

General Description

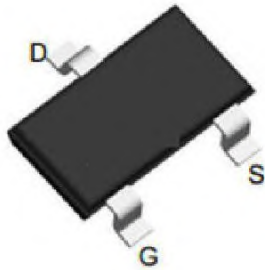
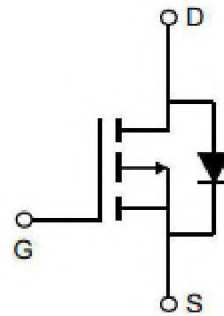
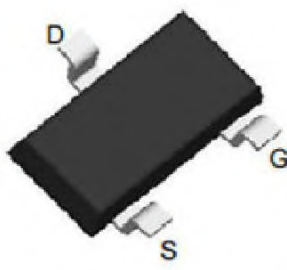
The ZLM0301AC uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications.

Applications

Notebook
 Load Switch
 Battery Protection
 Hand-held Instruments
 USB cable

Product Summary

V_{DS}	-30V
I_D (at $V_{GS} = 10V$)	-3.2A
$R_{DS(ON)}$ (at $V_{GS} = -10V$)	< 58m Ω
$R_{DS(ON)}$ (at $V_{GS} = -4.5V$)	< 60m Ω

Top View

Bottom View

Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	± 12	V
Continuous Drain Current	$T_A = 25^\circ\text{C}$	I_D	-3.2	A
	$T_A = 70^\circ\text{C}$		-2.6	
Pulsed Drain Current ^A		I_{DM}	-12.6	A
Power Dissipation	$T_A = 25^\circ\text{C}$	P_D	0.9	W
	$T_A = 70^\circ\text{C}$		0.5	
Storage Temperature Range		T_{STG}	-55 to +150	$^\circ\text{C}$
Operating Junction Temperature Range		T_J	-55 to +150	$^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient		$R_{\theta JA}$	90	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
B _V ^{DSS}	Drain-Source Breakdown Voltage	I _D =-250uA, V _{GS} =0V	-30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-30V, V _{GS} =0V			-1	uA
I _{GSS} V	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±12V			±100	nA
I _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250uA	-0.5	-0.9	-1.5	V
I _{D(ON)}	Onstate drain current	V _{GS} =10V, V _{DS} =5V	-12.6			A
R _{DS(ON)} g	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-1A V _{GS} =-4.5V, I _D =-1A		38 42	58 60	mΩ mΩ
g _{FS} V	Forward Transconductance	V _{DS} =-5V, I _D =-4.1A		7		S
V _{SD}	Diode Forward Voltage	I _{DS} =-1A, V _{GS} =0V		-0.7	-1.5	V
I _S	Maximum Body-Diode Continuous Current				-3.7	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-15V, f=1MHz		815		pF
C _{oss}	Output Capacitance			60		pF
C _{rss}	Reverse Transfer Capacitance			50		pF
SWITCHING PARAMETERS						
Q _g Q _{gs}	Total Gate Charge ^{2,3} Gate Source Charge ^{2,3}	V _{GS} =-4.5V, V _{DS} =-15V, I _D =-3.2A		7.8		nC
Q _{gd}	Gate Drain Charge ^{2,3}			2.1		nC
t _{D(on)}	Turn-On Delay Time ^{2,3}			2.4		nC
t _r	Turn-On Rise Time ^{2,3}	V _{GS} =-10V, V _{DS} =-15V, R _G =3Ω, I _D =-4A		12.4		ns
t _{D(off)}	Turn-Off Delay Time ^{2,3}			5.6		ns
t _f	Turn-Off Fall Time ^{2,3}			43.2		ns
				6.8		ns

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 <300 μs 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

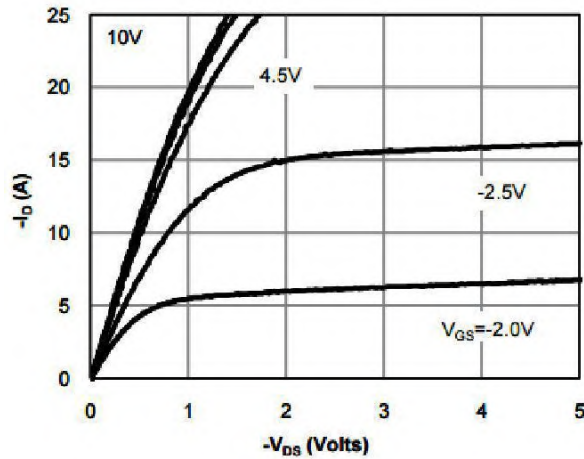


Fig 1: On-Region Characteristics (Note D)

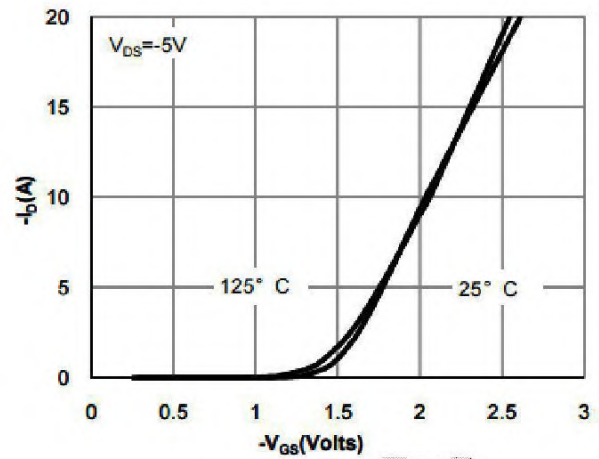


Figure 2: Transfer Characteristics (Note D)

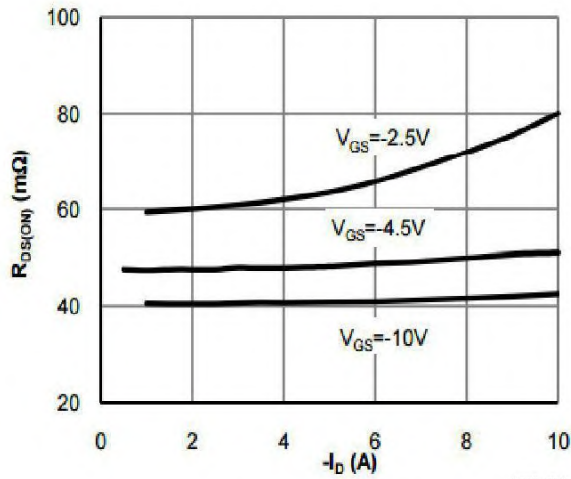


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note D)

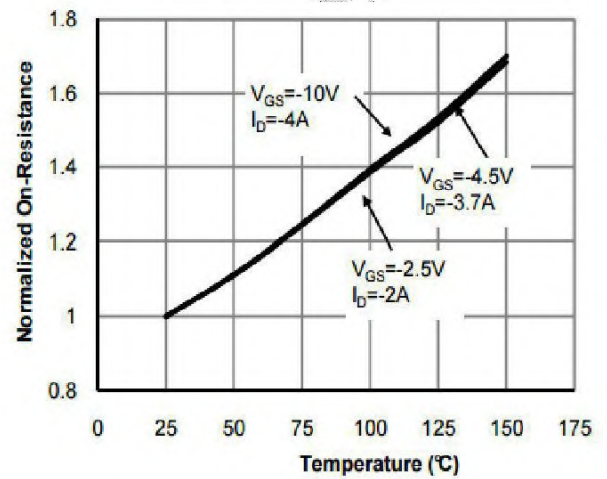


Figure 4: On-Resistance vs. Junction Temperature (Note D)

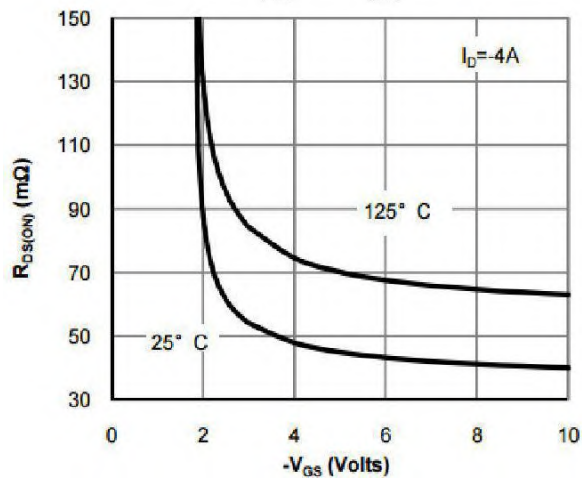


Figure 5: On-Resistance vs. Gate-Source Voltage (Note D)

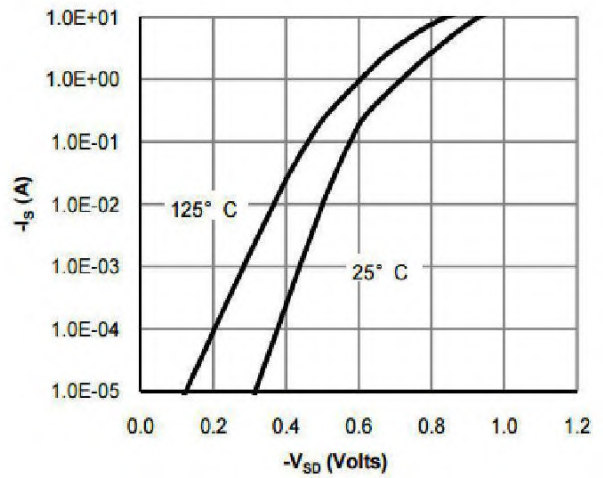


Figure 6: Body-Diode Characteristics (Note D)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

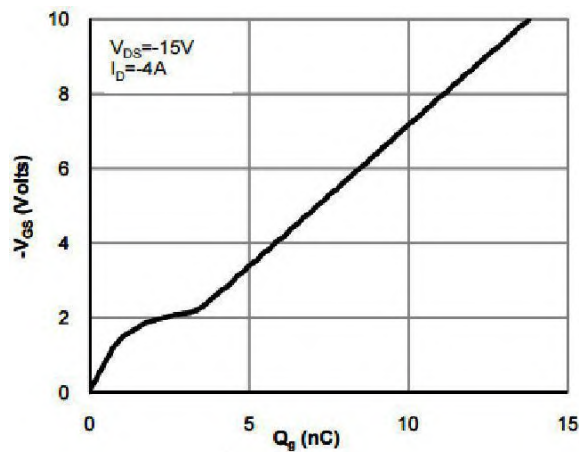


Figure 7: Gate-Charge Characteristics

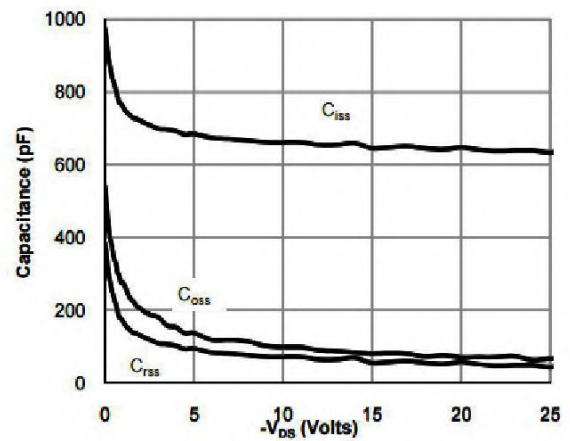


Figure 8: Capacitance Characteristics

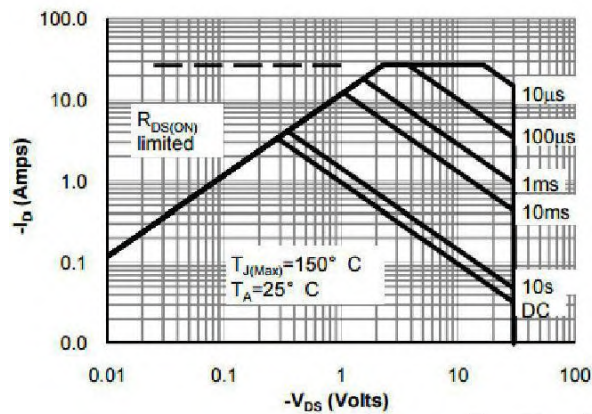


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

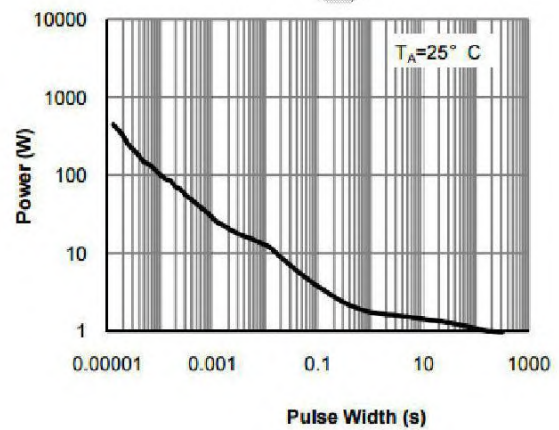


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

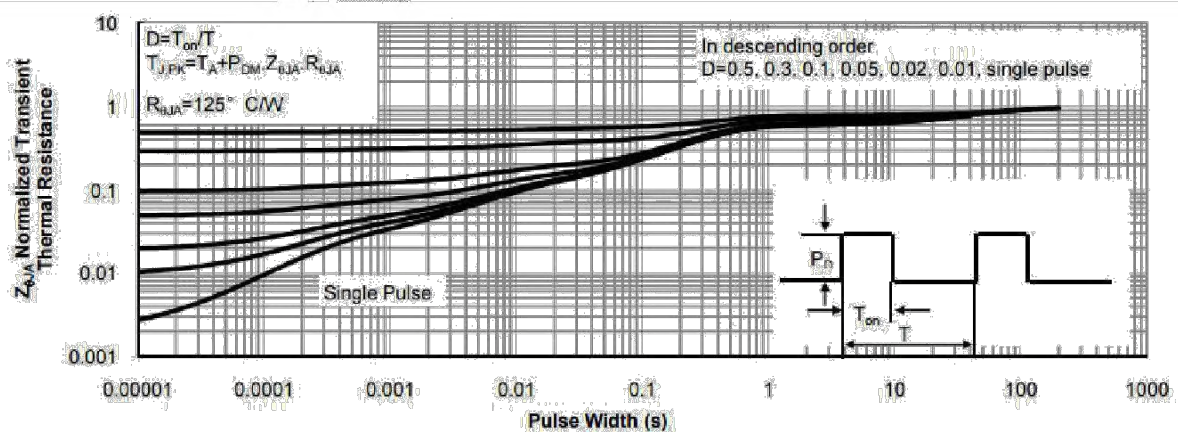
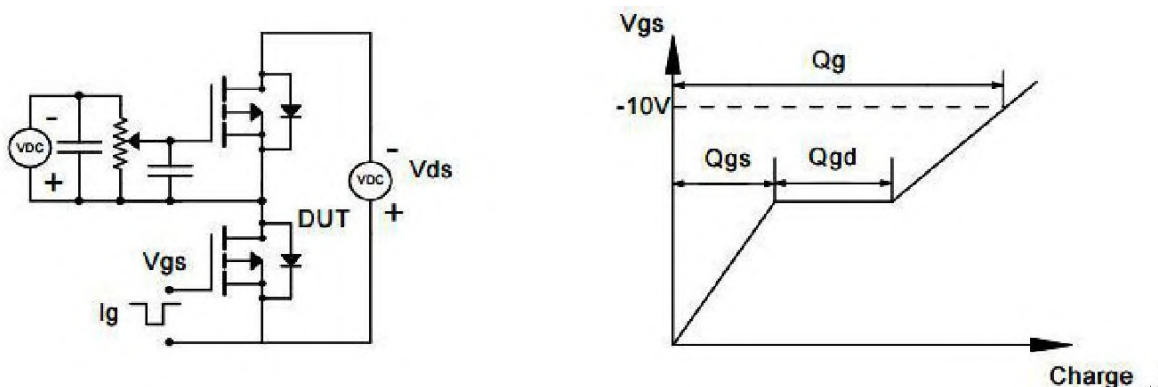
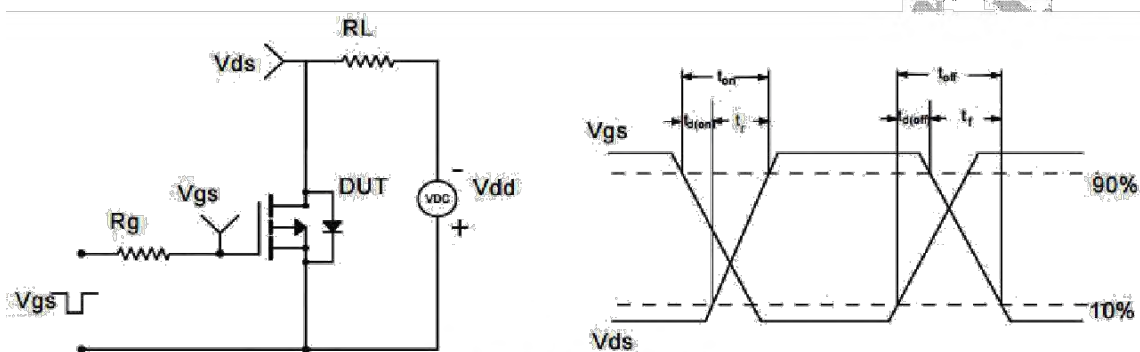
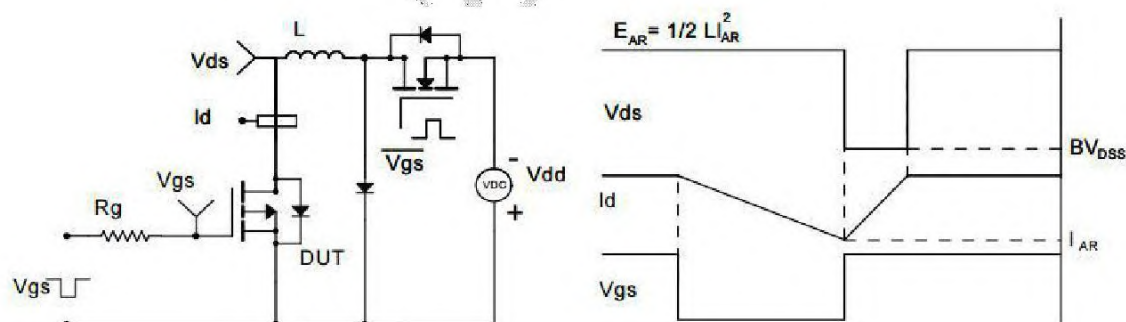
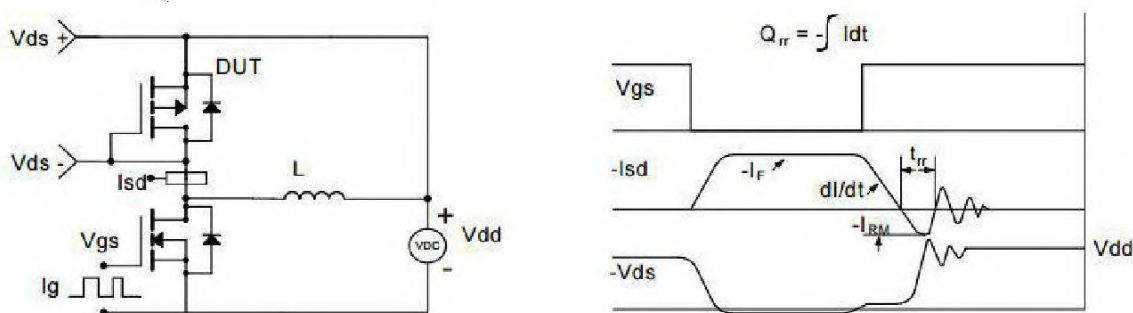
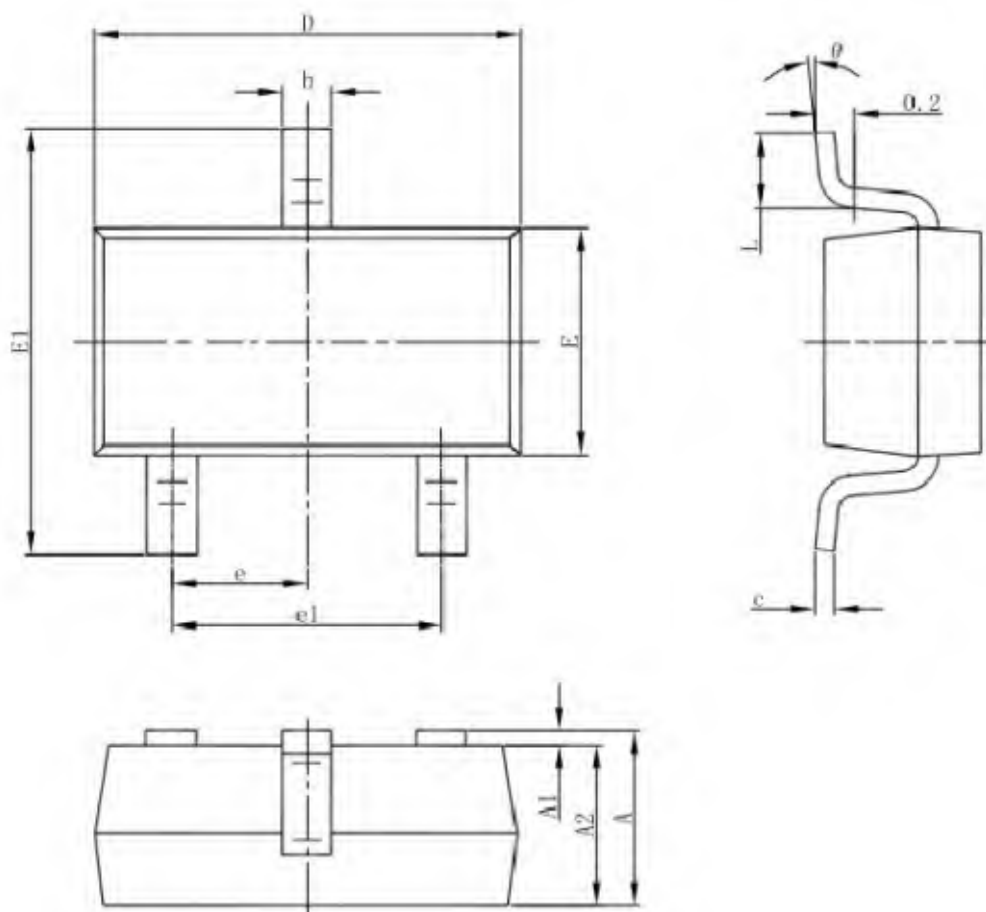


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)

Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

Diode Recovery Test Circuit & Waveforms


Package Information

SOT23-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°