

Features

- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

Product Summary

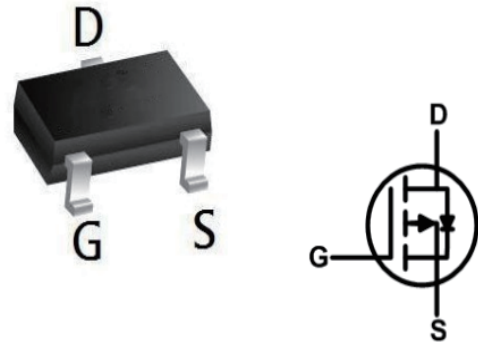
RoHS

BVDSS	RDSON	ID
-30V	48mΩ	-4A

Description

THE 3401 is the high cell density trenched P-ch MOSFETs, which provide excellent RDSON and efficiency for most of the small power switching and load switch applications. The 3401 meet the RoHS and Green Product requireme n t with full function reliability approved.

SOT23 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{DS}	Drain-to-Source Voltage	-30	V
V_{GS}	Gate-to-Source Voltage	±12	V
I_D	Continuous Drain Current	$T_A = 25^\circ\text{C}$	-4
		$T_A = 100^\circ\text{C}$	-3
I_{DM}	Pulsed Drain Current ⁽¹⁾	-16	A
P_D	Power Dissipation	$T_A = 25^\circ\text{C}$	1.2
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient ⁽²⁾	108	°C/W
T_J, T_{STG}	Junction & Storage Temperature Range	-55 to 150	°C

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_b = -250\mu\text{A}, V_{GS} = 0\text{V}$	-30	-	-	V
I_{BSS}	Zero Gate Voltage Drain Current	$V_{DS} = -30\text{V}, V_{GS} = 0\text{V}$	-	-	1	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS} = 0\text{V}, V_{GS} = \pm 12\text{V}$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_b = -250\mu\text{A}$	-0.6	-0.95	-1.3	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance ⁽³⁾	$V_{GS} = -10\text{V}, I_b = -4\text{A}$	-	48	62	$\text{m}\Omega$
		$V_{GS} = -4.5\text{V}, I_b = -3\text{A}$	-	56	73	$\text{m}\Omega$
		$V_{GS} = -2.5\text{V}, I_b = -3\text{A}$	-	75	98	$\text{m}\Omega$
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = -15\text{V}, f = 1\text{MHz}$	-	553	-	pF
C_{oss}	Output Capacitance		-	57	-	pF
C_{rss}	Reverse Transfer Capacitance		-	35	-	pF
Q_g	Total Gate Charge	$V_{GS} = 0 \text{ to } -4.5\text{V}, V_{DS} = -15\text{V}, I_b = -3\text{A}$	-	6.5	-	nC
Q_{gs}	Gate Source Charge		-	1.4	-	nC
Q_{gd}	Gate Drain ("Miller") Charge		-	1.7	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = -4.5\text{V}, V_{DD} = -15\text{V}, I_b = -3\text{A}, R_{GEN} = 3\Omega$	-	10	-	ns
t_r	Turn-On Rise Time		-	86	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	150	-	ns
t_f	Turn-Off Fall Time		-	357	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-4	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-16	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = -4\text{A}$	-	-	-1.2	V
t_{rr}	Body Diode Reverse Recovery Time	$I_F = -3\text{A}, di/dt = 80\text{A}/\mu\text{s}$	-	36	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	5	-	nC

Note :

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. $R_{\theta JA}$ is measured with the device mounted on a 1inch² pad of 2oz copper FR4 PCB
3. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 0.5\%$.

P-Channel Typical Performance Characteristics

Figure 1: Typical Output Characteristics

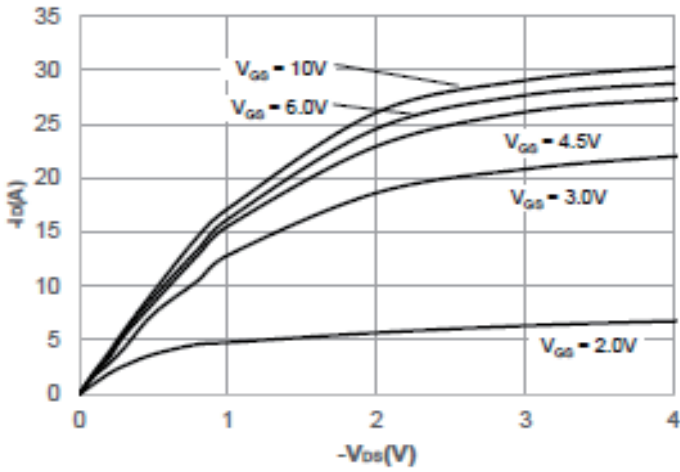


Figure 2: Transfer Characteristics

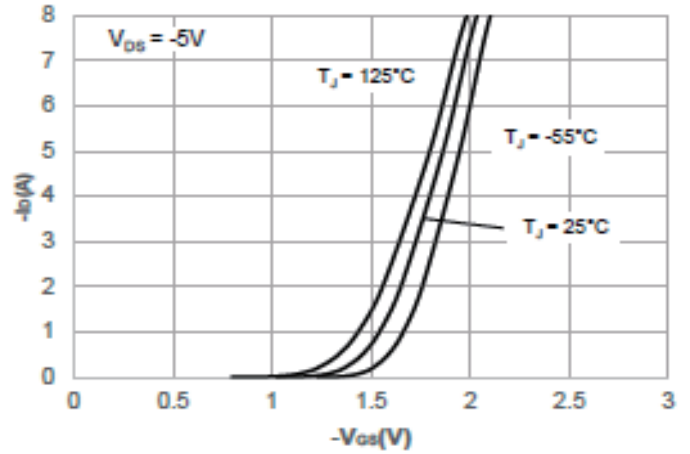


Figure 3: On-resistance vs. Drain Current

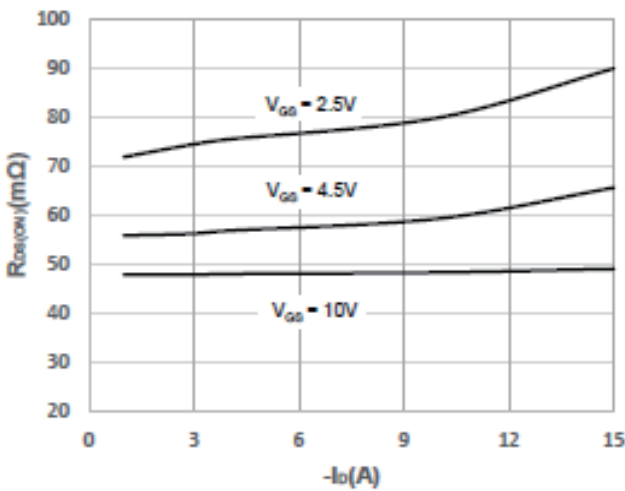


Figure 4: Body Diode Characteristics

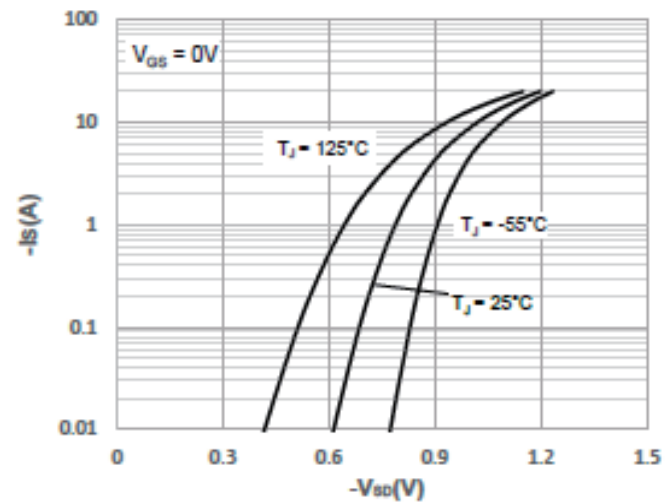


Figure 5: Gate Charge Characteristics

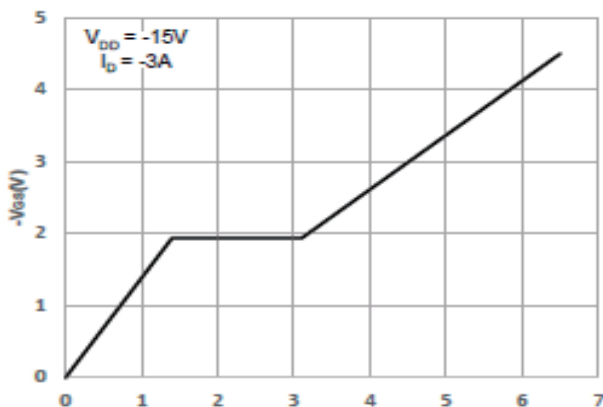
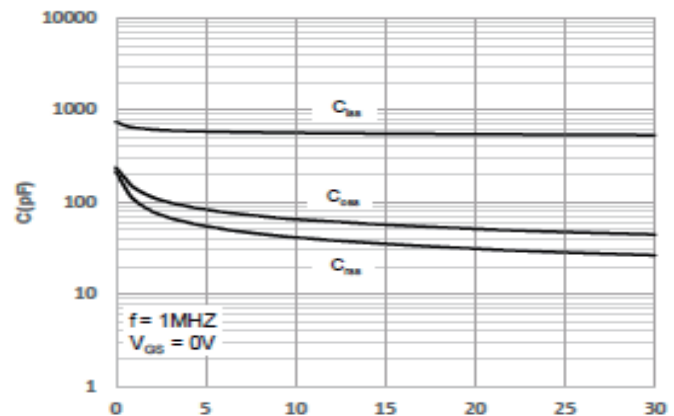


Figure 6: Capacitance Characteristics



P-Channel Typical Performance Characteristics

Figure7: Normalized Breakdown voltage vs. Junction Temperature

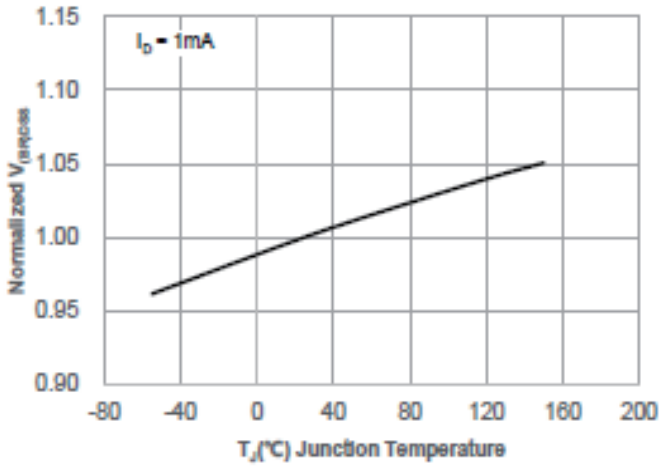


Figure 8: Normalized on Resistance vs. Junction Temperature

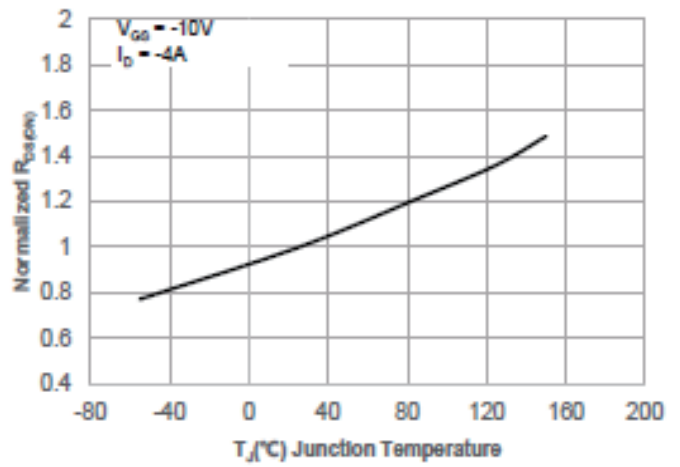


Figure9: Maximum Safe Operating Area

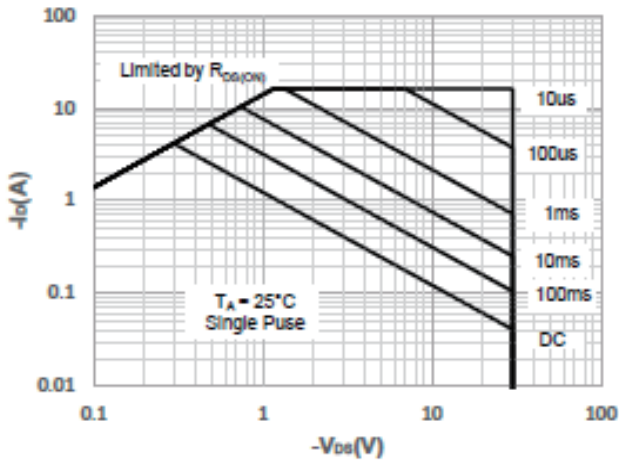


Figure10: Maximum Continuous Drain Current vs. Ambient Temperature

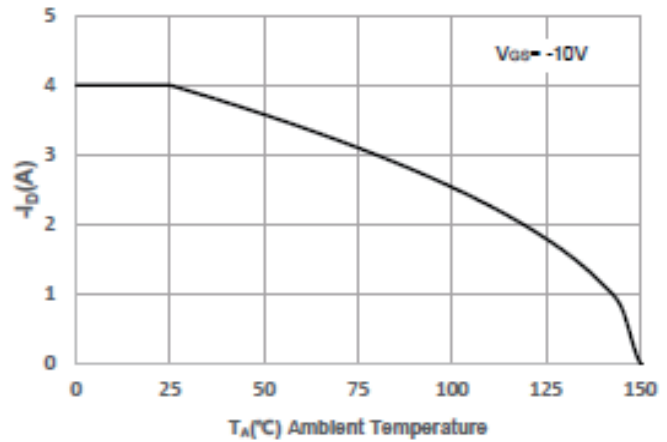


Figure11: Normalized Maximum Transient Thermal Impedance

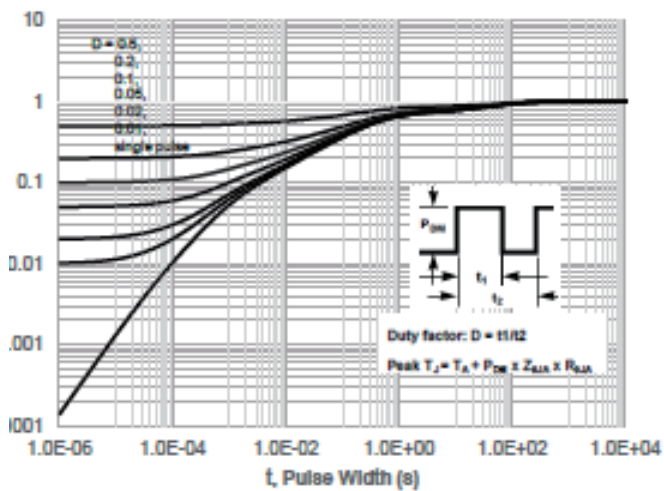
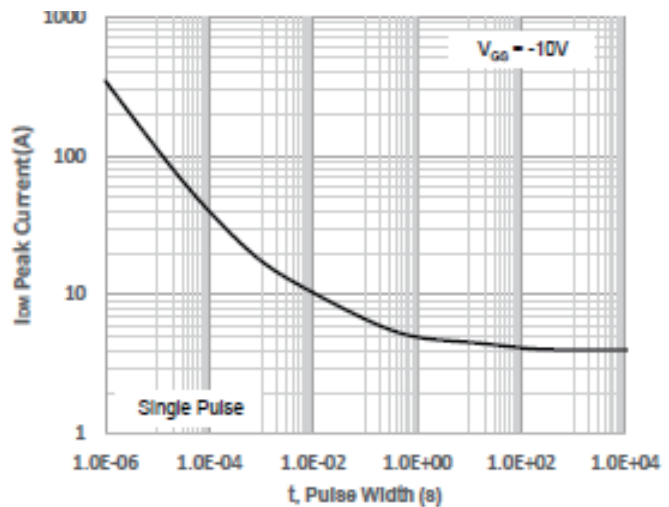


Figure 11: Peak Current Capacity



Test Circuit

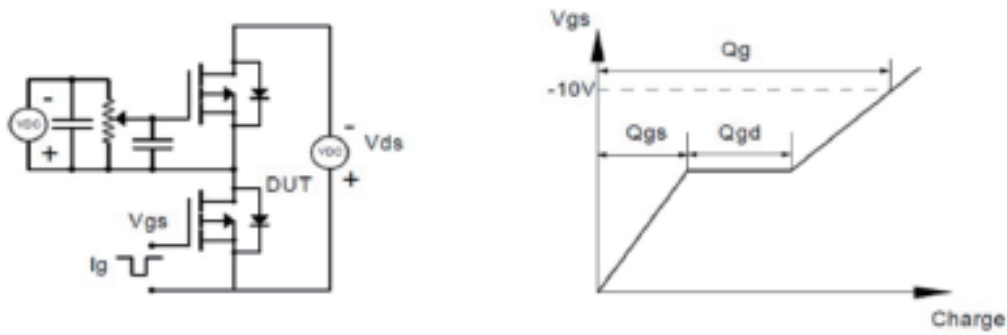


Figure 1: Gate Charge Test Circuit & Waveform

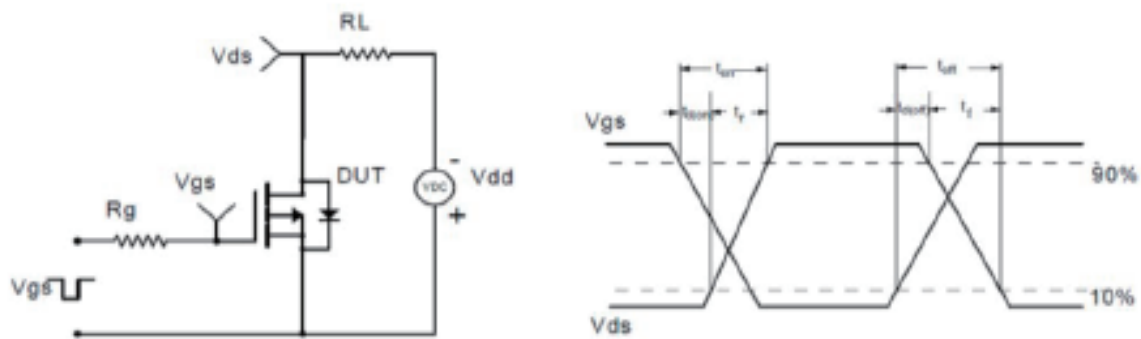


Figure 2: Resistive Switching Test Circuit & Waveform

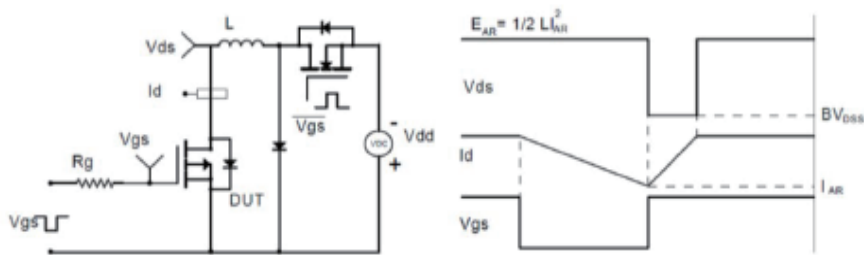


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

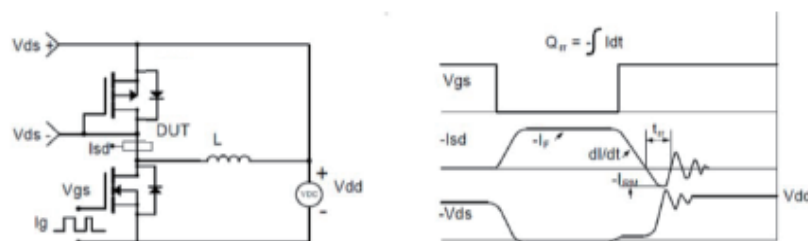
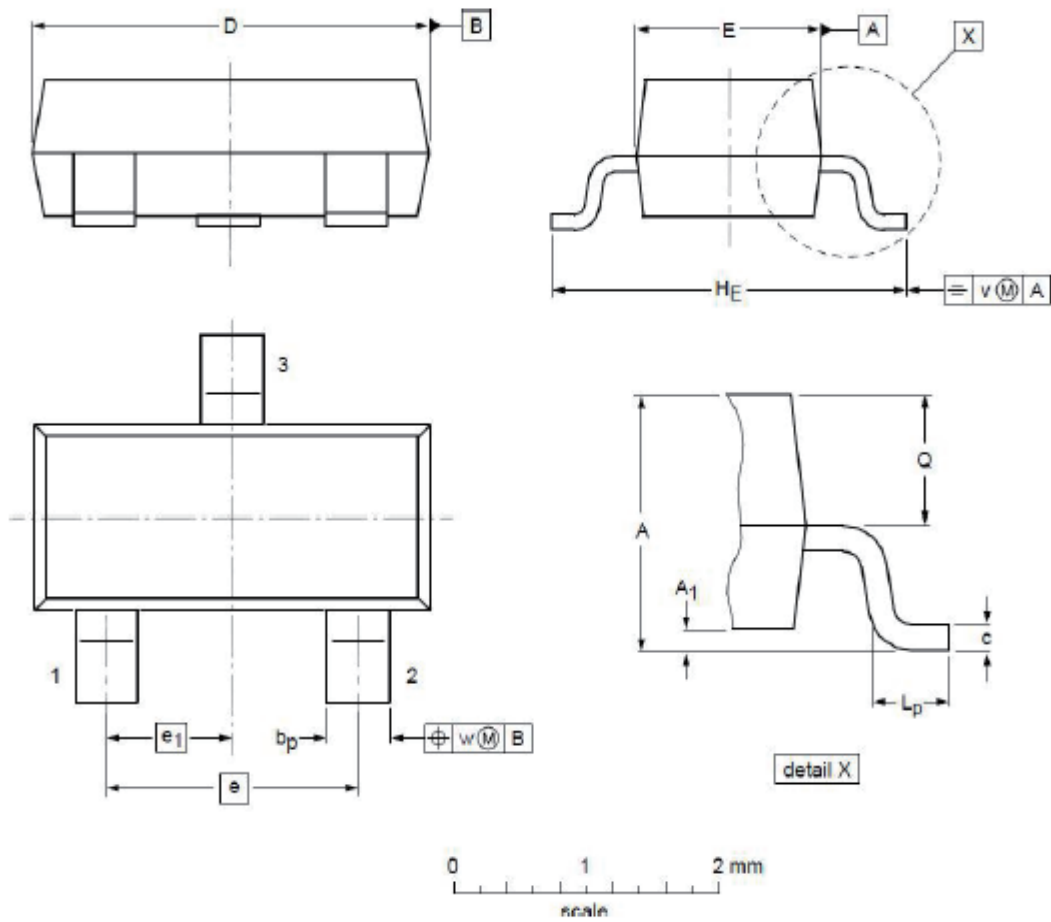


Figure 4: Diode Recovery Test Circuit & Waveform

PackageMechanicalData-SOT-23



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.90	1.01	1.15	A ₁	0.01	0.05	0.10
b _p	0.30	0.42	0.50	c	0.08	0.13	0.15
D	2.80	2.92	3.00	E	1.20	1.33	1.40
e	--	1.90	--	e ₁	--	0.95	--
H _E	2.25	2.40	2.55	L _p	0.30	0.42	0.50
Q	0.45	0.49	0.55	v	--	0.20	--
w	--	0.10	--				