

30V Dual N-Channel Enhancement Mode Power MOSFET

Description

WMB042DN03LG2 uses Wayon'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

- Q1: $V_{DS} = 30V$, $I_D = 50A$
 $R_{DS(on)} < 4.2m\Omega @ V_{GS} = 10V$
 $R_{DS(on)} < 6.5m\Omega @ V_{GS} = 4.5V$
- Q2: $V_{DS} = 30V$, $I_D = 45A$
 $R_{DS(on)} < 5.5m\Omega @ V_{GS} = 10V$
 $R_{DS(on)} < 9m\Omega @ V_{GS} = 4.5V$
- Dual Asymmetric N-Channel
- Low Gate Charge
- 100% EAS Guaranteed

Applications

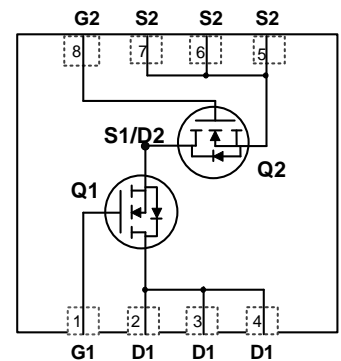
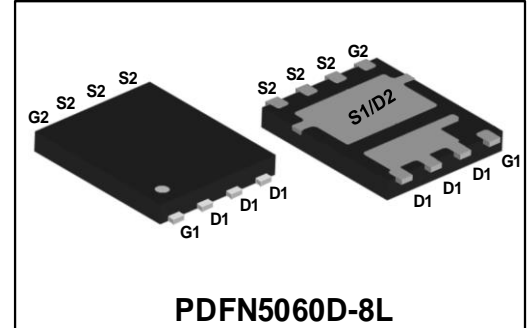
- Power Management in Switches
- DC/DC Converter

Absolute Maximum Ratings

Parameter	Symbol	Value		Unit	
		Q1	Q2		
Drain-Source Voltage	V_{DS}	30	30	V	
Gate-Source Voltage	V_{GS}	± 20	± 20	V	
Continuous Drain Current ¹	I_D	$T_C=25^\circ C$	50	45	A
		$T_C=100^\circ C$	35	30	
Pulsed Drain Current ²	I_{DM}	145	125	A	
Single Pulse Avalanche Energy ³	EAS	80	51.2	mJ	
Avalanche Current	I_{AS}	40	32	A	
Total Power Dissipation ³	P_D	27.1	26	W	
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	-55 to 150	$^\circ C$	

Thermal Characteristics

Parameter	Symbol	Value		Unit
		Q1	Q2	
Thermal Resistance from Junction-to-Ambient ¹	$R_{\theta JA}$	51	64	$^\circ C/W$
Thermal Resistance from Junction-to-Case ¹	$R_{\theta JC}$	4.6	4.8	



Q1-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	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	30	-	-	V
Gate-body Leakage Current	I_{GSS}	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	± 100	nA
Zero Gate Voltage Drain Current	$T_J = 25^\circ\text{C}$	$V_{DS} = 30V, V_{GS} = 0V$	-	-	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	1.7	2.4	V
Drain-Source On-Resistance ²	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$	-	3.7	4.2	m Ω
		$V_{GS} = 4.5V, I_D = 15A$	-	5.2	6.5	
Forward Transconductance ²	g_{fs}	$V_{DS} = 5V, I_D = 20A$	-	76	-	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 15V, V_{GS} = 0V, f = 1\text{MHz}$	-	1390	-	μF
Output Capacitance	C_{oss}		-	680	-	
Reverse Transfer Capacitance	C_{rss}		-	53	-	
Switching Characteristics						
Gate Resistance	R_g	$V_{DS} = 0V, V_{GS} = 0V, f = 1\text{MHz}$	-	2	-	Ω
Total Gate Charge	Q_g	$V_{GS} = 4.5V, V_{DS} = 15V, I_D = 20A$	-	15	-	nC
Gate-Source Charge	Q_{gs}		-	5.9	-	
Gate-Drain Charge	Q_{gd}		-	3.5	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10V, V_{DS} = 15V, R_G = 3\Omega, I_D = 20A$	-	7.7	-	nS
Rise Time	t_r		-	20.5	-	
Turn-Off Delay Time	$t_{d(off)}$		-	21.8	-	
Fall Time	t_f		-	4.5	-	
Drain-Source Body Diode Characteristics						
Diode Forward Voltage ²	V_{SD}	$I_S = 1A, V_{GS} = 0V$	-	-	1	V
Continuous Source Current ^{1,5}	I_S	$V_G = V_D = 0V$, Force Current	-	-	50	A

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 $V_{DD} = 25V, V_{GS} = 10V, L = 0.1\text{mH}, I_{AS} = 40A$
- 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.

Q2-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	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	30	-	-	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}	$V_{DS} = 30V, V_{GS} = 0V$	-	-	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	1.7	2.4	V	
Drain-Source On-Resistance ²	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 15A$	-	4.5	5.5	m Ω	
		$V_{GS} = 4.5V, I_D = 8A$	-	6.8	9		
Forward Transconductance ²	g_{fs}	$V_{DS} = 5V, I_D = 20A$	-	66	-	S	
Dynamic Characteristics							
Input Capacitance	C_{iss}	$V_{DS} = 15V, V_{GS} = 0V, f = 1\text{MHz}$	-	1100	-	pF	
Output Capacitance	C_{oss}		-	430	-		
Reverse Transfer Capacitance	C_{rss}		-	60	-		
Switching Characteristics							
Gate Resistance	R_g	$V_{DS} = 0V, V_{GS} = 0V, f = 1\text{MHz}$	-	2.1	-	Ω	
Total Gate Charge	Q_g	$V_{GS} = 4.5V, V_{DS} = 15V, I_D = 20A$	-	8.8	-	nC	
Gate-Source Charge	Q_{gs}		-	3	-		
Gate-Drain Charge	Q_{gd}		-	3.5	-		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10V, V_{DS} = 15V, R_g = 3\Omega, I_D = 20A$	-	7.1	-	nS	
Rise Time	t_r		-	18.6	-		
Turn-Off Delay Time	$t_{d(off)}$		-	19.2	-		
Fall Time	t_f		-	3.5	-		
Drain-Source Body Diode Characteristics							
Diode Forward Voltage ²	V_{SD}	$I_S = 1A, V_{GS} = 0V$	-	-	1	V	
Continuous Source Current ^{1,5}	I_S	$V_G = V_D = 0V$, Force Current	-	-	45	A	

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 $V_{DD} = 25V, V_{GS} = 10V, L = 0.1\text{mH}, I_{AS} = 32A$
- 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.

Q1-Typical Characteristics

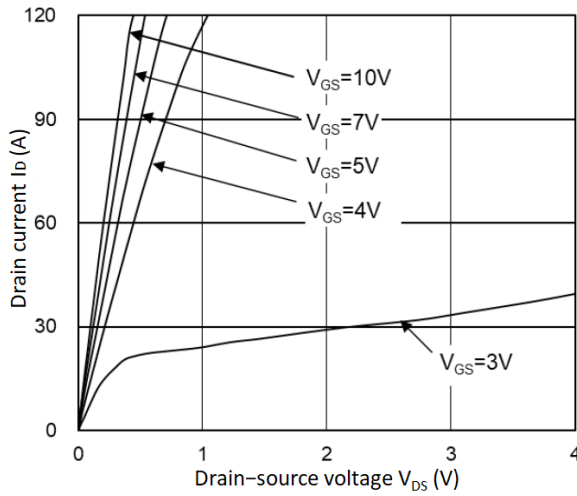


Figure 1. Output Characteristics

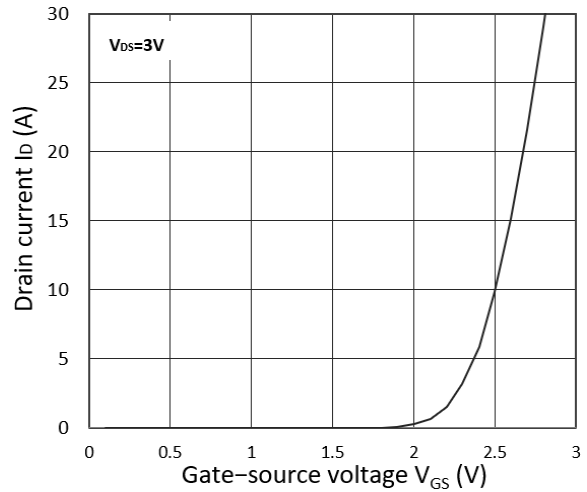


Figure 2. Transfer Characteristics

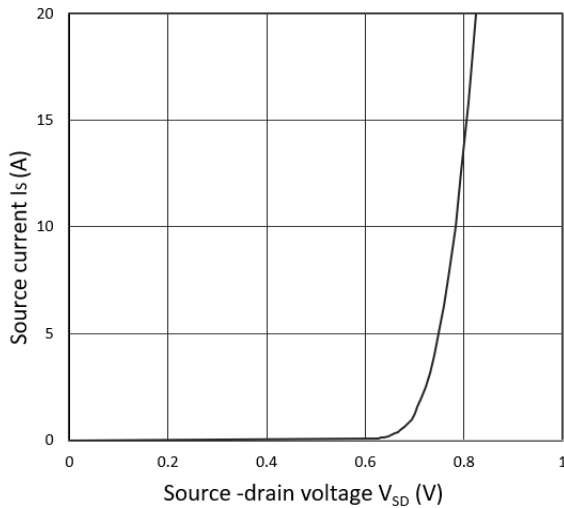


Figure 3. Forward Characteristics of Reverse

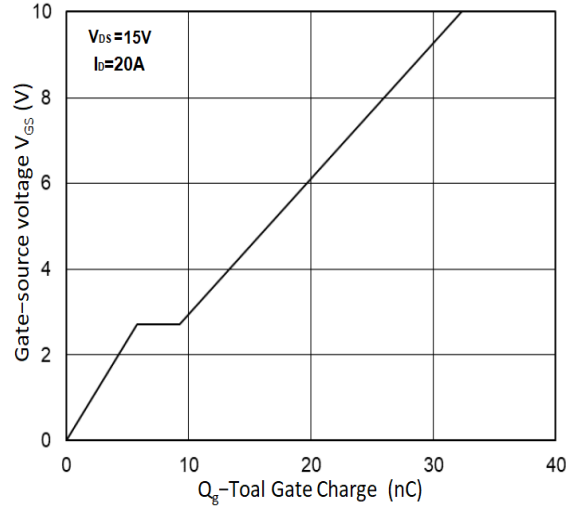


Figure 4. Gate Charge Characteristics

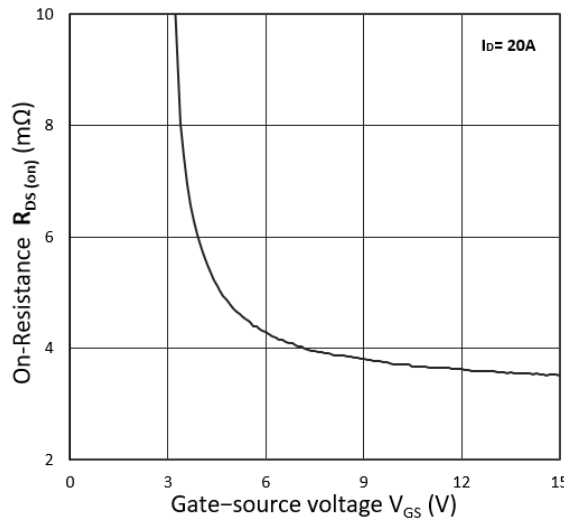


Figure 5. $R_{DS(on)}$ vs. V_{GS}

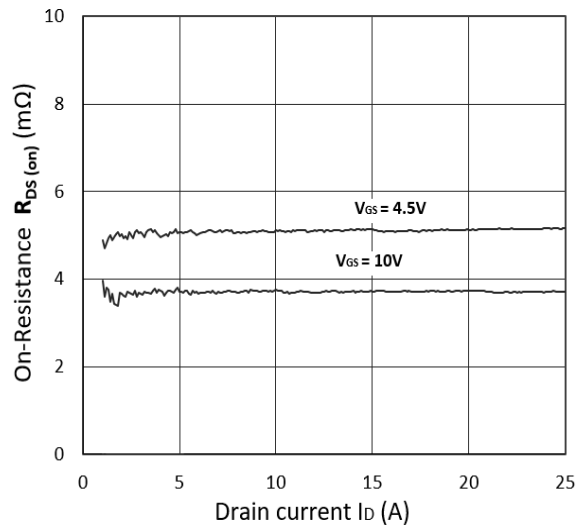


Figure 6. $R_{DS(on)}$ vs. I_D

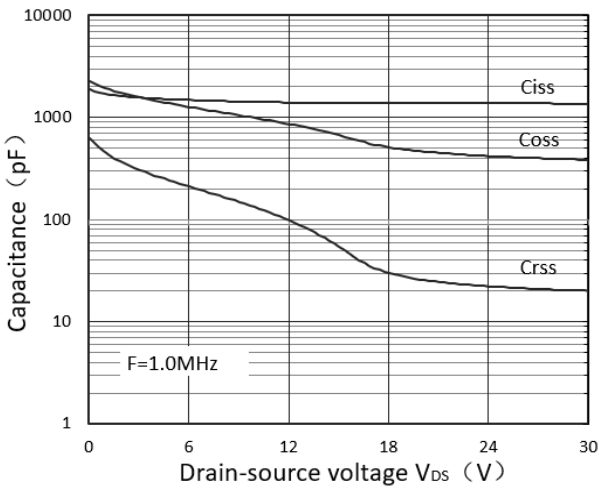


Figure 7. Capacitance Characteristics

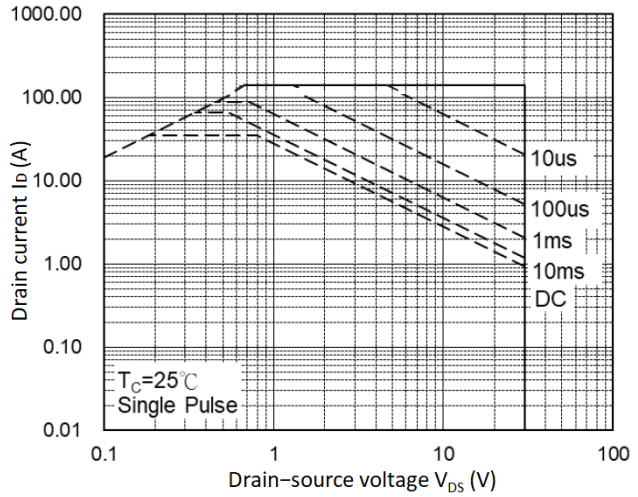


Figure 8. Safe Operating Area

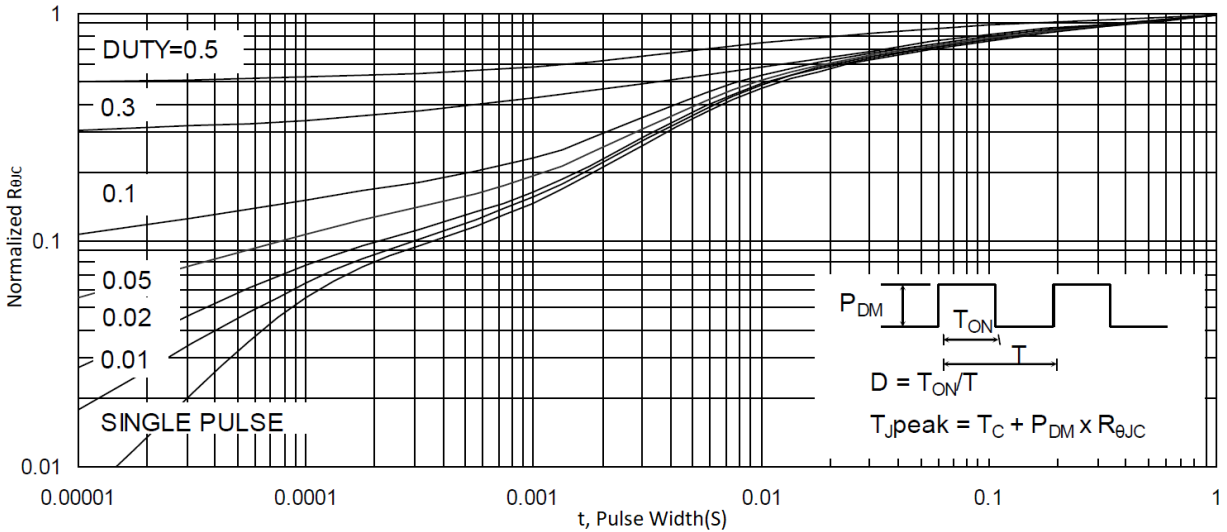


Figure 9. Normalized Maximum Transient Thermal Impedance

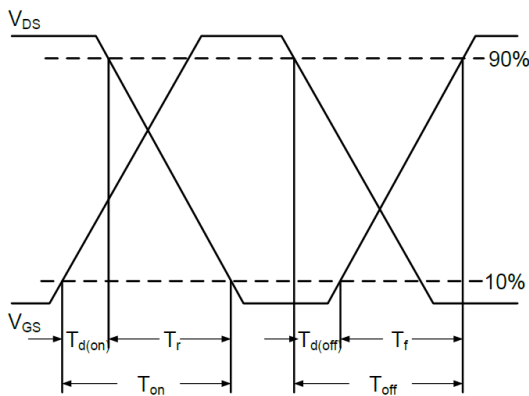


Figure 10. Switching Time Waveform

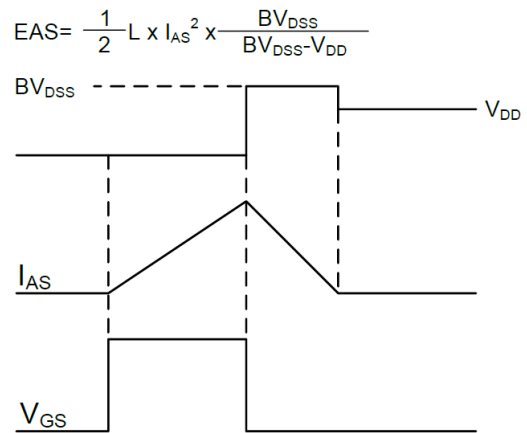


Figure 11. Unclamped Inductive Switching Waveform

Q2-Typical Characteristics

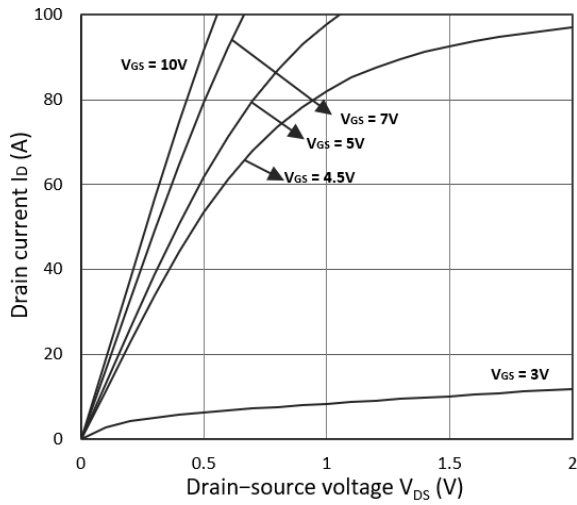


Figure 1. Output Characteristics

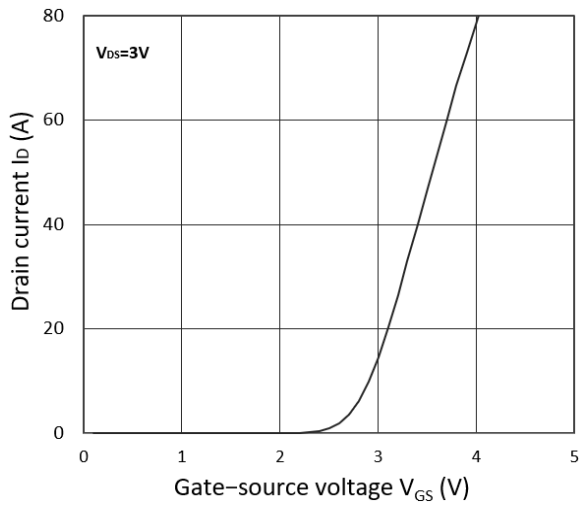


Figure 2. Transfer Characteristics

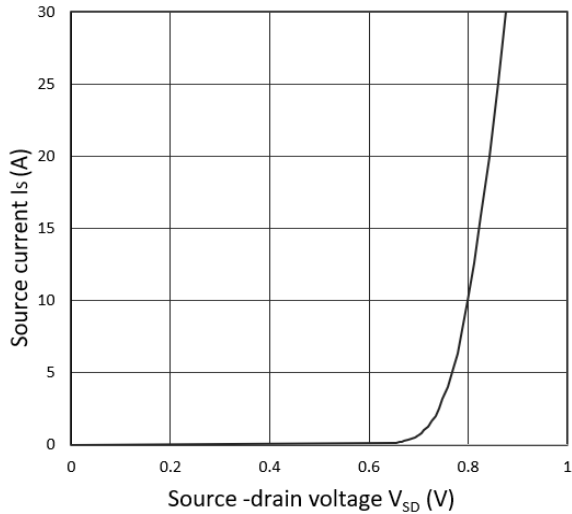


Figure 3. Forward Characteristics of Reverse

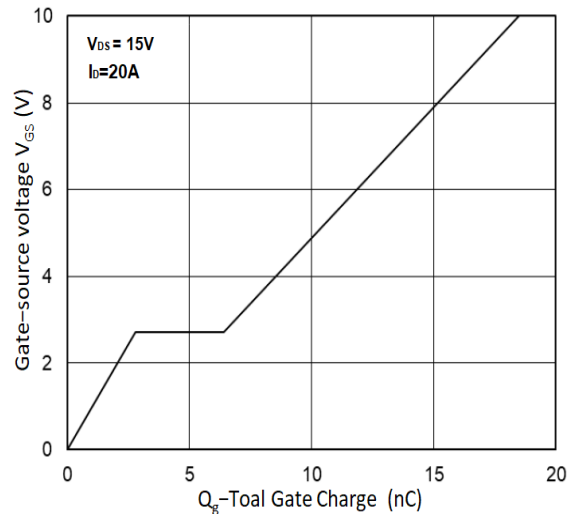


Figure 4. Gate Charge Characteristics

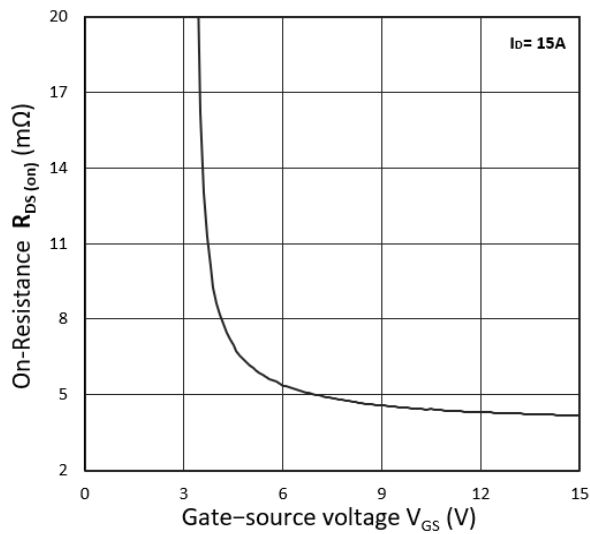


Figure 5. $R_{DS(on)}$ vs. V_{GS}

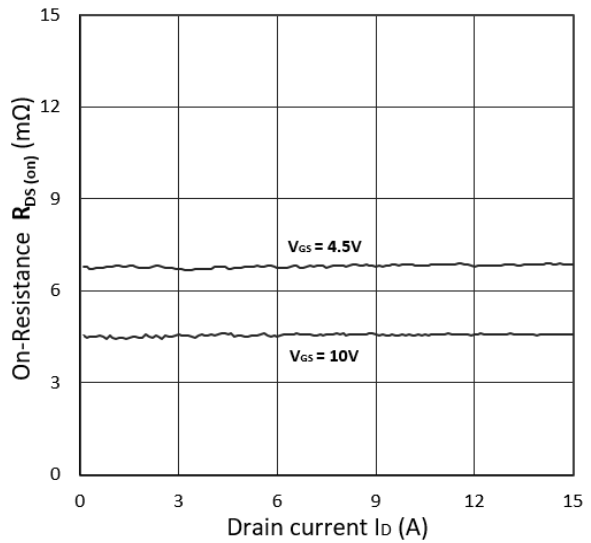


Figure 6. $R_{DS(on)}$ vs. I_D

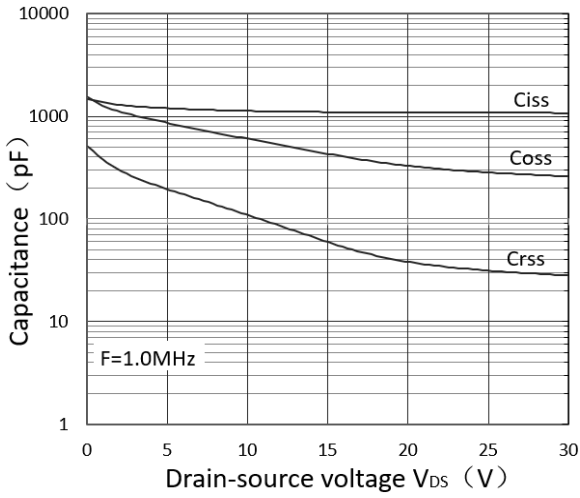


Figure 7. Capacitance Characteristics

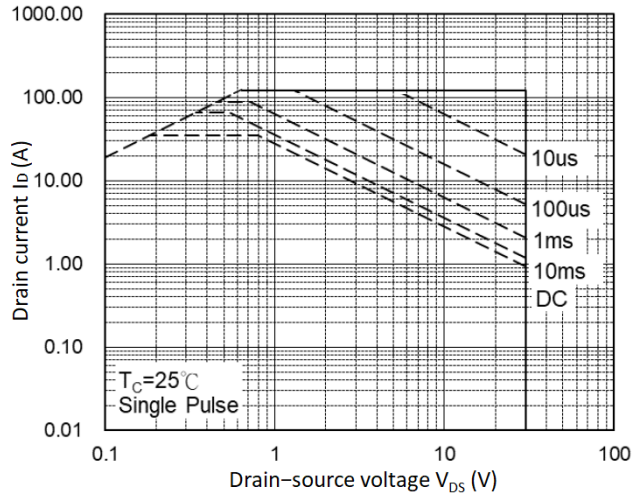


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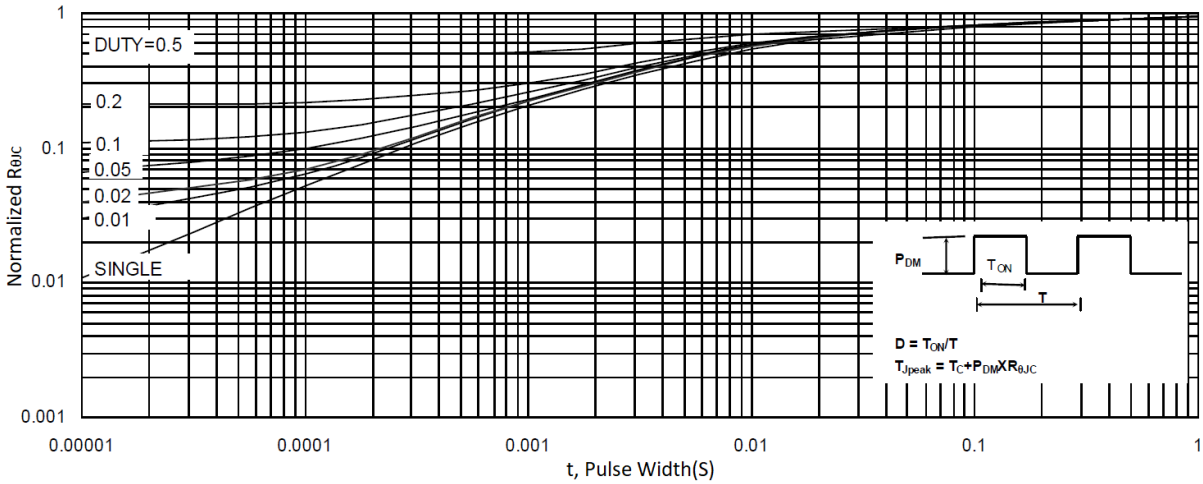


Figure 9. Normalized Maximum Transient Thermal Impedance

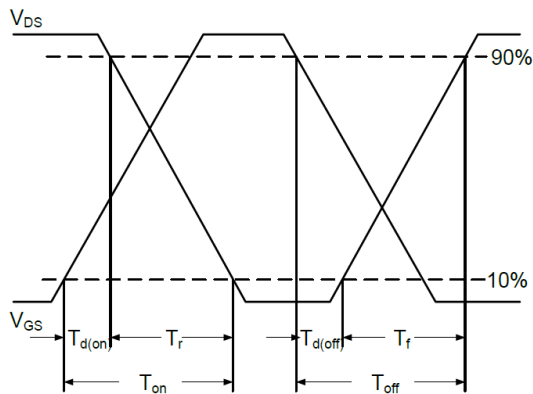


Figure 10. Switching Time Waveform

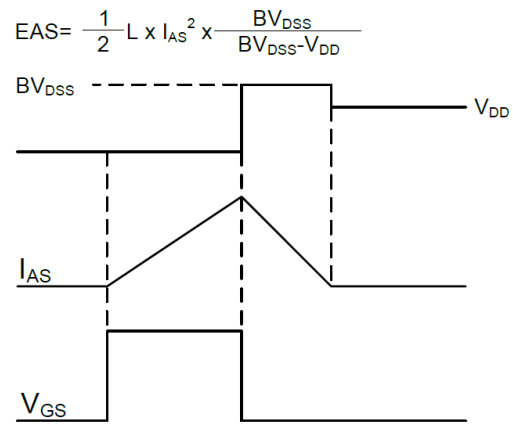
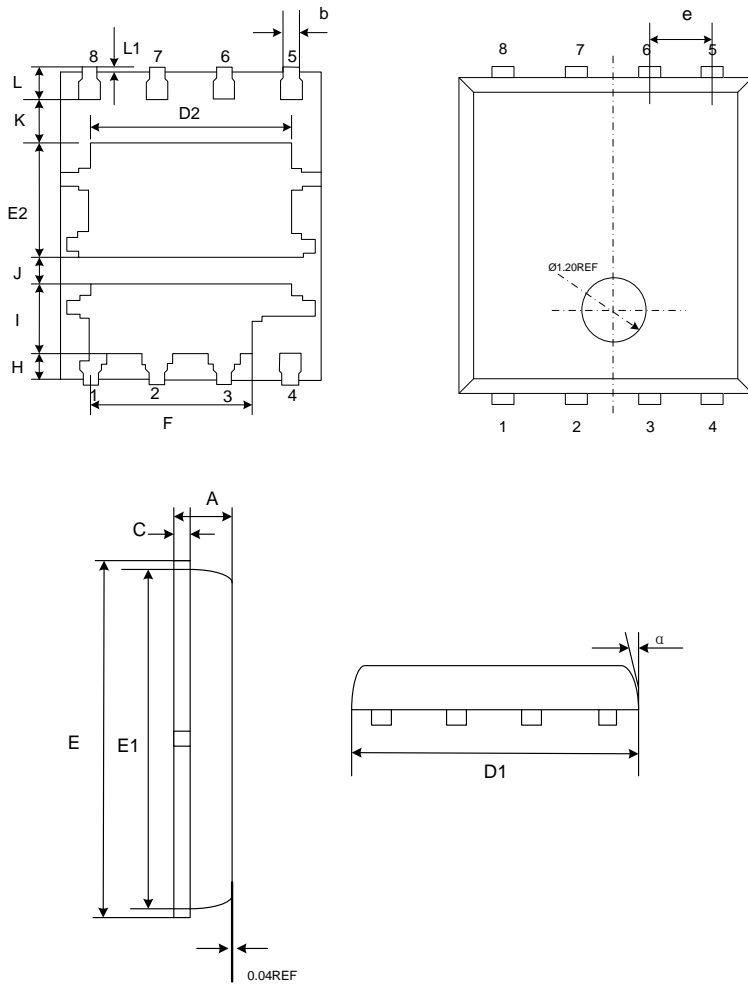


Figure 11. Unclamped Inductive Switching Waveform

$$EAS = \frac{1}{2} L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

Mechanical Dimensions for Dual PDFN5060D-8L

COMMON DIMENSIONS

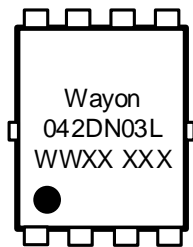


SYMBOL	MM	
	MIN	MAX
A	0.90	1.10
b	0.33	0.51
C	0.20	0.30
D1	4.80	5.00
D2	3.61	3.96
E	5.90	6.10
E1	5.70	5.80
E2	2.02	2.32
e	1.27BSC	
F	2.87	3.22
H	0.48	0.68
I	1.22	1.42
J	0.40	0.60
K	0.50	-
L	0.51	0.71
L1	0.06	0.20
α	0°	12°

Ordering Information

Part	Package	Marking	Packing method
WMB042DN03LG2	PDFN5060D-8L	042DN03L	Tape and Reel

Marking Information



042DN03L = Device code

WWXX XXX= Date code

Contact Information

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