

ADJUSTABLE HIGH PRECISION SHUNT REGULATOR

■ GENERAL DESCRIPTION

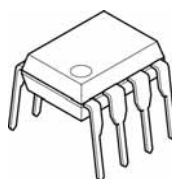
The **NJM2380/A** and **NJM2390/A** are adjustable high precision shunt regulators.

They are adapted for downsizing power supply module, battery charger and others, because an ultra mini package SOT23-5 is included in the package line-up.

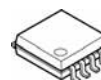
■ FEATURES

- Operating Voltage V_{REF} to 18V
- High Precision Voltage Reference $2.465V \pm 2\%$
 $2.465V \pm 1\%$: A Version
- Mounted in Ultra Mini Package SOT23-5
- Minimum External Parts
- Bipolar Technology
- Package Outline DIP8, DMP8, SOP8 JEDEC 150mil
SOT89-3, SOT23-5

■ PACKAGE OUTLINE



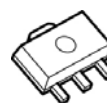
NJM2380D/AD
(DIP8)



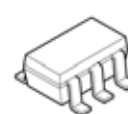
NJM2380M/AM
(DMP8)



NJM2380E/AE
(SOP8)

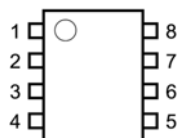


NJM2380U/AU
NJM2390U/AU
(SOT89-3)



NJM2380F/AF
(SOT23-5)

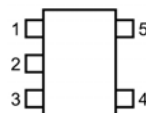
■ PIN CONFIGURATION



NJM2380D/AD
NJM2380M/AM
NJM2380E/AE

PIN FUNCTION

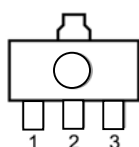
1. CATHODE
2. NC
3. NC
4. NC
5. NC
6. ANODE
7. NC
8. REFERENCE



NJM2380F/AF

PIN FUNCTION

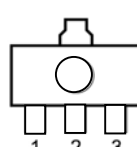
1. NC
2. ANODE
3. NC
4. CATHODE
5. REFERENCE



NJM2380U/AU

PIN FUNCTION

1. REFERENCE
2. ANODE
3. CATHODE

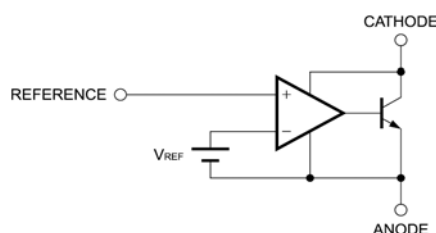


NJM2390U/AU

PIN FUNCTION

1. CATHODE
2. ANODE
3. REFERENCE

■ BLOCK DIAGRAM



NJM2380/A, NJM2390/A

■ ABSOLUTE MAXIMUM RATINGS

(T_a=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Cathode Voltage	V _{KA}	+20	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 (SOP8) 300 (SOT89) 350 (SOT23) 200	mW
Operating Temperature Range	T _{OPR}	-40 to +85	°C
Storage Temperature Range	T _{STG}	-50 to +150	°C

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Cathode Voltage	V _{KA}	V _{REF}	-	18	V
Cathode Current	I _K	1		100	mA

■ ELECTRICAL CHARACTERISTICS

(I_K=10mA, T_a=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Reference Voltage	V _{REF}	V _{KA} =V _{REF} (*1)	2415	2465	2515	mV
		V _{KA} =V _{REF} (*1), A Version	2440	2465	2490	
Reference Voltage Change vs. Cathode Voltage Change	V _{REF} /V _{KA}	V _{REF} ≤ V _{KA} ≤ 10V(*2)	-	±1.4	±2.7	mV/V
		10 ≤ V _{KA} ≤ 18V(*2)	-	±1	±2	mV/V
Reference Input Current	I _{REF}	R=10kΩ, R2=∞(*2)	-	2	4	μA
Minimum Input Current	I _{MIN}	V _{KA} =V _{REF} (*1)	-	0.4	1.0	mA
Cathode Current (Off Cond.)	I _{OFF}	V _{KA} =18V, V _{REF} =0V(*3)	-	0.1	1.0	μA
Dynamic Impedance	Z _{KA}	V _{KA} =V _{REF} , f≤1kHz 1mA≤I _K ≤100mA(*1)	-	0.2	-	Ω

■ TEMPERATURE CHARACTERISTICS

(I_K=10mA, T_a=-20 to +85°C)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Reference Voltage Change	ΔV _{REF}	V _{KA} =V _{REF} (*1)	-	8	17	mV
Reference Input Current Change	ΔI _{REF}	R1=10kΩ, R2=∞(*2)	-	0.4	1.2	μA

The "Reference Voltage Change" and "Reference Input Current Change" is tested to using some samples of the first five lots. These "TEMPERATURE CHARACTERISTICS" are not guaranteed.

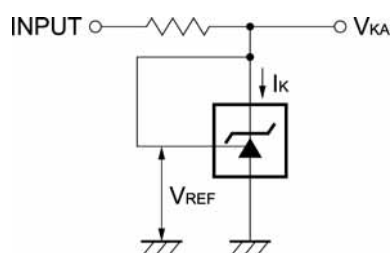
|V_{REF}| ... Reference voltage includes error.

(*1) : TEST CIRCUIT 1 (Fig.1)

(*2) : TEST CIRCUIT 2 (Fig.2)

(*3) : TEST CIRCUIT 3 (Fig.3)

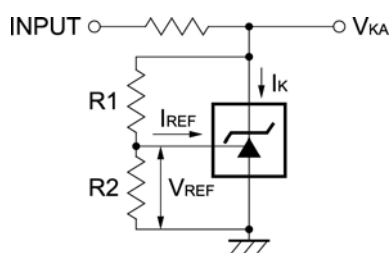
■ TEST CIRCUIT



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

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

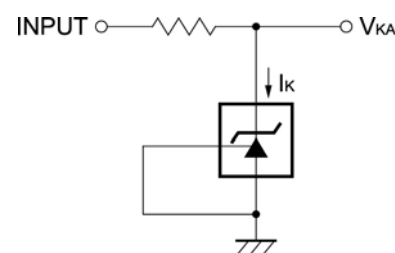
(Fig.1)



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

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

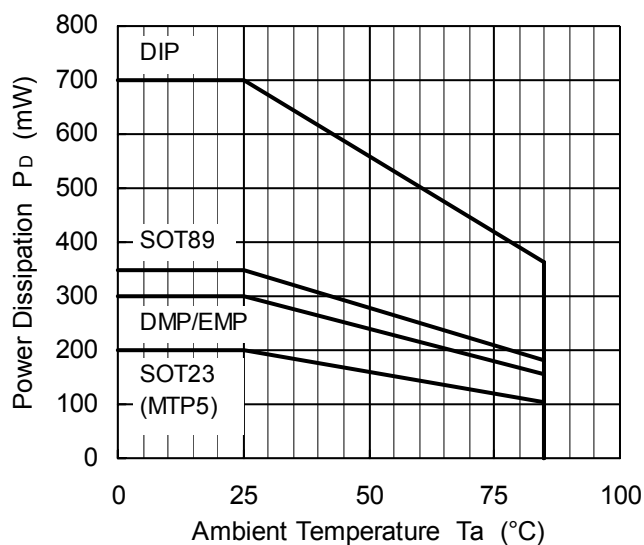
(Fig.2)



3, I_{OFF}

(Fig.3)

■ POWER DISSIPATION VS. AMBIENT TEMPERATURE

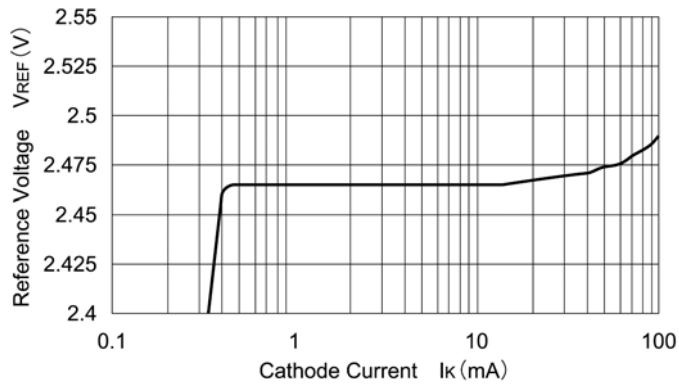


NJM2380/A, NJM2390/A

■ TYPICAL CHARACTERISTICS

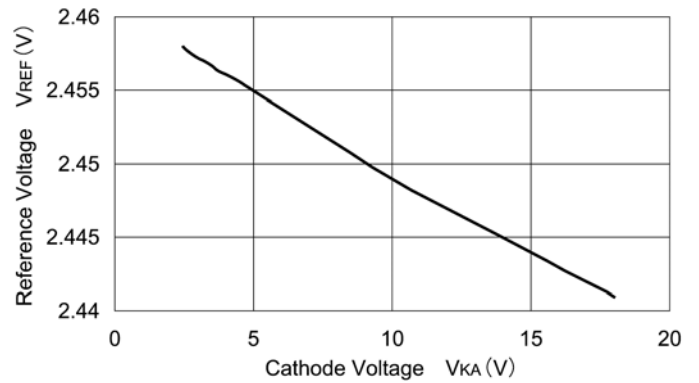
Reference Voltage

($V_{KA}=V_{REF}$, $T_a=25^\circ\text{C}$)



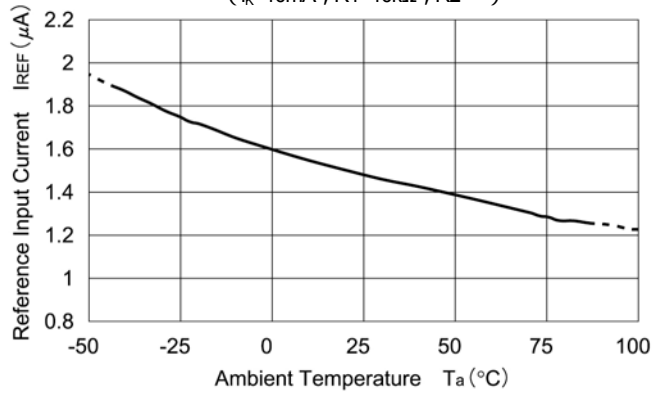
Reference Voltage

($I_k=10\text{mA}$, $R_1=\text{Variable}$, $R_2=2.5\text{k}\Omega$, $T_a=25^\circ\text{C}$)



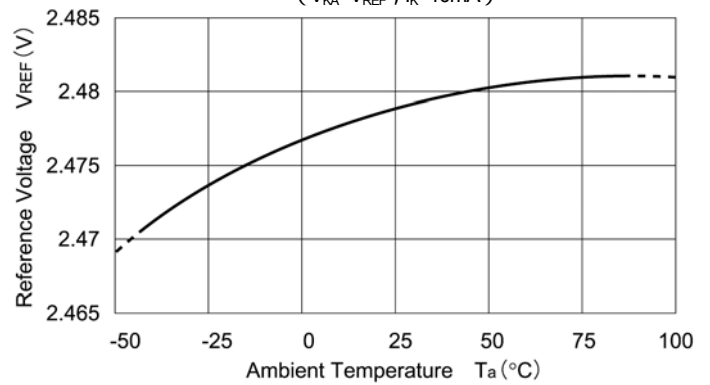
Reference Input Current

($I_k=10\text{mA}$, $R_1=10\text{k}\Omega$, $R_2=\infty$)



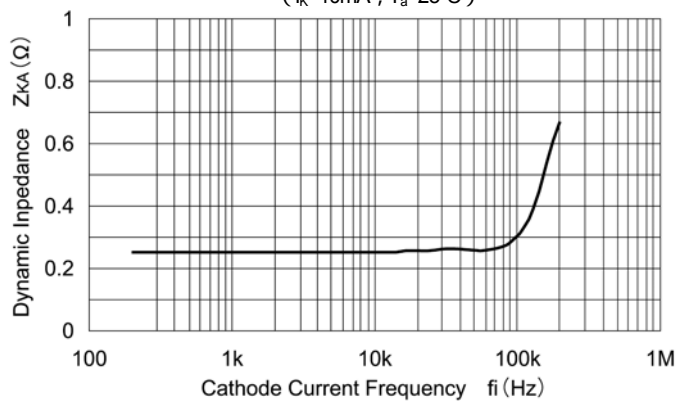
Reference Voltage

($V_{KA}=V_{REF}$, $I_k=10\text{mA}$)

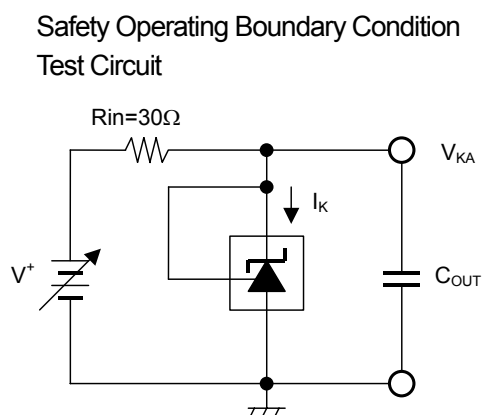
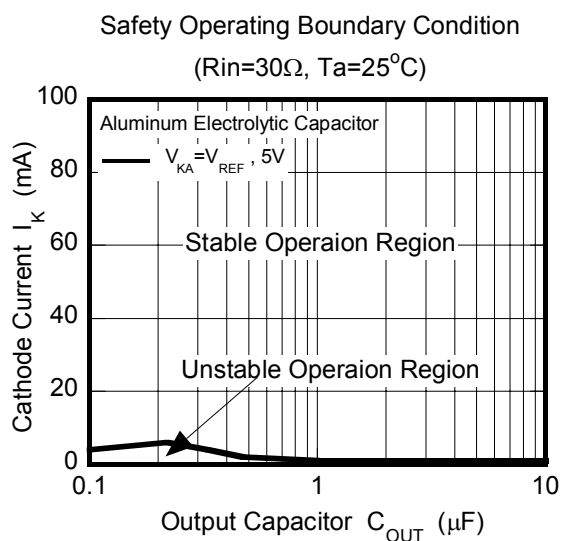


Dynamic Impedance

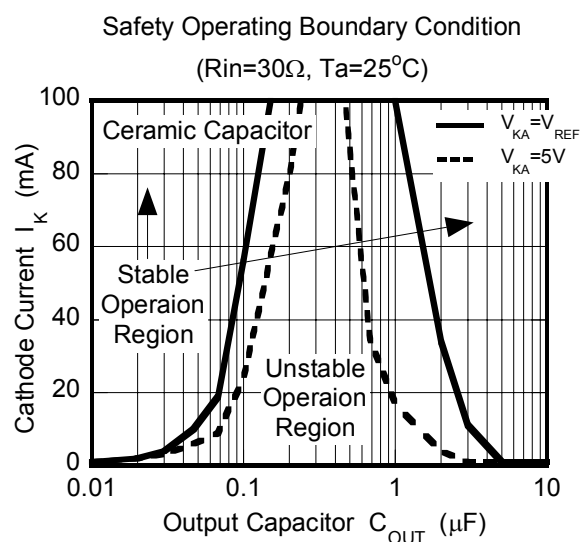
($I_k=10\text{mA}$, $T_a=25^\circ\text{C}$)



■ TYPICAL CHARACTERISTICS



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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