

650V 1.2Ω Zener-protected Power MOSFET

Description

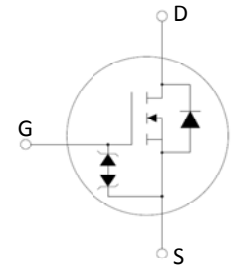
WMOS™ MM is Wayon's new generation super junction MOSFET family that is utilizing charge balance technology for extremely low on-resistance and low gate charge performance. WMOS™ MM is suitable for applications which require superior power density and outstanding efficiency.

Features

- $V_{DS} = 700V @ T_{j,max}$
- 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	WMF05N65MM	Unit
Drain-Source Voltage	V_{DSS}	650	V
Continuous drain current ¹⁾ ($T_C = 25^\circ C$)	I_D	5.4	A
($T_C = 100^\circ C$)		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 ($T_C = 25^\circ C$)	P_D	5	W
- Derate above $25^\circ C$		0.04	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	WMF05N65MM	Unit
Thermal Resistance, Junction-to-Solder point	$R_{\theta JS}$	24	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	75	$^\circ C/W$

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}	$V_{GS}=0\text{ V}, I_D=1\text{ mA}$	650	-	-	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}	$V_{DS}=650\text{ V}, V_{GS}=0\text{ V},$ $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	-	-	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 $T_J = 25^\circ\text{C}$

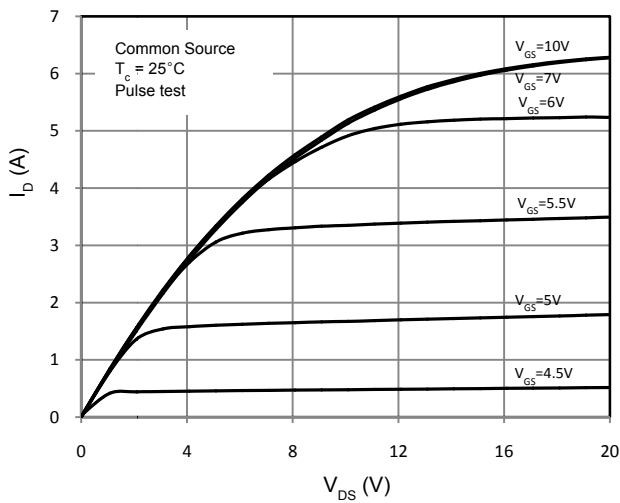


Figure 1. On-Region Characteristics

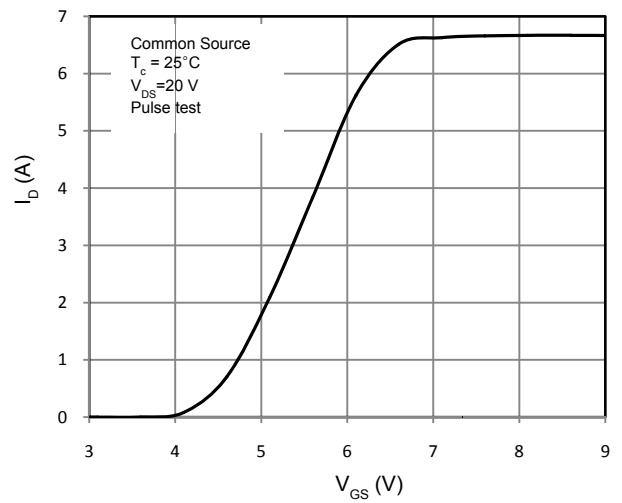


Figure 2. Transfer Characteristics

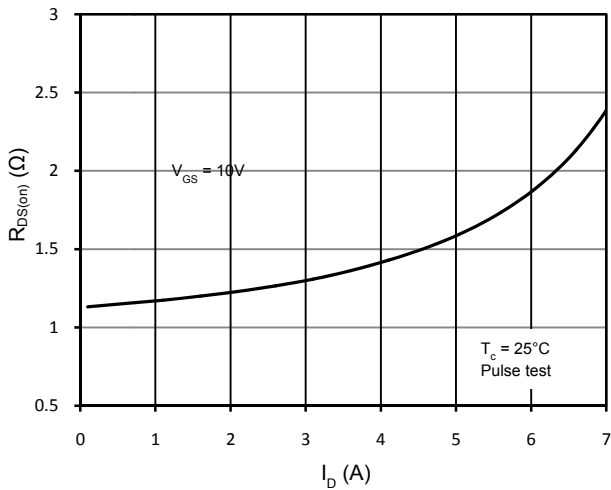


Figure 3. Static Drain-Source On Resistance

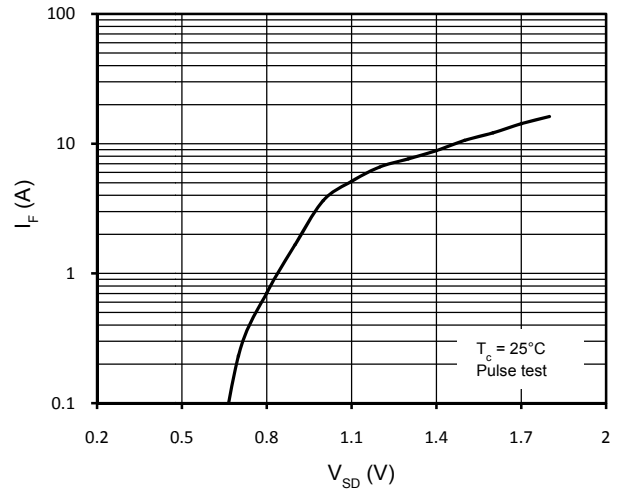


Figure 4. Body-Diode Forward Characteristics

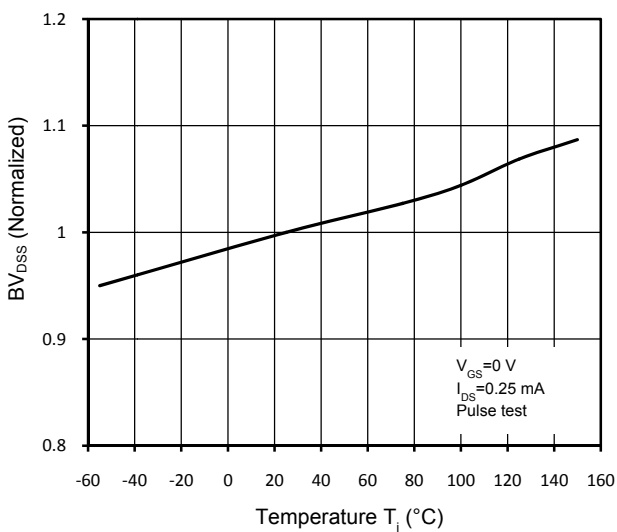


Figure 5. Normalized BV_{DS} vs. Temperature

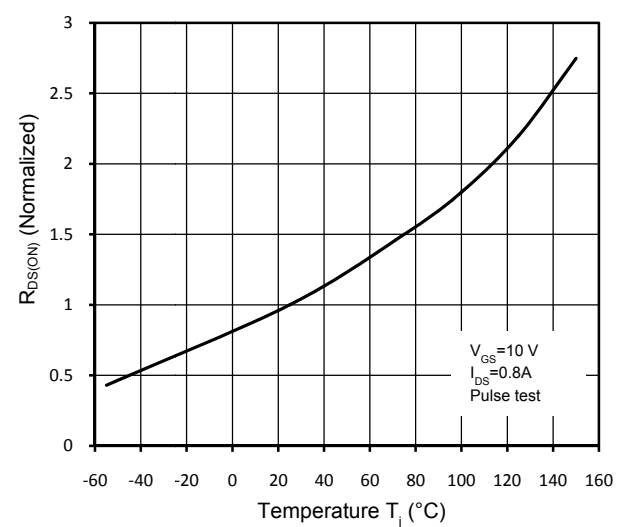


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

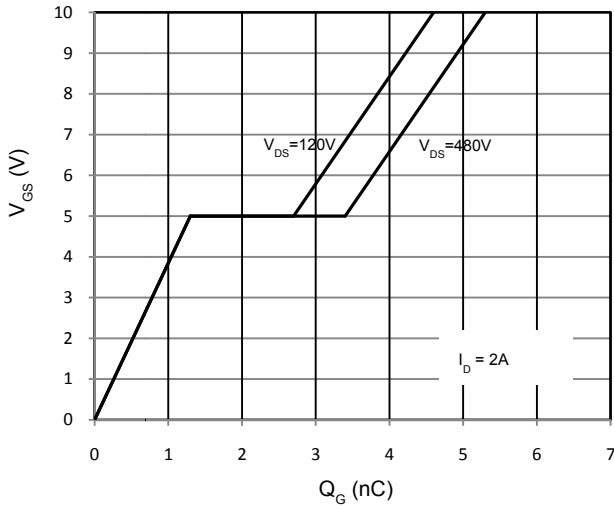


Figure 7. Gate Charge Characteristics

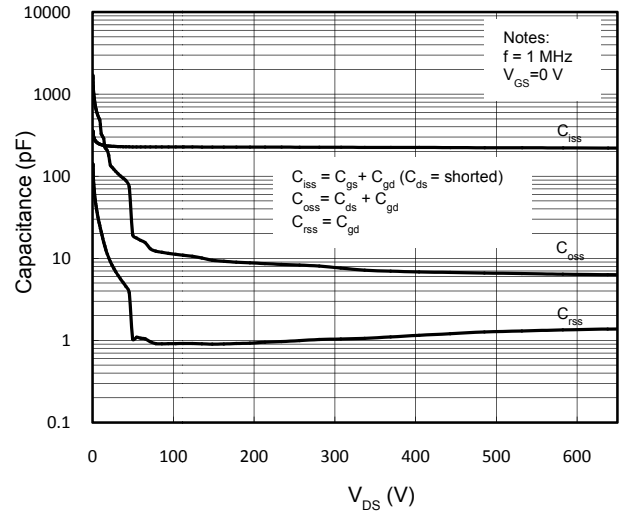


Figure 8. Capacitance Characteristics

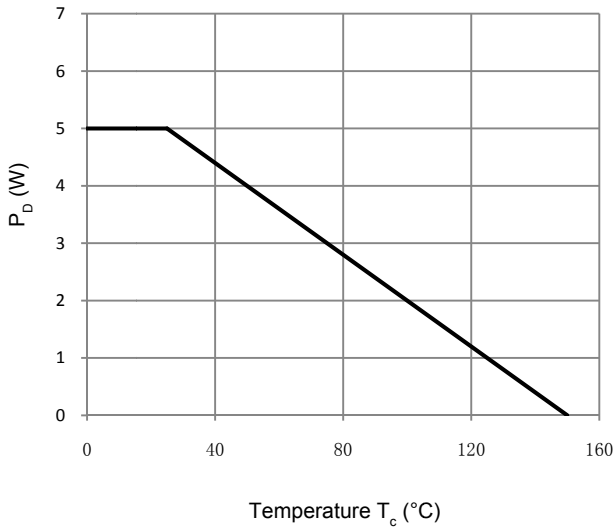


Figure 9. Power Dissipation

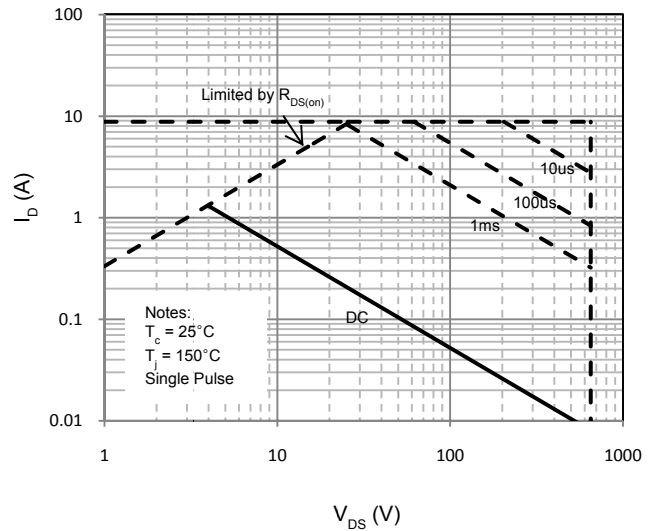


Figure 10. Maximum Safe Operating Area

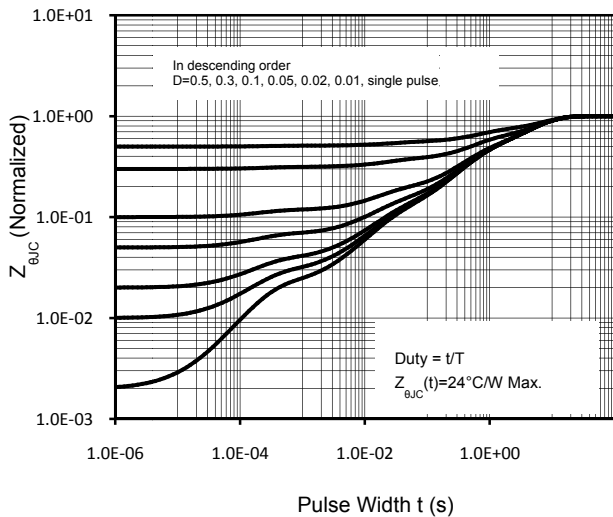
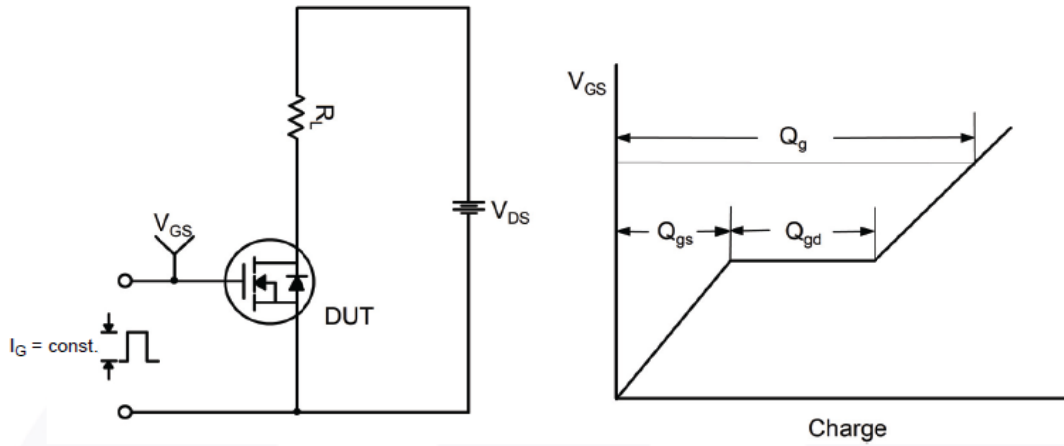
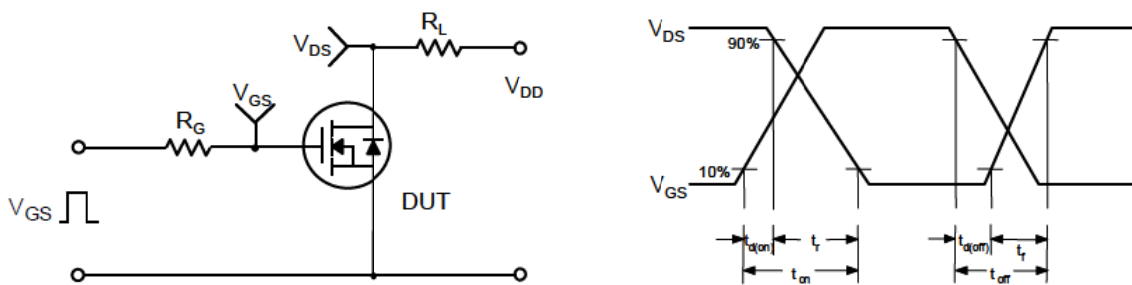


Figure 11. Transient Thermal Response Curve

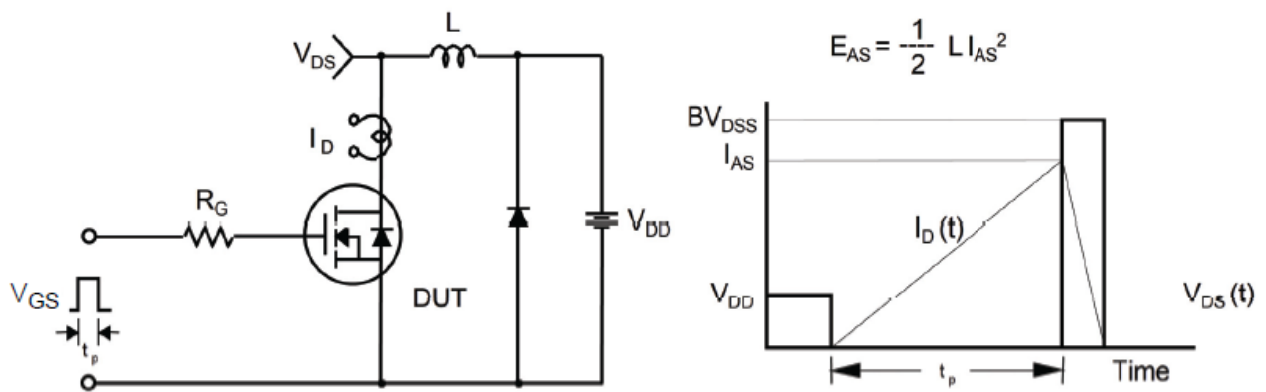
Gate Charge Test Circuit & Waveform



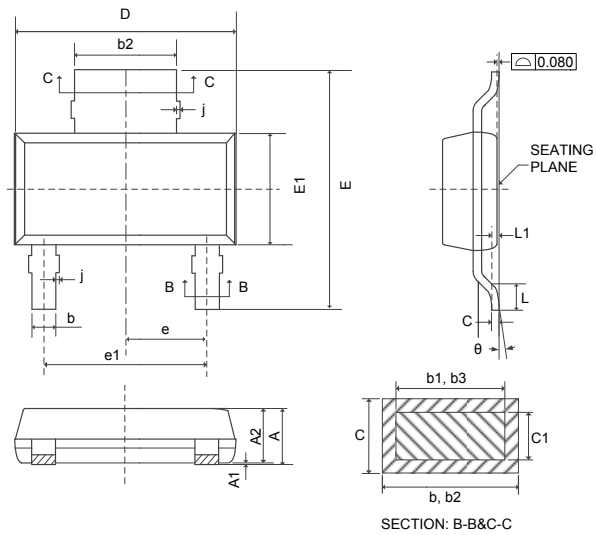
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions for SOT-223-2L



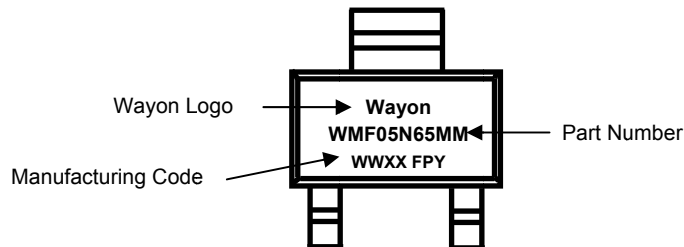
COMMON DIMENSIONS

SYMBOL	mm	
	MIN	MAX
A	-	1.80
A1	0.02	0.10
A2	1.50	1.70
b	0.6	0.84
b1	0.6	0.79
b2	2.90	3.10
b3	2.84	3.05
C	0.23	0.35
C1	0.23	0.33
D	6.30	6.95
E	6.70	7.30
E1	3.30	3.70
e	2.30 BSC	
e1	4.60 BSC	
L	0.81	-
L1	0.25 BSC	
theta	0°	10°
j	-	0.15

Ordering Information

Part	Package	Marking	Packing method
WMF05N65MM	SOT-223-2L	WMF05N65MM	Tape and Reel

Marking Information




Contact Information

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