

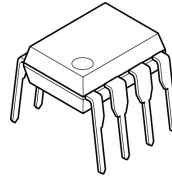
ADJUSTABLE HIGH PRECISION SHUNT REGULATOR

■ GENERAL DESCRIPTION

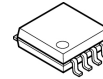
The **NJM2380/A, NJM2390/A** is an adjustable high precision shunt regulator.

It is adapted for downsizing power supply module, battery charger and others, because an ultra mini package SOT23(MTP5) is included in the package line-up.

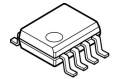
■ PACKAGE OUTLINE



NJM2380D/AD



NJM2380M/AM



NJM2380E/AE

■ 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 (MTP5)
- Minimum External Parts
- Bipolar Technology
- Package Outline DIP8, DMP8, EMP8,
SOT89 (3pin), SOT23 (MTP5)

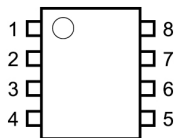


NJM2380U/AU
NJM2390U/AU



NJM2380F/AF

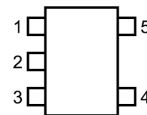
■ PIN CONFIGURATION



NJM2380D/AD
NJM2380M/AM
NJM2380E/AE

PIN FUNCTION

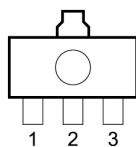
1. CATHODE
2. NC
3. NC
4. NC
5. NC
6. ANODE
7. NC
8. REFERENCE



NJM2380F/AF

PIN FUNCTION

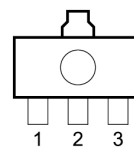
1. NC
2. ANODE
3. NC
4. CATHODE
5. REFERENCE



NJM2380U/AU

PIN FUNCTION

1. REFERENCE
2. ANODE
3. CATHODE

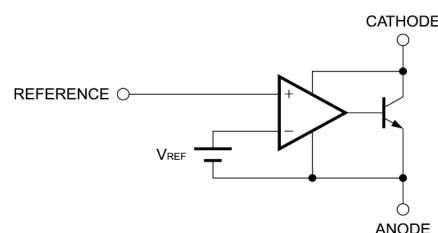


NJM2390U/AU

PIN FUNCTION

1. CATHODE
2. ANODE
3. REFERENCE

■ BLOCK DIAGRAM



NJM2380/A, NJM2390/A

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■ ABSOLUTE MAXIMUM RATINGS

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

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 (EMP8) 300 (SOT89) 350 (SOT23[MTP5]) 200	mW
Operating Temperature Range	T_{OPR}	-40 to +85	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-50 to +150	$^{\circ}\text{C}$

■ 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

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

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} \leq V_{KA} \leq 10\text{V}(*2)$	-	± 1.4	± 2.7	mV/V
		$10 \leq V_{KA} \leq 18\text{V}(*2)$	-	± 1	± 2	mV/V
Reference Input Current	I_{REF}	$R=10\text{k}\Omega$, $R2=\infty(*2)$	-	2	4	μA
Minimum Input Current	I_{MIN}	$V_{KA}=V_{REF}(*1)$	-	0.4	1.0	mA
Cathode Current (Off Cond.)	I_{OFF}	$V_{KA}=18\text{V}$, $V_{REF}=0\text{V}(*3)$	-	0.1	1.0	μA
Dynamic Impedance	$ Z_{KA} $	$V_{KA}=V_{REF}$, $f \leq 1\text{kHz}$ $1\text{mA} \leq I_K \leq 100\text{mA}(*1)$	-	0.2	-	Ω

■ TEMPERATURE CHARACTERISTICS

($I_K=10\text{mA}$, $T_a=-20$ to $+85^{\circ}\text{C}$)

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}	$R1=10\text{k}\Omega$, $R2=\infty(*2)$	-	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.

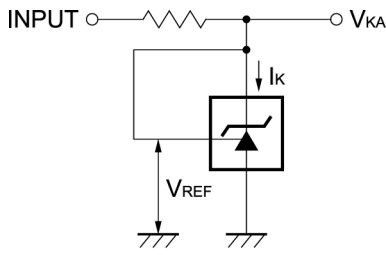
$|V_{REF}|$... Reference voltage includes error.

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

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

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

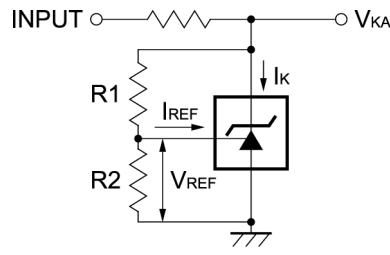
■ TEST CIRCUIT



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

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

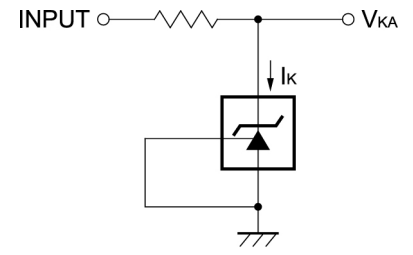
(Fig.1)



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

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

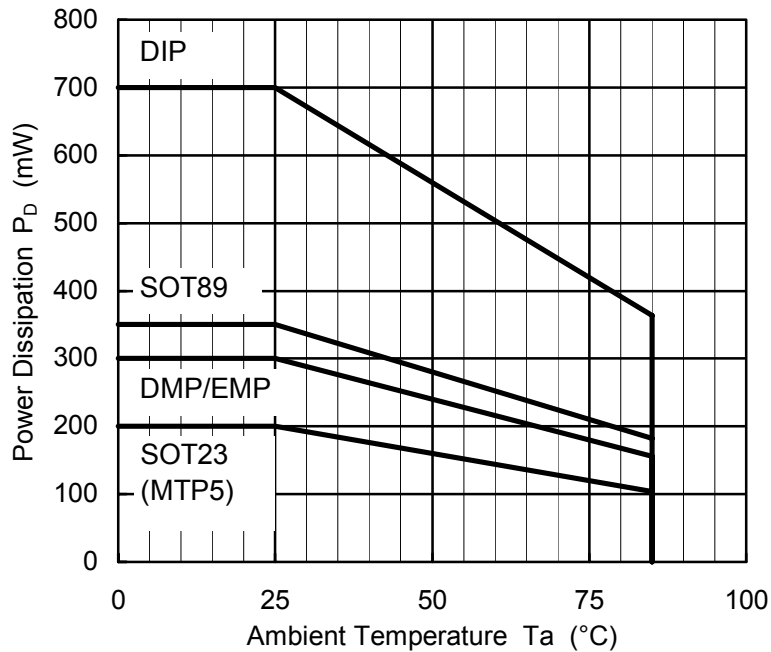
(Fig.2)



3, I_{OFF}

(Fig.3)

■ POWER DISSIPATION VS. AMBIENT TEMPERATURE



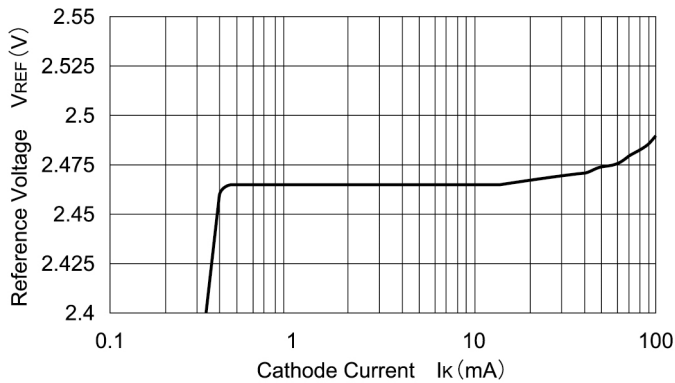
NJM2380/A, NJM2390/A

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■ TYPICAL CHARACTERISTICS

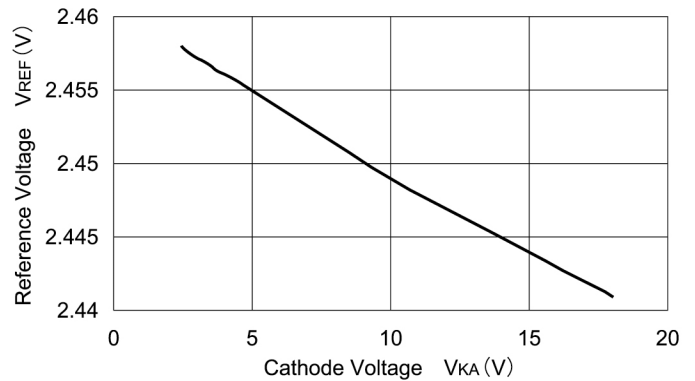
Reference Voltage

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



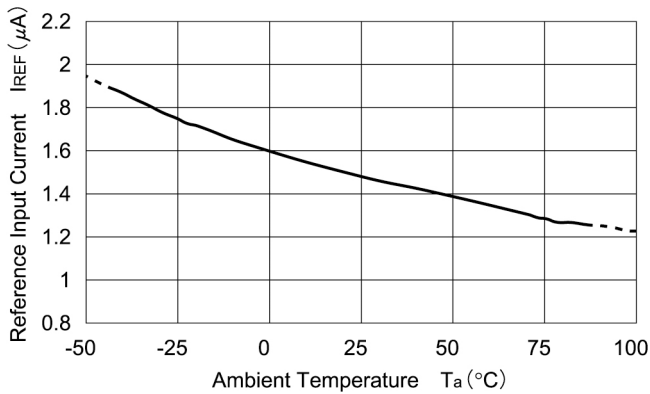
Reference Voltage

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



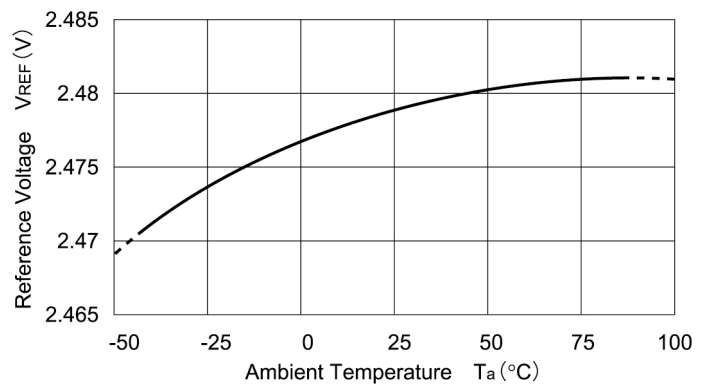
Reference Input Current

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



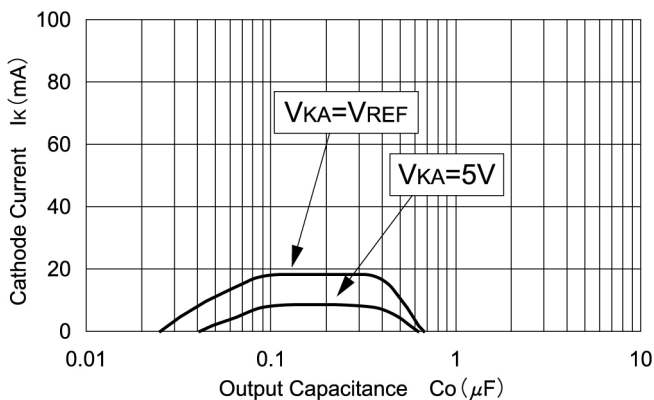
Reference Voltage

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



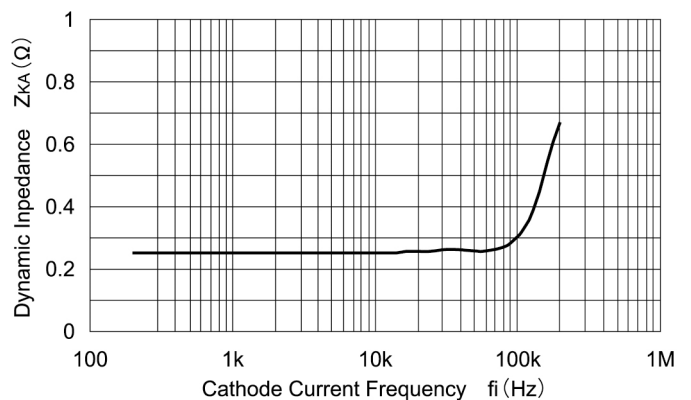
Safety Operating Boundary Condition

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



Dynamic Impedance

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



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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