

1200V 12A 1.25Ω N-ch Power MOSFET

Description

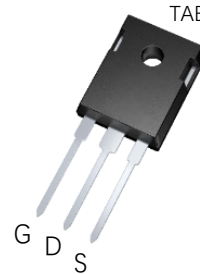
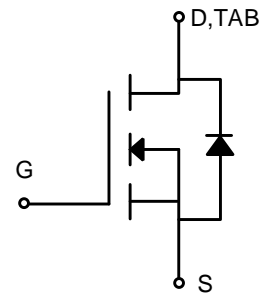
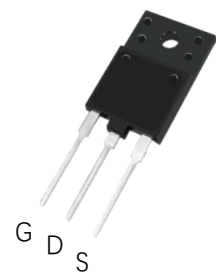
WMOS™ D1 is Wayon's 1st generation VDMOS family that is dramatic reduction in on-resistance and ultra-low gate charge for applications requiring high power density and high efficiency. And it is very robust and RoHS compliant.

Features

- Typ. $R_{DS(on)}=1.25\Omega@V_{GS}=10V$
- 100% avalanche tested
- Pb-free, Halogen free

Applications

- SMPS
- Charger
- DC-DC


TO-247

TO-3PF


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

Parameter	Symbol	WMJ12N120D1	WMX12N120D1	Unit
Drain-source voltage	V_{DS}	1200		V
Gate-source voltage	V_{GS}	± 30		V
Continuous drain current	I_D	12		A
Pulsed drain current	I_{DM}	48		A
Avalanche energy, single pulse	E_{AS}	700		mJ
Power dissipation	P_D	278	90.6	W
Derate above 25°C		2.22	0.7	W/°C
Operating junction temperature	T_j	-55~150		°C
Storage temperature	T_{stg}	-55~150		°C
Continuous diode forward current	I_S	12		A
Diode pulse current	I_{Spulse}	48		A

Thermal Characteristic

Thermal resistance, junction-to-case	$R_{\theta JC}$	0.45	1.38	°C/W
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	50	50	°C/W

Electrical Characteristics of MOSFET

				Min.	Typ.	Max.	
Drain-source break down voltage	BV_{DSS}	$I_D=250\mu A, V_{GS}=0V$	$T_C=25^\circ C$	1200	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\mu A, V_{DS}=V_{GS}$	$T_J=25^\circ C$	2.5	3.5	4	V
Drain-source leakage current	I_{DSS}	$V_{DS}=1200V, V_{GS}=0V$	$T_J=25^\circ C$	-	-	1	μA
		$V_{DS}=960V, V_{GS}=0V$	$T_J=125^\circ C$	-	-	400	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	$R_{DS(ON)}$	$V_{GS}=10V, I_D=6A$	$T_J=25^\circ C$	-	1.25	1.4	Ω
Transconductance	G_{fs}	$V_{DS}=15V, I_D=6A$	$T_J=25^\circ C$	-	11.6	-	S

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

				Min.	Typ.	Max.	
Input capacitance	C_{iss}	$f=1MHz, V_{DS}=25V, V_{GS}=0V$		-	3624	-	pF
Output capacitance	C_{oss}			-	243	-	pF
Reverse transfer capacitance	C_{rss}			-	28.7	-	pF
Gate to source charge	Q_{gs}	$V_{DD}=600V$		-	24.7	-	nC
Gate to drain charge	Q_{gd}	$I_D=6A$		-	32.8	-	nC
Total gate charge	Q_g	$V_{GS}=0$ to 10V		-	94	-	nC

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

				Min.	Typ.	Max.	
Turn-on delay time	$t_{d on}$	$V_{DS}=600V, I_D=6A,$ $R_G=4.7\Omega, V_{GS}=15V$		-	66.2	-	ns
Rise time	t_r			-	58	-	ns
Turn-off delay time	$t_{d off}$			-	286	-	ns
Fall time	t_f			-	62	-	ns

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

				Min.	Typ.	Max.	
Forward voltage	V_{SD}	$I_{SD}=12A, V_{GS}=0V$		-	-	1.5	V
Reverse recovery time	t_{rr}	$I_S=12A, V_{GS}=0V$ $di/dt=100A/\mu s$		-	1.9	-	μs
Reverse recovery current	I_{rr}			-	26.3	-	A
Recovery charge	Q_{rr}			-	25	-	μC

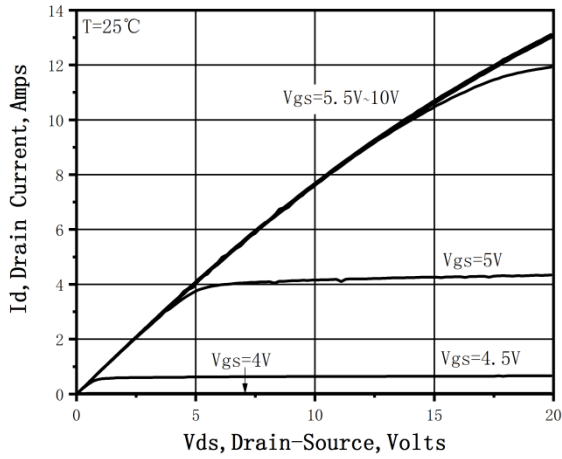


Figure 1. On-Region Characteristics

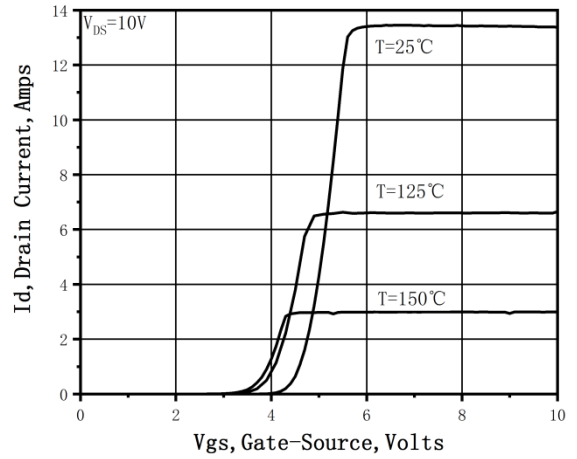


Figure 2. Transfer Characteristics

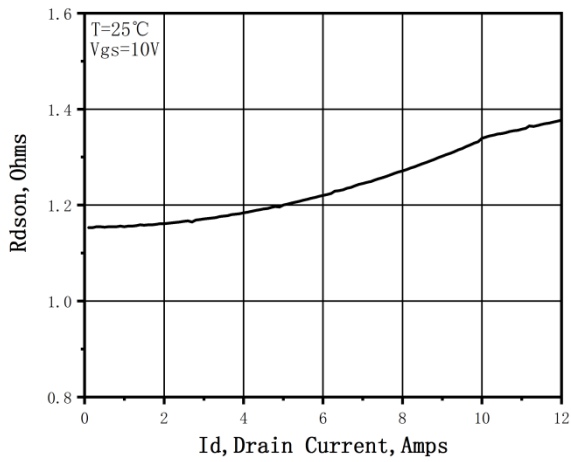


Figure 3. Static Drain-Source On Resistance

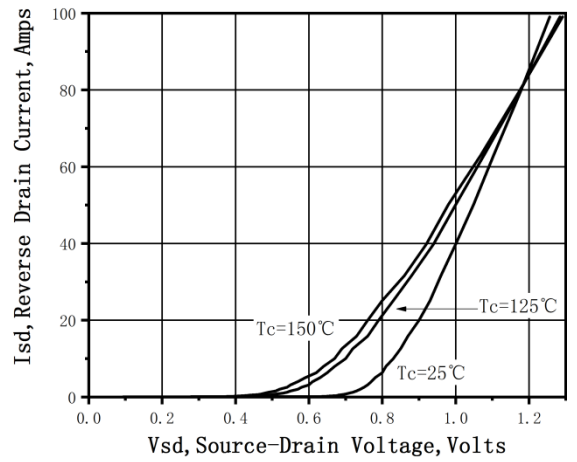


Figure 4. Typical Body Diode Transfer Characteristics

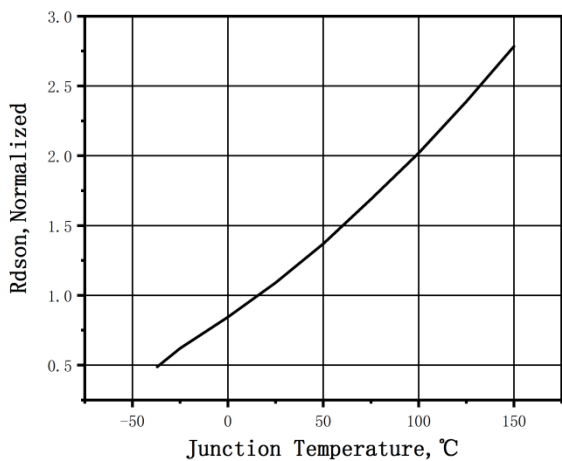


Figure 5. Normalized R_{DS(on)} vs. Temperature

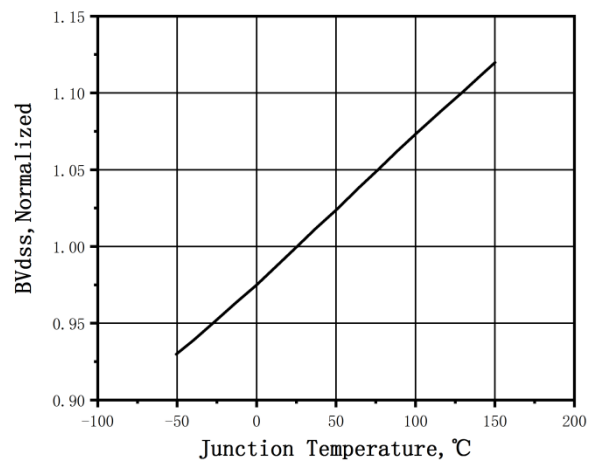


Figure 6. Normalized BV_{DSS} vs. Temperature

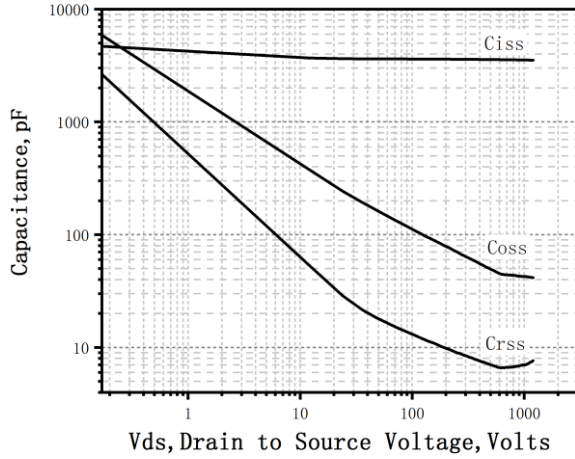


Figure 7. Capacitance Characteristics

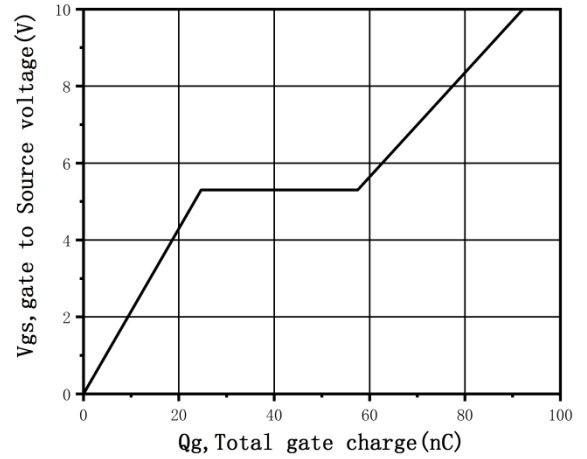


Figure 8. Gate Charge Characteristics

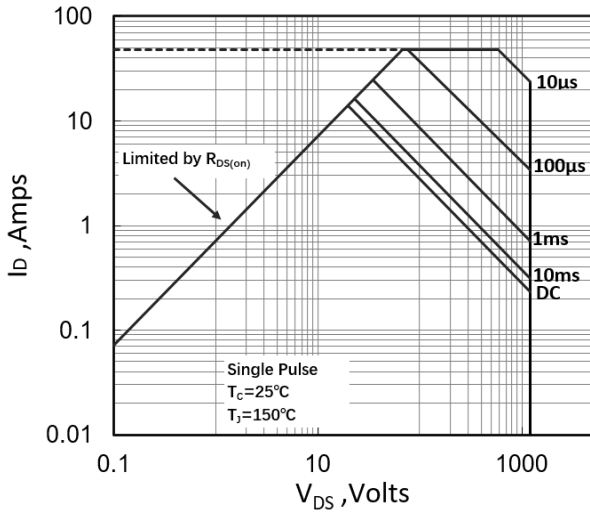


Figure 9. Maximum Safe Operating Area (TO-247)

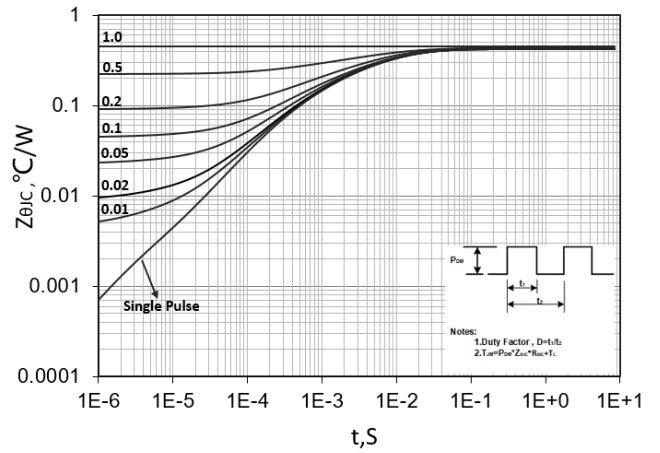


Figure 10. Transient Thermal Response Curve (TO-247)

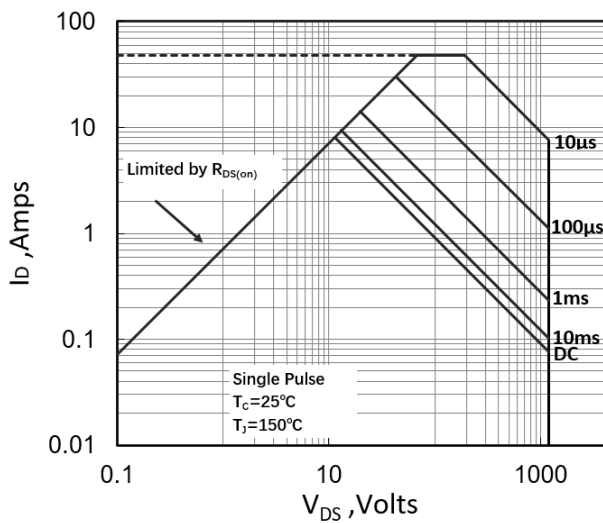


Figure 11. Maximum Safe Operating Area (TO-3PF)

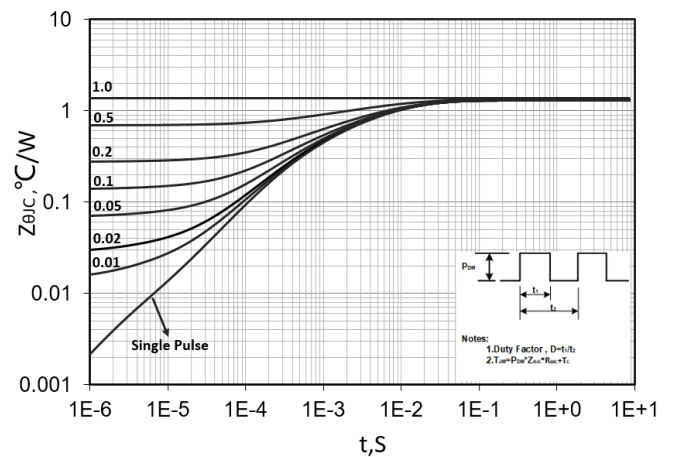
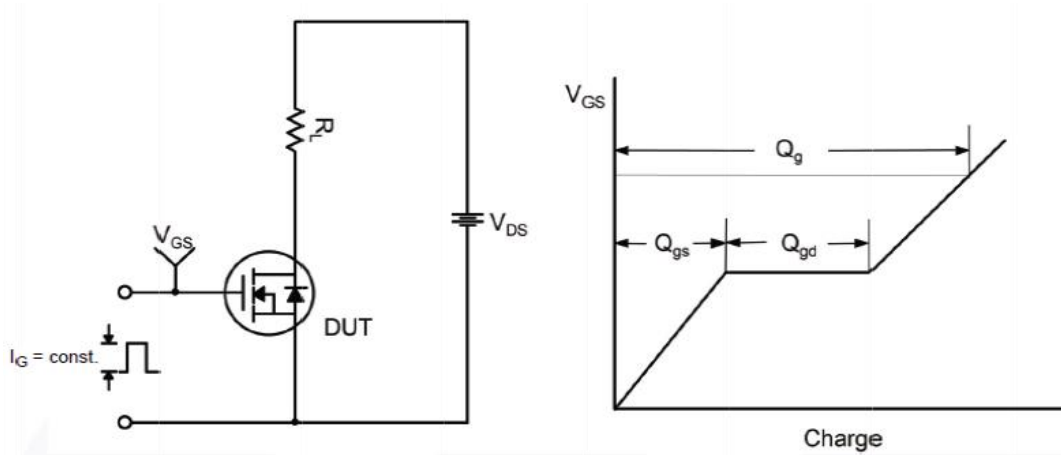
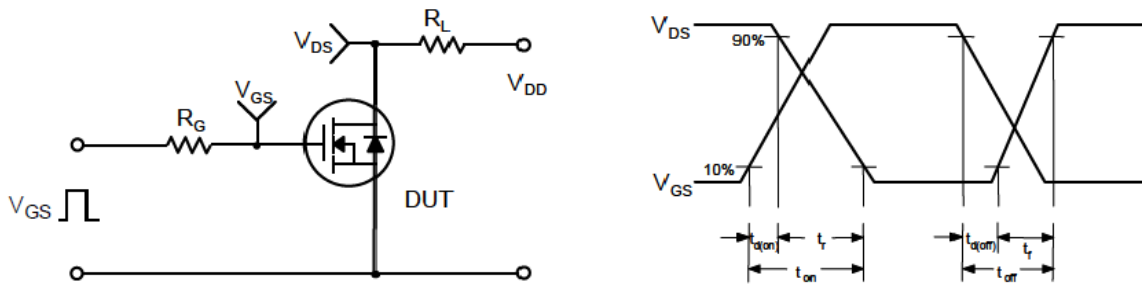


Figure 12. Transient Thermal Response Curve (TO-3PF)

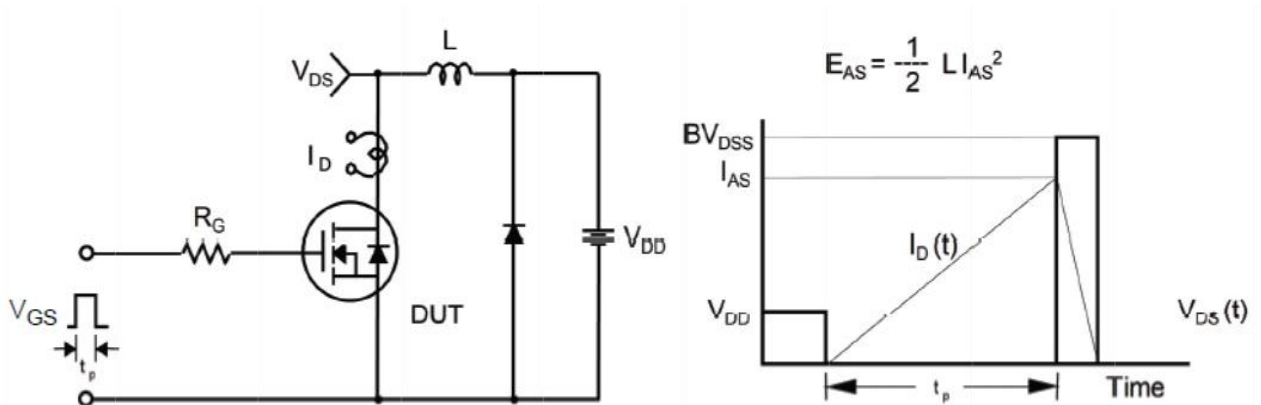
Gate Charge Test Circuit & Waveform



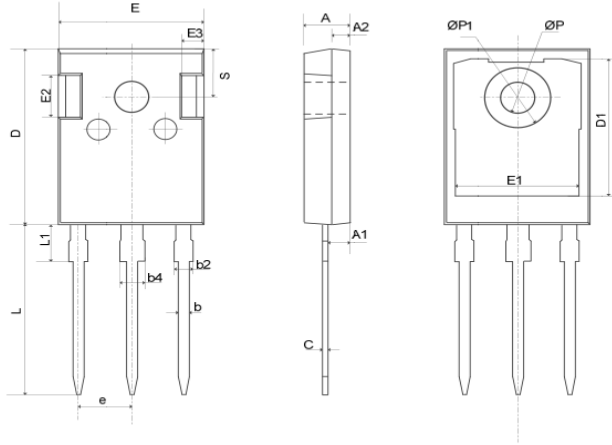
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



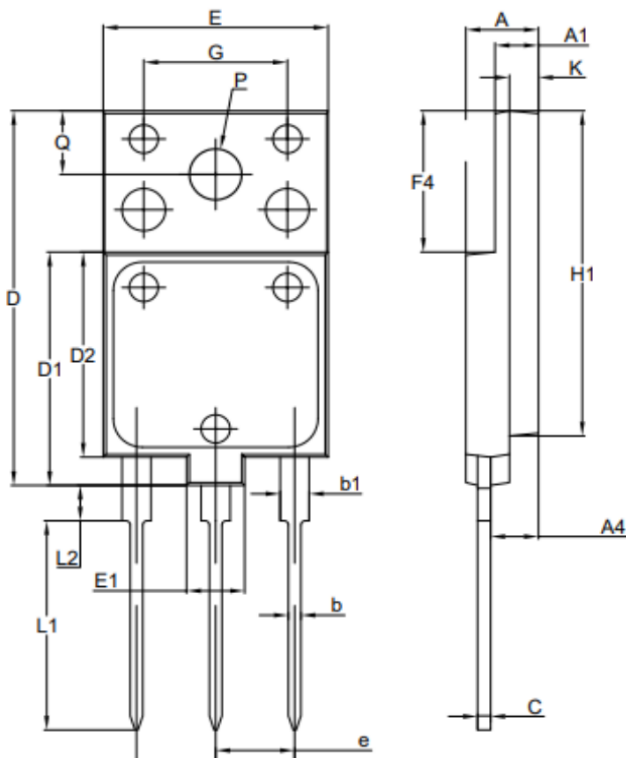
Mechanical Dimensions for TO-247



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	4.80	5.20
A1	2.21	2.61
A2	1.85	2.15
b	1.11	1.36
b2	1.91	2.21
b4	2.91	3.21
c	0.51	0.75
D	20.70	21.30
D1	16.25	16.85
E	15.50	16.10
E1	13.00	13.60
E2	4.80	5.20
E3	2.30	2.70
e	5.44BSC	
L	19.62	20.22
L1	—	4.30
ØP	3.40	3.80
ØP1	—	7.30
S	6.15BSC	

Mechanical Dimensions for TO-3PF



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	5.3	5.5	5.7
A1	2.8	3	3.2
b	0.66	0.86	1.06
b1	1.8	2	2.2
A4	3.1	3.3	3.5
C	0.8	0.9	1
D	26.3	26.5	26.7
D1	16.3	16.5	16.7
D2	14.3	14.5	14.7
P	3.4	3.6	3.8
E	15.3	15.5	15.7
E1	3.8	4	4.2
e	5.15	5.45	5.75
G	9.7	9.9	10.1
Q	4.35	4.5	4.65
L1	14.6	14.8	15
L2	2.3	2.5	2.7
K	1.8	2	2.2
F4	9.8	10	10.2
H1	22.8	23	23.2
K	1.8	2	2.2

Ordering Information

Part	Package	Marking	Packing method
WMJ12N120D1	TO-247	WMJ12N120D1	Tube
WMX12N120D1	TO-3PF	WMX12N120D1	Tube

Contact Information

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