

## 650V 10A 0.8Ω N-ch Power MOSFET

### Description

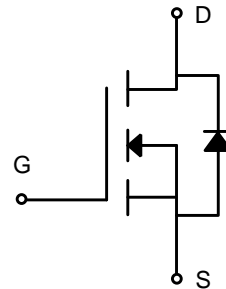
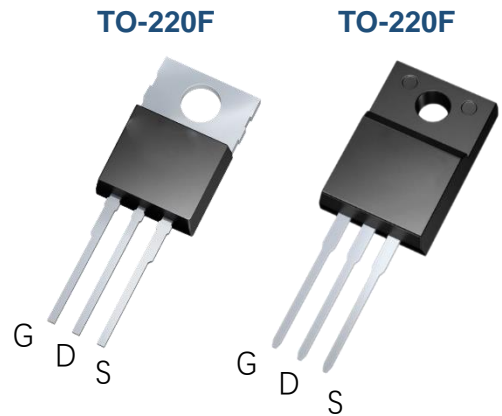
WMOS™ D1 is Wayon's 1<sup>st</sup> generation VDMOS family that is dramatic reduction in on-resistance and ultra-low gate charge for applications requiring high power density and high efficiency. And it is very robust and RoHS compliant.

### Features

- $V_{DS}=700V@T_{jmax}$
- $Typ.R_{DS(on)}=0.8\Omega@V_{GS}=10V$
- 100% avalanche tested
- Pb-free, Halogen free

### Applications

- SMPS
- Charger
- DC-DC



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

Parameter	Symbol	WMK10N65D1	WML10N65D1	Unit
Drain-source voltage	$V_{DS}$	650		V
Gate-source voltage	$V_{GS}$	$\pm 30$		V
Continuous drain current	$I_D$	10		A
Pulsed drain current	$I_{DM}$	40		A
Avalanche energy, single pulse	$E_{AS}$	405		mJ
Power dissipation	$P_D$	156	65	W
Derate above 25°C		1.25	0.5	W/°C
Operating junction temperature	$T_j$	-55~150		°C
Storage temperature	$T_{stg}$	-55~150		°C
Continuous diode forward current	$I_S$	10		A
Diode pulse current	$I_{Spulse}$	40		A

### Thermal Characteristic

Thermal resistance, junction-to-case	$R_{\theta JC}$	0.8	2	°C/W
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	30( $R_{thJ-PCB}$ )	62.5	°C/W

### Electrical Characteristics of MOSFET

				Min.	Typ.	Max.	
Drain-source break down voltage	$BV_{DSS}$	$I_D=250\mu A, V_{GS}=0V$	$T_C=25^\circ C$	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\mu A, V_{DS}=V_{GS}$	$T_J=25^\circ C$	2.0	3.0	4.0	V
Drain-source leakage current	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V$	$T_J=25^\circ C$	-	-	1	$\mu A$
		$V_{DS}=520V, V_{GS}=0V$	$T_J=125^\circ C$	-	-	100	$\mu A$
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	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5A$	$T_J=25^\circ C$	-	0.8	0.95	$\Omega$
Transconductance	$G_{fs}$	$V_{DS}=20V$	$T_J=25^\circ C$	-	13.5	-	S

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

				Min.	Typ.	Max.	
Input capacitance	$C_{iss}$	$f=1MHz, V_{DS}=25V, V_{GS}=0V$		-	1370	-	pF
Output capacitance	$C_{oss}$			-	130	-	pF
Reverse transfer capacitance	$C_{rss}$			-	13	-	pF
Gate to source charge	$Q_{gs}$	$V_{DD}=320V$		-	6	-	nC
Gate to drain charge	$Q_{gd}$	$I_D=10A$		-	10	-	nC
Total gate charge	$Q_g$	$V_{GS}=0$ to 10V		-	30	-	nC

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

				Min.	Typ.	Max.	
Turn-on delay time	$t_{d on}$	$V_{DS}=320V, I_D=10A,$ $R_G=25\Omega, V_{GS}=0$ to 10V		-	20	-	ns
Rise time	$t_r$			-	24	-	ns
Turn-off delay time	$t_{d off}$			-	110	-	ns
Fall time	$t_f$			-	43	-	ns

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

				Min.	Typ.	Max.	
Forward voltage	$V_{SD}$	$I_{SD}=10A, V_{GS}=0V$		-	-	1.5	V
Reverse recovery time	$t_{rr}$	$V_{DS}=320V, I_S=10A, V_{GS}=10V$ $-di/dt=100A/\mu s$		-	520	-	ns
Reverse recovery current	$I_{rr}$			-	12	-	A
Recovery charge	$Q_{rr}$			-	3.1	-	$\mu C$

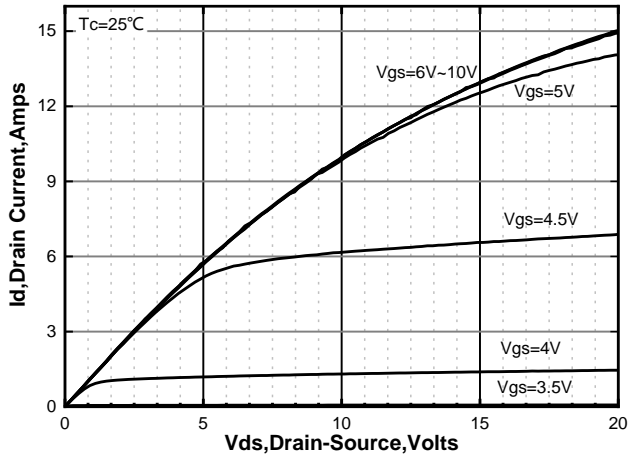


Figure 1. On-Region Characteristics

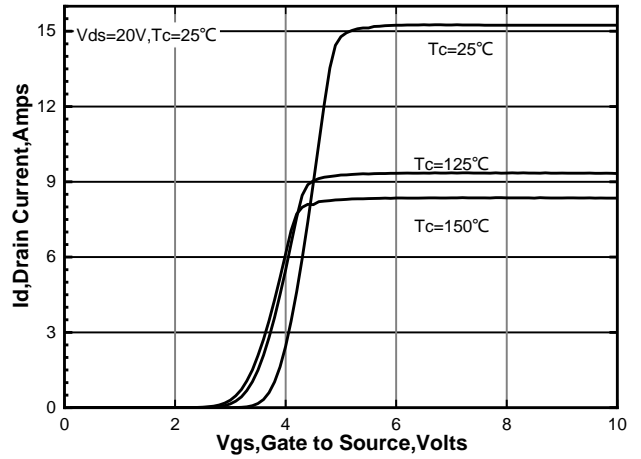


Figure 2. Transfer Characteristics

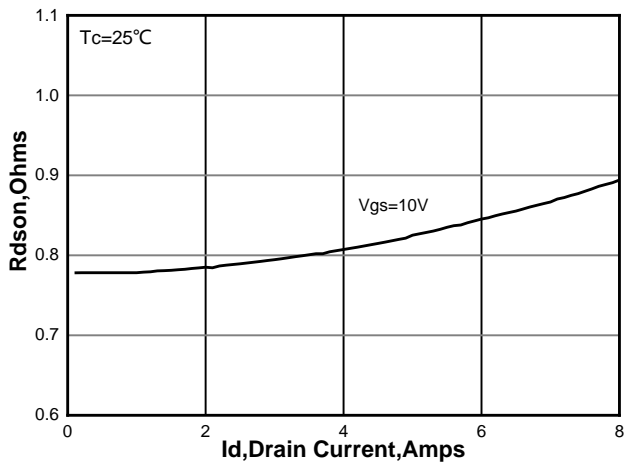


Figure 3. Static Drain-Source On Resistance

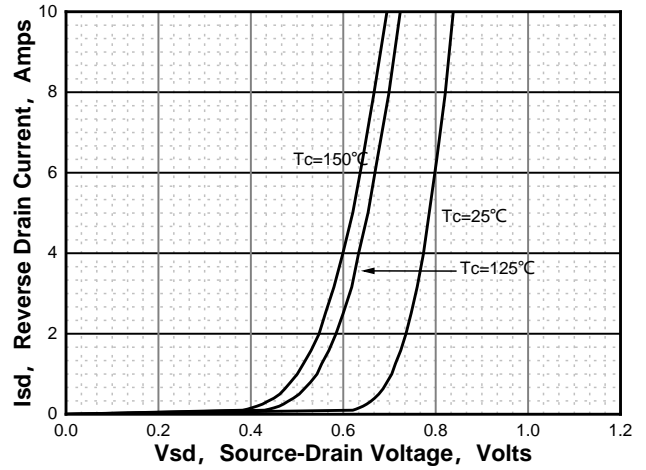


Figure 4. Typical Body Diode Transfer Characteristics

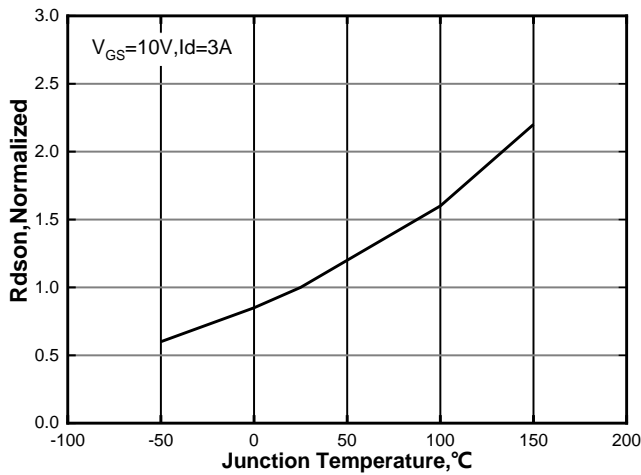


Figure 5. Normalized  $R_{DS(on)}$  vs. Temperature

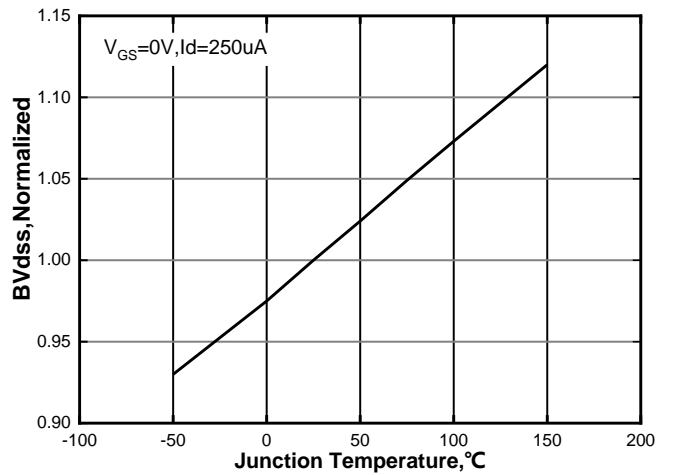


Figure 6. Normalized  $BV_{DSS}$  vs. Temperature

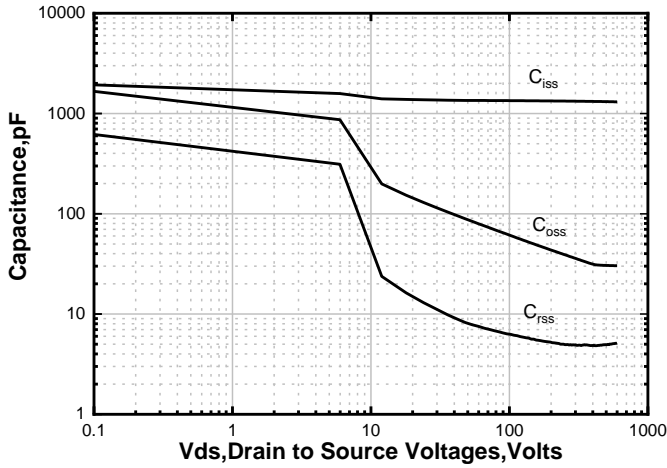


Figure 7. Capacitance Characteristics

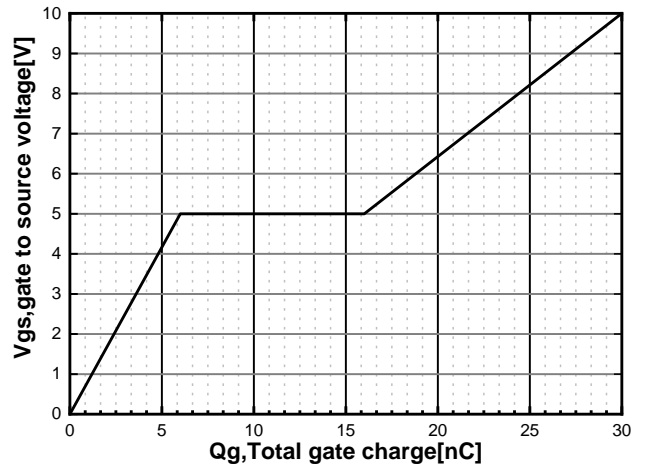


Figure 8. Gate Charge Characteristics

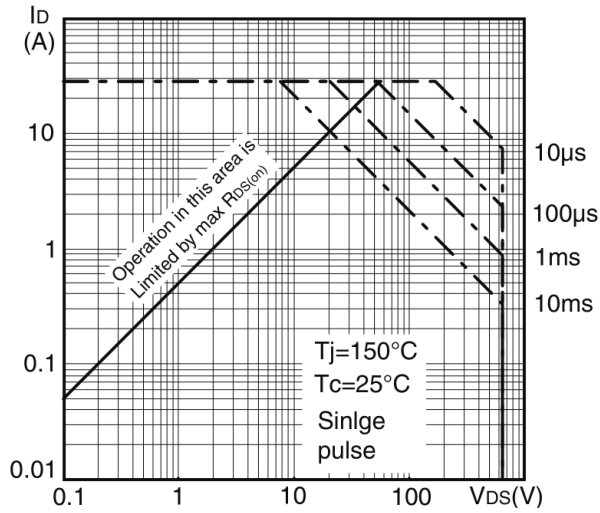


Figure 9. Maximum Safe Operating Area (TO-220F)

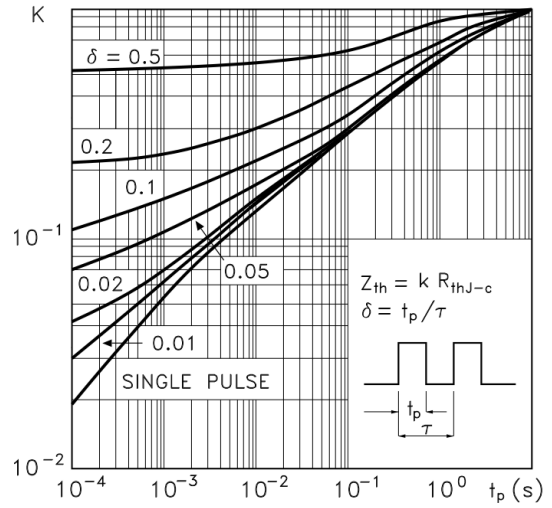


Figure 10. Transient Thermal Response Curve (TO-220F)

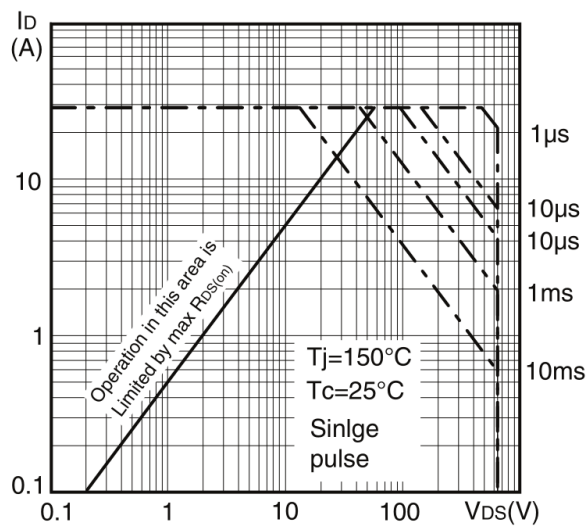


Figure 9. Maximum Safe Operating Area (TO-220)

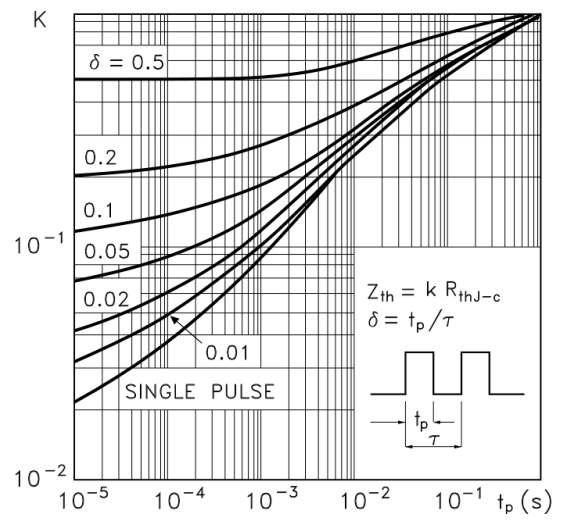
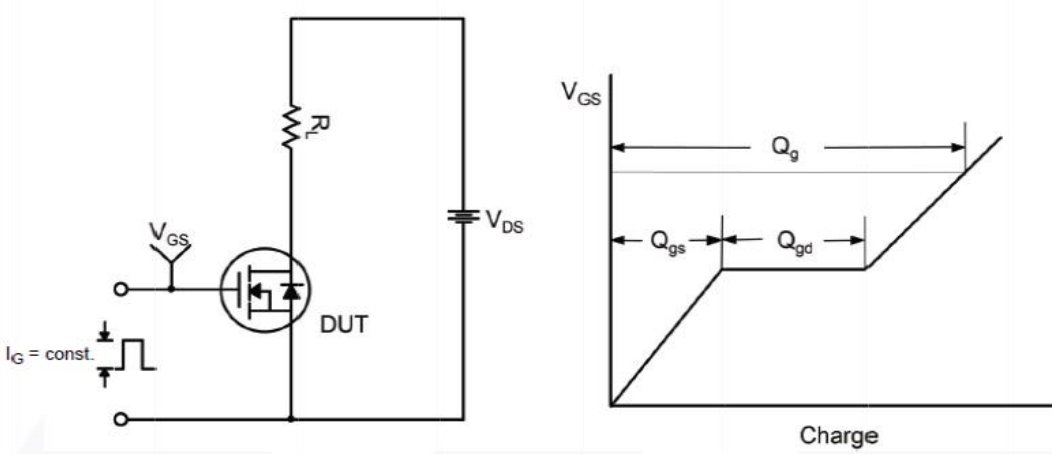
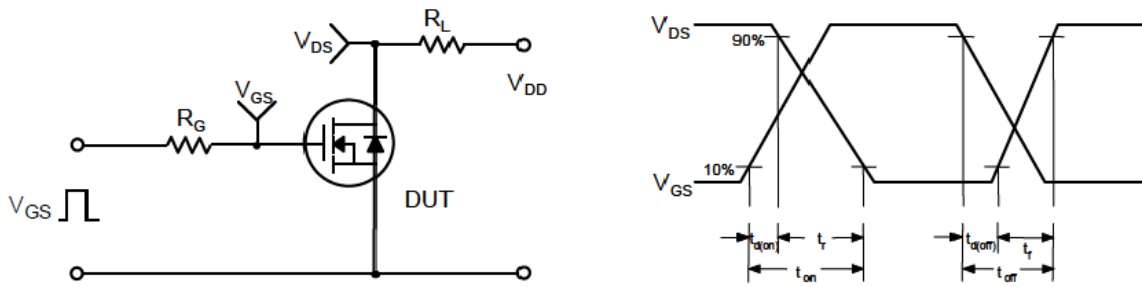


Figure 12. Transient Thermal Response Curve (TO-220)

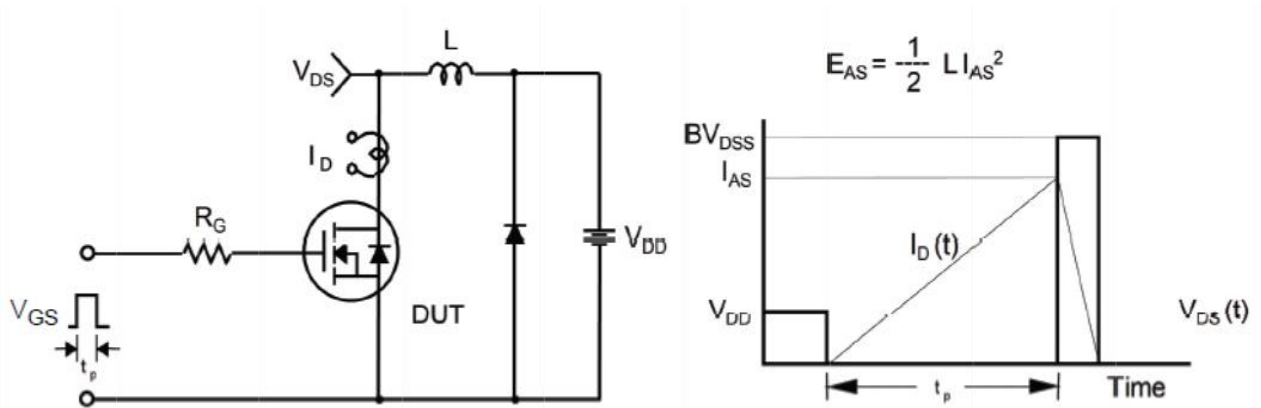
Gate Charge Test Circuit & Waveform



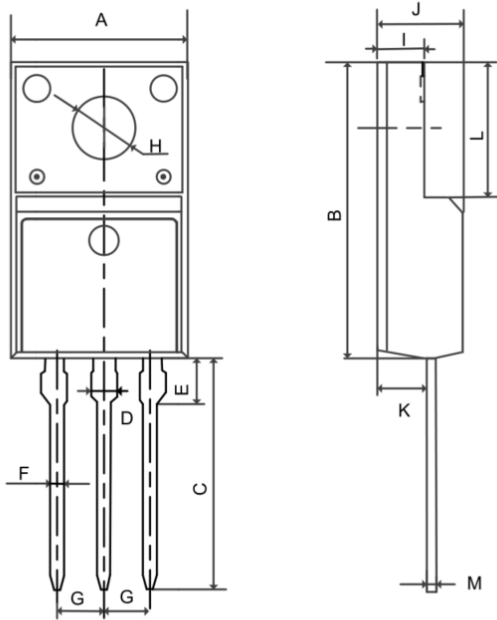
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



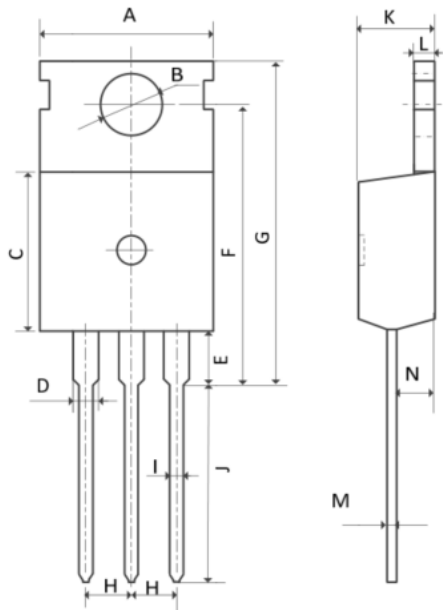
**Mechanical Dimensions for TO-220F**



**COMMON DIMENSIONS**

SYMBOL	MM	
	MIN	MAX
A	9.96	10.36
B	15.67	16.07
C	12.70	13.30
D	1.12	1.32
E	1.85	2.15
F	0.59	0.79
G	2.39	2.69
H	3.08	3.29
I	2.34	2.74
J	4.50	4.90
K	2.61	2.91
L	6.50	6.90
M	0.40	0.60

**Mechanical Dimensions for TO-220**



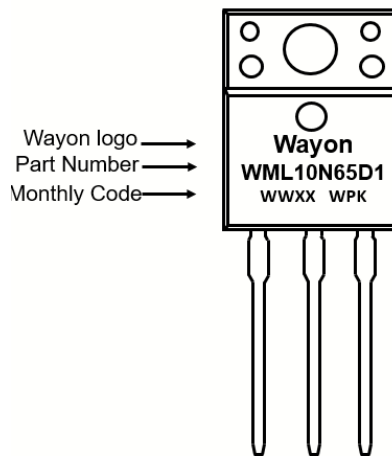
**COMMON DIMENSIONS**

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
WML10N65D1	TO-220F	WML10N65D1	Tube
WMK10N65D1	TO-220	WMK10N65D1	Tube

## Marking Information




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