

## 650V Silicon N-channel Power MOSFET

### Description

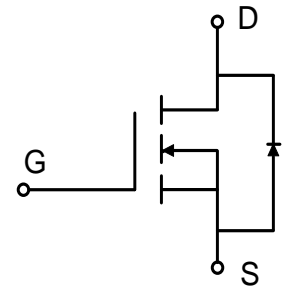
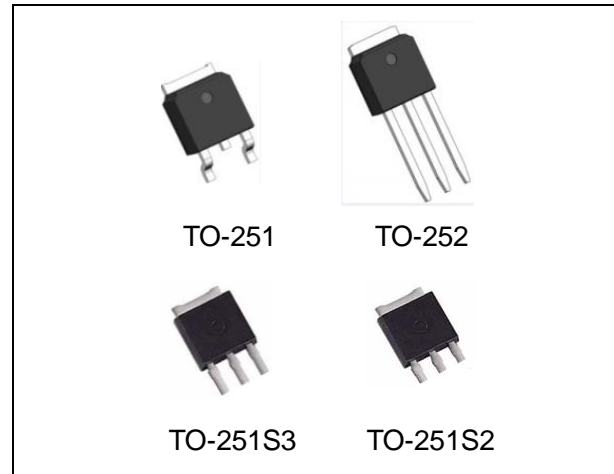
WMOS<sup>TM</sup> DM, the silicon N-channel enhanced VDMOSFETs, is obtained by the self-aligned planar technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency.

### Features

- Fast switching
- Typ.  $R_{DS(on)} = 1.1\Omega$
- Low gate charge (Typ.  $Q_g = 21.2nC$ )
- Typ.  $C_{rss} = 9.0pF$
- 100% UIS tested

### Applications

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



### Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	$V_{DSS}$	650	V
Continuous drain current ( $T_C = 25^\circ C$ )	$I_D$	7	A
( $T_C = 100^\circ C$ )		4	A
Pulsed drain current <sup>1)</sup>	$I_{DM}$	28	A
Gate-source voltage	$V_{GS}$	$\pm 30$	V
Avalanche energy, single pulse <sup>2)</sup>	$E_{AS}$	375	mJ
Power dissipation ( $T_C = 25^\circ C$ )	$P_D$	89	W
- Derate above $25^\circ C$		0.71	W/ $^\circ C$
Operating and storage temperature range	$T_J, T_{STG}$	-55 to +150	$^\circ C$
Continuous diode forward current	$I_S$	7	A
Diode pulse current	$I_{S,pulse}$	28	A

### Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	1.4	$^\circ C/W$
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	62.0	$^\circ C/W$

**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	$V_{GS(th)}^{(3)}$	$V_{DS}=V_{GS}, I_D=0.25\text{ mA}$	2	-	4	V
Drain cut-off current	$I_{DSS}$	$V_{DS}=650\text{ V}, V_{GS}=0\text{ V}$	-	-	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	$R_{DS(on)}^{(3)}$	$V_{GS}=10\text{ V}, I_D=3.5\text{ A}$	-	1.1	1.4	$\Omega$
<b>Dynamic characteristics</b>						
Input capacitance	$C_{iss}$	$V_{DS}=25\text{ V}, V_{GS}=0\text{ V},$ $f=1\text{ MHz}$	-	789	-	pF
Output capacitance	$C_{oss}$		-	98	-	
Reverse transfer capacitance	$C_{rss}$		-	9.0	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=325\text{ V}, I_D=7\text{ A}$ $R_G=25\Omega, V_{GS}=10\text{ V}$	-	15.0	-	ns
Rise time	$t_r$		-	32.0	-	
Turn-off delay time	$t_{d(off)}$		-	51.0	-	
Fall time	$t_f$		-	32.5	-	
<b>Gate charge characteristics</b>						
Gate to source charge	$Q_{gs}$	$V_{DD}=520\text{ V}, I_D=7\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	4.53	-	nC
Gate to drain charge	$Q_{gd}$		-	10.2	-	
Gate charge total	$Q_g$		-	21.2	-	
<b>Reverse diode characteristics</b>						
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=7\text{ A}$	-	-	1.4	V
Reverse recovery time	$t_{rr}$	$I_F=7\text{ A}, dI_F/dt=100\text{ A}/\mu\text{s}$	-	499	-	ns
Reverse recovery charge	$Q_{rr}$	$V_{GS}=0\text{ V}$	-	3.0	-	$\mu\text{C}$

## Notes:

1. Repetitive rating: pulse width limited by maximum junction temperature
2.  $I_{AS}=5\text{ A}, V_{DD}=50\text{ V}, R_G=25\Omega$ , starting  $T_J = 25^\circ\text{C}$
3. Pulse test: pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .

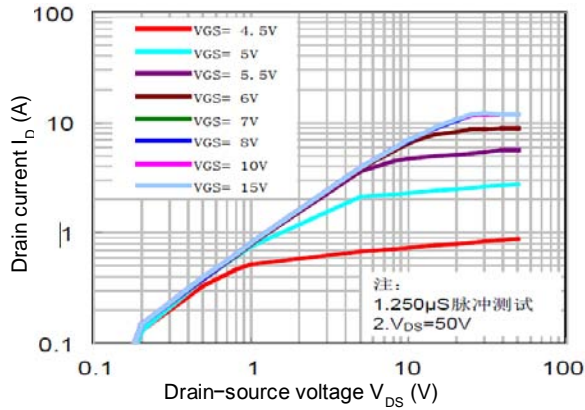


Figure 1. On-Region Characteristics

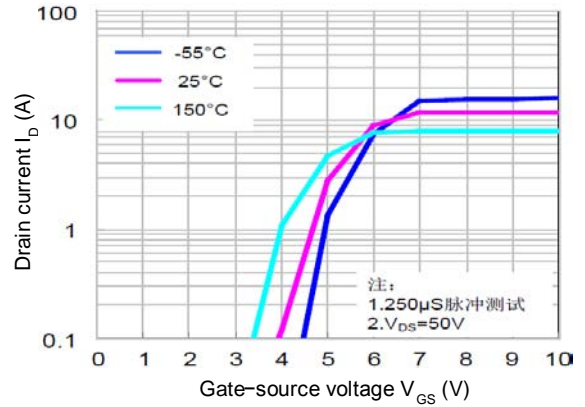


Figure 2. Transfer Characteristics

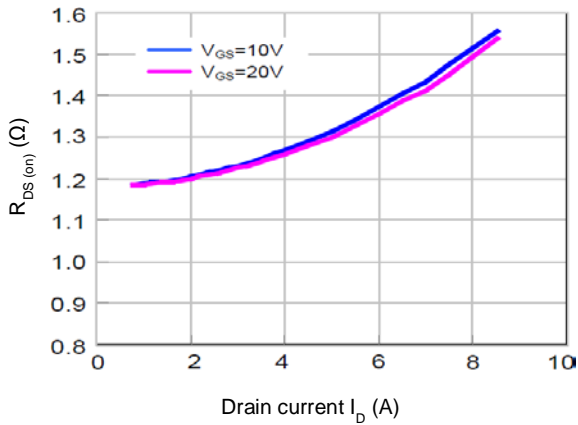


Figure 3. On-Resistance Variation vs. Drain Current

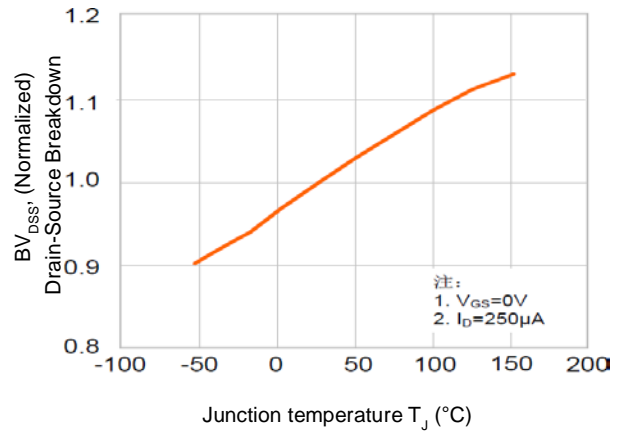


Figure 4. Breakdown Voltage vs. Temperature

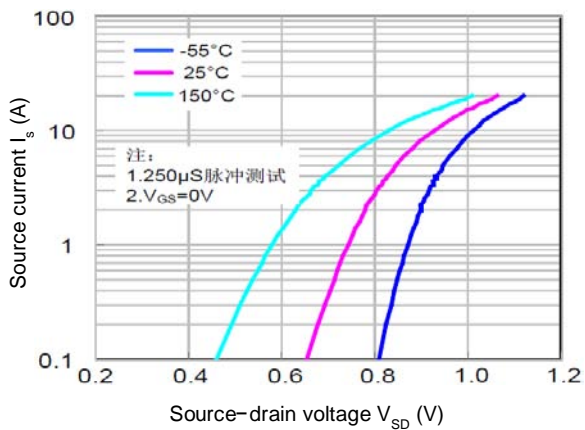


Figure 5. Source Current Variation vs. Source-drain Voltage

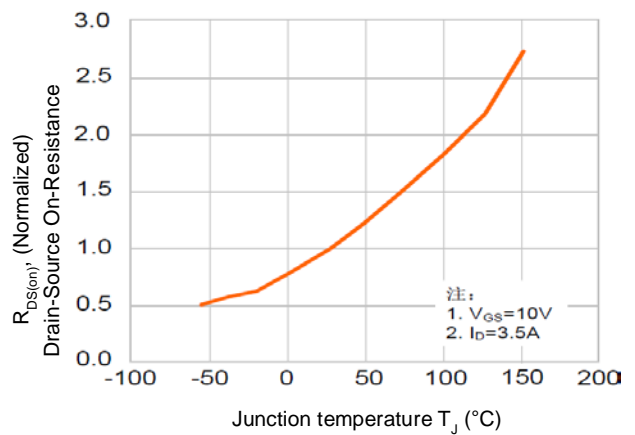


Figure 6. On-Resistance vs. Temperature

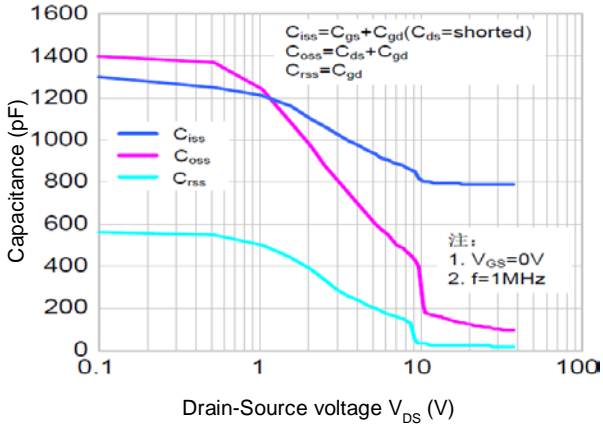


Figure 7. Capacitance Characteristics

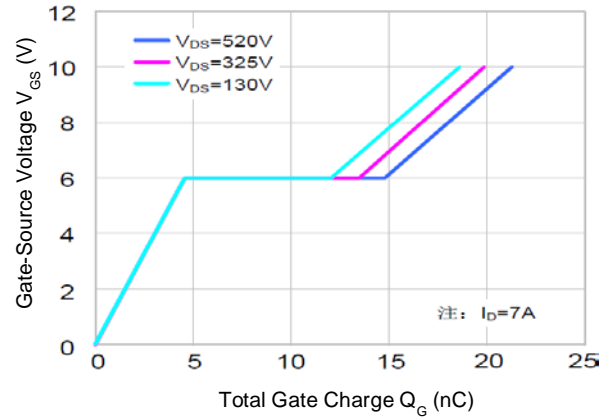


Figure 8. Gate Charge Characteristics

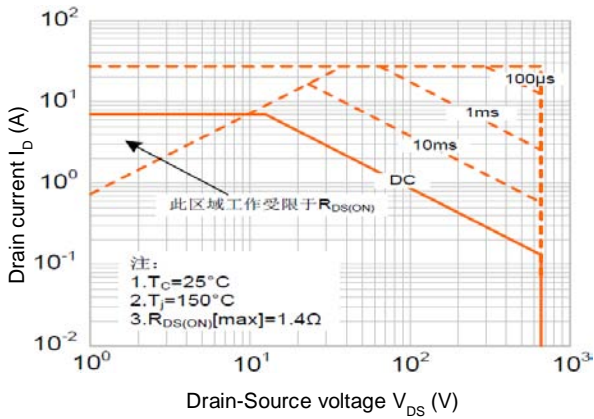


Figure 9. Maximum Safe Operating Area

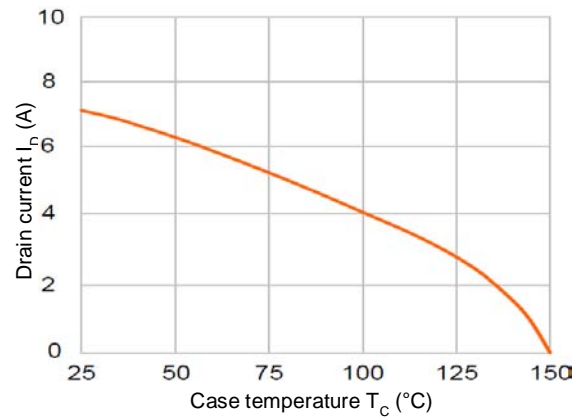
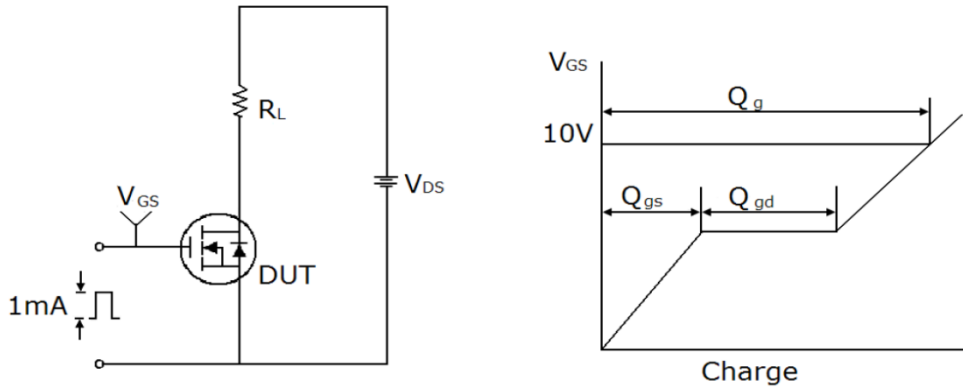
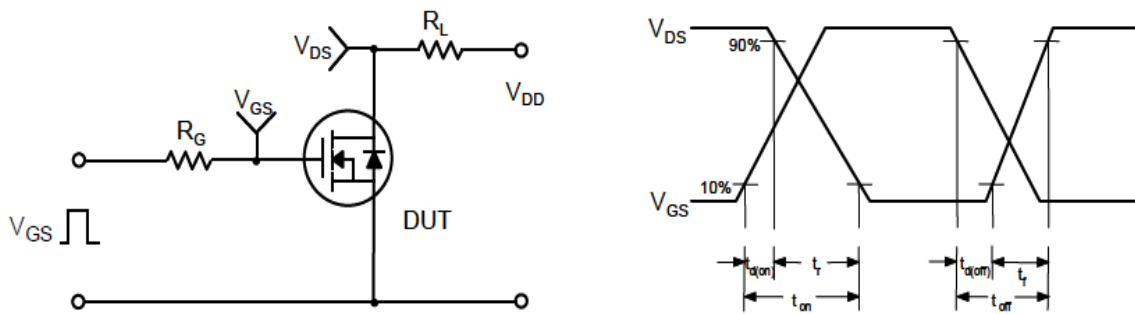


Figure 10. Drain Current vs. Case Temperature

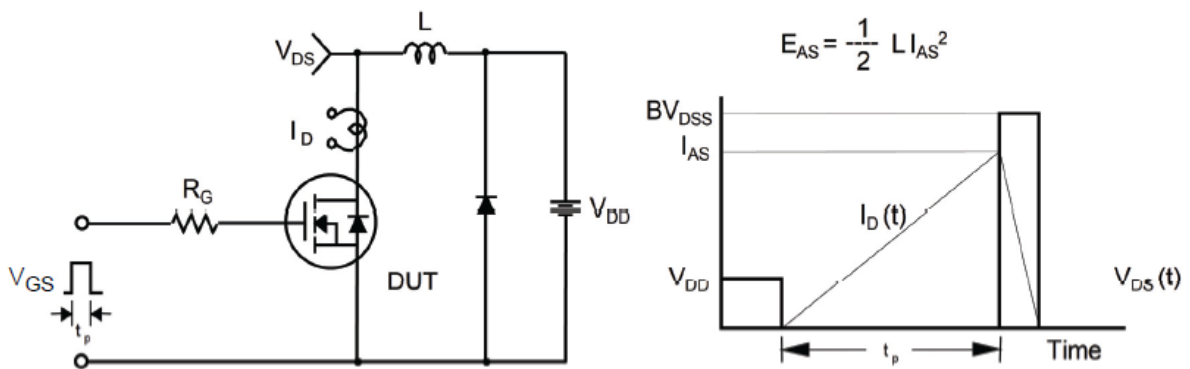
**Gate Charge Test Circuit & Waveform**



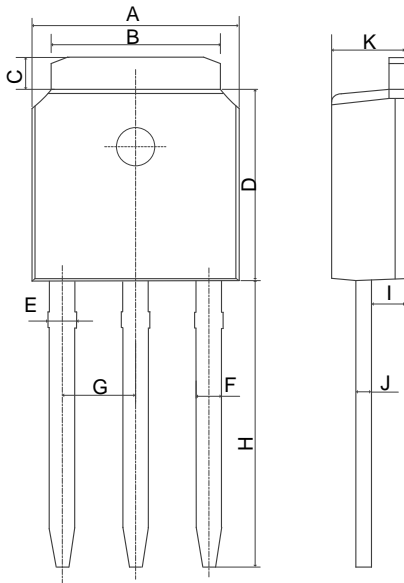
**Switching Test Circuit & Waveforms**



**Unclamped Inductive Switching Test Circuit & Waveforms**



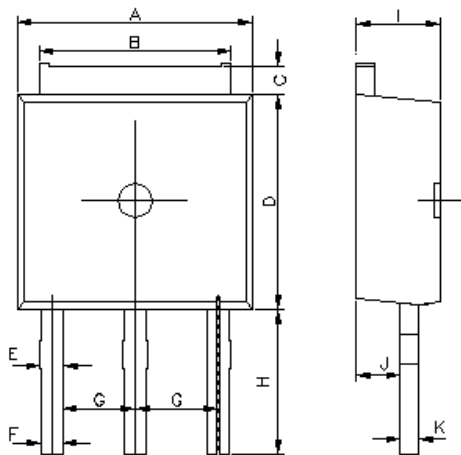
**Mechanical Dimensions for TO-251**



**COMMON DIMENSIONS**

SYMBOL	MM	
	MIN	MAX
A	6.40	6.80
B	5.13	5.46
C	0.90	1.25
D	5.90	6.20
E	0.80	1.00
F	0.71	0.91
G	2.19	2.39
H	9.00	9.60
I	0.90	1.10
J	0.40	0.60
K	2.10	2.50

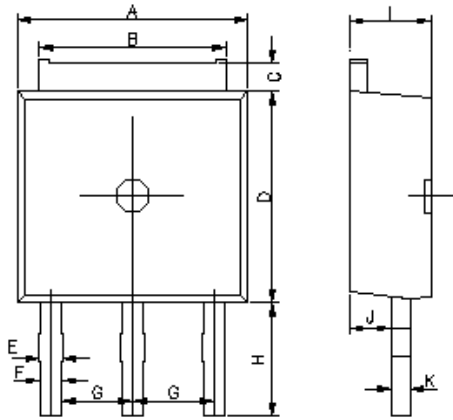
**Mechanical Dimensions for TO-251S3**



**COMMON DIMENSIONS**

SYMBOL	MM	
	MIN	MAX
A	6.40	6.80
B	5.18	5.48
C	0.75	1.02
D	5.95	6.35
E	0.70	1.00
F	0.70	0.90
G	2.14	2.44
H	3.30	3.70
I	2.10	2.50
J	0.85	1.15
K	0.41	0.61

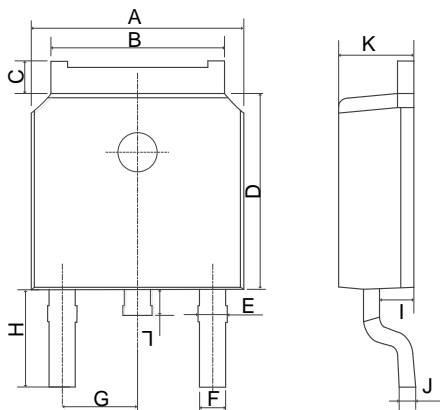
**Mechanical Dimensions for TO-251S2**



**COMMON DIMENSIONS**

SYMBOL	MM	
	MIN	MAX
A	6.40	6.80
B	5.18	5.48
C	0.75	1.02
D	5.95	6.35
E	0.70	1.00
F	0.70	0.90
G	2.14	2.44
H	2.30	2.70
I	2.10	2.50
J	0.85	1.15
K	0.41	0.61

**Mechanical Dimensions for TO-252**



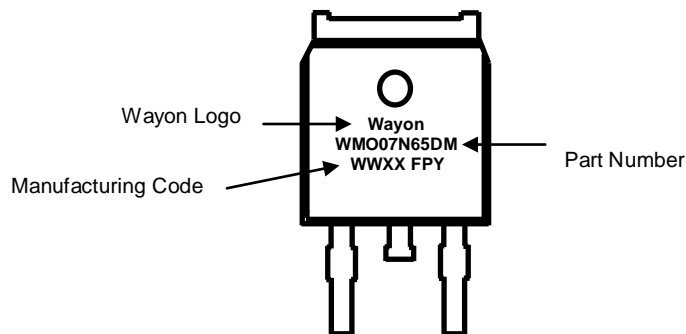
**COMMON DIMENSIONS**

SYMBOL	MM	
	MIN	MAX
A	6.40	6.80
B	5.13	5.46
C	0.90	1.25
D	5.90	6.20
E	0.80	1.00
F	0.71	0.91
G	2.19	2.39
H	2.60	3.10
I	0.90	1.10
J	0.40	0.60
K	2.10	2.50
L	0.60	1.00

## Ordering Information

Part	Package	Marking	Packing method	Quantity
WMO07N65DM	TO-252	WMO07N65DM	Tape and Reel	2500
WMP07N65DM	TO-251	WMP07N65DM	Tube	80
WMH07N65DM	TO-252S2	WMH07N65DM	Tube	80
WMG07N65DM	TO-251S3	WMG07N65DM	Tube	80

## Marking Information



## Contact Information

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