

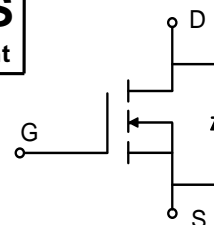
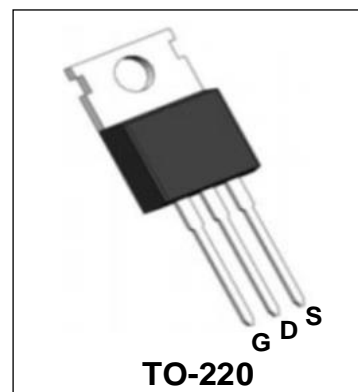
60V N-Channel Enhancement Mode Power MOSFET

Description

WMK50N06TS uses advanced power trench technology that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Features

- $V_{DS} = 60V$, $I_D = 50A$
- $R_{DS(on)} < 16m\Omega$ @ $V_{GS} = 10V$
 $R_{DS(on)} < 20m\Omega$ @ $V_{GS} = 4.5V$
- Green Device Available
- 100% EAS Guaranteed
- Optimized for High Speed Smooth Switching



Applications

- Synchronous Rectification
- DC/DC Converter

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	T _c =25°C	50
		T _c =100°C	31.6
Pulsed Drain Current ⁴	I_{DM}	200	A
Single Pulse Avalanche Energy ³	EAS	96.8	mJ
Total Power Dissipation	P_D	69.4	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	$R_{\theta JA}$	48	°C/W
Thermal Resistance from Junction-to-Case	$R_{\theta Jc}$	1.8	°C/W

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	60	-	-	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} = 60V, V _{GS} = 0V	-	-	1	μA
	T _J =100°C			-	-	100	
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	1.2	1.7	2.5	V	
Drain-Source on-Resistance ²	R _{DS(on)}	V _{GS} = 10V, I _D = 20A	-	12.5	16	mΩ	
		V _{GS} = 4.5V, I _D = 10A	-	16	20		
Forward Transconductance ²	g _{fs}	V _{DS} = 10V, I _D = 20A	-	36	-	S	
Dynamic Characteristics							
Input Capacitance	C _{iss}	V _{DS} = 30V, V _{GS} = 0V, f = 1MHz	-	2690	-	pF	
Output Capacitance	C _{oss}		-	120	-		
Reverse Transfer Capacitance	C _{rss}		-	98	-		
Switching Characteristics							
Gate Resistance	R _G	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz	-	0.6	-	Ω	
Total Gate Charge	Q _g	V _{GS} = 10V, V _{DD} = 30V, I _D = 20A	-	46	-	nC	
Gate-Source Charge	Q _{gs}		-	8.5	-		
Gate-Drain Charge	Q _{gd}		-	7.5	-		
Turn-on Delay Time	t _{d(on)}	V _{GS} = 10V, V _{DD} = 30V, R _G = 3Ω, I _D = 20A	-	10.5	-	ns	
Rise Time	t _r		-	21.2	-		
Turn-off Delay Time	t _{d(off)}		-	35	-		
Fall Time	t _f		-	13	-		
Drain-Source Body Diode Characteristics							
Diode Forward Voltage ²	V _{SD}	I _S = 20A, V _{GS} = 0V	-	-	1.2	V	
Continuous Source Current ^{1,5}	I _S	V _G =V _D =0V, Force Current	-	-	50	A	
Reverse Recovery Time	t _{rr}	V _R = 30V, I _F = 20A, dI _F /dt = 100A/μs	-	38	-	ns	
Reverse Recovery Charge	Q _{rr}		-	-	72	-	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}=25V, V_{GS}=10V, L=0.4mH, I_{AS}=22A
- 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

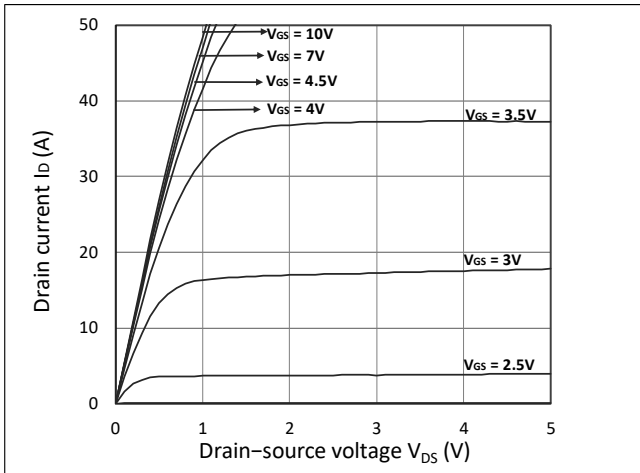


Figure 1. Output Characteristics

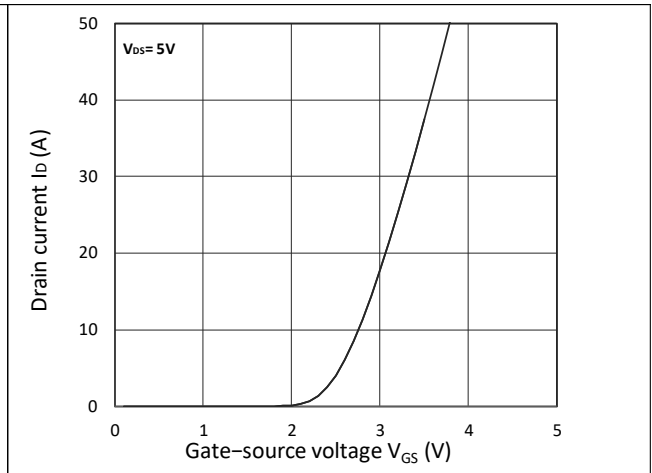


Figure 2. Transfer Characteristics

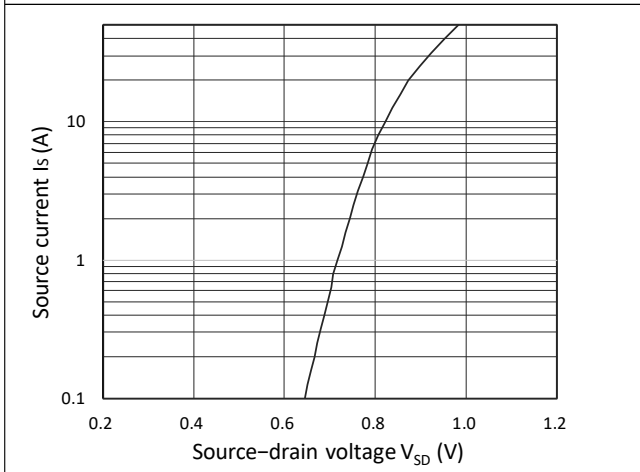


Figure 3. Forward Characteristics of Reverse

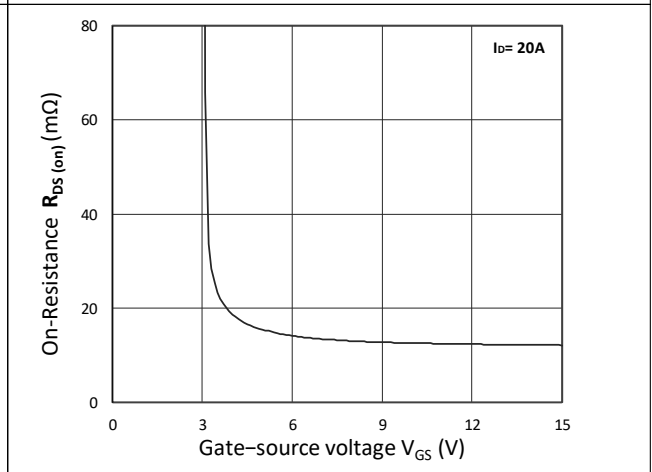


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

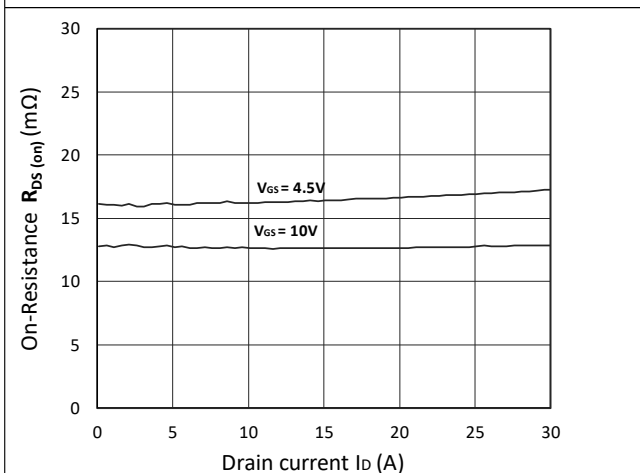


Figure 5. $R_{DS(ON)}$ vs. I_D

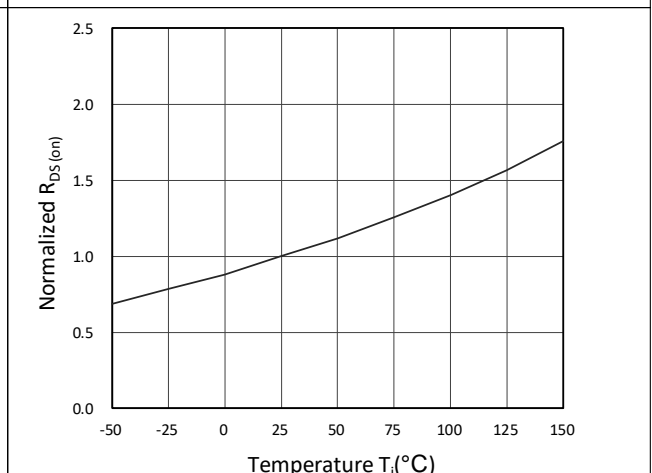


Figure 6. Normalized $R_{DS(ON)}$ vs. Temperature

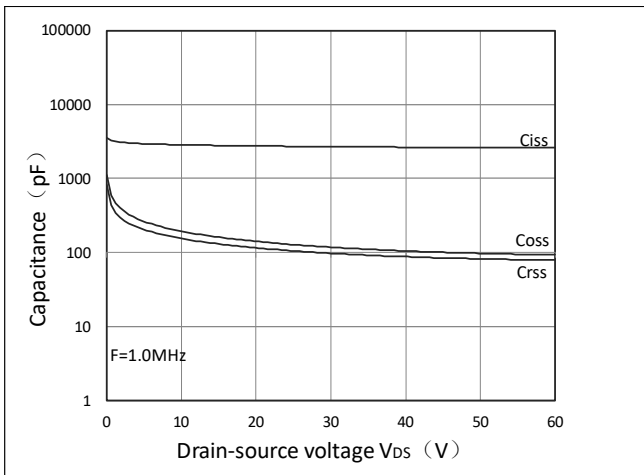


Figure 7. Capacitance Characteristics

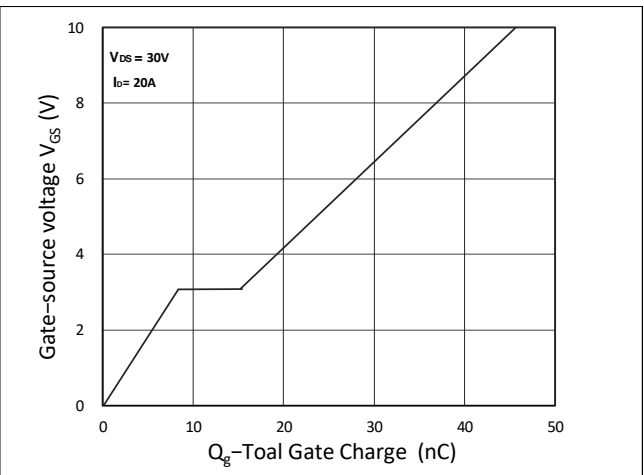


Figure 8. Gate Charge Characteristics

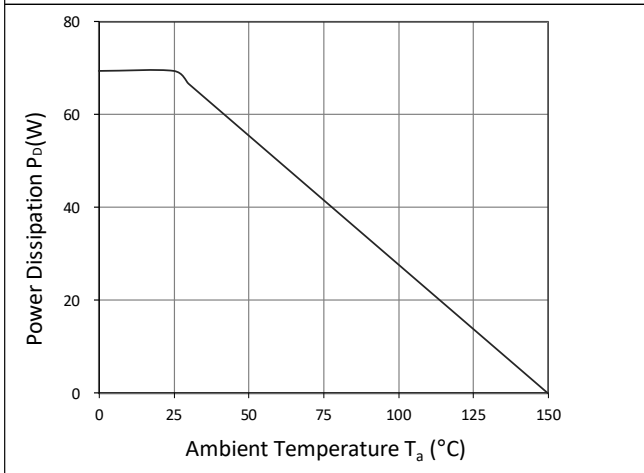


Figure 9. Power Dissipation

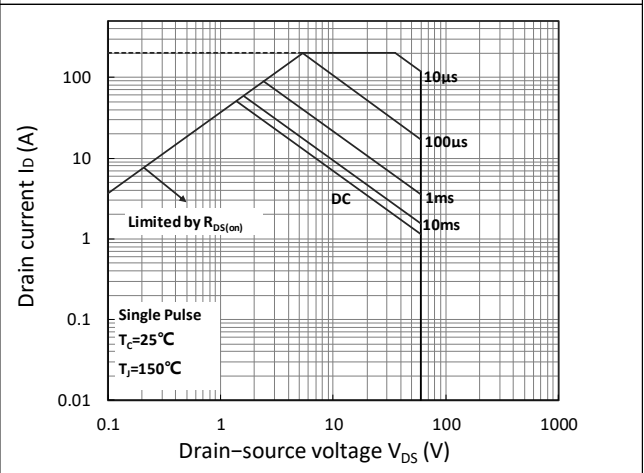


Figure 10. Safe Operating Area

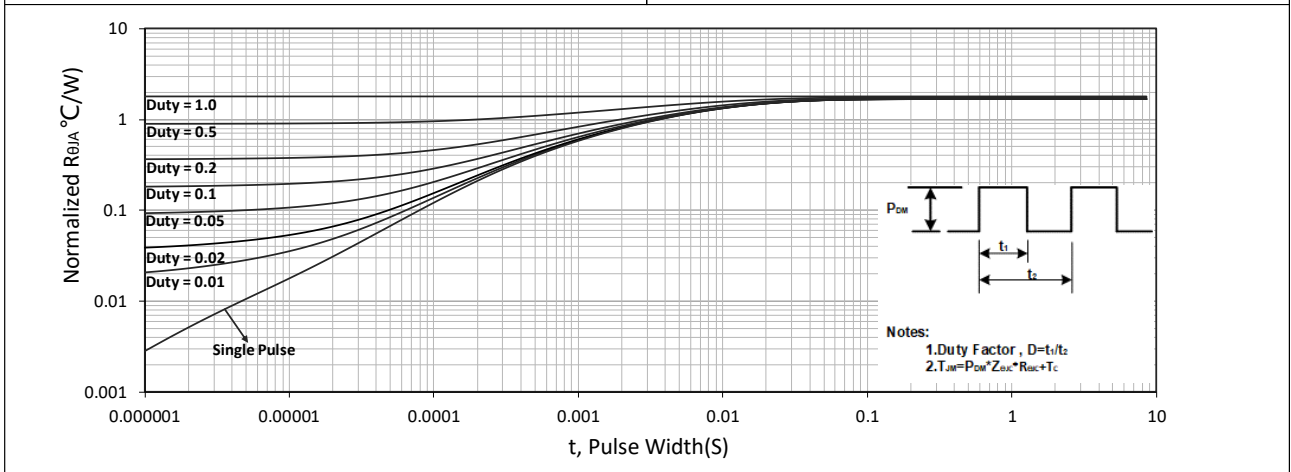


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

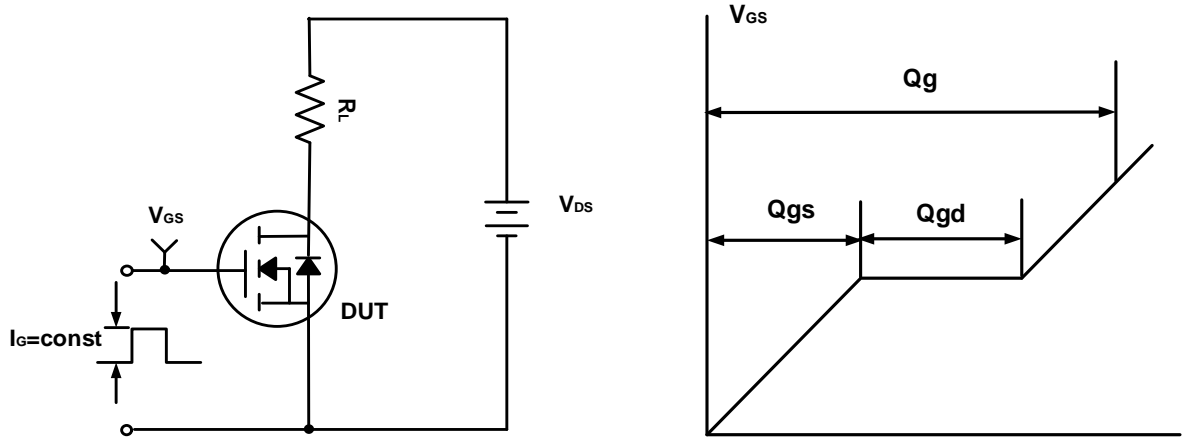


Figure A. Gate Charge Test Circuit & Waveforms



Figure B. Switching Test Circuit & Waveforms

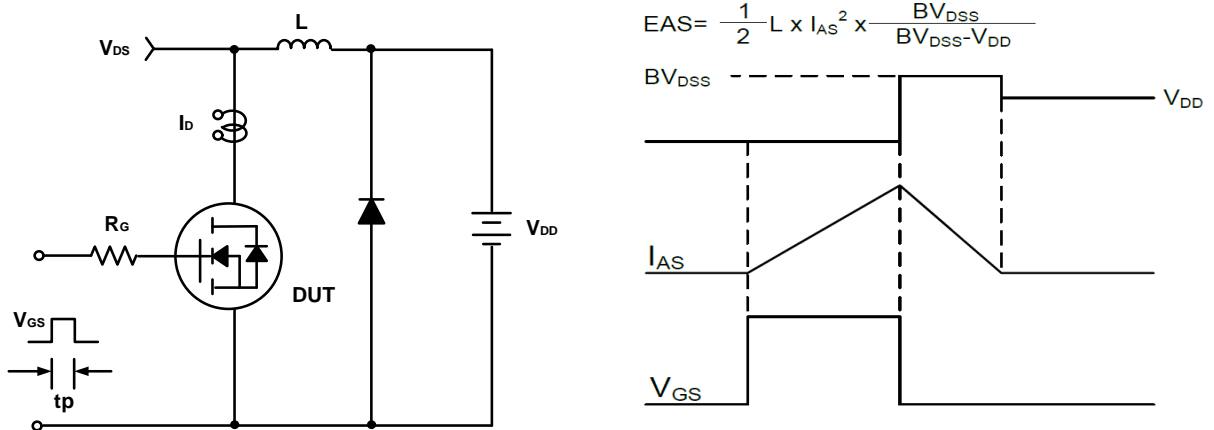
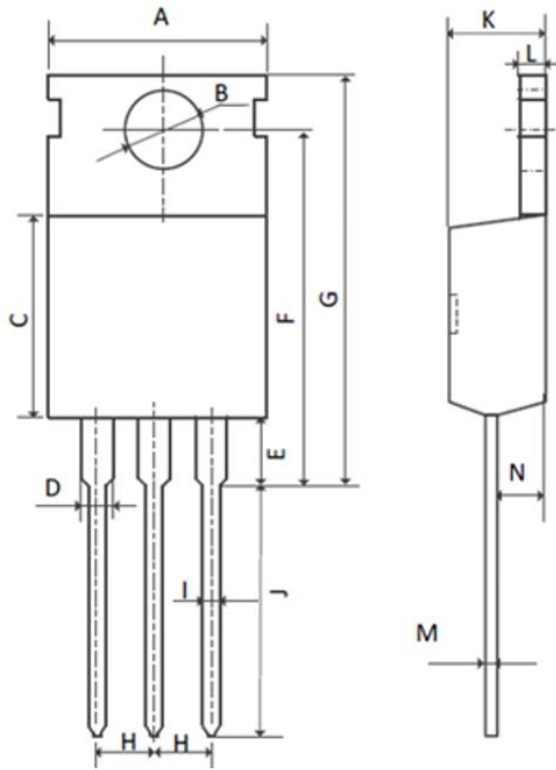


Figure C. Unclamped Inductive Switching Circuit & Waveforms

Mechanical Dimensions for TO-220

COMMON DIMENSIONS

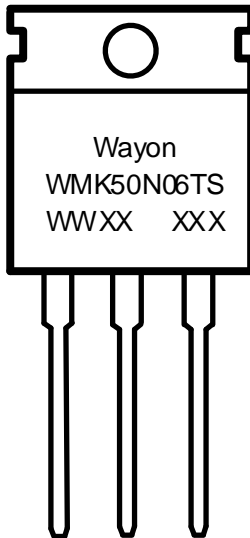


SYMBOL	MM	
	MIN	MAX
A	9.70	10.30
B	3.40	3.80
C	8.80	9.40
D	1.17	1.47
E	2.60	3.50
F	15.10	16.70
G	19.55MAX	
H	2.54REF	
I	0.70	0.95
J	9.35	11.00
K	4.30	4.77
L	1.20	1.45
M	0.40	0.65
N	2.20	2.60

Ordering Information

Part	Package	Marking	Packing method
WMK50N06TS	TO-220	WMK50N06TS	Tube

Marking Information



WMK50N06TS = Device code

WWXX XXX= Date code

Contact Information

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