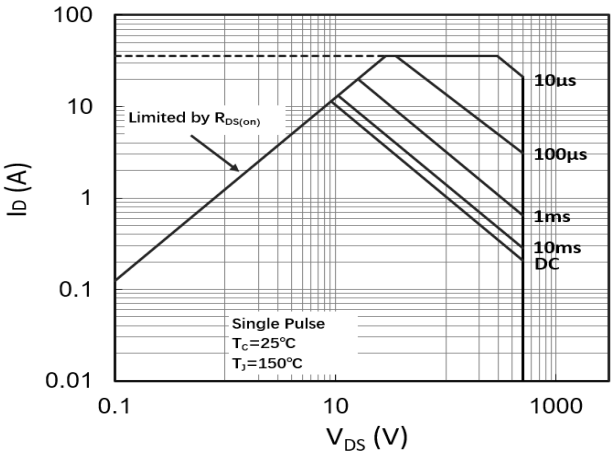


Figure13. Maximum Safe Operating Area
(TO-252)

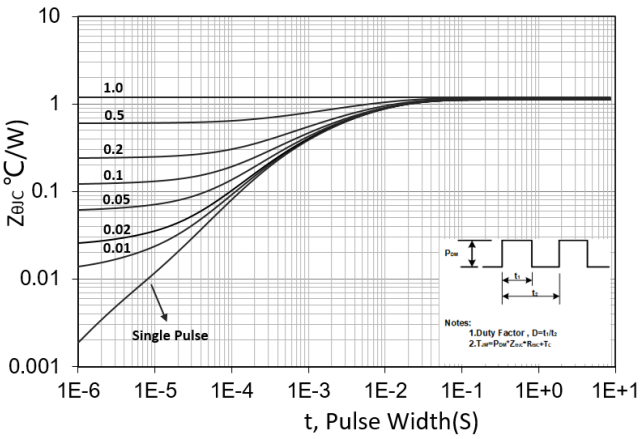
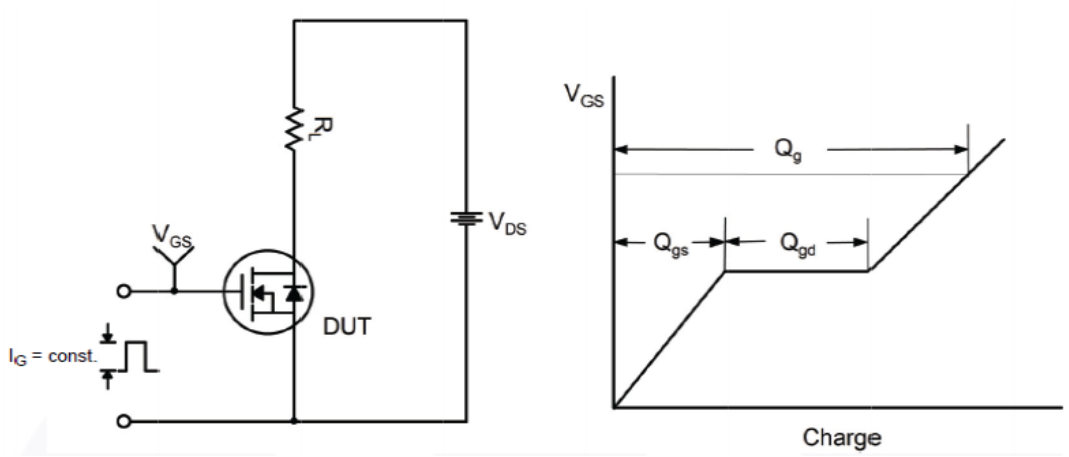
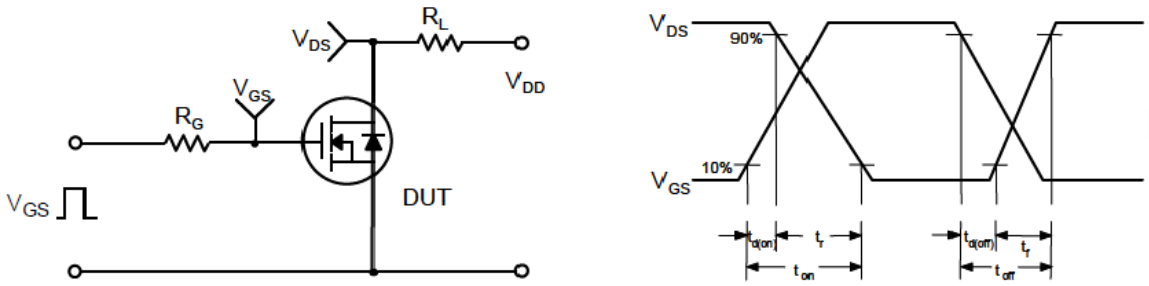


Figure 14. Transient Thermal Response Curve
(TO-252)

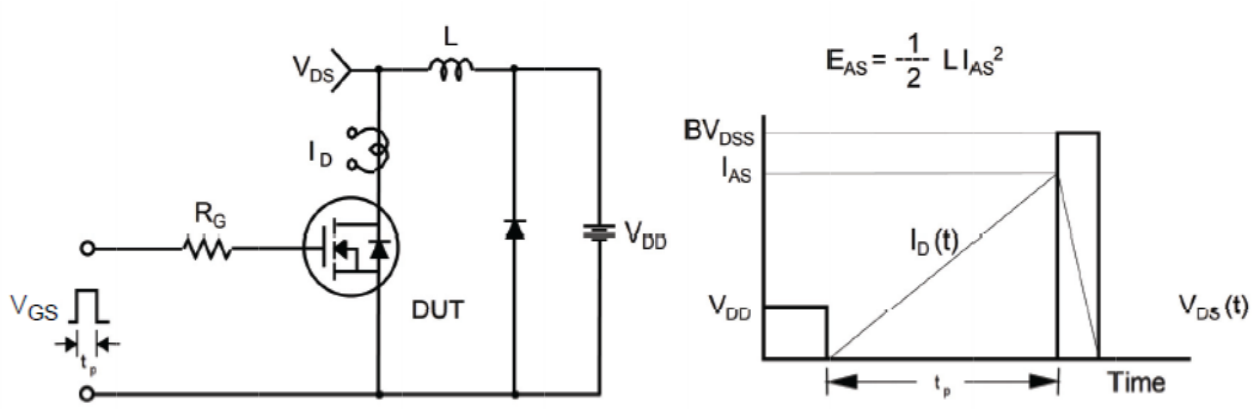
Gate Charge Test Circuit &Waveform



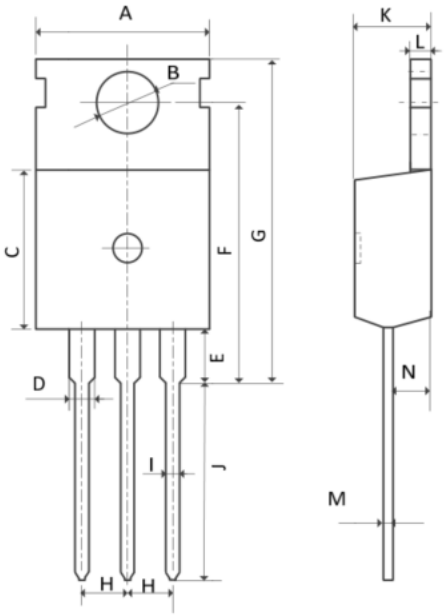
Switching Test Circuit &Waveforms



Unclamped Inductive Switching Test Circuit &Waveforms



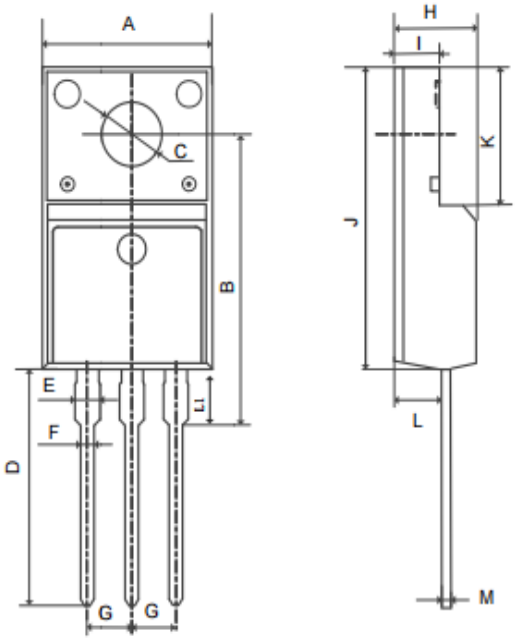
Mechanical Dimensions for TO-220



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	9.70	10.20
B	3.40	3.80
C	8.90	9.40
D	1.17	1.47
E	2.60	3.40
F	15.10	16.70
G	19.55MAX	
H	2.54REF	
I	0.70	0.95
J	9.35	11.00
K	4.30	4.77
L	1.20	1.45
M	0.40	0.65
N	2.20	2.60

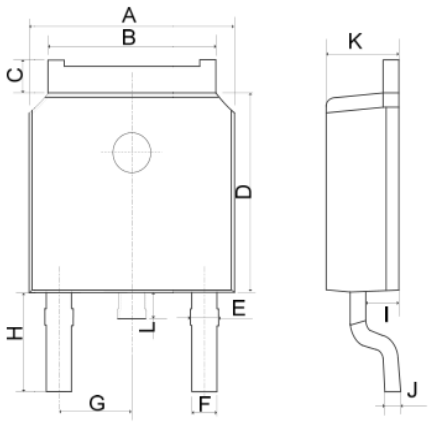
Mechanical Dimensions for TO-220F



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	9.96	10.36
B	15.10	16.10
C	3.03	3.38
D	12.64	13.28
E	1.18	1.58
F	0.70	0.95
G	2.54REF	
H	4.50	4.90
I	2.34	2.74
J	15.57	16.17
K	6.70REF	
L	2.56	2.96
M	0.40	0.65
L1	2.85	3.45

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
WMK9N50D1B	TO-220	WMK9N50D1B	Tube
WML9N50D1B	TO-220F	WML9N50D1B	Tube
WMO9N50D1B	TO-252	WMO9N50D1B	Tape and reel

Contact Information

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WAYON website: **http://www.way-on.com**
For additional information, please contact your local Sales Representative.

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