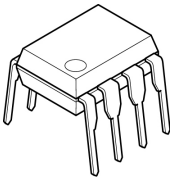
ADJUSTABLE HIGH PRECISION SHUNT REGULATOR

■ GENERAL DESCRIPTION

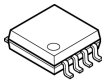
The **NJM2380/A**, **NJM2390/A** is an adjustable high precision shunt regulator.

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.

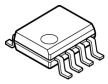
■ PACKAGE OUTLINE



NJM2380D/AD



NJM2380M/AM



NJM2380E/AE

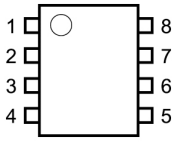
NJM2380U/AU
NJM2390U/AU

NJM2380F/AF

■ FEATURES

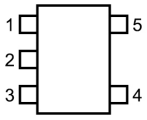
- Operating Voltage — V_{REF} to 18V
- High Precision Voltage Reference — 2.465V±2%
  2.465V±1% : A Version
- Mounted in Ultra Mini Package — SOT23 (MTP5)
- Minimum External Parts
- Bipolar Technology
- Package Outline — DIP8, DMP8, EMP8,
  SOT89 (3pin), SOT23 (MTP5)

■ PIN CONFIGURATION



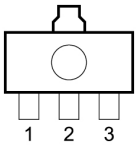
NJM2380D/AD
NJM2380M/AM
NJM2380E/AE

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



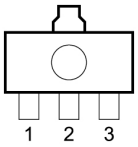
NJM2380F/AF

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



NJM2380U/AU

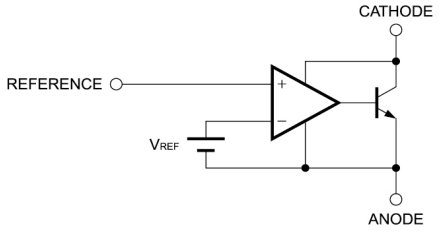
PIN FUNCTION
1. REFERENCE
2. ANODE
3. CATHODE



NJM2390U/AU

PIN FUNCTION
1. CATHODE
2. ANODE
3. REFERENCE

■ BLOCK DIAGRAM



■ 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	mW
		(DMP8)	300	
		(EMP8)	300	
		(SOT89)	350	
		(SOT23[MTP5])	200	
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}	$\lvert V_{REF} \rvert \le V_{KA} \le 10V$(*2)	-	±1.4	±2.7	mV/V
		$10 \le V_{KA} \le 18V$(*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	$\lvert Z_{KA} \rvert$	$V_{KA}=V_{REF}$, 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.

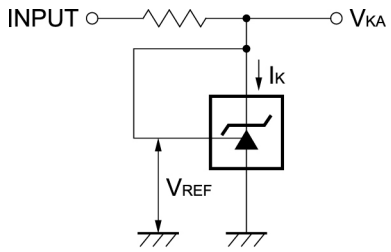
$\lvert V_{REF} \rvert$ …Reference voltage includes error.

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

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

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

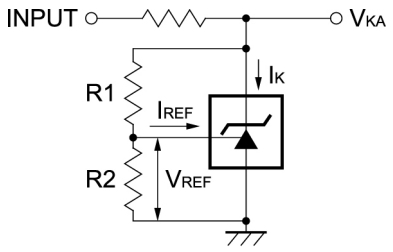
■ TEST CIRCUIT



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

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

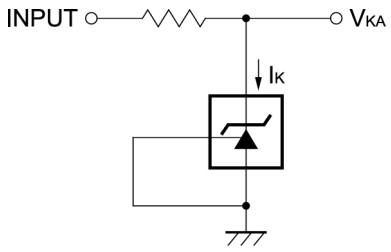
(Fig.1)



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

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

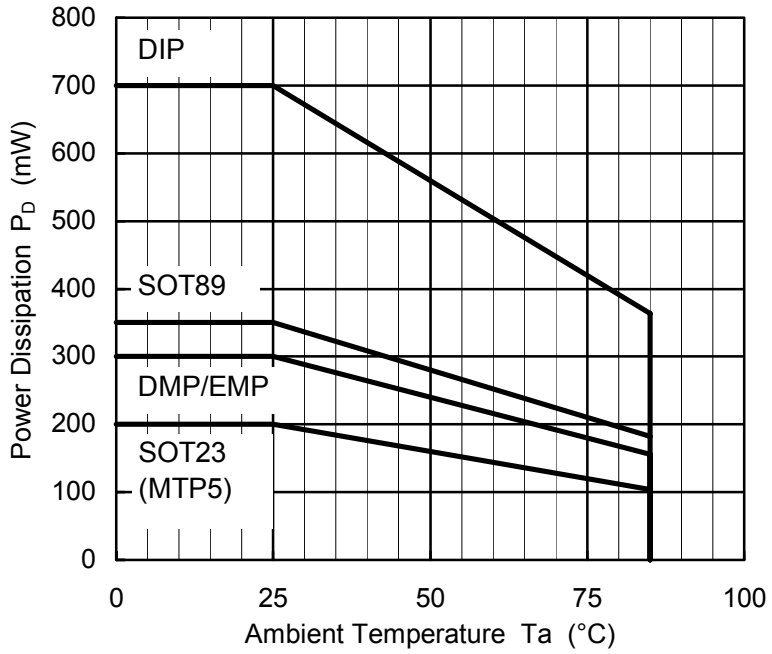
(Fig.2)



3, I_{OFF}

(Fig.3)

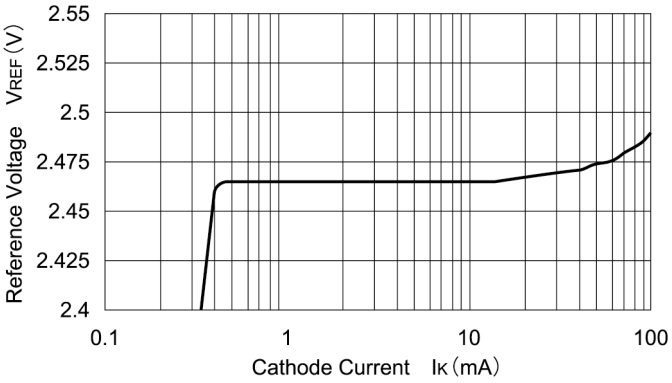
■ POWER DISSIPATION VS. AMBIENT TEMPERATURE



■ TYPICAL CHARACTERISTICS

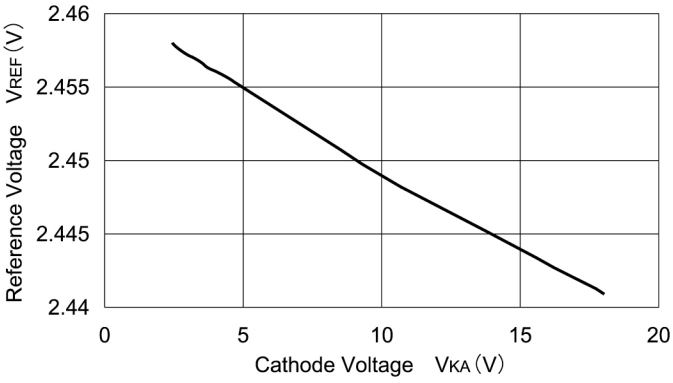
Reference Voltage

($V_{KA}=V_{REF}$, $T_a=25°C$)



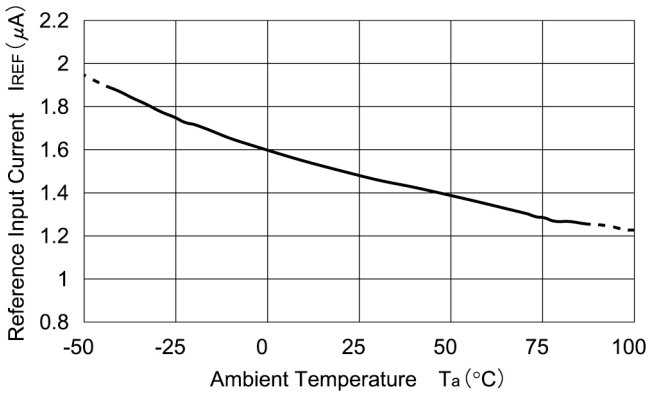
Reference Voltage

(I_K=10mA, R1=Variable, R2=2.5kΩ, $T_a=25°C$)



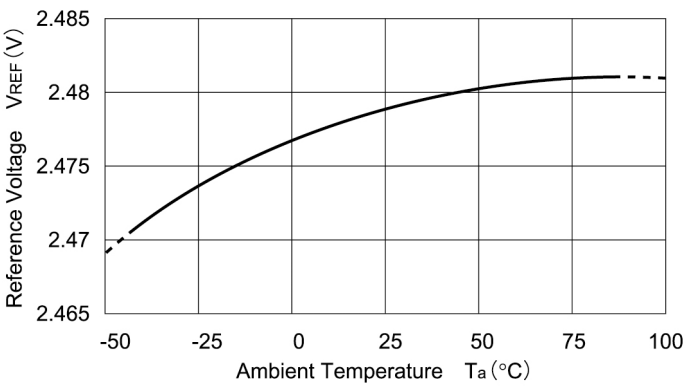
Reference Input Current

(I_K=10mA, R1=10kΩ, R2=∞)



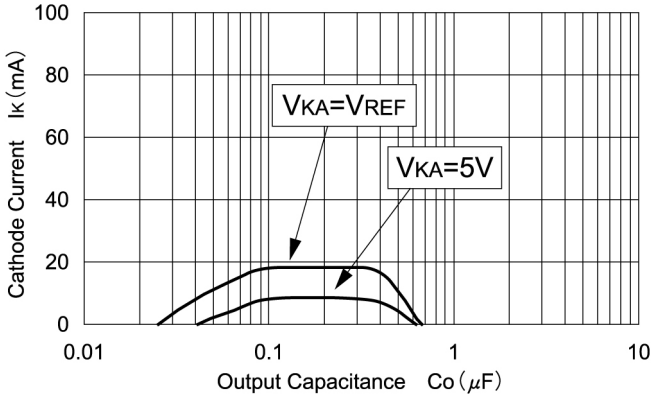
Reference Voltage

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



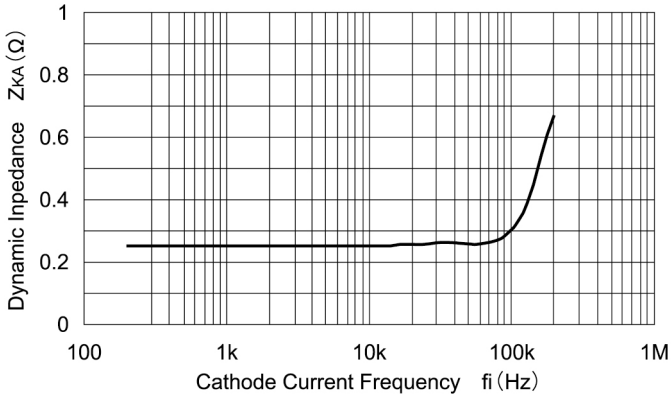
Sefety Operating Boundary Condition

($T_a=25°C$)



Dynamic Inpedance

(I_K=10mA, $T_a=25°C$)



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