ELM0431BA 2.5V Programable shunt regulator

■General description

ELM0431BA is three-terminal adjustable shunt regulator utilizing an accurate 2.5V band-gap reference. The output voltage can be set to any value between 2.5V (Vref) to 29V with two external resistors as shown in the typical application circuit. The device exhibit a wide operating current range of 0.4 to 100 mA with a typical dynamic impedance of 0.25Ω. The characteristics of these reference make it excellent replacements for zener diodes in many applications such as digital voltmeters, power supplies, and op amp circuitry. The 2.5V volt reference makes it convenient to obtain a stable reference from 5.0V logic supplies.

ELM0431BA shunt regulator is available in a SOT-23 package.

■Features

- Low cost solution
- Shunt capacity   : 100mA
- Output voltage range(adj.)   : Set up to 29V
- Output impedance   : Typ.0.25Ω
- Trimmed band-gap design   : 1%
- Package   : SOT-23(ELM0431BA)

■Application

- Linear regulator
- Precision voltage reference
- Switching power supplies
- Battery operating equipment
- Instrumentation

■Maximum absolute ratings

Parameter	Symbol	Limit	Unit
Cathode-Anode reverse breakdown voltage	Vka	30	V
Cathode –Anode current	Ika	100	mA
Reference input current	Iref	10	mA
Power dissipation (Ta=25°C)	Pd	200 [*1] / 500 [*2]	mW
Junction temperature	Tj	150	°C
Operationg temperature (Tj <150°C)	Top	-40 to +125	°C
Storage temperature	Tstg	-65 to +150	°C

* 1. No mounted, IC alone.

* 2. When mounted on glass epoxy 2-layers PCB (EIJ/JEDEC standard size: 76.2 mm×114.3 mm×1.6 mm), Cu thickness 35 μm, copper foil area ratio 20% on the front side, back side 100% .

■Selection guide

ELM0431BA-S

Symbol		
a	Package	B: SOT-23(ELM0431BA)
b	Product version	A
c	Taping direction	S: Refer to PKG file

＊Taping direction is one way.

ELM0431 B A - S
↑ ↑ ↑
a b c

ELM0431BA 2.5V Programable shunt regulator

■Pin configuration

(TOP VIEW)
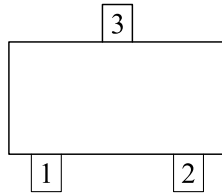
Pin No.	Pin name
1	REFERENCE
2	CATHODE
3	ANODE

■Circuit

Cathode(K)

Reference(R)

Anode(A)

■Typical application

R

Vin(batt)   Vout

R1
0.1%

Vref   ELM0431BA

R2
0.1%

$Vout=(1+R1/R2)Vref$

Return

Shunt regulator

■Block diagram

Reference
(R)

Cathode
(K)

2.5 Vref

Anode
(A)
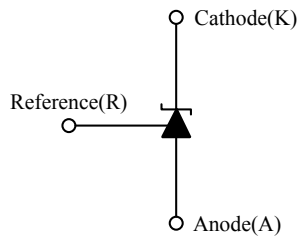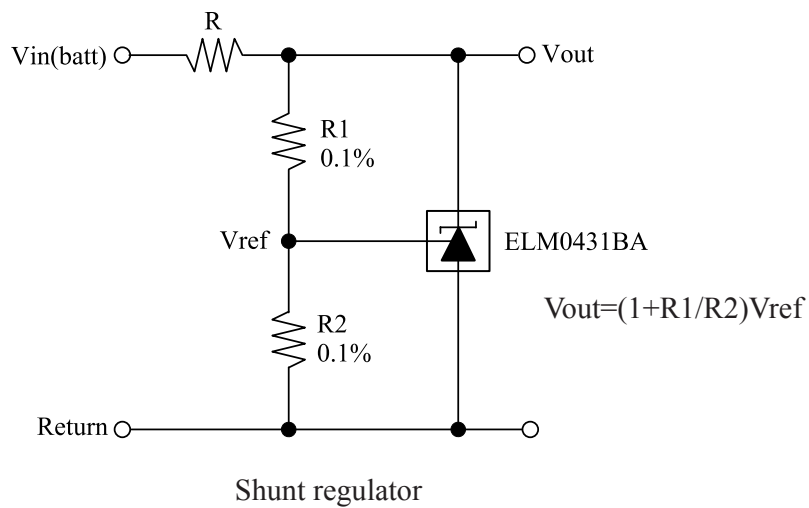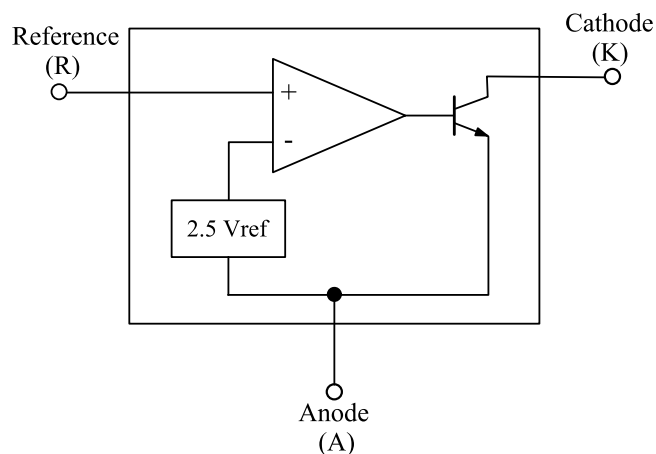
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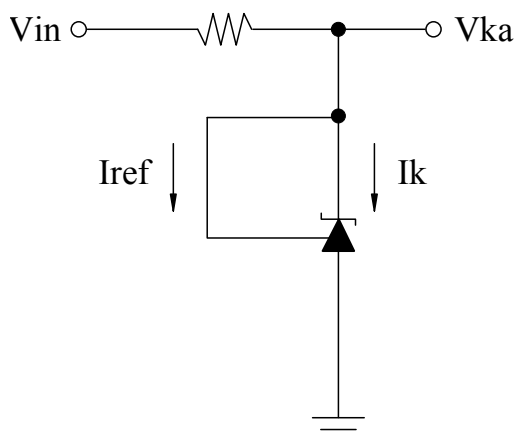## ■Electrical characteristics

Vka=Vref, Ik=10mA, Top=25°C, unless otherwise stated

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Reference voltage	Vref		2.470	2.495	2.520	V	1
Reference voltage with temperature	ΔVref/ ΔTop			0.07	0.20	mV/°C	1
Ration of change in Vref to cathode voltage	Vref/ Vin	Vref to 10V	-2.7	-1.0		mV/V	2
		10V to 30V	-2.0	-0.4	0.3		
Reference input current	Iref			0.7	4.0	μA	2
Iref temperature deviation	ΔIref	Ta=-20 to 85°C		0.4	1.2	μA	2
Min. Ik for regulation	Ik(min)			0.4	1.0	mA	1
Stand-by current	Istandby	Vref=0V, Vka=30V		0.1	1.0	μA	3
Dynamic output impedance	Zout	f≤1kHz, Ik=1 to 100mA		0.25	0.50	Ω	1

Note : test circuit No.
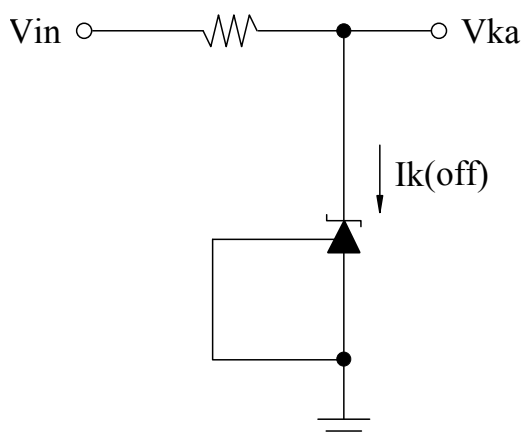
■Test circuits
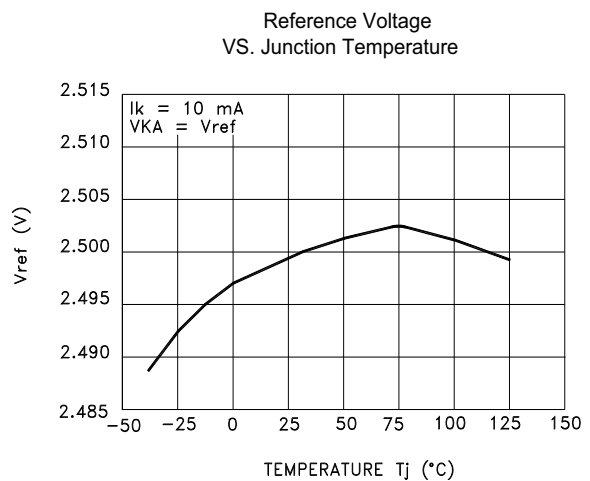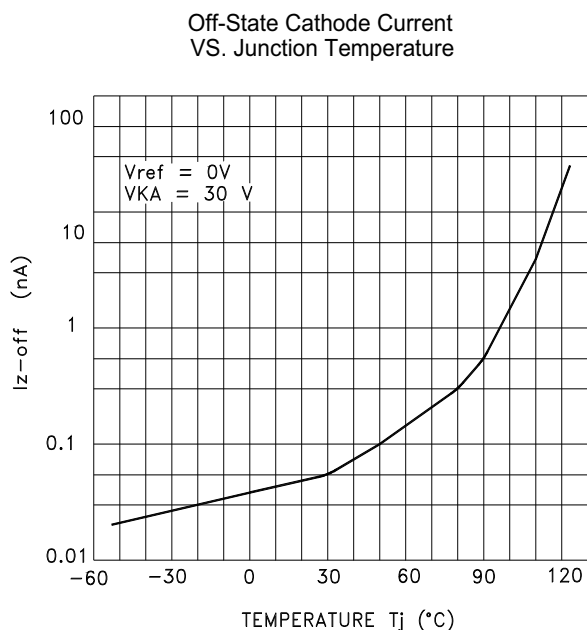

Test circuit 1 : Vka=Vref
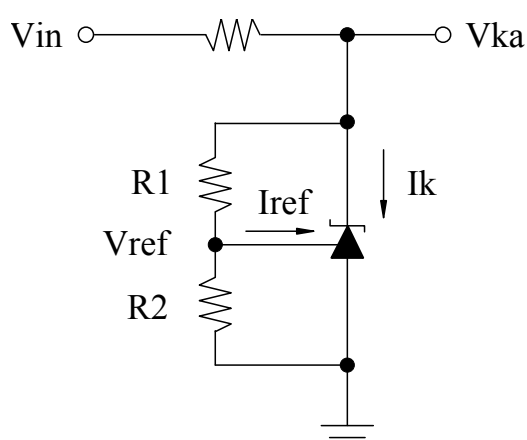
Test circuit 2 : Vka>Vref
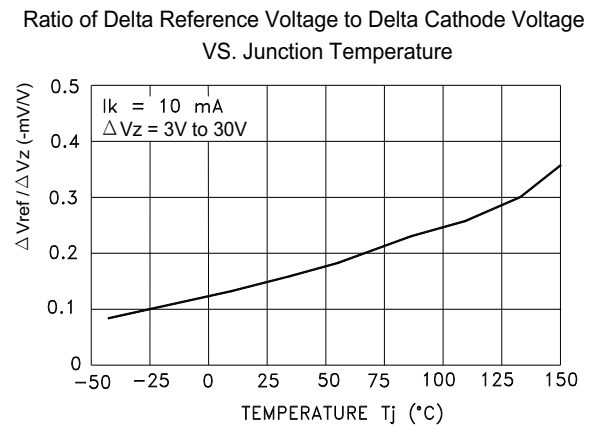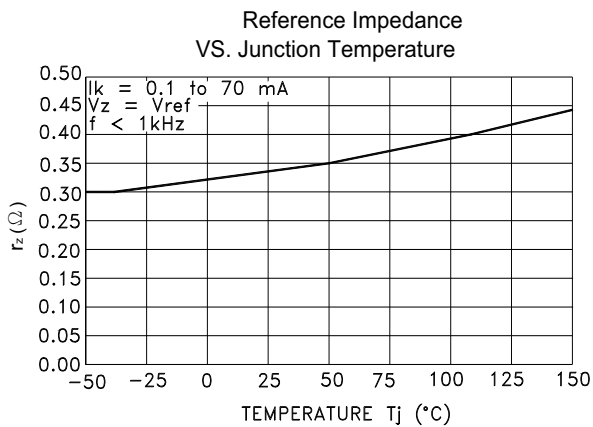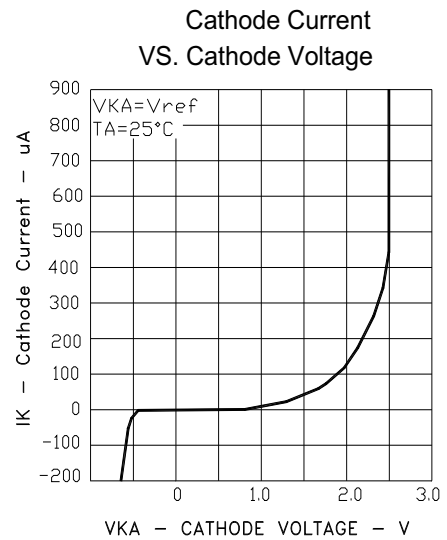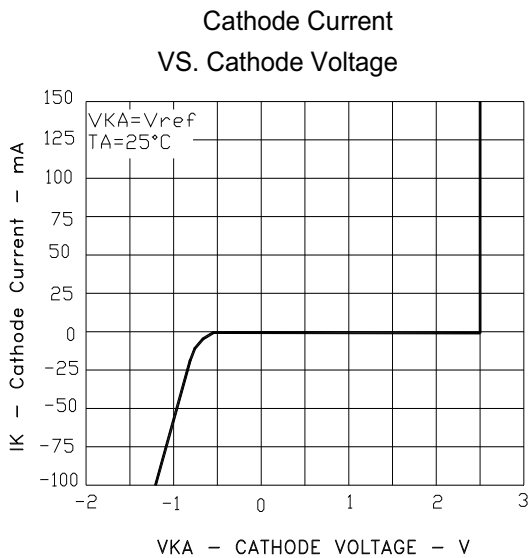

Test circuit 3 : Off state current

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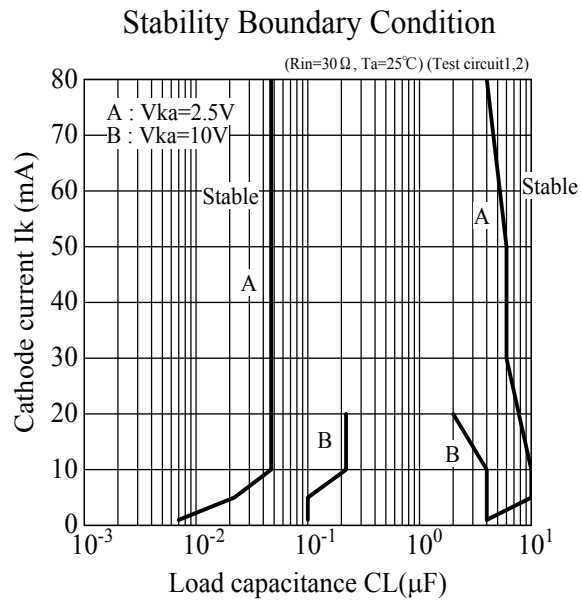
■Typical characteristics

Cathode Current VS. Cathode Voltage

VKA=Vref
TA=25°C

IK — Cathode Current — mA

VKA — CATHODE VOLTAGE — V

Cathode Current VS. Cathode Voltage

VKA=Vref
TA=25°C

IK — Cathode Current — uA

VKA — CATHODE VOLTAGE — V

Reference Impedance VS. Junction Temperature

Ik = 0.1 to 70 mA
Vz = Vref
f < 1kHz

r_z (Ω)

TEMPERATURE Tj (°C)

Ratio of Delta Reference Voltage to Delta Cathode Voltage VS. Junction Temperature

Ik = 10 mA
ΔVz = 3V to 30V

ΔVref / ΔVz (-mV/V)

TEMPERATURE Tj (°C)

Off-State Cathode Current VS. Junction Temperature

Vref = 0V
VKA = 30 V

Iz-off (nA)

TEMPERATURE Tj (°C)

Reference Voltage VS. Junction Temperature

Ik = 10 mA
VKA = Vref

Vref (V)

TEMPERATURE Tj (°C)

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Stability Boundary Condition

(Rin=30Ω, Ta=25℃) (Test circuit1,2)

A : Vka=2.5V
B : Vka=10V

Cathode current Ik (mA)

Load capacitance CL(μF)

Stable

Stable

A

A

B

B

■Marking

a b c d e

a to e : Assembly lot No. ——
        A to Z (I, O, X excepted) and 0 to 9

ELM TECHNOLOGY