



ZHEJIANG UNIU-NE Technology CO., LTD

浙江宇力微新能源科技有限公司



TL431H Data Sheet

V 1.1

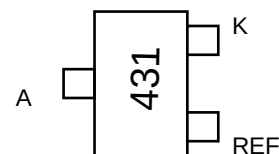
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FEATURES

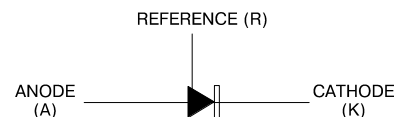
- On-wafer Vref trimming $\pm 0.3\%$
- 95% chips after packaging have Vref accuracy $\pm 0.5\%$
- Low Dynamic output impedance 0.1Ω (Typ)
- Adjustable output voltage
- Fast turn-on response
- Sink current capability of 0.1mA to 100mA
- Low output noise
- Industrial temperature range
- Improved temperature compensation
- Excellent temperature coefficient 25ppm/°C
- Electrostatic discharge voltage 1.6kV

DESCRIPTION

The TL431H are three-terminal adjustable shunt regulators with a specified thermal stability. The output voltage may be set to any value between V_{ref} (approx. 2.5V) and 36V with two external resistors. The active output circuitry provides a very sharp turn-on characteristic making these devices an excellent replacement for zener diodes in many applications.

PIN CONFIGURATION
(Top View)
SOT-23

SYMBOL



Top Marking: 431

ABSOLUTE MAXIMUM RATINGS

(Over operating free-air temperature range, unless otherwise noted)

PARAMETER	VALUE	UNITS
Cathode voltage (Note 1)	40	V
Continuous cathode current range	-100 to 150	mA
REF (Reference) input current range	-50 μ A to 10mA	
Operating free-air temperature range	-40 to 125	°C
Lead temperature (1.6mm aside from the case, 10 seconds)	260	
ESD (HBM)	2.5	kV

Note 1: The voltage values are with respect to the anode terminal unless otherwise noted.

RECOMMENDED OPERATING CONDITIONS

PARAMETER	MIN	MAX	UNIT
Cathode voltage, V_{KA}	V_{ref}	36	V
Cathode current, I_K (for regulation)	0.3	100	mA

ELECTRICAL CHARACTERISTICS

(At 25°C free-air temperature, unless otherwise noted)

PARAMETER	SYMBOL	TEST CIRCUIT	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Reference voltage accuracy at wafer testing	dVref	1	Wafer testing $V_{KA} = V_{ref}$	-0.5%	0%	0.5%	%
Packaged dice with Vref accuracy $\pm 0.5\%$			$V_{KA} = V_{ref}$		95%		%
REF input voltage	V_{ref}	1	$V_{KA} = V_{ref}$, $I_K = 10\text{mA}$	2475	2500	2525	mV
Deviation of the REF input voltage over full temperature range	$V_{ref(dev)}$	1	$V_{KA} = V_{ref}$, $I_K = 10\text{mA}$, $T_A = 0$ to 125°C		8	17	
REF input voltage-to-cathode voltage change ratio	$\Delta V_{ref}/\Delta V_{KA}$	2	$I_K = 10\text{mA}$, $\Delta V_{KA} = 10\text{V}$ to V_{ref}	-2.7	-1.0		mV/V
			$\Delta V_{KA} = 36\text{V}$ to 10V	-2	-0.4		
REF input current	I_{ref}	2	$I_K = 10\text{mA}$, $R_1 = 10\text{k}\Omega$, $R_2 = \infty$		0.5	1.2	μA
Deviation of the REF input current over full temperature range	$I_{ref(dev)}$	2	$I_K = 10\text{mA}$, $R_1 = 10\text{k}\Omega$, $R_2 = \infty$, $T_A = \text{full range}$		0.4	1.2	
Minimum cathode current for regulation	I_{min}	1	$V_{KA} = V_{ref}$		0.08	0.5	mA
Off-state cathode current	I_{off}	3	$V_{KA} = 36\text{V}$, $V_{ref} = 0$		0.01	0.9	μA
Dynamic impedance	$ Z_{KA} $	1	$V_{KA} = V_{ref}$, $I_K = 0.2\text{mA}$ to 100mA , $f \leq 1\text{kHz}$		0.1	0.5	Ω

PARAMETER MEASUREMENT INFORMATION

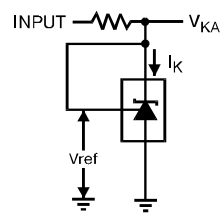


FIGURE 1. TEST CIRCUIT FOR $V_{KA} = V_{ref}$

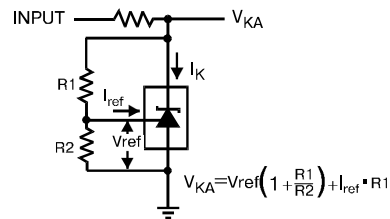


FIGURE 2. TEST CIRCUIT FOR $V_{KA} > V_{ref}$

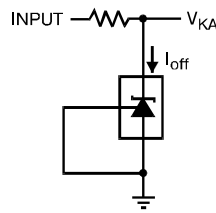


FIGURE 3. TEST CIRCUIT FOR I_{off}

TYPICAL CHARACTERISTICS

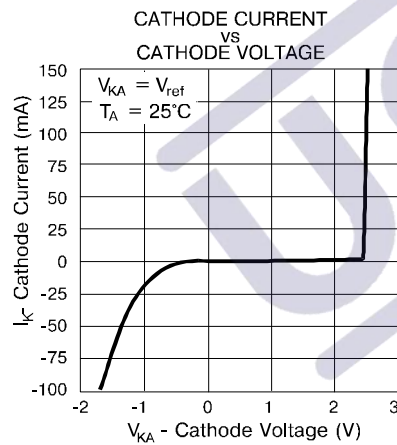


FIGURE 1

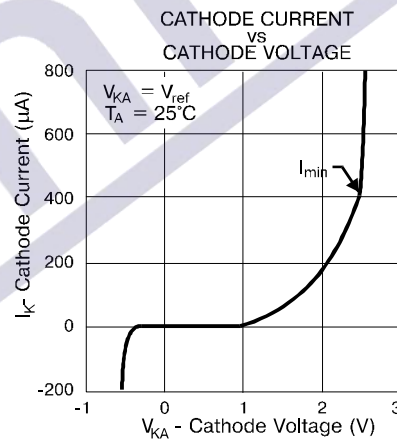


FIGURE 2

TYPICAL APPLICATIONS

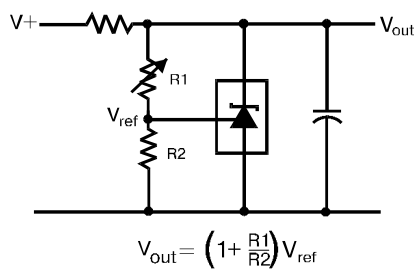


FIGURE 1. SHUNT REGULATOR

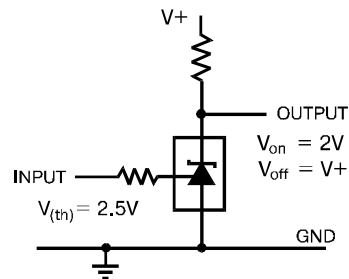
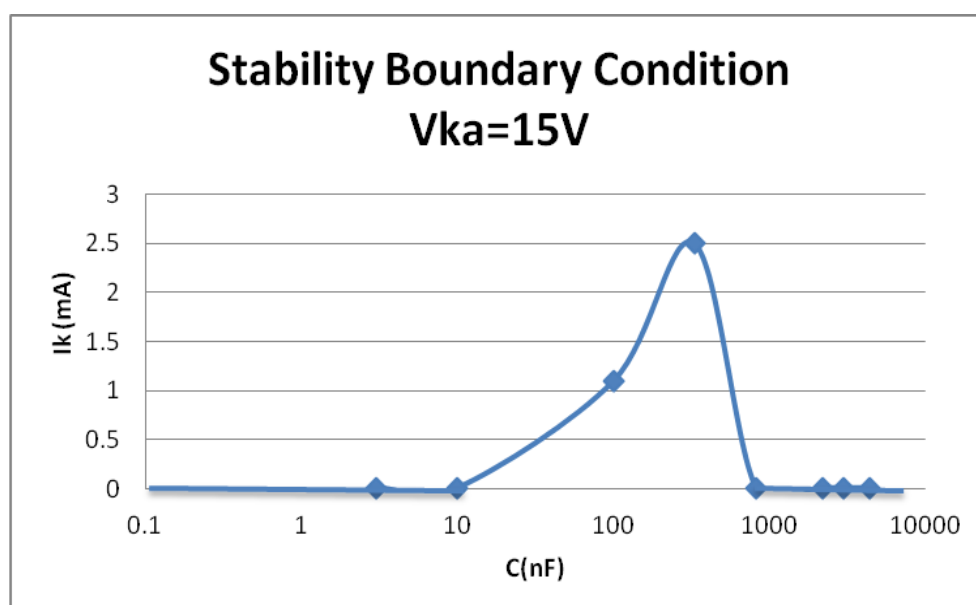
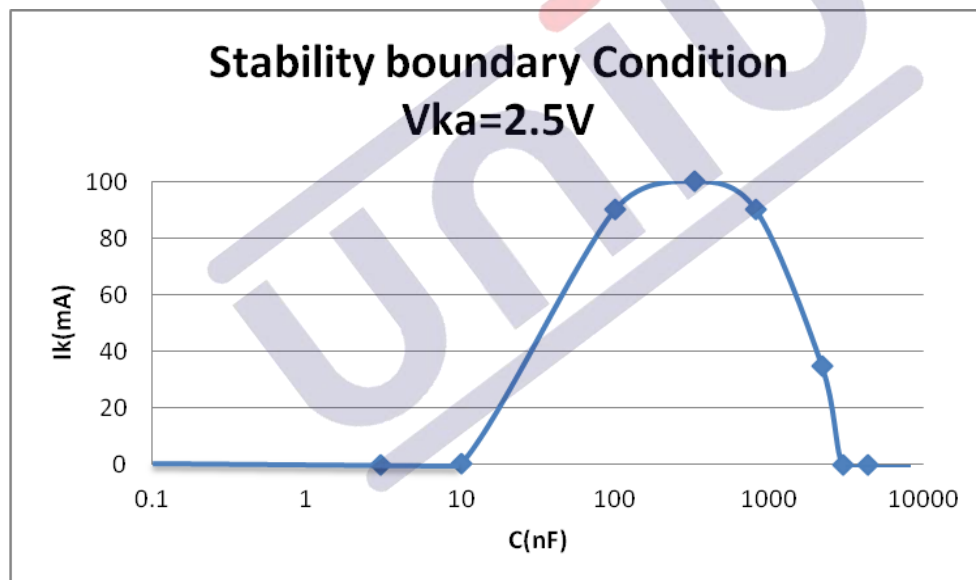
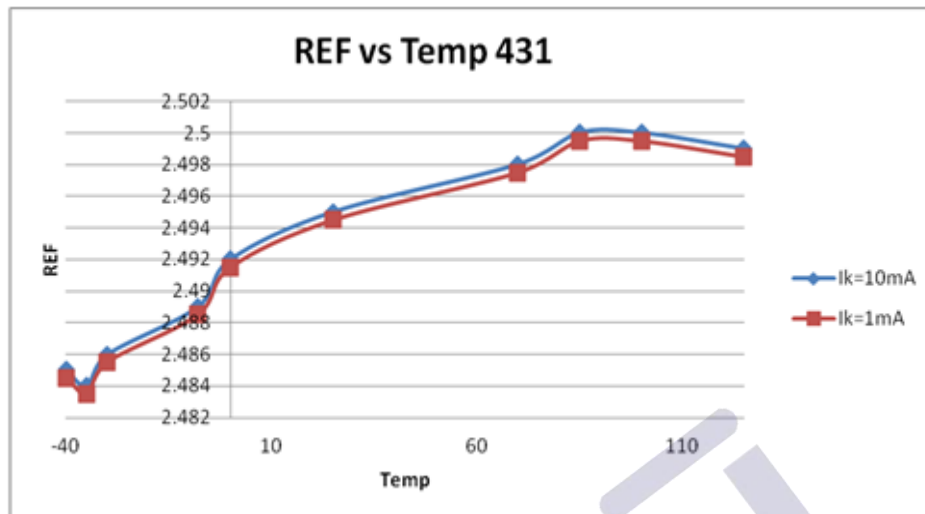
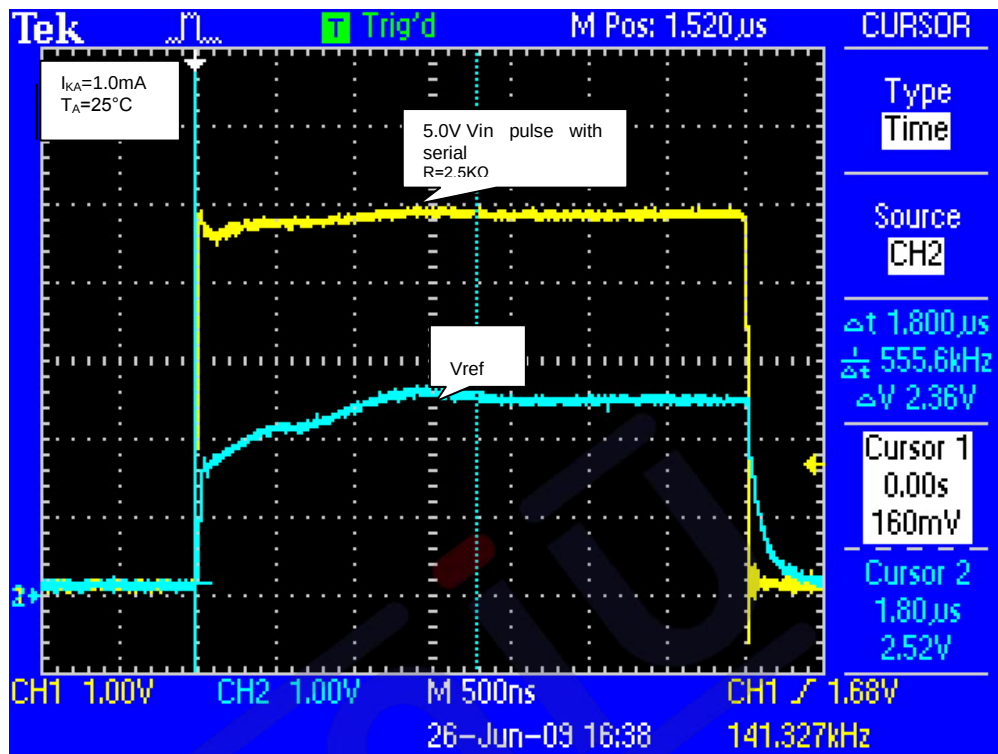


FIGURE 2. SINGLE-SUPPLY COMPARATOR WITH TEMPERATURE-COMPENSATED THRESHOLD

TYPICAL PERFORMANCE CHARACTERISTICS



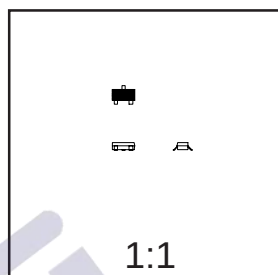
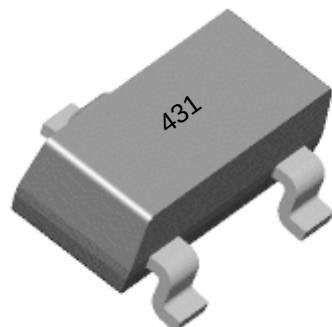
PULSE RESPONSE



Pulse response: $T_{on} = 1.8\mu\text{s}$

SOT-23 Tape and Reel Data and Package Dimensions, continued

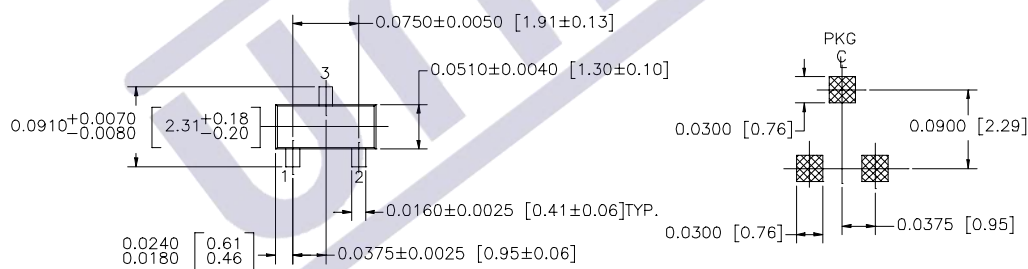
SOT-23



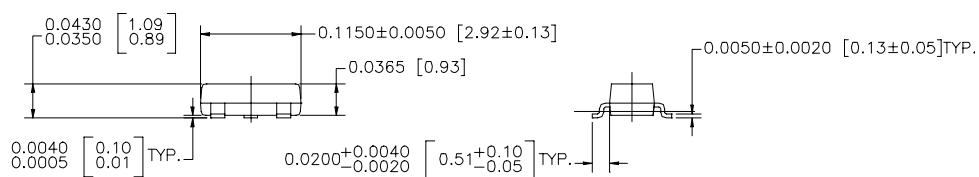
Scale 1:1 on letter size paper

Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.0082



LAND PATTERN RECOMMENDATION

CONTROLLING DIMENSION IS INCH
VALUES IN [] ARE MILLIMETERS

SOT 23, 3 LEADS LOW PROFILE

NOTE : UNLESS OTHERWISE SPECIFIED

- STANDARD LEAD FINISH 150 MICROINCHES / 3.81 MICROMETERS
MINIMUM TIN / LEAD (SOLDER) ON ALLOY 42
- REFERENCE JEDEC REGISTRATION TO-236, VARIATION AB, ISSUI

3

1.版本记录

DATE	REV.	DESCRIPTION
2018/04/19	1.0	First Release
2021/12/11	1.1	Layout adjustment

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