

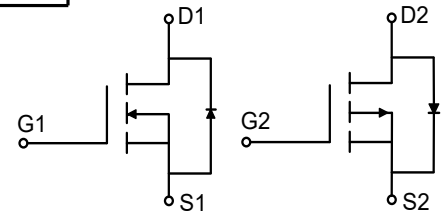
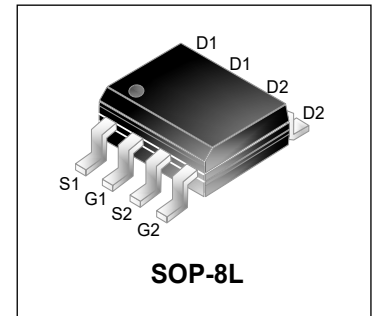
40V N+P Dual Channel Enhancement Mode Power MOSFET

Description

WMS10DH04TS uses advanced power trench technology that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Features

- N - Channel:
 $V_{DS} = 40V$, $I_D = 10A$
 $R_{DS(on)} < 16m\Omega$ @ $V_{GS} = 10V$
 $R_{DS(on)} < 20m\Omega$ @ $V_{GS} = 4.5V$
- P - Channel:
 $V_{DS} = -40V$, $I_D = -8A$
 $R_{DS(on)} < 33m\Omega$ @ $V_{GS} = -10V$
 $R_{DS(on)} < 40m\Omega$ @ $V_{GS} = -4.5V$
- Low Gate Charge
- 100% EAS Guaranteed



Applications

- Synchronous Rectification
- DC/DC Converter

Absolute Maximum Ratings ($T_A = 25^\circ C$, unless otherwise noted)

Parameter		Symbol	Value		Unit
Drain-Source Voltage		V_{DS}	40	-40	V
Gate-Source Voltage		V_{GS}	± 20	± 20	V
Continuous Drain Current	$T_A = 25^\circ C$	I_D	10	-8	A
	$T_A = 100^\circ C$		6.3	-5	
Pulsed Drain Current ¹		I_{DM}	40	-32	A
Single Pulse Avalanche Energy ²		EAS	39.2	45	mJ
Total Power Dissipation	$T_A = 25^\circ C$	P_D	3		W
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 ³	$R_{\theta JA}$	41.7	$^\circ C/W$

Electrical Characteristics: N-Channel ($T_J=25^{\circ}\text{C}$ 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 = 250μA	40	-	-	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} = 40V, 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	1.6	2.2	V
Drain-Source on-Resistance ⁴		R _{DS(on)}	V _{GS} = 10V, I _D = 6A	-	12.5	16	mΩ
			V _{GS} = 4.5V, I _D = 4A	-	16	20	
Forward Transconductance ⁴		g _{fs}	V _{DS} = 10V, I _D = 5A	-	25	-	S
Dynamic Characteristics ⁵							
Input Capacitance		C _{iss}	V _{DS} = 20V, V _{GS} =0V, f =1MHz	-	1310	-	pF
Output Capacitance		C _{oss}		-	110	-	
Reverse Transfer Capacitance		C _{rss}		-	82	-	
Gate Resistance		R _g	f =1MHz	-	3	-	Ω
Switching Characteristics ⁵							
Total Gate Charge		Q _g	V _{GS} = 10V, V _{DS} = 20V, I _D = 6A	-	26	-	nC
Gate-Source Charge		Q _{gs}		-	4	-	
Gate-Drain Charge		Q _{gd}		-	6.5	-	
Turn-on Delay Time		t _{d(on)}	V _{GS} =10V, V _{DD} = 20V, R _G = 3Ω, I _D = 6A	-	8.4	-	ns
Rise Time		t _r		-	5.6	-	
Turn-off Delay Time		t _{d(off)}		-	28.5	-	
Fall Time		t _f		-	6.4	-	
Body Diode Reverse Recovery Time		t _{rr}	I _F = 6A, dI/dt=100A/μs	-	22	-	ns
Body Diode Reverse Recovery Charge		Q _{rr}		-	40	-	nC
Drain-Source Body Diode Characteristics							
Diode Forward Voltage ⁴		V _{SD}	I _S = 6A, V _{GS} = 0V	-	-	1.2	V
Continuous Source Current	T _A =25°C	I _S	-	-	-	10	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150^{\circ}\text{C}$.
2. The EAS data shows Max. rating . The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.4mH, I_{AS}=14A$.
3. The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
5. This value is guaranteed by design hence it is not included in the production test.

Electrical Characteristics: P-Channel ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics							
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-40	-	-	V
Gate-Body Leakage current		I_{GSS}	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	± 100	nA
Zero Gate Voltage Drain Current	$T_J=25^{\circ}C$	I_{DSS}	$V_{DS} = -40V, V_{GS} = 0V$	-	-	-1	μA
	$T_J=100^{\circ}C$			-	-	-100	
Gate-Threshold Voltage		$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1.2	-1.6	-2.2	V
Drain-Source on-Resistance ⁴		$R_{DS(on)}$	$V_{GS} = -10V, I_D = -6A$	-	27	33	m Ω
			$V_{GS} = -4.5V, I_D = -4A$	-	33	40	
Forward Transconductance ⁴		g_{fs}	$V_{DS} = -10V, I_D = -6A$	-	20	-	S
Dynamic Characteristics ⁵							
Input Capacitance		C_{iss}	$V_{DS} = -20V, V_{GS} = 0V, f = 1MHz$	-	1385	-	pF
Output Capacitance		C_{oss}		-	110	-	
Reverse Transfer Capacitance		C_{rss}		-	97	-	
Gate Resistance		R_g	$f = 1MHz$	-	10.8	-	Ω
Switching Characteristics ⁵							
Total Gate Charge		Q_g	$V_{GS} = -10V, V_{DS} = -20V, I_D = -6A$	-	30	-	nC
Gate-Source Charge		Q_{gs}		-	4.4	-	
Gate-Drain Charge		Q_{gd}		-	5.6	-	
Turn-on Delay Time		$t_{d(on)}$	$V_{GS} = -10V, V_{DD} = -20V, R_G = 3\Omega, I_D = -6A$	-	5	-	ns
Rise Time		t_r		-	19.5	-	
Turn-off Delay Time		$t_{d(off)}$		-	75	-	
Fall Time		t_f		-	46	-	
Drain-Source Body Diode Characteristics							
Diode Forward Voltage ⁴		V_{SD}	$I_S = -6A, V_{GS} = 0V$	-	-	-1.2	V
Continuous Source Current	$T_A=25^{\circ}C$	I_S	-	-	-	-8	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150^{\circ}\text{C}$.
2. The EAS data shows Max. rating . The test condition is $V_{DD} = -25V, V_{GS} = -10V, L=0.4\text{mH}, I_{AS} = -15A$.
3. The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Characteristics: N-Channel

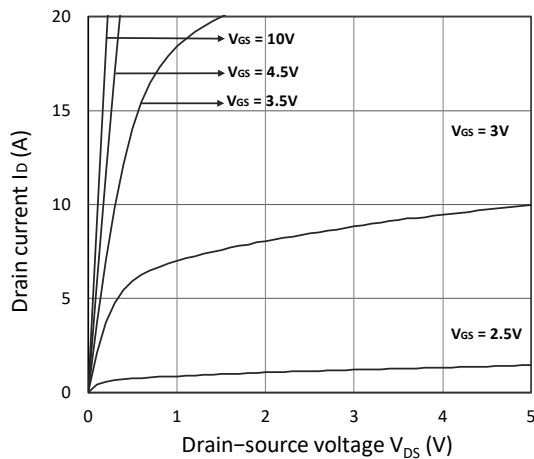


Figure 1. Output Characteristics

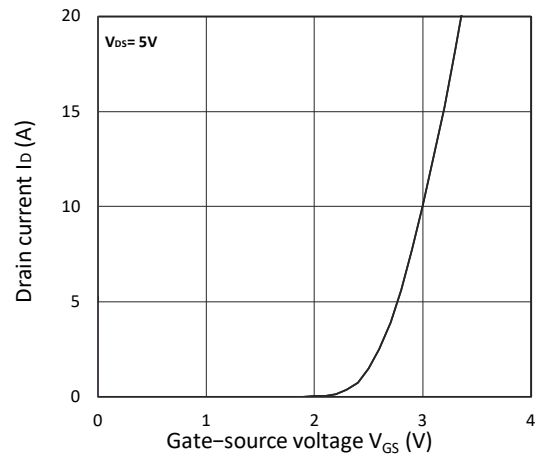


Figure 2. Transfer Characteristics

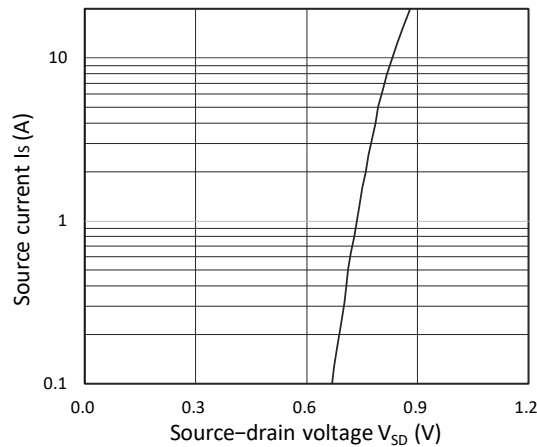
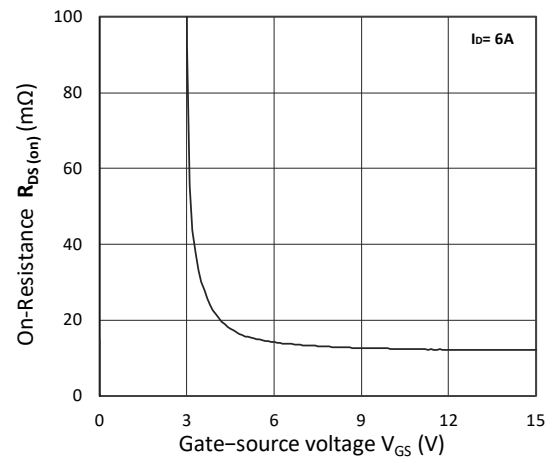
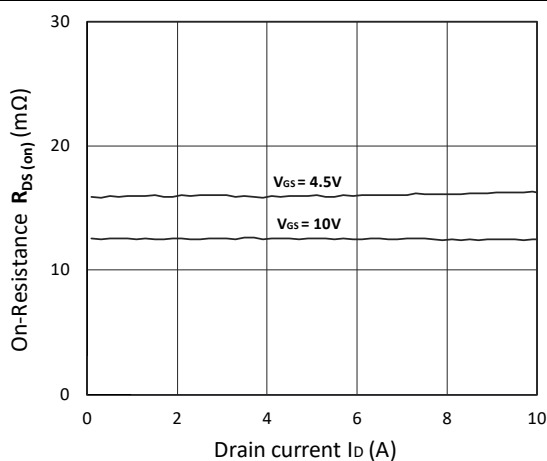
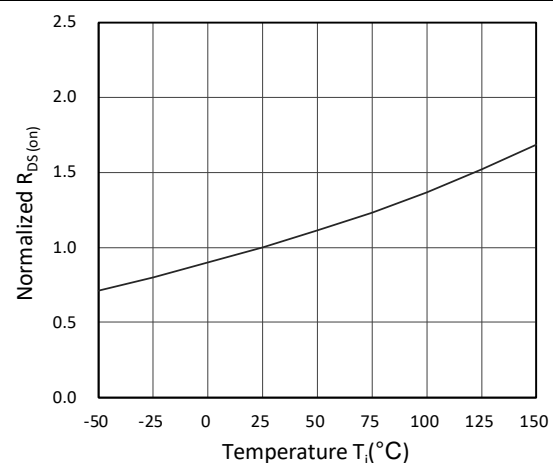


Figure 3. Forward Characteristics of Reverse

Figure 4. $R_{DS(on)}$ vs. V_{GS} Figure 5. $R_{DS(on)}$ vs. I_D Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

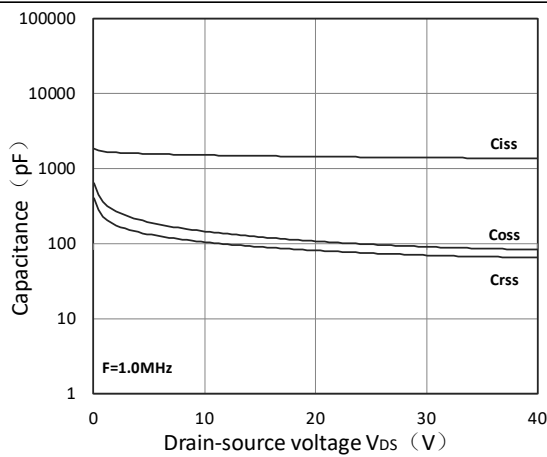


Figure 7. Capacitance Characteristics

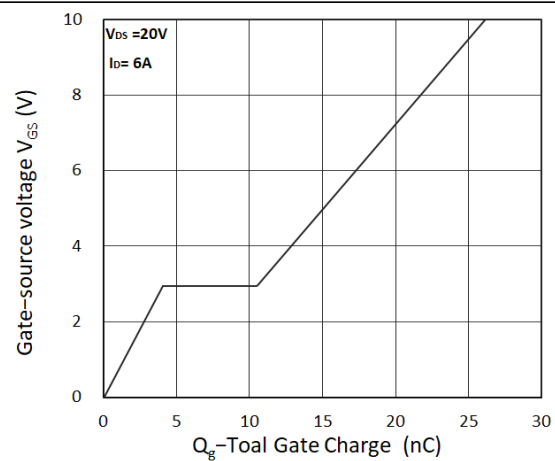


Figure 8. Gate Charge Characteristics

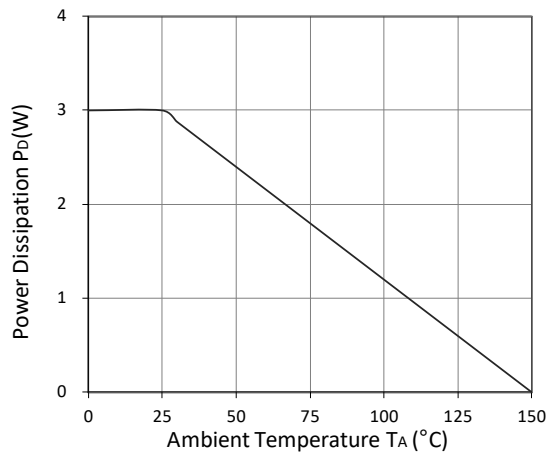


Figure 9. Power Dissipation

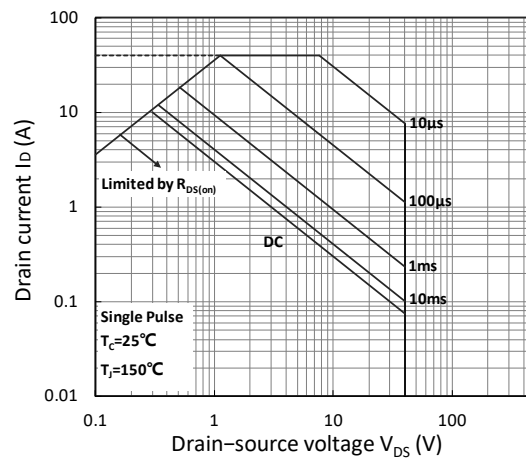


Figure 10. Safe Operating Area

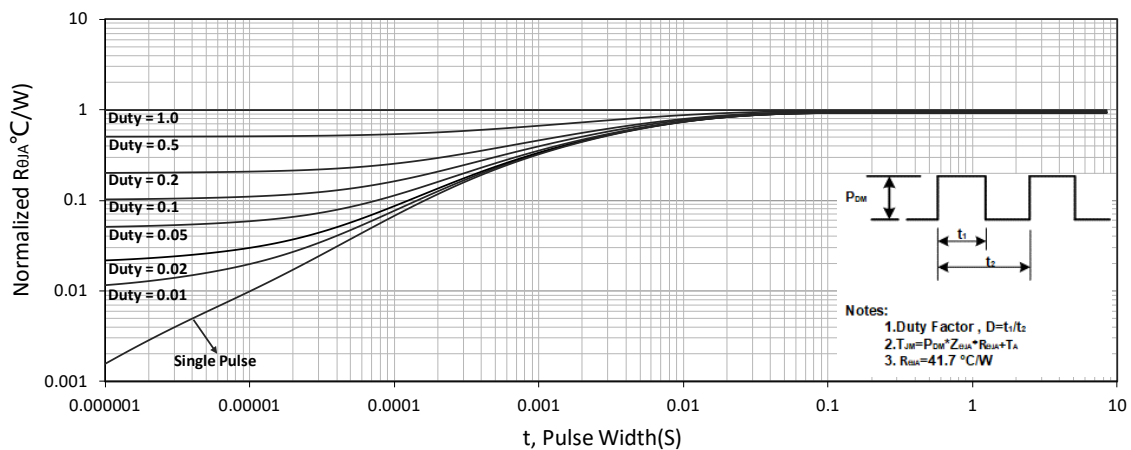


Figure 11. Normalized Maximum Transient Thermal Impedance

Typical Characteristics:P-Channel

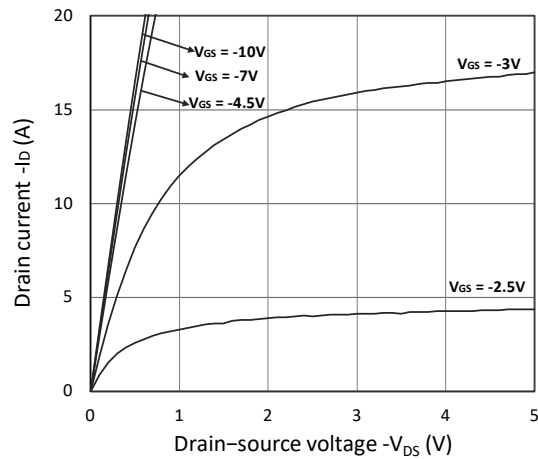


Figure 1. Output Characteristics

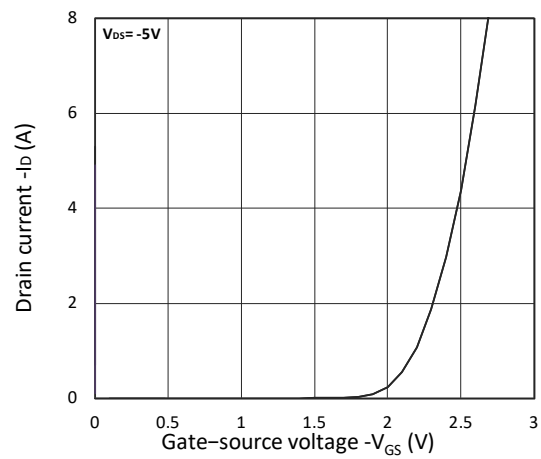


Figure 2. Transfer Characteristics

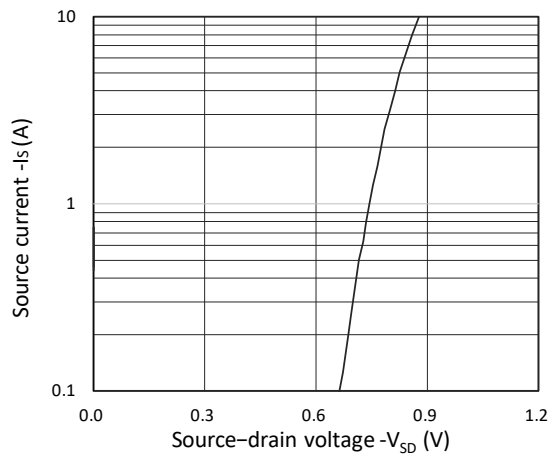
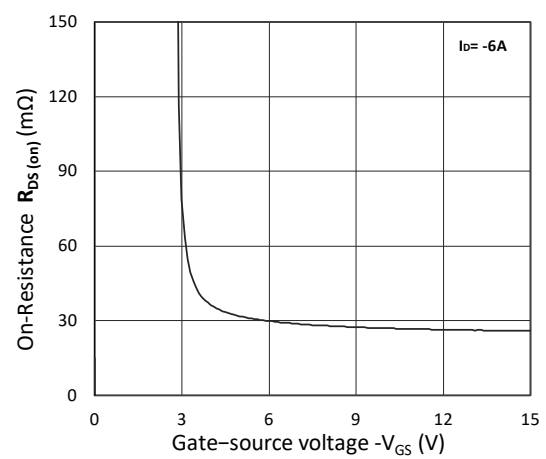
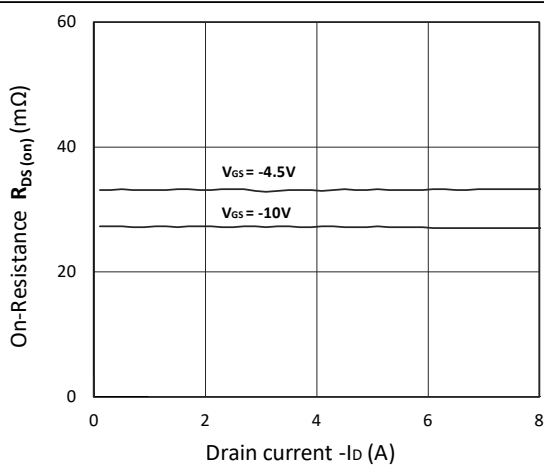
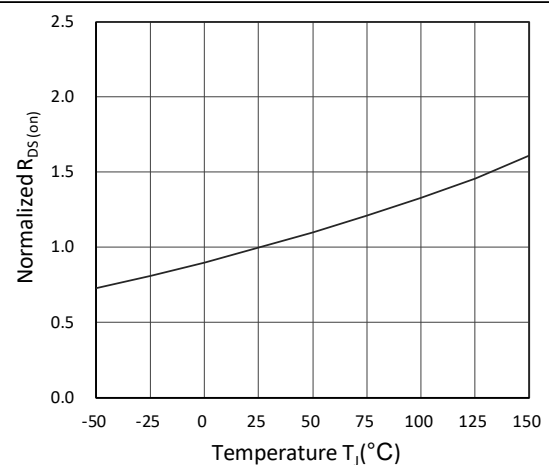


Figure 3. Forward Characteristics of Reverse

Figure 4. $R_{DS(on)}$ vs. V_{GS} Figure 5. $R_{DS(on)}$ vs. I_D Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

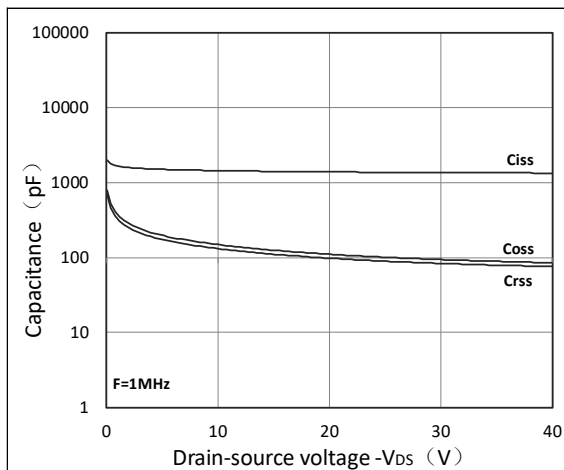


Figure 7. Capacitance Characteristics

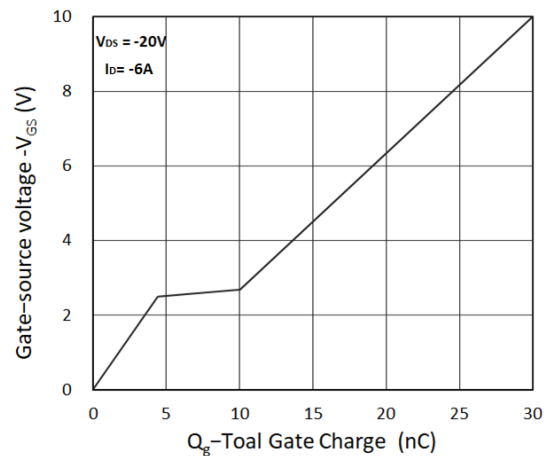


Figure 8. Gate Charge Characteristics

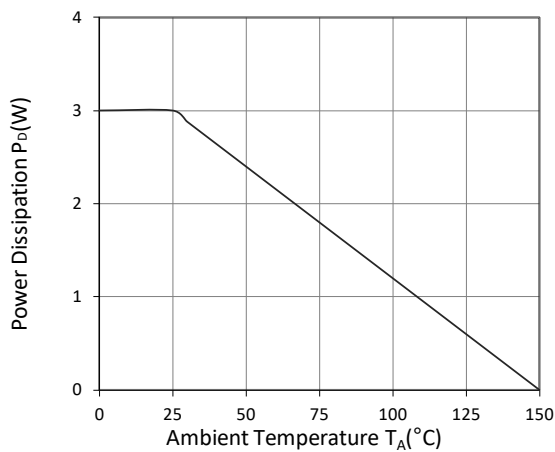


Figure 9. Power Dissipation

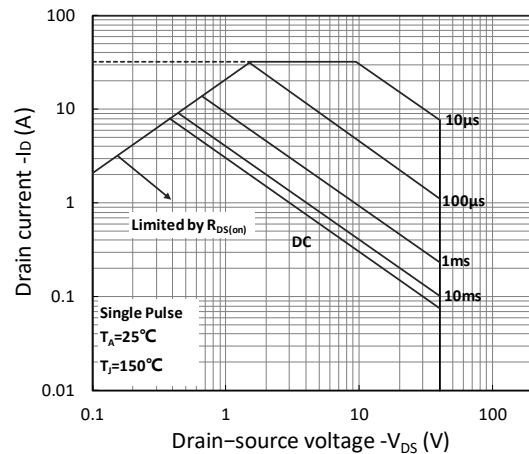


Figure 10. Safe Operating Area

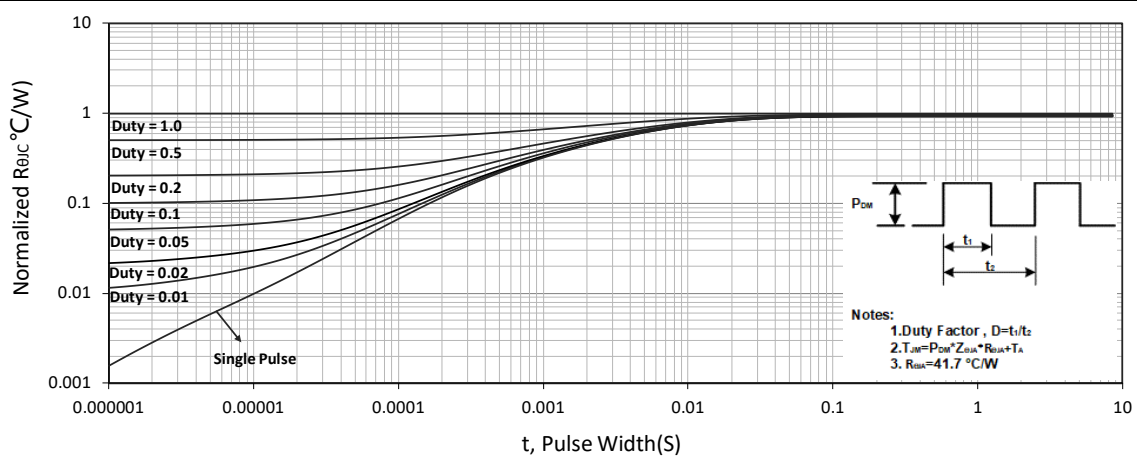


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

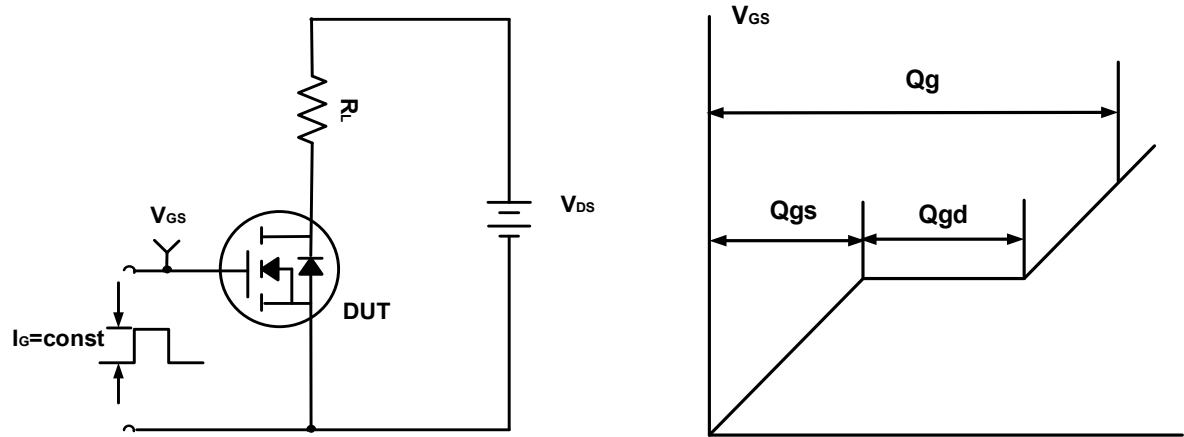


Figure A. Gate Charge Test Circuit & Waveforms

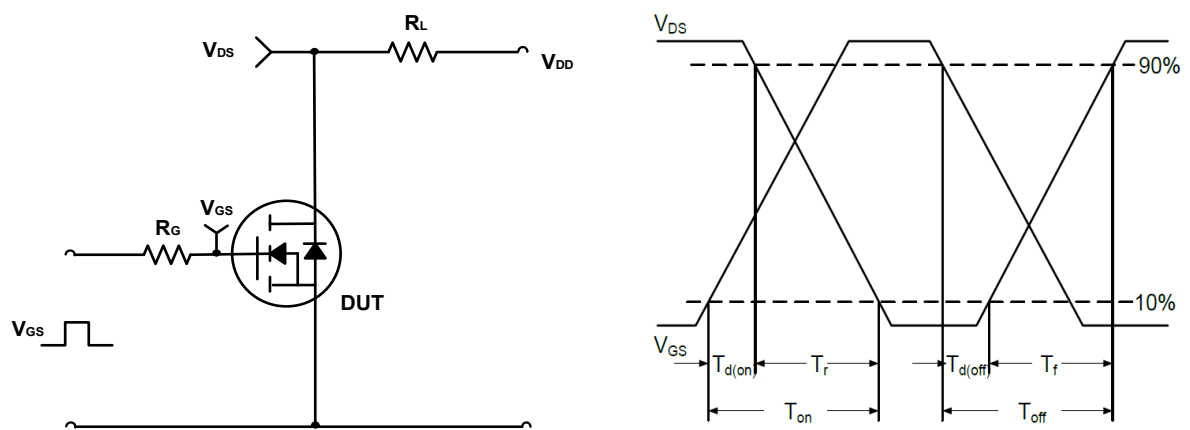


Figure B. Switching Test Circuit & Waveforms

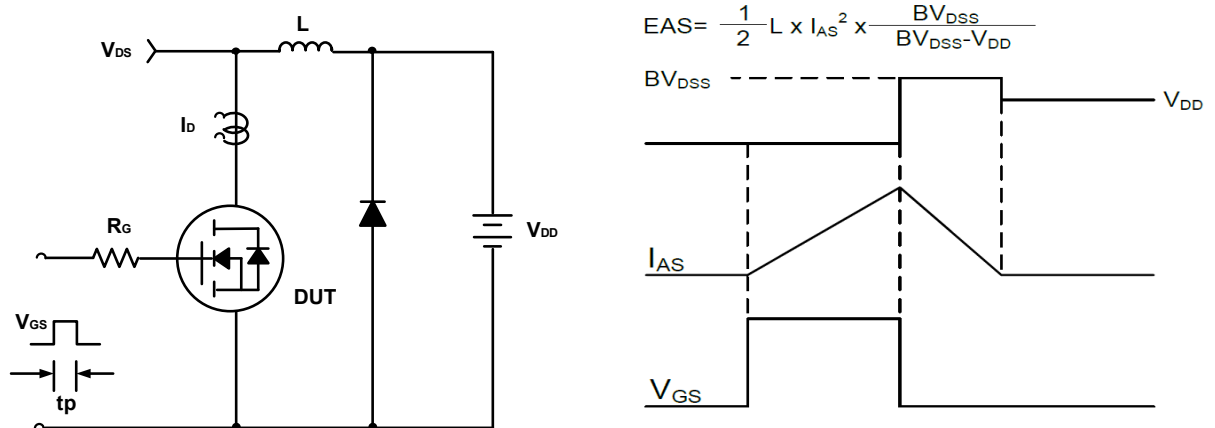
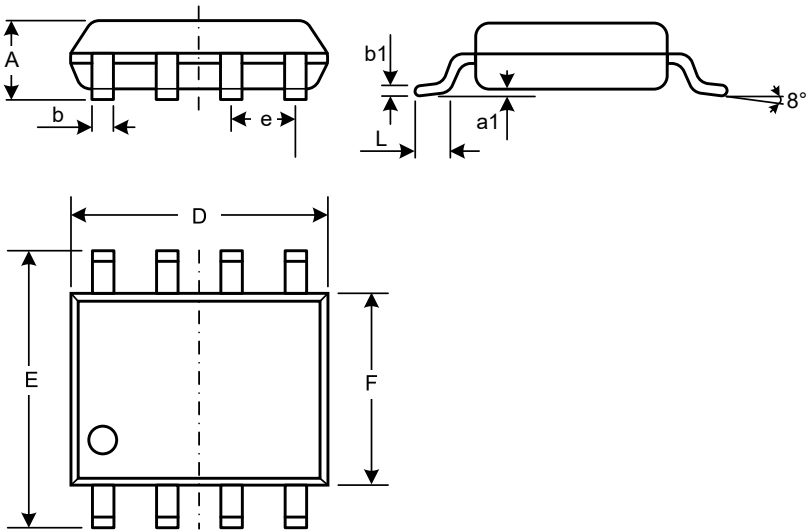


Figure C. Unclamped Inductive Switching Circuit & Waveforms

Mechanical Dimensions for SOP-8L

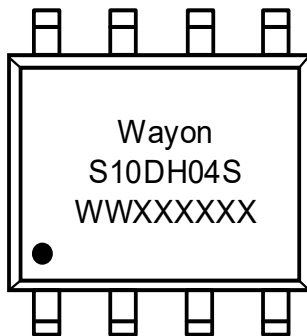
COMMON DIMENSIONS



SYMBOL	MM	
	MIN	MAX
A	1.35	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	0.40	1.27

Ordering Information

Part	Package	Marking	Packing method
WMS10DH04TS	SOP-8L	S10DH04S	Tape and Reel

Marking Information

S10DH04S = Device code

WWXXXXXX= Date code

Contact Information

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WAYON website: <http://www.way-on.com>

For additional information, please contact your local Sales Representative.

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