

KA431SAMF2TF Datasheet



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DiGi Electronics Part Number	KA431SAMF2TF-DG
Manufacturer	onsemi
Manufacturer Product Number	KA431SAMF2TF
Description	IC VREF SHUNT ADJ 1% SOT23F-3
Detailed Description	Shunt Voltage Reference IC Adjustable 2.495V 36 V V \pm 1% 100 mA SOT-23F-3

This model KA431SAMF2TF is available at DiGi Electronics.

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Purchase and inquiry

Manufacturer Product Number:

KA431SAMF2TF

Series:

-

Reference Type:

Shunt

Voltage - Output (Min/Fixed):

2.495V

Current - Output:

100 mA

Temperature Coefficient:

50ppm/°C Typical

Noise - 10Hz to 10kHz:

-

Current - Supply:

-

Operating Temperature:

-25°C ~ 85°C (TA)

Package / Case:

SOT-23-3 Flat Leads

Base Product Number:

KA431

Manufacturer:

onsemi

Product Status:

Active

Output Type:

Adjustable

Voltage - Output (Max):

36 V

Tolerance:

±1%

Noise - 0.1Hz to 10Hz:

-

Voltage - Input:

-

Current - Cathode:

1 mA

Mounting Type:

Surface Mount

Supplier Device Package:

SOT-23F-3

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8542.39.0001

Moisture Sensitivity Level (MSL):

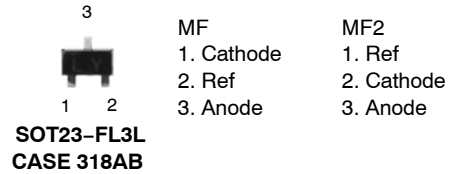
1 (Unlimited)

ECCN:

EAR99

Programmable Shunt Regulator

KA431S, KA431SA, KA431SL



Description

The KA431S / KA431SA / KA431SL are three-terminal adjustable regulator series with a guaranteed thermal stability over the operating temperature range. The output voltage can be set to any value between V_{REF} (approximately 2.5 V) and 36 V with two external resistors. These devices have a typical dynamic output impedance of 0.2 Ω . Active output circuitry provides a sharp turn-on characteristic, making these devices excellent replacement for zener diodes in many applications.

Features

- Programmable Output Voltage to 36 V
- Low Dynamic Output Impedance 0.2 Ω (Typical)
- Sink Current Capability: 1.0 to 100 mA
- Equivalent Full-Range Temperature Coefficient of 50 ppm/ $^{\circ}$ C (Typical)
- Temperature Compensated for Operation Over Full Rated Operating Temperature Range
- Low Output Noise Voltage
- Fast Turn-on Response
- These Devices are Pb-Free and Halogen Free

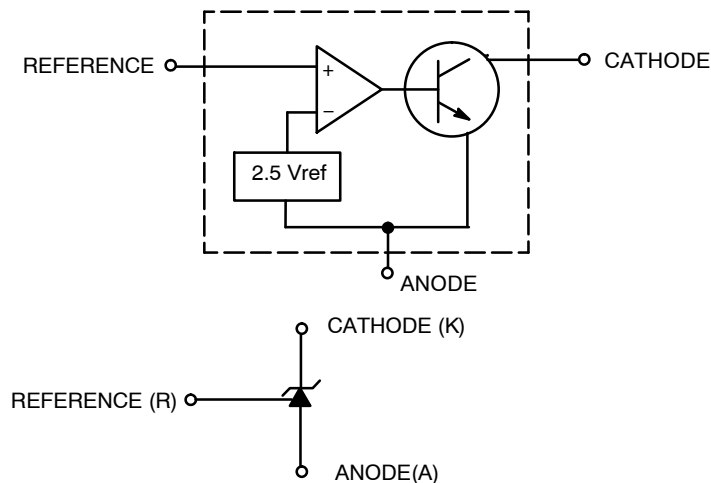


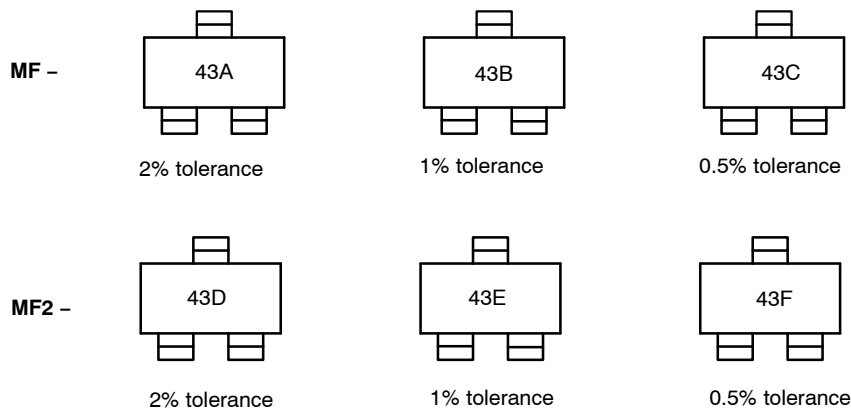
Figure 1. Block Diagram

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 2 of this data sheet.

ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

KA431S, KA431SA, KA431SL**MARKING INFORMATION****Figure 2. Top Mark (per package)****ABSOLUTE MAXIMUM RATINGS**

$T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Unit
V_{KA}	Cathode Voltage	37	V
I_{KA}	Cathode Current Range (Continuous)	-100 ~ +150	mA
I_{REF}	Reference Input Current Range	-0.05 ~ +10	mA
$R_{\theta JA}$	Thermal Resistance Junction-Air (Note 1) (Note 2) MF Suffix Package	350	$^\circ\text{C}/\text{W}$
I_{REF}	Power Dissipation (Note 3) (Note 4) MF Suffix Package	350	mW
T_J	Junction Temperature	150	$^\circ\text{C}$
T_{OPR}	Operating Temperature Range	-25 ~ +85	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-65 ~ +150	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

- Thermal resistance test board:
Size: 1.6 mm x 76.2 mm x 114.3 mm (1S0P)
JEDEC Standard: JESD51-3, JESD51-7
- Assume no ambient airflow.
- $T_{JMAX} = 150^\circ\text{C}$; Ratings apply to ambient temperature at 25°C .
- Power dissipation calculation: $P_D = (T_J - T_A) / R_{\theta JA}$.

RECOMMENDED OPERATING RANGES

Symbol	Parameter	Min.	Max.	Unit
V_{KA}	Cathode Voltage	V_{REF}	36	V
I_{KA}	Cathode Current	1	100	mA

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

KA431S, KA431SA, KA431SL**ELECTRICAL CHARACTERISTICS** (Note 5)Values are at $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	KA431S			KA431SA			KA431SL			Unit	
			Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.		
V_{REF}	Reference Input Voltage	$V_{KA} = V_{REF}$, $I_{KA} = 10\text{ mA}$	2.450	2.500	2.550	2.470	2.495	2.520	2.482	2.495	2.508	V	
$\Delta V_{REF}/\Delta T$	Deviation of Reference Input Voltage Over-Temperature	$V_{KA} = V_{REF}$, $I_{KA} = 10\text{ mA}$, $T_{MIN} \leq T_A \leq T_{MAX}$	-	4.5	17.0	-	4.5	17.0	-	4.5	17.0	mV	
$\Delta V_{REF}/\Delta V_{KA}$	Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage	$I_{KA} = 10\text{ mA}$	$\Delta V_{KA} = 10\text{ V} - V_{REF}$	-	-1.0	-2.7	-	-1.0	-2.7	-	-1.0	-2.7	mV/V
			$\Delta V_{KA} = 36\text{ V} - 10\text{ V}$	-	-0.5	-2.0	-	-0.5	-2.0	-	-0.5	-2.0	
I_{REF}	Reference Input Current	$I_{KA} = 10\text{ mA}$, $R1 = 10\text{ k}\Omega$, $R2 = \infty$	-	1.5	4.0	-	1.5	4.0	-	1.5	4.0	μA	
$\Delta I_{REF}/\Delta T$	Deviation of Reference Input Current Over Full Temperature Range	$I_{KA} = 10\text{ mA}$, $R1 = 10\text{ k}\Omega$, $R2 = \infty$, $T_A = \text{Full Range}$	-	0.4	1.2	-	0.4	1.2	-	0.4	1.2	μA	
$I_{KA(MIN)}$	Minimum Cathode Current for Regulation	$V_{KA} = V_{REF}$	-	0.45	1.00	-	0.45	1.00	-	0.45	1.00	mA	
$I_{KA(OFF)}$	Off-Stage Cathode Current	$V_{KA} = 36\text{ V}$, $V_{REF} = 0$	-	0.05	1.00	-	0.05	1.00	-	0.05	1.00	μA	
Z_{KA}	Dynamic Impedance	$V_{KA} = V_{REF}$, $I_{KA} = 1\text{ to }100\text{ mA}$, $f \geq 1.0\text{ kHz}$	-	0.15	0.50	-	0.15	0.50	-	0.15	0.50	Ω	

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

5. $T_{MIN} = -25^\circ\text{C}$, $T_{MAX} = +85^\circ\text{C}$

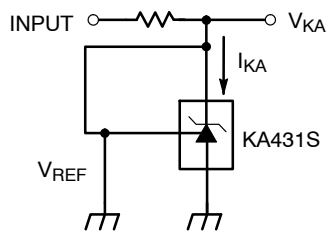
TEST CIRCUITS

Figure 3. Test Circuit for $V_{KA} = V_{REF}$

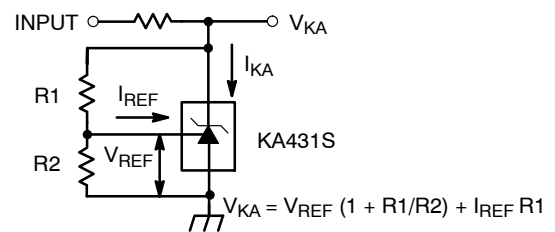


Figure 4. Test Circuit for $V_{KA} \geq V_{REF}$

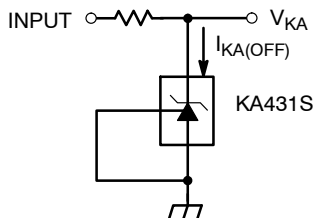


Figure 5. Test Circuit for $I_{KA(OFF)}$

KA431S, KA431SA, KA431SL

TYPICAL APPLICATIONS

$$V_o = \left(1 + \frac{R_1}{R_2}\right) V_{ref}$$

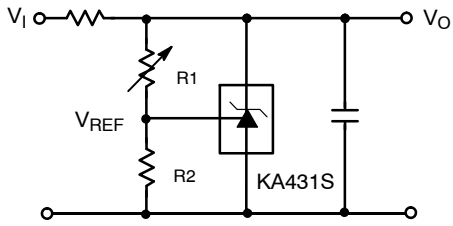


Figure 6. Shunt Regulator

$$V_o = \left(1 + \frac{R_1}{R_2}\right) V_{ref}$$

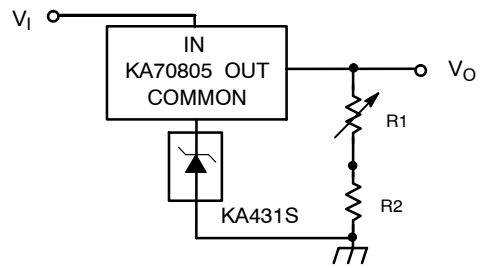


Figure 7. Output Control for Three-Terminal Fixed Regulator

$$V_o = \left(1 + \frac{R_1}{R_2}\right) V_{ref}$$

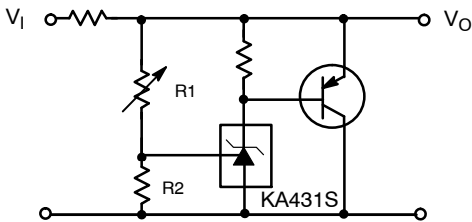


Figure 8. High Current Shunt Regulator

$$I_o = \frac{V_{REF}}{R_{CL}}$$

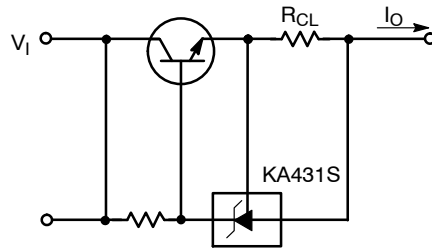


Figure 9. Current limit or Current Source

$$I_o = \frac{V_{REF}}{R_s}$$

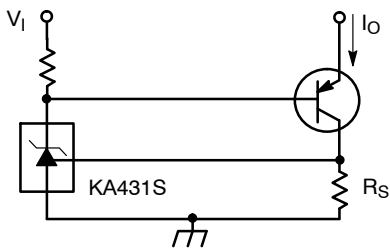


Figure 10. Constant-Current Sink

KA431S, KA431SA, KA431SL

TYPICAL CHARACTERISTICS

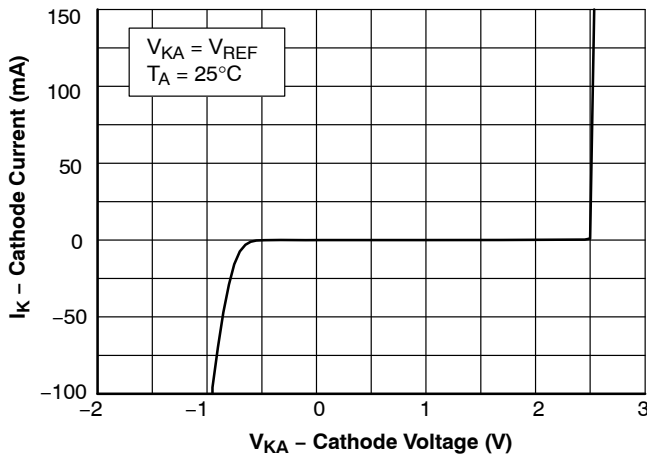


Figure 11. Cathode Current vs. Cathode Voltage

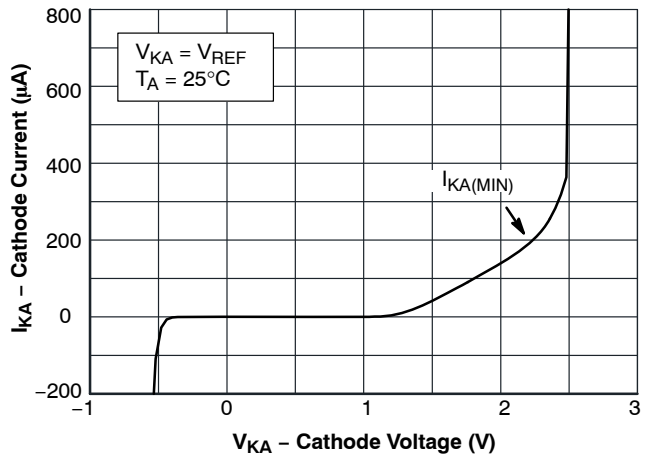


Figure 12. Cathode Current vs. Cathode Voltage

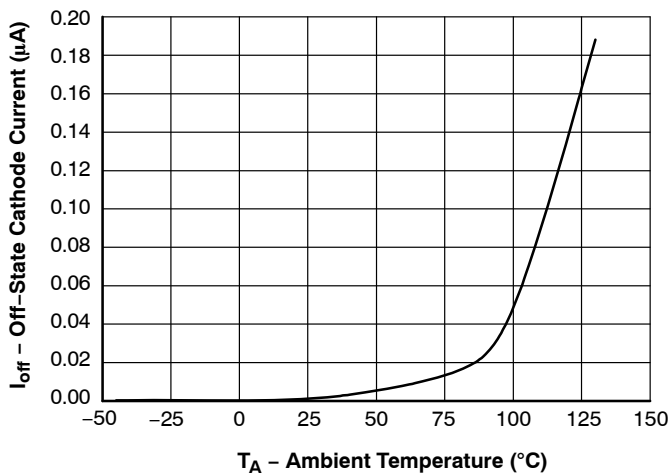


Figure 13. OFF-State Cathode Current vs. Ambient Temperature

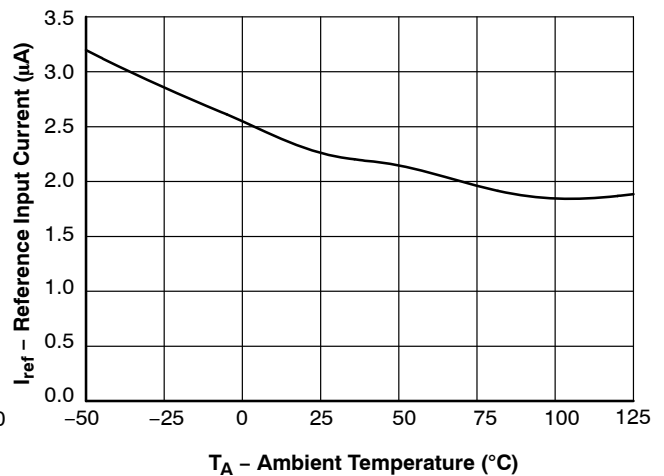


Figure 14. Reference Input Current vs. Ambient Temperature

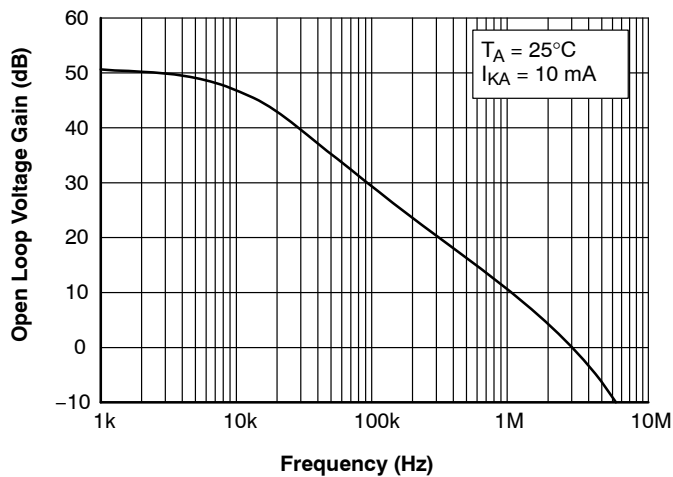


Figure 15. Frequency vs. Small Signal Voltage Amplification

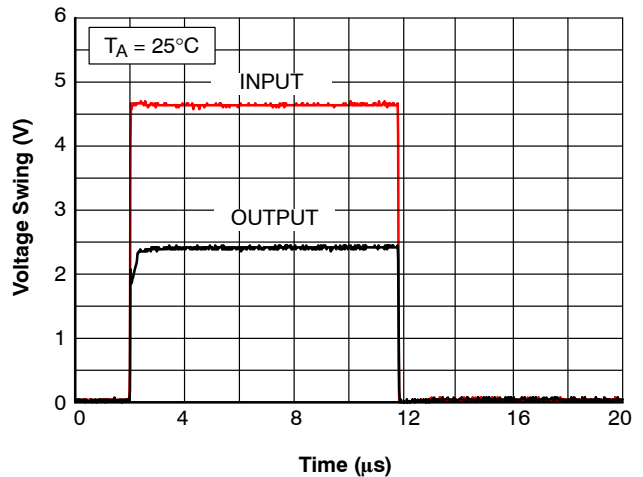
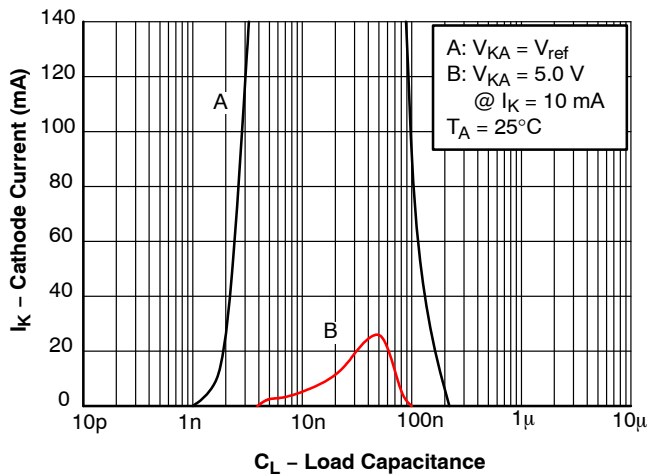
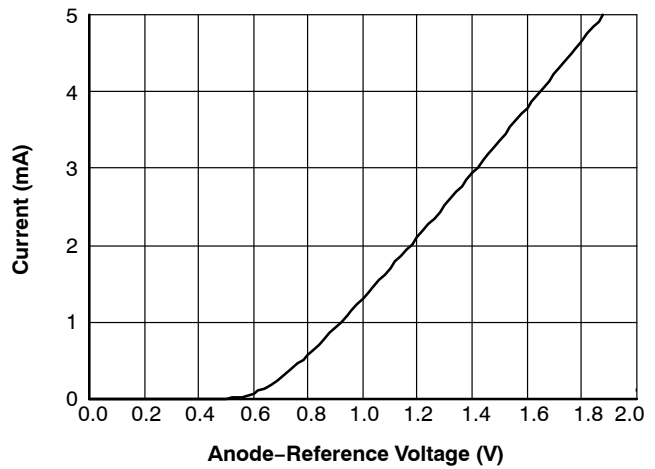
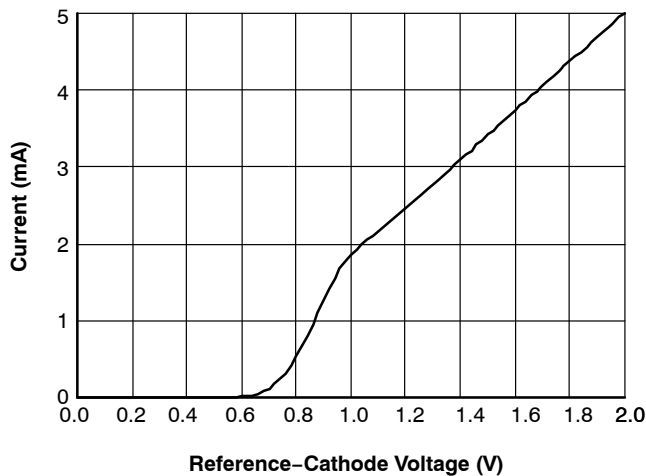
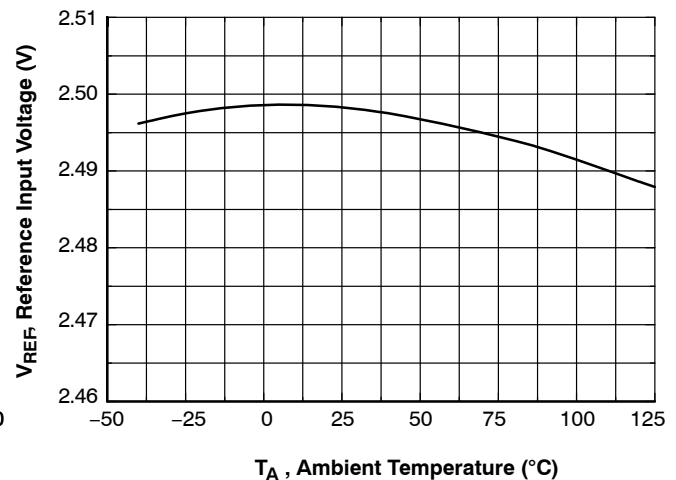
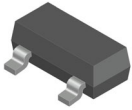


Figure 16. Pulse Response

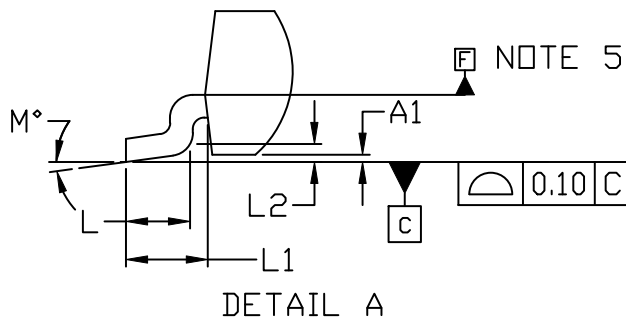
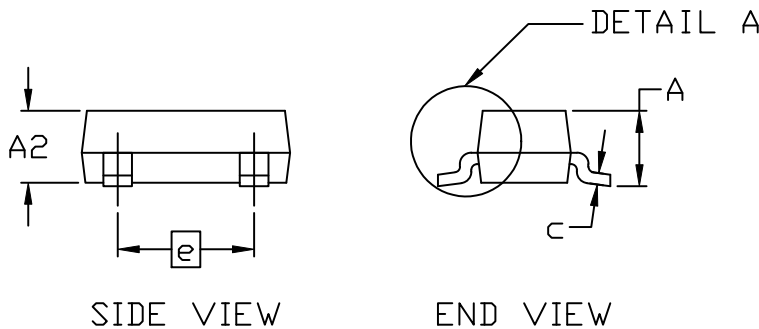
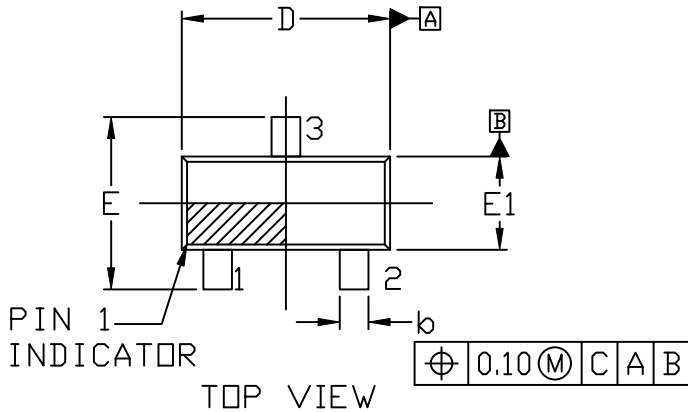
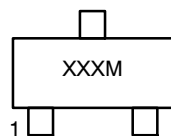
KA431S, KA431SA, KA431SL**TYPICAL CHARACTERISTICS** (Continued)**Figure 17. Stability Boundary Conditions****Figure 18. Anode-Reference Diode Curve****Figure 19. Reference-Cathode Diode Curve****Figure 20. Reference Input Voltage vs. Ambient Temperature****ORDERING INFORMATION**

Part Number	Output Voltage Tolerance	Operating Temperature Range	Top Mark	Package	Shipping [†]
KA431SMFTF	2%	-25 to +85°C	43A	SOT23-FL3L (Pb-Free)	3000 / Tape and Reel
KA431SMF2TF			43D		
KA431SAMFTF	1%		43B		
KA431SAMF2TF			43E		
KA431SLMFTF	0.5%		43C		
KA431SLMF2TF			43F		

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).


SOT23-3L
CASE 318AB
ISSUE A

DATE 14 DEC 2021


**GENERIC
MARKING DIAGRAM***


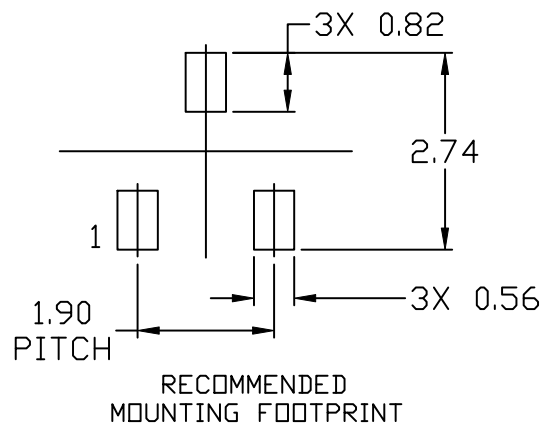
XXX = Specific Device Code
M = Date Code

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "μ", may or may not be present. Some products may not follow the Generic Marking.

NOTES:

- DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
- CONTROLLING DIMENSION: MILLIMETERS
- DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.127 mm IN EXCESS OF MAXIMUM MATERIAL CONDITION.
- DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 mm PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM F.
- DATUMS A AND B ARE TO BE DETERMINED AT DATUM F.
- A1 IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.
- LEAD THICKNESS (c) AND LEAD WIDTH (b) INCLUDE PLATING THICKNESS.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	---	---	1.15
A1	0.00	---	0.10
A2	0.90	1.00	1.10
b	0.30	---	0.50
c	0.127 REF		
D	2.80	2.90	3.00
E	2.25	2.40	2.55
E1	1.20	1.30	1.40
e	1.90 BSC		
L	0.30	---	---
L1	0.55 REF		
L2	0.25 REF		
M	0°	---	8°



- * For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERM/D.

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