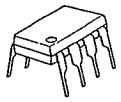
# ADJUSTABLE HIGH PRECISION SHUNT REGULATOR

## ■ 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

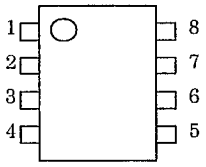

NJM2380U/AU


NJM2380F/AF

## ■ FEATURES

- ●Operating Voltage ($V_{REF}$～18V)
- ●High Precision Voltage Reference (2.465V±2%)
  (2.465V±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

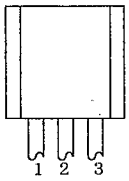
## ■ PIN CONFIGURATION



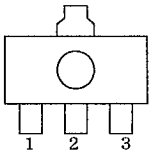

NJM2380D/AD
NJM2380M/AM
NJM2380E/AE

PIN FUNCTION

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

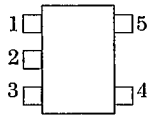



NJM2380L/AL




NJM2380U/AU

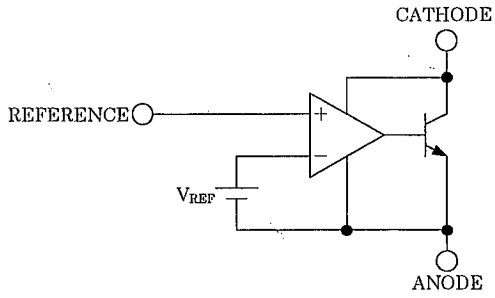
PIN FUNCTION
1. REFERENCE
2. ANODE
3. CATHODE




NJM2380/F/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 | Topr | −40～+85 | °C |
| Storage Temperature | Tstg | −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,Ta=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 | $\Delta V_{REF}/\Delta V_{KA}$ | $\lvert V_{REF} \rvert \leqq V_{KA} \leqq 10V$(＊2) | — | ±1.4 | ±2.7 | mV/V |
| | | $10 \leqq V_{KA} \leqq 18V$(＊2) | — | ±1 | ±2 | mV/V |
| Reference Input Current | $I_{REF}$ | R1=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<br>1mA≦Ik≦100mA(＊1) | — | 0.2 | — | Ω |

■TEMPERATURE CHARACTERISTICS ($I_K$=10mA,Ta=−20～+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=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.

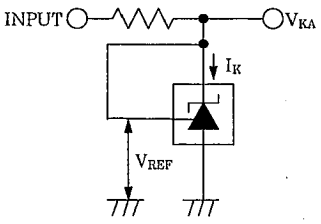
$\lvert V_{REF} \rvert$ ···Reference voltage includes error.

(＊1) : TEST CIRCUIT1(Fig.1)

(＊2) : TEST CIRCUIT2(Fig.2)

(＊3) : TEST CIRCUIT3(Fig.3)

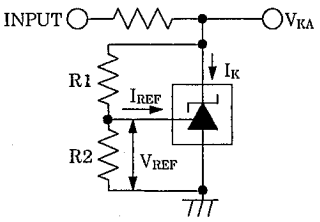
■TEST CIRCUIT




1、$V_{KA}=V_{REF}$

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

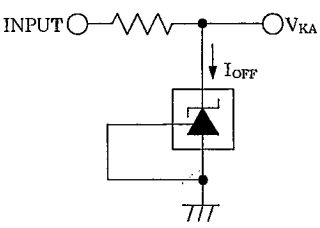
(Fig.1)




2、$V_{KA}>V_{REF}$

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

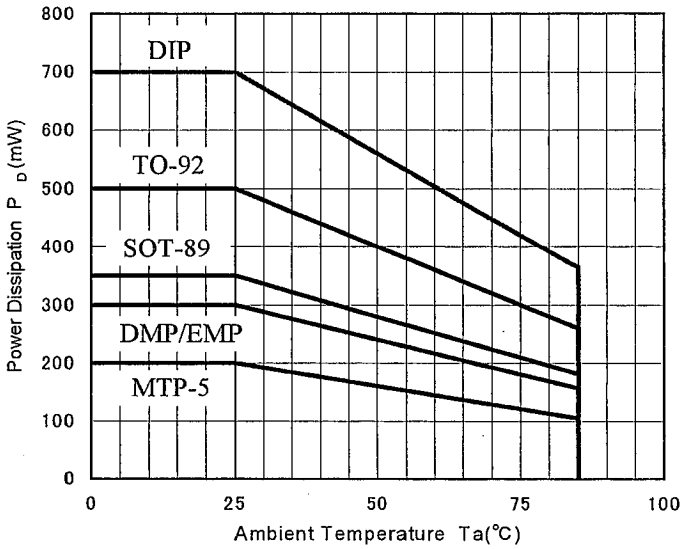
(Fig.2)




3、$I_{OFF}$

(Fig.3)

■POWER DISSIPATION VS. AMBIENT TEMPERATURE

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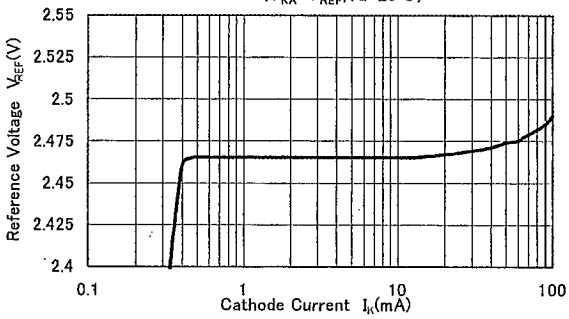
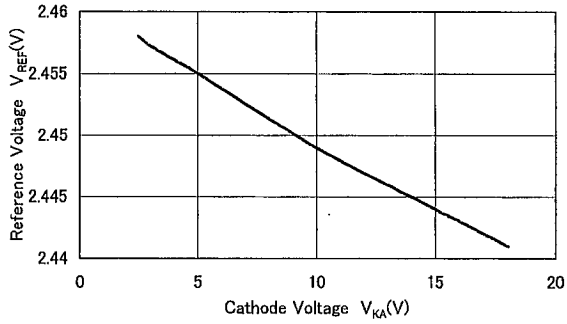
## ■TYPICAL CHARACTERISTICS

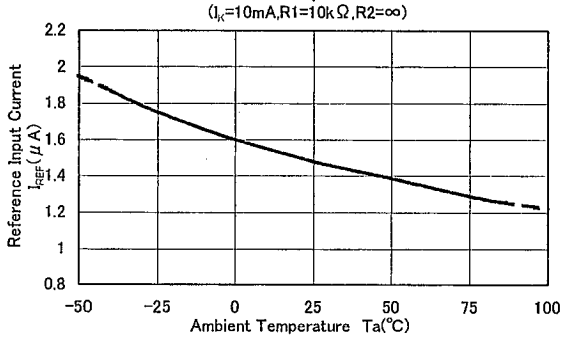
Reference Voltage
($V_{KA}=V_{REF}$,Ta=25°C)



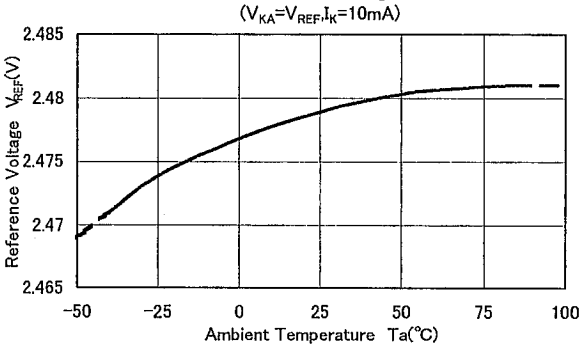

Reference Voltage
($I_K$=10mA,R1=Variable,R2=2.5kΩ,Ta=25°C)



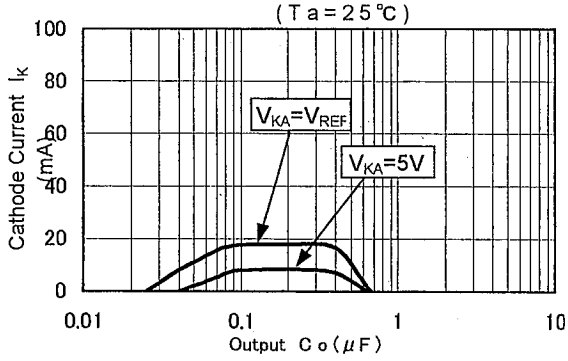

Reference Input Current
($I_K$=10mA,R1=10kΩ,R2=∞)



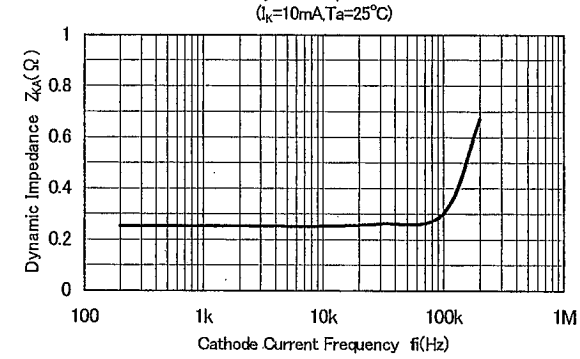

Reference Voltage
($V_{KA}=V_{REF}$,$I_K$=10mA)




Sefety Operating Boundary Condition
( T a = 2 5 °C )




Dynamic Impedance
($I_K$=10mA,Ta=25°C)




Note)Oscillation might occure 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

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MEMO