

## 650V 1.0Ω Super Junction Power MOSFET

### Description

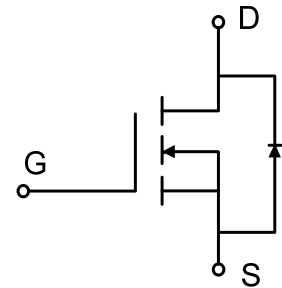
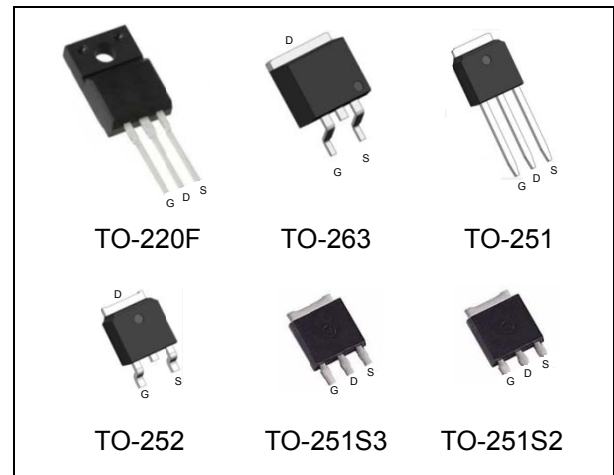
WMOS™ C2 is Wayon's 2<sup>nd</sup> generation super junction MOSFET family that is utilizing charge balance technology for extremely low on-resistance and low gate charge performance. WMOS™ C2 is suitable for applications which require superior power density and outstanding efficiency.

### Features

- $V_{DS} = 700V @ T_{j,max}$
- Typ.  $R_{DS(on)} = 1.0\Omega$
- 100% UIS tested
- Pb-free plating, Halogen free

### Applications

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



### Absolute Maximum Ratings

Parameter	Symbol	WMH/WMM/WMO/WMP/WMG	WML	Unit
Drain-source voltage	$V_{DSS}$	650		V
Continuous drain current <sup>1)</sup> ( $T_C = 25^\circ C$ )	$I_D$	5		A
		3		A
Pulsed drain current <sup>2)</sup>	$I_{DM}$	9		A
Gate-source voltage	$V_{GS}$	$\pm 30$		V
Avalanche energy, single pulse <sup>3)</sup>	$E_{AS}$	15		mJ
Avalanche energy, repetitive <sup>2)</sup>	$E_{AR}$	0.1		mJ
Avalanche current, repetitive <sup>2)</sup>	$I_{AR}$	0.7		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	$I_S$	5		A
Diode pulse current	$I_{S,pulse}$	9		A

### Thermal Characteristics

Parameter	Symbol	WMH/WMM/WMO/WMP/WMG	WML	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
<b>Static characteristics</b>						
Drain-source breakdown voltage	$BV_{DSS}$	$V_{GS}=0\text{ V}, I_D=0.25\text{ mA}$	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=0.25\text{ mA}$	2.5	3.3	4.5	V
Drain cut-off current	$I_{DSS}$	$V_{DS}=650\text{ V}, V_{GS}=0\text{ V},$ $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	-	-	1	$\mu\text{A}$
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	$R_{DS(on)}$	$V_{GS}=10\text{ V}, I_D=2\text{ A}$ $T_j = 25^\circ\text{C}$	-	1.0	1.14	$\Omega$
<b>Dynamic characteristics</b>						
Input capacitance	$C_{iss}$	$V_{DS}=25\text{ V}, V_{GS}=0\text{ V},$ $f = 1\text{ MHz}$	-	270	-	pF
Output capacitance	$C_{oss}$		-	200	-	
Reverse transfer capacitance	$C_{rss}$		-	2	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=300\text{ V}, I_D=2\text{ A}$ $R_G=25\Omega, V_{GS}=10\text{ V}$	-	5	-	ns
Rise time	$t_r$		-	16	-	
Turn-off delay time	$t_{d(off)}$		-	24	-	
Fall time	$t_f$		-	12	-	
<b>Gate charge characteristics</b>						
Gate to source charge	$Q_{gs}$	$V_{DD}=480\text{ V}, I_D=2\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	1.6	-	nC
Gate to drain charge	$Q_{gd}$		-	1.7	-	
Gate charge total	$Q_g$		-	5.8	-	
Gate plateau voltage	$V_{plateau}$		-	5	-	V
<b>Reverse diode characteristics</b>						
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=2\text{ A}$	-	-	1.2	V
Reverse recovery time	$t_{rr}$	$V_R=50\text{ V}, I_F=2\text{ A},$ $dI_F/dt=100\text{ A}/\mu\text{s}$	-	163	-	ns
Reverse recovery charge	$Q_{rr}$		-	0.84	-	$\mu\text{C}$
Peak reverse recovery current	$I_{rrm}$		-	10.3	-	A

## Notes:

- Limited by  $T_{j\max}$ . Maximum duty cycle  $D=0.5$ .
- Repetitive rating: pulse width limited by maximum junction temperature
- $I_{AS} = 0.7\text{ A}$ ,  $V_{DD} = 50\text{ V}$ ,  $R_G = 25\Omega$ , starting  $T_j = 25^\circ\text{C}$

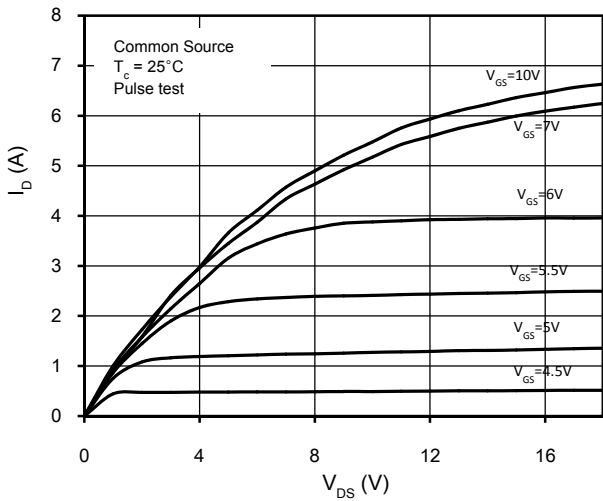


Figure 1. On-Region Characteristics

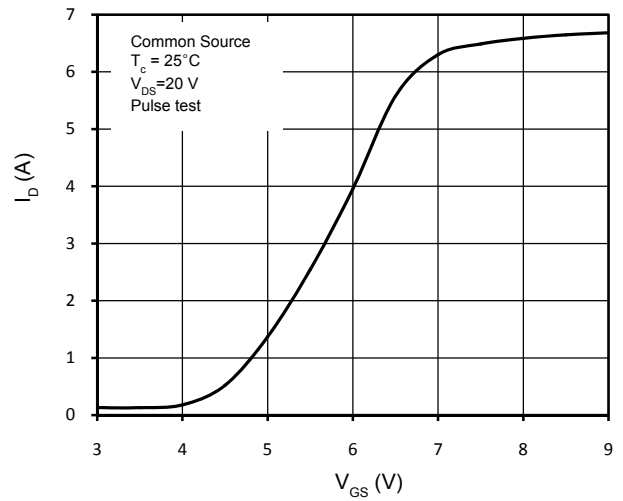


Figure 2. Transfer Characteristics

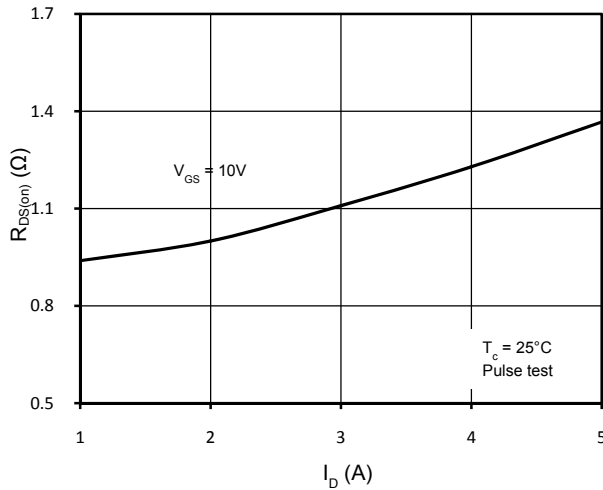


Figure 3. Static Drain-Source On Resistance

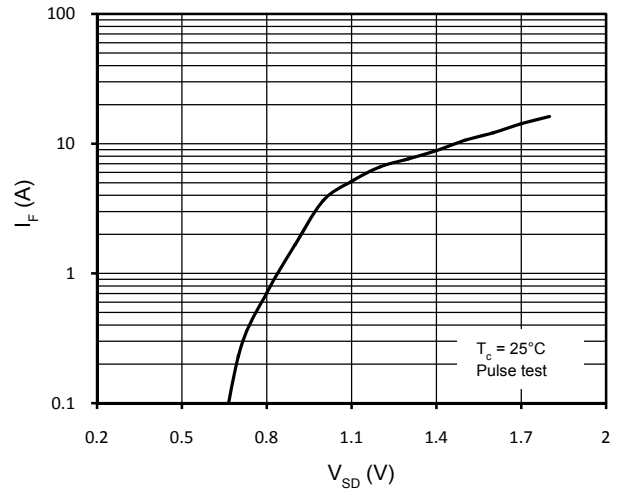


Figure 4. Body-Diode Forward Characteristics

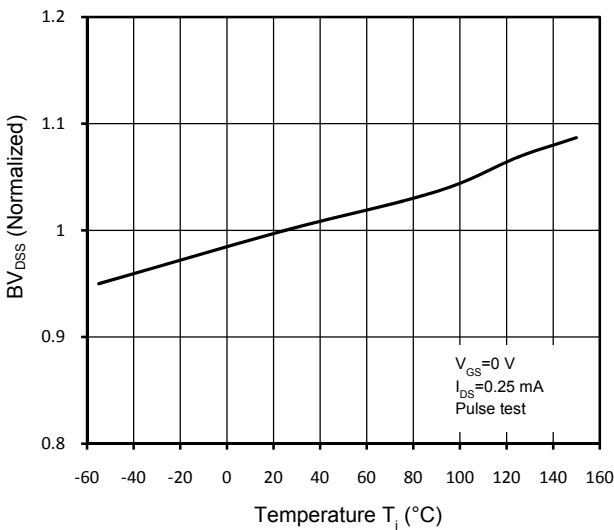


Figure 5. Normalized BV<sub>DS</sub> vs. Temperature

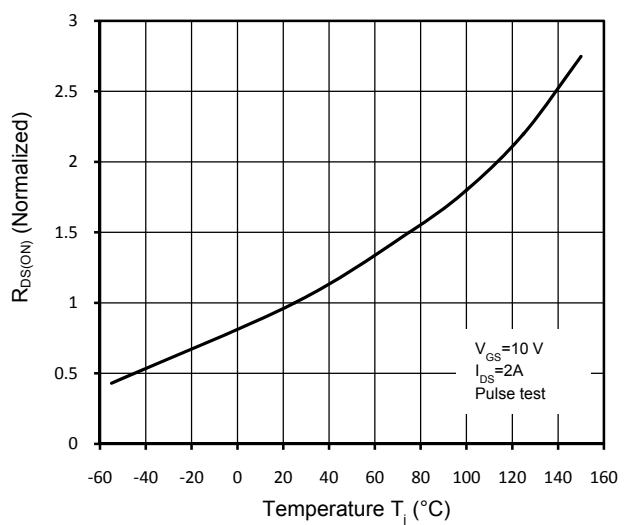


Figure 6. Normalized R<sub>DS(on)</sub> vs. Temperature

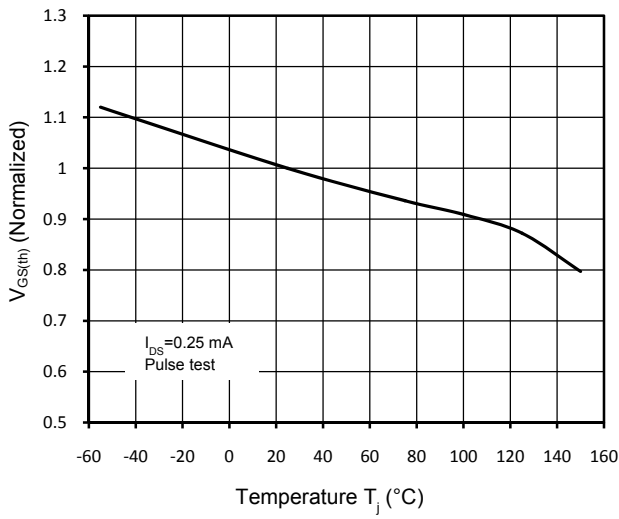


Figure 7. Threshold Voltage vs. Temperature

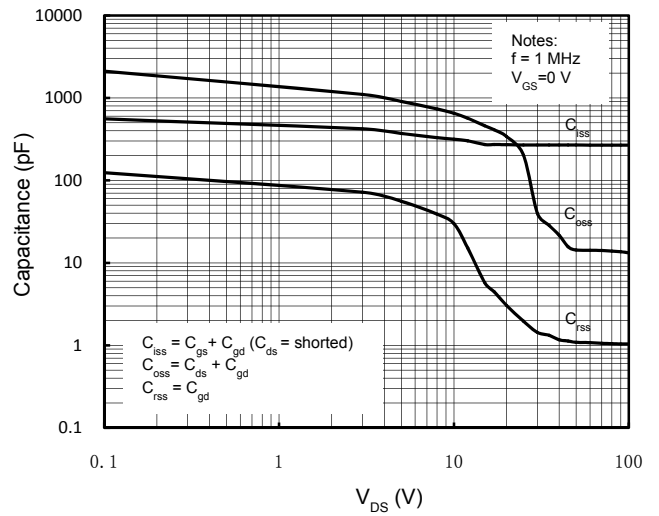


Figure 8. Capacitance Characteristics

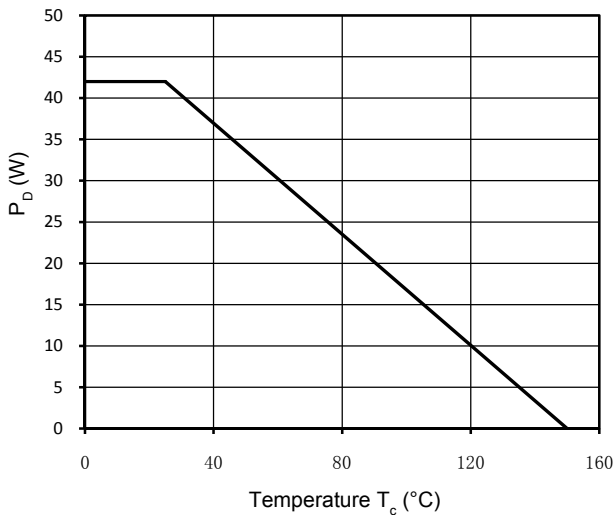


Figure 9. Power Dissipation

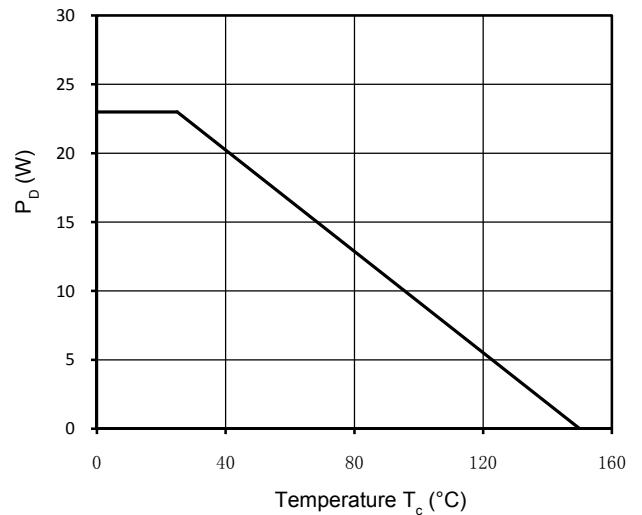


Figure 10. Power Dissipation (TO-220F)

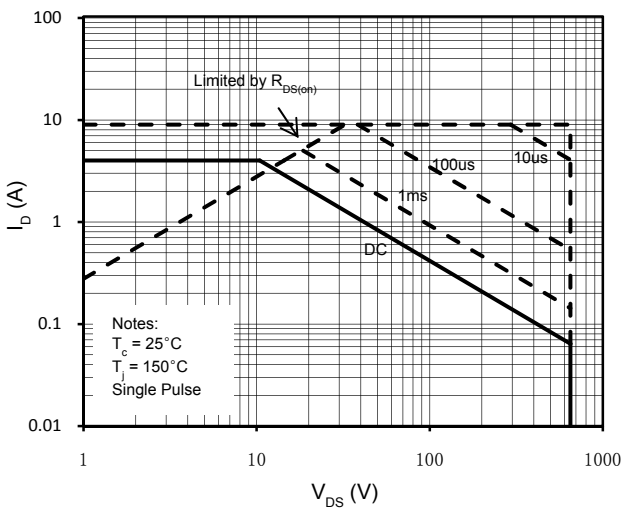


Figure 11. Maximum Safe Operating Area

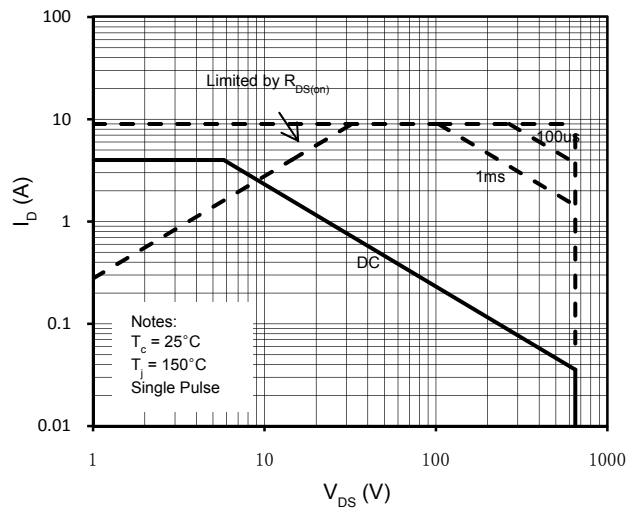


Figure 12. Maximum Safe Operating Area (TO-220F)

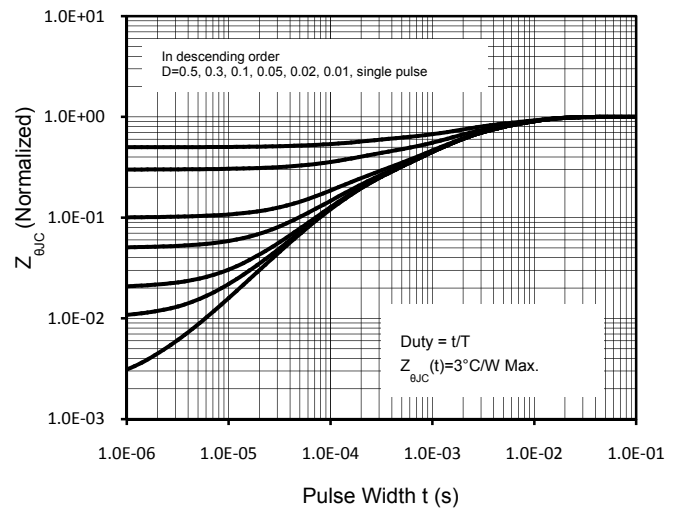
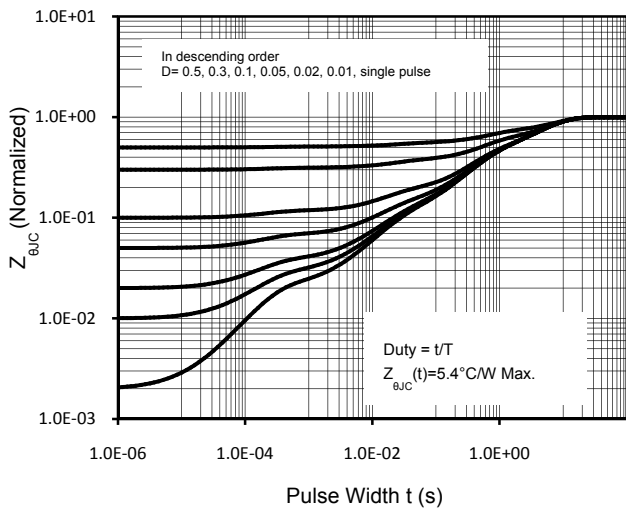


Figure 13. Transient Thermal Response Curve (TO-220F) Figure 14. Transient Thermal Response Curve

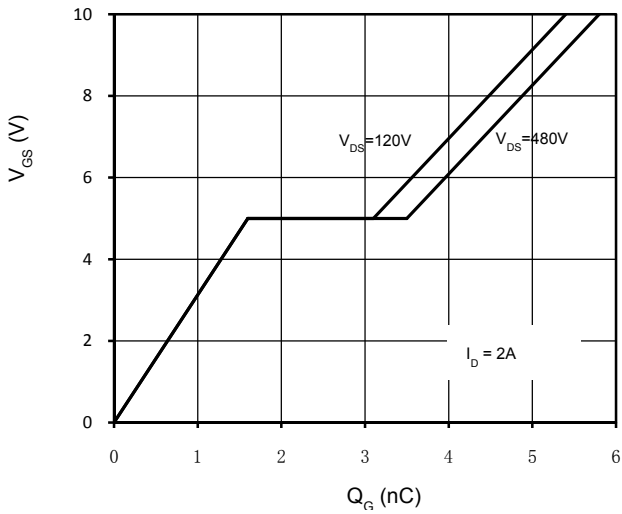


Figure 15. Gate Charge Characteristics

**Gate Charge Test Circuit & Waveform**



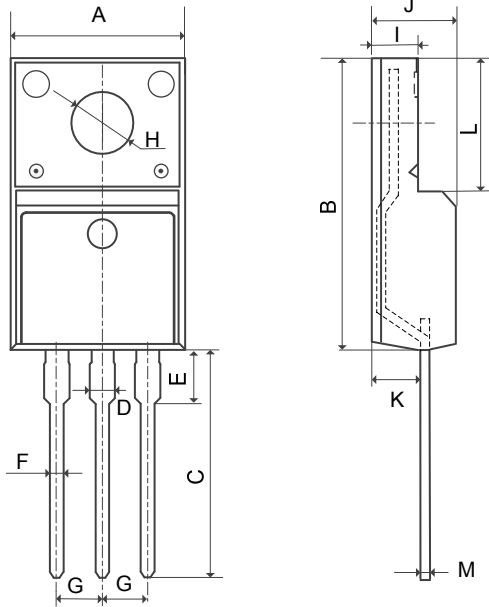
**Switching Test Circuit & Waveforms**



**Unclamped Inductive Switching Test Circuit & Waveforms**



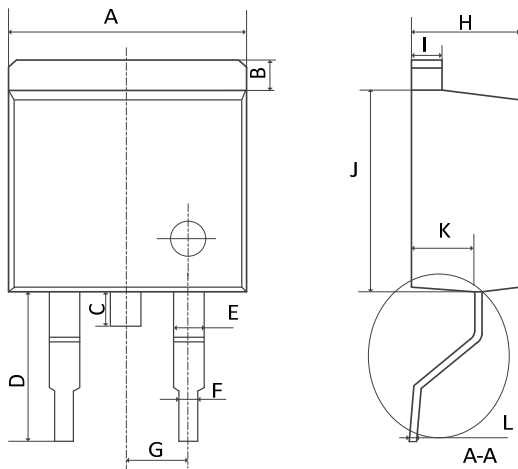
**Mechanical Dimensions for TO-220F**



**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

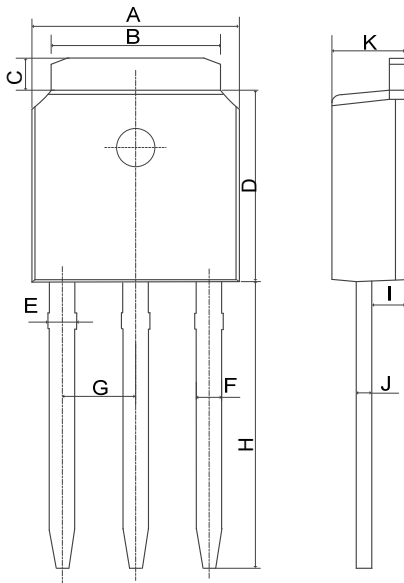
**Mechanical Dimensions for TO-263**



**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

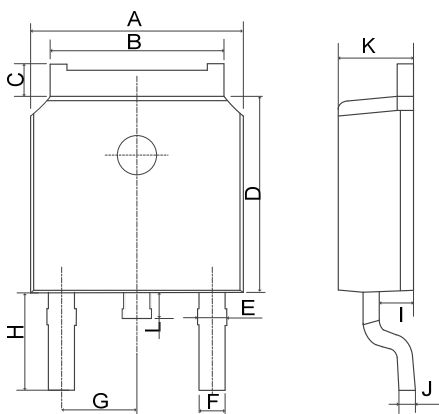
**Mechanical Dimensions for TO-251**



**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

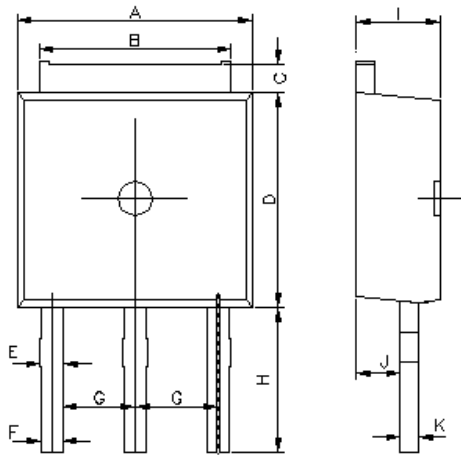
**Mechanical Dimensions for TO-252**



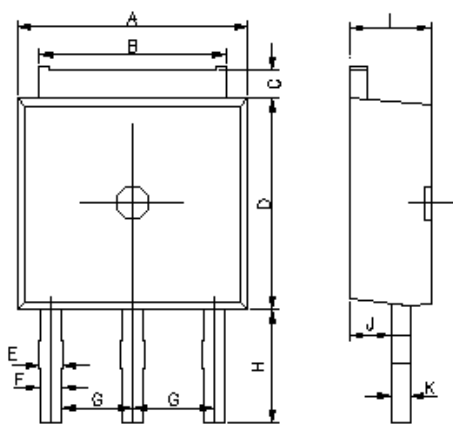
**COMMON DIMENSIONS**

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-251S3**

**COMMON DIMENSIONS**

SYMBOL	MM	
	MIN	MAX
A	6.40	6.80
B	5.15	5.48
C	0.71	1.02
D	5.95	6.35
E	0.70	1.00
F	0.70	0.90
G	2.13	2.44
H	3.20	3.80
I	2.10	2.50
J	0.85	1.15
K	0.40	0.61

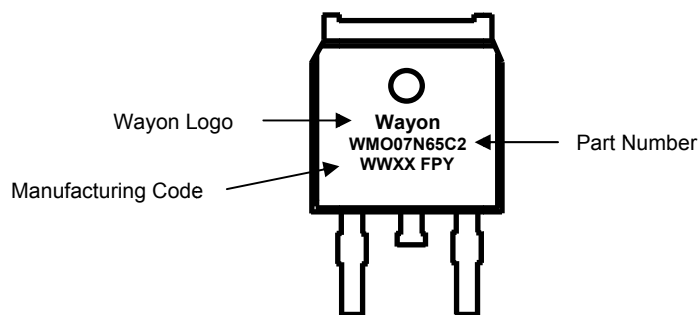
**Mechanical Dimensions for TO-251S2**

**COMMON DIMENSIONS**

SYMBOL	MM	
	MIN	MAX
A	6.40	6.80
B	5.15	5.48
C	0.71	1.02
D	5.95	6.35
E	0.70	1.00
F	0.70	0.90
G	2.13	2.44
H	2.20	2.80
I	2.10	2.50
J	0.85	1.15
K	0.40	0.61

## Ordering Information

Part	Package	Marking	Packing method
WML07N65C2	TO-220F	WML07N65C2	Tube
WMM07N65C2	TO-263	WMM07N65C2	Tape and Reel
WMO07N65C2	TO-252	WMO07N65C2	Tape and Reel
WMP07N65C2	TO-251	WMP07N65C2	Tube
WMG07N65C2	TO-251S3	WMG07N65C2	Tube
WMH07N65C2	TO-251S2	WMH07N65C2	Tube

## Marking Information



## Contact Information

### CYG WAYON CIRCUIT PROTECTION CO., LTD.

No.1001, Shiwan(7) Road, Pudong District, Shanghai, P.R.China.201202

Tel: 86-21-50310888 Fax: 86-21-50757680 Email: market@way-on.com

WAYON website: <http://www.way-on.com>

For additional information, please contact your local Sales Representative.

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