

## 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.

### ■ PACKAGE OUTLINE



NJM2380D/AD



NJM2380M/AM



NJM2380E/AE



NJM2380L/AL



NJM2380U/AU

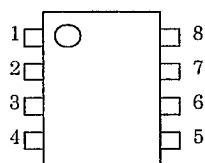


NJM2380F/AF

### ■ FEATURES

- Operating Voltage ( $V_{REF} \sim 18V$ )
- 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

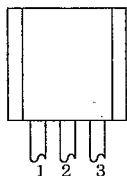
### ■ PIN CONFIGURATION



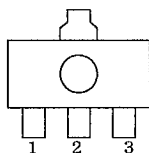
NJM2380D/AD  
NJM2380M/AM  
NJM2380E/AE

#### PIN FUNCTION

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



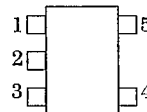
NJM2380L/AL



NJM2380U/AU

#### PIN FUNCTION

1. REFERENCE
2. ANODE
3. CATHODE

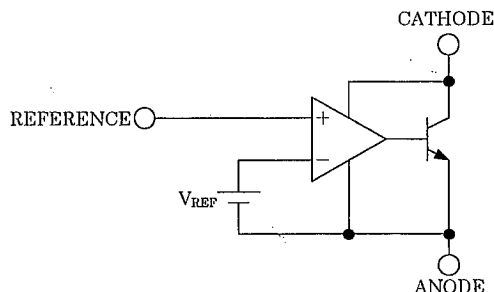


NJM2380F/AF

#### PIN FUNCTION

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

### ■ BLOCK DIAGRAM



## ■ABSOLUTE MAXIMUM RATING

(Ta=25°C)

| PARAMETER                  | SYMBOL    | RATINGS                                                                              | UNIT |
|----------------------------|-----------|--------------------------------------------------------------------------------------|------|
| Cathode Voltage            | $V_{KA}$  | +20                                                                                  | V    |
| Continuous Cathode Current | $I_{KA}$  | -100~150                                                                             | mA   |
| Reference Input Current    | $I_{REF}$ | -0.05~10                                                                             | mA   |
| Power Dissipation          | $P_D$     | (DIP8) 700<br>(DMP8) 300<br>(EMP8) 300<br>(TO-92) 500<br>(SOT-89) 350<br>(MTP-5) 200 | mW   |
| Operating Temperature      | $T_{opr}$ | -40~+85                                                                              | °C   |
| Storage Temperature        | $T_{stg}$ | -50~+150                                                                             | °C   |

## ■RECOMMENDED OPERATING CONDITION

| PARAMETER       | SYMBOL   | MIN.      | TYP. | MAX. | UNIT |
|-----------------|----------|-----------|------|------|------|
| Cathode Voltage | $V_{KA}$ | $V_{REF}$ | —    | 18   | V    |
| Cathode Current | $I_K$    | 1         | —    | 100  | mA   |

## ■ELECTORICAL CHARACTERISTICS ( $I_K=10mA, T_a=25°C$ )

| PARAMETER                                           | SYMBOL                         | CONDITION                                                      | 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 | $\Delta V_{REF}/\Delta V_{KA}$ | $ V_{REF}  \leq V_{KA} \leq 10V(*2)$                           | —    | $\pm 1.4$ | $\pm 2.7$ | mV/V     |
|                                                     |                                | $10 \leq V_{KA} \leq 18V(*2)$                                  | —    | $\pm 1$   | $\pm 2$   | mV/V     |
| Reference Input Current                             | $I_{REF}$                      | $R1=10k\Omega, R2=\infty(*2)$                                  | —    | 2         | 4         | $\mu A$  |
| 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       | $\mu A$  |
| Dynamic Impedance                                   | $ Z_{KA} $                     | $V_{KA}=V_{REF}, f \leq 1kHz$<br>$1mA \leq I_K \leq 100mA(*1)$ | —    | 0.2       | —         | $\Omega$ |

## ■TEMPERATURE CHARACTERISTICS ( $I_K=10mA, T_a=-20 \sim +85°C$ )

| PARAMETER                      | SYMBOL           | CONDITION                     | MIN. | TYP. | MAX. | UNIT    |
|--------------------------------|------------------|-------------------------------|------|------|------|---------|
| Reference Voltage Change       | $\Delta V_{REF}$ | $V_{KA}=V_{REF}(*1)$          | —    | 8    | 17   | mV      |
| Reference Input Current Change | $\Delta I_{REF}$ | $R1=10k\Omega, R2=\infty(*2)$ | —    | 0.4  | 1.2  | $\mu A$ |

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.

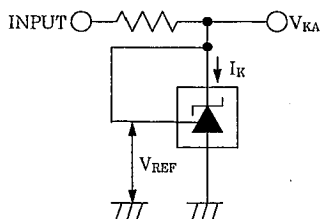
$|V_{REF}|$  ...Reference voltage includes error.

(\*1) : TEST CIRCUIT1(Fig.1)

(\*2) : TEST CIRCUIT2(Fig.2)

(\*3) : TEST CIRCUIT3(Fig.3)

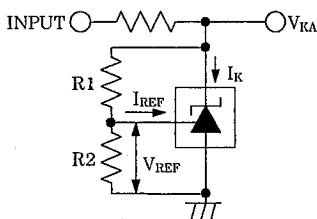
■ TEST CIRCUIT



1、 $V_{KA} = V_{REF}$

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

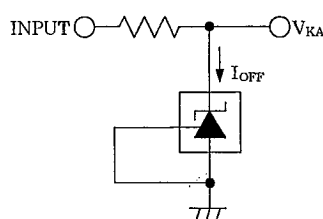
(Fig.1)



2、 $V_{KA} > V_{REF}$

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

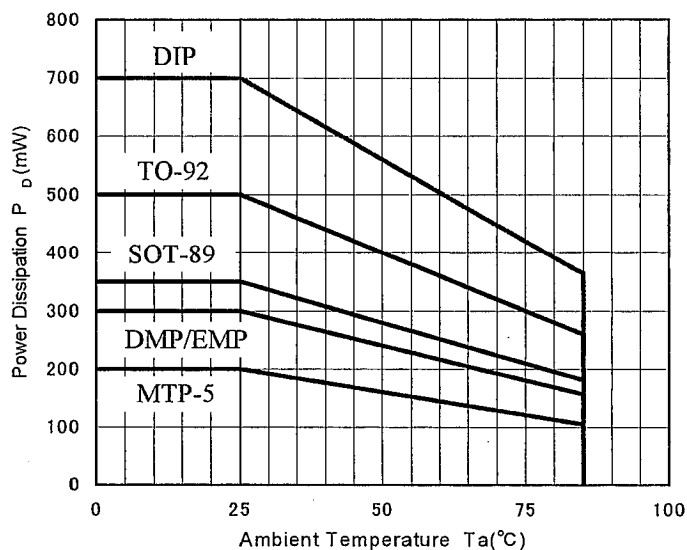
(Fig.2)



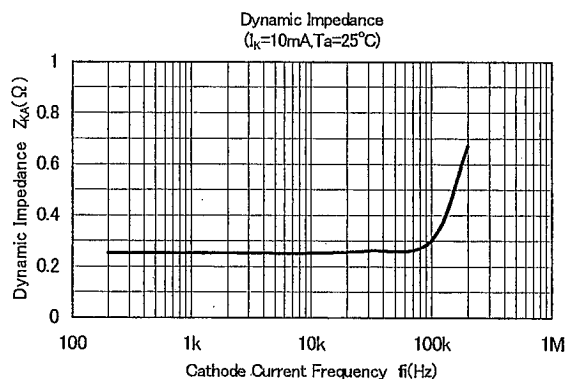
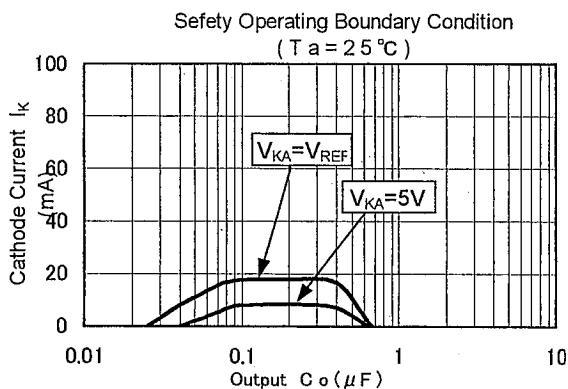
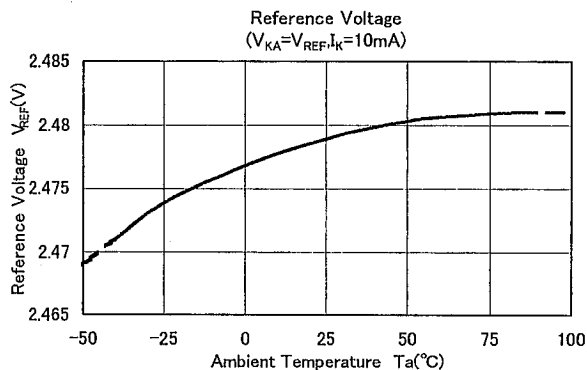
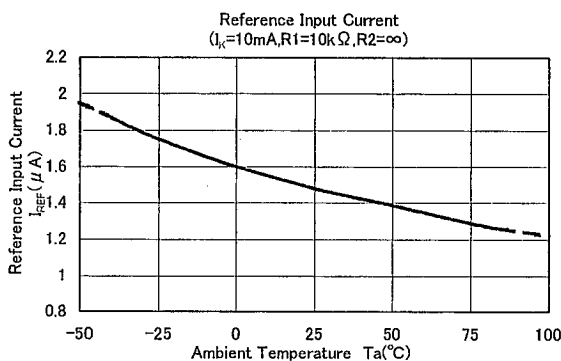
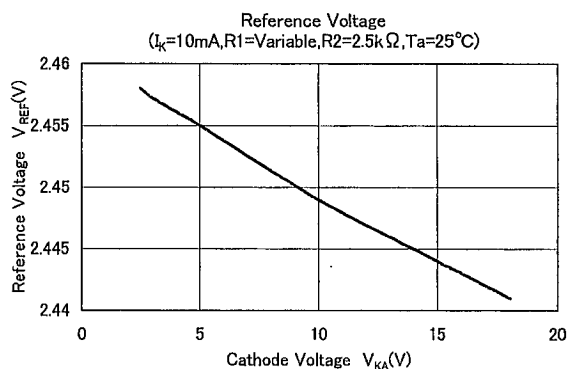
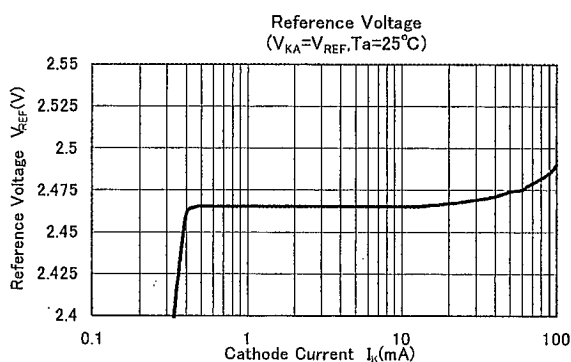
3、 $I_{OFF}$

(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

## MEMO

**[CAUTION]**

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