NJM431

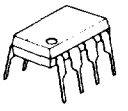
The NJM431 is a three-terminal adjustable shunt regulator. The output voltage may be set to any value between V_{REF} (about 2.5V) and 36V by two resistors. Output circuitry shows a sharp turn-on characteristics. Applications include shunt regulators, series regulators for small power and isolation regulators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

■ Absolute Maximum Ratings (Ta=25°C)

Cathode Voltage (note 1)	V_{KA}	37V
Continuous Cathode Current	I_{KA}	−100mA~150mA
Reference Input Current	I_{REF}	−50μA~10mA
Power Dissipation	P_D (L-Type)	500mW
	(D-Type)	700mW
	(M-Type)	300mW
	(U-Type)	350mW
Operating Temperature Range	T_{opr}	−20°C~+85°C
Storage Temperature Range	T_{stg}	−40°C~+125°C

(note 1) Unless specified, all voltage values are with respect to the anode terminal.

■ Package Outline

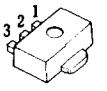


NJM431D

NJM431M
NJM431E

1. REF
2. ANODE
3. CATHODE

NJM431L (TO-92)



NJM431U (SOT 89)

■ Recommended Operating Conditions

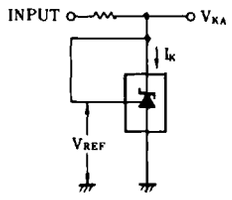
Parameter	Symbol	Min.	Typ.	Max.	Unit
Cathode Voltage	V_{KA}	V_{REF}	—	36	V
Cathode Current	I_K	1	—	100	mA

■ Electrical Characteristics (Ta=25°C)

Parameter	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Reference Voltage	V_{REF}	$V_{KA}=V_{REF}$, I_K=10mA (note 1)		2440	2495	2550	mV
Reference Voltage Change (Full Oper. Temp. Range)	V_{REF} (dev)	$V_{KA}=V_{REF}$, I_K=10mA (note 1) Ta=−20°C~+85°C		—	8	17	mV
Reference Voltage Change vs. Cathode Voltage Change	$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	I_K=10mA (note 2)	$\Delta V_{KA}=10V-V_{REF}$	—	−1.4	−2.7	mV/V
			$\Delta V_{KA}=36V-10V$	—	−1	−2	mV/V
Reference Input Current	I_{REF}	I_K=10mA, R_1=10kΩ, R_2=∞ (note 2)		—	2	4	μA
Reference Input Current Change (Full Oper. Temp. Range)	I_{REF} (dev)	I_K=10mA, R_1=10kΩ, R_2=∞ (note 2) Ta=−20°C~+85°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}=36V, V_{REF}=0 (note 3)		—	0.1	1.0	μA
Dynamic Impedance	$\lvert Z_{KA}\rvert$	$V_{KA}=V_{REF}$, I_K=1mA~100mA, f≦1kHz (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)

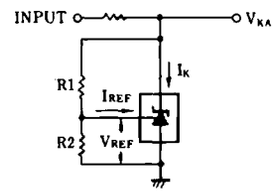
■ Test Circuits



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

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

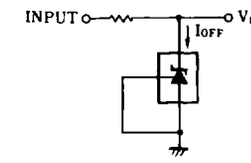
(Fig. 1)



2 . $V_{KA} > V_{REF}$

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

(Fig. 2)

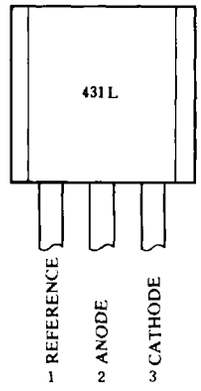


3 . I_{OFF}

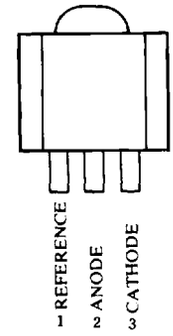
(Fig. 3)

■ Connection Diagram

L-Type

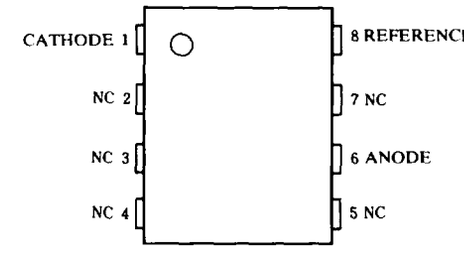


U-Type

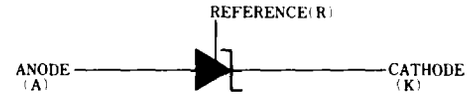


D,M-Type

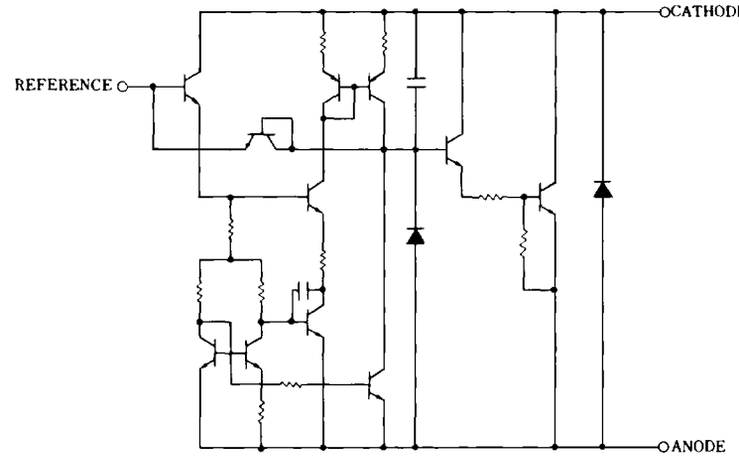
(Top View)



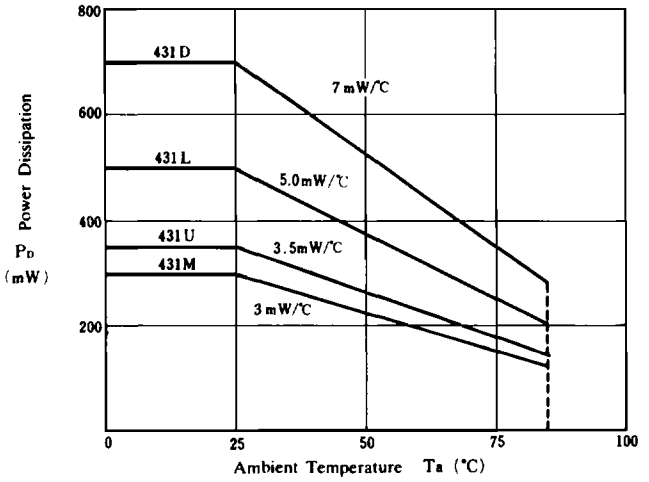
■ Block Diagram



■ Equivalent Circuit



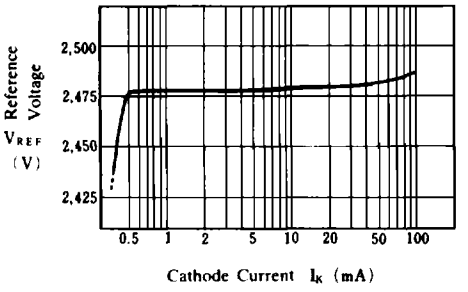
■ Power Dissipation vs. Ambient Temperature



■ Typical Characteristics

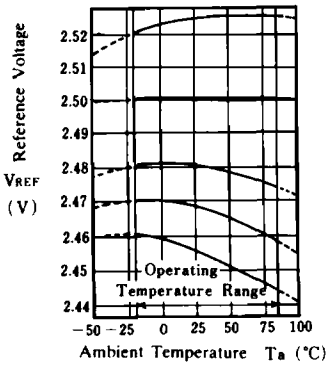
Reference Voltage

($V_{KA}=V_{REF}$, $Ta=25℃$)



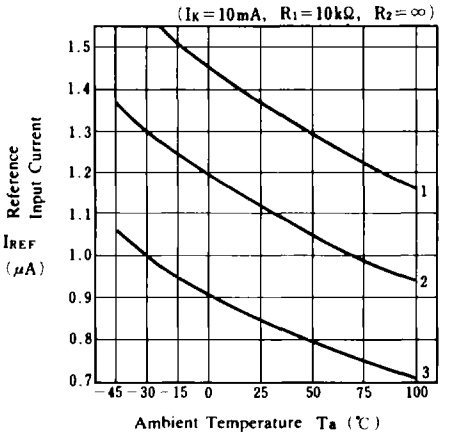
Reference Voltage

($V_{KA}=V_{REF}$, $I_K=10mA$)



Reference Input Current

($I_K=10mA$, $R_1=10kΩ$, $R_2=∞$)



I_{REF}(dev)
No.1 −0.38μA
No.2 −0.27μA
No.3 −0.21μA

V_{REF}(dev)	(Ta=−20~25°C)	(Ta=25~85°C)	(Ta=25°C)
No.1	+ 5 mV	+ 1 mV	2525mV
No.2	0 mV	0 mV	2501mV
No.3	0 mV	− 6 mV	2481mV
No.4	− 2 mV	− 9 mV	2468mV
No.5	− 5 mV	−12mV	2456mV

Reference Voltage

($I_K=10mA$, R_1 : Variable, $R_2=2.5kΩ$, $Ta=25°C$)