

20V P-Channel Enhancement Mode MOSFET

Description

The PECN3415EVR uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications.

General Features

- ◆ $V_{DS} = -20V$, $I_D = -4A$
 $R_{DS(ON)}(Typ.) = 46m\Omega$ @ $V_{GS} = -2.5V$
 $R_{DS(ON)}(Typ.) = 38m\Omega$ @ $V_{GS} = -4.5V$
- ◆ High power and current handing capability
- ◆ Lead free product is acquired
- ◆ Surface mount package
- ◆ ESD Rating: 2500V HBM

Application

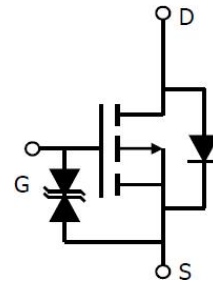
- ◆ PWM applications
- ◆ Load switch

Package

- ◆ SOT-23

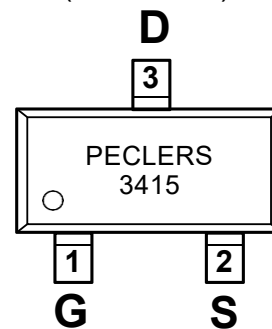


Schematic diagram



Marking and pin assignment

SOT-23
(TOP VIEW)



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP3415EVR-G	-55°C to +150°C	SOT-23	3000

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

parameter		symbol	limit	unit
Drain-source voltage		V_{DS}	-20	V
Gate-source voltage		V_{GS}	±8	V
Continuous Drain Current (TJ = 150 °C)	$T_C = 25^\circ C$	I_D	-4	A
	$T_C = 70^\circ C$		-3.5	
	$T_A = 25^\circ C$		-3.7 ^{b,c}	
	$T_A = 70^\circ C$		-2.9 ^{b,c}	
Continuous Source-Drain Diode Current	$T_C = 25^\circ C$	I_S	-1.4	
	$T_A = 25^\circ C$		-1 ^{b,c}	
Pulsed Drain Current (t = 300 μs)		I_{DM}	-12	

Maximum power dissipation	T _C =25°C	P _D	1.7	W
	T _C =70°C		1.1	
	T _A =25°C		1 ^{b,c}	
	T _A =70°C		0.6 ^{b,c}	
Operating Junction and Storage Temperature Range		T _J , T _{STG}	-55—150	°C

Thermal Characteristics

Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient ^{b, d}	t ≤ 5 s	R _{θJA}	100	130	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R _{θJF}	60	75	

Notes:

- TC = 25 °C.
- Surface mounted on 1" x 1" FR4 board.
- t = 5 s.
- Maximum under steady state conditions is 175 °C/W.

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =-250μA	-20	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =-20V, V _{GS} =0V	-	-	-1	μA
Gate-body leakage	I _{GSS}	V _{DS} =0V, V _{GS} =±8V	-	-	±10	μA
ON Characteristics						
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-0.4	-0.59	-0.9	V
Drain-source on-state resistance	R _{DS(ON)}	V _{GS} =-4.5V, I _D =-4A	-	38	45	mΩ
		V _{GS} =-2.5V, I _D =-4A	-	46	55	
Forward transconductance	g _{fs}	V _{DS} =-5V, I _D =-4A	8	-	-	S
Dynamic Characteristics						
Input capacitance	C _{ISS}	V _{DS} =-10V, V _{GS} =0V f=1.0MHz	-	751	-	pF
Output capacitance	C _{OSS}		-	115	-	
Reverse transfer capacitance	C _{RSS}		-	80	-	
Switching Characteristics						
Turn-on delay time	t _{D(ON)}	V _{DD} =-10V I _D =-2.8A V _{GEN} =-4.5V R _L =10ohm R _{GEN} =-60ohm	-	13	-	ns
Rise time	t _r		-	9	-	
Turn-off delay time	t _{D(OFF)}		-	19	-	
Fall time	t _f		-	29	-	
Total gate charge	Q _g	V _{DS} =-10V, I _D =-3A V _{GS} =-4.5V	-	9.3	-	nC
Gate-source charge	Q _{gs}		-	1	-	
Gate-drain charge	Q _{gd}		-	2.2	-	

DRAIN-SOURCE DIODE CHARACTERISTICS

Diode forward voltage	V_{SD}	$V_{GS}=0V, I_S=-1.25A$	-	-0.81	-1.2	V
-----------------------	----------	-------------------------	---	-------	------	---

Typical Performance Characteristics

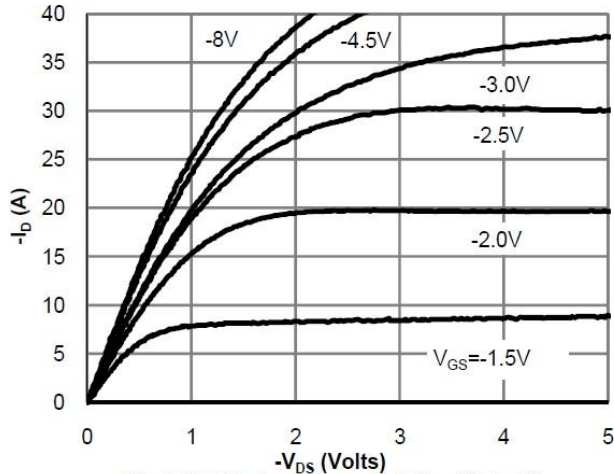


Fig 1: On-Region Characteristics (Note E)

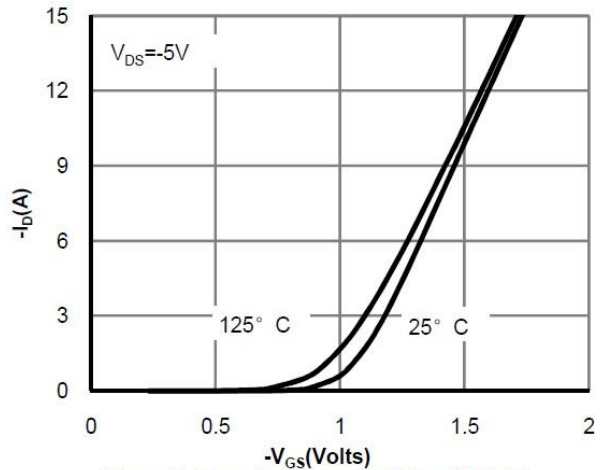


Figure 2: Transfer Characteristics (Note E)

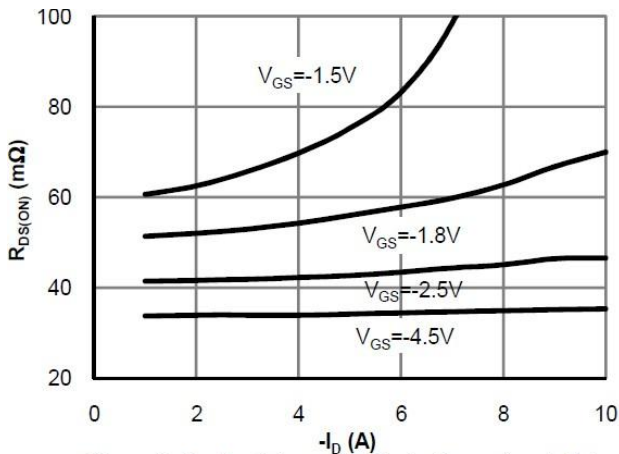


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

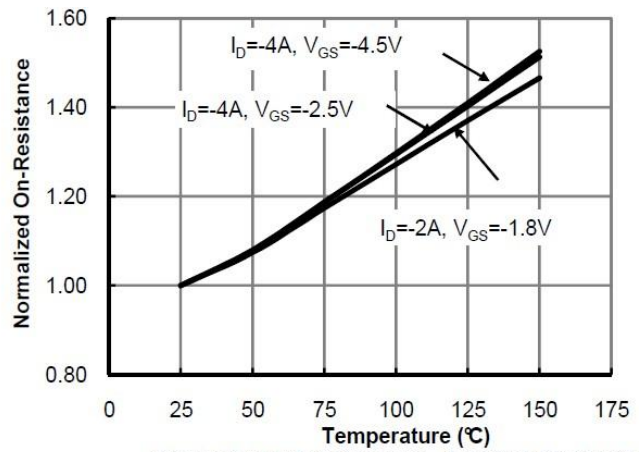


Figure 4: On-Resistance vs. Junction Temperature (Note E)

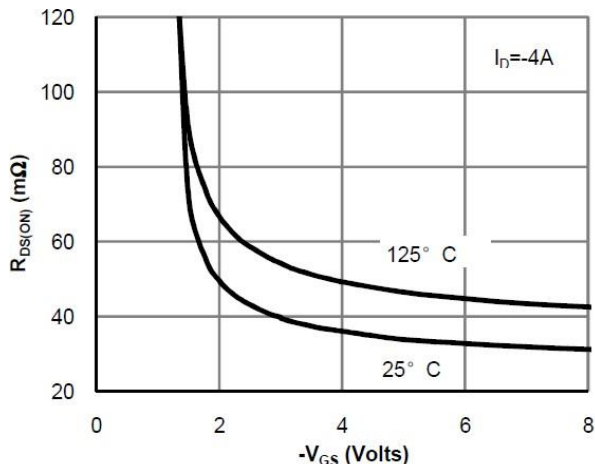


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

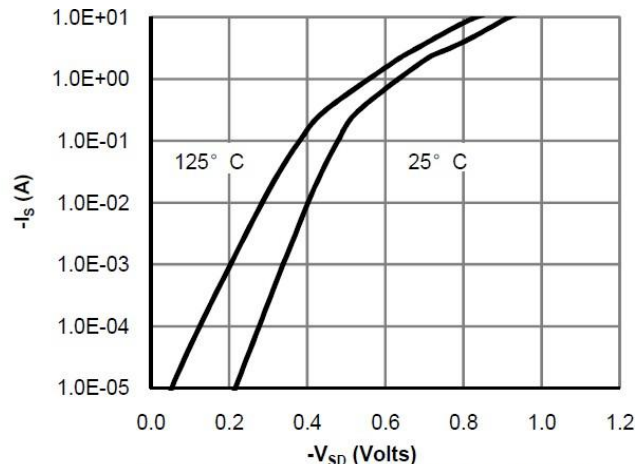


Figure 6: Body-Diode Characteristics (Note E)

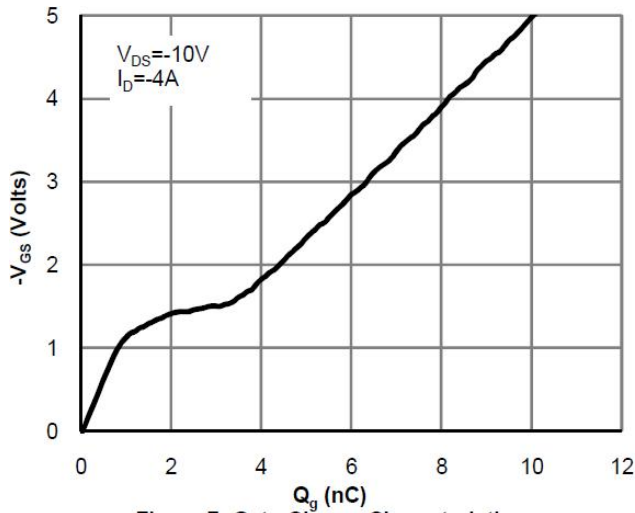


Figure 7: Gate-Charge Characteristics

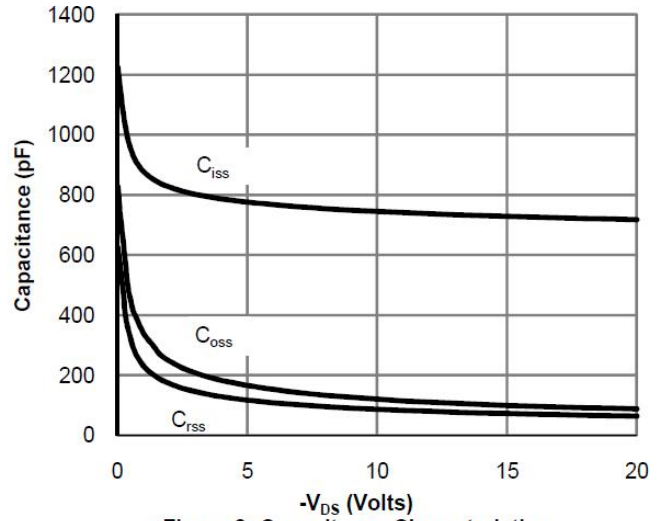


Figure 8: Capacitance Characteristics

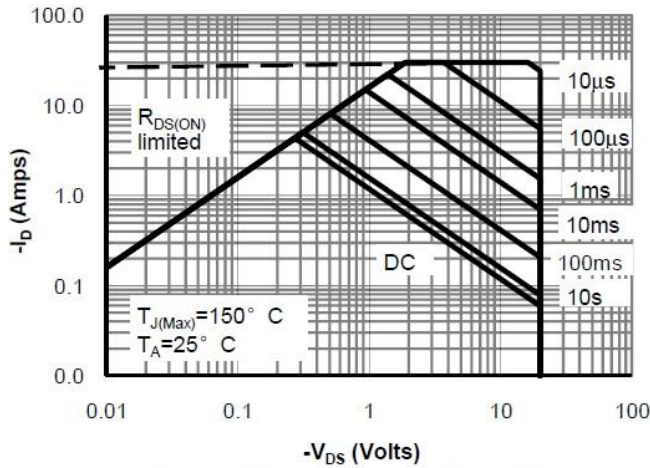


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

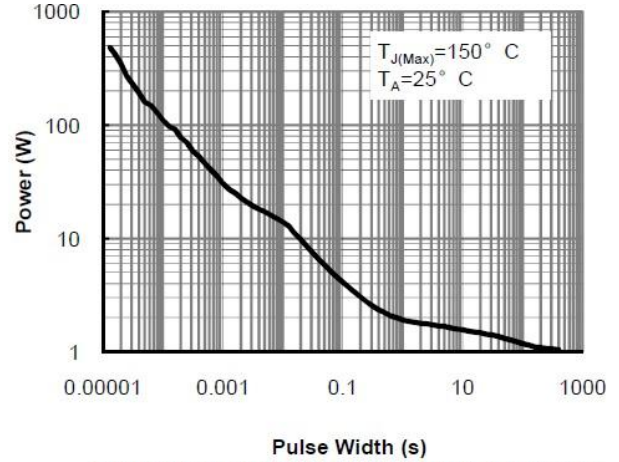


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

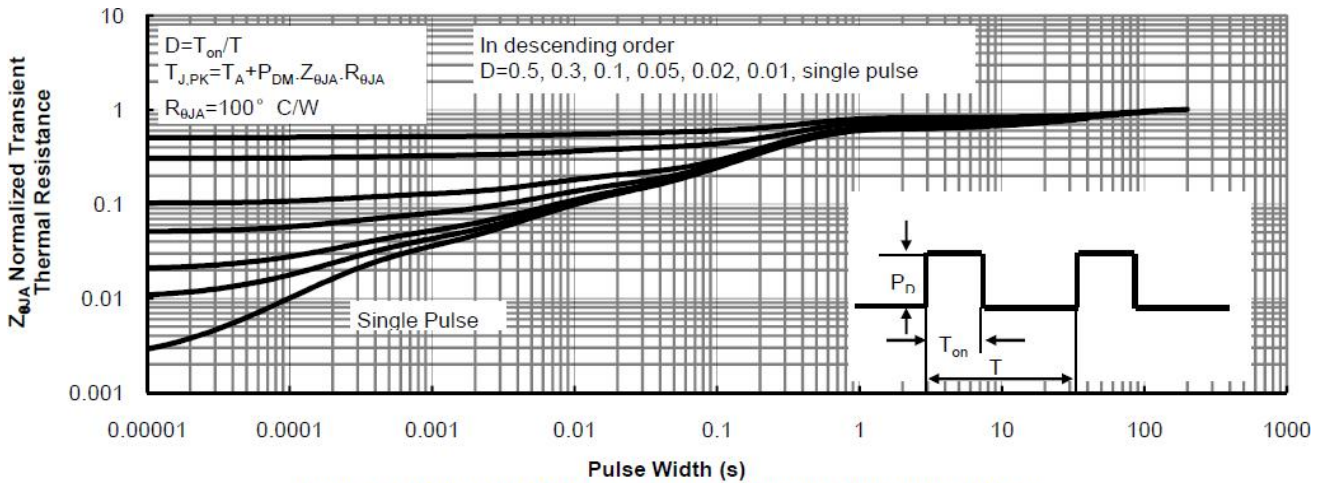
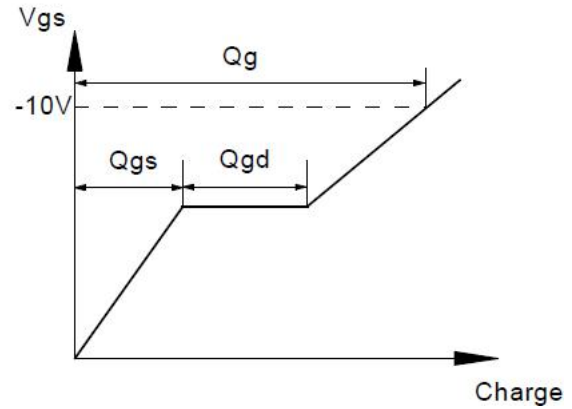
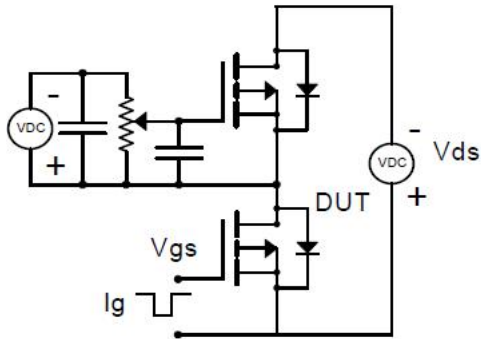
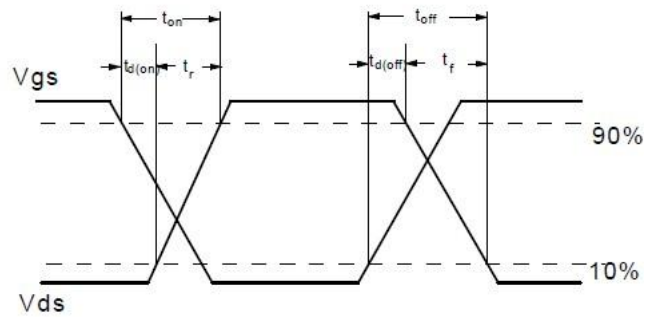
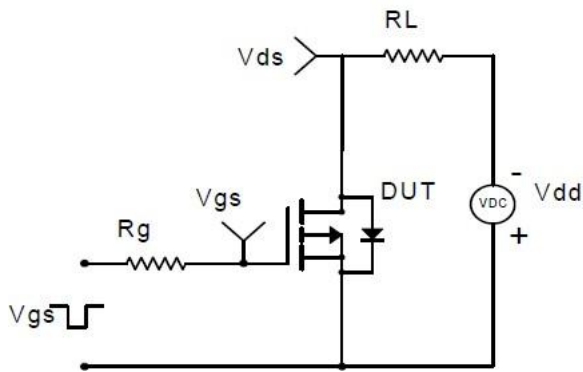


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

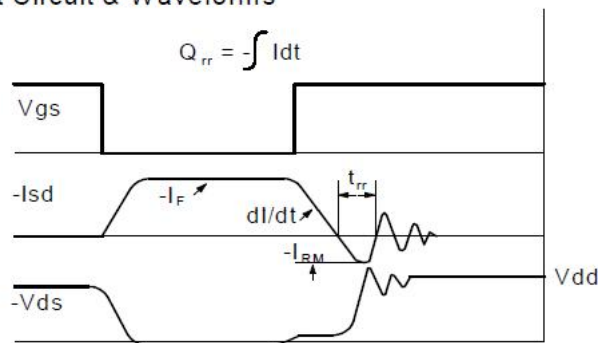
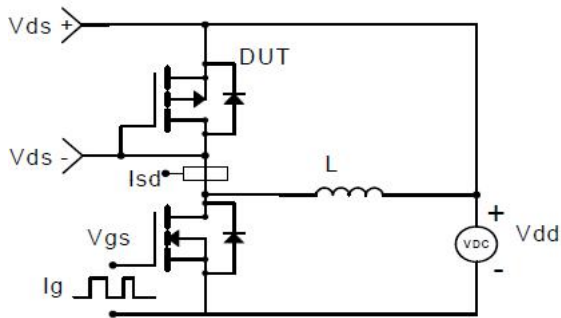
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

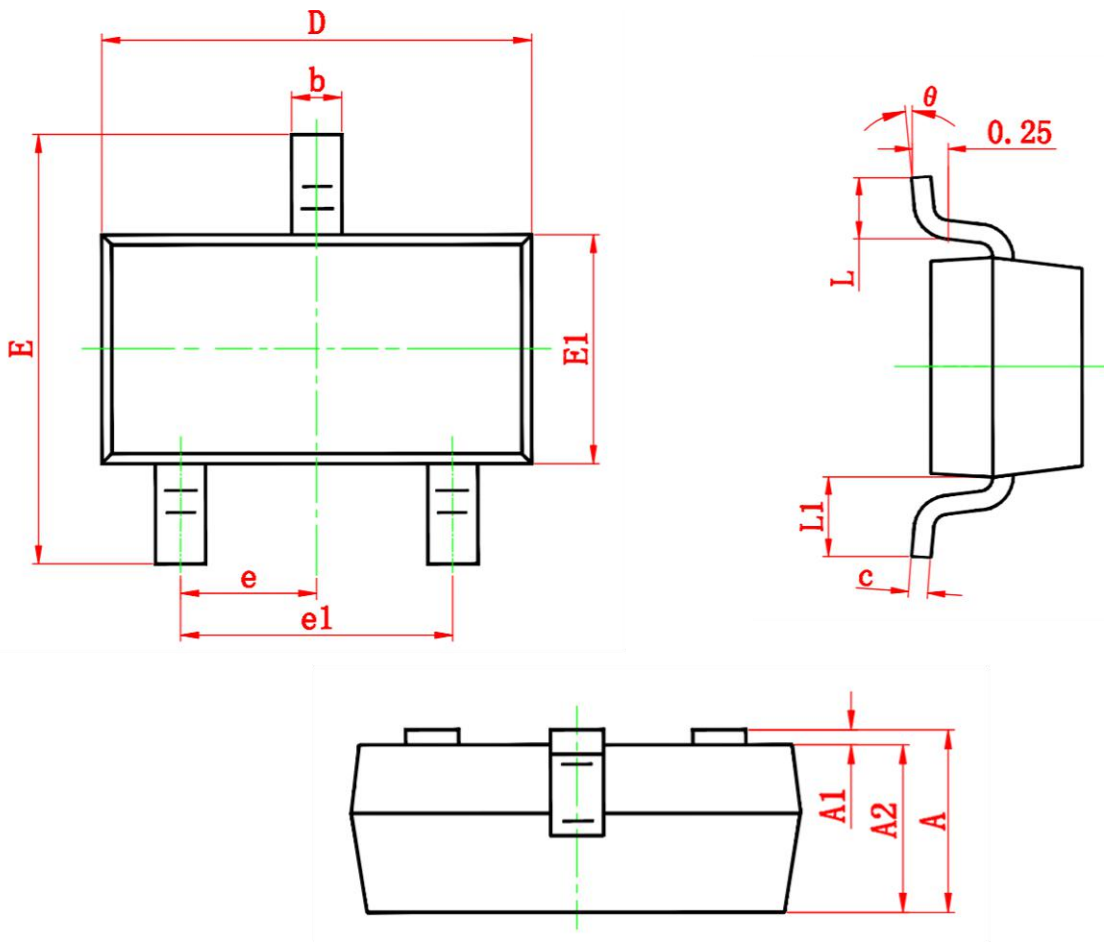


Diode Recovery Test Circuit & Waveforms



Package Information

- 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	2.250	2.550	0.089	0.100
E1	1.200	1.400	0.047	0.055
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.300	0.500	0.012	0.020
L1	0.550 REF.		0.022 REF.	
θ	0°	8°	0°	8°