



Adjustable Voltage Reference – TLV431W

Precision low-voltage programmable Shunt Reference in bare die form

**Rev 1.0
18/03/21**

Description

The TLV431W three-terminal shunt reference combines low temperature co-efficient zener band-gap regulation with programmability. The device operates over a wide 80µA to 100mA current range with voltage adjustable from V_{REF} (1.24V) to 18V, set via x2 external resistors. With high temperature stability and typical dynamic impedance of 0.2Ω, these references make excellent replacements for zener diodes in many high reliability applications. With sharp accurate response, the device is simply implemented as either positive or negative reference.

Ordering Information

The following part suffixes apply:

- No suffix - MIL-STD-883 /2010B Visual Inspection
- "H" - MIL-STD-883 /2010B Visual Inspection
+ MIL-PRF-38534 Class H LAT
- "K" - MIL-STD-883 /2010A Visual Inspection (Space)
+ MIL-PRF-38534 Class K LAT

LAT = Lot Acceptance Test.

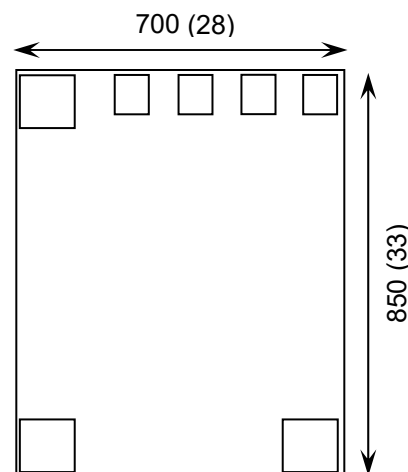
For further information on LAT process flows see below.

www.siliconsupplies.com/quality/bare-die-lot-qualification

Features:

- Programmable output voltage to 18V
- $\pm 0.5\%$ reference voltage tolerance at 25°C
- Low dynamic output impedance: 0.2Ω Typ
- Sink current capability: 80µA to 100mA
- Band-gap reference corrects temperature drift
- Direct replacement for TLV431 and TLVH431
- Full military temperature range.

Die Dimensions in µm (mils)



Supply Formats:

- Default - Die in Waffle Pack (400 per tray capacity)
- Sawn Wafer on Tape – On request
- Unsawn Wafer – On request
- Die Thickness \leftrightarrow 280µm(11 Mils) – On request
- In Metal or Ceramic package – On request

Mechanical Specification

Die Size (Unsawn)	700 x 850 28 x 33	µm mils
Minimum Bond Pad Size	100 x 100 3.94 x 3.94	µm mils
Die Thickness	260 (±20) 11 (±0.8)	µm mils
Top Metal Composition	Al 1%Si 1.4µm	
Back Metal Composition	N/A – Bare Si	



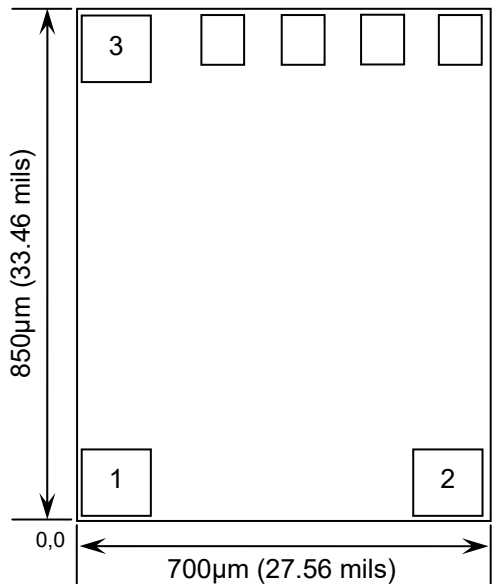


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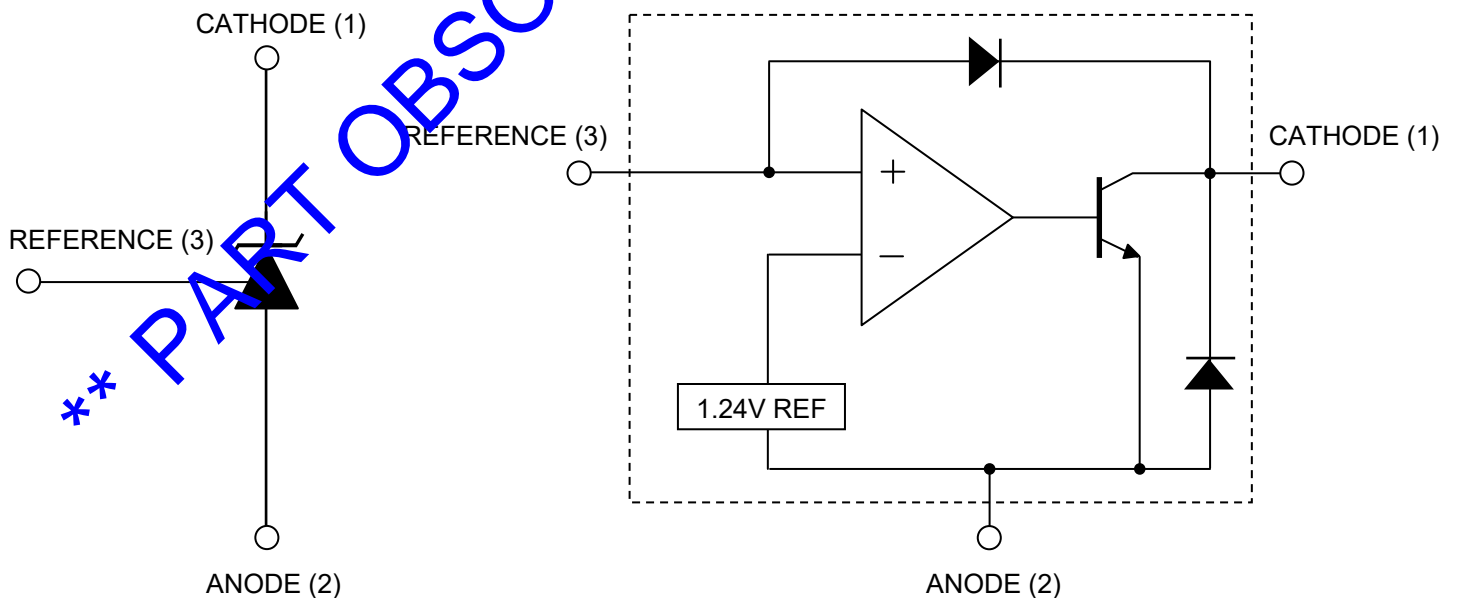
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Pad Layout and Functions



PAD	FUNCTION	COORDINATES (µm)	
		X	Y
1	CATHODE (K)	60	60
2	ANODE (A)	540	60
3	REFERENCE	60	690
CONNECT CHIP BACK TO ANODE			

Symbol & functional block diagram





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Absolute Maximum Ratings¹ $T_A = 25^\circ\text{C}$ unless otherwise stated

PARAMETER	SYMBOL	VALUE	UNIT
Cathode to Anode Voltage	V_{KA}	20	V
Cathode Current Range, Continuous	I_K	120	mA
Reference Input Current Range, Continuous	I_{REF}	-0.05 to 3	mA
ESD Rating (Human Body Model)	V_{ESD}	>2	kV
Operating Junction Temperature Range	T_J	150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-65 to 150	$^\circ\text{C}$

1. Operation above the absolute maximum rating may cause device failure. Operation at the absolute maximum ratings, for extended periods, may reduce device reliability.

Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	MAX	UNIT
Cathode Voltage	V_{KA}	V_{REF}	18	V
Cathode Current	I_K	0.08	100	mA
Ambient Operating Temperature Range	T_A	-55 to 125		$^\circ\text{C}$

Electrical Characteristics, $T_A = 25^\circ\text{C}$, $V_{KA} = V_{REF}$, $I_K = 10\text{mA}$ unless otherwise stated

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Reference input voltage	V_{REF}	$V_{KA} = V_{REF}$, $I_K = 10\text{mA}$	1.235	1.240	1.245	V
Reference input voltage, Deviation over temperature range	ΔV_{REF}	$V_{KA} = V_{REF}$, $I_K = 10\text{mA}$, $-55^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	-	10	20	mV
Ratio of change in reference input voltage to change in cathode to anode voltage	$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	$I_K = 10\text{mA}$, $\Delta V_{KA} = 18\text{V to } V_{REF}$	-1.0	-0.4	-	mV/V
Reference input current	I_{REF}	$I_K = 10\text{mA}$, $R1 = 10\text{k}\Omega$, $R2 = \infty$	-	0.1	0.5	μA
Reference input current, Deviation over temperature range	ΔI_{REF}	$I_K = 10\text{mA}$, $R1 = 10\text{k}\Omega$, $R2 = \infty$	-	0.04	0.2	μA
Minimum cathode current for regulation	$I_{K(MIN)}$	$1.215\text{V} \leq V_{REF} \leq 1.265\text{V}$	-	60	80	μA
Off-State cathode current	$I_{K(OFF)}$	$V_{KA} = 18\text{V}$, $V_{REF} = 0\text{V}$	-	0.01	0.5	μA
Dynamic impedance	$ Z_{KA} $	$I_K = 100\text{mA to } 1\text{mA}$, $f \leq 1.0\text{KHz}$	-	0.2	0.4	Ω





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Test Circuits

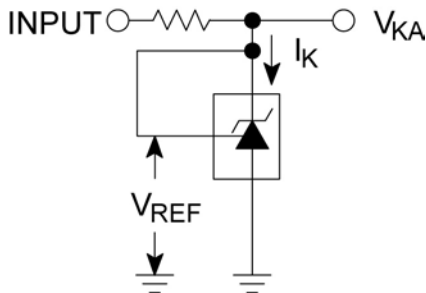


FIGURE 1. $V_{KA} = V_{REF}$

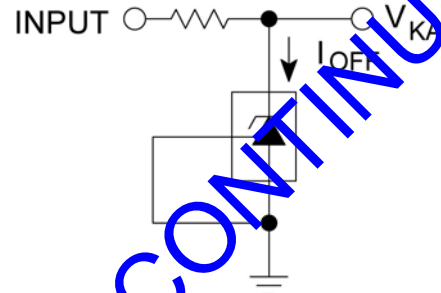
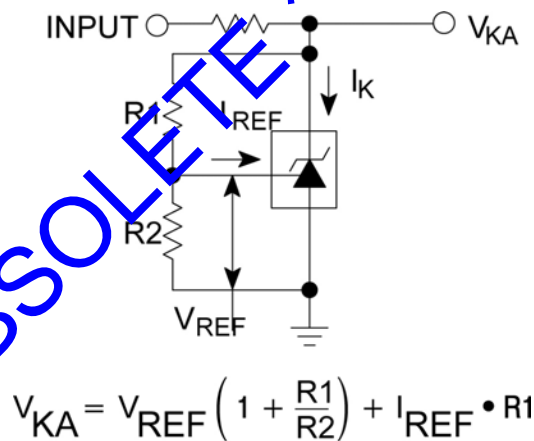


FIGURE 2. I_{OFF}



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

FIGURE 3. $V_{KA} > V_{REF}$

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