

**• General Description**

The AGM403D1 combines advanced trench MOSFET technology with a low resistance package to provide extremely low  $R_{DS(ON)}$ . This device is ideal for load switch and battery protection applications.

**• Features**

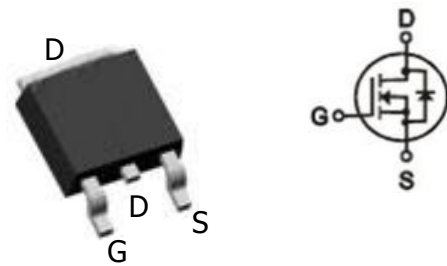
- Advance high cell density Trench technology
- Low  $R_{DS(ON)}$  to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance

**• Application**

- MB/VGA Vcore
- SMPS 2<sup>nd</sup> Synchronous Rectifier
- POL application
- BLDC Motor driver

**Product Summary**

BVDSS	RDSON	ID
40V	2.7mΩ	120A

**TO-252 Pin Configuration**

**Package Marking and Ordering Information**

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM403D	AGM403D1	TO-252	---mm	---mm	2500

**Table 1. Absolute Maximum Ratings (TA=25°C)**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-Source Voltage ( $V_{GS}=0V$ )	40	V
$V_{GS}$	Gate-Source Voltage ( $V_{DS}=0V$ )	±20	V
$I_D$	Drain Current-Continuous( $T_c=25^\circ C$ ) (Note 1)	120	A
	Drain Current-Continuous( $T_c=100^\circ C$ )	72	A
$I_{DM (pluse)}$	Drain Current-Continuous@ Current-Pulsed (Note 2)	420	A
$P_D$	Maximum Power Dissipation( $T_c=25^\circ C$ )	105	W
	Maximum Power Dissipation( $T_c=100^\circ C$ )	41	W
$E_{AS}$	Avalanche energy (Note 3)	360	mJ
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55 To 150	°C

**Table 2. Thermal Characteristic**

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) <sup>1</sup>	---	45	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	1.2	°C/W

**Table 3. Electrical Characteristics (TA=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>On/Off States</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	40			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V			1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.1	1.5	2.3	V
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A		16		S
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A		2.7	3.7	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A		3.4	4.7	mΩ
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, F=1MHZ		3000		pF
C <sub>oss</sub>	Output Capacitance			370		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			170		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1.0MHz		1.7		Ω
<b>Switching Times</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =0.75Ω, R <sub>GEN</sub> =3.3Ω		6.9		nS
t <sub>r</sub>	Turn-on Rise Time			1.7		nS
t <sub>d(off)</sub>	Turn-Off Delay Time			30		nS
t <sub>f</sub>	Turn-Off Fall Time			15		nS
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =20V, I <sub>D</sub> =12A		20		nC
Q <sub>gs</sub>	Gate-Source Charge			9		nC
Q <sub>gd</sub>	Gate-Drain Charge			11		nC
<b>Source-Drain Diode Characteristics</b>						
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current			120	A
V <sub>SD</sub>	Forward on Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =20A			1.2	V

Notes 1.The maximum current rating is package limited.

Notes 2.Repetitive Rating: Pulse width limited by maximum junction temperature

Notes 3.EAS condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=20V, V<sub>G</sub>=10V, R<sub>G</sub>=25Ω

Fig.1 Power Dissipation

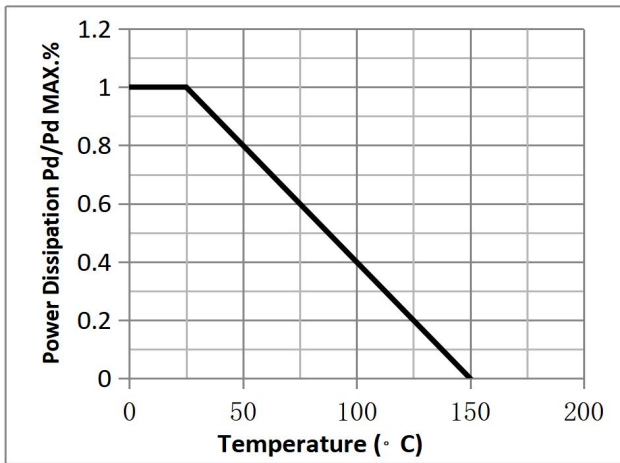


Fig.2 Typical output Characteristics

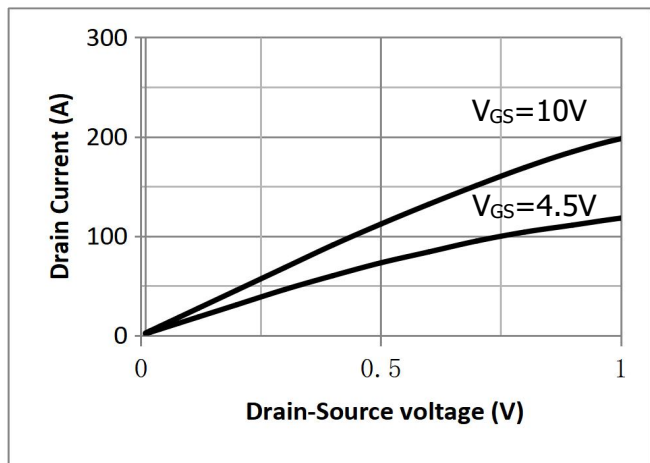


Fig.3 Threshold Voltage V.S Junction Temperature

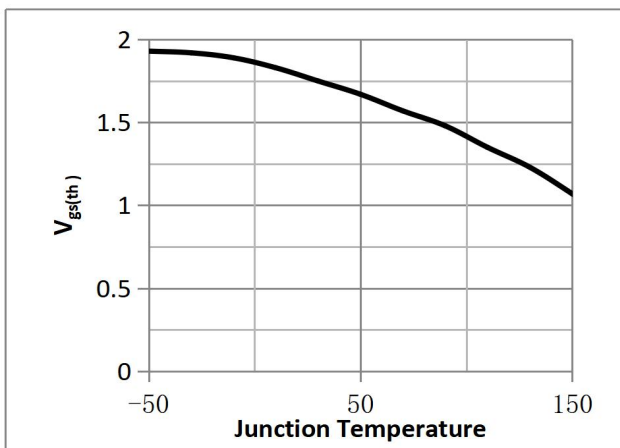


Fig.4 Resistance V.S Drain Current

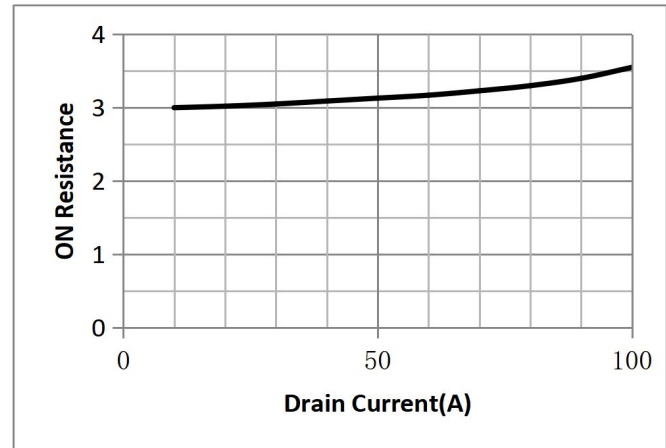


Fig.5 On-Resistance VS Gate Source Voltage

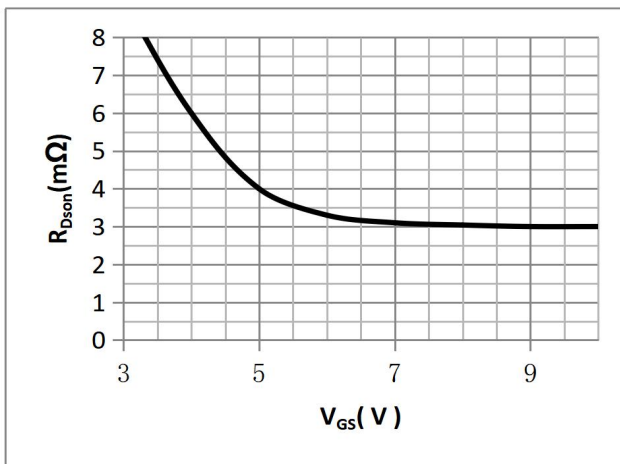


Fig.6 On-Resistance V.S Junction Temperature

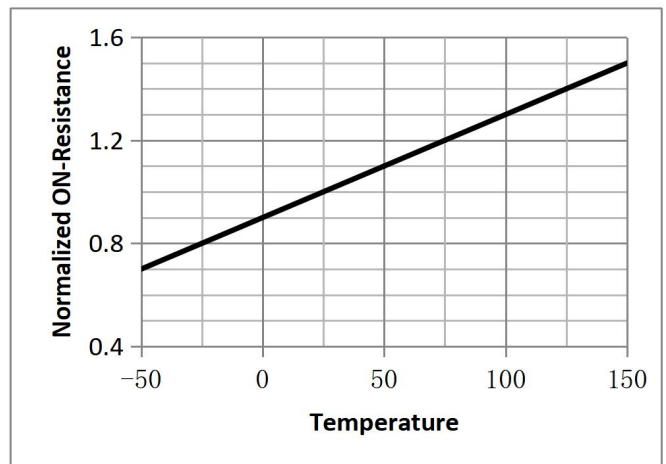


Fig.7 Switching Time Measurement Circuit

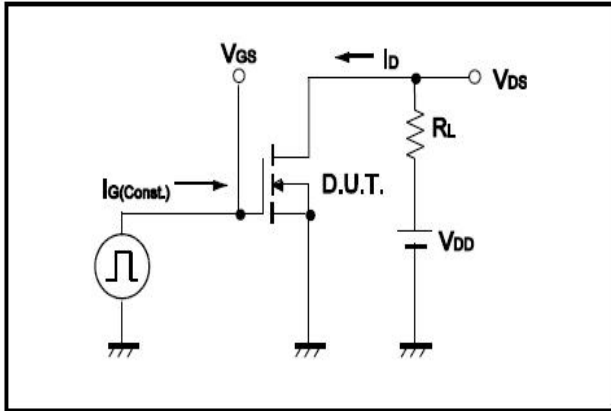


Fig.8 Gate Charge Waveform

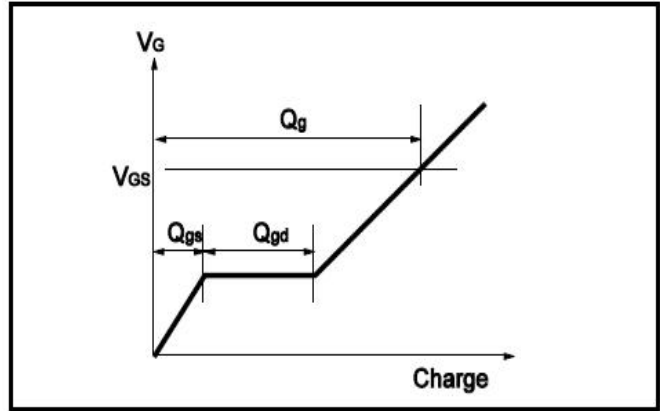


Fig.9 Switching Time Measurement Circuit

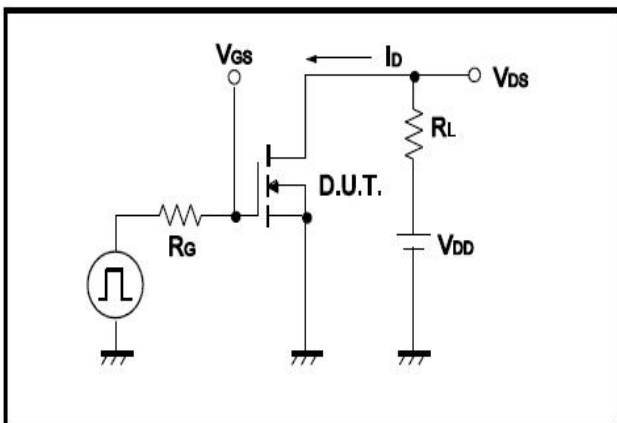


Fig.10 Gate Charge Waveform

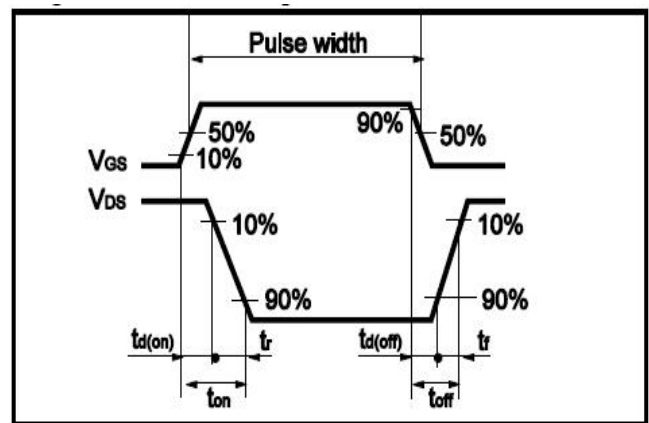


Fig.11 Avalanche Measurement Circuit

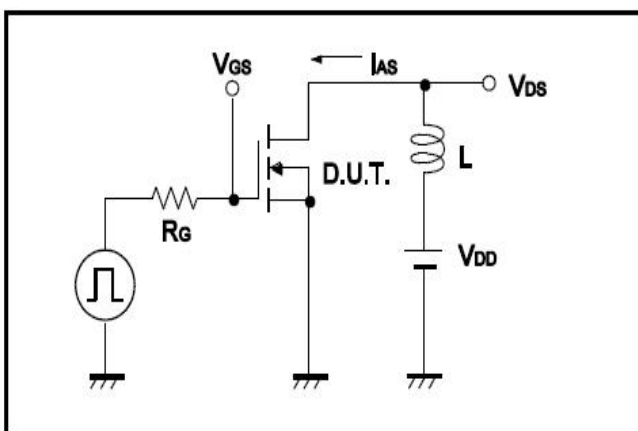
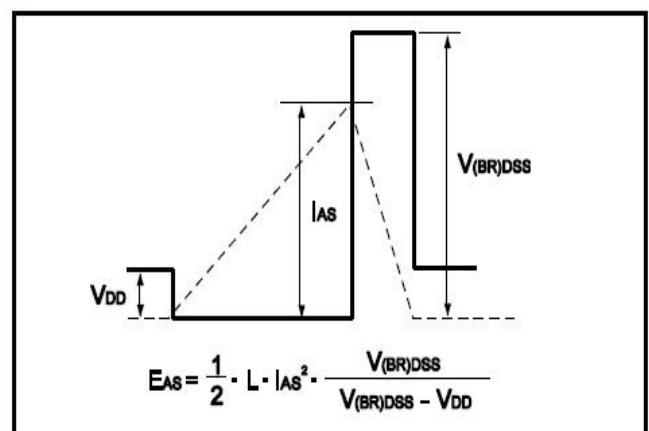


Fig.12 Avalanche Waveform



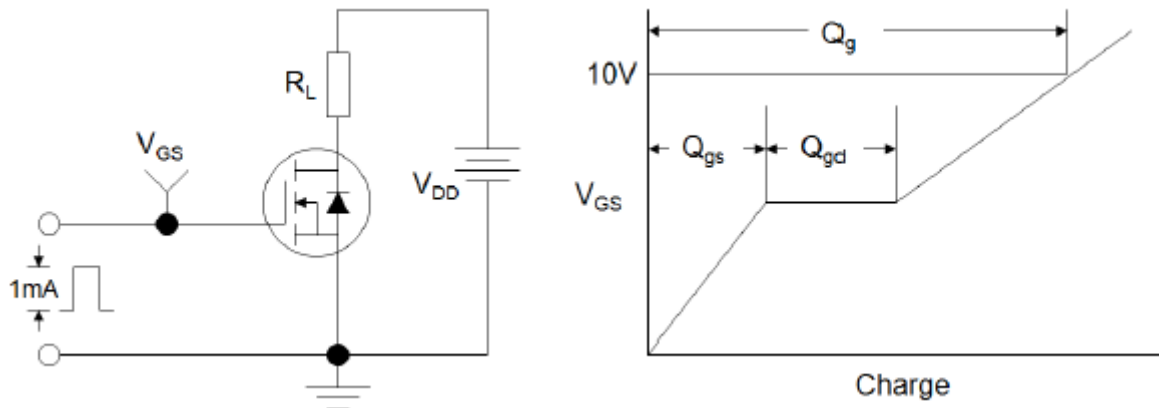


Figure1:Gate Charge Test Circuit &amp; Waveform

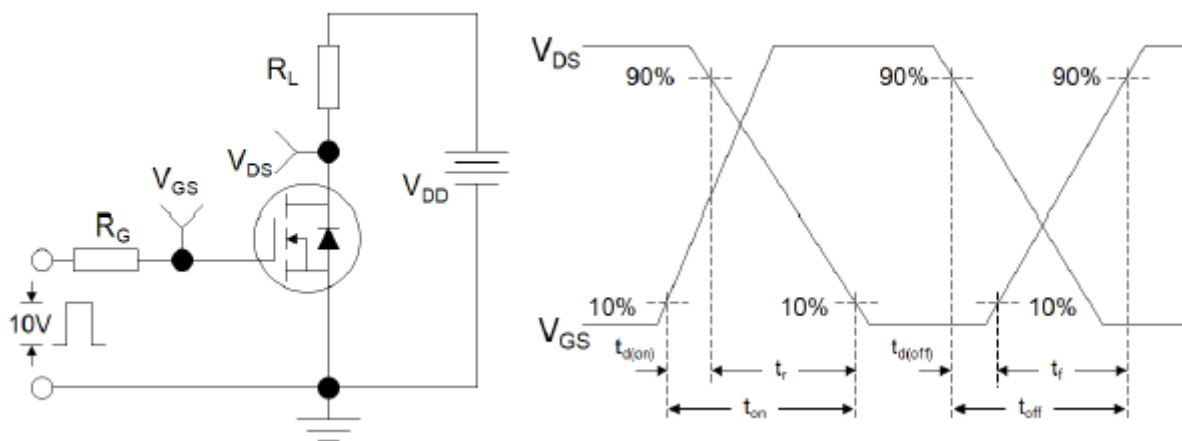


Figure 2: Resistive Switching Test Circuit &amp; Waveforms

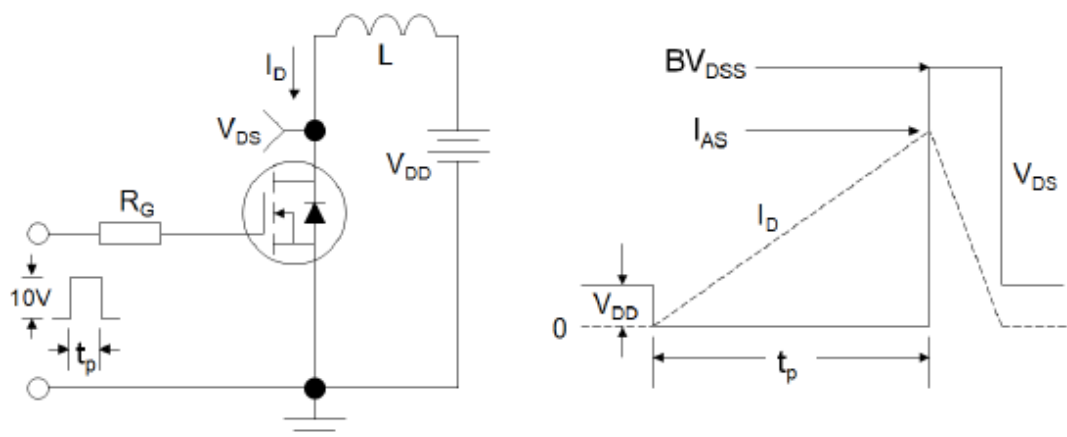
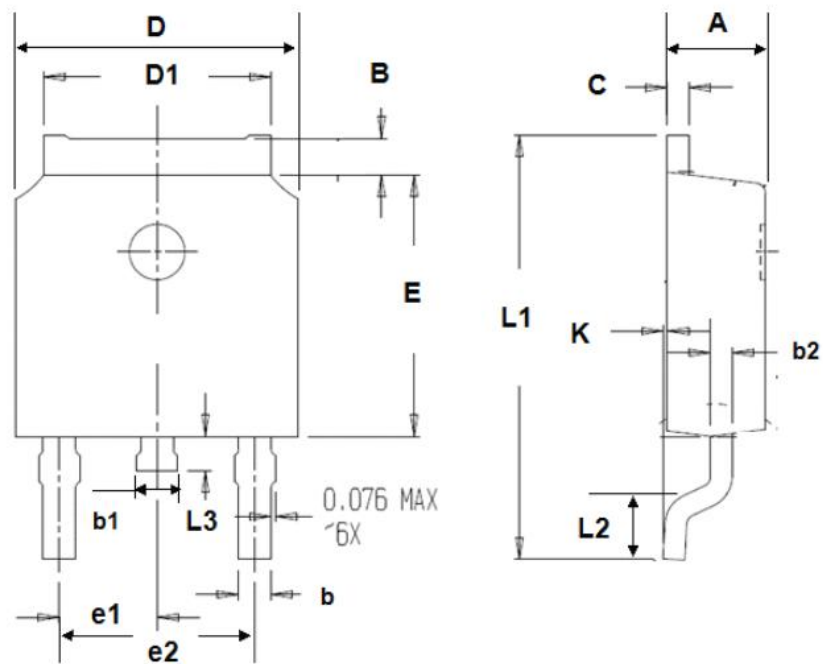
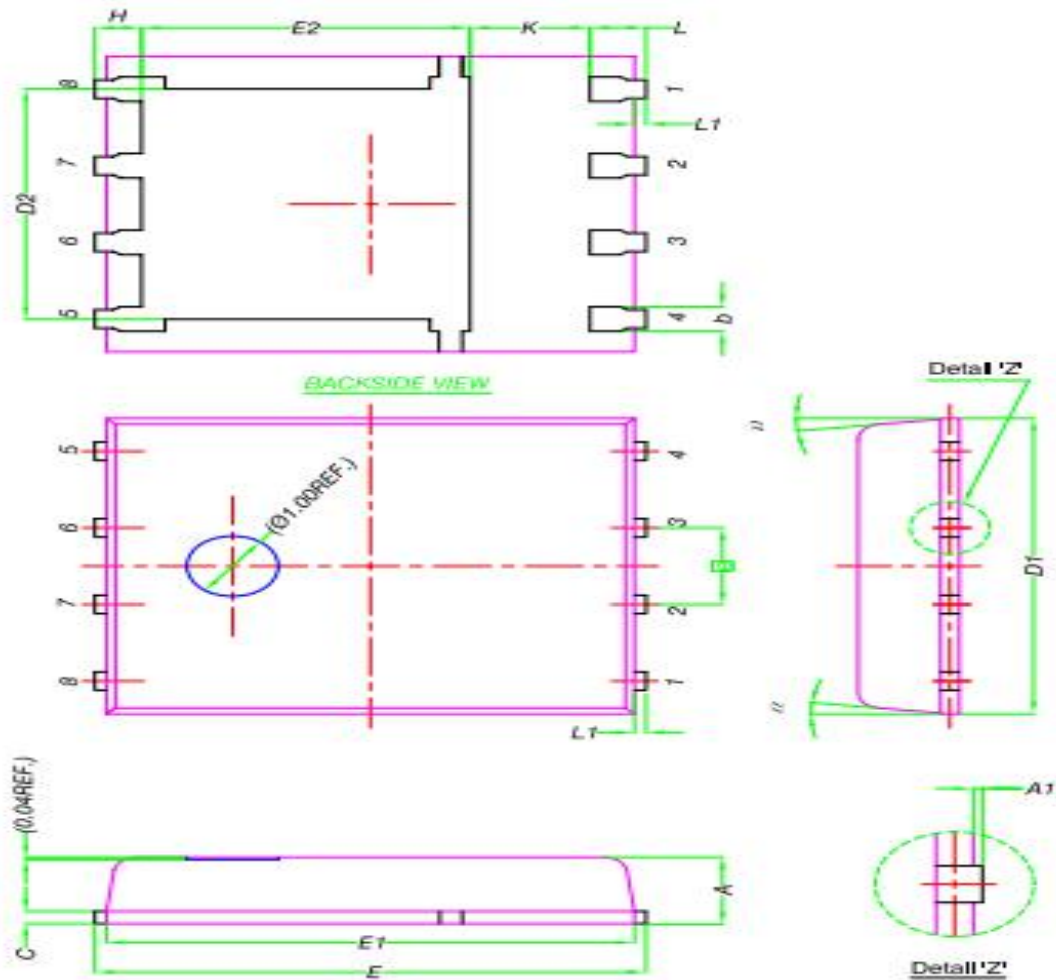


Figure 3:Unclamped Inductive Switching Test Circuit &amp; Waveforms

**•Dimensions**

SYMBOL	min	max	SYMBOL	min	max
A	2.10	2.50	B	0.85	1.25
b	0.50	0.80	b1	0.50	0.90
b2	0.45	0.70	C	0.45	0.70
D	6.30	6.75	D1	5.10	5.50
E	5.30	6.30	e1	2.25	2.35
L1	9.20	10.60	e2	4.45	4.75
L2	0.90	1.75	L3	0.60	1.10
K	0.00	0.23			



**•Dimensions (DFN5×6)**


DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
AT	0	-	0.05
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
$\square e$	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
LT	0.06	0.13	0.20
$\alpha$	0°	-	12°


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