

150V N-Channel MOSFETs

Description

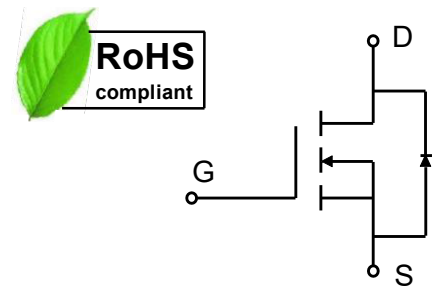
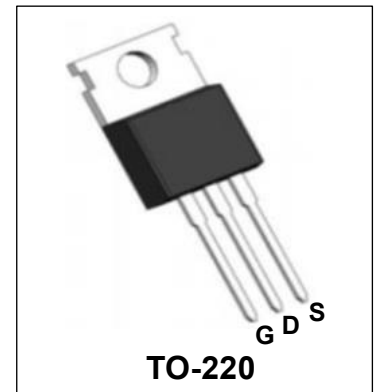
WMK115N15HG2 uses FS's 2nd generation power trench MOSFET technology that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance. This device is well suited for high efficiency fast switching applications.

Features

- $V_{DS} = 150V, I_D = 90A$
- $R_{DS(on)} < 11.5m\Omega @ V_{GS} = 10V$
LOW $R_{DS(ON)}$
- 100% EAS Guaranteed
- High Speed Power Switching

Applications

- Hard Switching and High Speed Circuit
- DC/DC Converter
- Synchronous Rectification in SMPS



Absolute Maximum Ratings (T_c = 25°C, unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	I_D	T _c =25°C	90
		T _c =100°C	57
Pulsed Drain Current ⁴	I_{DM}	360	A
Single Pulse Avalanche Energy ³	EAS	245	mJ
Total Power Dissipation	P_D	173.6	W
Operating Junction and Storage Temperature Range	T_J , T_{STG}	-55 to 150	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient ¹	R_{θJA}	58	°C/W
Thermal Resistance from Junction-to-Case	R_{θJC}	0.72	°C/W



WMK115N15HG2

Electrical Characteristics (T_c = 25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	V_{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	150	-	-	V
Gate-body Leakage Current	I_{GSS}	V _{DS} = 0V, V _{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	T _J =25°C	I _{DSS} V _{DS} = 150V, V _{GS} = 0V	-	-	1	μA
	T _J =100°C		-	-	100	
Gate-Threshold Voltage	V_{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	2	3	4	V
Drain-Source On-Resistance ²	R_{DS(on)}	V _{GS} = 10V, I _D = 20A	-	9.1	11.5	mΩ
Forward Transconductance ²	g_{fs}	V _{DS} = 5V, I _D = 20A	-	66	-	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V _{DS} = 75V, V _{GS} = 0V, f = 1MHz	-	3520	-	pF
Output Capacitance	C_{oss}		-	262	-	
Reverse Transfer Capacitance	C_{rss}		-	9.8	-	
Switching Characteristics						
Gate Resistance	R_g	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz	-	2.4	-	Ω
Total Gate Charge	Q_g	V _{GS} = 10V, V _{DD} = 75V, I _D = 20A	-	45	-	nC
Gate-Source Charge	Q_{gs}		-	18	-	
Gate-Drain Charge	Q_{gd}		-	8.8	-	
Turn-On Delay Time	t_{d(on)}	V _{GS} = 10V, V _{DD} = 75V, R _G = 10Ω, I _D = 20A	-	18	-	ns
Rise Time	t_r		-	9	-	
Turn-Off Delay Time	t_{d(off)}		-	32	-	
Fall Time	t_f		-	13	-	
Drain-Source Body Diode Characteristics						
Diode Forward Voltage ²	V_{SD}	I _F = 20A, V _{GS} = 0V	-	-	1.2	V
Continuous Source Current ^{1,5}	I_S	V _G = V _D = 0V, Force Current	-	-	90	A
Reverse Recovery Time	t_{rr}	V _R = 75V, I _F = 20A, di _F /dt = 100A/μs	-	81.6	-	ns
Reverse Recovery Charge	Q_{rr}		-	162	-	nC

Notes:

- The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- The EAS data shows Max. rating. The test condition is V_{DD}=50V, V_{GS}=10V, L=0.4mH, I_{AS}=35A
- Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150°C.
- The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

Typical Characteristics

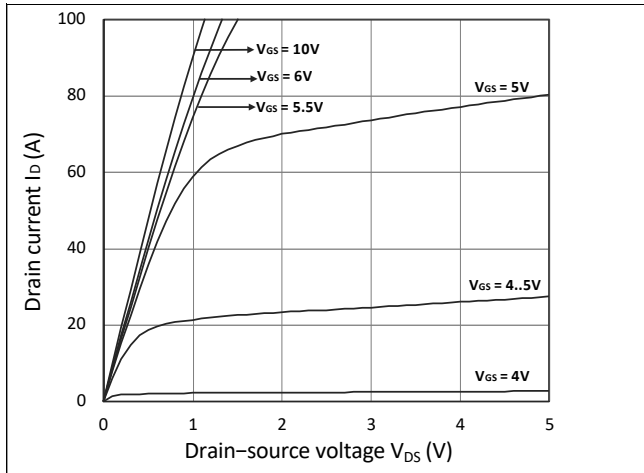


Figure 1. Output Characteristics

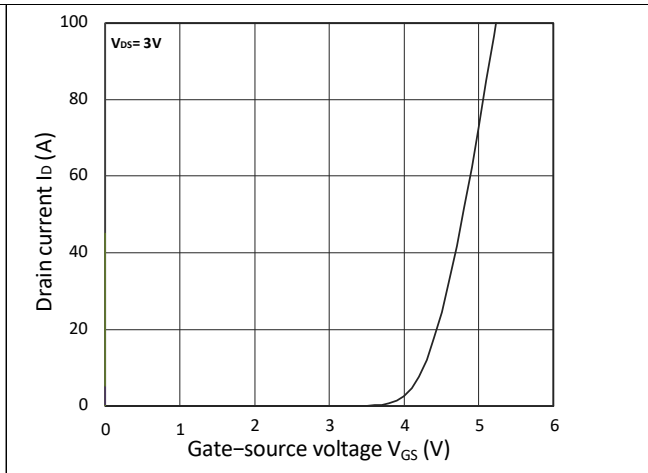


Figure 2. Transfer Characteristics

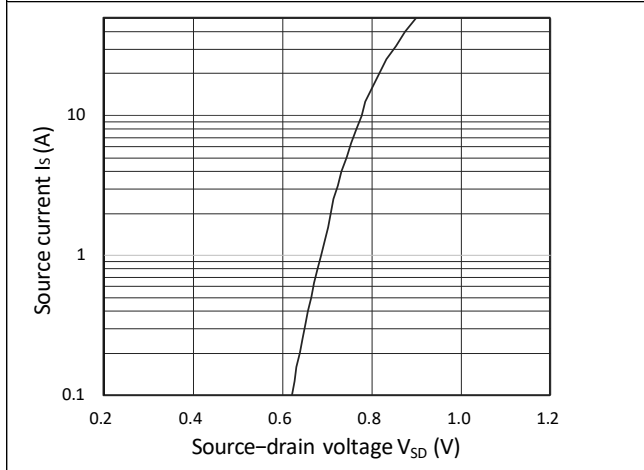


Figure 3. Forward Characteristics of Reverse

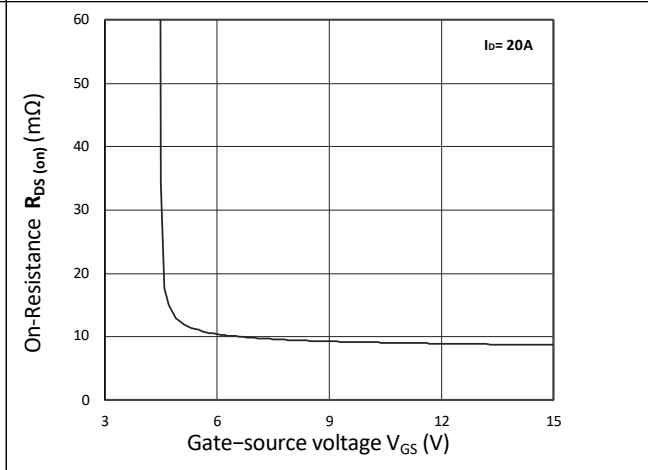


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

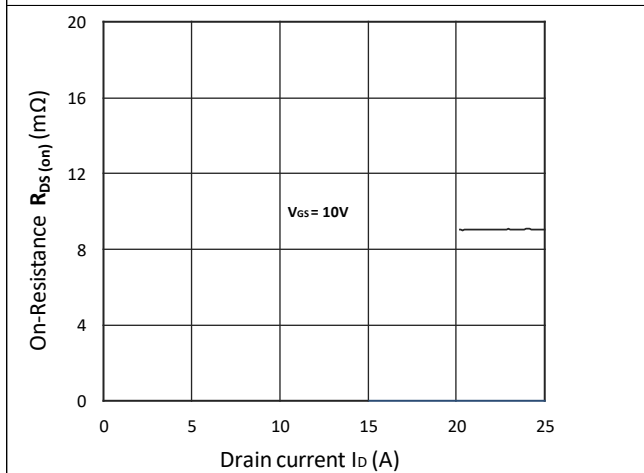


Figure 5. $R_{DS(ON)}$ vs. I_D

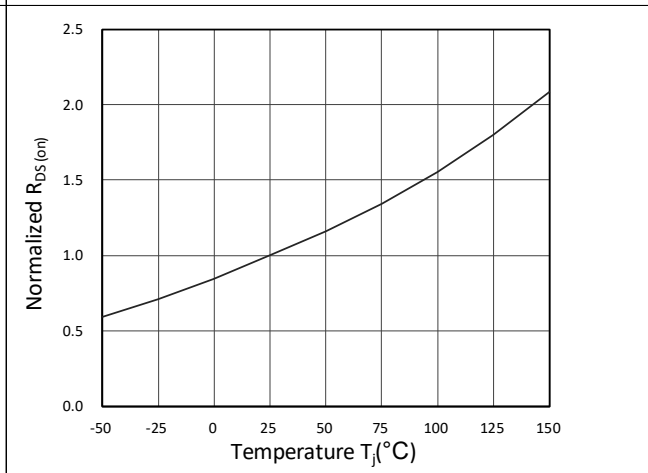


Figure 6. Normalized $R_{DS(ON)}$ vs. Temperature

Typical Characteristics(Con.)

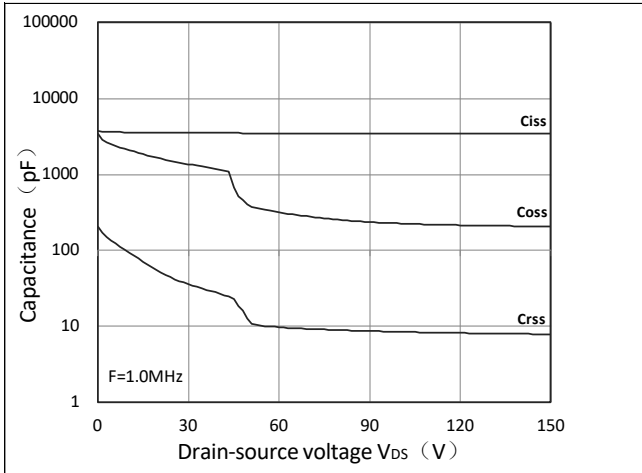


Figure 7. Capacitance Characteristics

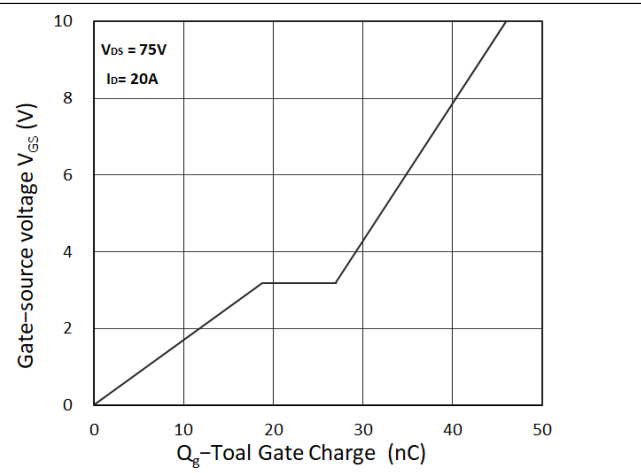


Figure 8. Gate Charge Characteristics

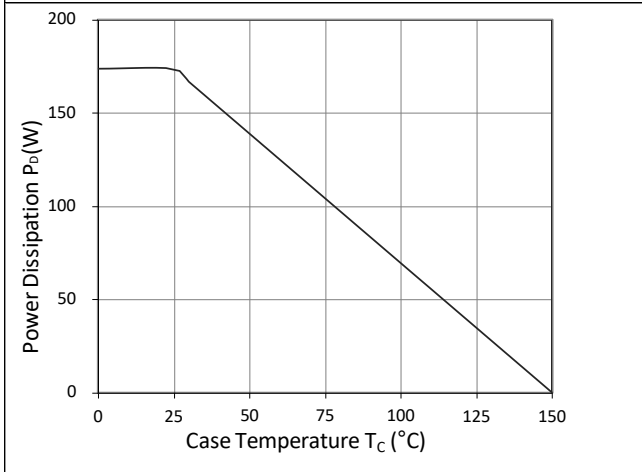


Figure 9. Power Dissipation

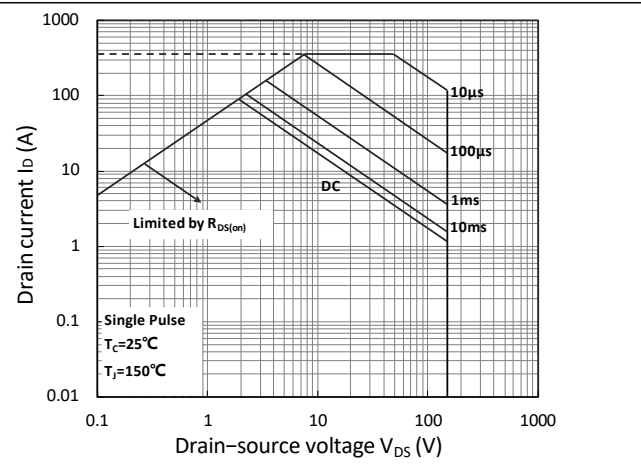


Figure 10. Safe Operating Area

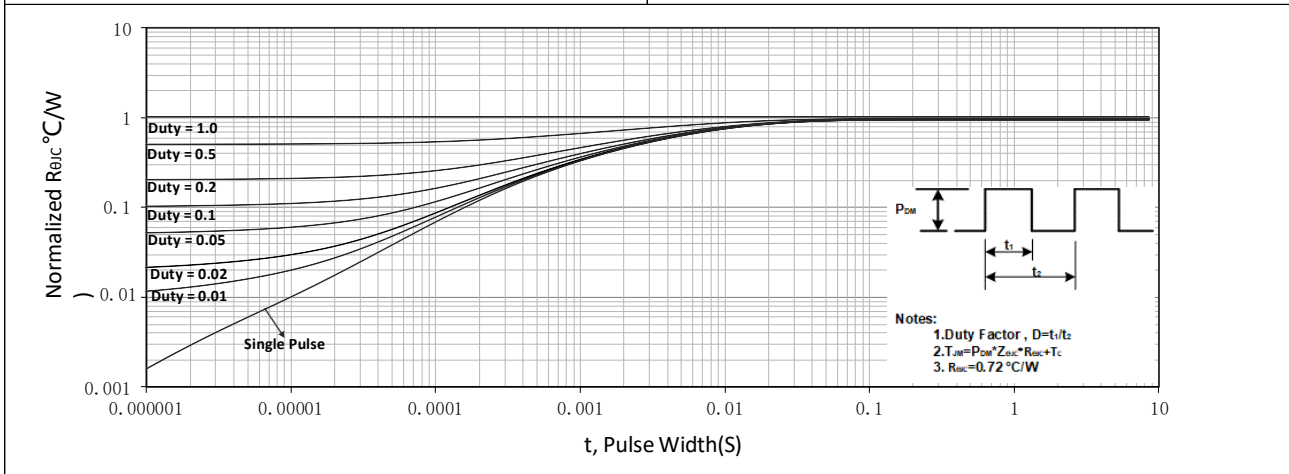


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

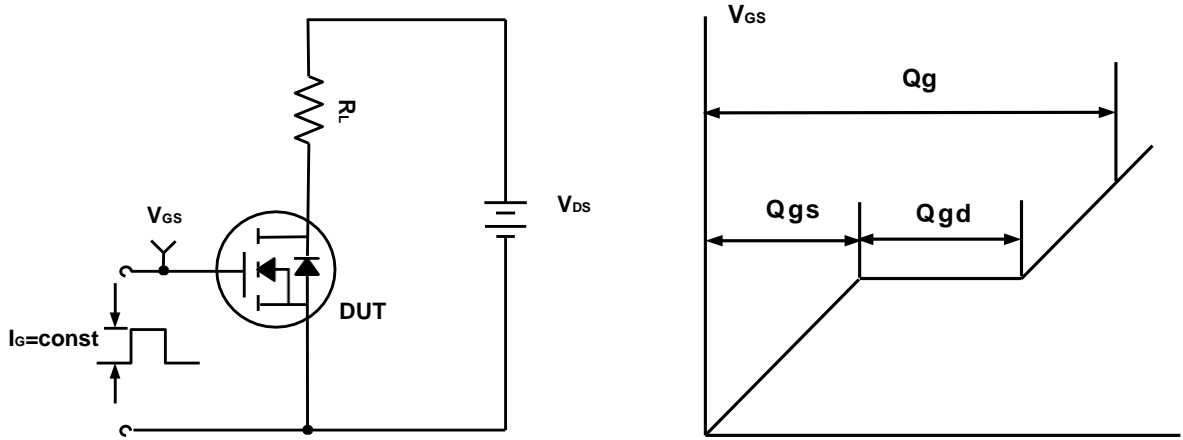


Figure A. Gate Charge Test Circuit & Waveforms

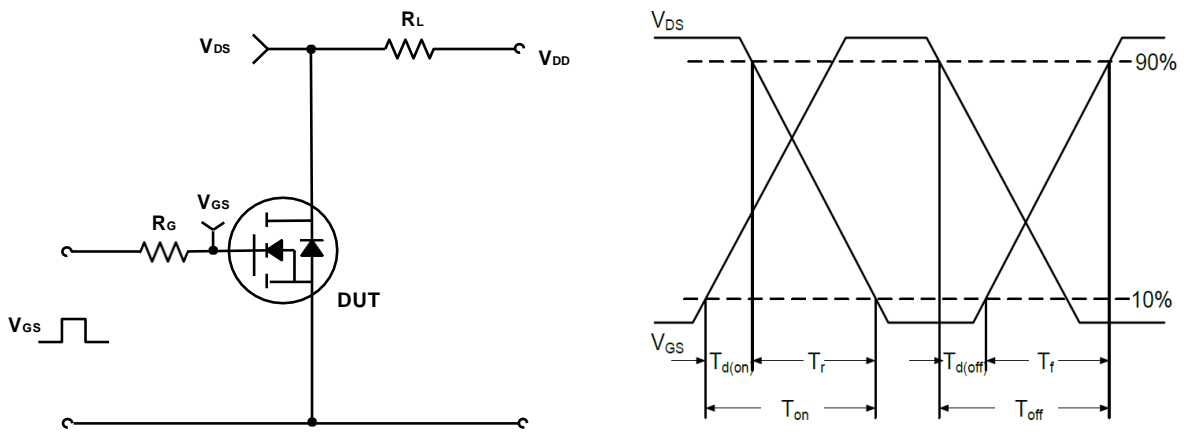


Figure B. Switching Test Circuit & Waveforms

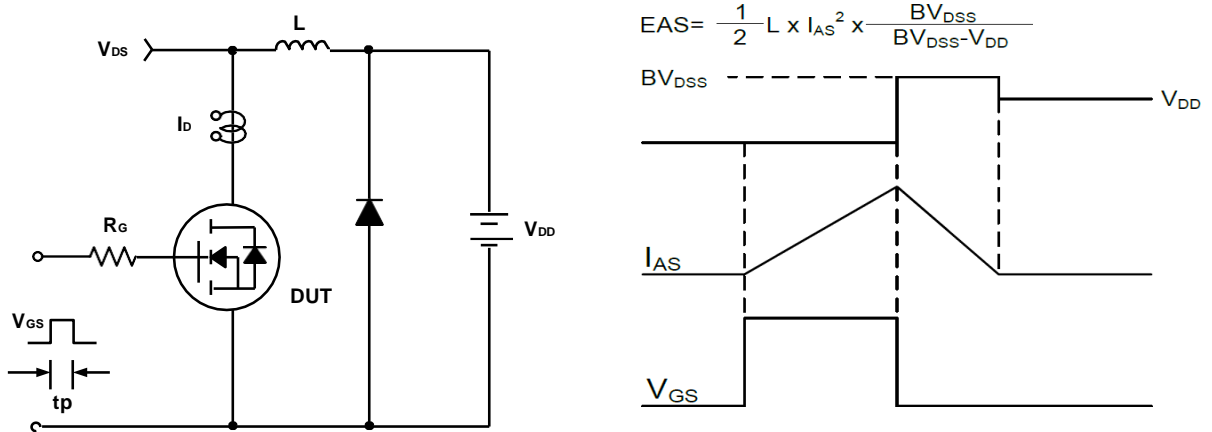
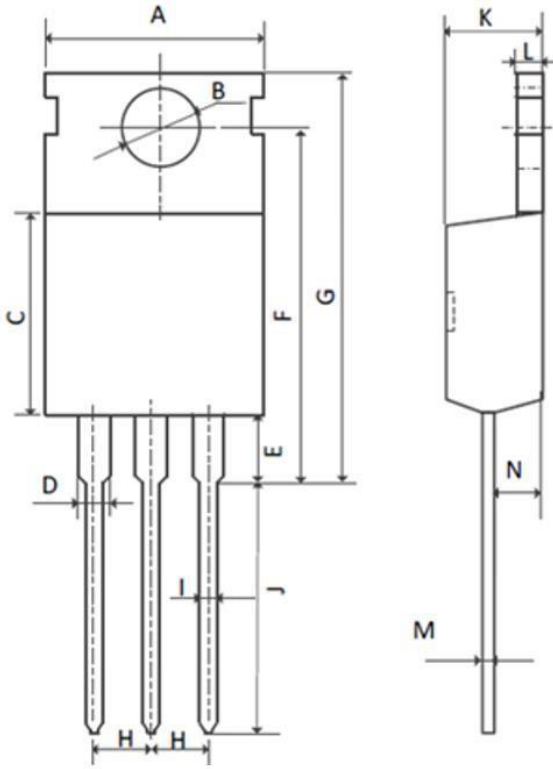


Figure C. Unclamped Inductive Switching Circuit & Waveforms

Mechanical Dimensions for TO-220



SYMBOL	MM	
	MIN	MAX
A	9.70	10.30
B	3.40	3.80
C	8.80	9.40
D	1.17	1.47
E	2.60	3.50
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