KA431/KA431A/KA431L
Programmable Shunt Regulator

Features

- Programmable Output Voltage to 36 Volts
- Low Dynamic Output Impedance 0.20 Typical
- Sink Current Capability of 1.0 to 100mA
- Equivalent Full-Range Temperature Coefficient of 50ppm/°C Typical
- Temperature Compensated for Operation Over Full Rated Operating Temperature Range
- Low Output Noise Voltage
- Fast Turn-on Response

Description

The KA431/KA431A/KA431L are three-terminal adjustable regulator series with a guaranteed thermal stability over applicable temperature ranges. The output voltage may be set to any value between VREF (approximately 2.5 volts) and 36 volts with two external resistors These devices have a typical dynamic output impedance of 0.2W Active output circuitry provides a very sharp turn on characteristic, making these devices excellent replacement for zener diodes in many applications.

TO-92

1

1. Ref 2. Anode 3. Cathode

8-DIP

1

1.Cathode 2.3.4.5.7.NC
6.Anode 8.Ref

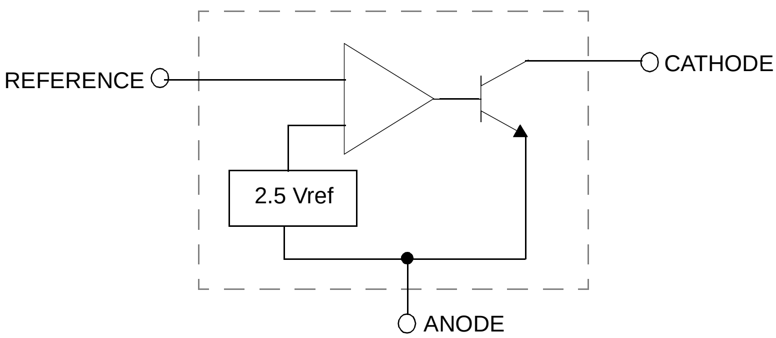
8-SOP

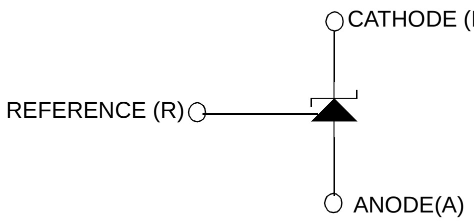
1

1.Cathode 2.3.6.7.Anode
4.5.NC 8.Ref

EEPW .com.cn

Internal Block Diagram





Rev. 1.0.6

©2002 Fairchild Semiconductor Corporation

Absolute Maximum Ratings

(Operating temperature range applies unless otherwise specified.)

Parameter	Symbol	Value	Unit
Cathode Voltage	V_{KA}	37	V
Cathode Current Range (Continuous)	I_{KA}	-100 ~ +150	mA
Reference Input Current Range	I_{REF}	0.05 ~ +10	mA
Power Dissipation D, Z Suffix Package DIP Package	P_D	770 1000	mW mW
Junction Temperature	T_J	150	°C
Operating Temperature Range	T_{OPR}	-25 ~ +85	°C
Storage Temperature Range	T_{STG}	-65 ~ +150	°C

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Cathode Voltage	V_{KA}	V_{REF}	-	36	V
Cathode Current	I_{KA}	1.0	-	100	mA

EEPW 電子產品世界 .com.cn

Electrical Characteristics

(T_A = +25°C, unless otherwise specified)

Parameter	Symbol	Conditions	KA431 Min.	KA431 Typ.	KA431 Max.	KA431A Min.	KA431A Typ.	KA431A Max.	KA431L Min.	KA431L Typ.	KA431L Max.	Unit
Reference Input Voltage	V_{REF}	$V_{KA}=V_{REF}$, I_{KA}=10mA	2.450	2.500	2.550	2.470	2.495	2.520	2.482	2.495	2.508	V
Deviation of Reference Input Voltage Over-Temperature	$\Delta V_{REF}/\Delta T$	$V_{KA}=V_{REF}$, I_{KA}=10mA, $T_{MIN} \leq T_A \leq T_{MAX}$	-	4.5	17	-	4.5	17	-	4.5	17	mV
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage	$\Delta V_{REF}/\Delta V_{KA}$	I_{KA}=10mA, ΔV_{KA}=10V-V_{REF}	-	-1.0	- 2.7	-	-1.0	- 2.7	-	-1.0	-2.7	mV/V
		I_{KA}=10mA, ΔV_{KA}=36V-10V	-	-0.5	-2.0	-	-0.5	-2.0	-	-0.5	-2.0	mV/V
Reference Input Current	I_{REF}	I_{KA}=10mA, R1=10kΩ,R2=∞	-	1.5	4	-	1.5	4	-	1.5	4	µA
Deviation of Reference Input Current Over Full Temperature Range	$\Delta I_{REF}/\Delta T$	I_{KA}=10mA, R1=10kΩ,R2=∞, T_A =Full Range	-	0.4	1.2	-	0.4	1.2	-	0.4	1.2	µA
Minimum Cathode Current for Regulation	$I_{KA(MIN)}$	$V_{KA}=V_{REF}$	-	0.45	1.0	-	0.45	1.0	-	0.45	1.0	mA
Off - Stage Cathode Current	$I_{KA(OFF)}$	V_{KA}=36V, V_{REF}=0	-	0.05	1.0	-	0.05	1.0	-	0.05	1.0	µA
Dynamic Impedance	Z_{KA}	$V_{KA}=V_{REF}$, I_{KA}=1 to 100mA, f ≥1.0kHz	-	0.15	0.5	-	0.15	0.5	-	0.15	0.5	Ω

- T_{MIN} = -25°C, T_{MAX} = +85°C

Test Circuits

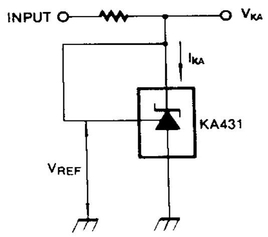


Figure 1. Test Circuit for V_{KA}=V_{REF}

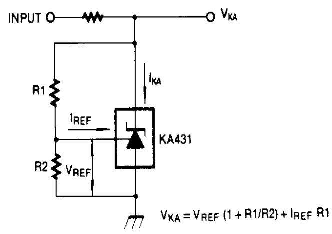


Figure 2. Test Circuit for $V_{KA} \geq V_{REF}$

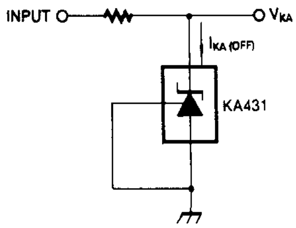


Figure 3. Test Circuit for $I_{KA(OFF)}$

EEPW .com.cn

Typical Performance Characteristics

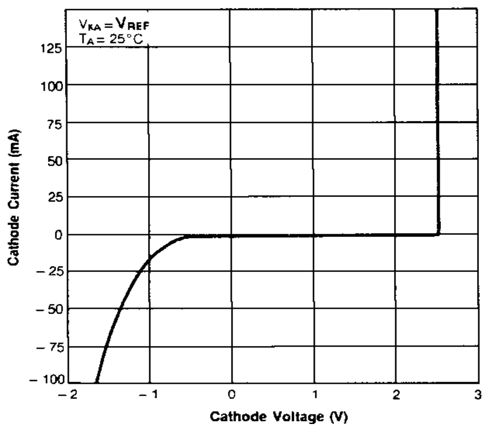


Figure 4. Cathode Current vs. Cathode Voltage

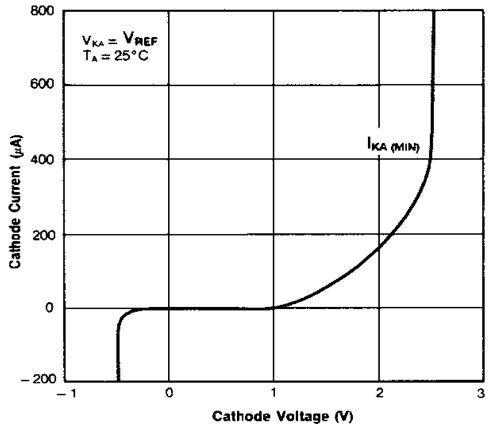


Figure 5. Cathode Current vs. Cathode Voltage

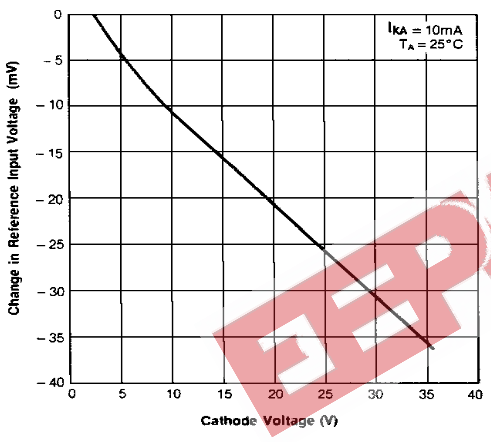


Figure 6. Change In Reference Input Voltage vs. Cathode Voltage

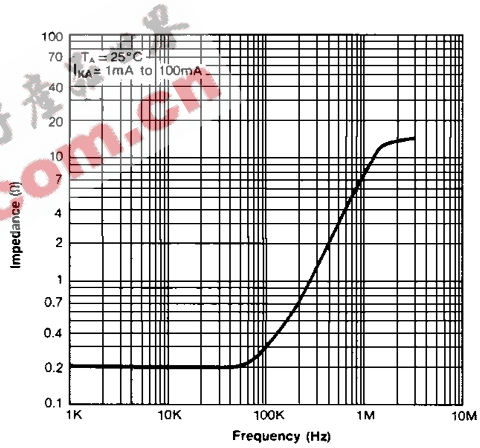


Figure7. Dynamic Impedance Frequency

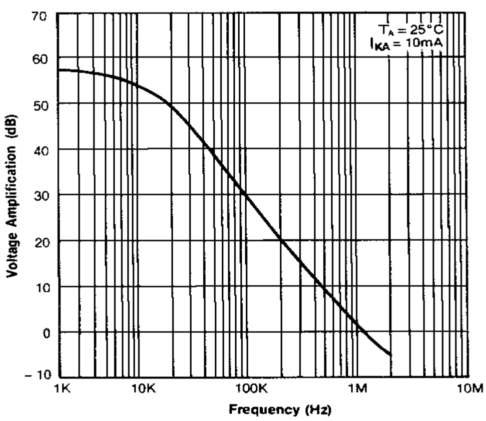


Figure 8. Small Signal Voltage Amplification vs. Frequency

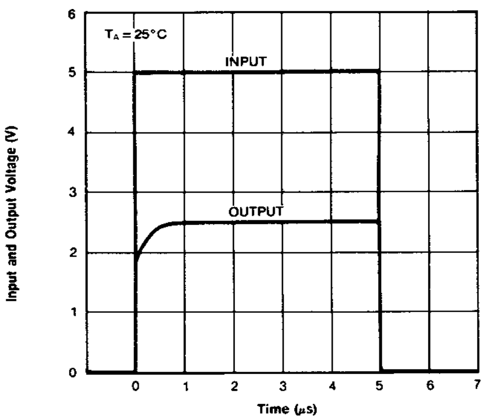


Figure 9. Pulse Response

Typical Performance Characteristics (Continued)

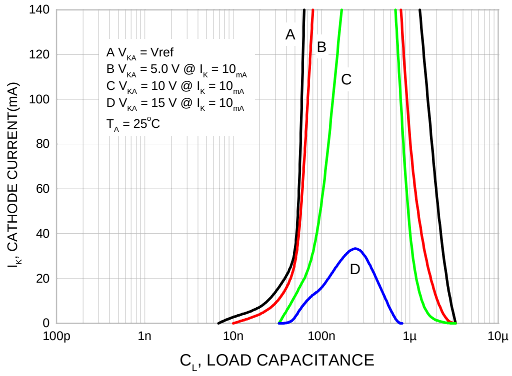


Figure 10. Stability Boundary Conditions

EEPW 电子产品世界 .com.cn

Typical Application

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

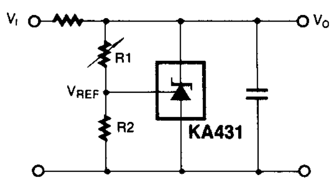


Figure 11. Shunt Regulator

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

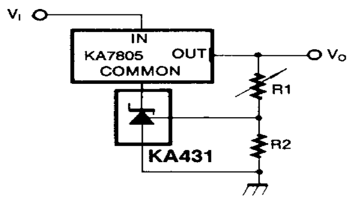


Figure 12. Output Control for Three--Ter minal Fixed Regulator

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

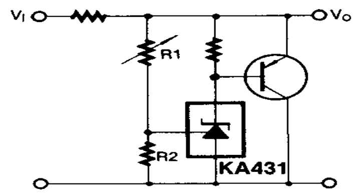


Figure 13. High Current Shunt Regulator

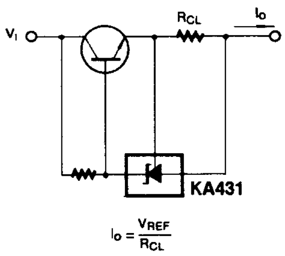


Figure 14. Current Limit or Current Source

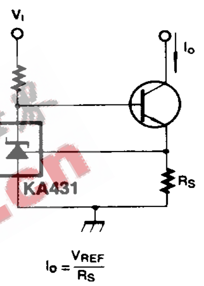


Figure 15. Constant-Current Sink

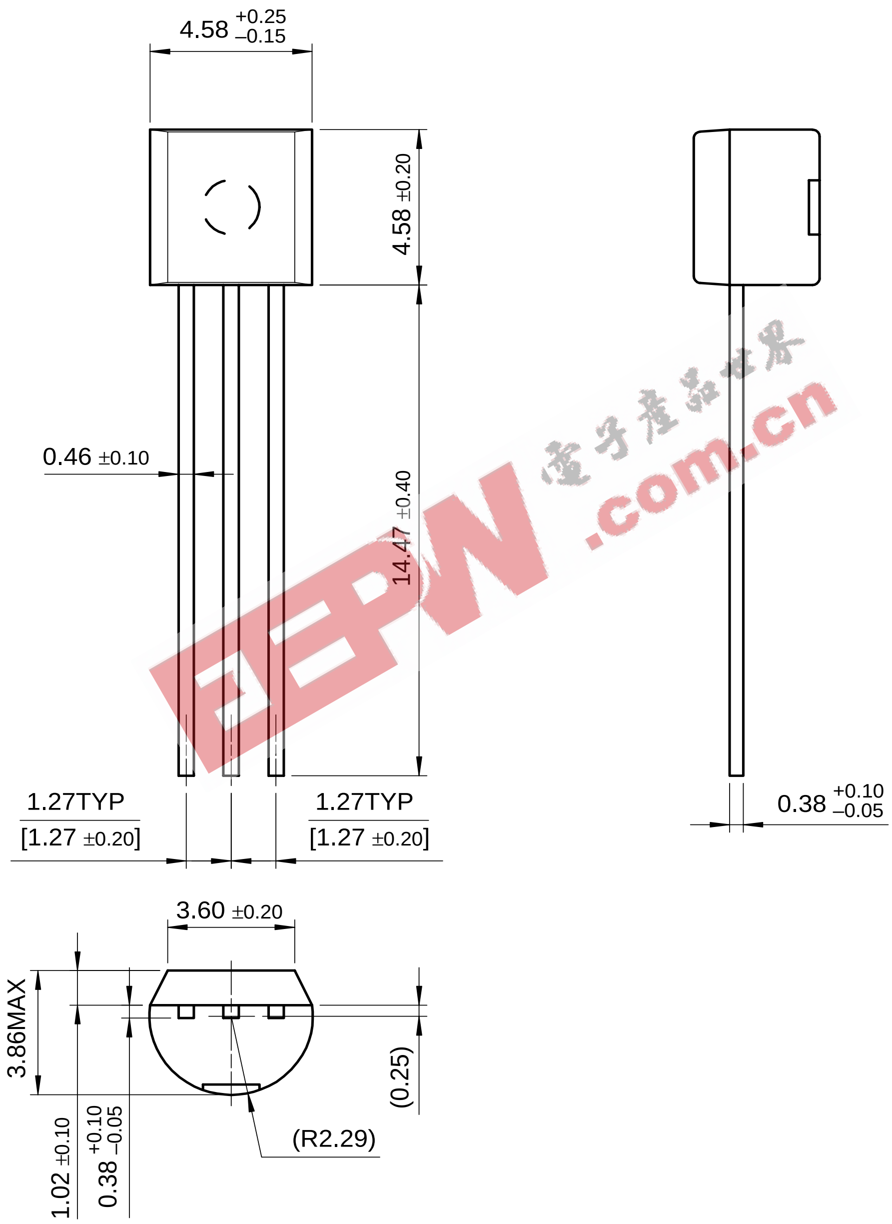
EEPW .com.cn

Mechanical Dimensions

Package

Dimensions in millimeters

TO-92



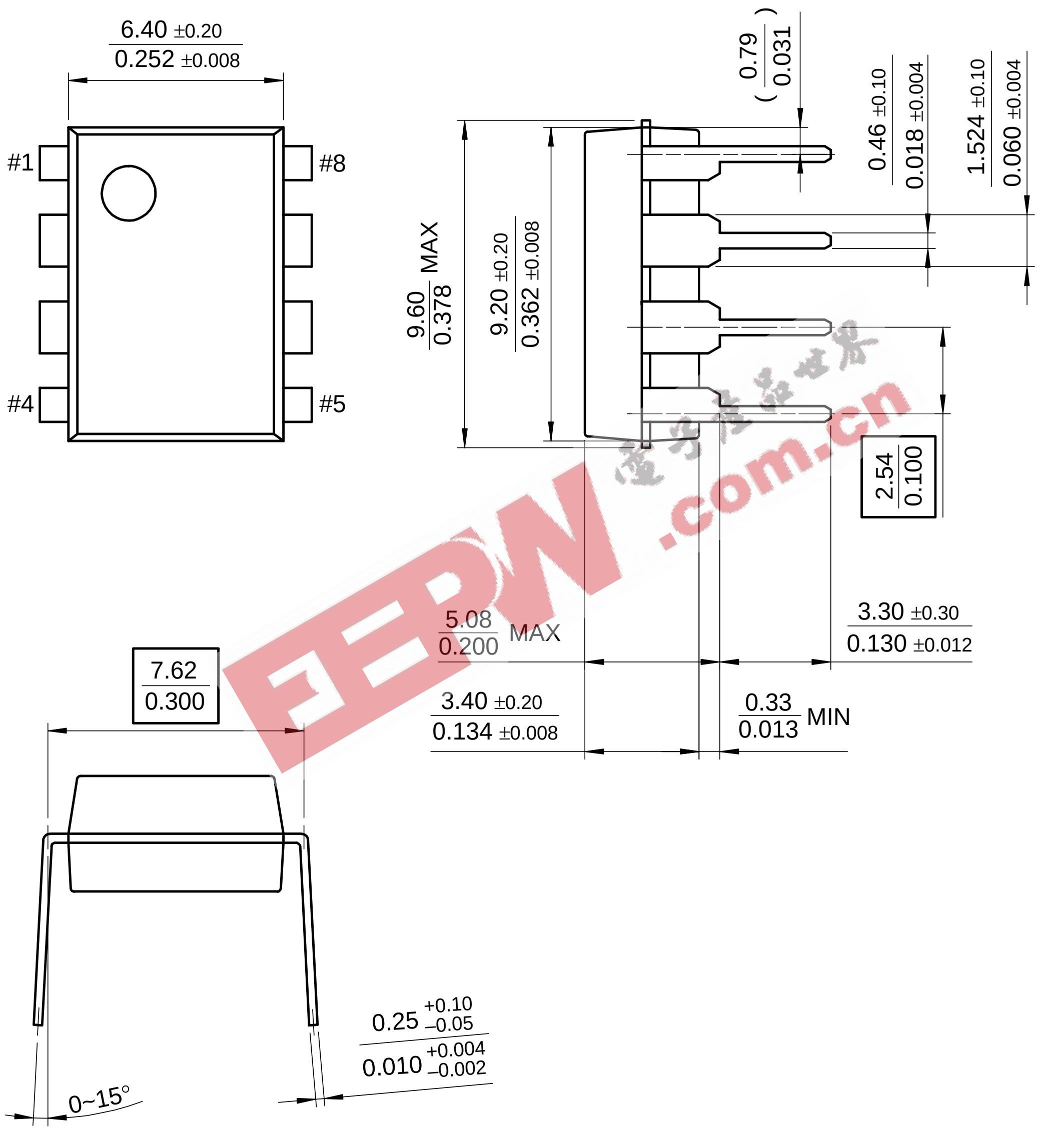
EEPW 电子产品世界 .com.cn

Mechanical Dimensions (Continued)

Package

Dimensions in millimeters

8-DIP



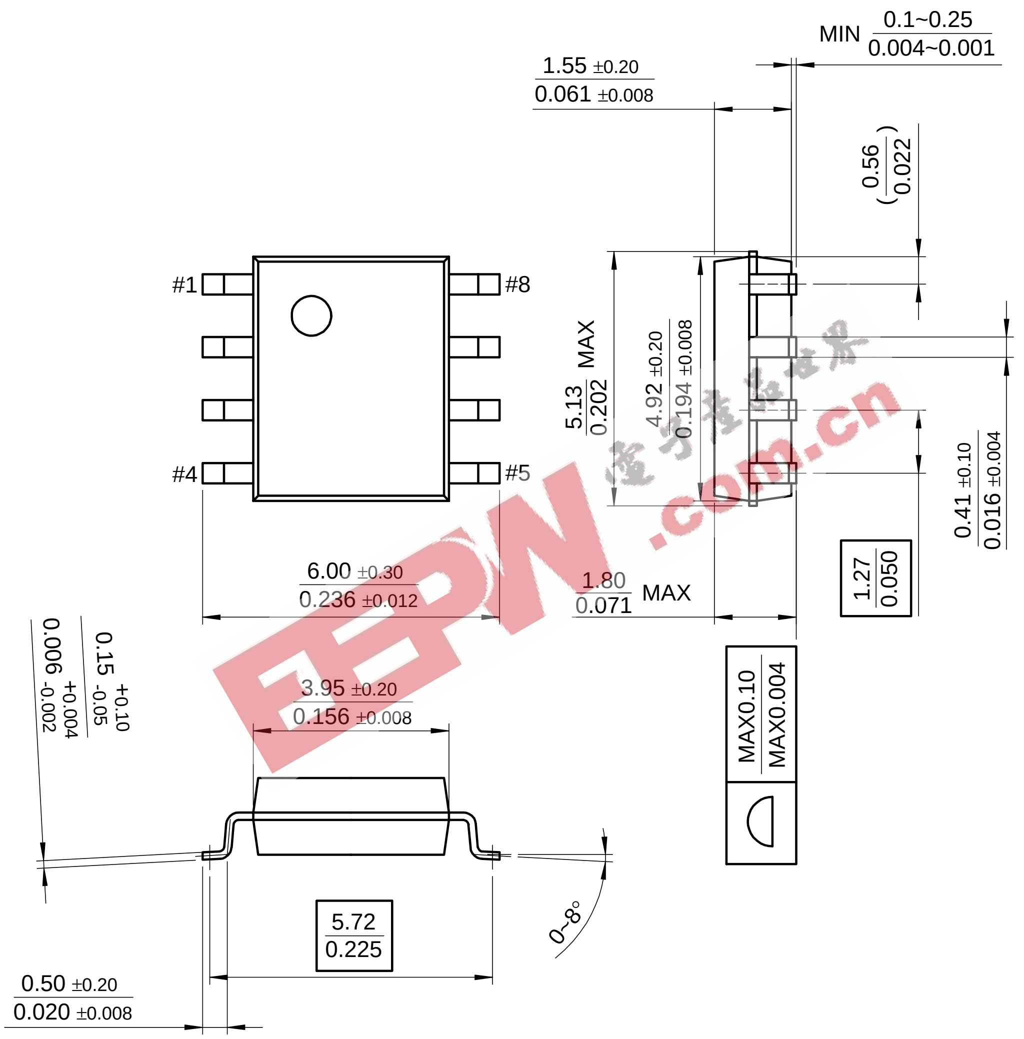
EEPW 电子产品世界 .com.cn

Mechanical Dimensions (Continued)

Package

Dimensions in millimeters

8-SOP



Ordering Information

Product Number	Output Voltage Tolerance	Package	Operating Temperature
KA431LZ	0.5%	TO-92	-25 ~ +85°C
KA431LD		8-SOP	
KA431AZ	1%	TO-92	
KA431AD		8-SOP	
KA431	2%	8-DIP	
KA431Z		TO-92	
KA431D		8-SOP	

EEPW 电子产品世界 .com.cn

EEPW 电子产品世界 .com.cn

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

8/20/02 0.0m 001
Stock#DSxxxxxxxx
© 2002 Fairchild Semiconductor Corporation