



GeneralDescription

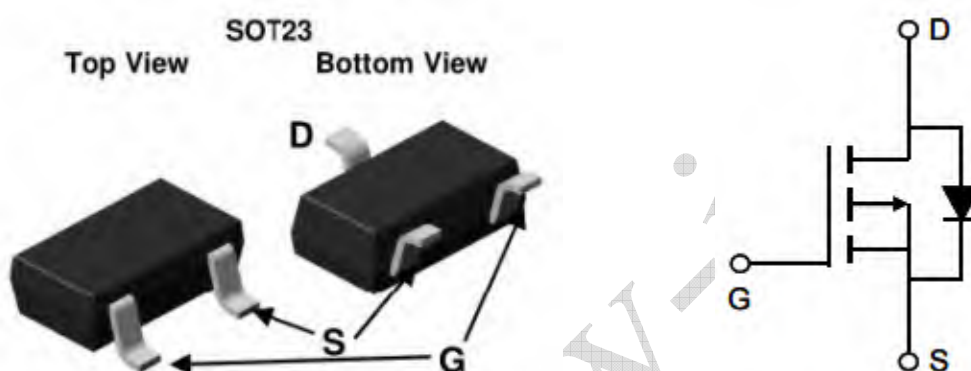
The ZL3415A uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch applications.

Applications

- ◆ Load switch
- ◆ USB cable

Product Summary

V_{DS}	-18V
I_D (at $V_{GS}=-4.5V$)	-3.5A
$R_{DS(ON)}$ (at $V_{GS}=-4.5V$)	<55m Ω
$R_{DS(ON)}$ (at $V_{GS}=-2.5V$)	<75m Ω



Absolute Maximum Ratings (T_A=25°C unless otherwise noted)

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	-18	V
Gate-Source Voltage	V_{GS}	±8	V
Continuous Drain Current	I_D	-3.5	A
		-3.1	
Pulsed Drain Current ^C	I_{DM}	-12	A
Power Dissipation ^B	P_D	1.5	W
		1	
Storage Temperature Range	T_{STG}	-55 to +150	°C
Operating Junction Temperature Range	T_J	-55 to +150	°C
Thermal Resistance, Junction-to-Ambient ^A	$R_{\theta JA}$	85	°C/W



Electrical Characteristics (T_J=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	-18			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-16V, V _{GS} =0V			-1	uA
I _{GSS}	Gate-Bodyleakagecurrent	V _{DS} =0V, V _{GS} =±8V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250uA	-0.5	-0.9	-1.4	V
I _{D(ON)}	Onstate draincurrent	V _{GS} =-4.5V, V _{DS} =-5V	-12			A
R _{DS(ON)}	StaticDrain-Source On-Resistance	V _{GS} =-4.5V, I _D =-3A		48	55	mΩ
		V _{GS} =-2.5V, I _D =-2A		67	75	mΩ
g _{FS}	ForwardTransconductance	V _{DS} =-5V, I _D =-4A		16		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.7	-1.2	V
I _S	Maximum Body-Diode ContinuousCurrent				-2	A
DYNAMIC PARAMETERS						
C _{iss}	InputCapacitance	V _{GS} =0V, V _{DS} =-10V, f=1MHz		568		pF
C _{oss}	OutputCapacitance			97		pF
C _{rss}	Reverse TransferCapacitance			72		pF
SWITCHING PARAMETERS						
Q _g	TotalGate Charge	V _{GS} =-4.5V, V _{DS} =-10V, I _D =-4A		15		nC
Q _{gs}	Gate Source Charge			2.6		nC
Q _{gd}	Gate Drain Charge			2.4		nC
t _{D(on)}	Turn-OnDelayTime	V _{GS} =-4.5V, V _{DS} =-10V, R _L =2.5Ω, R _{GEN} =3Ω		18.8		ns
t _r	Turn-On Rise Time			13		ns
t _{D(off)}	Turn-OffDelayTime			26		ns
t _f	Turn-OffFallTime			35.6		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =-3A, dI/dt=500A/μs		32		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-3A, dI/dt=500A/μs		58		nC

Notes:

- A. is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. R_{θJC} is guaranteed by design while R_{θCA} is determined by the user's board design. R_{θJA} shown below for single device operation on FR-4 in still air.
- 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 initial T_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 impedance which is measured with the device mounted on 1in2 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

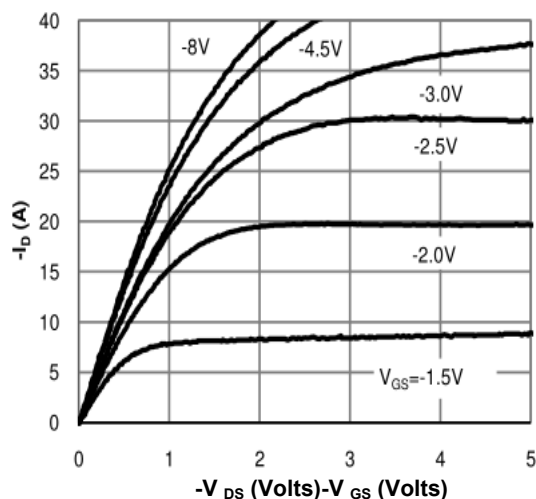


Fig 1: On-Region Characteristics (Note D)

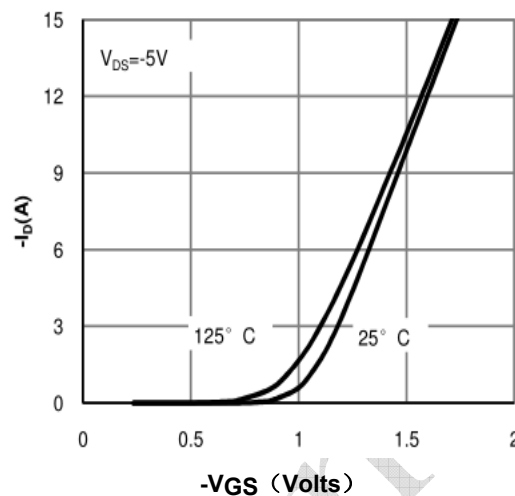


Figure 2: Transfer Characteristics (Note D)

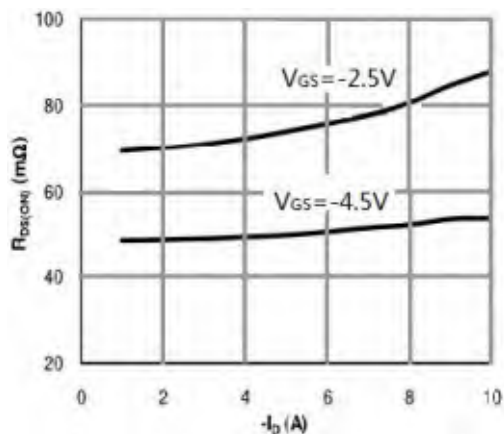


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note D)(Note D)

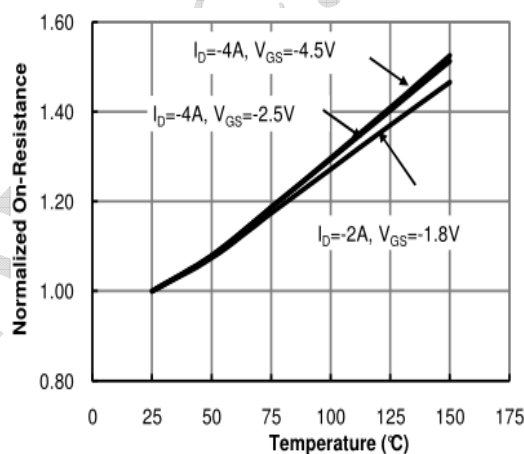


Figure 4: On-Resistance vs. Junction Temperature

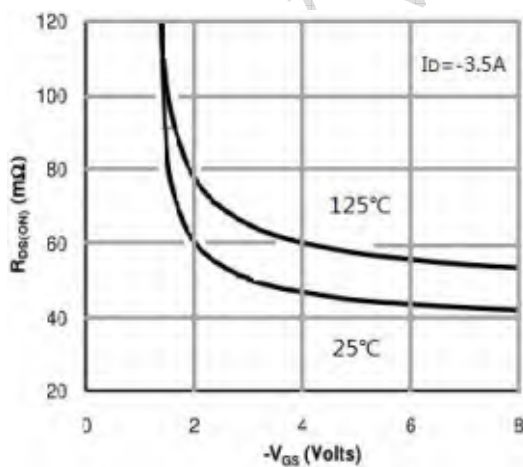


Figure 5: On-Resistance vs. Gate-Source Voltage (Note D)

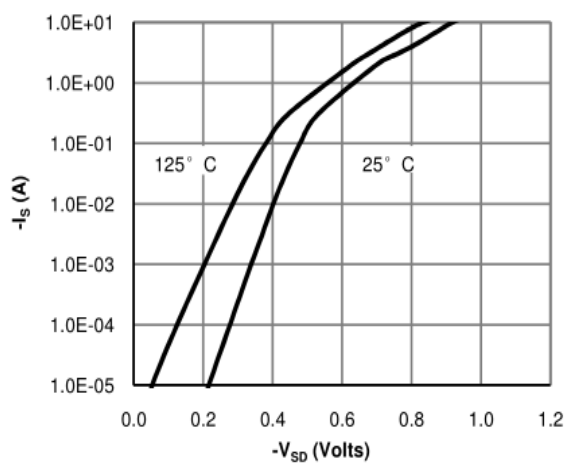


Figure 6: Body-Diode Characteristics (Note D)



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

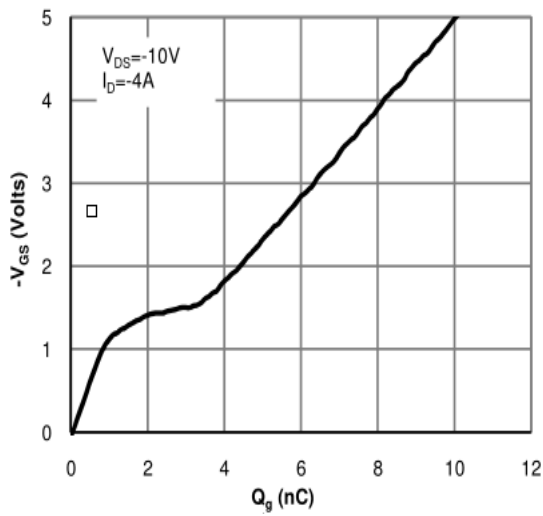


Figure 7: Gate-Charge Characteristics

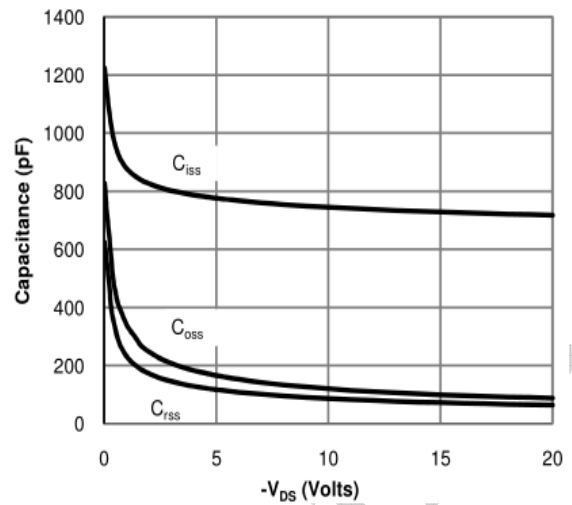


Figure 8: Capacitance Characteristics

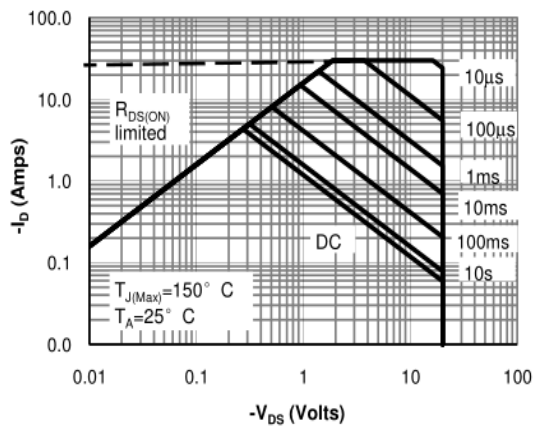


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

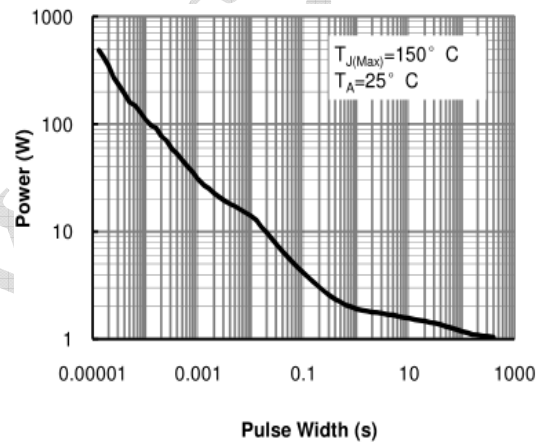


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

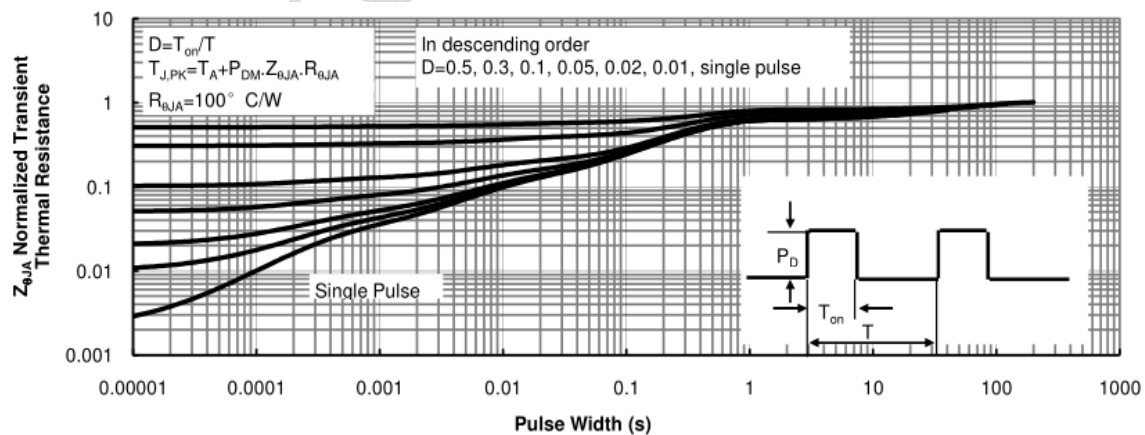
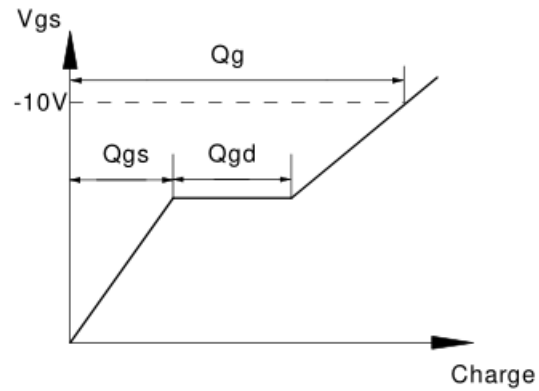
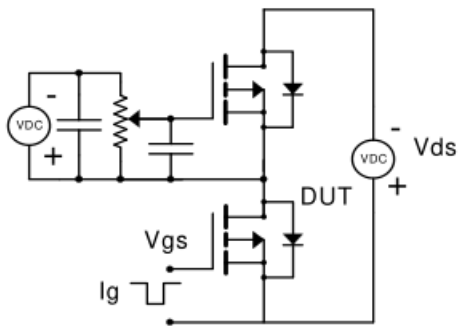


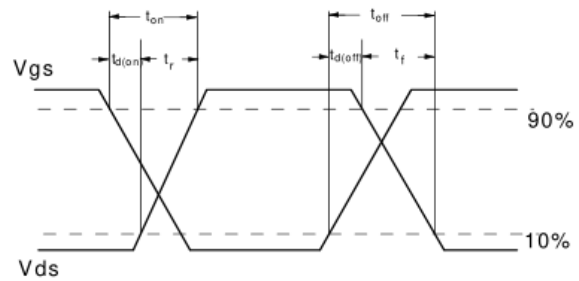
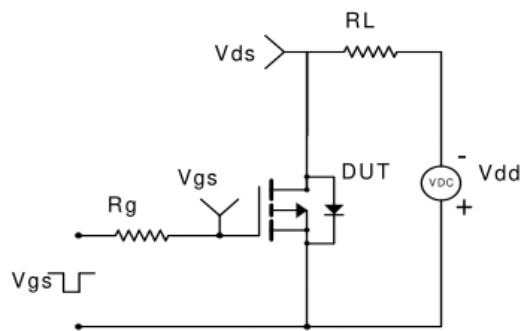
Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)



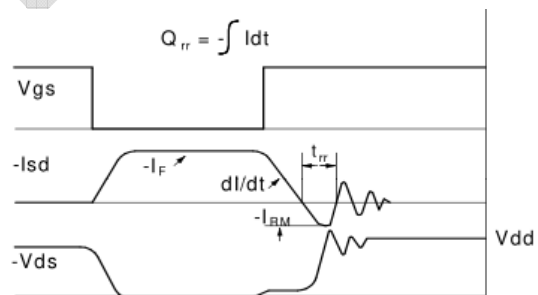
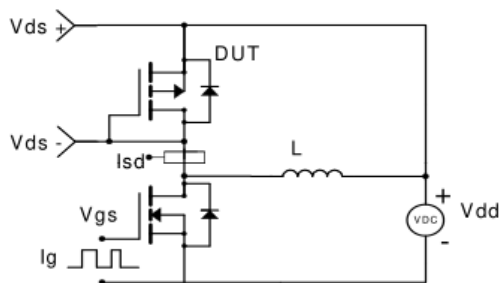
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

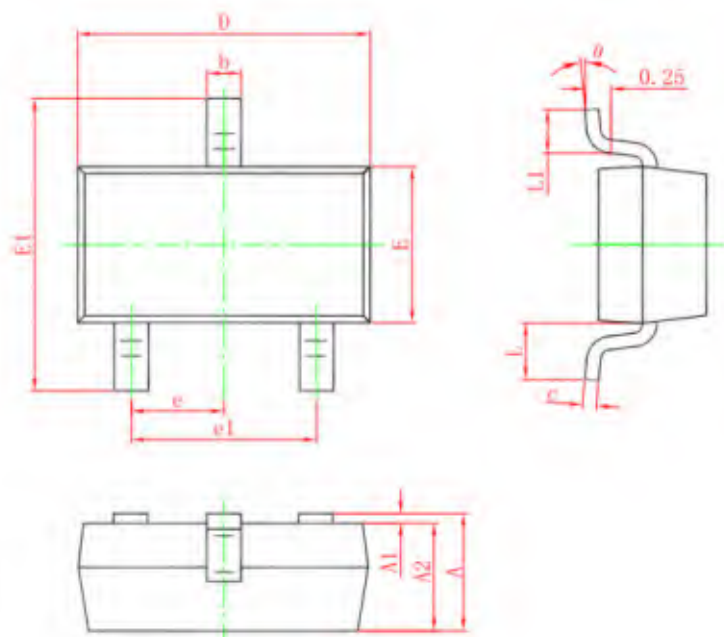


Diode Recovery Test Circuit & Waveforms





SOT-23



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°