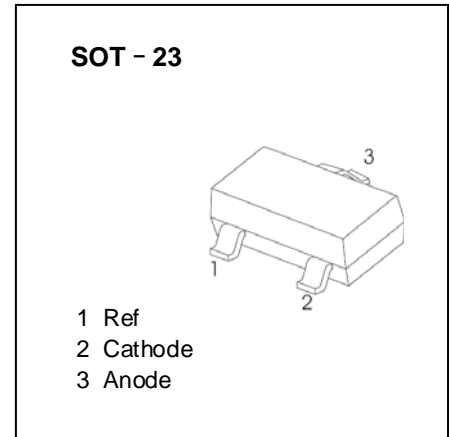


**DESCRIPTION**

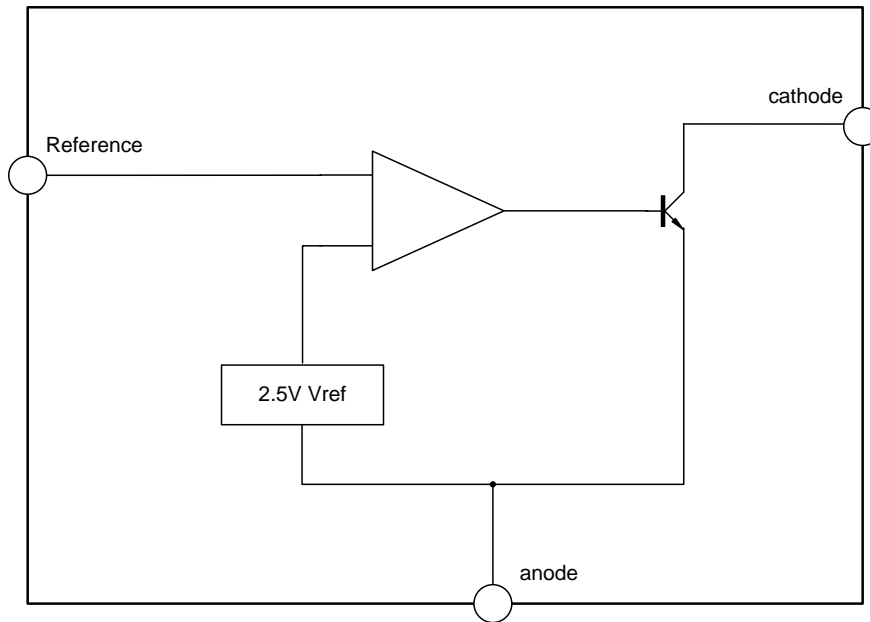
UMW TL432 is an adjustable three-terminal shunt regulator with excellent thermal stability over operating temperature range. The output voltage can be set to any value between Vref (approximately 2.5V) and 36V through external resistors. It provides a very sensitive turn-on characteristic, which makes it possible to replace Zener diodes in many applications.

**FEATURES**

- ◆ Adjustable output voltage: up to 36V
- ◆ Low dynamic output impedance: 0.3
- ◆ Sink current capability: 1.0~100mA
- ◆ Equivalent full-scale temperature coefficient: typ. 50ppm/C
- ◆ Temperature compensation in the rated operating temperature range
- ◆ Low output noise
- ◆ Fast start-up response



**BLOCK DIAGRAM**



**ABSOLUTE MAXIMUM RATINGS**

Characteristics	Symbol	Rating		Unit
Cathode voltage	$V_{KA}$	37		V
Cathode current (continuous)	$I_{KA}$	-100~+150		mA
Reference input current range	$I_{ref}$	0.05~+10		mA
Power dissipation	$P_D$	SOT-23	290	mW
Storage temperature range	$T_{stg}$	-65~+150		°C

**RECOMMENDED OPERATING CONDITION**

Characteristics	Symbol	Min.	Typ.	Max.	Unit
Cathode voltage	$V_{KA}$	$V_{REF}$	--	36	V
Cathode current	$I_{KA}$	1.0	--	100	mA
Operating temperature range	$T_{opr}$	-40	--	125	°C

**ELECTRICAL CHARACTERISTICS (UNLESS OTHERWISE SPECIFIED, T<sub>a</sub> -25°C)**

Characteristics		Symbol	Test conditions	Min.	Typ.	Max.	Unit	
Reference voltage	TL432BIDBZR	V <sub>ref</sub>	V <sub>KA</sub> =V <sub>REF</sub> , I <sub>KA</sub> =10mA	2.488	2.50	2.512	V	
	TL432AIDBZR			2.475	2.50	2.525		
Deviation of reference input voltage over full temperature range (note 1)		ΔV <sub>ref</sub>	V <sub>KA</sub> =V <sub>REF</sub> , I <sub>KA</sub> =10mA T <sub>MIN</sub> ≤T <sub>A</sub> ≤T <sub>MAX</sub>	--	14	34	mV	
Ratio of change in reference voltage to the change in cathode voltage		ΔV <sub>ref</sub> /ΔV <sub>KA</sub>	I <sub>KA</sub> =10mA	ΔV <sub>KA</sub> =10V~V <sub>REF</sub>	--	-1.0	-2.7	mV/V
				ΔV <sub>KA</sub> =36V~10V	--	-0.5	-2.0	
Reference input current		I <sub>ref</sub>	I <sub>KA</sub> =10mA, R1=10kΩ, R2=∞	--	1.5	4	μA	
Deviation of reference input current over full temperature range		ΔI <sub>ref</sub>	I <sub>KA</sub> =10mA, R1=10kΩ, R2=∞, T <sub>A</sub> =full Temperature	--	0.4	1.2	μA	
Min. cathode current for regulation		I <sub>KA(min)</sub>	V <sub>KA</sub> =V <sub>REF</sub>	--	0.45	1.0	mA	
Off-state cathode current		I <sub>KA(OFF)</sub>	V <sub>KA</sub> =36V, V <sub>REF</sub> =0	--	0.05	1.0	μA	
Dynamic impedance		Z <sub>KA</sub>	V <sub>KA</sub> =V <sub>REF</sub> , I <sub>KA</sub> =1 to 100mA, f≤1.0kHz	--	0.3	0.5	Ω	

**Note 1:** T<sub>MIN</sub>=-40°C, T<sub>MAX</sub>=+125°C.

**TYPICAL ELECTRICAL CHARACTERISTICS**

Figure 1. Cathode Current vs. Cathode Voltage

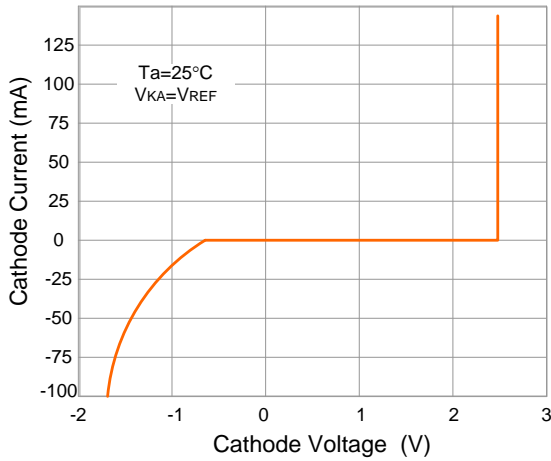


Figure 2. Cathode Current vs. Cathode Voltage

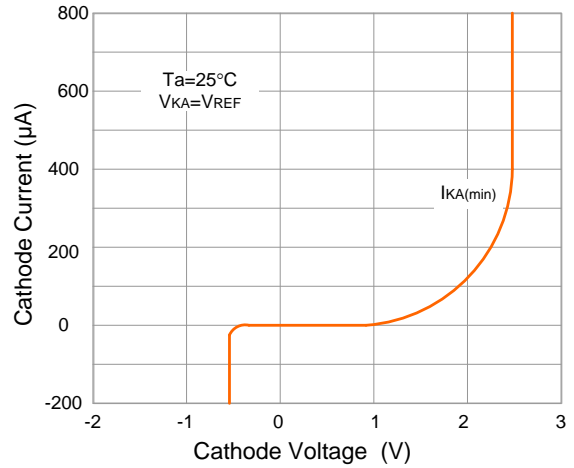


Figure 3. Reference Input Voltage Change vs. Cathode Voltage

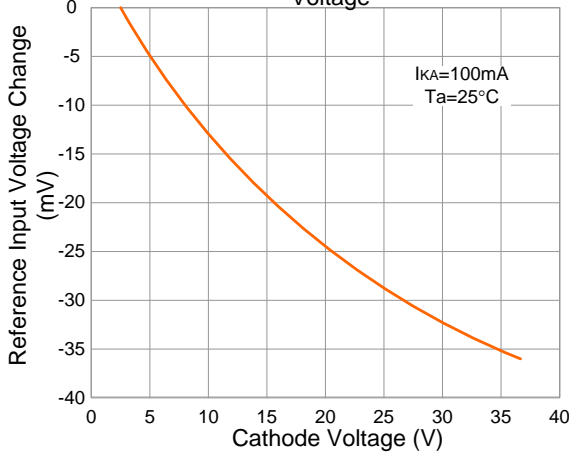


Figure 4. Pulse Response

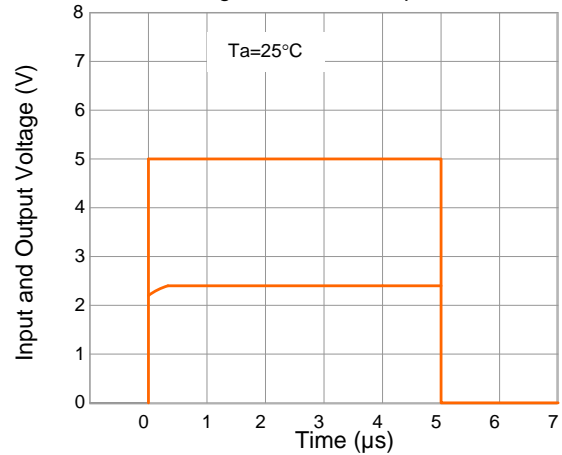


Figure 5. Dynamic Impedance vs. Frequency

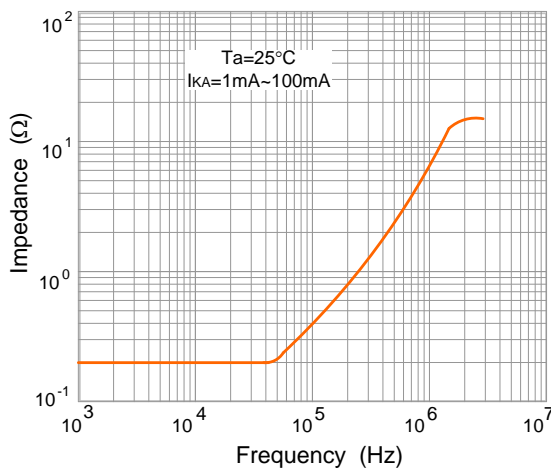
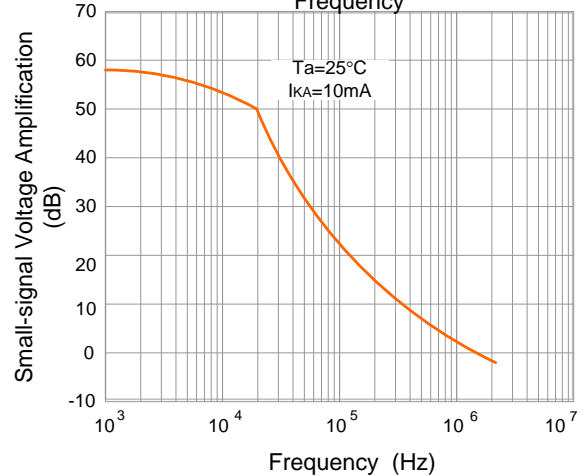
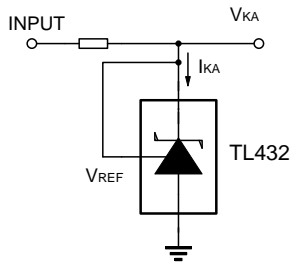


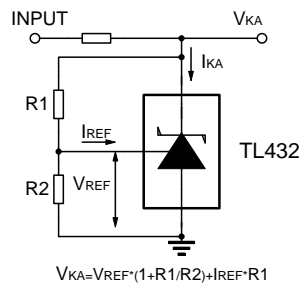
Figure 6. Small-signal Voltage Amplification vs. Frequency



**TEST CIRCUITS**

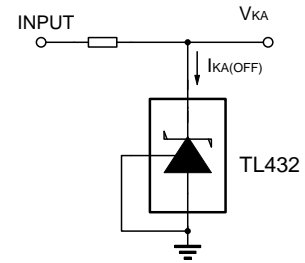


Test Circuit for  $V_{KA} = V_{REF}$



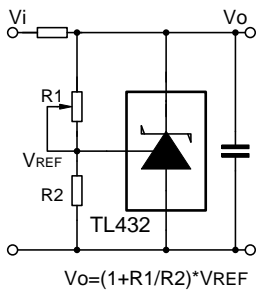
Test Circuit for  $V_{KA} \geq V_{REF}$

$$V_{KA} = V_{REF} \cdot (1 + R1/R2) + I_{REF} \cdot R1$$



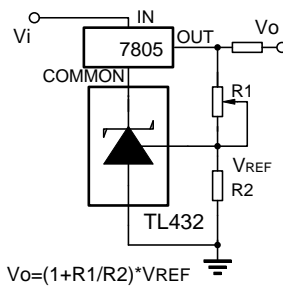
Test Circuit for  $I_{KA(OFF)}$

**TYPICAL APPLICATION CIRCUIT**



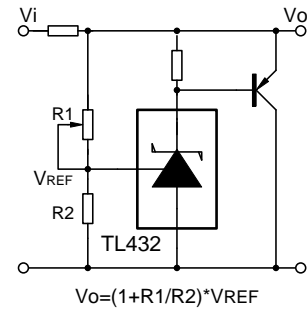
Shunt Regulator

$$V_o = (1 + R1/R2) \cdot V_{REF}$$



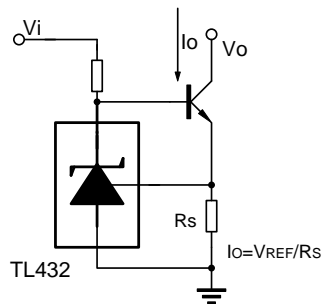
Three-terminal Fixed Regulator Output Control

$$V_o = (1 + R1/R2) \cdot V_{REF}$$



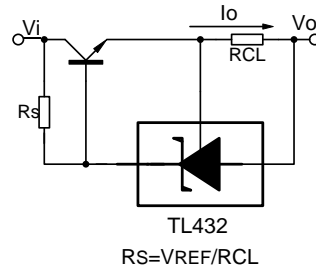
High-current Shunt Regulator

$$V_o = (1 + R1/R2) \cdot V_{REF}$$



Constant Current Source

$$I_o = V_{REF} / R_s$$

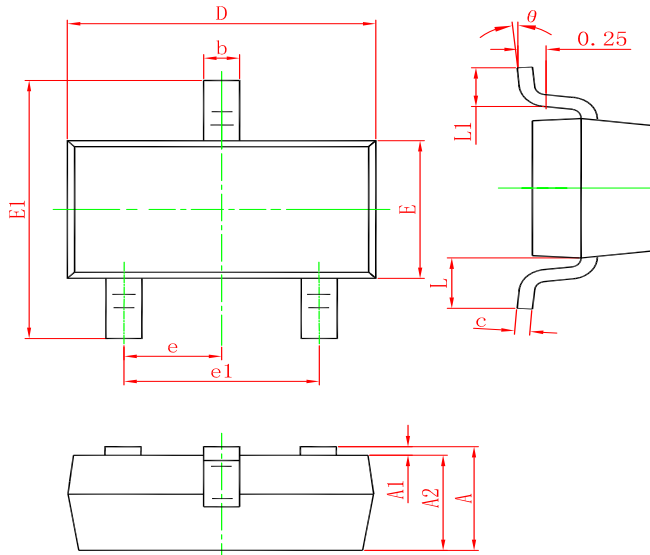


Current Limiter or Current Source

$$R_s = V_{REF} / R_{CL}$$

PACKAGE OUTLINE

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°

Ordering information

Order code	Package	Baseqty	Deliverymode	Accuracy	Marking
UMW TL432AIDBZR	SOT-23	3000	Tape and reel	1%	T4A3 UMW
UMW TL432BIDBZR	SOT-23	3000	Tape and reel	0.5%	T4FG UMW