

650V Silicon N-channel Power MOSFET

Description

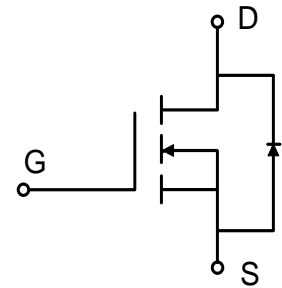
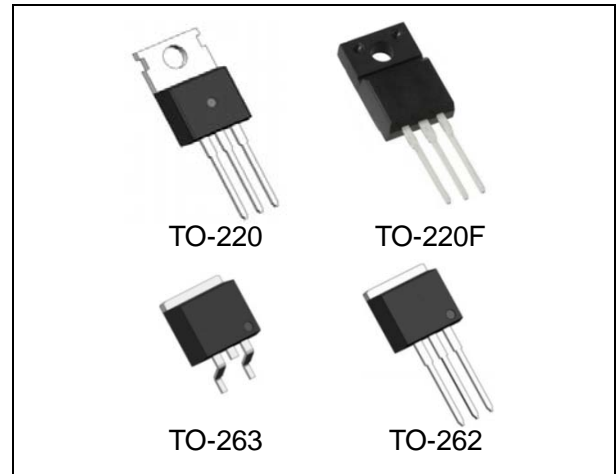
WMOSTM DM, the silicon N-channel enhanced VDMOSFETs, is obtained by the self-aligned planar technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency.

Features

- Fast switching
- Typ. $R_{DS(on)} = 0.8\Omega$
- Low gate charge (Typ. $Q_g = 28.5nC$)
- Typ. $C_{rss} = 12.5pF$
- 100% UIS tested

Applications

LED Lighting, Charger, Adapter, PC, LCD TV, Server



Absolute Maximum Ratings

Parameter	Symbol	WML	WMK/M/N	Unit
Drain-source voltage	V_{DSS}	650		V
Continuous drain current ($T_C = 25^\circ C$) ($T_C = 100^\circ C$)	I_D	10		A
		5.5		A
Pulsed drain current ¹⁾	I_{DM}	40		A
Gate-source voltage	V_{GS}	± 30		V
Avalanche energy, single pulse ²⁾	E_{AS}	540		mJ
Power dissipation ($T_C = 25^\circ C$) - Derate above $25^\circ C$	P_D	50	150	W
		0.4	1.2	W/ $^\circ C$
Operating and storage temperature range	T_J, T_{STG}	-55 to +150		$^\circ C$
Continuous diode forward current	I_S	10		A
Diode pulse current	$I_{S,pulse}$	40		A

Thermal Characteristics

Parameter	Symbol	WML	WMK/M/N	Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	2.5	0.83	$^\circ C/W$
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	62.5	62.5	$^\circ C/W$

Electrical Characteristics $T_c = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0\text{ V}, I_D=0.25\text{ mA}$	650	-	-	V
Gate threshold voltage	$V_{GS(th)}^{3)}$	$V_{DS}=V_{GS}, I_D=0.25\text{ mA}$	2	-	4	V
Drain cut-off current	I_{DSS}	$V_{DS}=650\text{ V}, V_{GS}=0\text{ V}$	-	-	1	μA
Gate leakage current, forward	I_{GSSF}	$V_{GS}=30\text{ V}, V_{DS}=0\text{ V}$	-	-	100	nA
Gate leakage current, reverse	I_{GSSR}	$V_{GS}=-30\text{ V}, V_{DS}=0\text{ V}$	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(on)}^{3)}$	$V_{GS}=10\text{ V}, I_D=5\text{ A}$	-	0.8	1.0	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	$V_{DS}=25\text{ V}, V_{GS}=0\text{ V},$ $f=1\text{ MHz}$	-	1100	-	pF
Output capacitance	C_{oss}		-	130	-	
Reverse transfer capacitance	C_{rss}		-	12.5	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=325\text{ V}, I_D=10\text{ A}$ $R_G=25\Omega, V_{GS}=10\text{ V}$	-	21.27	-	ns
Rise time	t_r		-	41.40	-	
Turn-off delay time	$t_{d(off)}$		-	82.47	-	
Fall time	t_f		-	42.53	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	$V_{DD}=520\text{ V}, I_D=10\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	6.23	-	nC
Gate to drain charge	Q_{gd}		-	13.2	-	
Gate charge total	Q_g		-	28.5	-	
Reverse diode characteristics						
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=10\text{ A}$	-	-	1.3	V
Reverse recovery time	t_{rr}	$I_F=10\text{ A}, dI_F/dt=100\text{ A}/\mu\text{s}$	-	561	-	ns
Reverse recovery charge	Q_{rr}	$V_{GS}=0\text{ V}$	-	4.32	-	μC

Notes:

1. Repetitive rating: pulse width limited by maximum junction temperature
2. $I_{AS}=6\text{ A}, V_{DD}=50\text{ V}, R_G=25\Omega$, starting $T_J = 25^\circ\text{C}$
3. Pulse test: pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

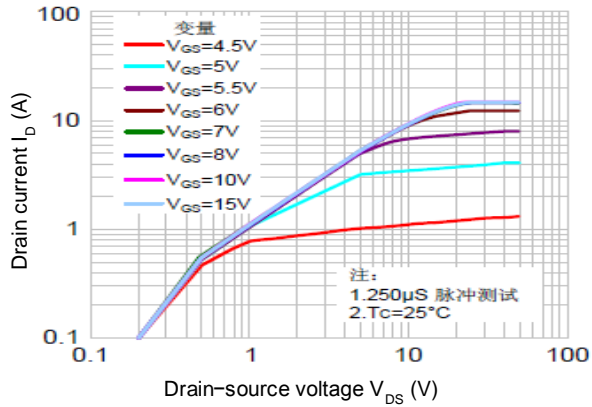


Figure 1. On-Region Characteristics

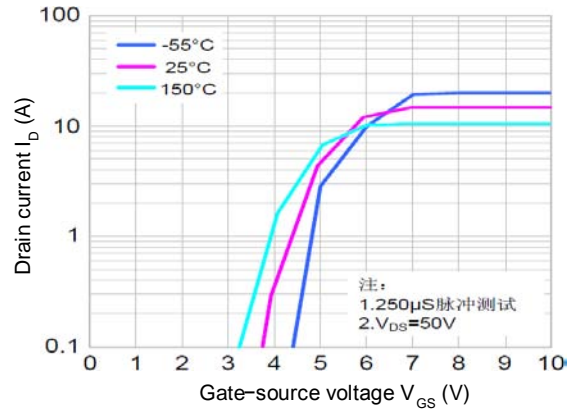


Figure 2. Transfer Characteristics

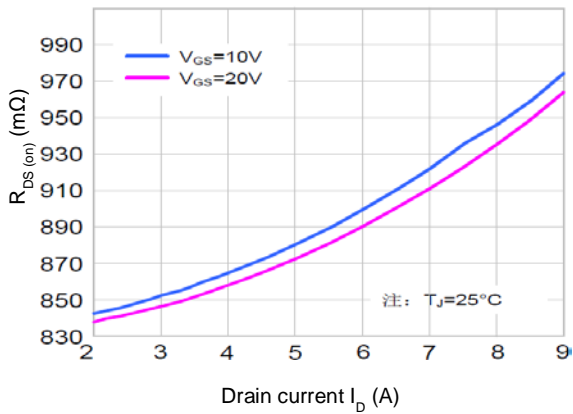


Figure 3. On-Resistance Variation vs. Drain Current

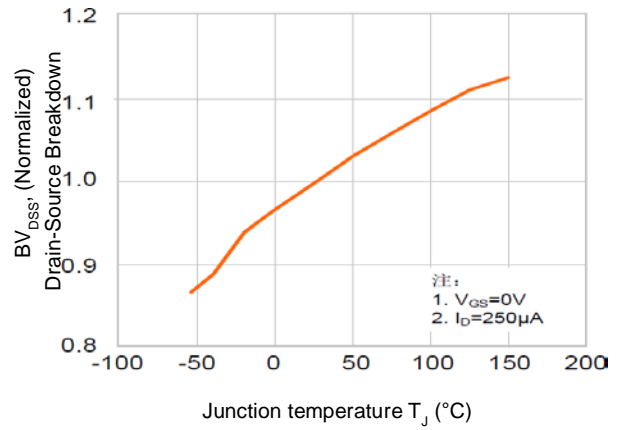


Figure 4. Breakdown Voltage vs. Temperature

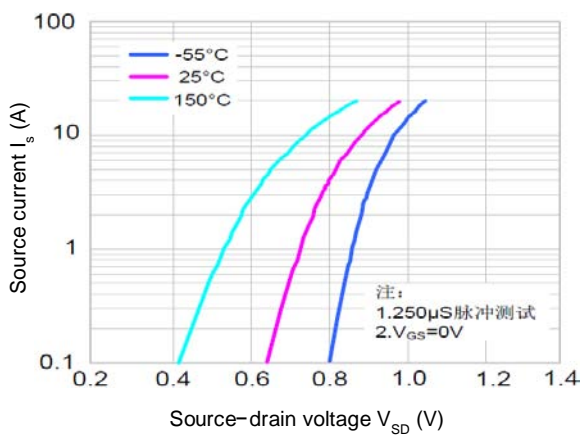


Figure 5. Source Current Variation vs. Source-drain Voltage

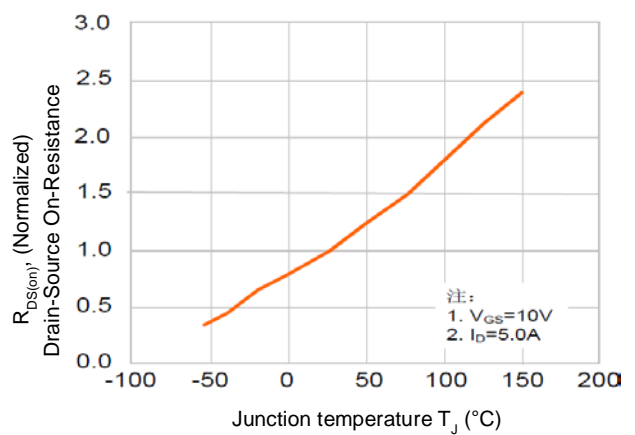


Figure 6. On-Resistance vs. Temperature

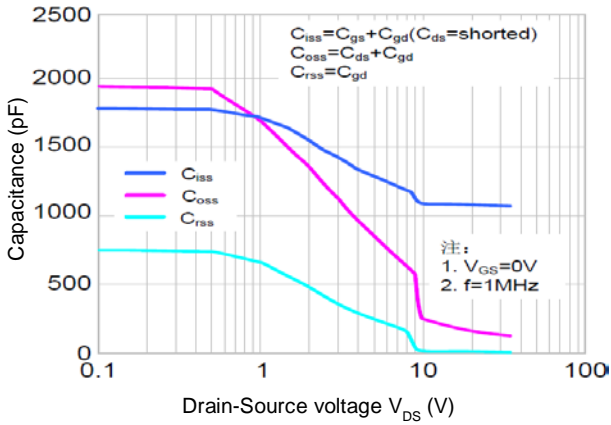


Figure 7. Capacitance Characteristics

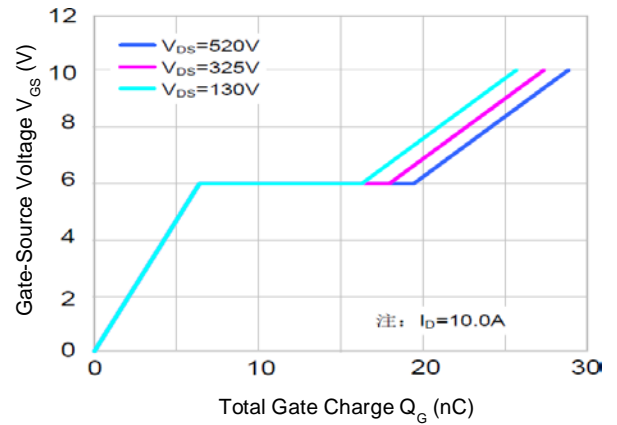


Figure 8. Gate Charge Characteristics

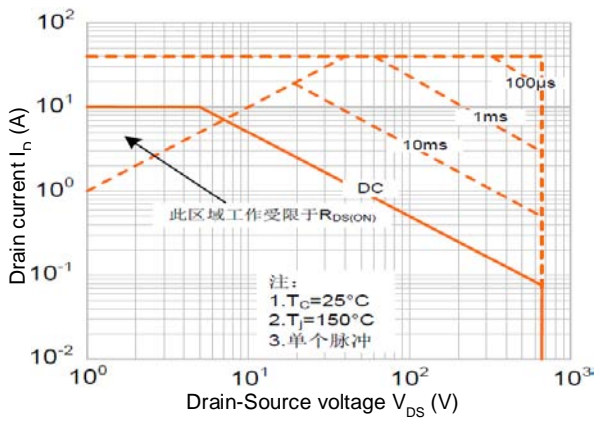


Figure 9. Maximum Safe Operating Area (WML10N65DM)

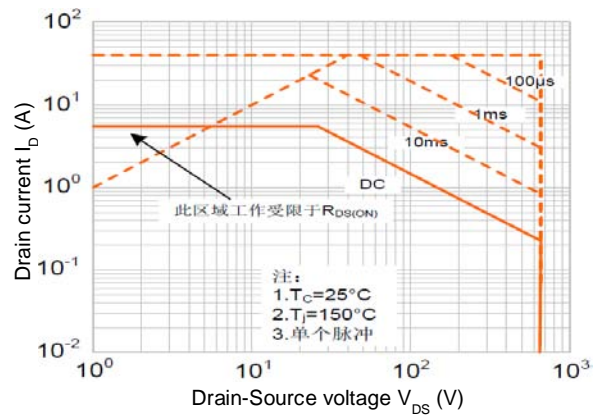


Figure 10. Maximum Safe Operating Area (WMK/M/N10N65DM)

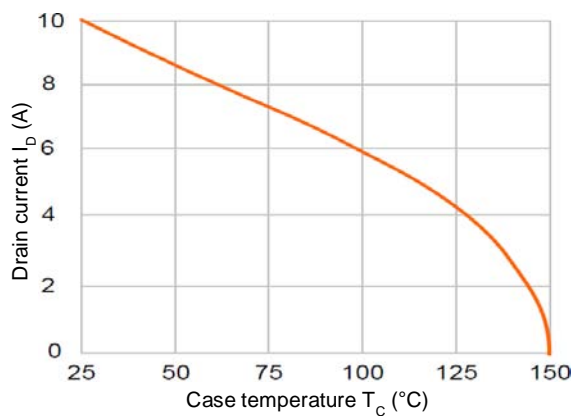
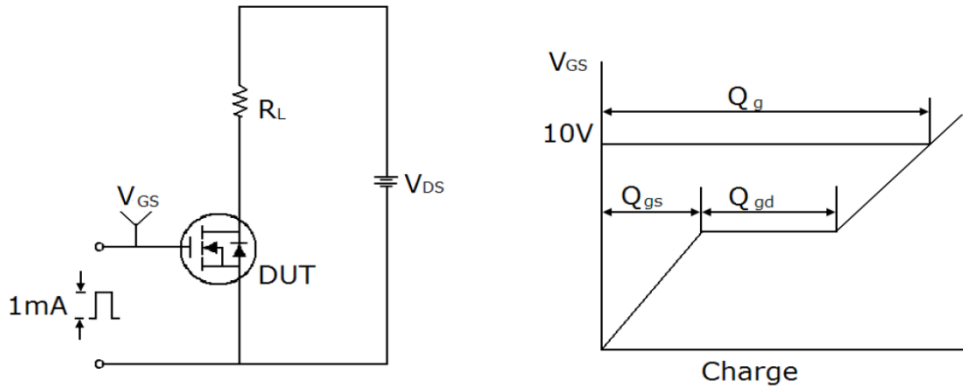
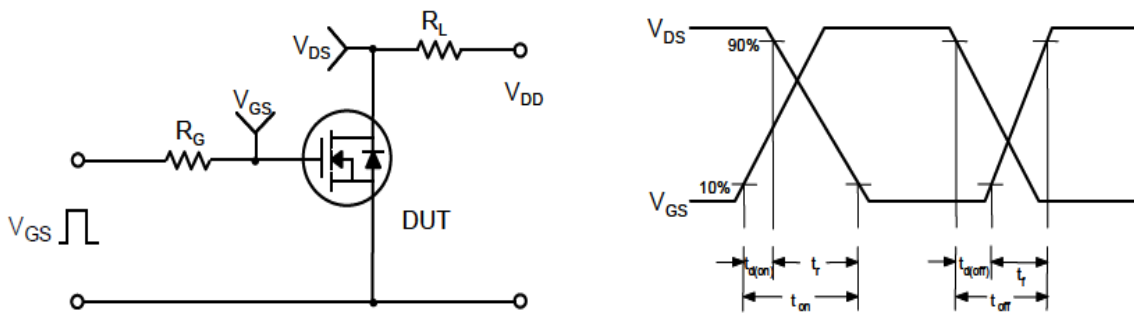


Figure 11. Drain Current vs. Case Temperature

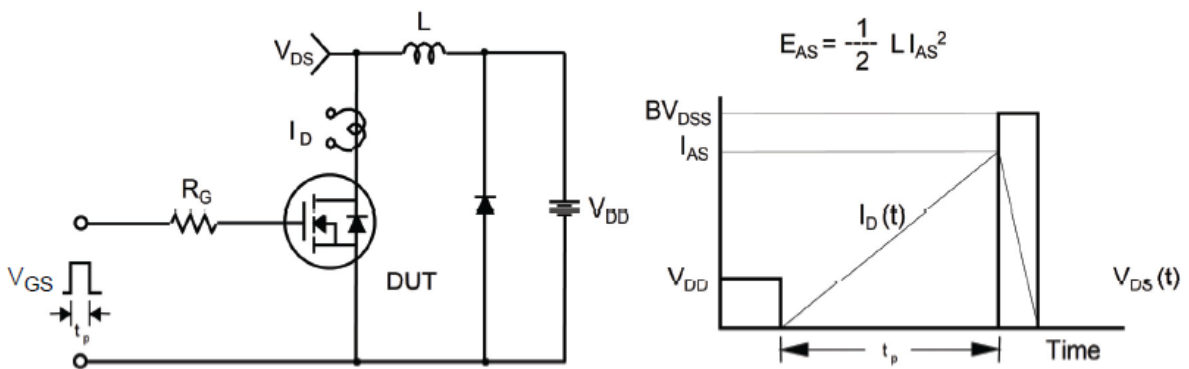
Gate Charge Test Circuit & Waveform



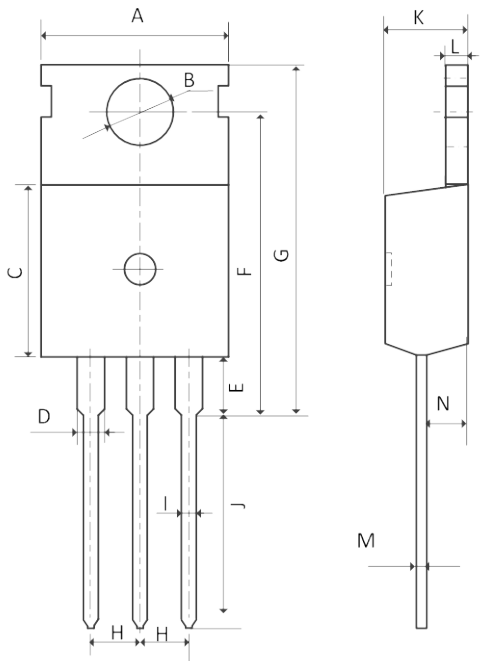
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



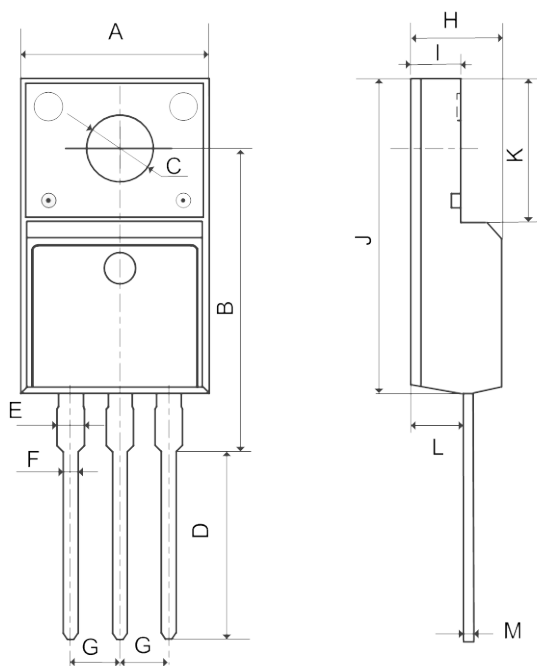
Mechanical Dimensions for TO-220



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	9.70	10.10
B	3.50	3.70
C	9.00	9.40
D	1.17	1.47
E	2.80	3.20
F	15.80	16.20
G	18.95MAX	
H	2.44	2.64
I	0.70	0.90
J	9.78	10.38
K	4.30	4.70
L	1.20	1.40
M	0.40	0.60
N	2.25	2.55

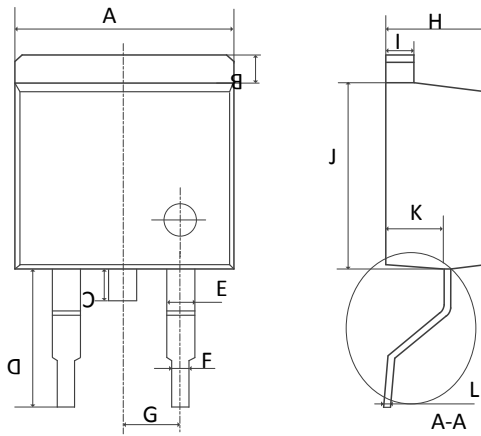
Mechanical Dimensions for TO-220F



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	9.96	10.36
B	15.50	16.10
C	3.08	3.28
D	12.64	13.24
E	1.18	1.58
F	0.70	0.90
G	2.39	2.69
H	4.50	4.90
I	2.34	2.74
J	15.67	16.07
K	6.50	6.90
L	2.56	2.96
M	0.40	0.60

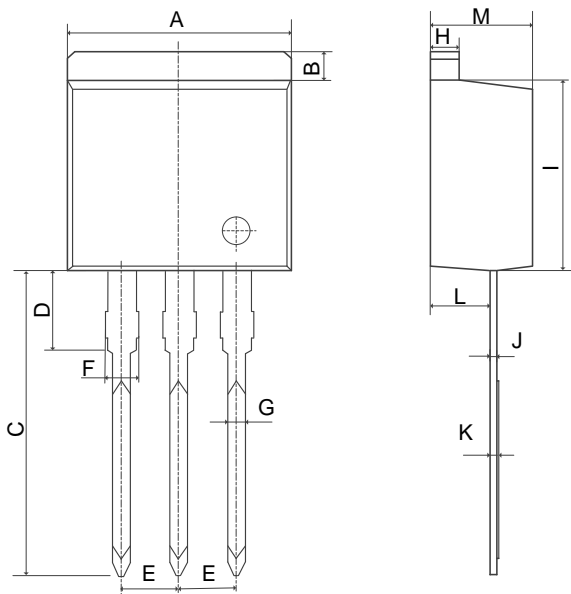
Mechanical Dimensions for TO-263



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	10.00	10.40
B	1.11	1.41
C	1.25	1.55
D	5.10	5.50
E	1.12	1.42
F	0.71	0.91
G	2.39	2.69
H	4.49	4.89
I	1.17	1.37
J	8.45	8.85
K	2.54	2.84
L	0.28	0.48

Mechanical Dimensions for TO-262



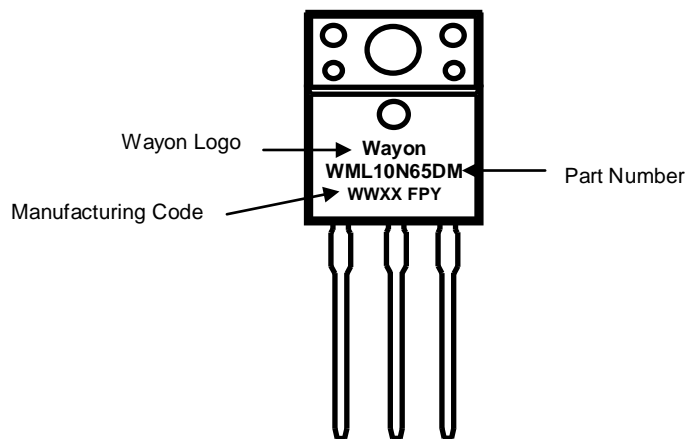
COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	10.00	10.40
B	1.11	1.41
C	13.56	14.16
D	3.58	3.98
E	2.39	2.69
F	1.07	1.47
G	0.71	0.91
H	1.17	1.37
I	8.45	8.85
J	0.28	0.48
K	0.32	0.52
L	2.54	2.84
M	4.50	4.90

Ordering Information

Part	Package	Marking	Packing method	Quantity
WMK10N65DM	TO-220	WMK10N65DM	Tube	50
WML10N65DM	TO-220F	WML10N65DM	Tube	50
WMM10N65DM	TO-263	WMM10N65DM	Tape and Reel	800
WMN10N65DM	TO-262	WMN10N65DM	Tube	50

Marking Information



Contact Information

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