

## ADJUSTABLE HIGH PRECISION SHUNT REGULATOR

### ■ GENERAL DESCRIPTION

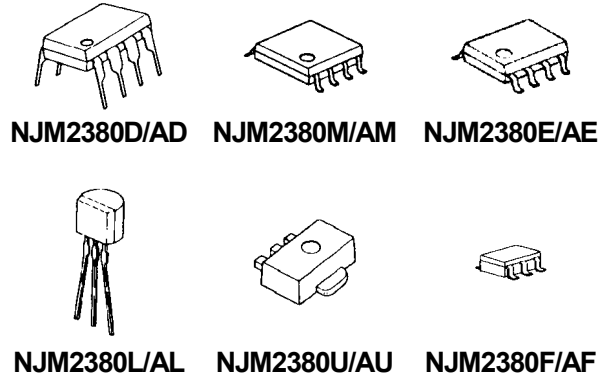
The **NJM2380/A** is an adjustable high precision shunt regulator.

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

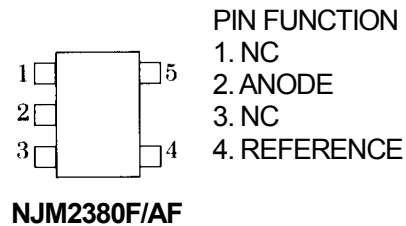
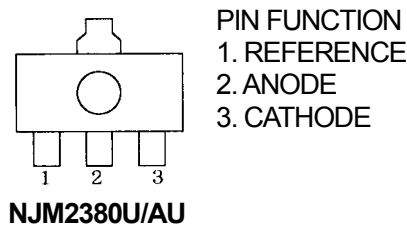
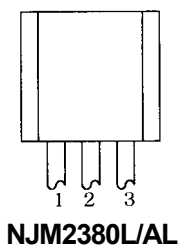
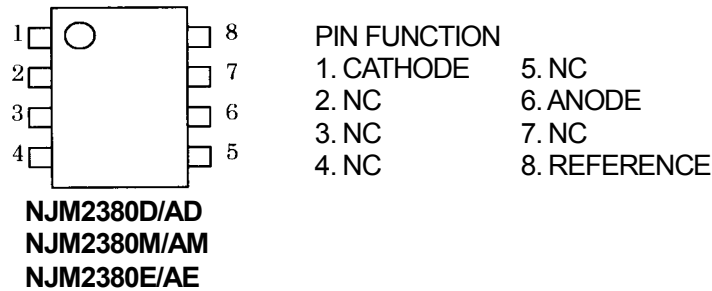
### ■ FEATURES

- 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 (MTP5)
- Minimum External Parts
- Bipolar Technology
- Package Outline DIP8, DMP8, EMP8,  
SOT-89 (3pin), TO-92, MTP5

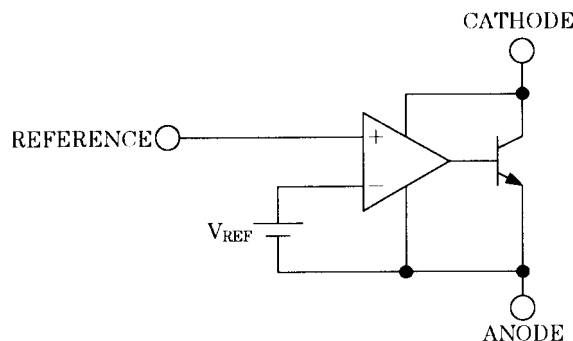
### ■ PACKAGE OUTLINE



### ■ PIN CONFIGURATION



### ■ BLOCK DIAGRAM



# NJM2380/A

## ■ ABSOLUTE MAXIMUM RATINGS (T<sub>a</sub>=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Cathode Voltage	V <sub>KA</sub>	+20	V
Continuous Cathode Current	I <sub>KA</sub>	-100 to 150	mA
Reference Input Current	I <sub>REF</sub>	-0.05 to 10	mA
Power Dissipation	P <sub>D</sub>	(DIP8) 700 (DMP8) 300 (EMP8) 300 (TO-92) 500 (SOT-89) 350 (MTP-5) 200	mW
Operating Temperature Range	T <sub>OPR</sub>	-40 to +85	°C
Storage Temperature Range	T <sub>STG</sub>	-50 to +125	°C

## ■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Cathode Voltage	V <sub>KA</sub>	V <sub>REF</sub>	-	18	V
Cathode Current	I <sub>K</sub>	1	-	100	mA

## ■ ELECTRICAL CHARACTERISTICS

(I<sub>K</sub>=10mA, T<sub>a</sub>=25°C)

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

## ■ TEMPERATURE CHARACTERISTICS

(I<sub>K</sub>=10mA, T<sub>a</sub>=-20 to +85°C)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Reference Voltage Change	ΔV <sub>REF</sub>	V <sub>KA</sub> =V <sub>REF</sub> (*1)	-	8	17	mV
Reference Input Current Change	ΔI <sub>REF</sub>	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.

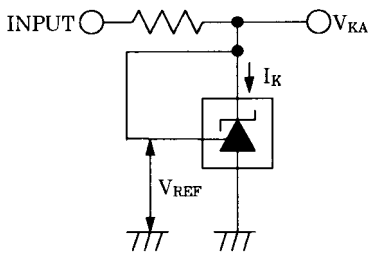
|V<sub>REF</sub>| ... Reference voltage includes error.

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

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

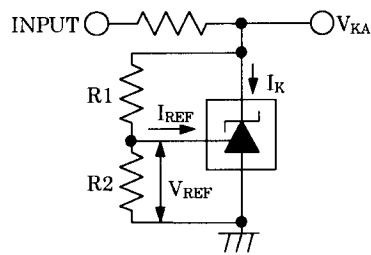
(\*3) : TEST CIRCUIT 3 (Fig.3)

## ■ TEST CIRCUIT



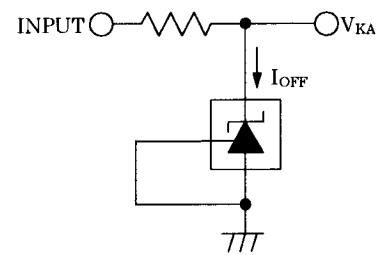
1,  $V_{KA} = V_{REF}$   
 $V_O = V_{KA} = V_{REF}$

(Fig.1)



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

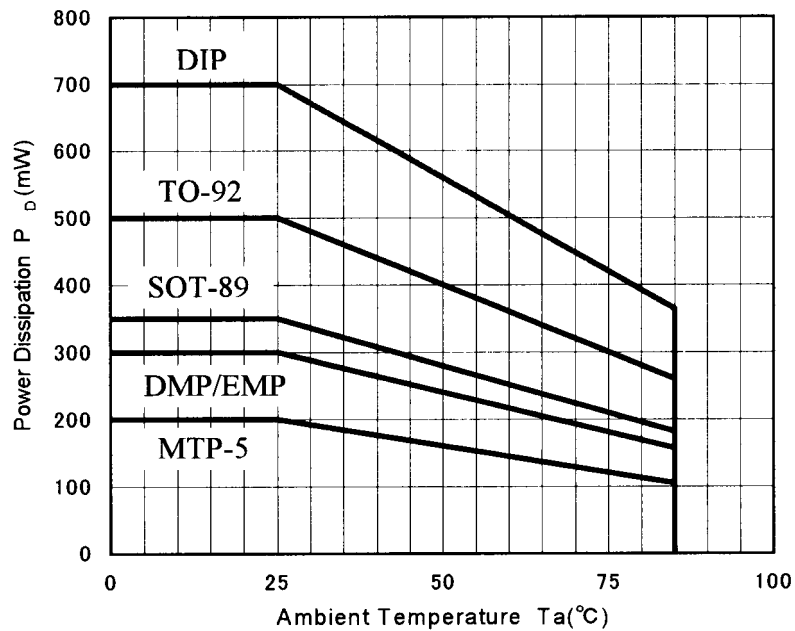
(Fig.2)



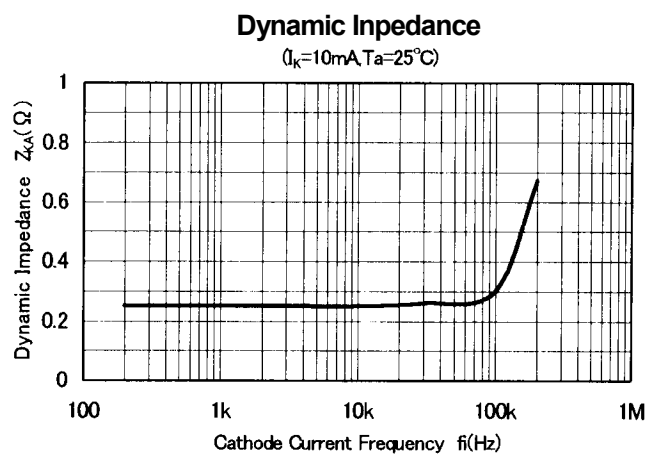
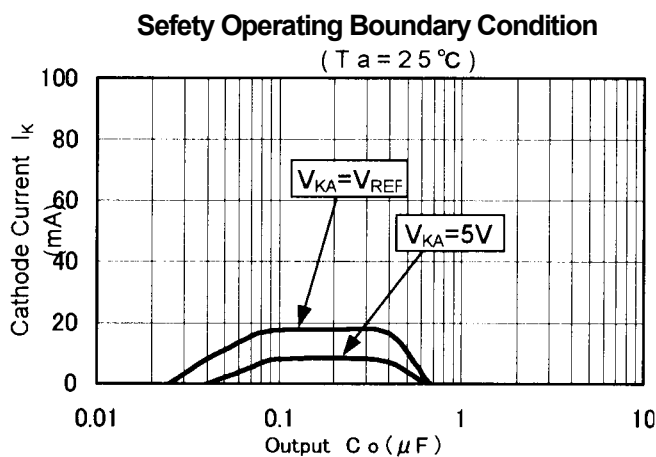
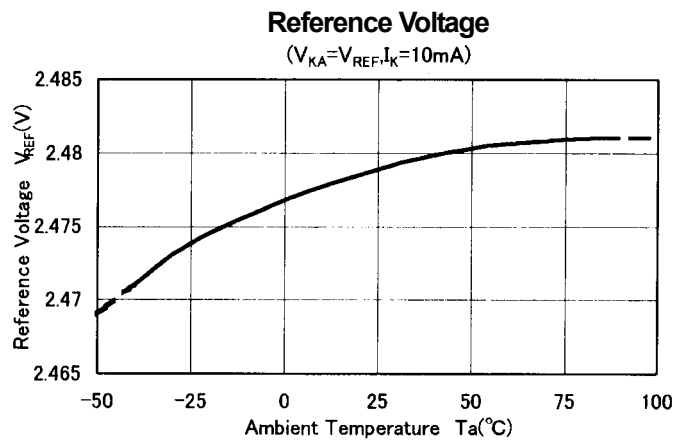
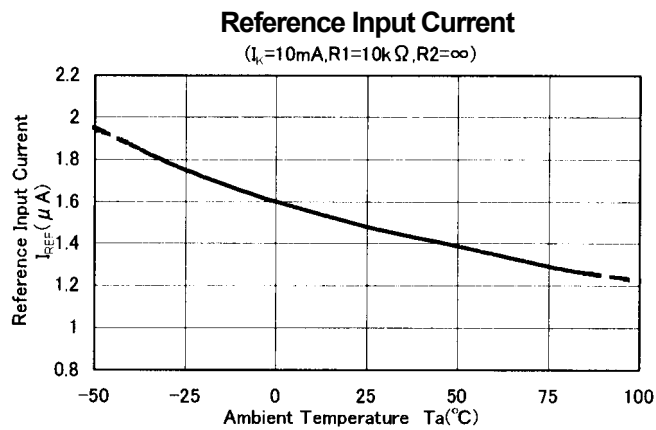
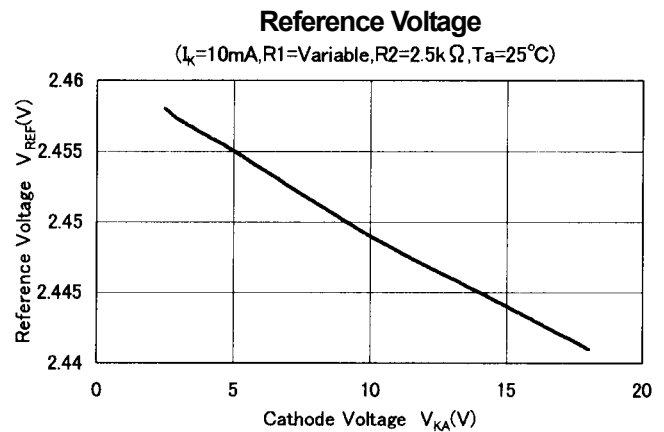
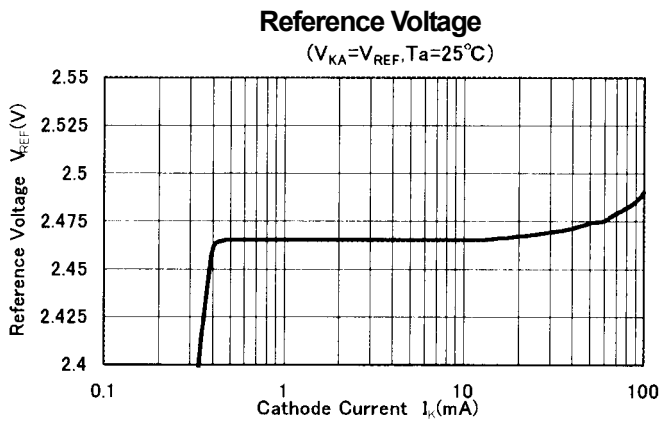
3,  $I_{OFF}$

(Fig.3)

## ■ POWER DISSIPATION VS. AMBIENT TEMPERATURE



## ■ 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]  
The specifications on this databook are only given for information, without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.