

800V 4A 3.5Ω 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.

Features

- Typ. $R_{DS(on)}=3.5\Omega@V_{GS}=10V$
- 100% avalanche tested
- Pb-free, Halogen free

Applications

- SMPS
- Charger
- DC-DC

TO-251-L9.4



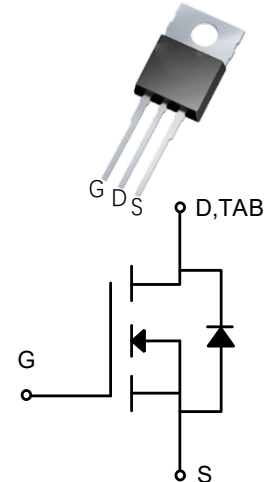
TO-251-L3.5



TO-252



TO-220



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

Parameter	Symbol	WMAA/WMH/WMO	WMK	Unit
Drain-source voltage	V_{DSS}	800		V
Gate-source voltage	V_{GS}	± 30		V
Continuous drain current	I_D	4		A
Pulsed drain current ¹	I_{DM}	16		A
Avalanche energy, single pulse ²	E_{AS}	24		mJ
Power dissipation	P_D	96	114	W
Derate above 25°C		0.8	0.9	W/°C
Operating junction temperature	T_j	-55~150		°C
Storage temperature	T_{stg}	-55~150		°C
Continuous diode forward current	I_S	4		A
Diode pulse current	I_{Spulse}	16		A

Thermal Characteristic

Thermal resistance, junction-to-case	$R_{\theta JC}$	1.3	1.1	°C/W
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	62.5	62.5	°C/W

Electrical Characteristics of MOSFET

				Min.	Typ.	Max.	
Drain-source break down voltage	BV_{DSS}	$I_D=250\mu A, V_{GS}=0V$	$T_C=25^\circ C$	800	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\mu A, V_{DS}=V_{GS}$	$T_J=25^\circ C$	2.0	3.1	4.0	V
Drain-source leakage current	I_{DSS}	$V_{DS}=800V, V_{GS}=0V$	$T_J=25^\circ C$	-	-	1	μA
		$V_{DS}=720V, V_{GS}=0V$	$T_J=125^\circ C$	-	-	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	$R_{DS(on)}$	$V_{GS}=10V, I_D=2A$	$T_J=25^\circ C$	-	3.5	4	Ω

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

				Min.	Typ.	Max.	
Input capacitance	C_{iss}	$f=1MHz, V_{DS}=25V, V_{GS}=0V$		-	497	-	pF
Output capacitance	C_{oss}			-	57	-	pF
Reverse transfer capacitance	C_{rss}			-	6	-	pF
Gate to source charge	Q_{gs}	$V_{DD}=400V$		-	3	-	nC
Gate to drain charge	Q_{gd}	$I_D=4A$		-	5	-	nC
Total gate charge	Q_g	$V_{GS}=0$ to 10V		-	13	-	nC

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

				Min.	Typ.	Max.	
Turn-on delay time	$t_{d on}$	$V_{DS}=400V, I_D=4A,$ $R_G=10\Omega, V_{GS}=0$ to 10V		-	10	-	ns
Rise time	t_r			-	25	-	ns
Turn-off delay time	$t_{d off}$			-	37	-	ns
Fall time	t_f			-	27	-	ns

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

				Min.	Typ.	Max.	
Forward voltage	V_{SD}	$I_{SD}=4A, V_{GS}=0V$		-	-	1.4	V
Reverse recovery time	t_{rr}	$I_S=4A, V_{GS}=0V$ $di/dt=100A/\mu s$		-	206	-	ns
Reverse recovery current	I_{rr}			-	5.6	-	A
Recovery charge	Q_{rr}			-	0.6	-	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 $V_{DD}=50V, V_{GS}=10V, L=10mH, I_{AS}=2.2A, T_C=25^\circ C$.
3. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

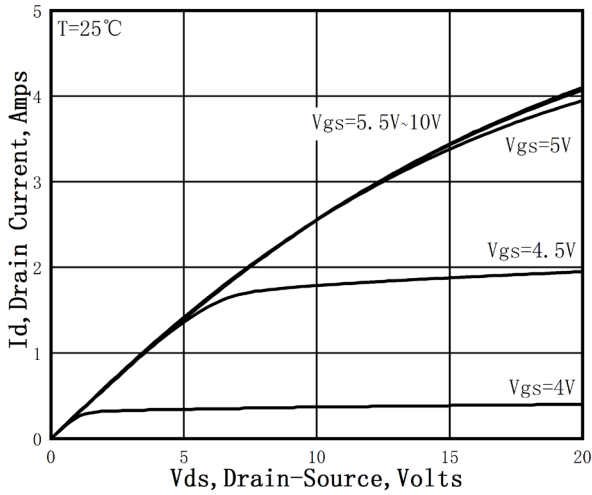


Figure 1. On-Region Characteristics

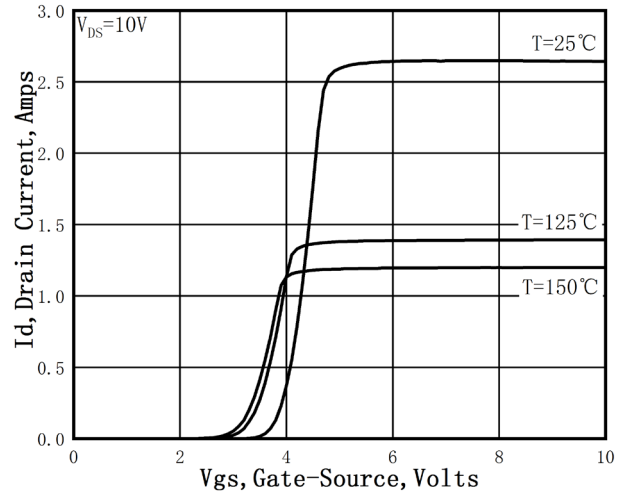


Figure 2. Transfer Characteristics

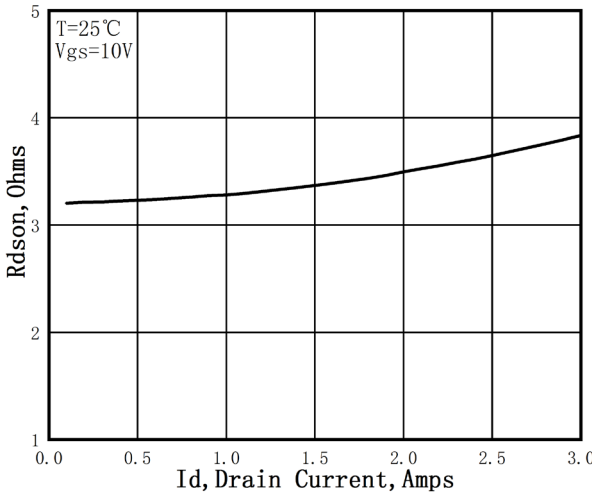


Figure 3. Static Drain-Source On Resistance

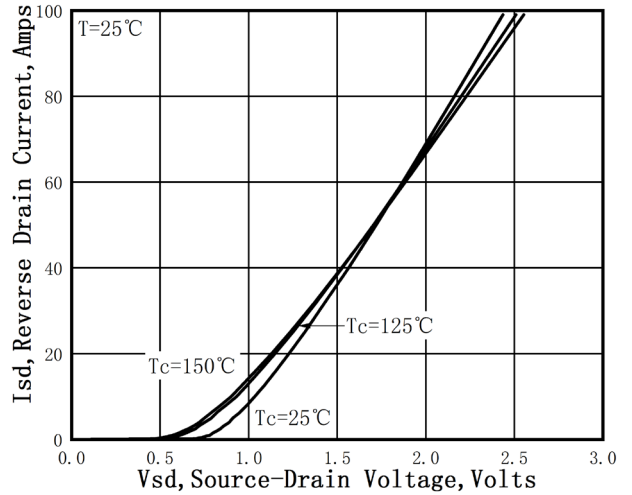


Figure 4. Typical Body Diode Transfer Characteristics

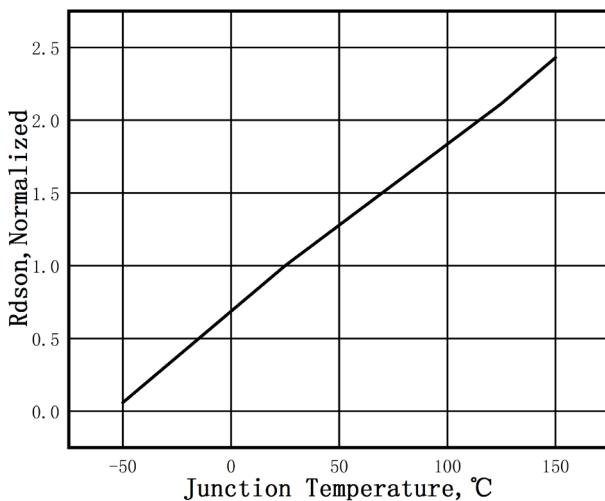


Figure 5. Normalized $R_{DS(on)}$ vs. Temperature

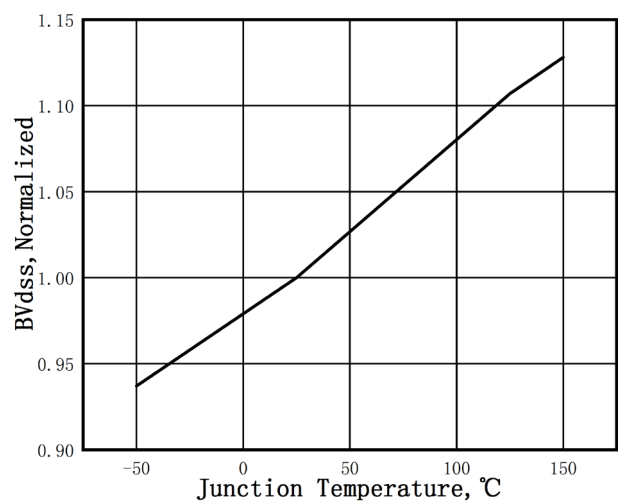


Figure 6. Normalized BV_{DSS} vs. Temperature

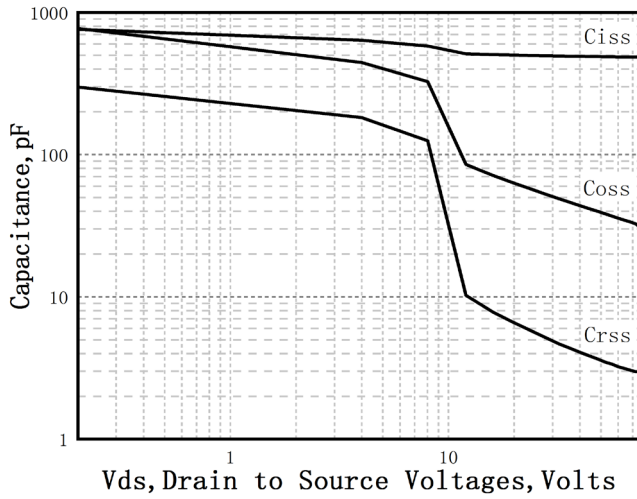


Figure 7. Capacitance Characteristics

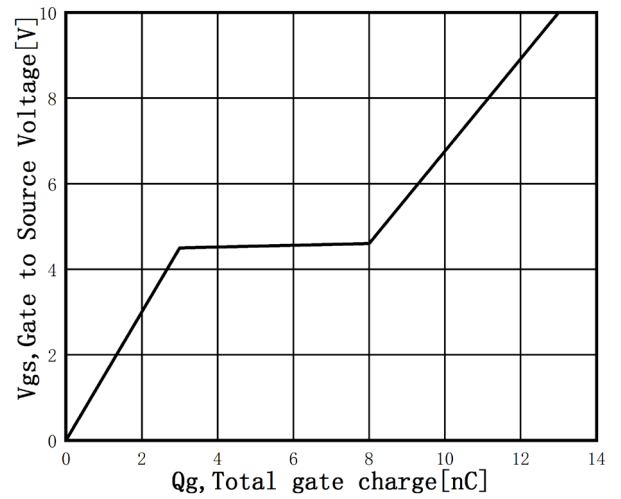


Figure 8. Gate Charge Characteristics

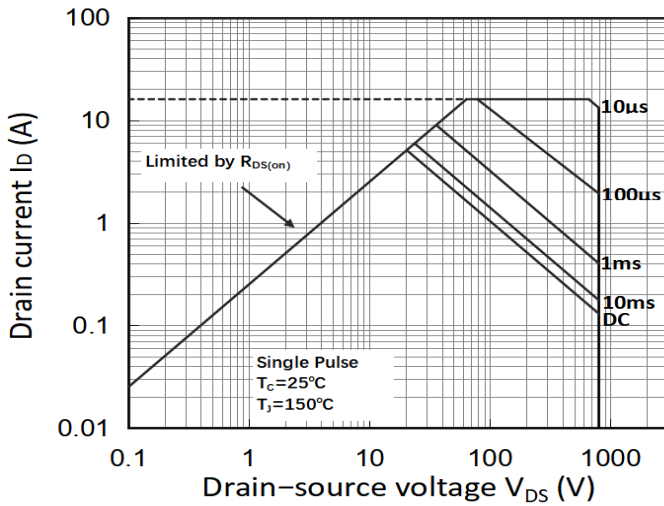


Figure 9. Maximum Safe Operating Area (TO-251/TO-252)

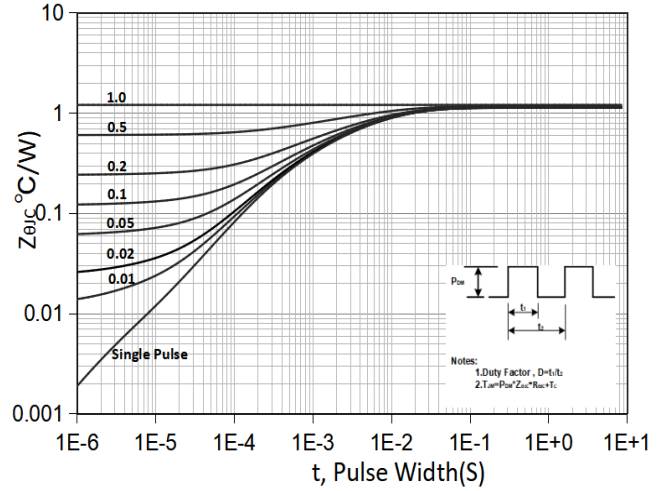


Figure 10. Transient Thermal Response Curve (TO-251/TO-252)

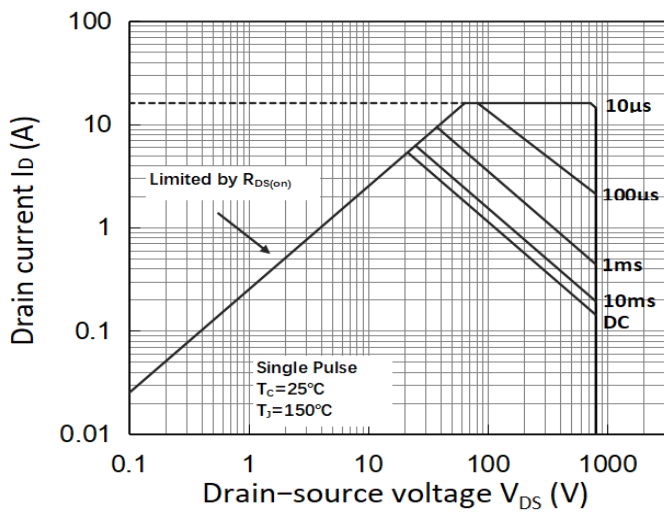


Figure 11. Maximum Safe Operating Area (TO-220)

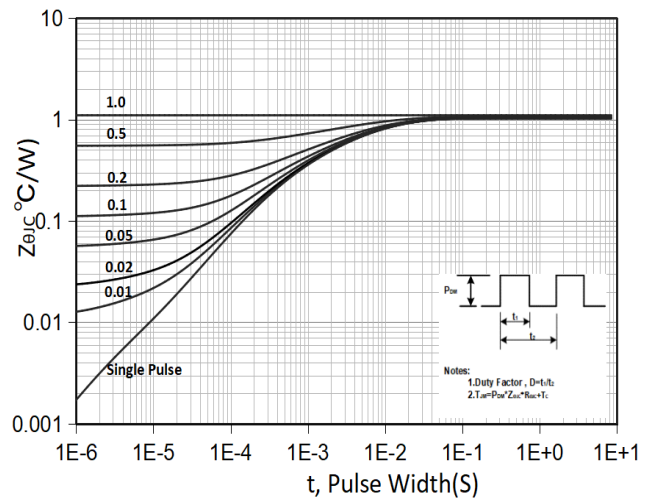
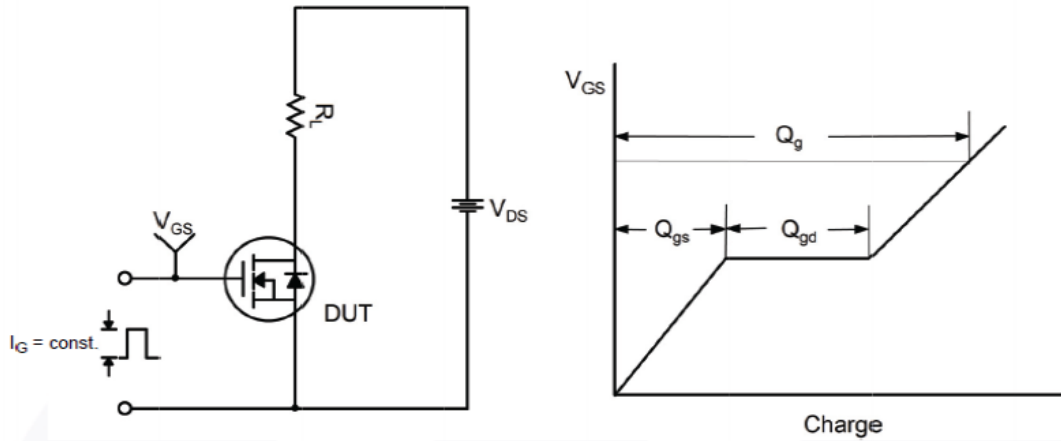
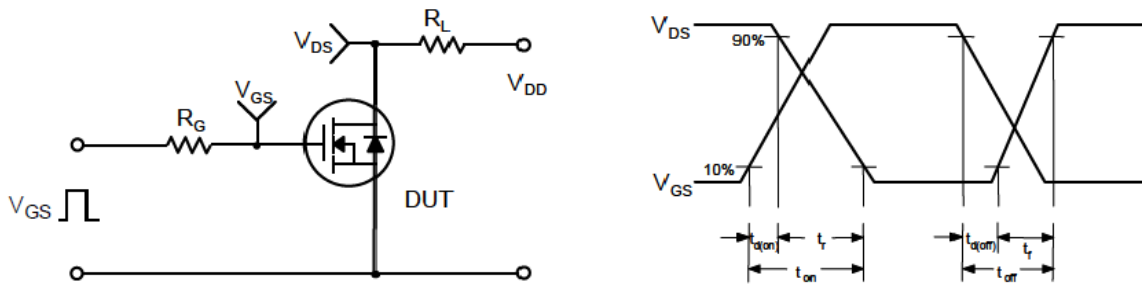


Figure 12. Transient Thermal Response Curve (TO-220)

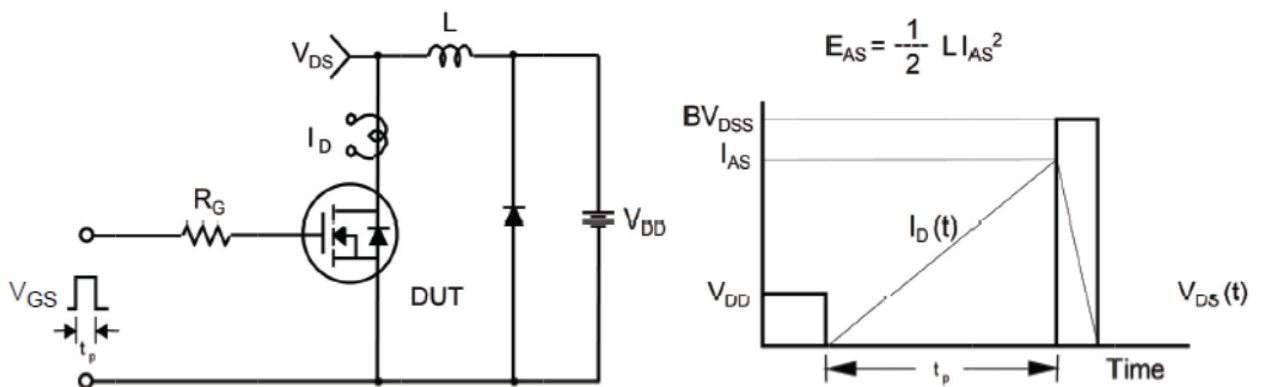
Gate Charge Test Circuit & Waveform



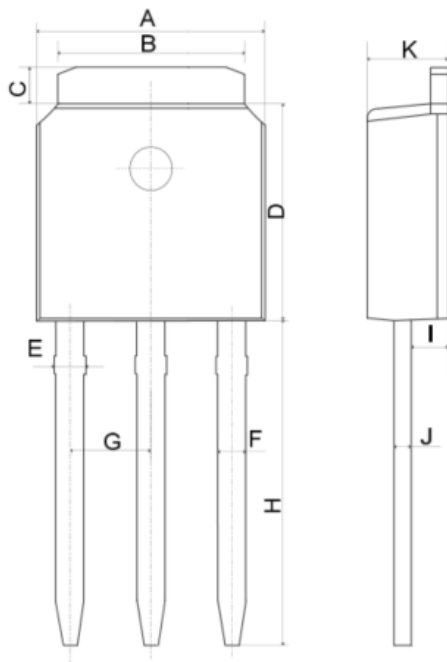
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



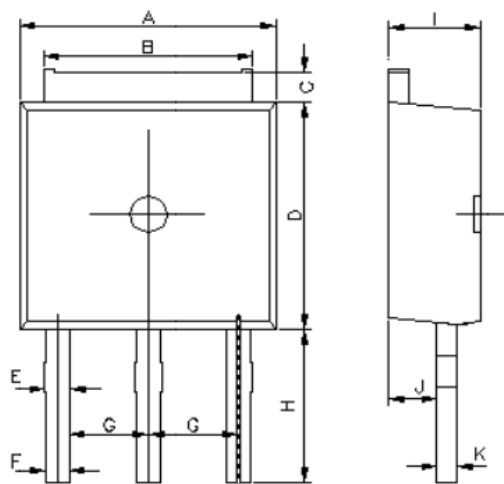
Mechanical Dimensions for TO-251-L9.4



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	6.40	6.80
B	5.13	5.46
C	0.88	1.28
D	5.90	6.22
E	0.68	1.10
F	0.68	0.91
G	2.29REF	
H	9.00	9.65
I	0.90	1.17
J	0.40	0.61
K	2.10	2.50

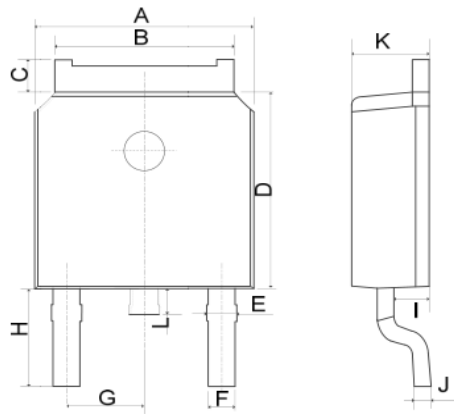
Mechanical Dimensions for TO-251-L3.5



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	6.40	6.80
B	5.15	5.48
C	0.71	1.02
D	5.95	6.35
E	0.70	1.00
F	0.70	0.90
G	2.13	2.44
H	3.20	3.80
I	2.10	2.50
J	0.85	1.15
K	0.40	0.61

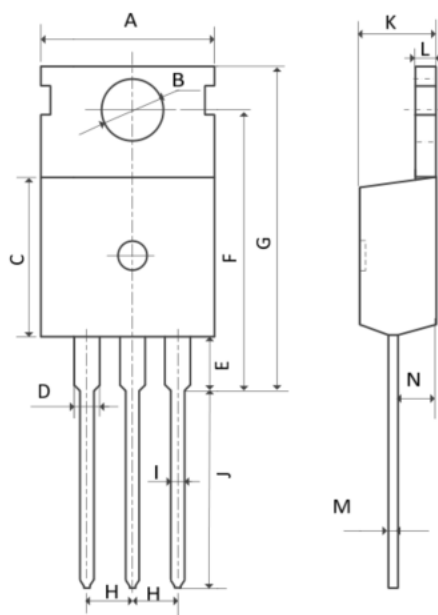
Mechanical Dimensions for TO-252



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

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

Ordering Information

Part	Package	Marking	Packing method
WMAA4N80D1B	TO-251-L9.4	WMAA4N80D1B	Tube
WMH4N80D1B	TO-251-L3.5	WMH4N80D1B	Tube
WMO4N80D1B	TO-252	WMO4N80D1B	Tape and reel
WMK4N80D1B	TO-220	WMK4N80D1B	Tube

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