

700V 1.2Ω Zener-protected Power MOSFET

Description

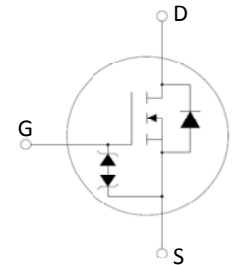
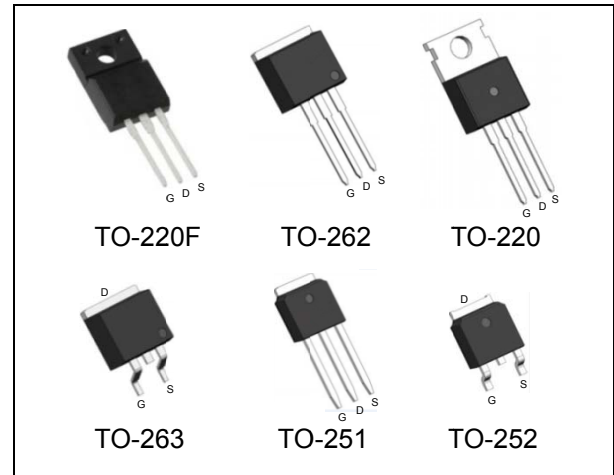
WMOS™ MM is Wayon's new generation super junction MOSFET family that is utilizing charge balance technology for extremely low on-resistance and low gate charge performance. WMOS™ MM is suitable for applications which require superior power density and outstanding efficiency.

Features

- $V_{DS} = 750V @ T_{j,max}$
- Typ. $R_{DS(on)} = 1.2\Omega$
- Ultra low gate charge (Typ. $Q_g = 5.3nC$)
- Zener-protected

Application

LED Lighting, Charger, Adapter, PC, LCD TV



Absolute Maximum Ratings

Parameter	Symbol	WMx05N70MM	WML05N70MM	Unit
Drain-Source Voltage	V_{DSS}	700		V
Continuous drain current ¹⁾ ($T_C = 25^\circ C$)	I_D	5.4		A
		3.2		A
Pulsed drain current ²⁾	I_{DM}	8.8		A
Gate-Source voltage	V_{GSS}	± 30		V
Avalanche energy, single pulse ³⁾	E_{AS}	35		mJ
Avalanche energy, repetitive	E_{AR}	0.1		mJ
Avalanche current, repetitive	I_{AR}	0.6		A
Power Dissipation ($T_C = 25^\circ C$) - Derate above $25^\circ C$	P_D	42	23	W
		0.34	0.18	W/ $^\circ C$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150		$^\circ C$
Continuous diode forward current ¹⁾	I_S	5.4		A
Diode pulse current ²⁾	$I_{S,pulse}$	8.8		A

Thermal Characteristics

Parameter	Symbol	WMx05N70MM	WML05N70MM	Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	3	5.4	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	80	$^\circ C/W$

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}	$V_{GS}=0\text{ V}, I_D=0.25\text{ mA}$	700	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=0.25\text{ mA}$	2.5	3.5	4.5	V
Drain cut-off current	I_{DSS}	$V_{DS}=700\text{ V}, V_{GS}=0\text{ V},$ $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	-	-	1	μA
Gate leakage current, Forward	I_{GSSF}	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$	-	-	1	μA
Gate leakage current, Reverse	I_{GSSR}	$V_{GS}=-20\text{ V}, V_{DS}=0\text{ V}$	-	-	-1	μA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10\text{ V}, I_D=0.8\text{ A}$ $T_j = 25^\circ\text{C}$	-	1.2	1.55	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	$V_{DS}=100\text{ V}, V_{GS}=0\text{ V},$ $f = 1\text{ MHz}$	-	227	-	pF
Output capacitance	C_{oss}		-	11	-	
Reverse transfer capacitance	C_{rss}		-	0.9	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 300\text{ V}, I_D = 2\text{ A}$ $R_G = 25\Omega, V_{GS}=10\text{ V}$	-	8	-	ns
Rise time	t_r		-	23	-	
Turn-off delay time	$t_{d(off)}$		-	49	-	
Fall time	t_f		-	18	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	$V_{DD}=480\text{ V}, I_D=2\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	1.3	-	nC
Gate to drain charge	Q_{gd}		-	2.1	-	
Gate charge total	Q_g		-	5.3	-	
Gate plateau voltage	$V_{plateau}$		-	5	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=1\text{ A}$	-	-	1.2	V
Reverse recovery time	t_{rr}	$V_R=50\text{ V}, I_F=2\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	135	-	ns
Reverse recovery charge	Q_{rr}		-	0.65	-	μC
Peak reverse recovery current	I_{rrm}		-	7.5	-	A

Notes:

1. DPAK equivalent. Limited by T_{Jmax} . Maximum duty cycle $D=0.5$
2. Pulse width t_p limited by T_{Jmax}
3. $I_{AS} = 0.6\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\Omega$, Starting $T_j = 25^\circ\text{C}$

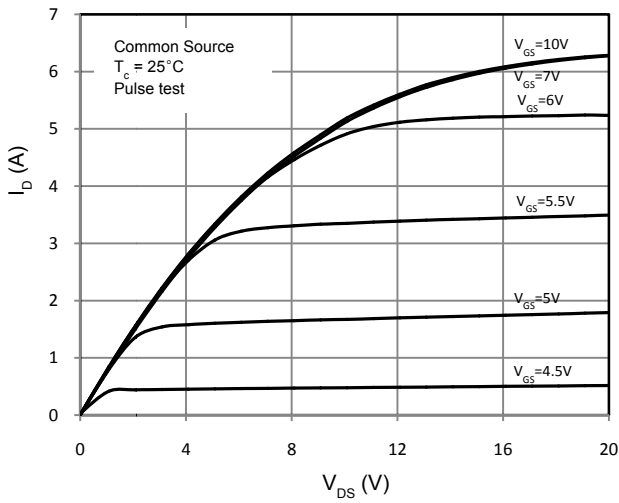


Figure 1. On-Region Characteristics

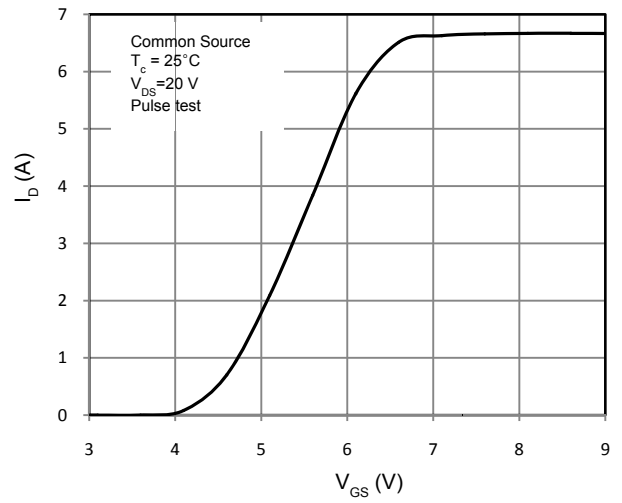


Figure 2. Transfer Characteristics

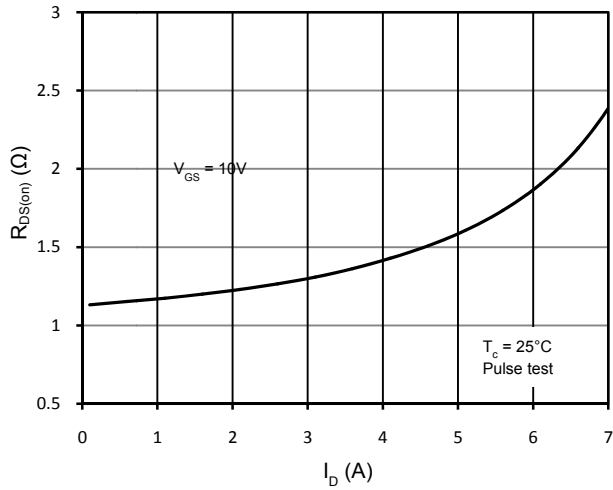


Figure 3. Static Drain-Source On Resistance

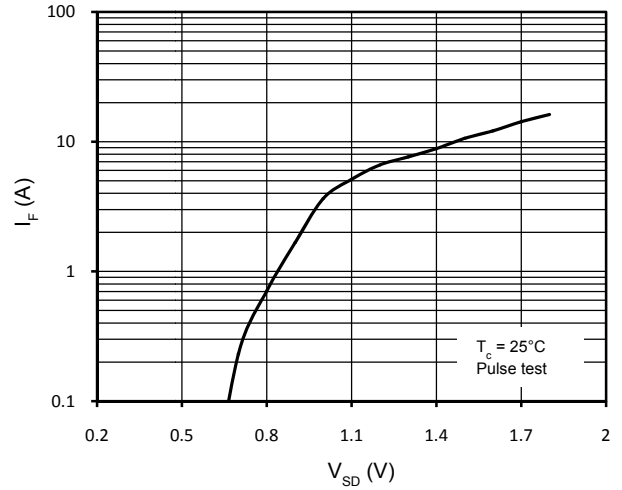


Figure 4. Body-Diode Forward Characteristics

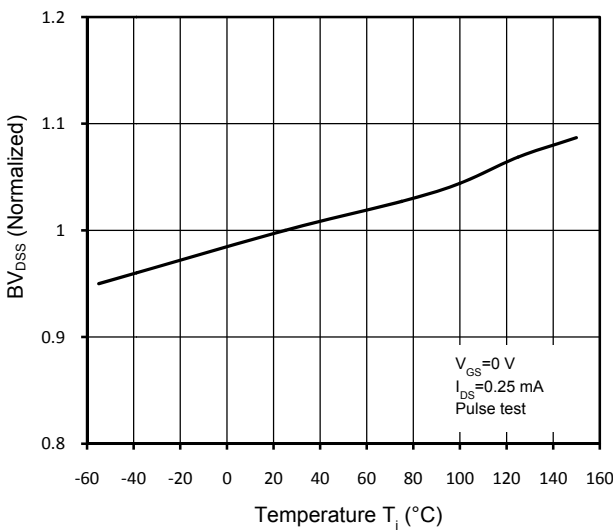


Figure 5. Normalized BV_{DS} vs. Temperature

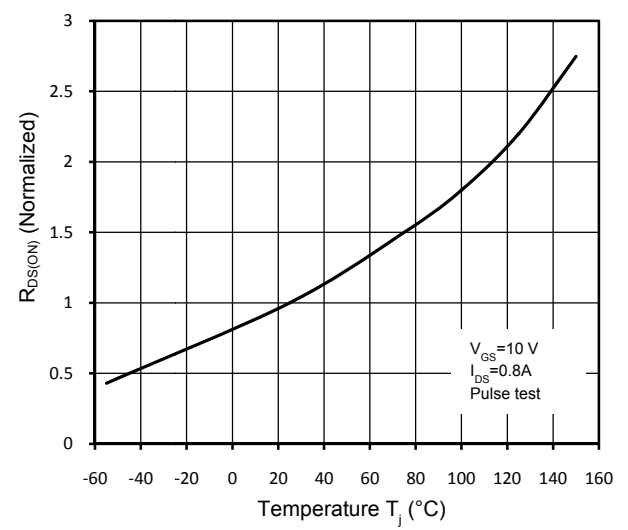


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

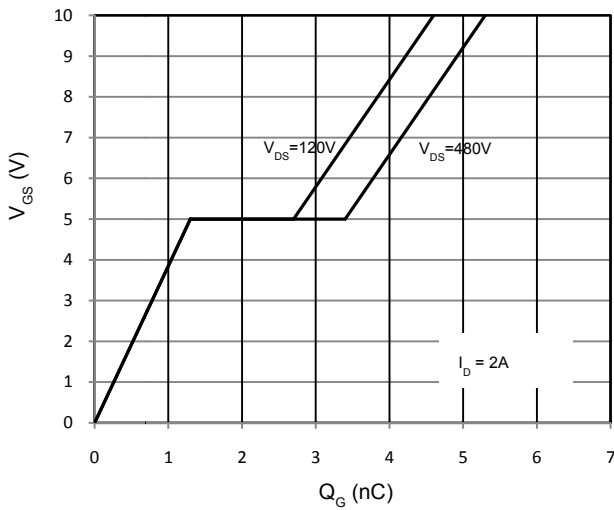


Figure 7. Gate Charge Characteristics

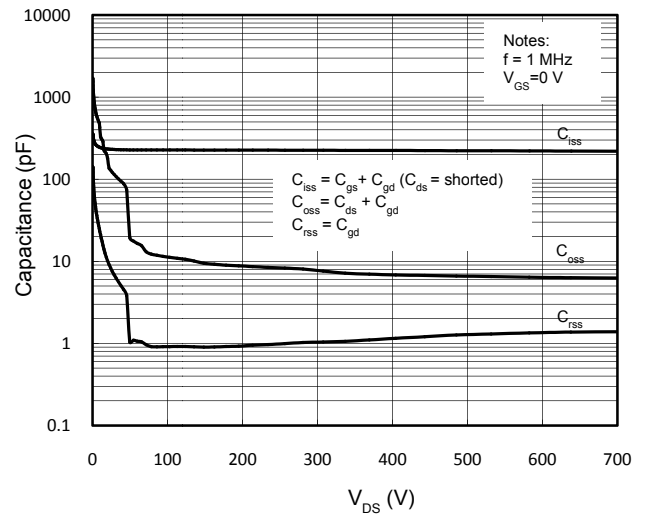


Figure 8. Capacitance Characteristics

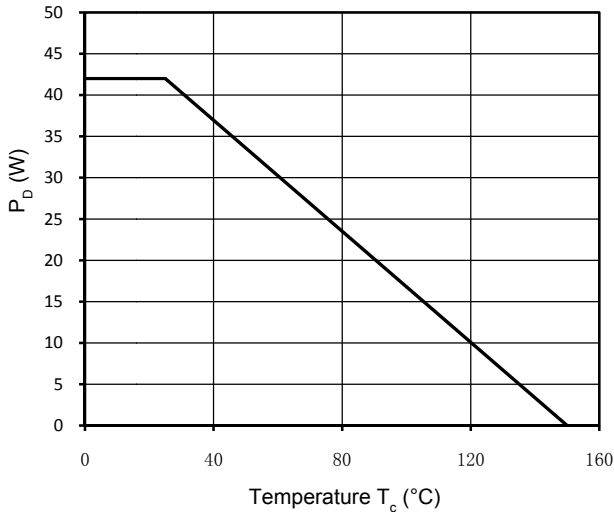


Figure 9. Power Dissipation

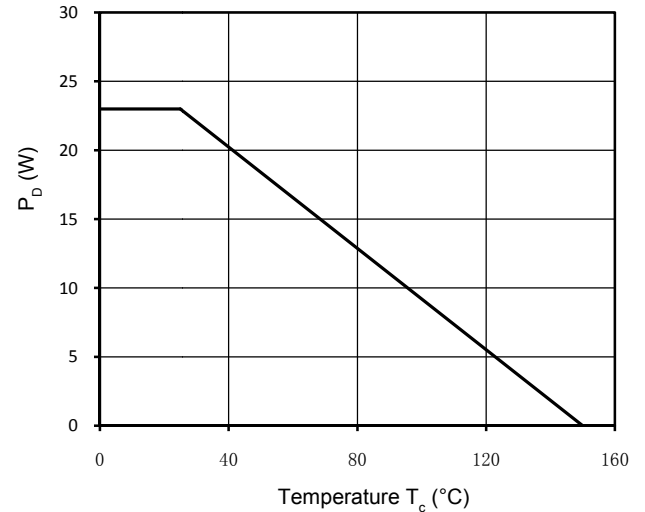


Figure 10. Power Dissipation (TO-220F)

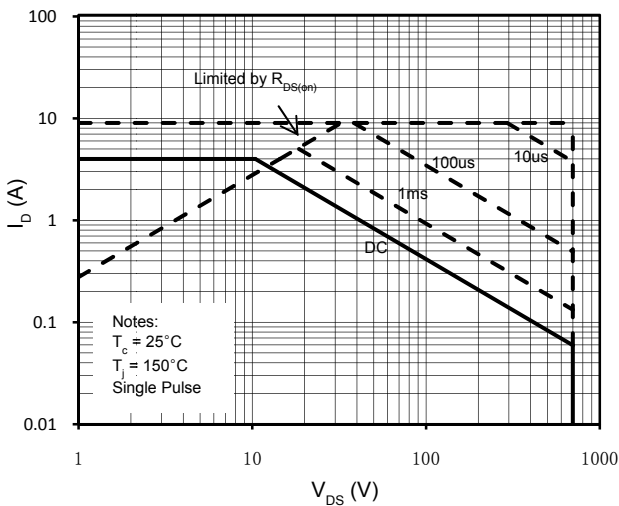


Figure 11. Maximum Safe Operating Area

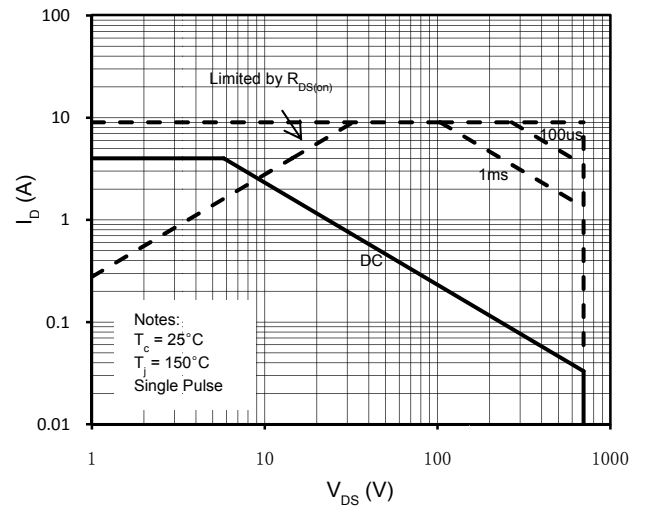


Figure 12. Maximum Safe Operating Area (TO-220F)

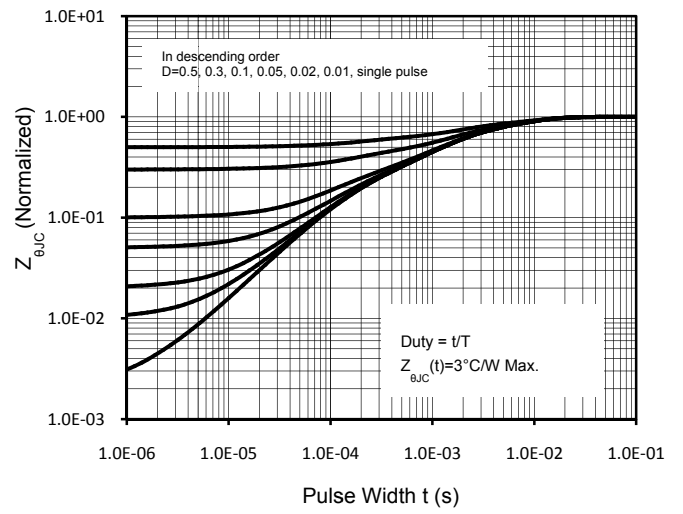
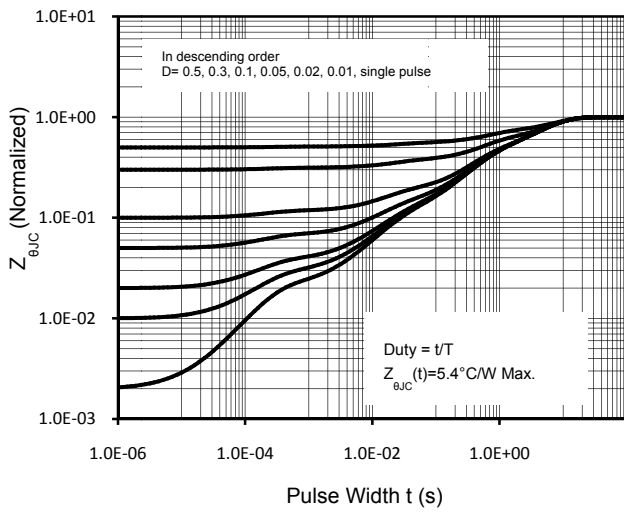
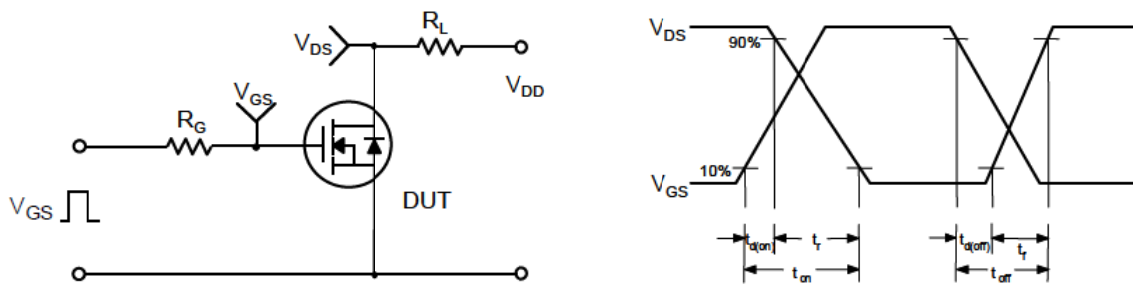


Figure 13. Transient Thermal Response Curve (TO-220F) Figure 14. Transient Thermal Response Curve

Gate Charge Test Circuit & Waveform



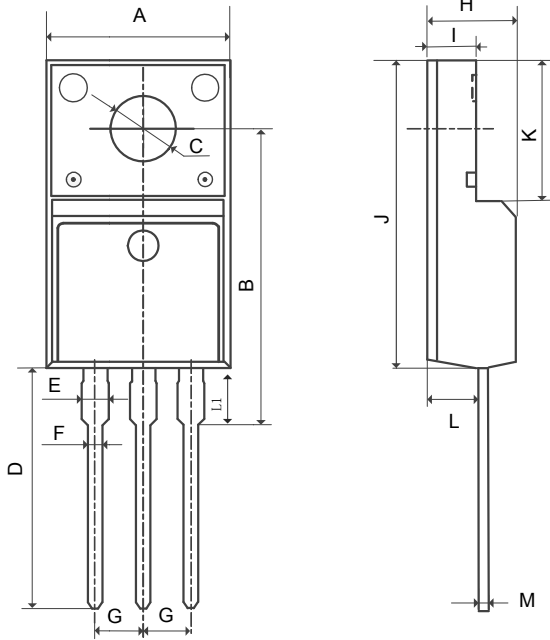
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



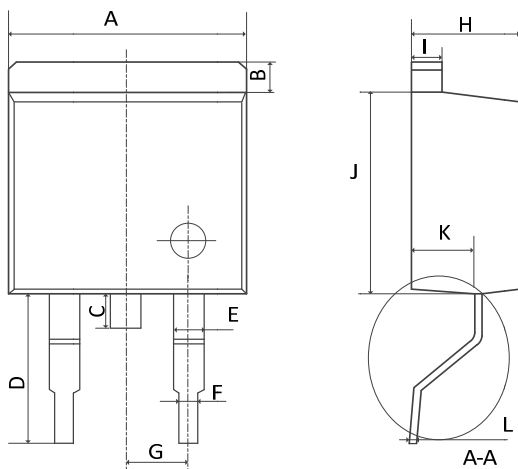
Mechanical Dimensions for TO-220F



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

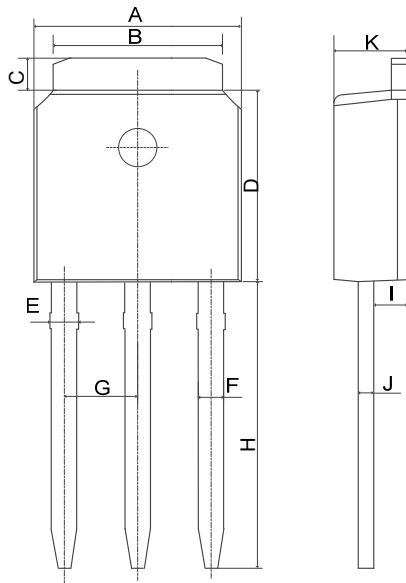
Mechanical Dimensions for TO-263



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	0.92
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	0.49

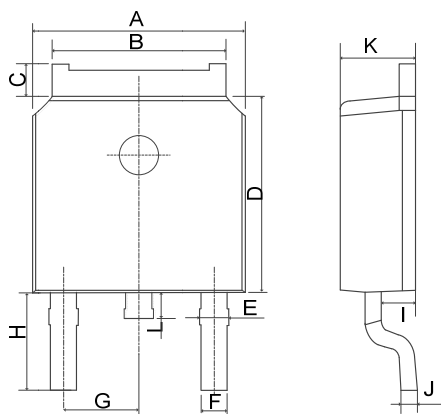
Mechanical Dimensions for TO-251



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

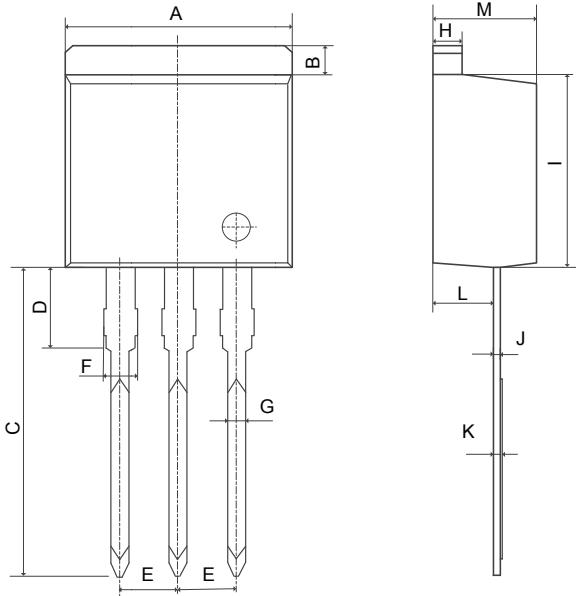
Mechanical Dimensions for TO-252



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

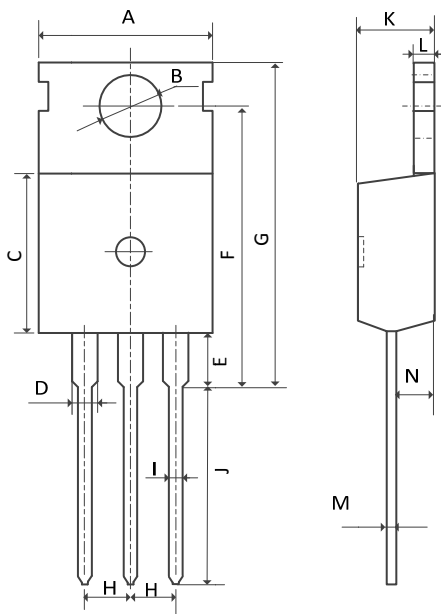
Mechanical Dimensions for TO-262



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	0.92
H	1.17	1.37
I	8.45	8.85
J	0.28	0.49
K	0.32	0.52
L	2.54	2.85
M	4.50	4.90

Mechanical Dimensions for TO-220



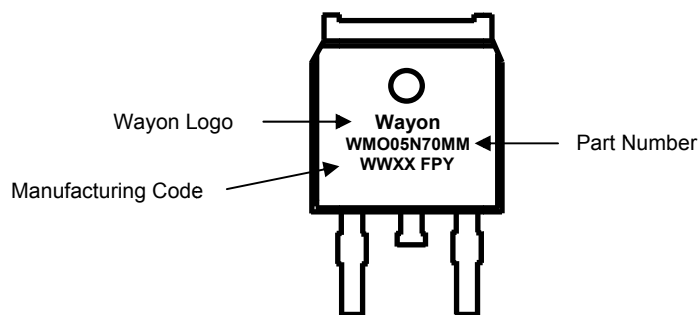
COMMON DIMENSIONS

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
WML05N70MM	TO-220F	WML05N70MM	Tube
WMK05N70MM	TO-220	WMK05N70MM	Tube
WMN05N70MM	TO-262	WMN05N70MM	Tube
WMM05N70MM	TO-263	WMM05N70MM	Tape and Reel
WMO05N70MM	TO-252	WMO05N70MM	Tape and Reel
WMP05N70MM	TO-251	WMP05N70MM	Tube

Marking Information



Contact Information

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