

650V 4A 2.2Ω N-ch Power MOSFET

Description

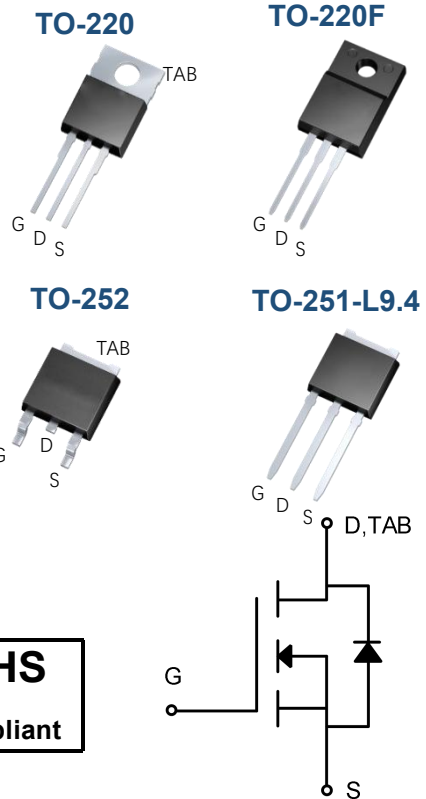
WMOS™ D1 is Wayon's 1st generation VDMOS family that is dramatic reduction in on-resistance and ultra-low gate charge for applications requiring high power density and high efficiency. And it is very robust and RoHS compliant.

Features

- $V_{DS}=700V@T_{jmax}$
- $Typ.R_{DS(on)}=2.2\Omega@V_{GS}=10V$
- 100% avalanche tested
- Pb-free, Halogen free

Applications

- SMPS
- Charger
- DC-DC



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

Parameter	Symbol	WMK	WML	WMO/WMAA	Unit
Drain-source voltage	V_{DSS}		650		V
Gate-source voltage	V_{GS}		± 30		V
Continuous drain current	I_D		4		A
Pulsed drain current	I_{DM}		16		A
Avalanche energy, single pulse	E_{AS}		120		mJ
Power dissipation	P_D	112	30	77	W
Derate above 25°C		0.91	0.24	0.62	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	$R_{\theta JC}$	1.1	4.17	1.62	°C/W
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	62.5	62.5	62.0	°C/W

Electrical Characteristics of MOSFET

				Min.	Typ.	Max.	
Drain-source break down voltage	BV_{DSS}	$I_D=250\mu A, V_{GS}=0V$	$T_C=25^\circ C$	650	-	-	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}	$V_{DS}=650V, V_{GS}=0V$	$T_J=25^\circ C$	-	-	1	μA
		$V_{DS}=520V, V_{GS}=0V$	$T_J=125^\circ C$	-	-	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	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2A$	$T_J=25^\circ C$	-	2.2	2.6	Ω
Transconductance	G_{fs}	$V_{DS}=20V$	$T_J=25^\circ C$	-	5.1	-	S

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}			-	55.7	-	pF
Reverse transfer capacitance	C_{rss}			-	6.6	-	pF
Gate to source charge	Q_{gs}	$V_{DD}=320V$		-	3.3	-	nC
Gate to drain charge	Q_{gd}	$I_D=4A$		-	5.9	-	nC
Total gate charge	Q_g	$V_{GS}=0$ to 10V		-	14.5	-	nC

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

				Min.	Typ.	Max.	
Turn-on delay time	$t_{d on}$	$V_{DS}=320V, I_D=4A, R_G=25\Omega,$ $V_{GS}=0$ to 10V		-	11.6	-	ns
Rise time	t_r			-	14.4	-	ns
Turn-off delay time	$t_{d off}$			-	48	-	ns
Fall time	t_f			-	23	-	ns

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

				Min.	Typ.	Max.	
Forward voltage	V_{SD}	$I_{SD}=7A, V_{GS}=0V$		-	0.85	1.4	V
Reverse recovery time	t_{rr}	$V_{DS}=320V, I_S=4A$ $di/dt=100A/\mu s$		-	450	-	ns
Reverse recovery current	I_{rr}			-	8.3	-	A
Recovery charge	Q_{rr}			-	1.9	-	μC

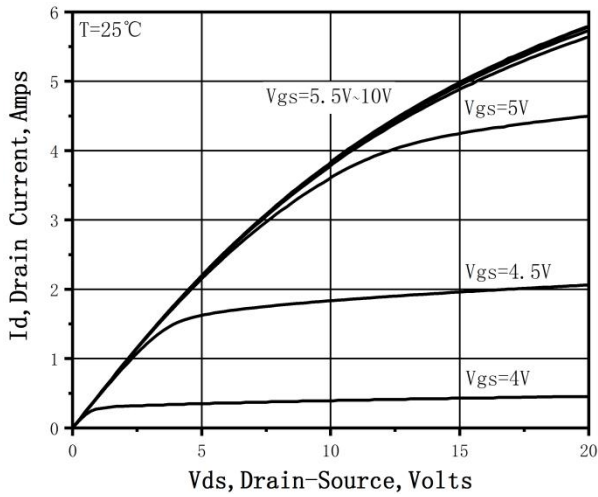


Figure 1. On-Region Characteristics

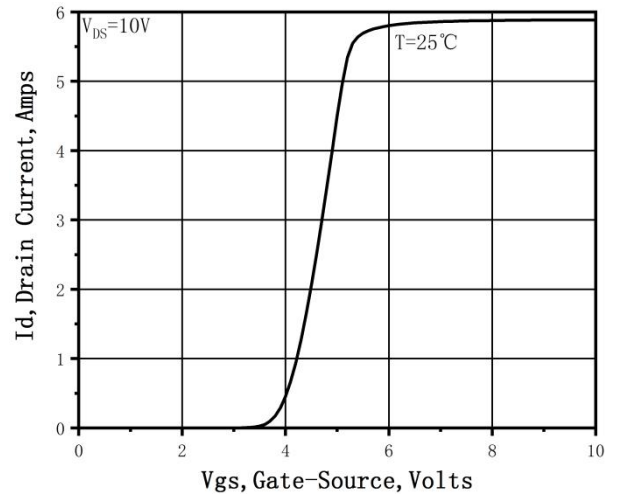


Figure 2. Transfer Characteristics

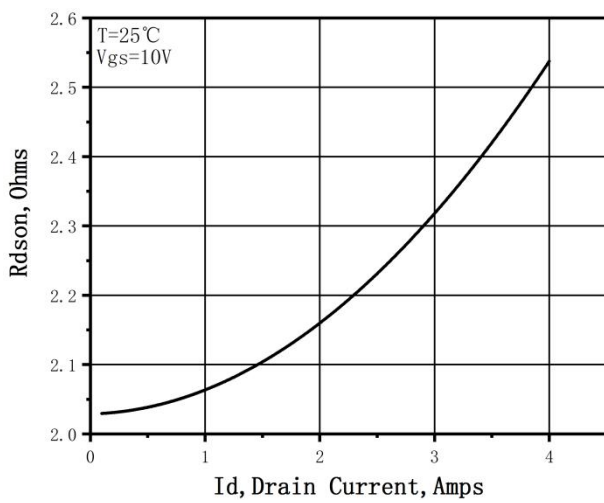


Figure 3. Static Drain-Source On Resistance

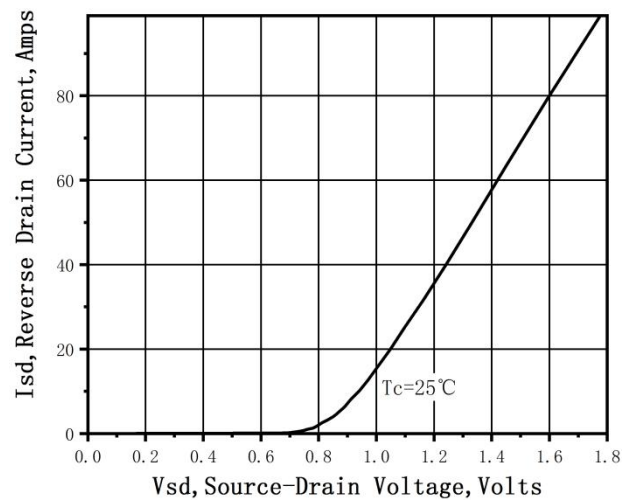


Figure 4. Typical Body Diode Transfer Characteristics

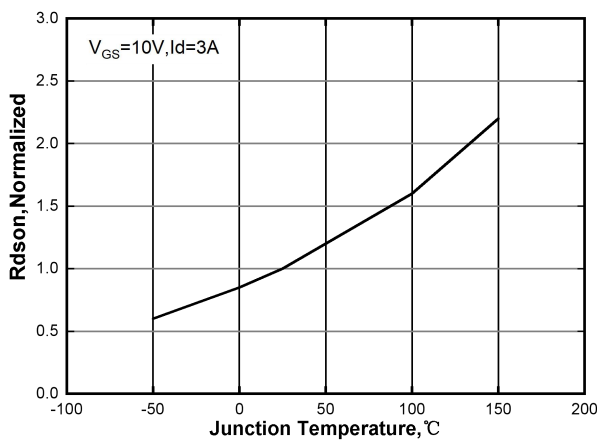


Figure 5. Normalized $R_{DS(on)}$ vs. Temperature

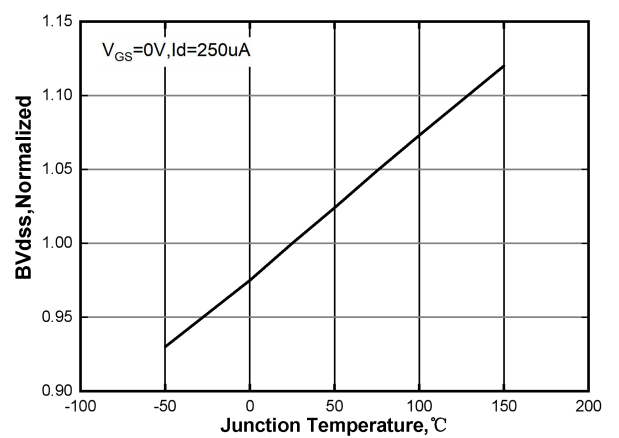


Figure 6. Normalized BV_{DSS} vs. Temperature

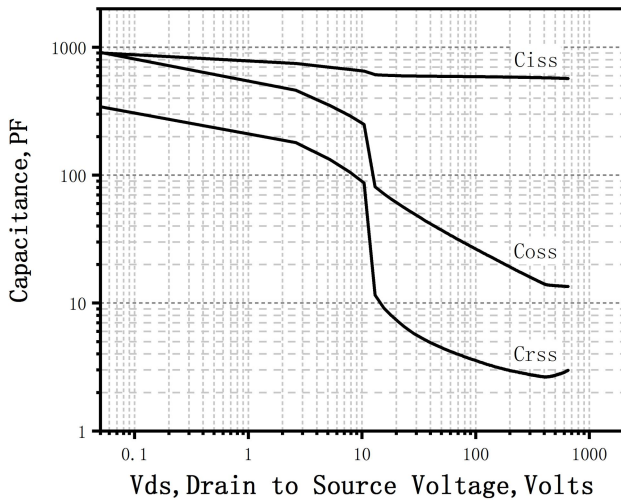


Figure 7. Capacitance Characteristics

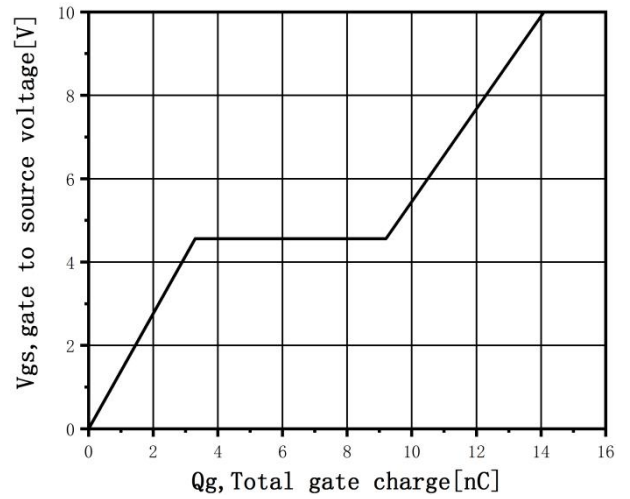


Figure 8. Gate Charge Characteristics

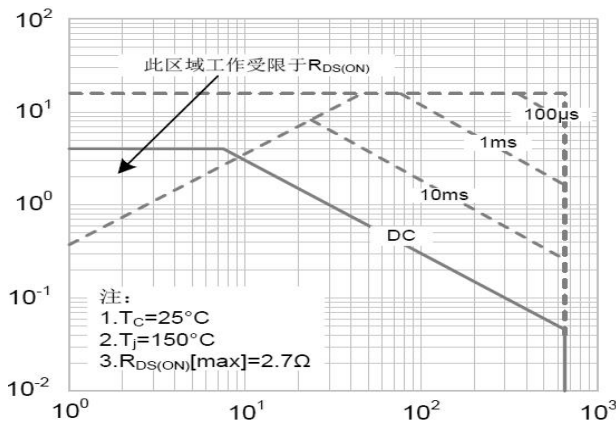


Figure 9. Maximum Safe Operating Area (TO-220F)

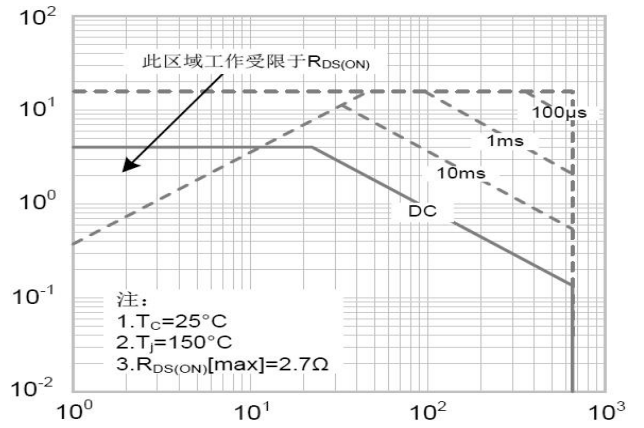


Figure 10. Maximum Safe Operating Area (TO-220)

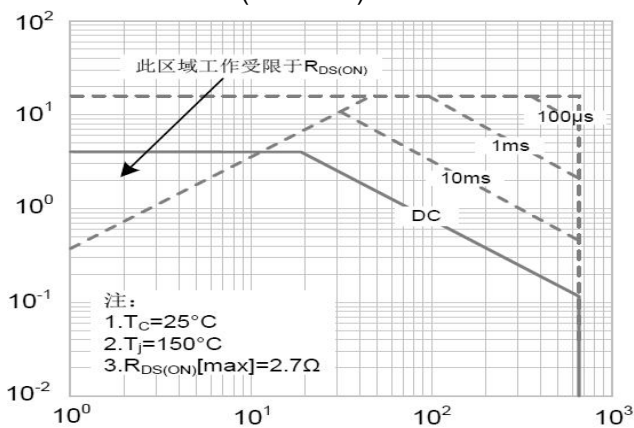
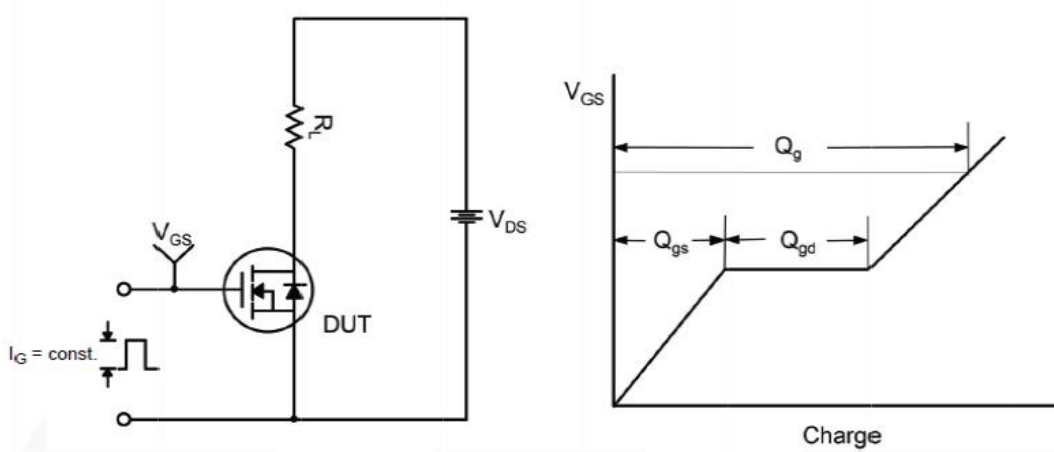
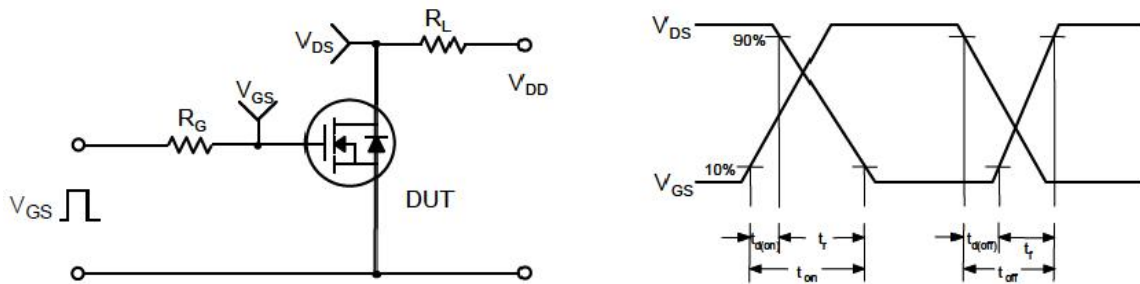


Figure 11. Maximum Safe Operating Area (TO-252/TO-251)

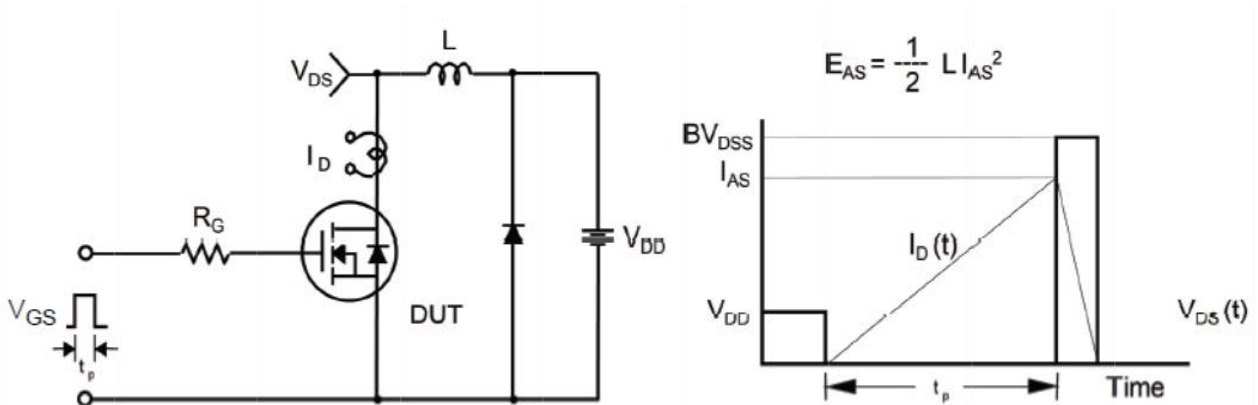
Gate Charge Test Circuit & Waveform



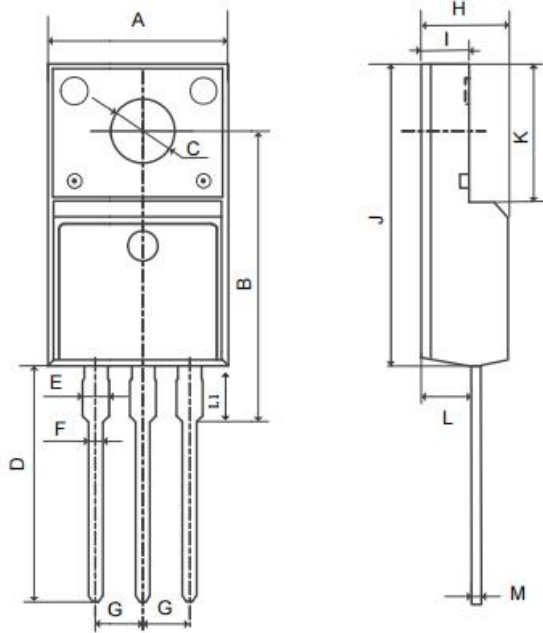
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



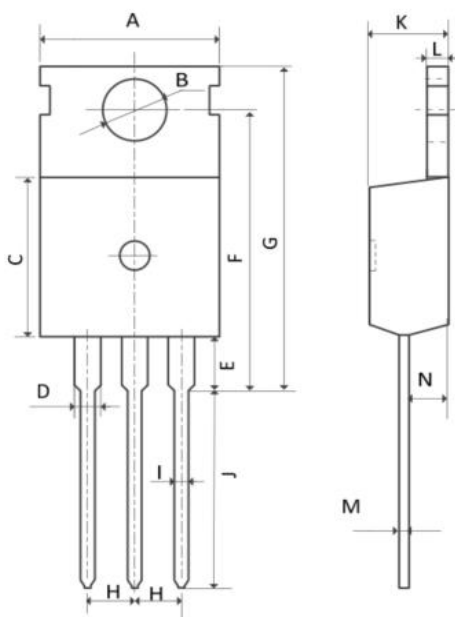
Mechanical Dimensions for TO-220F



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

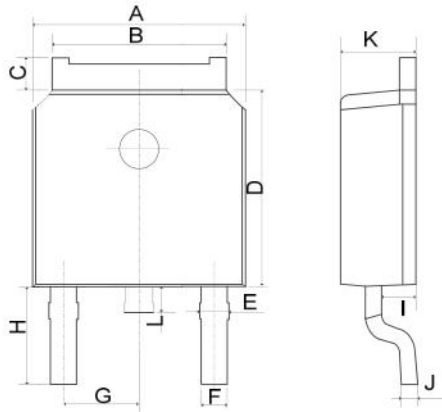
Mechanical Dimensions for TO-220



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

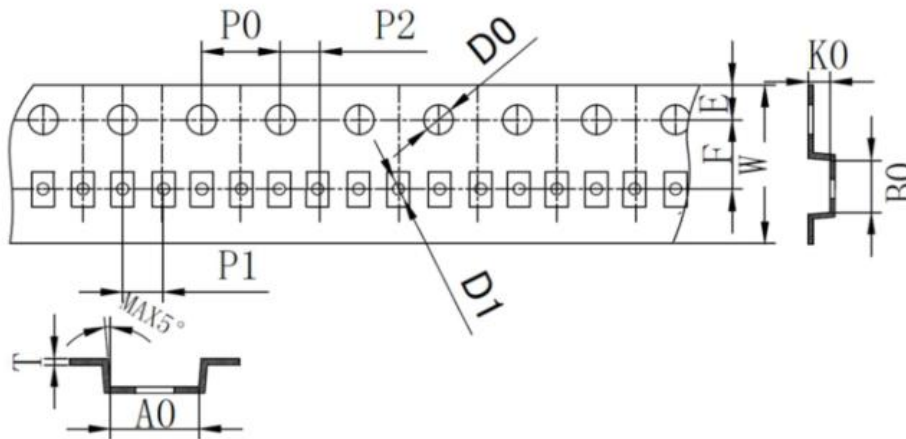
Mechanical Dimensions for TO-252



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

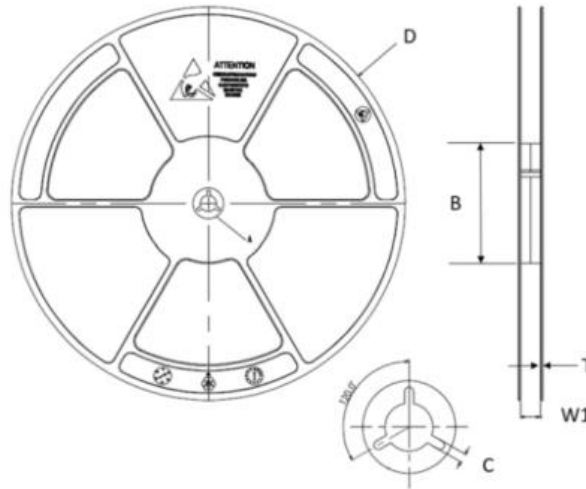
Packaging mechanical data(Tape for TO-252)



单位: mm

A0	B0	K0	D0	D1	P0
6.80~7.00	10.4~10.85	2.55~2.95	1.45~1.65	1.40~1.60	3.90~4.10
P1	P2	W	T	E	F
7.90~8.10	1.90~2.10	15.70~16.30	0.25~0.35	1.65~1.85	7.40~7.60

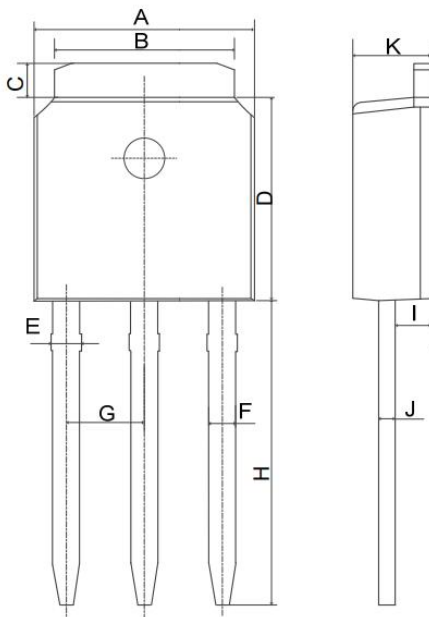
Packaging mechanical data(Reel for TO-252)



单位: mm

D (卷盘直径)	W1 (卷盘宽度)	T (厚度)	B (内圈直径)	C 卡槽宽度
328~332	16.4~18.4	1.5~3.1	98~102	1.8~3.6

Mechanical Dimensions for TO-251-L9.4



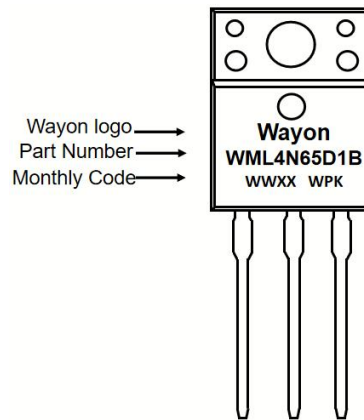
COMMON DIMENSIONS

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

Ordering Information

Part	Package	Marking	Packing method
WML4N65D1B	TO-220F	WML4N65D1B	Tube
WMK4N65D1B	TO-220	WMK4N65D1B	Tube
WMO4N65D1B	TO-252	WMO4N65D1B	Tape and reel
WMAA4N65D1B	TO-251	WMAA4N65D1B	Tube

Marking Information



Contact Information

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