General Description

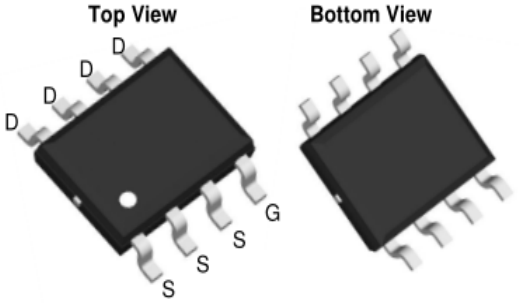
The ZLM0402BA uses advanced trench technology to provide excellent $R_{DS(ON)}$ with low gate charge. This is an all purpose device that is suitable for use in a wide range of power conversion applications.

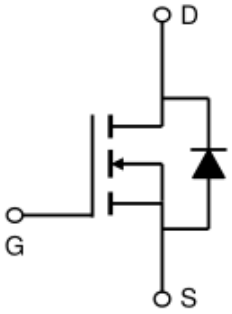
Applications

- Power Management
- Portable Equipment
- Switching Power Supply

Product Summary

- V_{DS} 40V
- I_D (at V_{GS} =10V) 10A
- $R_{DS(ON)}$ (at V_{GS} =10V) < 10mΩ
- $R_{DS(ON)}$ (at V_{GS} =4.5V) < 12mΩ





Absolute MaximumRatings （T_A=25℃unless otherwisenoted）

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	V
ContinuousDrain Current	T_A=25℃	I_D	10	A
	T_A=70℃		8	
PulsedDrainCurrent[C]		I_{DM}	100	A
Power Dissipation[B]	T_A=25℃	P_D	1.7	W
	T_A=70℃		1.1	
Storage Temperature Range		T_{STG}	-55 to +150	℃
Operating Junction Temperature Range		T_J	-55 to +150	℃
Thermal Resistance, Junction-to-Ambient [A]		$R_{\theta JA}$	40	℃/W

Electrical Characteristics (TJ=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=250uA, V_{GS}=0V	40			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=40V,V_{GS}=0V			1	uA
I_{GSS}	Gate-Bodyleakagecurrent	V_{DS}=0V,V_{GS}=±20V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250uA	1.7	2.2	3	V
$I_{D(ON)}$	Onstate draincurrent	V_{GS}=10V,V_{DS}=5V	120			A
$R_{DS(ON)}$	StaticDrain-Source On-Resistance	V_{GS}=10V,I_D=10A		8.2	10	mΩ
		V_{GS}=4.5V,I_D=8A		10	12	mΩ
g_{FS}	ForwardTransconductance	V_{DS}=5V,I_D=10A		75		S
V_{SD}	Diode Forward Voltage	I_{DS}=1A,V_{GS}=0V		0.72	1	V
I_S	Maximum Body-Diode ContinuousCurrent				2.5	A
DYNAMIC PARAMETERS						
C_{iss}	InputCapacitance	V_{GS}=0V,V_{DS}=15V, f=1MHz		1500		pF
C_{oss}	OutputCapacitance			215		pF
C_{rss}	Reverse TransferCapacitance			135		pF
SWITCHING PARAMETERS						
Q_g	TotalGate Charge	V_{GS}=10V,V_{DS}=15V, I_D=10A		27.2		nC
Q_{gs}	Gate Source Charge			4.5		nC
Q_{gd}	Gate Drain Charge			6.4		nC
$t_{D(on)}$	Turn-OnDelayTime	V_{GS}=10V,V_{DS}=20V, R_L=2Ω,R_{GEN}=3Ω		6.4		ns
t_r	Turn-On Rise Time			17.2		ns
$t_{D(off)}$	Turn-OffDelayTime			29.6		ns
t_f	Turn-OffFallTime			16.8		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=10A,dI/dt=500A/μs		30		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=10A,dI/dt=500A/μs		19		nC

Notes:

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C. The value in any given application depends on the user's specific board design.

B. The power dissipation P D is based on $T_{J(MAX)}$ =150°C, using ≤ 10s junction-to-ambient thermal resistance

C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$ =150°C. Ratings are based on low frequency and duty cycles to keep initialT_J =25°C.

D. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max

E. These curves are based on the junction-to-ambient thermal impedence which is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, assuming a maximum junction temperature of $T_{J(MAX)}$ =150°C. The SOA curve provides a single pulse rating.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

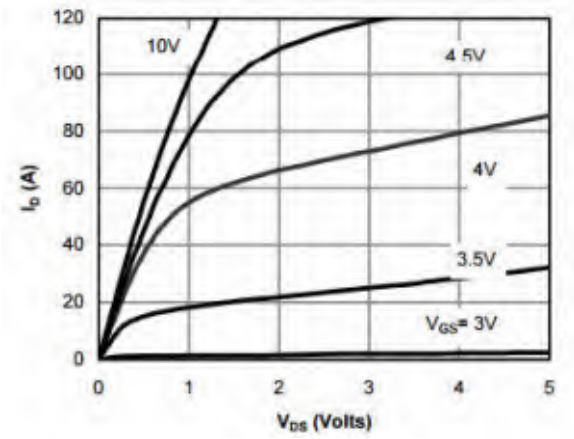


Fig 1: On-Region Characteristics (Note D)

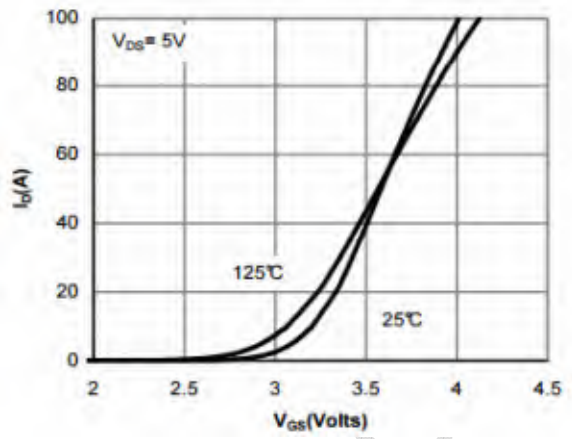


Figure 2: Transfer Characteristics (Note D)

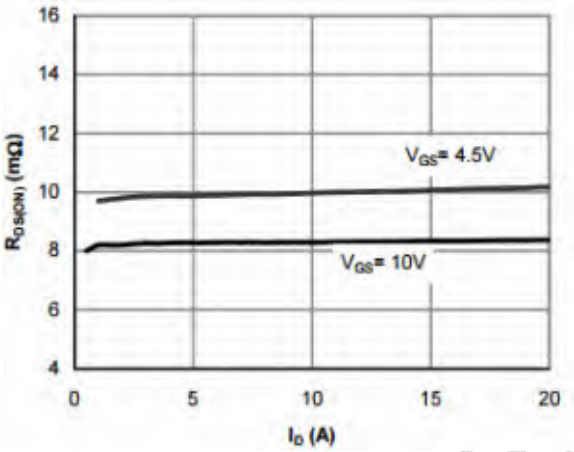


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note D)

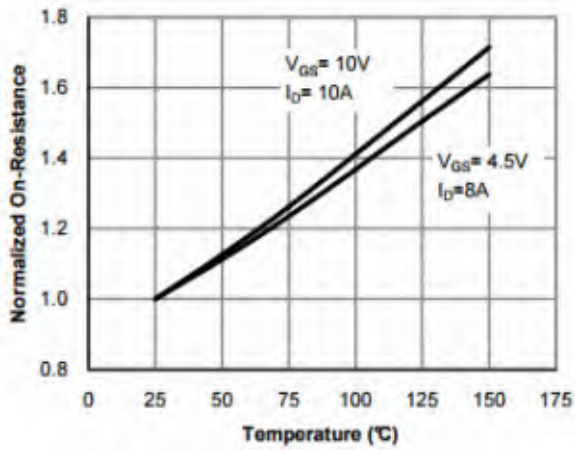


Figure 4: On-Resistance vs. Junction Temperature (Note D)

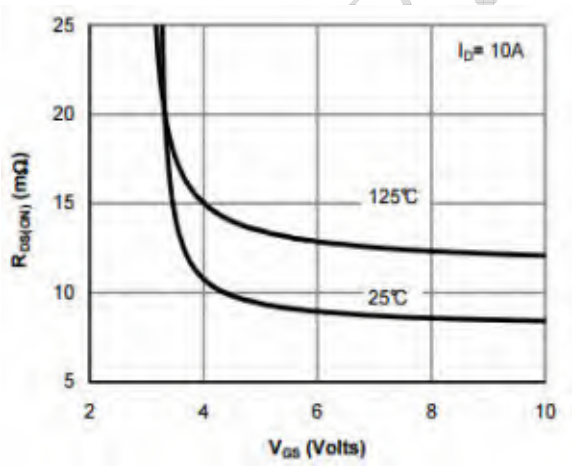


Figure 5: On-Resistance vs. Gate-Source Voltage (Note D)

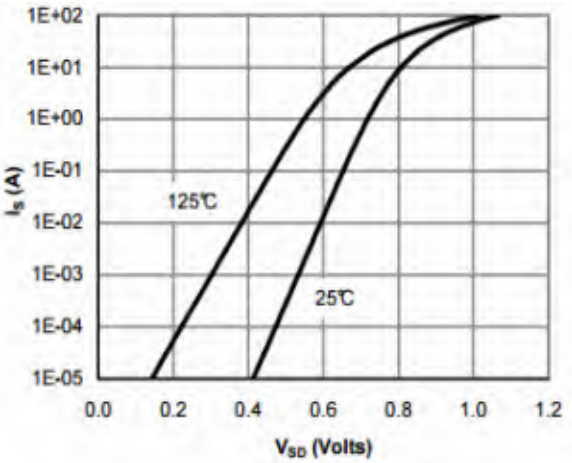


Figure 6: Body-Diode Characteristics (Note D)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

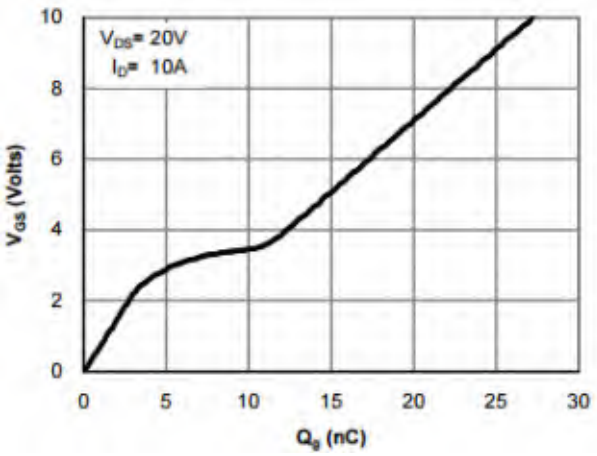


Figure 7: Gate-Charge Characteristics

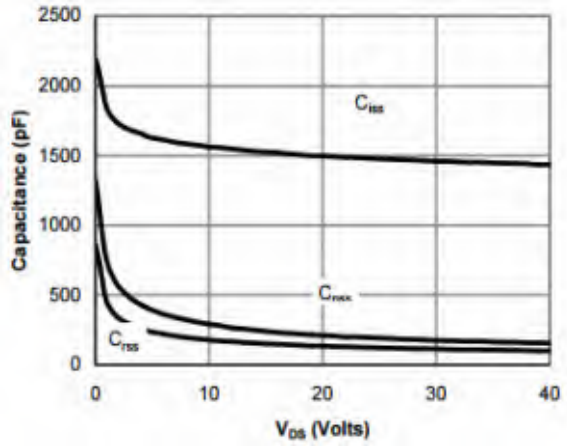


Figure 8: Capacitance Characteristics

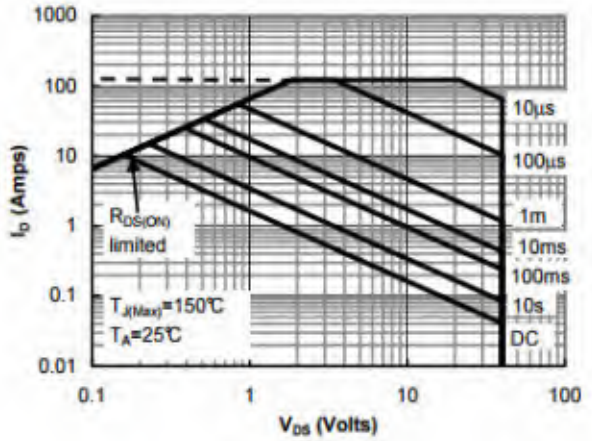


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

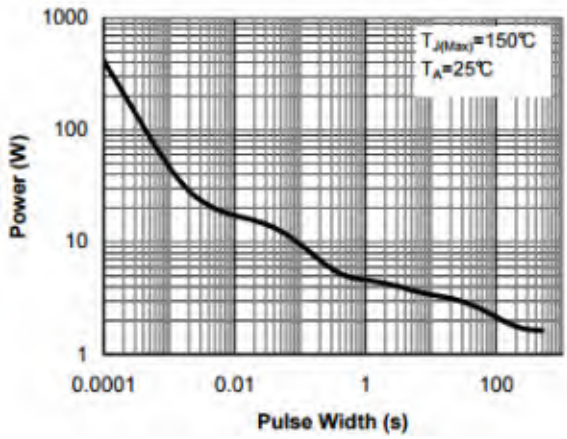


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

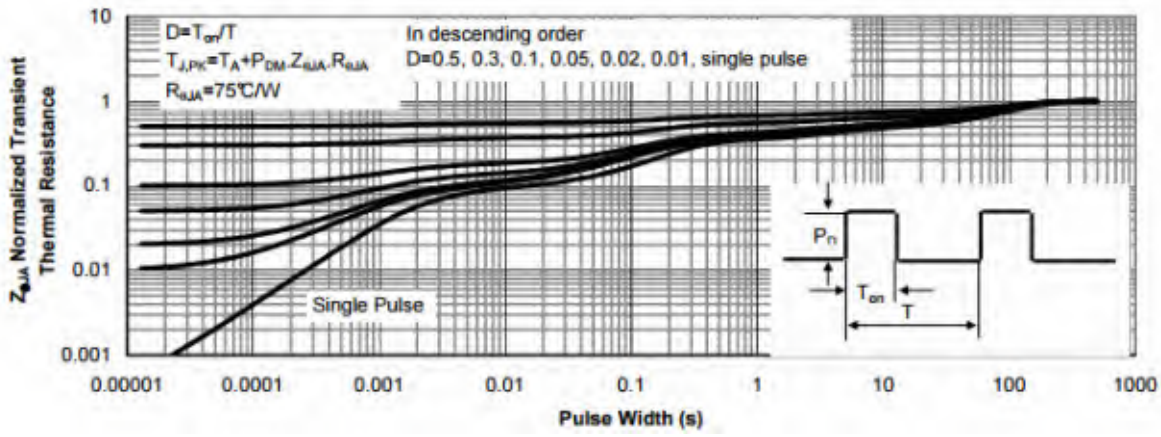
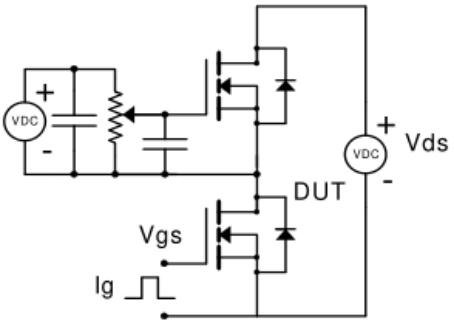
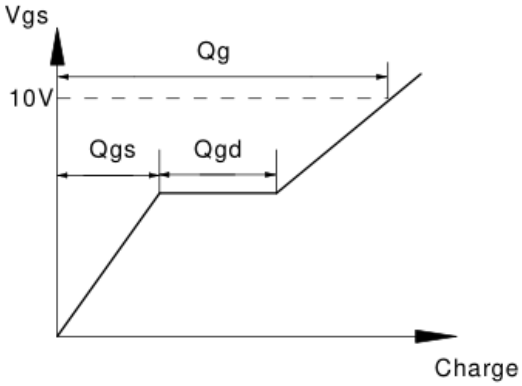


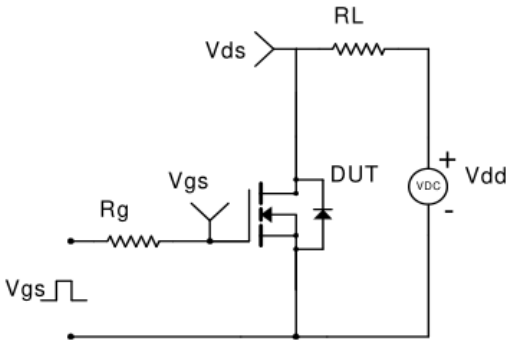
Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)

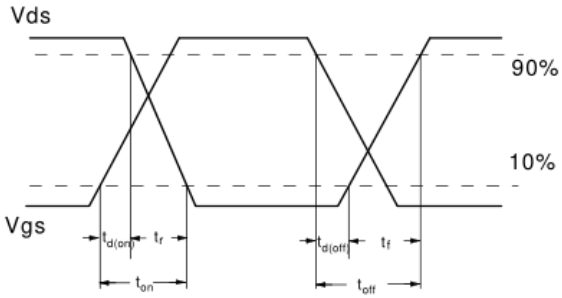
Gate Charge Test Circuit & Waveform



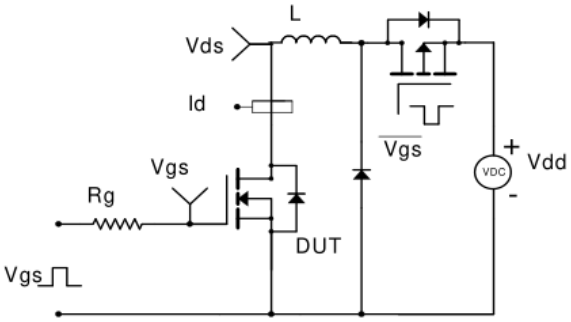


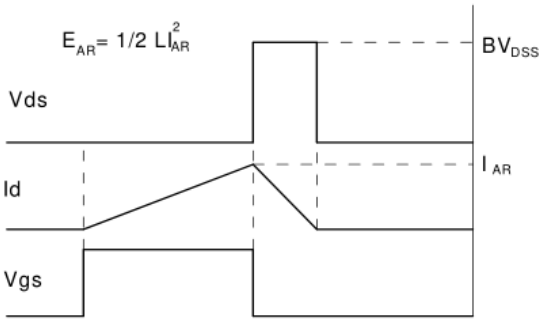
Resistive Switching Test Circuit & Waveforms



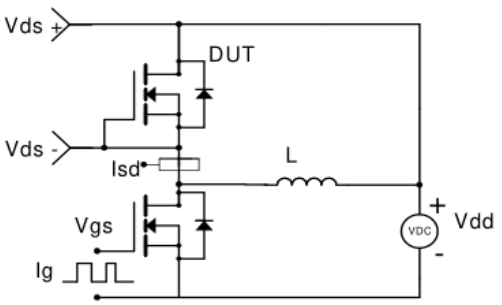


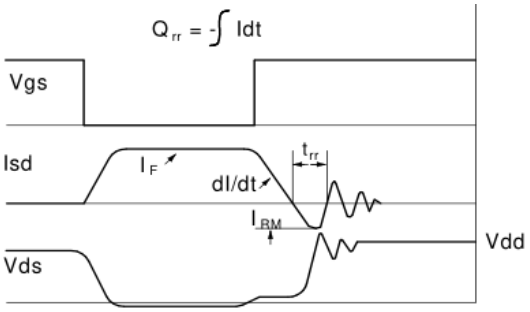
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





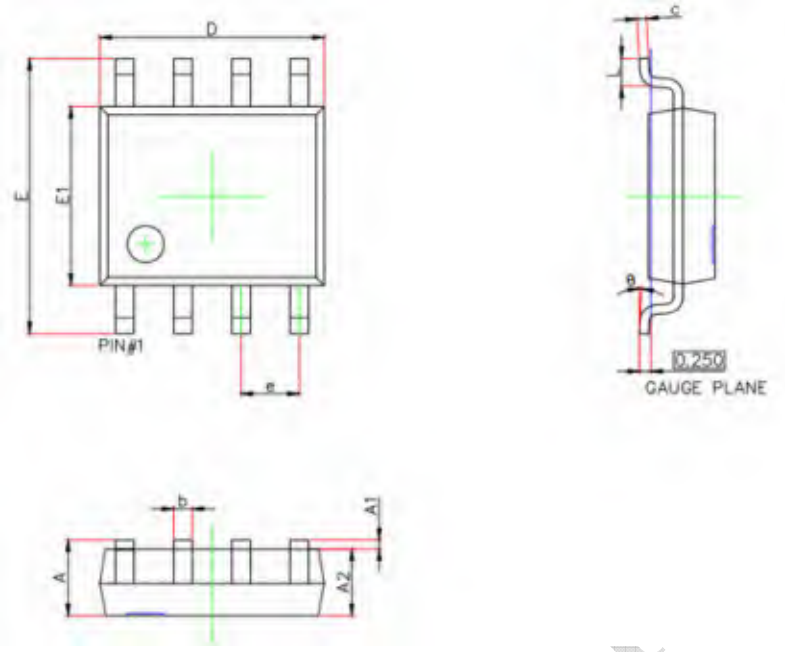
Diode Recovery Test Circuit & Waveforms





Package Information

SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 （BSC）		0.050 （BSC）	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°