

## 700V 16A 0.5Ω N-ch Power MOSFET

### Description

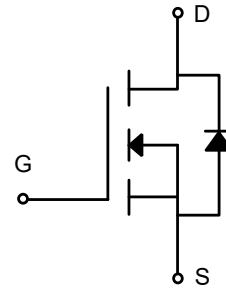
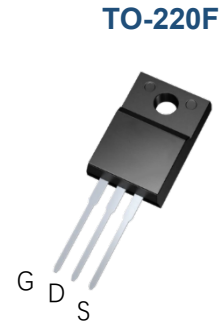
WMOS™ D1 is Wayon's 1<sup>st</sup> generation VDMOS family that is dramatic reduction in on-resistance and ultra-low gate charge for applications requiring high power density and high efficiency. And it is very robust and RoHS compliant.

### Features

- Typ. $R_{DS(on)}=0.5\Omega@V_{GS}=10V$
- 100% avalanche tested
- Pb-free, Halogen free

### Applications

- SMPS
- Charger
- DC-DC



### Absolute Maximum Ratings ( $T_c=25^\circ\text{C}$ )

Parameter	Symbol	WML16N70D1B	Unit
Drain-source voltage	$V_{DSS}$	700	V
Gate-source voltage	$V_{GS}$	$\pm 30$	V
Continuous drain current	$I_D$	16	A
Pulsed drain current <sup>1</sup>	$I_{DM}$	64	A
Avalanche energy, single pulse <sup>2</sup>	$E_{AS}$	500	mJ
Power dissipation	$P_D$	43	W
Derate above 25°C		0.4	W/°C
Operating junction temperature	$T_j$	-55~150	°C
Storage temperature	$T_{stg}$	-55~150	°C
Continuous diode forward current	$I_S$	16	A
Diode pulse current	$I_{Spulse}$	64	A

### Thermal Characteristic

Thermal resistance, junction-to-case	$R_{\theta JC}$	2.9	°C/W
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	62.5	°C/W

## Electrical Characteristics of MOSFET

				Min.	Typ.	Max.	
Drain-source break down voltage	$BV_{DSS}$	$I_D=250\mu A, V_{GS}=0V$	$T_C=25^\circ C$	700	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$I_D=250\mu A, V_{DS}=V_{GS}$	$T_J=25^\circ C$	2	3.4	4	V
Drain-source leakage current	$I_{DSS}$	$V_{DS}=700V, V_{GS}=0V$	$T_J=25^\circ C$	-	-	1	$\mu A$
		$V_{DS}=560V, V_{GS}=0V$	$T_J=125^\circ C$	-	-	400	$\mu A$
Gate-source leakage current,forward	$I_{GSSF}$	$V_{DS}=0V, V_{GS}=30V$	$T_J=25^\circ C$	-	-	100	nA
Gate-source leakage current,reverse	$I_{GSSR}$	$V_{DS}=0V, V_{GS}=-30V$	$T_J=25^\circ C$	-	-	-100	nA
Drain-source on-state resistance <sup>3</sup>	$R_{DS(ON)}$	$V_{GS}=10V, I_D=8A$	$T_J=25^\circ C$	-	0.5	0.66	$\Omega$
Transconductance <sup>3</sup>	$G_{fs}$	$V_{DS}=20V$	$T_J=25^\circ C$	-	15	-	S

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

				Min.	Typ.	Max.	
Input capacitance	$C_{iss}$	$f=1MHz, V_{DS}=25V, V_{GS}=0V$		-	2440	-	pF
Output capacitance	$C_{oss}$			-	200	-	pF
Reverse transfer capacitance	$C_{rss}$			-	16	-	pF
Gate to source charge	$Q_{gs}$	$V_{DD}=400V$		-	15	-	nC
Gate to drain charge	$Q_{gd}$	$I_D=16A$		-	9	-	nC
Total gate charge	$Q_g$	$V_{GS}=0$ to 10V		-	44	-	nC

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

				Min.	Typ.	Max.	
Turn-on delay time	$t_{d on}$	$V_{DS}=400V, I_D=16A,$ $R_C=25\Omega, V_{GS}=0$ to 10V		-	56	-	ns
Rise time	$t_r$			-	56	-	ns
Turn-off delay time	$t_{d off}$			-	116	-	ns
Fall time	$t_f$			-	34	-	ns

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

				Min.	Typ.	Max.	
Forward voltage	$V_{SD}$	$I_{SD}=16A, V_{GS}=0V$		-	-	1.5	V
Reverse recovery time	$t_{rr}$	$V_{DS}=400V, I_S=16A, V_{GS}=10V$ $-di/dt=100A/\mu s$		-	568	-	ns
Reverse recovery current	$I_{rr}$			-	39	-	A
Recovery charge	$Q_{rr}$			-	11	-	$\mu C$

Notes:

1. Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)}=150^\circ C$ .
2. The EAS data shows Max. rating . The test condition is  $V_{DD}=50V, V_{GS}=10V, L=10mH, I_{AS}=10A, T_C=25^\circ C$ .
3. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .

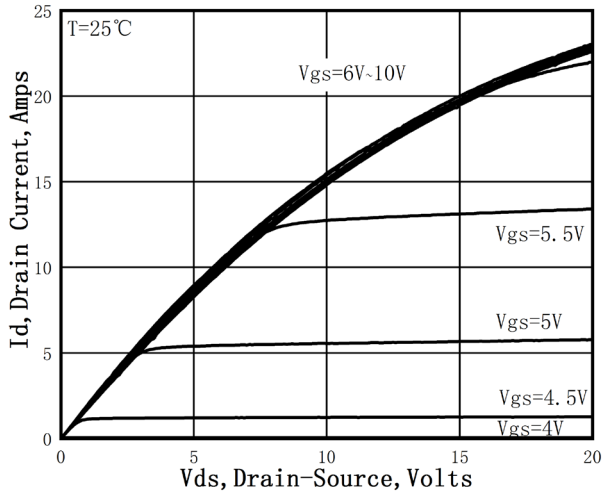


Figure 1. On-Region Characteristics

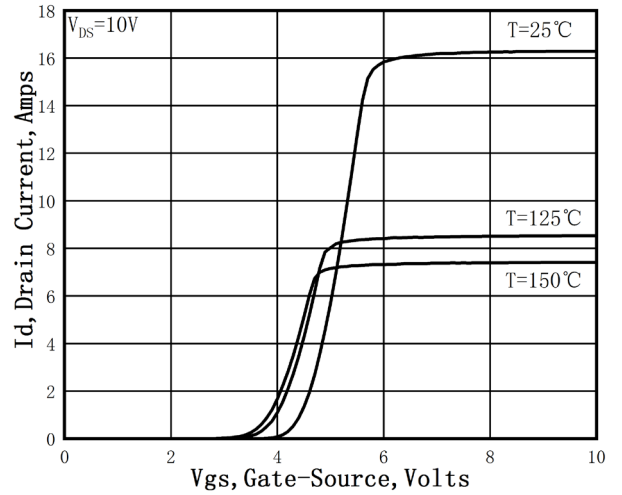


Figure 2. Transfer Characteristics

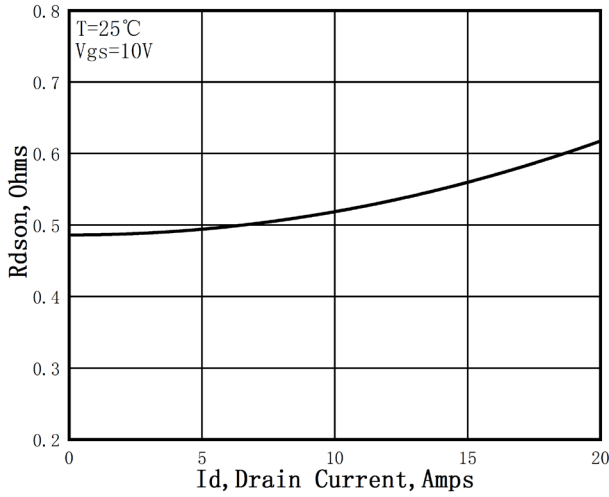


Figure 3. Static Drain-Source On Resistance

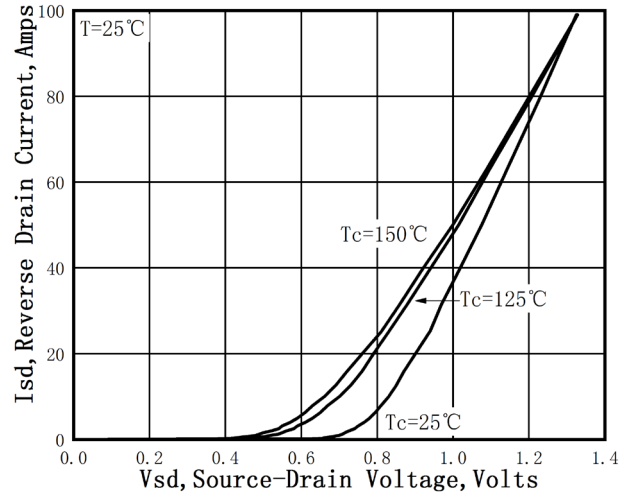


Figure 4. Typical Body Diode Transfer Characteristics

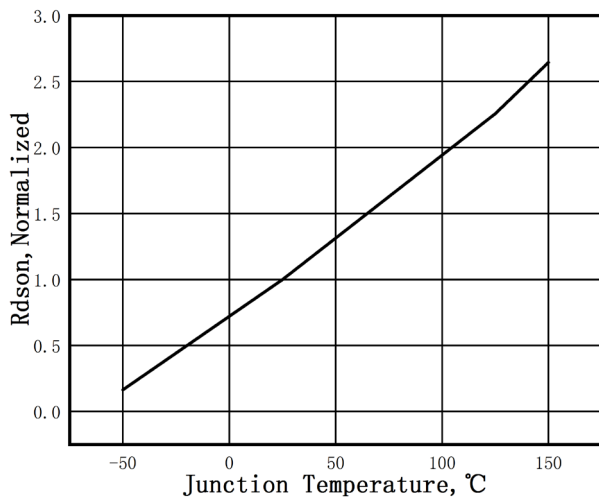


Figure 5. Normalized  $R_{DS(on)}$  vs. Temperature

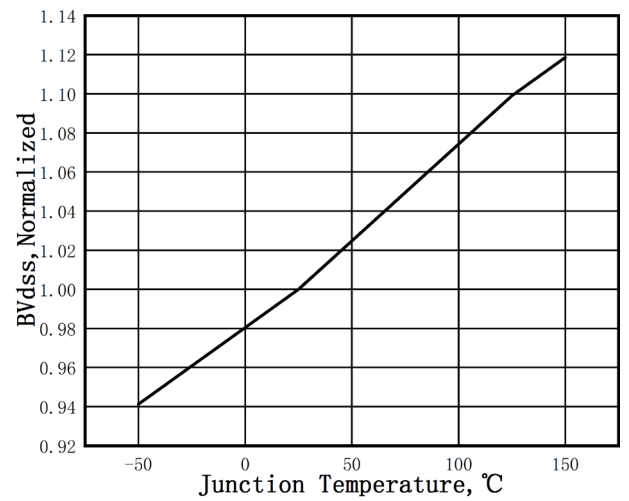


Figure 6. Normalized  $BV_{DSS}$  vs. Temperature

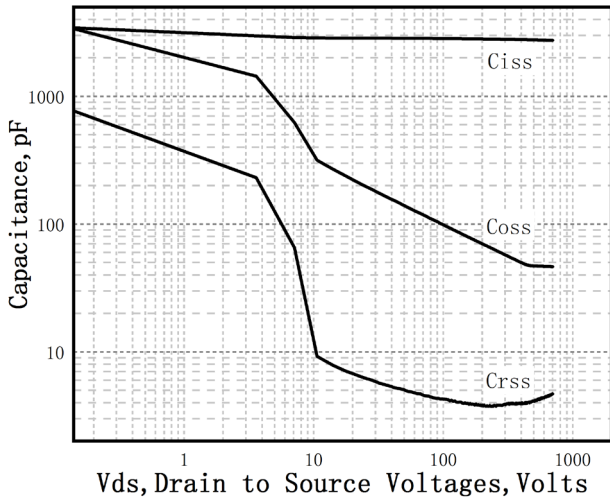


Figure 7. Capacitance Characteristics

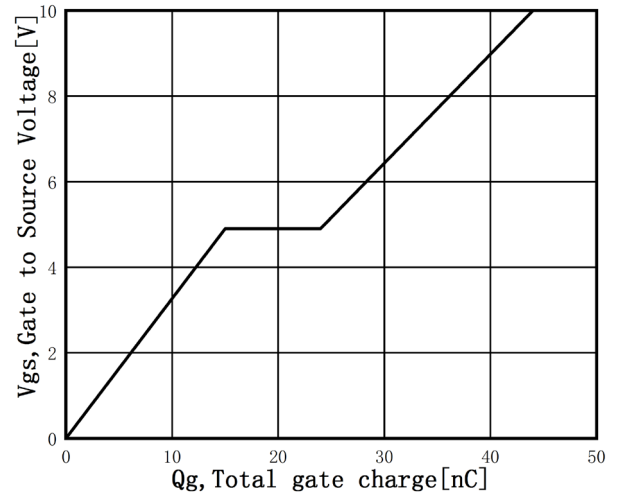


Figure 8. Gate Charge Characteristics

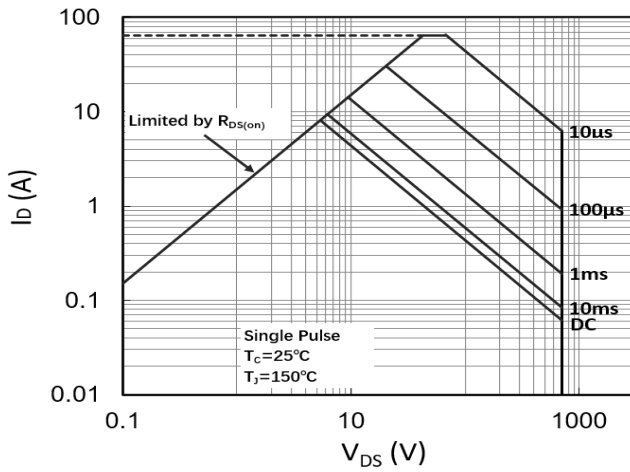


Figure 9. Maximum Safe Operating Area

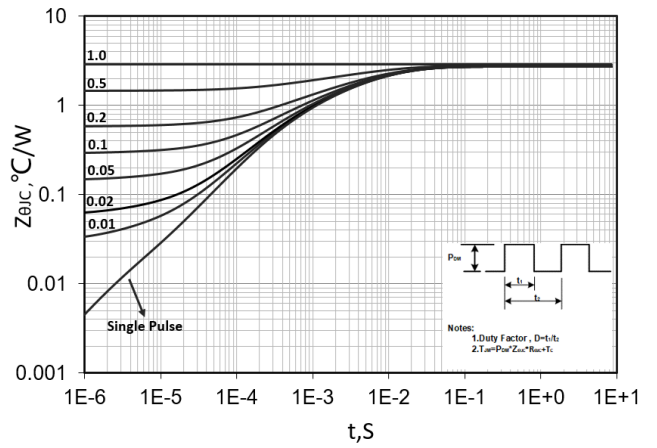
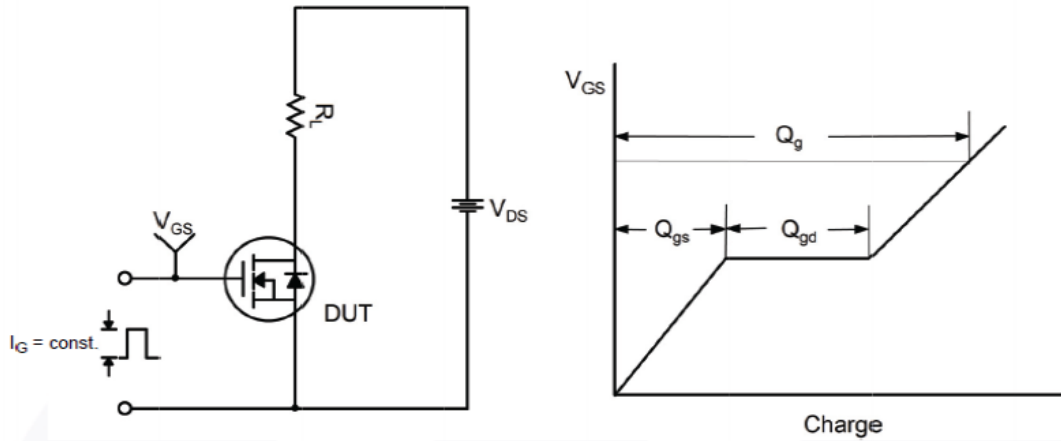
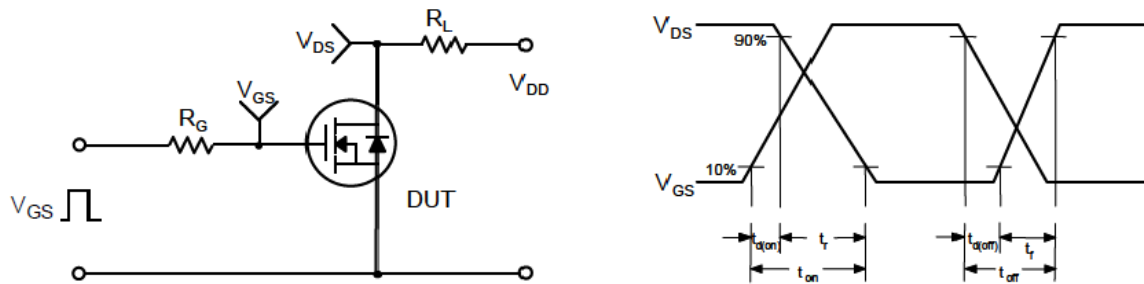


Figure 10. Transient Thermal Response Curve

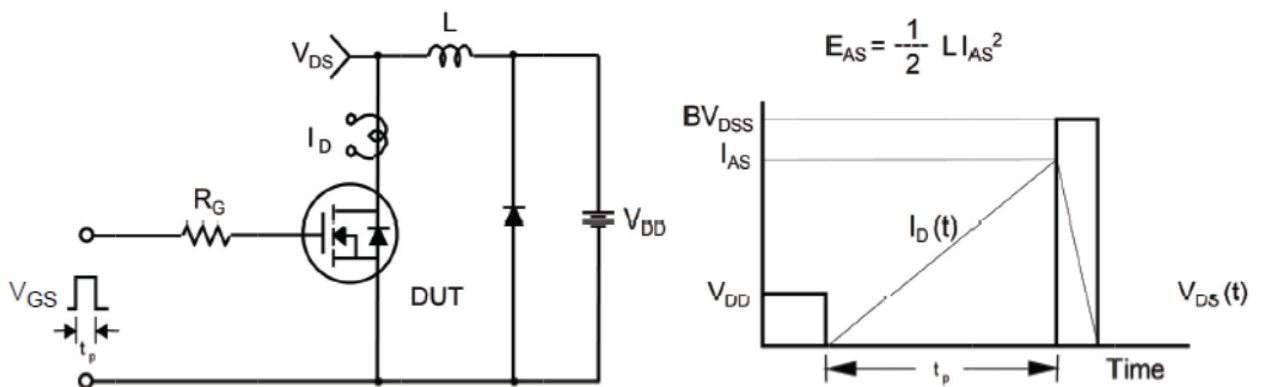
Gate Charge Test Circuit & Waveform



Switching Test Circuit & Waveforms

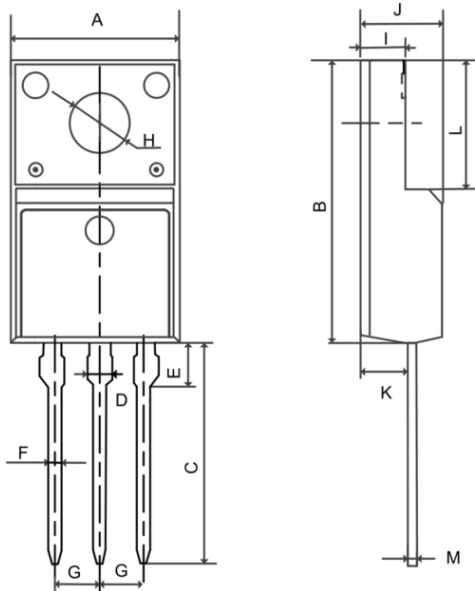


Unclamped Inductive Switching Test Circuit & Waveforms



## 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

## Ordering Information

Part	Package	Marking	Packing method
WML16N70D1B	TO-220F	WML16N70D1B	Tube

## Contact Information

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