

## 1500V 4A 5.4Ω N-ch Power MOSFET

### Description

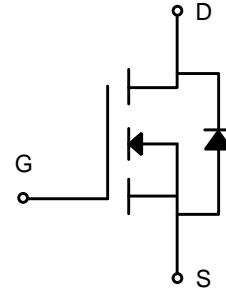
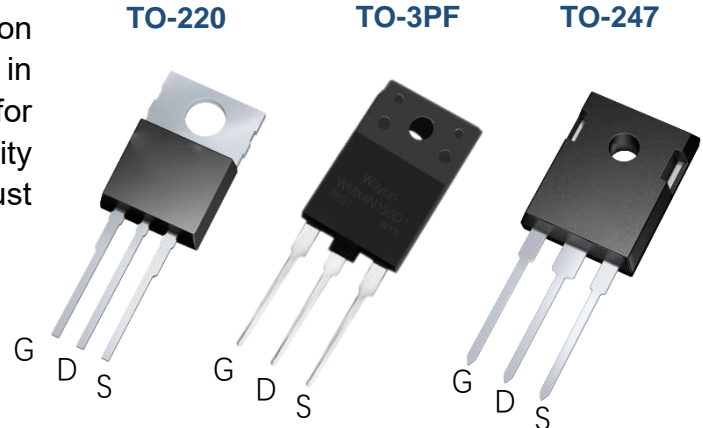
WMOS™ D1 is Wayon's 1<sup>st</sup> generation VDMOS family that is dramatic reduction in on-resistance and ultra-low gate charge for applications requiring high power density and high efficiency. And it is very robust and RoHS compliant.

### Features

- Typ.  $R_{DS(on)}=5.4\Omega@V_{GS}=10V$
- 100% avalanche tested
- Pb-free, Halogen free

### Applications

- SMPS
- Charger
- DC-DC



### Absolute Maximum Ratings (T<sub>c</sub>=25°C)

Parameter	Symbol	WMK4N150D1	WMX4N150D1	WMJ4N150D1	Unit
Drain-source voltage	V <sub>DSS</sub>		1500		V
Gate-Source Voltage	V <sub>GS</sub>		±30		V
Continuous drain current	I <sub>D</sub>		4		A
Pulsed drain current	I <sub>DM</sub>		16		A
Avalanche energy, single pulse	E <sub>AS</sub>		350		mJ
Power dissipation	P <sub>D</sub>	125	90	125	W
Derate above 25°C		1	0.72	1	W/°C
Operating Junction Temperature	T <sub>j</sub>		-55~150		°C
Storage Temperature	T <sub>stg</sub>		-55~150		°C
Continuous diode forward current	I <sub>S</sub>		4		A
Diode pulse current	I <sub>Spulse</sub>		16		A
Insulation withstand voltage (RMS) from all three leads to external heat sink (t=1s, T <sub>c</sub> =25°C)	V <sub>ISO</sub>		3500		V

### Thermal Characteristic

Thermal resistance, junction-to-case	$R_{\theta JC}$	1	1.38	1	$^{\circ}\text{C/W}$
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	65	50	50	$^{\circ}\text{C/W}$

### Electrical Characteristics of MOSFET

				Min.	Typ.	Max.	
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	$T_C=25^{\circ}\text{C}$	1500	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\mu\text{A}, V_{DS}=V_{GS}$	$T_J=25^{\circ}\text{C}$	2.5	3.5	4.5	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=1500\text{V}, V_{GS}=0\text{V}$	$T_J=25^{\circ}\text{C}$	-	-	1	$\mu\text{A}$
		$V_{DS}=1200\text{V}, V_{GS}=0\text{V}$	$T_J=125^{\circ}\text{C}$	-	-	500	$\mu\text{A}$
Gate-Source leakage current, forward	$I_{GSSF}$	$V_{DS}=0\text{V}, V_{GS}=30\text{V}$	$T_J=25^{\circ}\text{C}$	-	-	100	nA
Gate-Source leakage current, reverse	$I_{GSSR}$	$V_{DS}=0\text{V}, V_{GS}=-30\text{V}$	$T_J=25^{\circ}\text{C}$	-	-	-100	nA
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10\text{V}, I_D=2\text{A}$	$T_J=25^{\circ}\text{C}$	-	5.4	6.2	$\Omega$
Transconductance	$G_{fs}$	$V_{DS}=20\text{V}$	$T_J=25^{\circ}\text{C}$	-	5.7	-	S

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

				Min.	Typ.	Max.	
Input Capacitance	$C_{iss}$	$f=1\text{MHz}, V_{DS}=25\text{V}, V_{GS}=0\text{V}$		-	1800	-	pF
Output Capacitance	$C_{oss}$			-	100	-	pF
Reverse Transfer Capacitance	$C_{rss}$			-	11	-	pF
Gate to Source Charge	$Q_{gs}$	$V_{DD}=750\text{V}$		-	8	-	nC
Gate to Drain Charge	$Q_{gd}$	$I_D=4\text{A}$		-	15	-	nC
Total Gate charge	$Q_g$	$V_{GS}=0\text{ to }10\text{V}$		-	41	-	nC

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

				Min.	Typ.	Max.	
Turn-on delay time	$t_{d on}$	$V_{DS}=750\text{V}, I_D=4\text{A}, R_G=4.7\Omega, V_{GS}=0\text{ to }10\text{V}$		-	18	-	ns
Rise time	$t_r$			-	10	-	ns
Turn-off delay time	$t_{d off}$			-	40	-	ns
Fall time	$t_f$			-	30	-	ns

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

				Min.	Typ.	Max.	
Forward voltage	$V_{SD}$	$I_{SD}=4\text{A}, V_{GS}=0\text{V}$		-	-	1.5	V
Reverse recovery time	$t_{rr}$	$V_{DS}=750\text{V}, I_F=4\text{A}, V_{GS}=0\text{V}$ $-di/dt=100\text{A}/\mu\text{s}$		-	274	-	ns
Reverse recovery current	$I_{rr}$			-	10	-	A
Recovery charge	$Q_{rr}$			-	1.35	-	$\mu\text{C}$

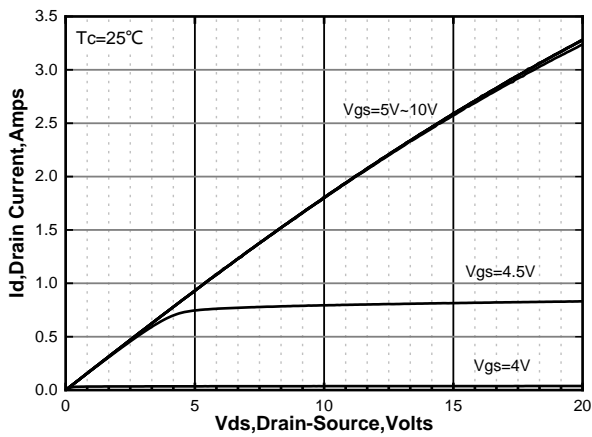


Figure 1. On-Region Characteristics

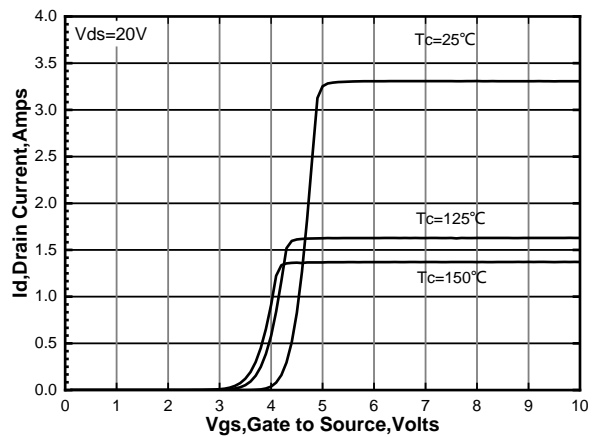


Figure 2. Transfer Characteristics

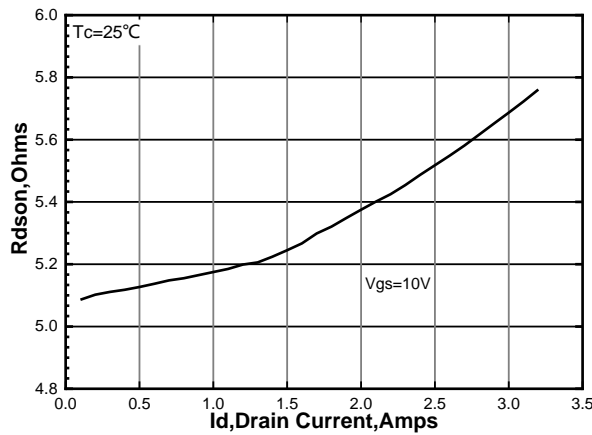


Figure 3. Static Drain-Source On Resistance

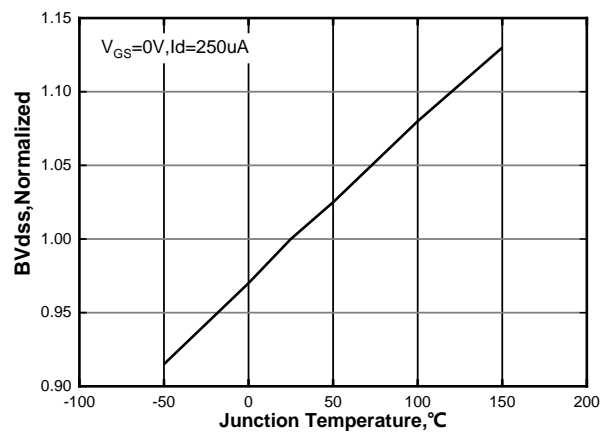


Figure 4. Normalized  $BV_{DSS}$  vs. Temperature

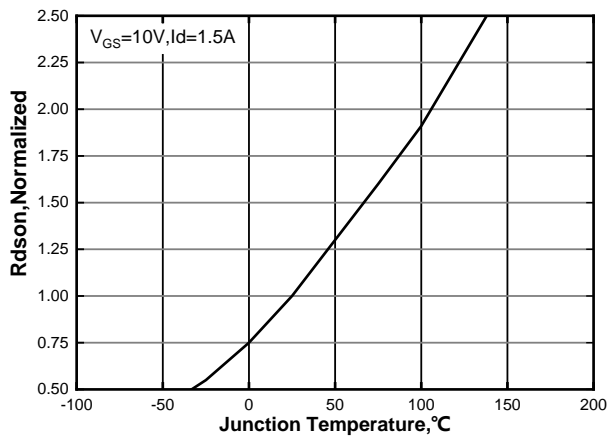


Figure 5. Normalized  $R_{DS(on)}$  vs. Temperature

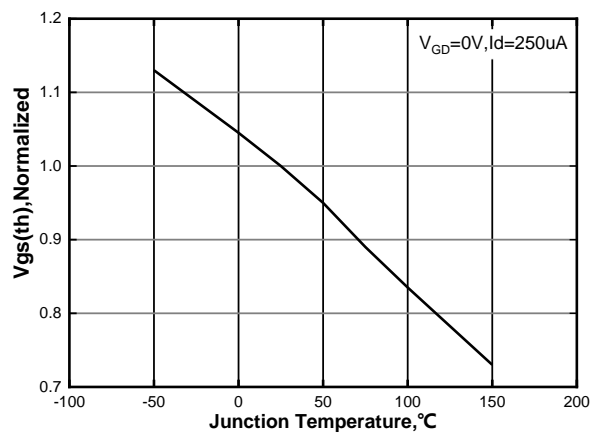


Figure 6. Normalized  $V_{GS(th)}$  vs. Temperature

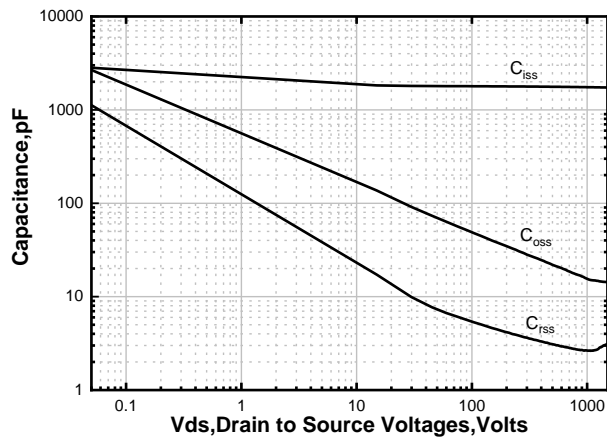


Figure 7. Capacitance Characteristics

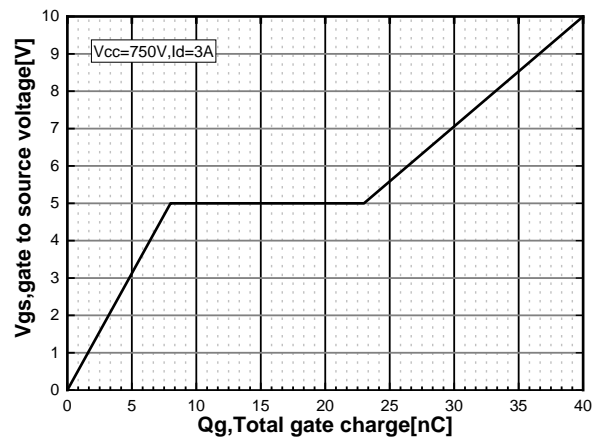


Figure 8. Gate Charge Characteristics

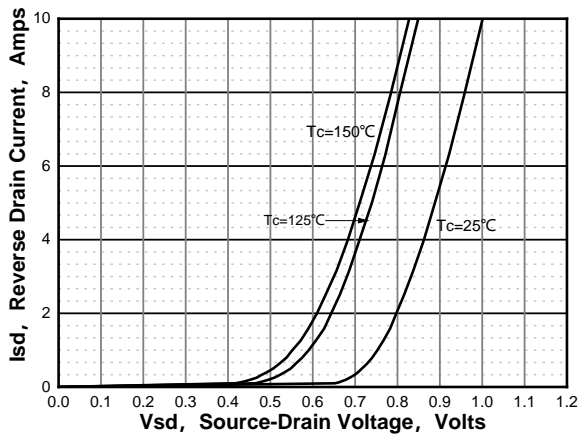


Figure 9. Typical Body Diode Transfer Characteristics

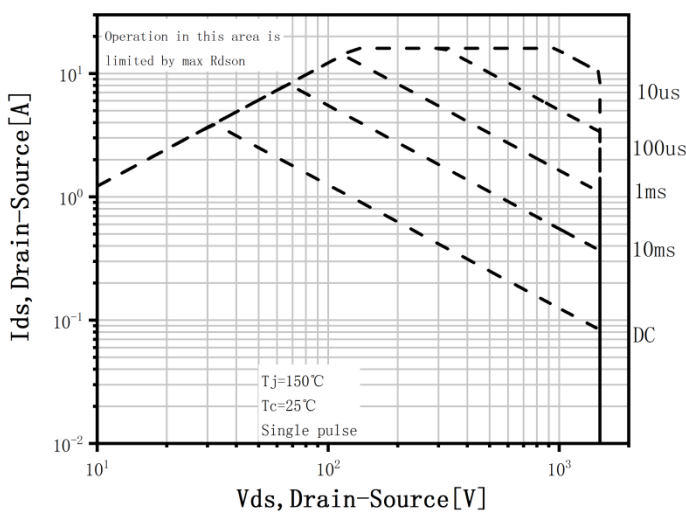


Figure 10. Maximum Safe Operating Area(TO-220)

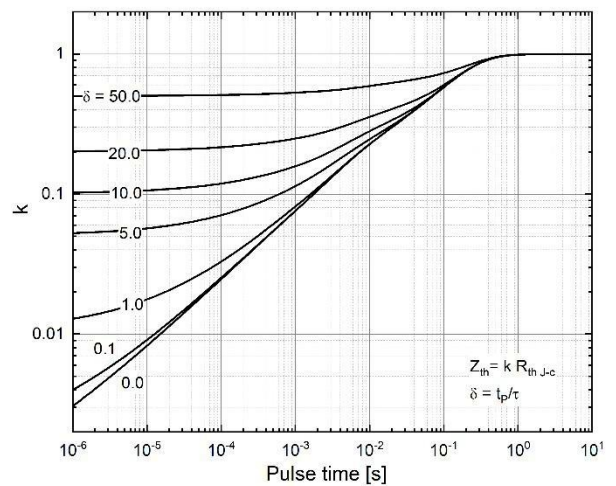


Figure 11. Transient Thermal Response Curve (TO-220)

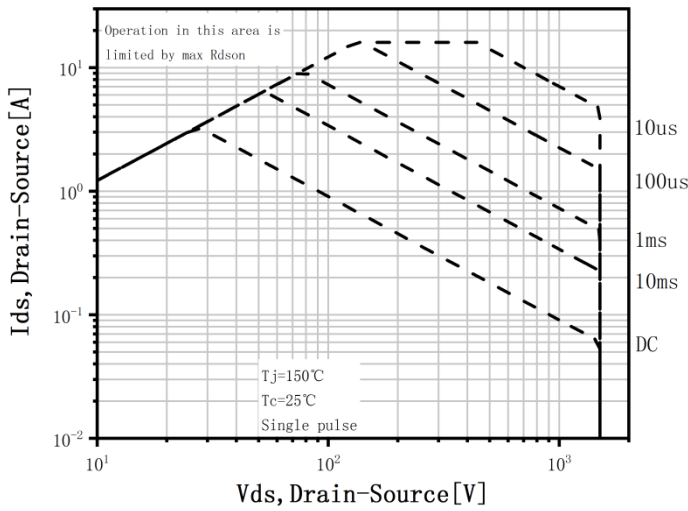


Figure 12. Maximum Safe Operating Area(TO-3PF)

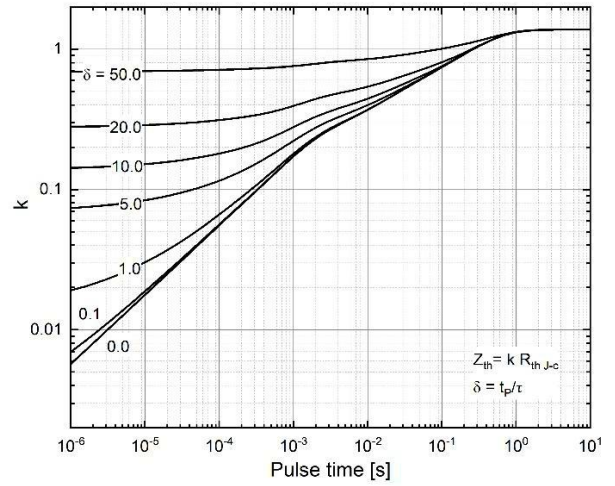


Figure 13. Transient Thermal Response Curve (TO-3PF)

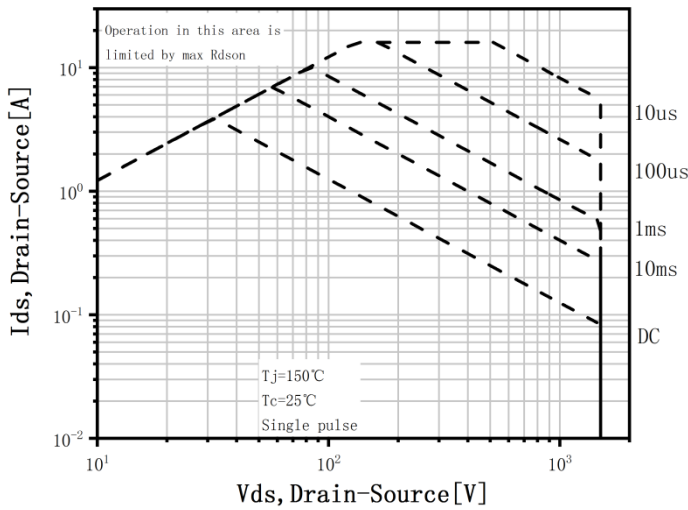


Figure 13. Maximum Safe Operating Area(TO-247)

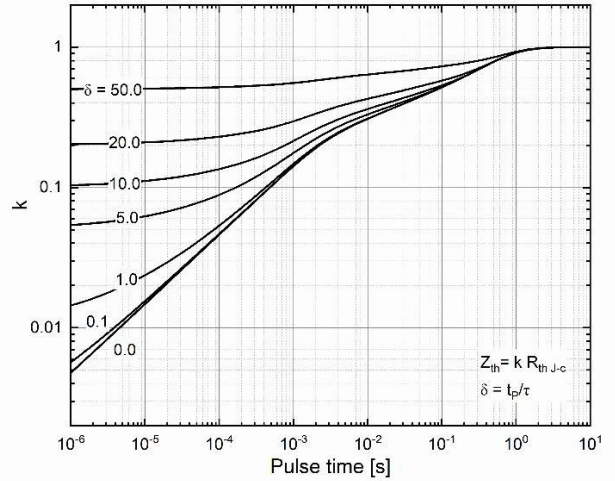
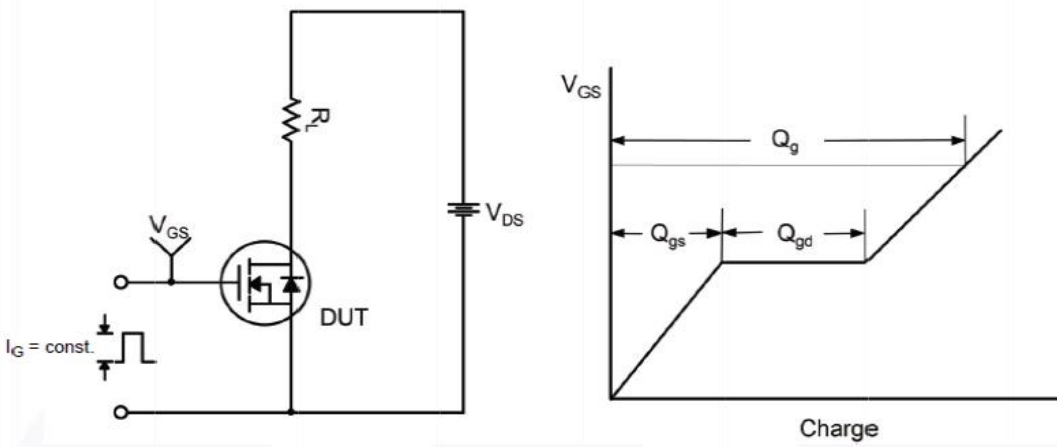
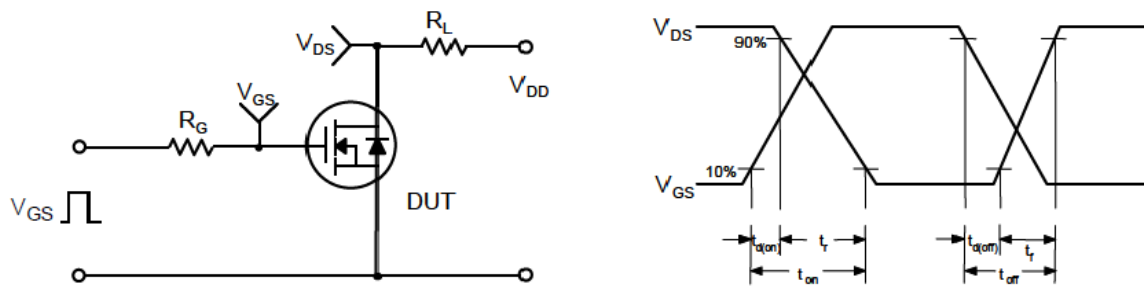


Figure 14. Transient Thermal Response Curve (TO-247)

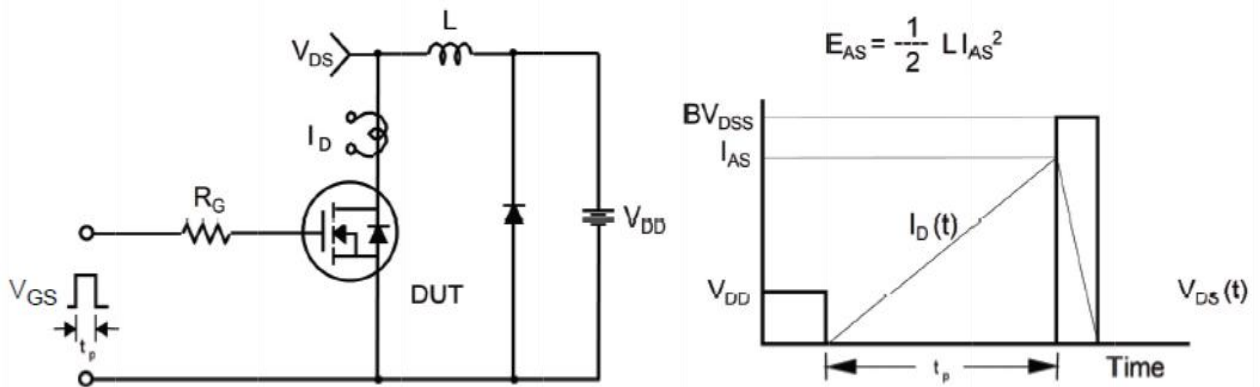
Gate Charge Test Circuit & Waveform



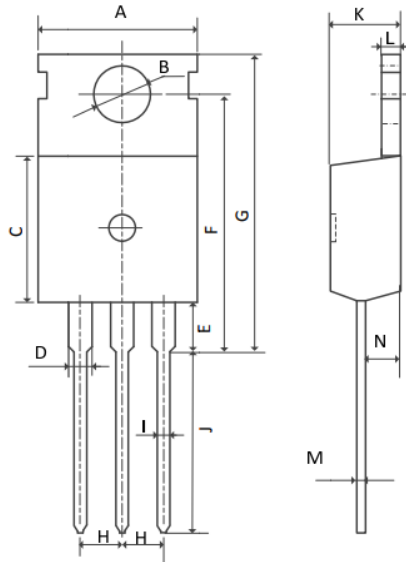
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



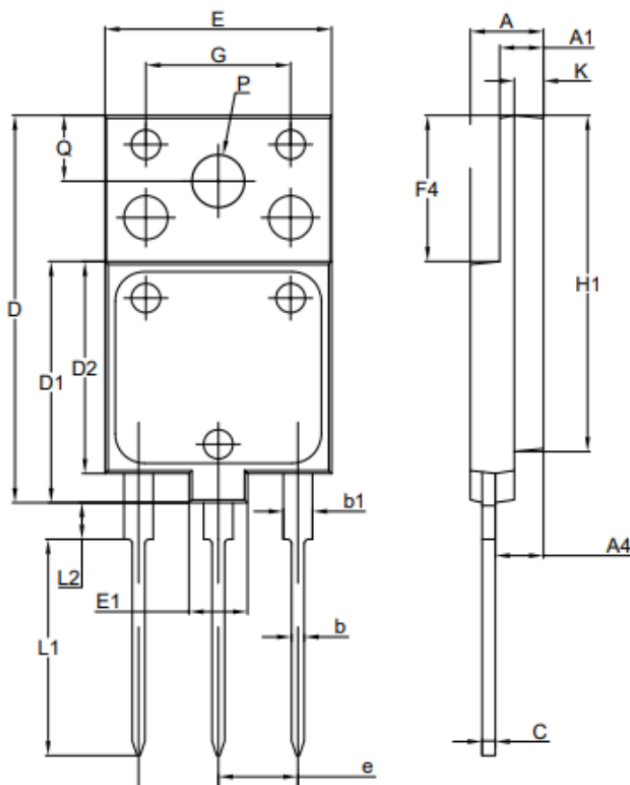
### Mechanical Dimensions for TO-220



#### 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

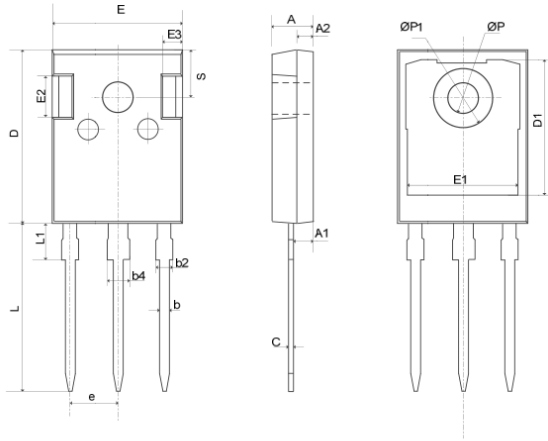
### Mechanical Dimensions for TO-3PF



#### COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	5.3	5.5	5.7
A1	2.8	3	3.2
b	0.66	0.86	1.06
b1	1.8	2	2.2
A4	3.1	3.3	3.5
C	0.8	0.9	1
D	26.3	26.5	26.7
D1	16.3	16.5	16.7
D2	14.3	14.5	14.7
P	3.4	3.6	3.8
E	15.3	15.5	15.7
E1	3.8	4	4.2
e	5.15	5.45	5.75
G	9.7	9.9	10.1
Q	4.35	4.5	4.65
L1	14.6	14.8	15
L2	2.3	2.5	2.7
K	1.8	2	2.2
F4	9.8	10	10.2
H1	22.8	23	23.2
K	1.8	2	2.2

### Mechanical Dimensions for TO-247



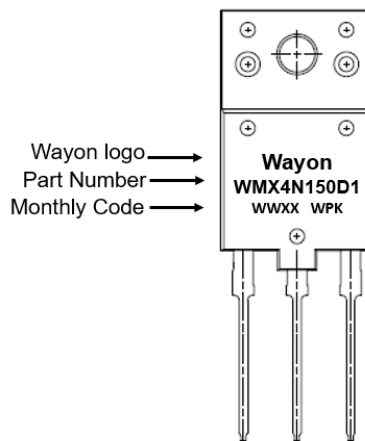
COMMON DIMENSIONS

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
WMK4N150D1	TO-220	WMK4N150D1	Tube
WMX4N150D1	TO-3PF	WMX4N150D1	Tube
WMJ4N150D1	TO-247	WMJ4N150D1	Tube

### Marking Information





## Contact Information

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