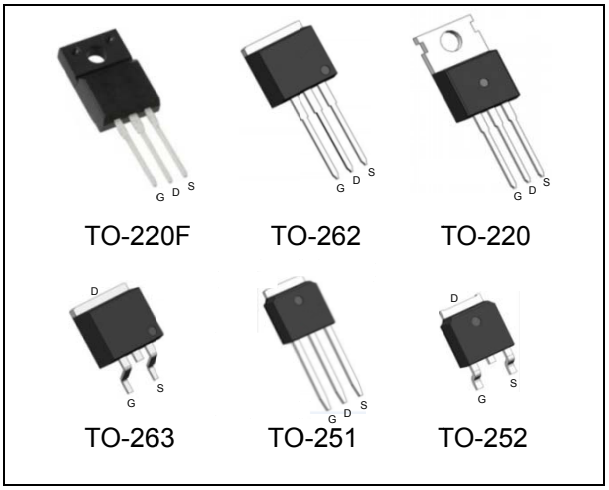
800V 0.68Ω Super Junction Power MOSFET

Description

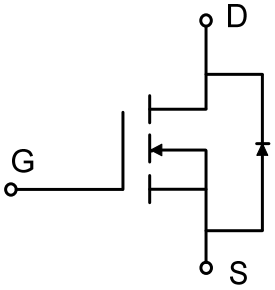
WMOS™ S is Wayon's new generation super junction MOSFET family that is utilizing charge balance technology for extremely low on-resistance and low gate charge performance. WMOS™ S is suitable for applications which require superior power density and outstanding efficiency.



Features

- V_{DS} =850V @ $T_{j,max}$
- Typ. $R_{DS(on)}$ =0.68Ω
- 100% UIS tested
- Pb-free plating, Halogen free

RoHS compliant



Applications

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

Absolute Maximum Ratings

Parameter	Symbol	WMx80R720S	WML80R720S	Unit
Drain-source voltage	V_{DSS}	800		V
Continuous drain current[1] (T_C = 25°C)	I_D	7		A
(T_C = 100°C)		4.2		A
Pulsed drain current[2]	I_{DM}	24		A
Gate-source voltage	V_{GS}	±30		V
Avalanche energy, single pulse[3]	E_{AS}	86		mJ
Avalanche energy, repetitive[2]	E_{AR}	0.2		mJ
Avalanche current, repetitive[2]	I_{AR}	1.7		A
Power dissipation (T_C = 25°C)	P_D	73	31	W
- Derate above 25°C		0.58	0.25	W/°C
Operating and storage temperature range	T_j, T_{stg}	-55 to +150		°C
Continuous diode forward current[1]	I_S	7		A
Diode pulse current[2]	$I_{S,pulse}$	24		A

Thermal Characteristics

Parameter	Symbol	WMx80R720S	WML80R720S	Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	1.7	4.0	°C/W
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	62	80	°C/W

Electrical Characteristics T_c = 25°C, unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0 V, I_D=1 mA	800	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=0.25mA	2.5	3.5	4.5	V
Drain cut-off current	I_{DSS}	V_{DS}=800 V, V_{GS}=0 V,				μA
		T_j = 25°C	-	-	1	
		T_j = 125°C	-	10	-	
Gate leakage current, forward	I_{GSSF}	V_{GS}=20 V, V_{DS}=0 V	-	-	5	μA
Gate leakage current, reverse	I_{GSSR}	V_{GS}=-20 V, V_{DS}=0 V	-	-	-5	μA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=1 A	-			
		T_j = 25°C	-	0.68	0.8	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS}= 100V, V_{GS}= 0 V,	-	625	-	
Output capacitance	C_{oss}	f = 1 MHz	-	18	-	pF
Reverse transfer capacitance	C_{rss}		-	0.6	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 300V, I_D = 3A	-	21	-	
Rise time	t_r	R_G = 25Ω, V_{GS}=10V	-	15	-	ns
Turn-off delay time	$t_{d(off)}$		-	43	-	
Fall time	t_f		-	13	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DD}=480 V, I_D=3A,	-	4	-	
Gate to drain charge	Q_{gd}	V_{GS}=0 to 10 V	-	9	-	nC
Gate charge total	Q_g		-	16	-	
Gate plateau voltage	$V_{plateau}$		-	5.7	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=1 A	-	-	1.2	V
Reverse recovery time	t_{rr}	V_R=50 V, I_F=3A,	-	310	-	ns
Reverse recovery charge	Q_{rr}	dI_F/dt=100 A/μs	-	2.4	-	μC
Peak reverse recovery current	I_{rrm}		-	11	-	A

Notes:

1. Limited by $T_{j\,max}$. Maximum duty cycle D=0.5.

2. Repetitive rating: pulse width limited by maximum junction temperature

3. I_{AS} = 2A, V_{DD} = 50V, R_G = 25Ω, starting T_j = 25°C

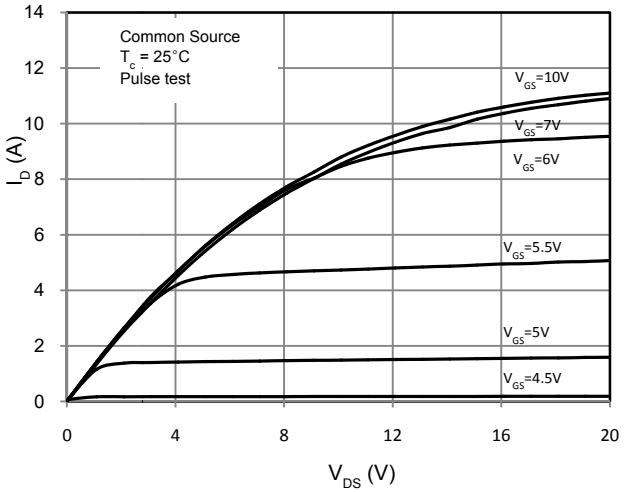


Figure 1.On-Region Characteristics

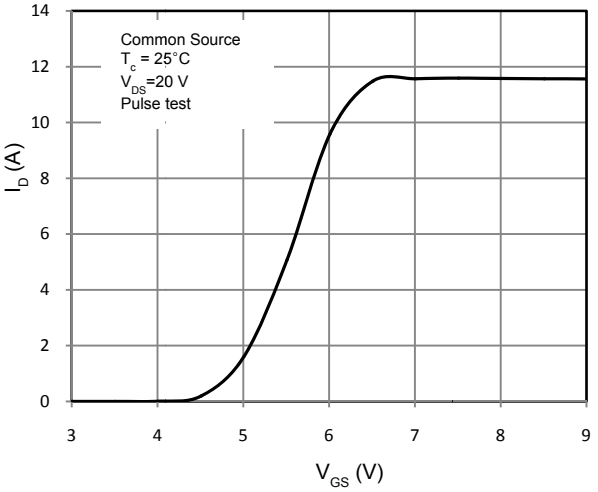


Figure 2. Transfer Characteristics

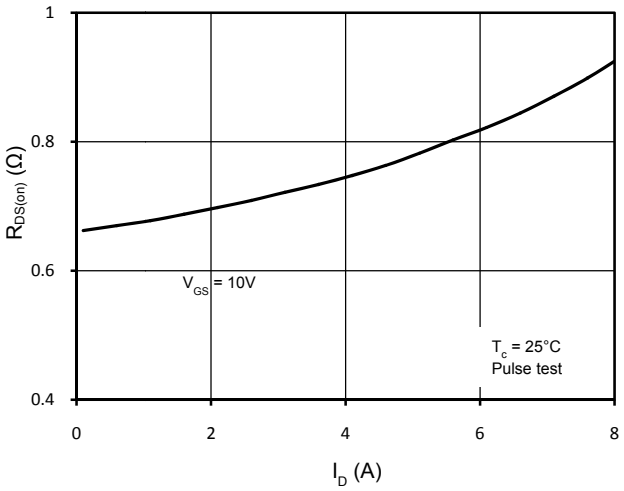


Figure 3. Static Drain-Source On Resistance

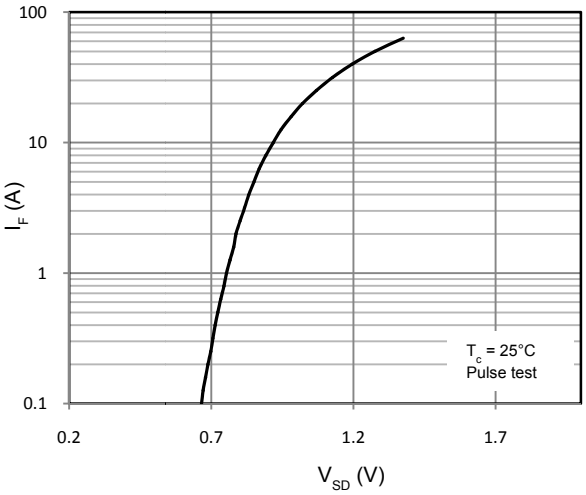


Figure 4. Body- Diode Forward Characteristics

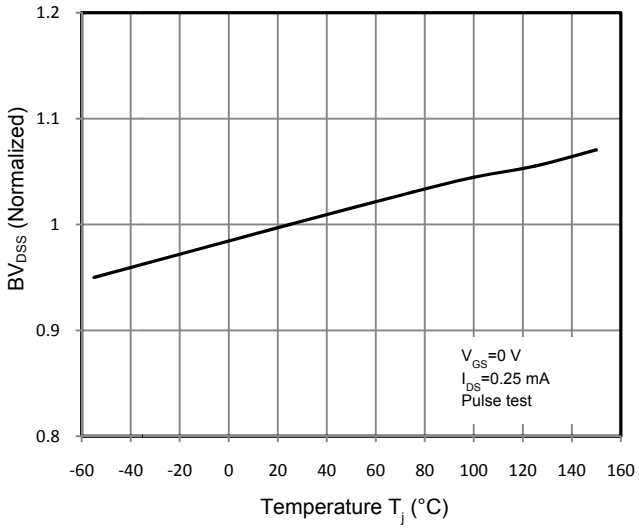


Figure 5. Normalized BV_{DSS} vs. Temperature

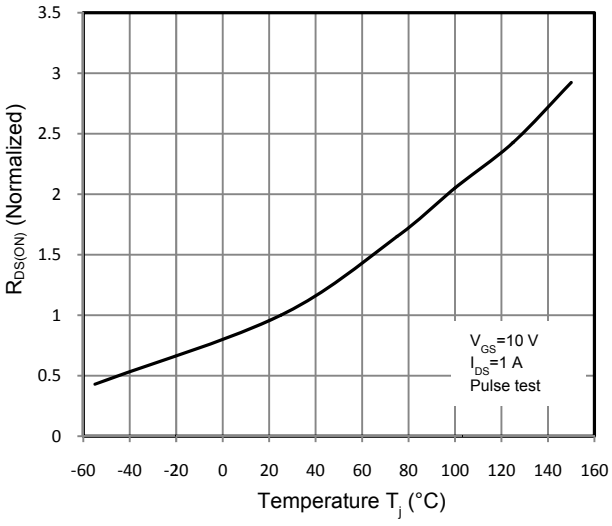


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

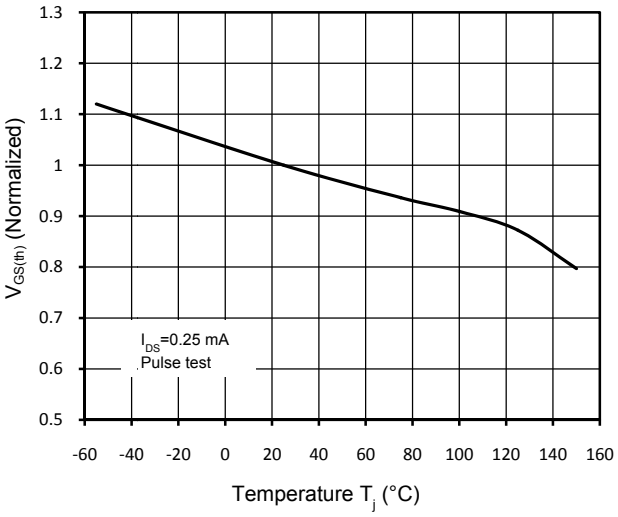


Figure 7. Threshold Voltage vs. Temperature

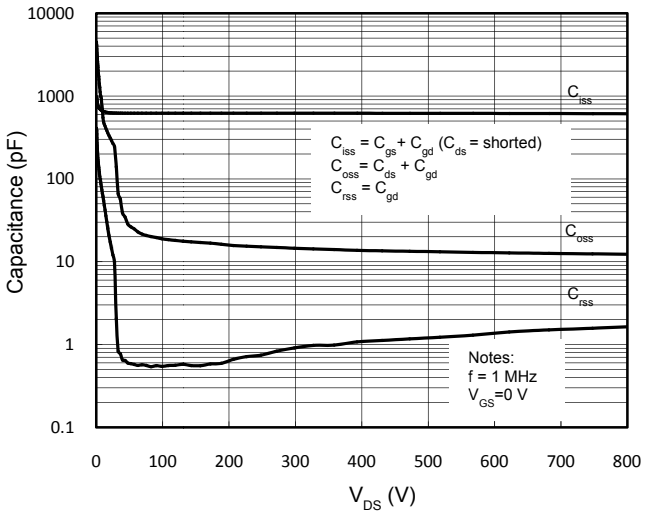


Figure 8. Capacitance Characteristics

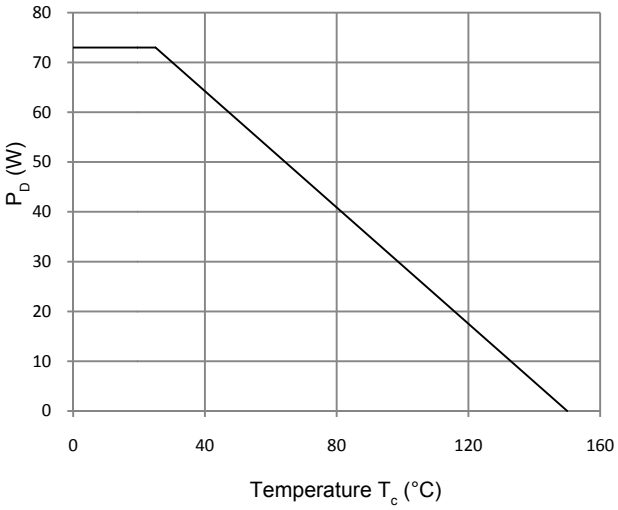


Figure 9. Power Dissipation

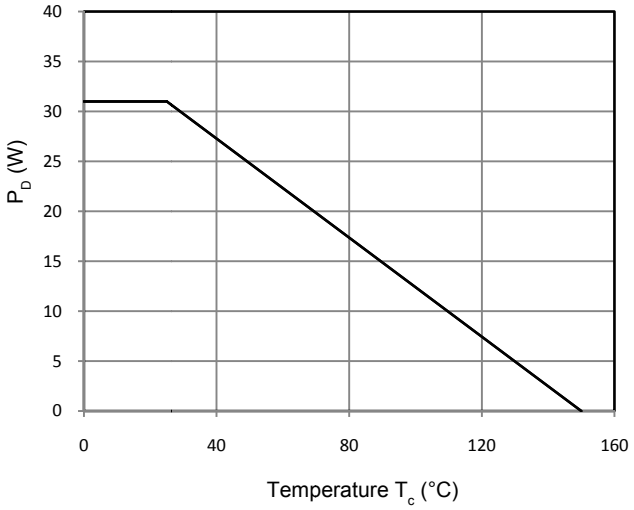


Figure 10. Power Dissipation (TO-220F)

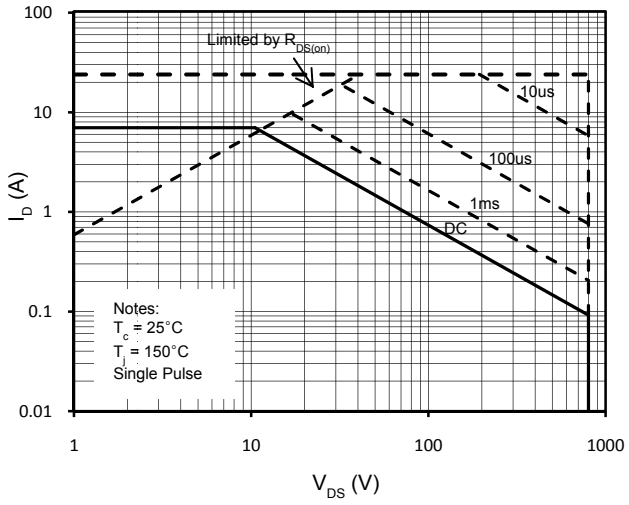


Figure 11. Maximum Safe Operating Area

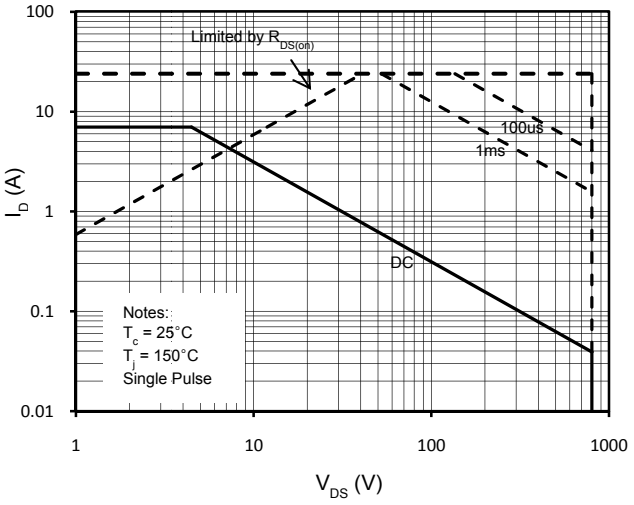


Figure 12. Maximum Safe Operating Area(TO-220F)

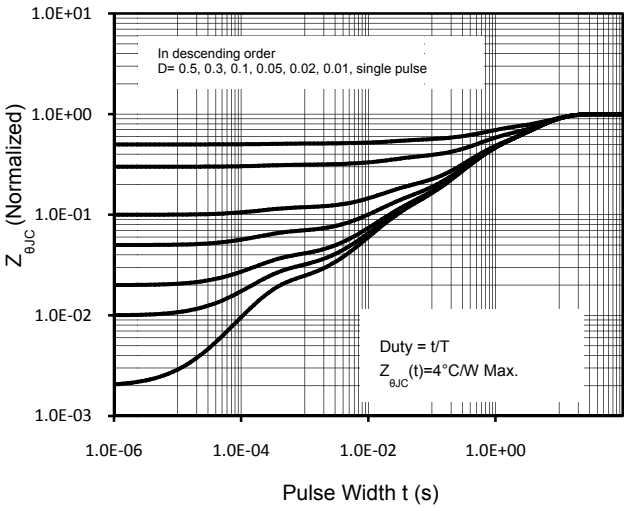


Figure 13. Transient Thermal Response Curve (TO-220F)

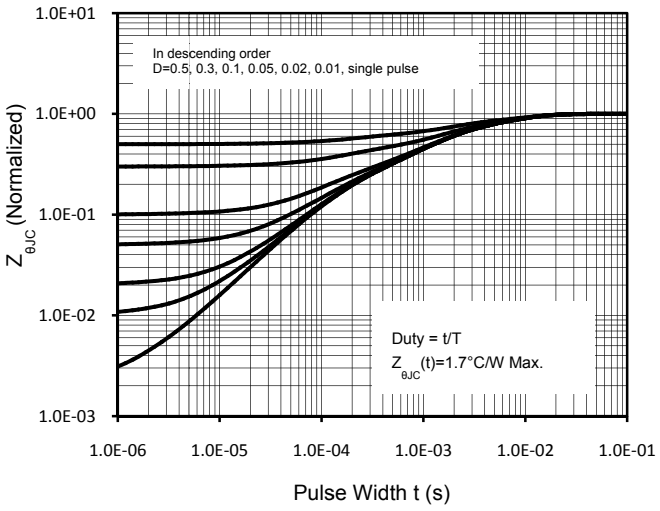


Figure 14. Transient Thermal Response Curve

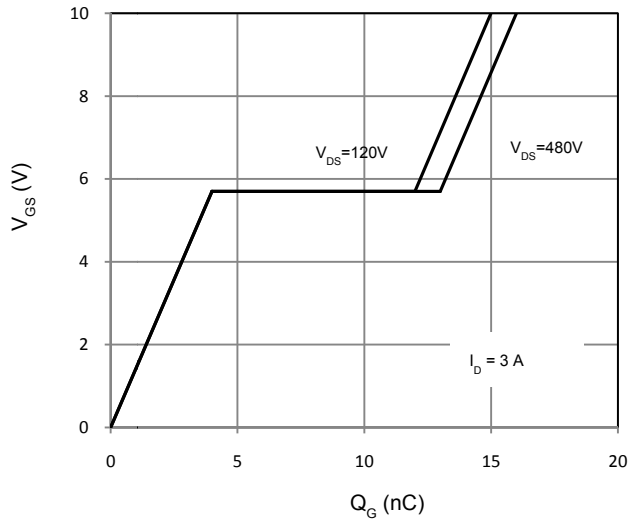
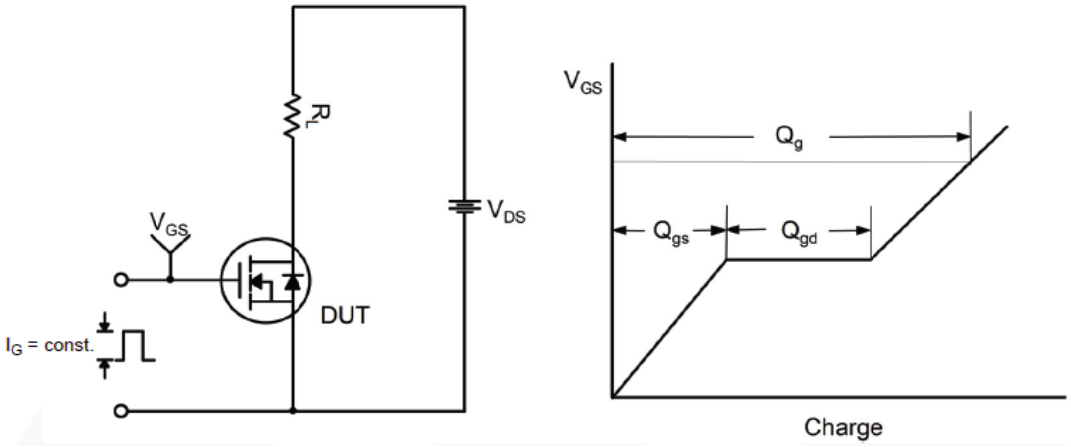
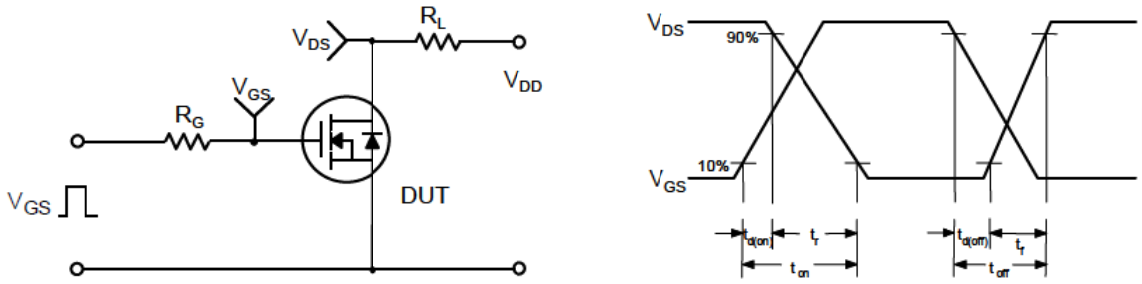


Figure 15. Gate Charge Characteristics

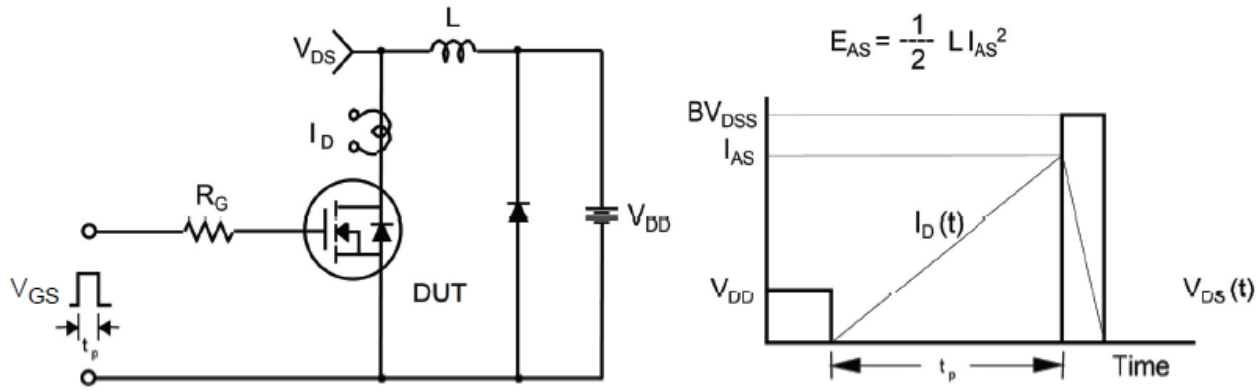
Gate Charge Test Circuit & Waveform



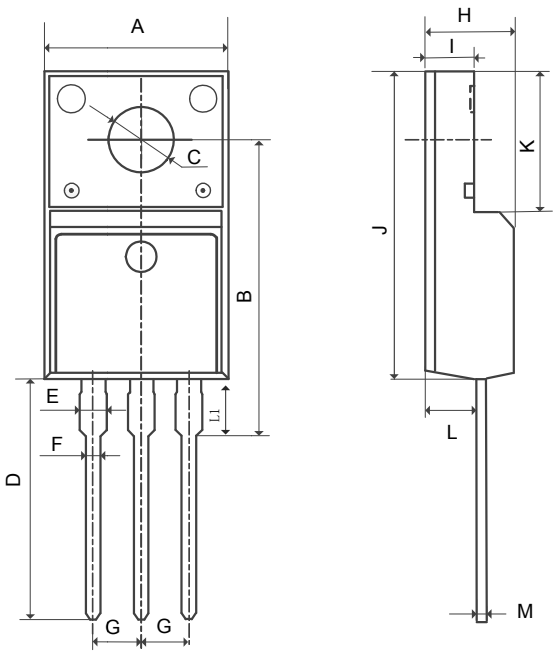
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



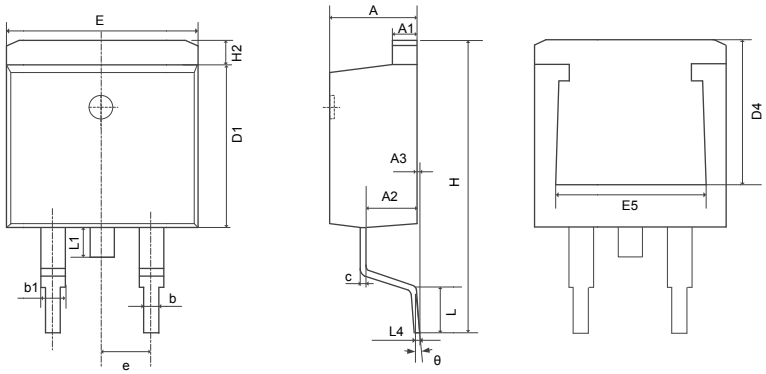
Mechanical Dimensions for TO-220F



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	9.96	10.16	10.36
B	15.10	15.60	16.10
C	3.03	3.20	3.38
D	12.64	12.96	13.28
E	1.18	1.38	1.58
F	0.70	0.81	0.95
G	2.54REF		
H	4.50	4.70	4.90
I	2.34	2.54	2.74
J	15.57	15.87	16.17
K	6.70REF		
L	2.56	2.76	2.96
M	0.40	0.52	0.65
L1	2.85	3.10	3.45

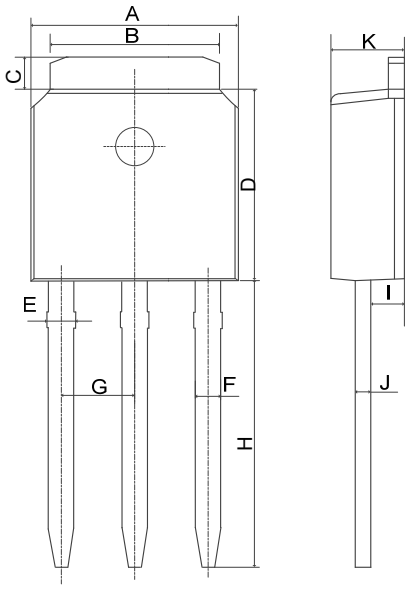
Mechanical Dimensions for TO-263



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.22	1.27	1.42
A2	2.49	2.69	2.89
b	0.70	0.81	0.96
b1	1.17	1.27	1.47
c	0.30	0.38	0.53
D1	8.50	8.70	8.90
D4	6.60	—	—
E	9.86	10.16	10.36
E5	7.06	—	—
e	2.54BSC		
H	14.70	15.10	15.50
H2	1.07	1.27	1.47
L	2.00	2.3	2.60
L1	1.40	1.55	1.70
L4	0.25BSC		
θ	0°	5°	9°

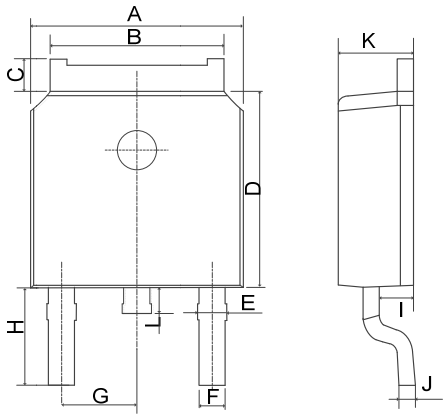
Mechanical Dimensions for TO-251



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	6.40	6.60	6.80
B	5.13	5.30	5.46
C	0.88	1.02	1.28
D	5.90	6.06	6.22
E	0.68	0.89	1.10
F	0.68	0.78	0.91
G	2.29REF		
H	9.00	9.40	9.65
I	0.90	1.04	1.17
J	0.40	0.51	0.61
K	2.10	2.30	2.50

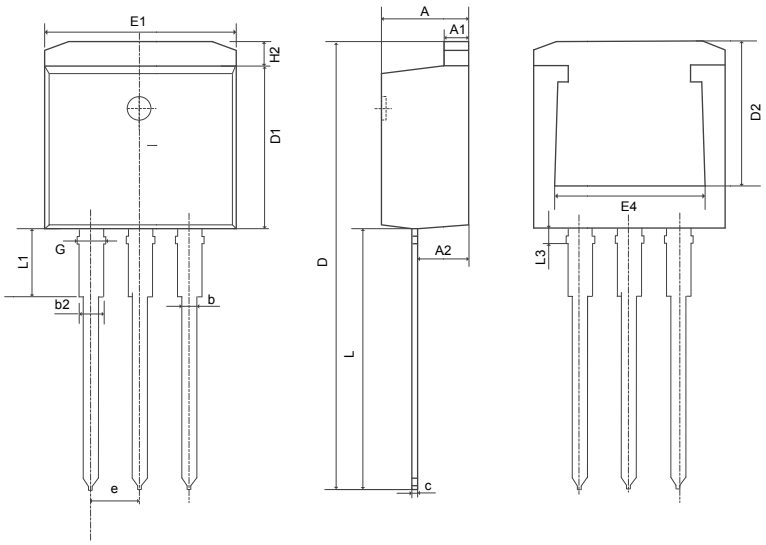
Mechanical Dimensions for TO-252



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	6.40	6.60	6.80
B	5.13	5.33	5.50
C	0.88	—	1.28
D	5.90	6.10	6.22
E	0.68	0.89	1.10
F	0.68	0.78	0.91
G	2.29REF		
H	2.90REF		
I	0.85	1.07	1.17
J	0.51REF		
K	2.10	2.30	2.50
L	0.40	—	1.00

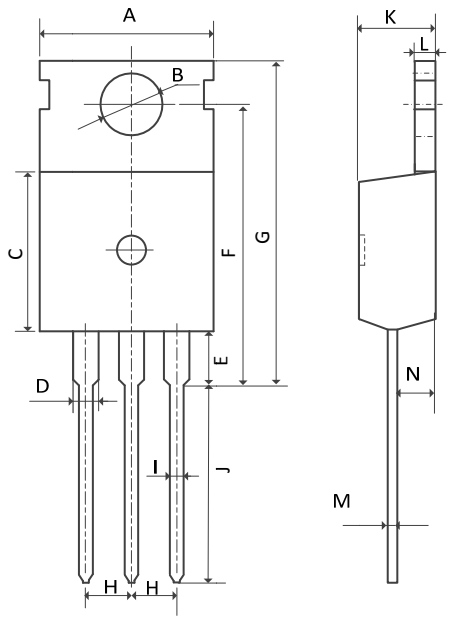
Mechanical Dimensions for TO-262



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.22	1.27	1.42
A2	2.49	2.69	2.89
b	0.71	0.81	0.96
b2	1.17	1.27	1.42
c	0.28	0.38	0.53
D	23.20	23.70	24.02
D1	8.50	8.7	8.90
D2	6.00	—	—
E1	9.86	10.16	10.36
E4	7.06	—	—
e	2.54BSC		
G	1.25	1.35	1.50
H2	—	—	1.50
L	13.33	13.73	14.13
L1	3.50	3.75	4.00
L3	1.28	1.43	1.58

Mechanical Dimensions for TO-220



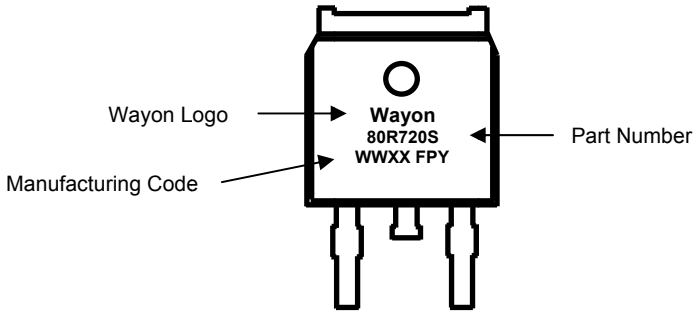
COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	9.70	10.00	10.20
B	3.40	3.60	3.80
C	8.90	9.10	9.40
D	1.17	1.27	1.47
E	2.60	3.10	3.40
F	15.10	15.80	16.70
G	19.55MAX		
H	2.54REF		
I	0.70	0.80	0.95
J	9.35	10.30	11.00
K	4.30	4.57	4.77
L	1.20	1.30	1.45
M	0.40	0.50	0.65
N	2.20	2.40	2.60

Ordering Information

Part	Package	Marking	Packing method
WML80R720S	TO-220F	80R720S	Tube
WMM80R720S	TO-263	80R720S	Tape and Reel
WMO80R720S	TO-252	80R720S	Tape and Reel
WMP80R720S	TO-251	80R720S	Tube
WMK80R720S	TO-220	80R720S	Tube
WMN80R720S	TO-262	80R720S	Tube

Marking Information



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For additional information, please contact your local Sales Representative.

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