

40V N-Channel Enhancement Mode Power MOSFET

Description

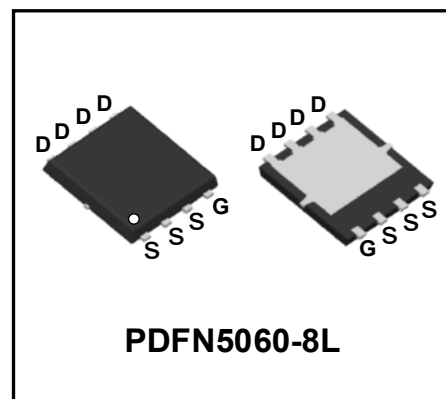
WMB56N04T1 uses advanced power trench technology that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Features

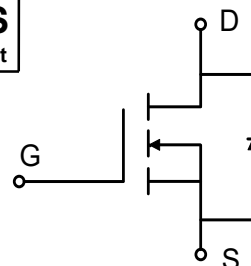
- $V_{DS} = 40V$, $I_D = 56A$
 $R_{DS(on)} < 7.2m\Omega$ @ $V_{GS} = 10V$
 $R_{DS(on)} < 8.5m\Omega$ @ $V_{GS} = 4.5V$
- Green Device Available
- 100% EAS Guaranteed
- Low Gate Charge
- Low $R_{DS(ON)}$

Applications

- Power Management Switches
- DC/DC Converter



RoHS
compliant

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

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	$T_C = 25^\circ C$	I_D	56	A
	$T_C = 100^\circ C$		35.4	
Pulsed Drain Current ¹		I_{DM}	224	A
Single Pulse Avalanche Energy ²		EAS	45	mJ
Total Power Dissipation	$T_C = 25^\circ C$	P_D	35.7	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 ³	$R_{\theta JA}$	63	$^\circ C/W$
Thermal Resistance from Junction-to-Case	$R_{\theta JC}$	3.5	$^\circ C/W$

Electrical Characteristics ($T_J = 25^\circ\text{C}$, 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	1.1	1.6	2.4	V
Drain-Source on-Resistance ⁴		R _{DS(on)}	V _{GS} = 10V, I _D = 30A	-	5.5	7.2	mΩ
			V _{GS} = 4.5V, I _D = 20A	-	6.5	8.5	
Forward Transconductance ⁴		g _{fs}	V _{DS} = 10V, I _D = 30A	-	28	-	S
Dynamic Characteristics ⁵							
Input Capacitance		C _{iss}	V _{DS} = 20V, V _{GS} =0V, f =1MHz	-	2370	-	pF
Output Capacitance		C _{oss}		-	190	-	
Reverse Transfer Capacitance		C _{rss}		-	160	-	
Gate Resistance		R _g	f =1MHz	-	2	-	Ω
Switching Characteristics ⁵							
Total Gate Charge		Q _g	V _{GS} = 10V, V _{DS} = 20V, I _D = 30A	-	36	-	nC
Gate-Source Charge		Q _{gs}		-	6.2	-	
Gate-Drain Charge		Q _{gd}		-	7.3	-	
Turn-on Delay Time		t _{d(on)}	V _{GS} =10V, V _{DD} = 20V, R _G = 3Ω, I _D = 30A	-	8.8	-	ns
Rise Time		t _r		-	9.5	-	
Turn-off Delay Time		t _{d(off)}		-	88	-	
Fall Time		t _f		-	40	-	
Reverse Recovery Time		t _{rr}	I _F =20A , dI/dt=100A/μs	-	34	-	ns
Reverse Recovery Charge		Q _{rr}		-	3.8	-	nC
Drain-Source Body Diode Characteristics							
Diode Forward Voltage ⁴		V _{SD}	I _S = 1A, V _{GS} = 0V	-	-	1.2	V
Continuous Source Current	T _C =25°C	I _S	-	-	-	56	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 $V_{DD} = 20V, V_{GS} = 10V, L = 0.1mH, I_{AS} = 30A$.
3. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ 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

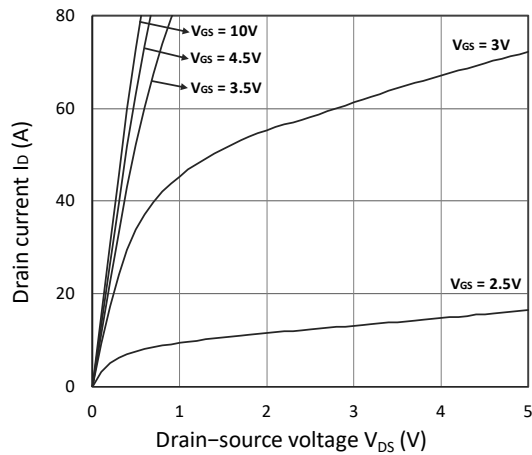


Figure 1. Output Characteristics

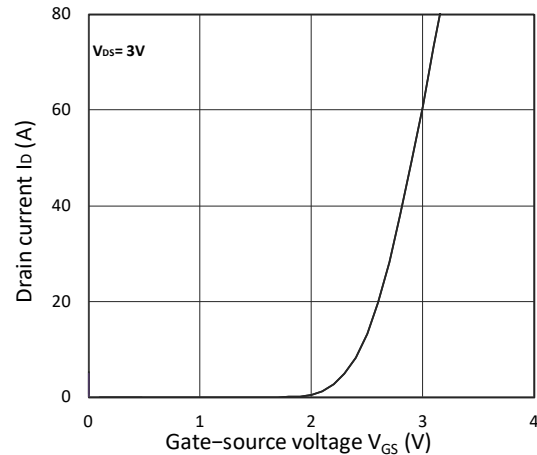


Figure 2. Transfer Characteristics

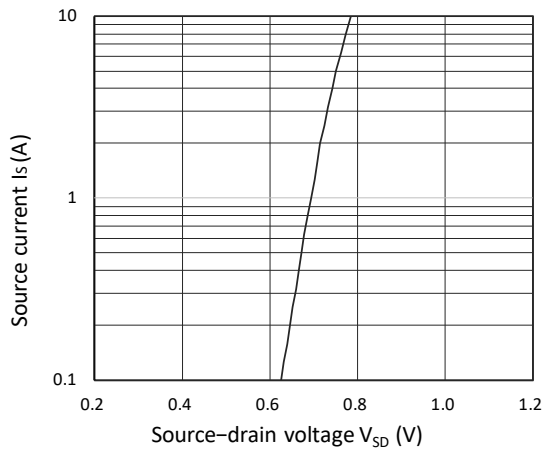
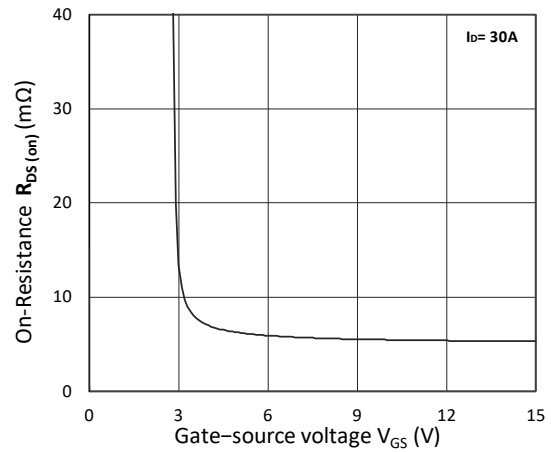
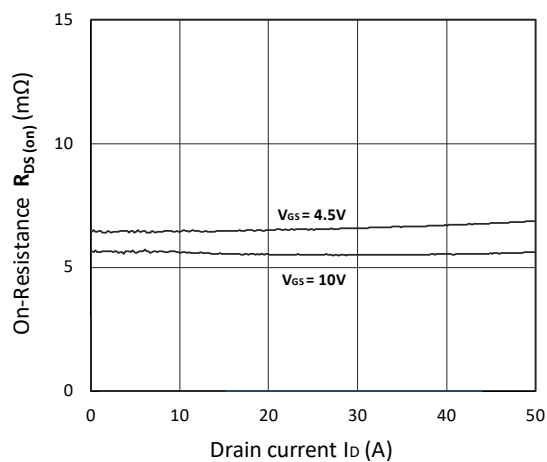
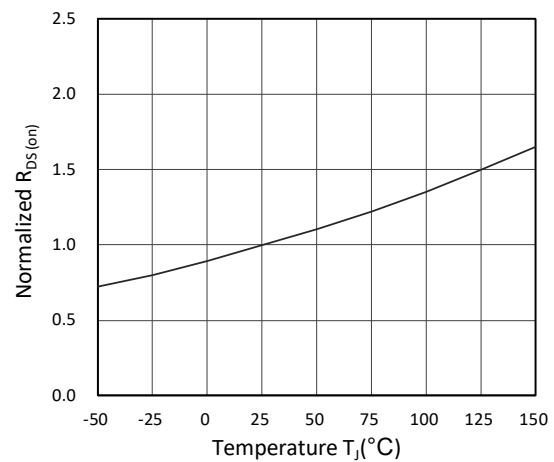


Figure 3. Forward Characteristics of Reverse

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

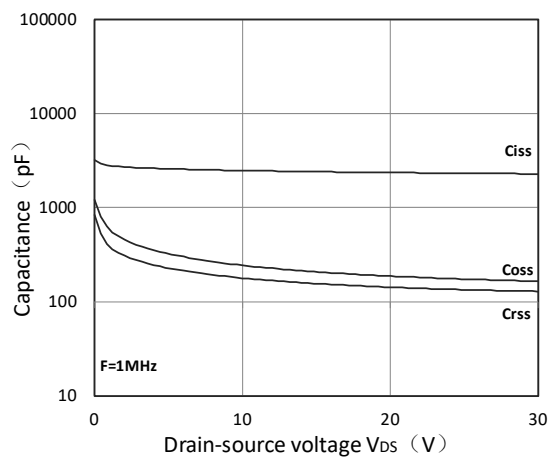


Figure 7. Capacitance Characteristics

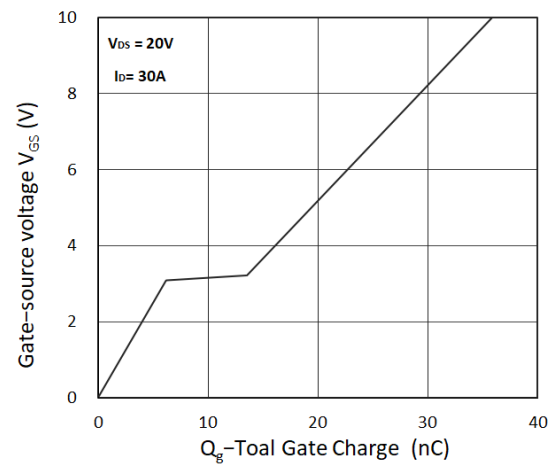


Figure 8. Gate Charge Characteristics

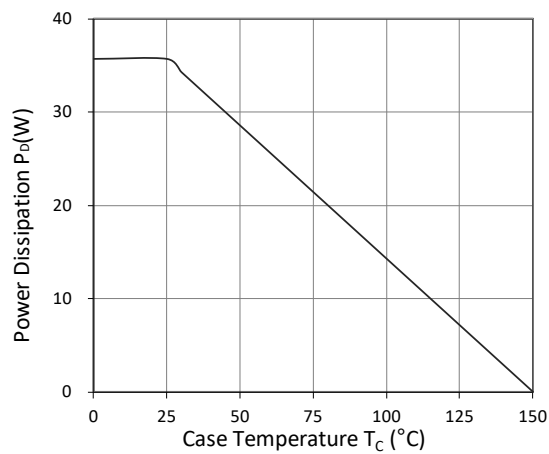


Figure 9. Power Dissipation

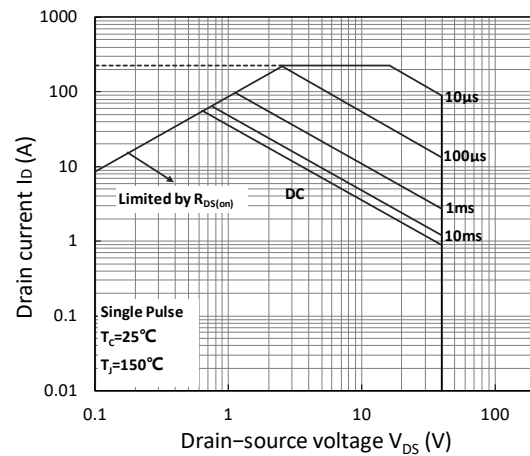


Figure 10. Safe Operating Area

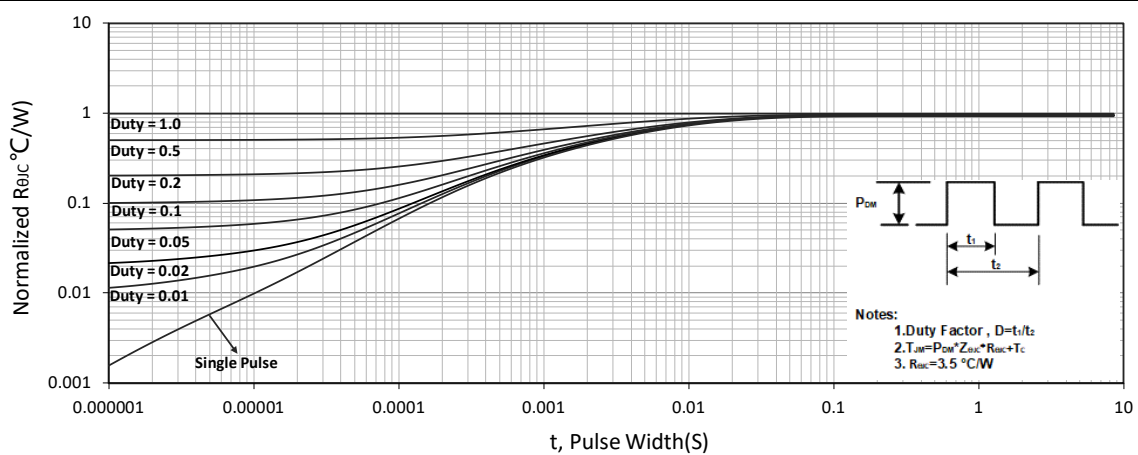


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

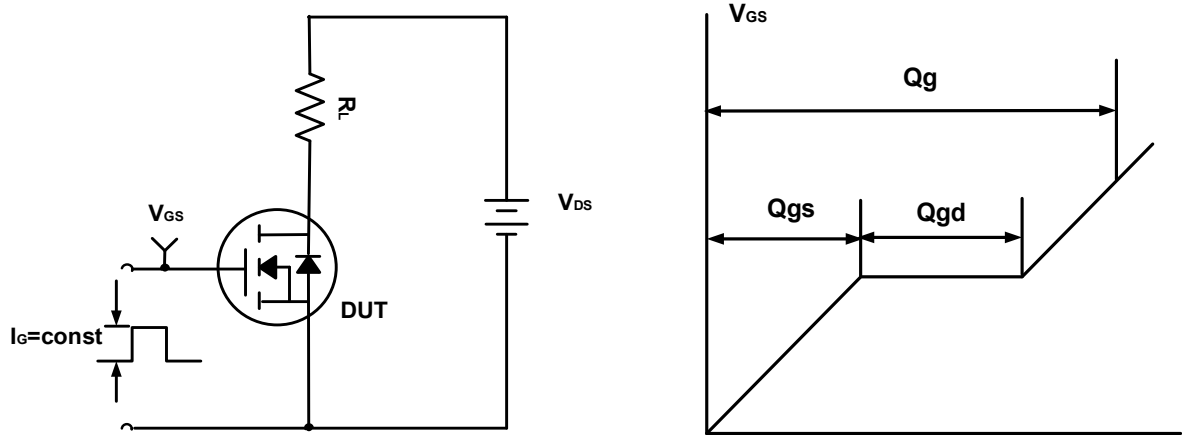


Figure A. Gate Charge Test Circuit & Waveforms

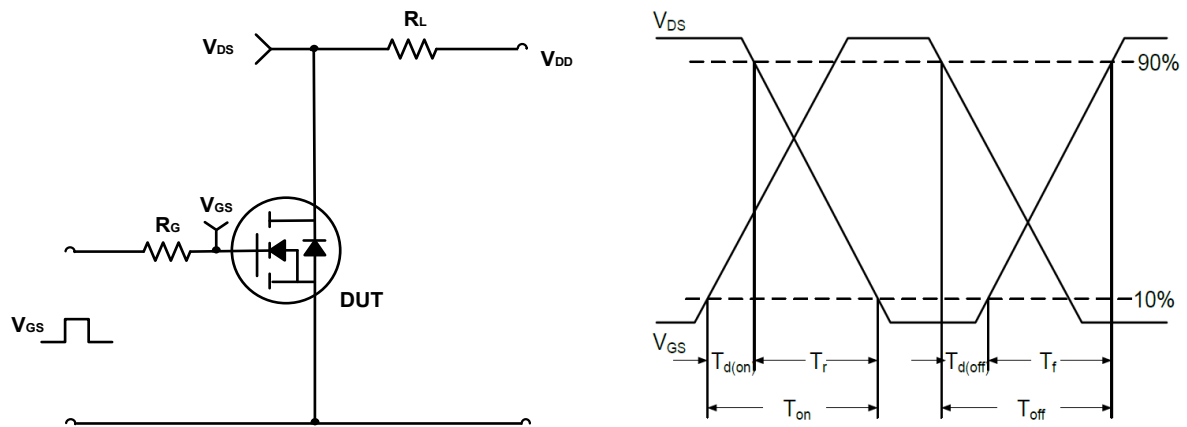


Figure B. Switching Test Circuit & Waveforms

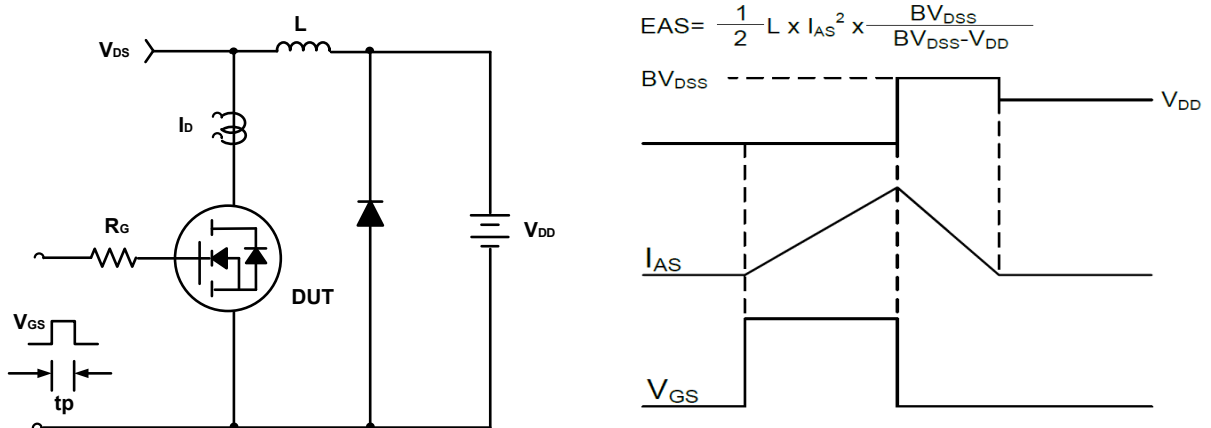
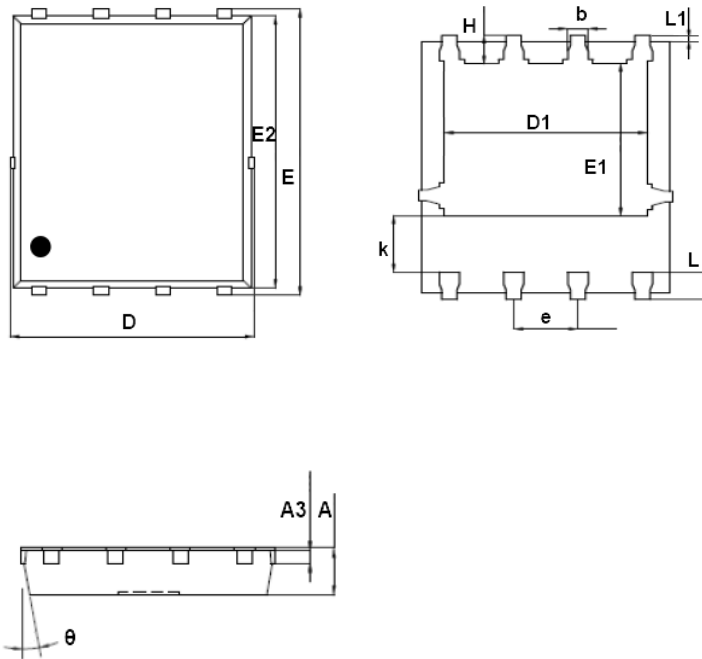


Figure C. Unclamped Inductive Switching Circuit & Waveforms

Mechanical Dimensions for PDFN5060-8L

COMMON DIMENSIONS

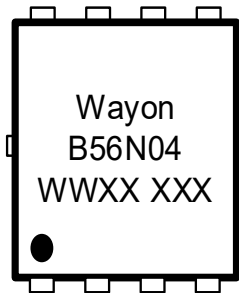


SYMBOL	MM	
	MIN	MAX
A	0.90	1.20
A3	0.15	0.35
D	4.80	5.40
E	5.90	6.35
D1	3.61	4.31
E1	3.30	3.92
E2	5.50	6.06
k	1.10	-
b	0.30	0.51
e	1.27BSC	
L	0.38	0.71
L1	0.05	0.36
H	0.38	0.71
θ	0°	12°

Ordering Information

Part	Package	Marking	Packing method
WMB56N04T1	PDFN5060-8L	B56N04	Tape and Reel

Marking Information



B56N04= Device code

WWXX XXX= Date code

Contact Information

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