

60V N-Channel Enhancement Mode Power MOSFET

Description

WMS13N06T1 uses advanced power trench technology that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Features

- $V_{DS} = 60V$, $I_D = 13A$
 $R_{DS(on)} < 8.5m\Omega @ V_{GS} = 10V$
 $R_{DS(on)} < 12m\Omega @ V_{GS} = 4.5V$
- Low $R_{DS(on)}$
- Low Gate Charge
- 100% EAS Guaranteed

Applications

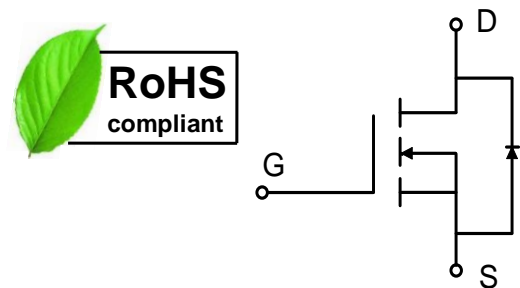
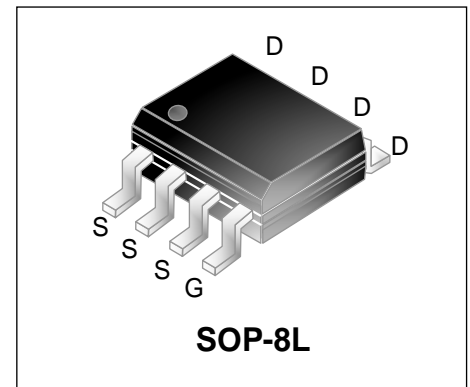
- Power Management Switches
- Synchronous Rectification for AC/DC Quick Charger

Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current@10V ¹	$T_A = 25^\circ C$	I_D	13	A
	$T_A = 100^\circ C$		8	
Pulsed Drain Current ²		I_{DM}	60	A
Single Pulse Avalanche Energy ³		EAS	80	mJ
Avalanche Current		I_{AS}	40	A
Total Power Dissipation ⁴	$T_A = 25^\circ C$	P_D	2.7	W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to +150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient ¹ ($t \leq 10S$)	$R_{\theta JA}$	45	$^\circ C/W$
Thermal Resistance from Junction-to-Ambient ¹	$R_{\theta JA}$	80	$^\circ C/W$



Electrical Characteristics $T_c = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	60	-	-	V
Gate-body Leakage current	I_{GSS}	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	± 100	nA
Zero Gate Voltage Drain Current	$T_J=25^\circ\text{C}$	I_{DSS} $V_{DS} = 48V, V_{GS} = 0V$	-	-	1	μA
	$T_J=55^\circ\text{C}$		-	-	5	
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.2	-	2.5	V
Drain-Source On-Resistance ²	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 10A$	-	7	8.5	m Ω
		$V_{GS} = 4.5V, I_D = 8A$	-	9	12	
Forward Transconductance	g_{fs}	$V_{DS} = 5V, I_D = 10A$	-	50	-	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 25V, V_{GS} = 0V, f = 1\text{MHz}$	-	3307	-	pF
Output Capacitance	C_{oss}		-	201	-	
Reverse Transfer Capacitance	C_{rss}		-	151	-	
Switching Characteristics						
Total Gate Charge	Q_g	$V_{GS} = 10V, V_{DS} = 48V, I_D = 10A$	-	57	-	nC
Gate-Source Charge	Q_{gs}		-	8.7	-	
Gate-Drain Charge	Q_{gd}		-	14	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10V, V_{DD} = 30V, R_G = 3.3\Omega, I_D = 10A$	-	16.2	-	nS
Rise Time	t_r		-	41.2	-	
Turn-Off Delay Time	$t_{d(off)}$		-	56.4	-	
Fall Time	t_f		-	16.2	-	
Drain-Source Body Diode Characteristics						
Diode Forward Voltage ²	V_{SD}	$I_S = 1A, V_{GS} = 0V$	-	-	1.2	V
Continuous Source Current ^{1,5}	I_S	$V_{GS}=V_D=0V$, Force Current	-	-	10	A
Pulsed Source Current ^{2,5}	I_{SM}		-	-	60	
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 10A, dI/dt = 100A/\mu s$	-	24	-	nS
Body Diode Reverse Recovery Charge	Q_{rr}		-	15	-	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 $\leq 300\mu s$, duty cycle $\leq 2\%$
- The EAS data shows Max. rating. The test condition is $V_{DD}=50V, V_{GS}=10V, L=0.1mH, I_{AS}=40A$
- The power dissipation is limited by 150°C junction temperature
- The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.

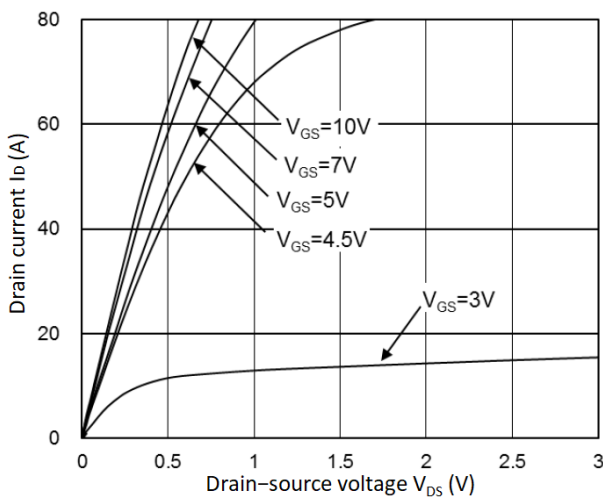


Figure 1. Typical Output Characteristics

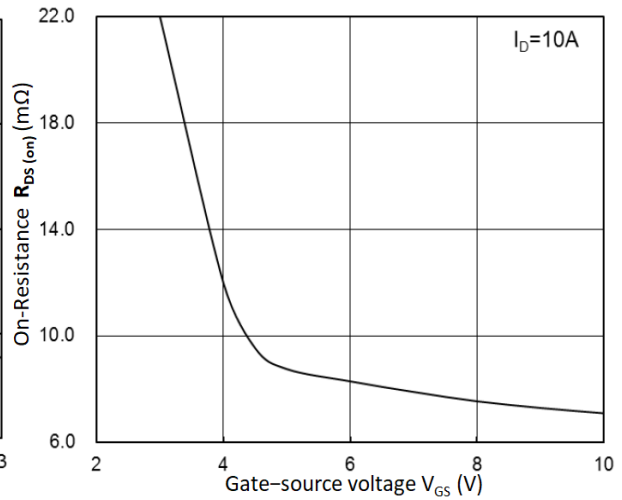


Figure 2. $R_{DS(on)}$ vs. V_{GS}

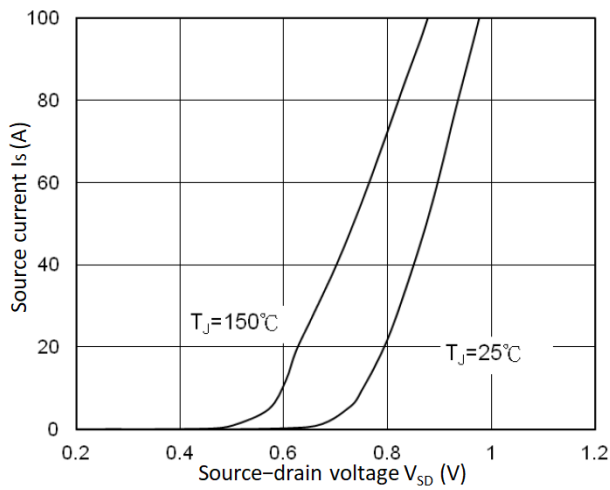


Figure 3. Forward Characteristics of Reverse

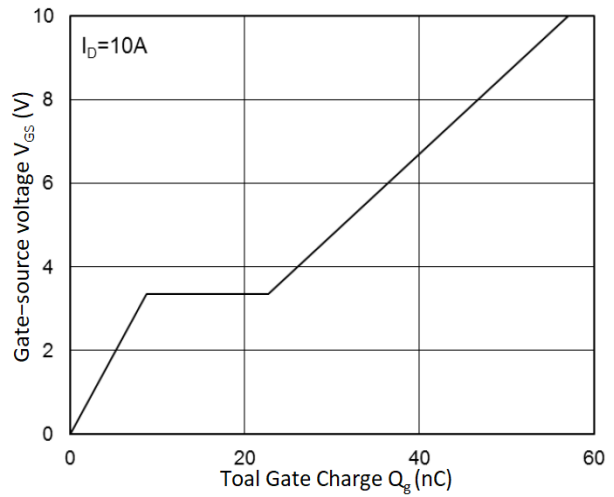


Figure 4. Gate Charge Characteristics

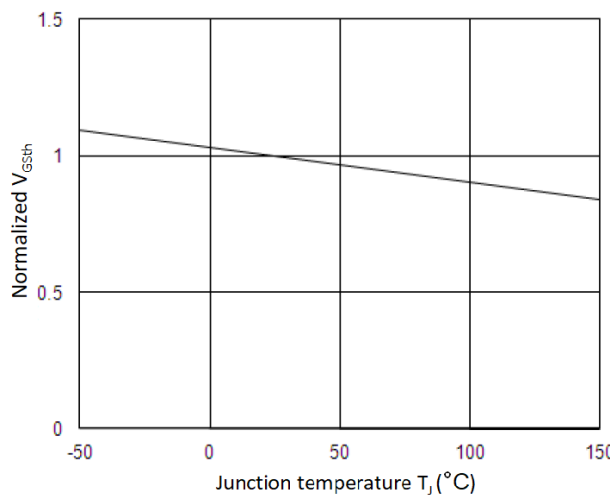


Figure 5. Normalized $V_{GS(th)}$ vs. T_J

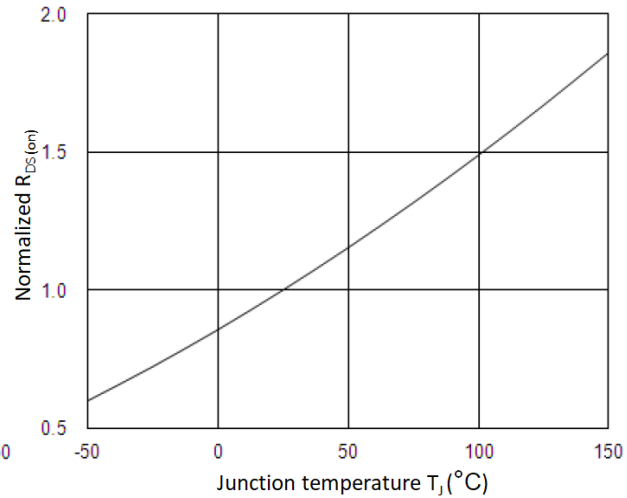


Figure 6. Normalized $R_{DS(on)}$ vs. T_J

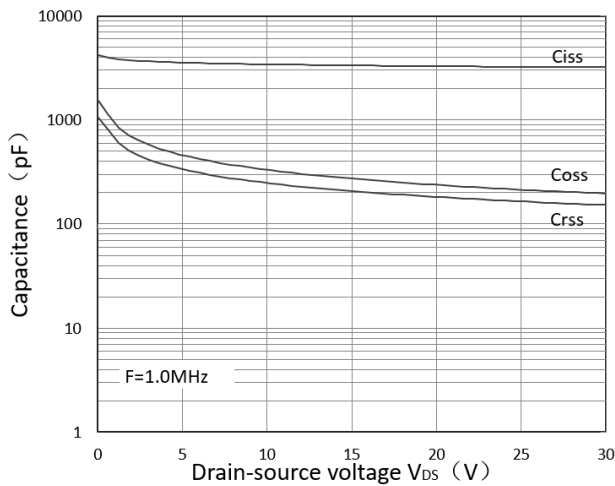


Figure 7. Capacitance Characteristics

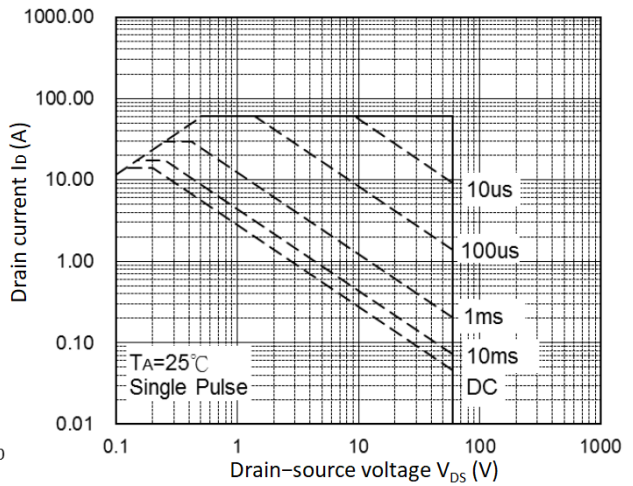


Figure 8. Safe Operating Area

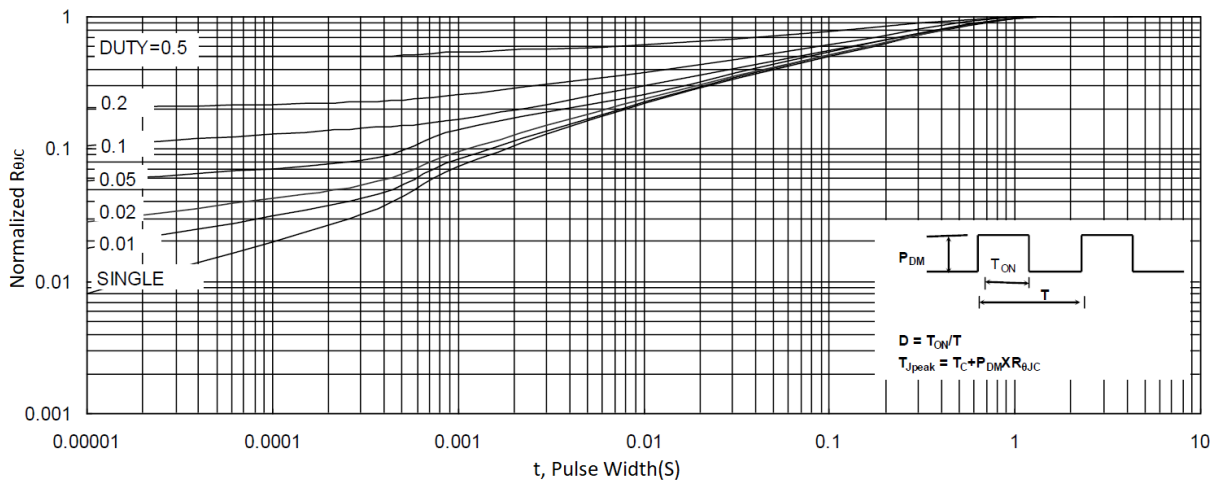


Figure 9. Normalized Maximum Transient Thermal Impedance

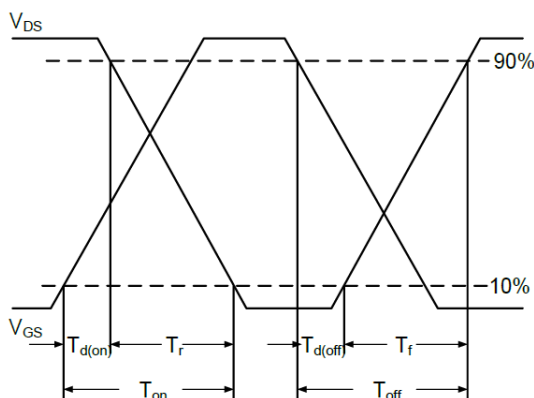


Figure 10. Switching Time Waveform

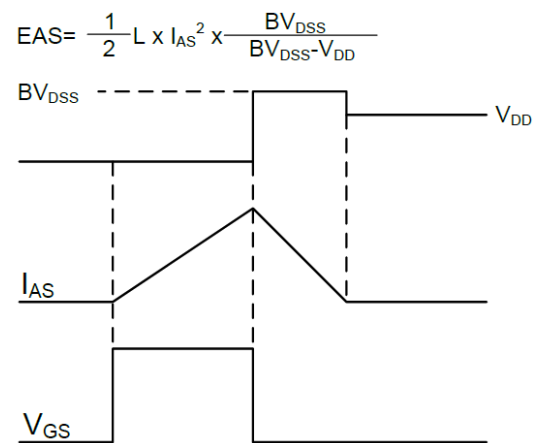
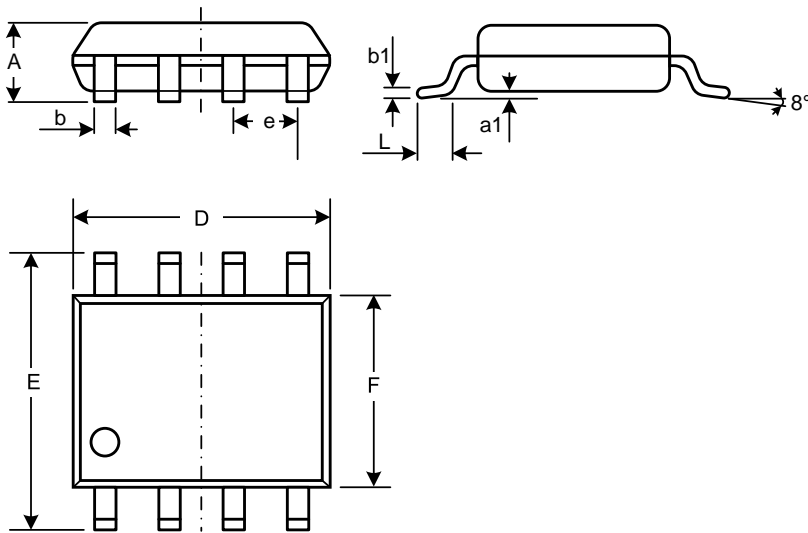


Figure 11. Unclamped Inductive Switching Waveform

Mechanical Dimensions for SOP-8L



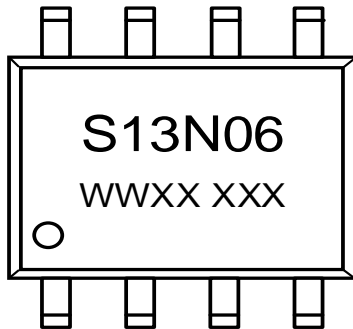
COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	1.23	1.75
a1	0.05	0.25
b	0.31	0.51
b1	0.16	0.25
D	4.70	5.15
E	5.75	6.25
e	1.07	1.47
F	3.70	4.10
L	0.4	1.27

Ordering Information

Part	Package	Marking	Packing method
WMS13N06T1	SOP-8L	S13N06	Tape and Reel

Marking Information



S13N06 = Device code

WWXX XXX= Date code

Contact Information

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