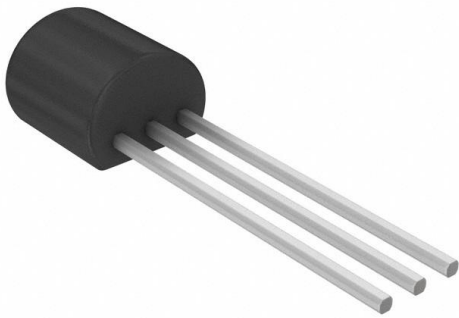


NJM431L Datasheet

www.digi-electronics.com



<https://www.DiGi-Electronics.com>

DiGi Electronics Part Number	NJM431L-DG
Manufacturer	Nisshinbo Micro Devices Inc.
Manufacturer Product Number	NJM431L
Description	IC VREF SHUNT ADJ 2.2% TO92-3
Detailed Description	Shunt Voltage Reference IC Adjustable 2.495V 36 V \pm 2.2% 100 mA TO-92-3

This model NJM431L is available at DiGi Electronics.

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DiGi is a global authorized distributor of electronic components.

Purchase and inquiry

Manufacturer Product Number:

NJM431L

Series:

-

Reference Type:

Shunt

Voltage - Output (Min/Fixed):

2.495V

Current - Output:

100 mA

Temperature Coefficient:

-

Noise - 10Hz to 10kHz:

-

Current - Supply:

-

Operating Temperature:

-40°C ~ 85°C (TA)

Package / Case:

TO-226-3, TO-92-3 (TO-226AA)

Base Product Number:

NJM431

Manufacturer:

Nisshinbo Micro Devices Inc.

Product Status:

Obsolete

Output Type:

Adjustable

Voltage - Output (Max):

36 V

Tolerance:

±2.2%

Noise - 0.1Hz to 10Hz:

-

Voltage - Input:

-

Current - Cathode:

1 mA

Mounting Type:

Through Hole

Supplier Device Package:

TO-92-3

Environmental & Export classification

RoHS Status:

RoHS non-compliant

ECCN:

EAR99

Moisture Sensitivity Level (MSL):

Not Applicable

HTSUS:

8542.39.0001



NJM431

ADJUSTABLE PRECISION SHUNT REGULATOR

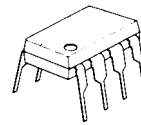
■ GENERAL DESCRIPTION

The NJM431 is a 3 terminal adjustable shunt regulator. The output voltage may be set to any value between V_{REF} (about 2.5V) and 36V by two resistors. Output circuitry shows a sharp turn-on characteristics. Applications include shunt regulators, series regulators for small power and isolation regulators with photo couplers.

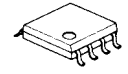
■ FEATURES

- Operating Voltage ($V_{KA} = V_{REF}$ to 36V)
- Fast Turn-On Respability
- Cathode Current (1mA to 100mA)
- Low Dynamic Output Impedance (0.2Ωtyp.)
- Load Regulation typically (0.1%)
- Package Outline DIP8, DMP8, TO-92, SOT-89
- Bipolar Technology

■ PACKAGE OUTLINE



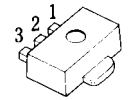
NJM431D



NJM431M



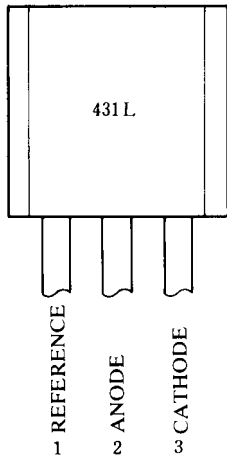
NJM431L(TO-92)



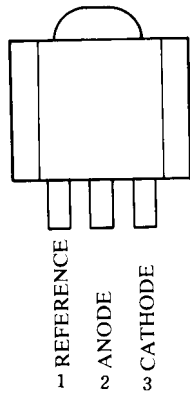
NJM431U(SOT-89)

1. REF
2. ANODE
3. CATHODE

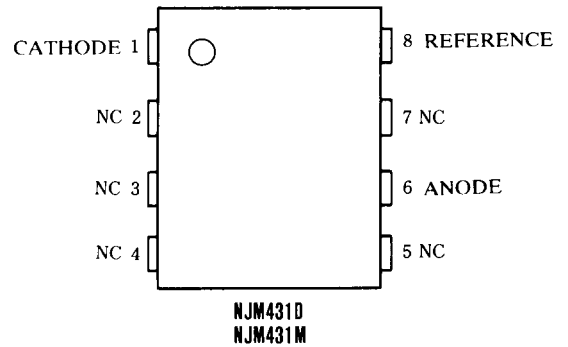
■ PIN CONFIGURATION



NJM431L

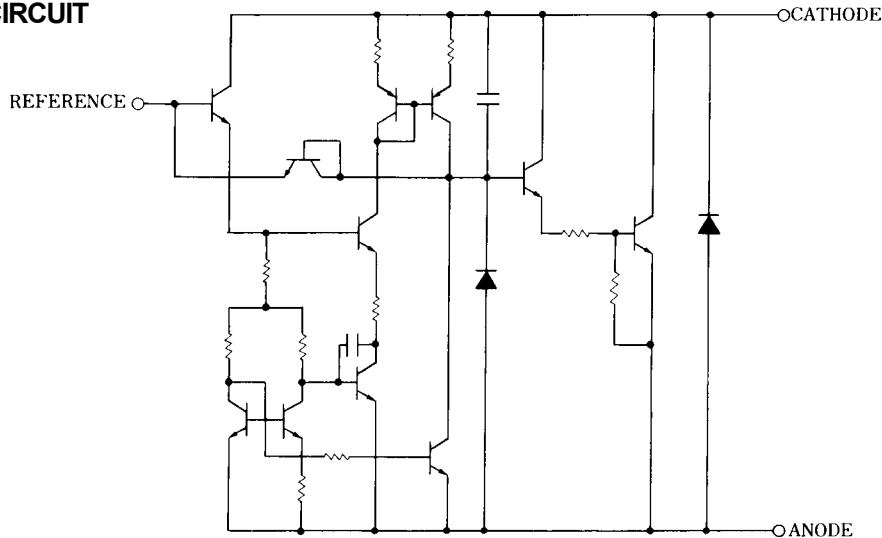


NJM431U



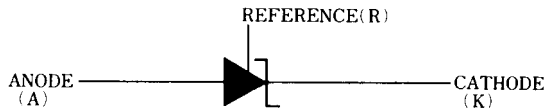
NJM431D
NJM431M

■ EQUIVALENT CIRCUIT



NJM431

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

($T_a=25^\circ\text{C}$)

PARAMETER	SYMBOL	RATINGS	UNIT
Cathode Voltage (note)	V_{KA}	37	V
Continuous Cathode Current	I_{KA}	-100 to 150	mA
Reference Input Current	I_{REF}	-0.05 to 10	mA
Power Dissipation	P_D	(DIP8) 700 (DMP8) 300 (TO92) 500 (SOT89) 350	mW mW mW mW
Operating Temperature	T_{opr}	-40 to +85	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-40 to +125	$^\circ\text{C}$

(note) Unless specified, all voltage value are with respect to the anode terminal.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Cathode Voltage	V_{KA}	V_{REF}	-	36	V
Cathode Current	I_K	1	-	100	mA

■ ELECTRICAL CHARACTERISTICS ($T_a=25^\circ\text{C}$)

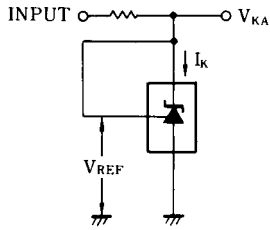
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Reference Voltage	V_{REF}	$V_{KA} = V_{REF}$, $I_K = 10\text{mA}$ (note 1)	2440	2495	2550	mV	
Reference Voltage Change (Full Oper. Temp. Range)	V_{REF} (dev)	$V_{KA} = V_{REF}$, $I_K = 10\text{mA}$ (note 1) $T_a = -20^\circ\text{C}$ to $+85^\circ\text{C}$	-	8	17	mV	
Reference Voltage Change vs. Cathode Voltage Change	$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	$I_K = 10\text{mA}$ (note 2)	$\Delta V_{KA} = 10\text{V} - V_{REF}$	-	-1.4	-2.7	mV/V
	$\Delta V_{KA} = 36\text{V} - 10\text{V}$		-	-1	-2	mV/V	
Reference Input Current	I_{REF}	$I_K = 10\text{mA}$, $R_1 = 10\text{k}\Omega$, $R_2 = \infty$ (note 2)	-	2	4	μA	
Reference Input Current Change (Full Oper. Temp. Range)	I_{REF} (dev)	$I_K = 10\text{mA}$, $R_1 = 10\text{k}\Omega$, $R_2 = \infty$ (note 2) $T_a = -20^\circ\text{C}$ to $+85^\circ\text{C}$	-	0.4	1.2	μA	
Minimum Input Current	I_{MIN}	$V_{KA} = V_{REF}$ (note 1)	-	0.4	1.0	mA	
Cathode Current (Off Cond.)	I_{OFF}	$V_{KA} = 36\text{V}$, $V_{REF} = 0$ (note 3)	-	0.1	1.0	μA	
Dynamic Impedance	$ Z_{KA} $	$V_{KA} = V_{REF}$, $I_K = 1\text{mA}$ to 100mA , $f \leq 1\text{kHz}$ (note 1)	-	0.2	0.5	Ω	

(note 1) TEST CIRCUIT (Fig. 1)

(note 2) TEST CIRCUIT (Fig. 2)

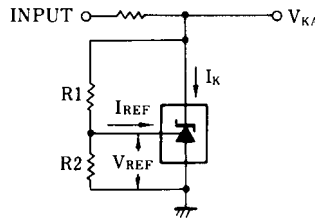
(note 3) TEST CIRCUIT (Fig. 3)

TEST CIRCUITS



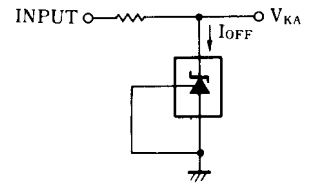
1. $V_{KA} = V_{REF}$
 $V_O = V_{KA} = V_{REF}$

(Fig. 1)



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

(Fig. 2)

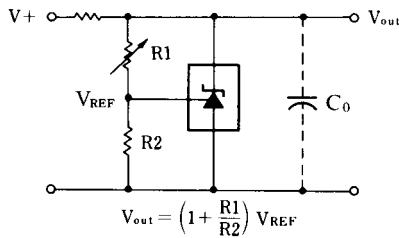


3. I_{OFF}

(Fig. 3)

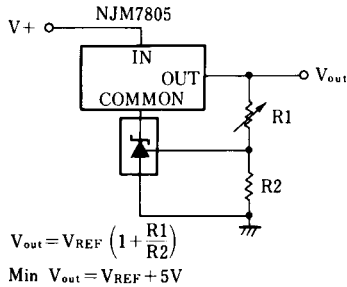
TYPICAL APPLICATION

(1) Shunt Regulator



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

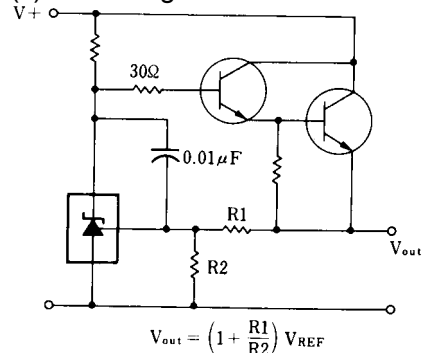
(3) Output Control of a Three-Terminal fixed Regulator



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

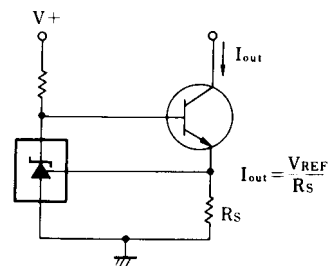
Min $V_{out} = V_{REF} + 5V$

(2) Series Regulator



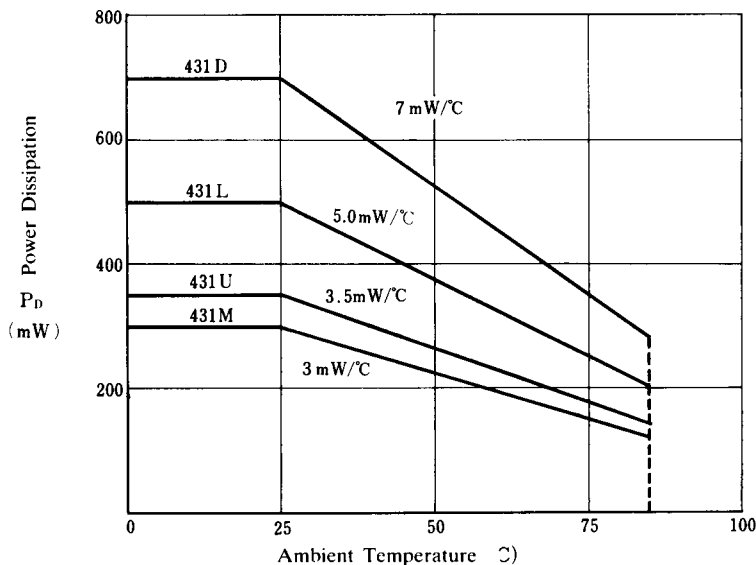
$$V_{out} = \left(1 + \frac{R1}{R2} \right) V_{REF}$$

(4) Constant Current Source



$$I_{out} = \frac{V_{REF}}{R_s}$$

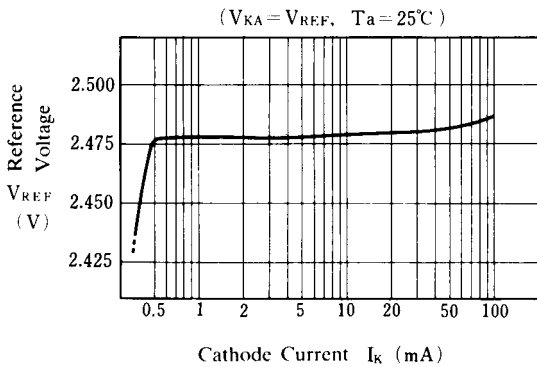
POWER DISSIPATION VS. AMBIENT TEMPERATURE



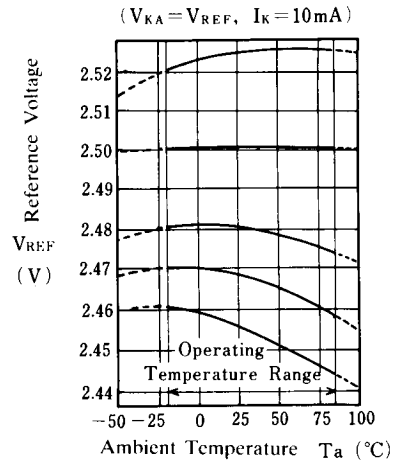
NJM431

■ TYPICAL CHARACTERISTICS

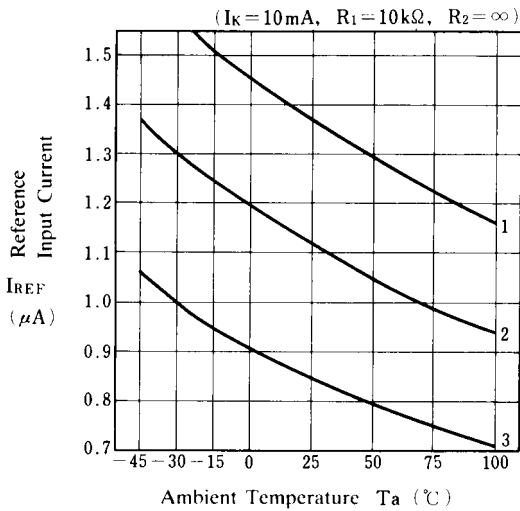
Reference Voltage



Reference Voltage



Reference Input Current

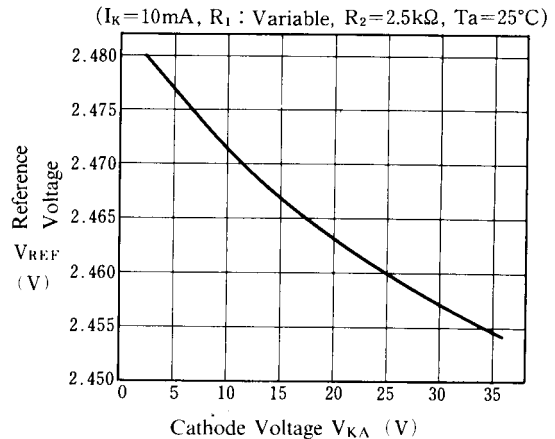


I_{REF} (dev)

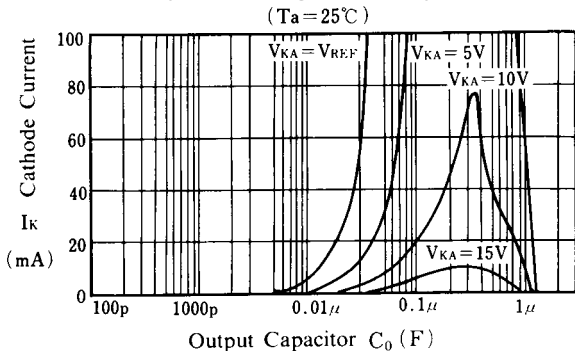
No.1	-0.38 μA
No.2	-0.27 μA
No.3	-0.21 μA

V_{REF} (dev)	($T_a = -20$ to 25°C)	($T_a = 25$ to 85°C)	($T_a = 25^\circ\text{C}$)
No. 1	+5mV	+1mV	2525mV
No. 2	0mV	0mV	2501mV
No. 3	0mV	-6mV	2481mV
No. 4	-2mV	-9mV	2468mV
No. 5	-5mV	-12mV	2456mV

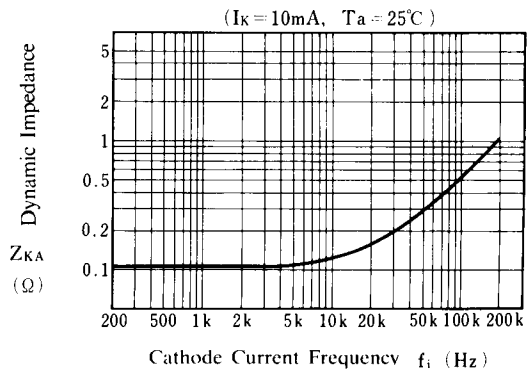
Reference Voltage



Safety Operating Boundary Condition



Dynamic Impedance



Note) Oscillation might occur while operating within the range of safety curve. So that, it is necessary to make ample margins by taking considerations of fluctuation of the device.

[CAUTION]
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