

500V 25A 0.21Ω N-ch Power MOSFET

Description

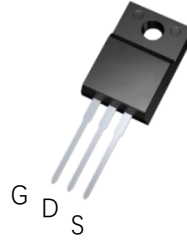
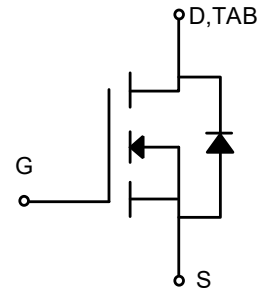
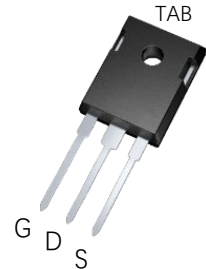
WMOS™ D1 is Wayon's 1st generation VDMOS family that is dramatic reduction in on-resistance and ultra-low gate charge for applications requiring high power density and high efficiency. And it is very robust and RoHS compliant.

Features

- Typ. $R_{DS(on)}=0.21\Omega@V_{GS}=10V$
- 100% avalanche tested
- RoHS Compliant

Applications

- SMPS
- Charger
- DC-DC

TO-220F

TO-247


Absolute Maximum Ratings (T_c=25°C)

Parameter	Symbol	WML25N50D1B	WMJ25N50D1B	Unit
Drain-source voltage	V _{DSS}	500		V
Gate-source voltage	V _{GS}	±30		V
Continuous drain current	I _D	25		A
Pulsed drain current ¹	I _{DM}	100		A
Avalanche energy, single pulse ²	E _{AS}	1280		mJ
Power dissipation	P _D	46	297	W
Derate above 25°C		0.4	2.4	W/°C
Operating junction temperature	T _j	-55~150		°C
Storage temperature	T _{stg}	-55~150		°C
Continuous diode forward current	I _S	25		A
Diode pulse current	I _{Spulse}	100		A

Thermal Characteristic

Thermal resistance, junction-to-case	R _{θJC}	2.7	0.42	°C/W
Thermal resistance, junction-to-ambient	R _{θJA}	62.5	62.5	°C/W

Electrical Characteristics of MOSFET

				Min.	Typ.	Max.	
Drain-source break down voltage	BV_{DSS}	$I_D=250\mu A, V_{GS}=0V$	$T_C=25^\circ C$	500	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\mu A, V_{DS}=V_{GS}$	$T_J=25^\circ C$	2	-	4	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	$R_{DS(on)}$	$V_{GS}=10V, I_D=12.5A$	$T_J=25^\circ C$	-	0.21	0.27	Ω
Transconductance ³	G_{fs}	$V_{DS}=20V$	$T_J=25^\circ C$	-	23	-	S

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

				Min.	Typ.	Max.	
Input capacitance	C_{iss}	$f=1MHz, V_{DS}=25V, V_{GS}=0V$		-	497	-	pF
Output capacitance	C_{oss}			-	57	-	pF
Reverse transfer capacitance	C_{rss}			-	5.6	-	pF
Gate to source charge	Q_{gs}	$V_{DD}=400V$		-	19	-	nC
Gate to drain charge	Q_{gd}	$I_D=25A$		-	13	-	nC
Total gate charge	Q_g	$V_{GS}=0$ to 10V		-	67	-	nC

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

				Min.	Typ.	Max.	
Turn-on delay time	$t_{d on}$	$V_{DS}=250V, I_D=25A,$ $R_C=25\Omega, V_{GS}=0$ to 10V		-	41	-	ns
Rise time	t_r			-	44	-	ns
Turn-off delay time	$t_{d off}$			-	224	-	ns
Fall time	t_f			-	60	-	ns

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

				Min.	Typ.	Max.	
Forward voltage	V_{SD}	$I_{SD}=25A, V_{GS}=0V$		-	-	1.5	V
Reverse recovery time	t_{rr}	$V_{DS}=250V, I_S=25A, V_{GS}=10V$ $-di/dt=100A/us$		-	521	-	ns
Reverse recovery current	I_{rr}			-	45	-	A
Recovery charge	Q_{rr}			-	12	-	μC

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150^\circ C$.
2. The E_{AS} data shows Max. rating . The test condition is $V_{DD}=50V, V_{GS}=10V, L=10mH, I_{AS}=16A, T_C=25^\circ C$.
3. The data tested by pulsed , pulse width $\leq 300us$, duty cycle $\leq 2\%$.

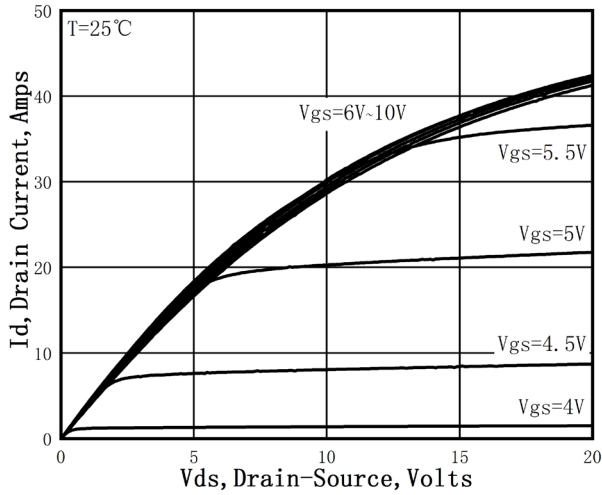


Figure 1. On-Region Characteristics

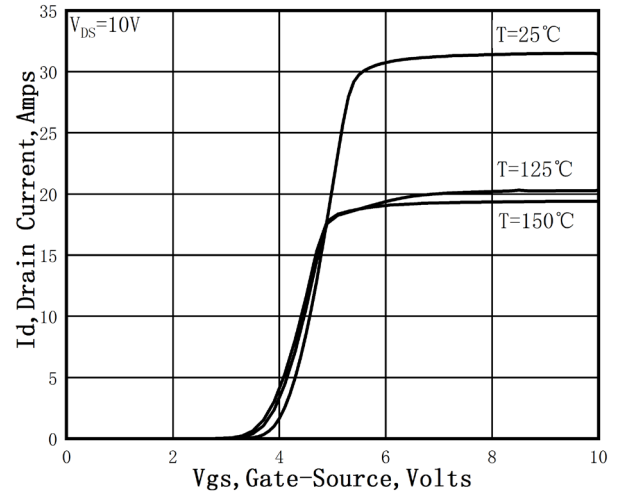


Figure 2. Transfer Characteristics

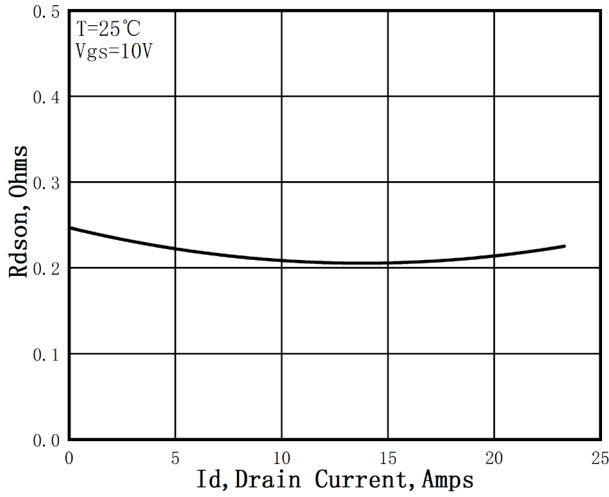


Figure 3. Static Drain-Source On Resistance

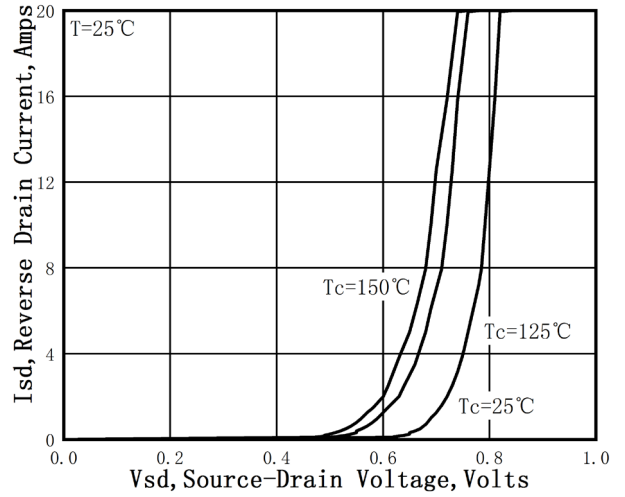


Figure 4. Typical Body Diode Transfer Characteristics

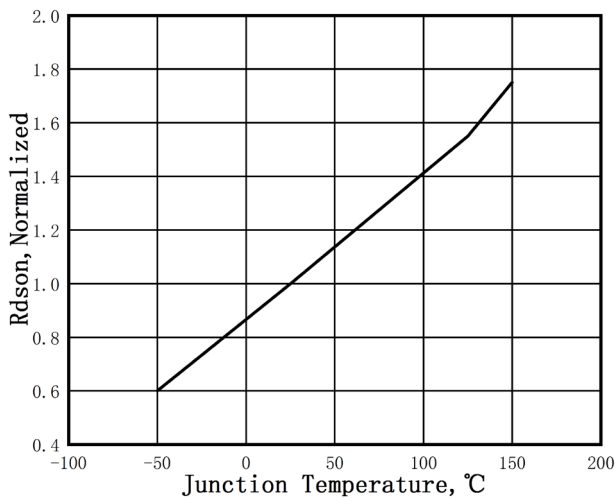


Figure 5. Normalized $R_{DS(on)}$ vs. Temperature

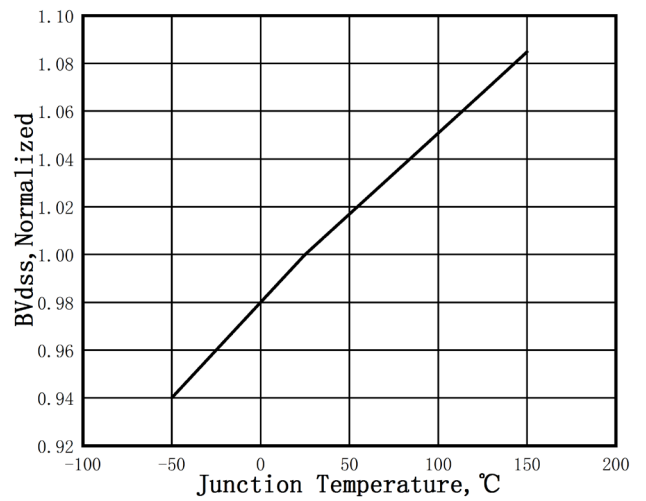


Figure 6. Normalized BV_{DSS} vs. Temperature

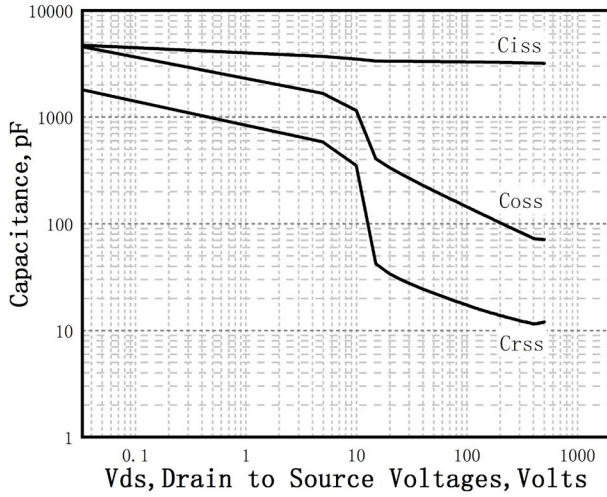


Figure 7. Capacitance Characteristics

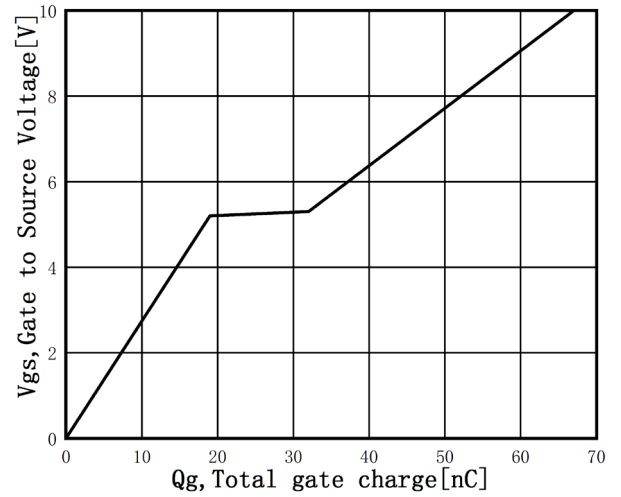


Figure 8. Gate Charge Characteristics

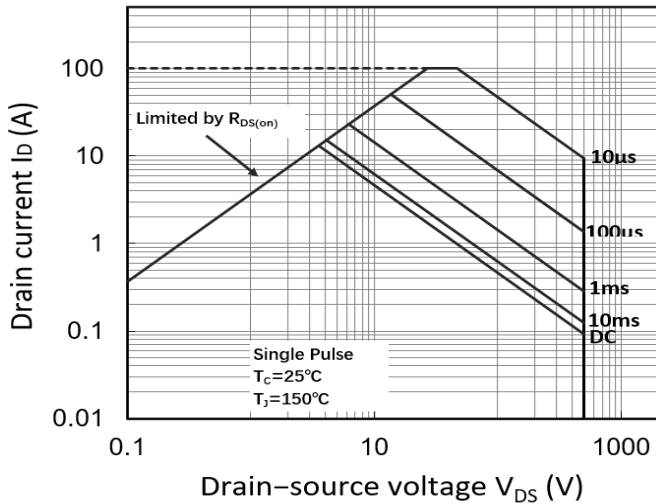


Figure 9. Maximum Safe Operating Area (TO-220F)

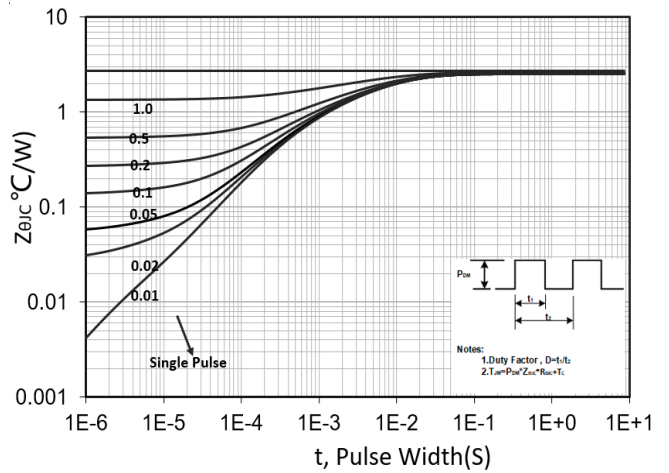


Figure 10. Transient Thermal Response Curve (TO-220F)

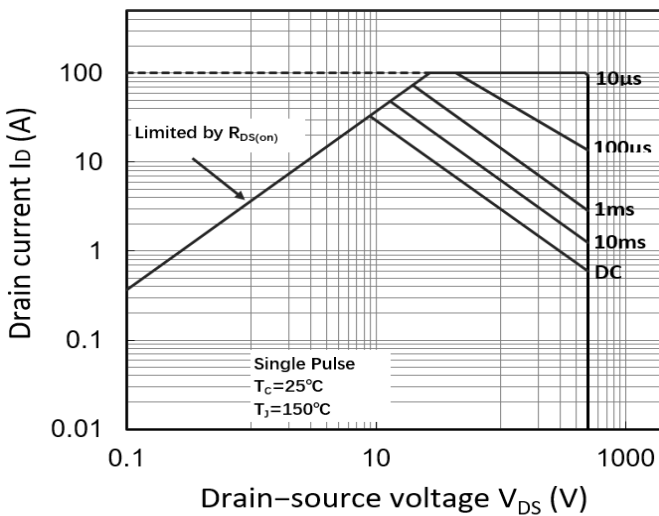


Figure 11. Maximum Safe Operating Area (TO-247)

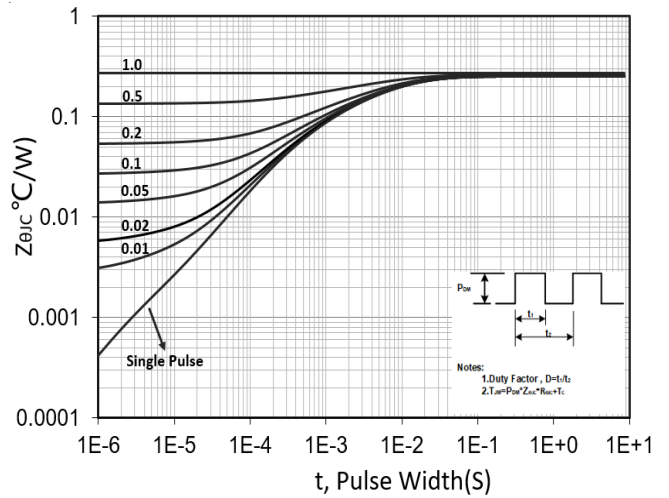
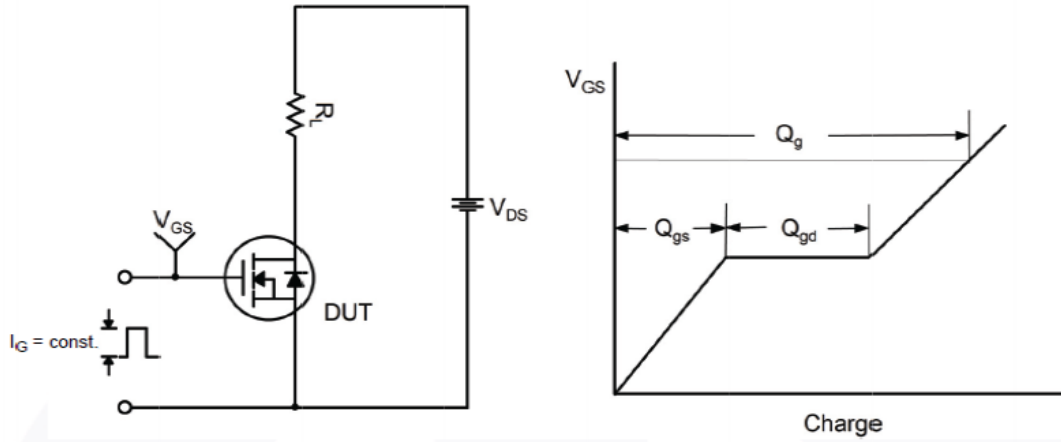
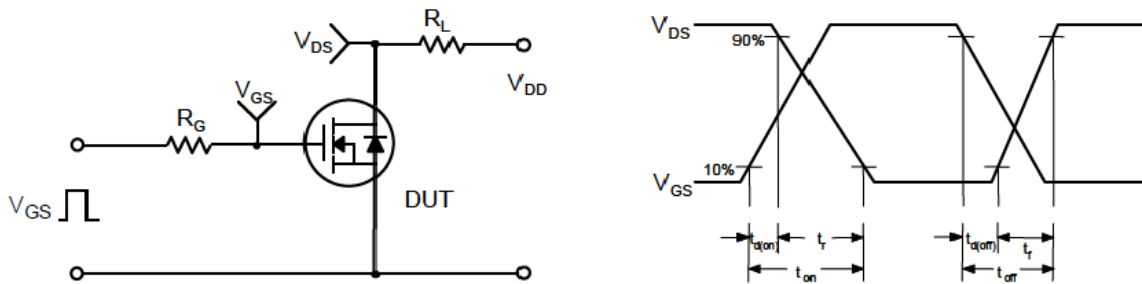


Figure 12. Transient Thermal Response Curve (TO-247)

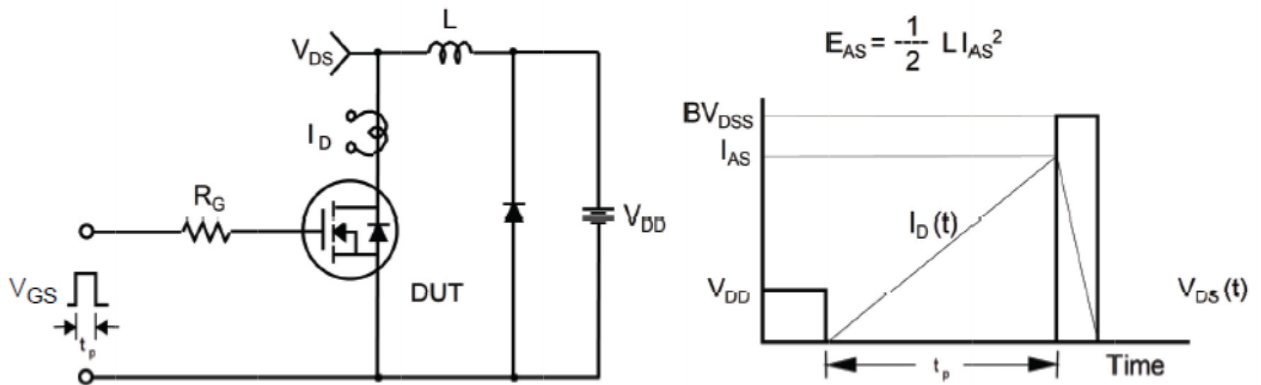
Gate Charge Test Circuit & Waveform



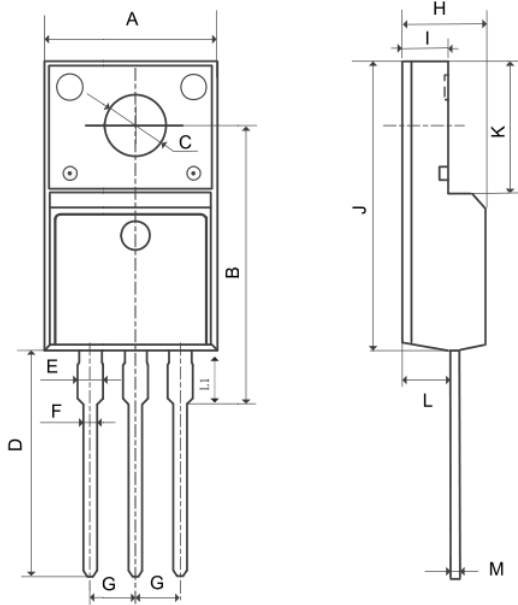
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



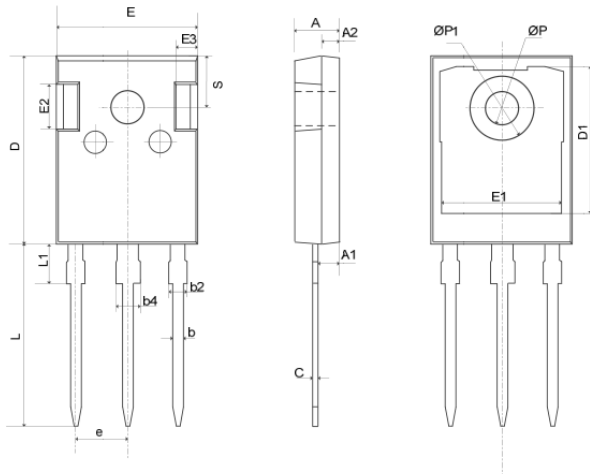
Mechanical Dimensions for TO-220F



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-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	

Ordering Information

Part	Package	Marking	Packing method
WML25N50D1B	TO-220F	WML25N50D1B	Tube
WMJ25N50D1B	TO-247	WMJ25N50D1B	Tube


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