

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.

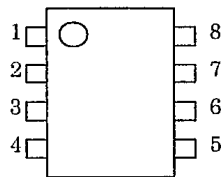
■ PACKAGE OUTLINE



■ FEATURES

- Operating Voltage $(V_{REF} \sim 18V)$
- High Precision Voltage Reference $(2.465V \pm 2\%)$
 $(2.465V \pm 1\%: A \text{ Version})$
- Mounted in Ultra Mini Package(MTP5)
- Minimum External Parts
- Bipolar Technology
- Package Outline DIP8, DMP8, EMP8
SOT-89(3pin), TO-92, MTP5

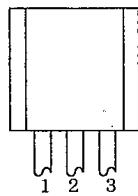
■ PIN CONFIGURATION



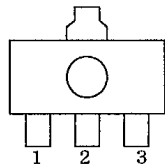
NJM2380D/AD
NJM2380M/AM
NJM2380E/AE

PIN FUNCTION

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



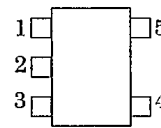
NJM2380L/AL



NJM2380U/AU

PIN FUNCTION

1. REFERENCE
2. ANODE
3. CATHODE

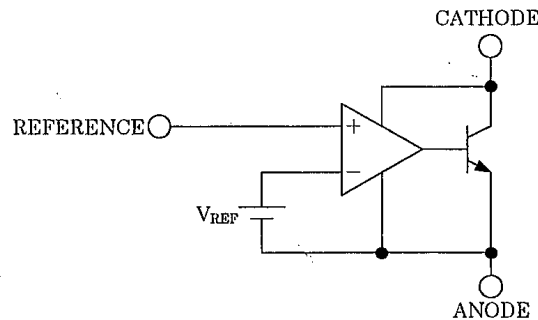


NJM2380F/AF

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 (DMP8) 300 (EMP8) 300 (TO-92) 500 (SOT-89) 350 (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

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

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	$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	$ V_{REF} \leq V_{KA} \leq 10V(*2)$	—	± 1.4	± 2.7	mV/V
		$10 \leq V_{KA} \leq 18V(*2)$	—	± 1	± 2	mV/V
Reference Input Current	I_{REF}	$R1=10k\Omega, R2=\infty(*2)$	—	2	4	μA
Minimum Input Current	I_{MIN}	$V_{KA}=V_{REF}(*1)$	—	0.4	1.0	mA
Cathode Current (Off Cond.)	I_{OFF}	$V_{KA}=18V, V_{REF}=0V(*3)$	—	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

6

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

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Reference Voltage Change	ΔV_{REF}	$V_{KA}=V_{REF}(*1)$	—	8	17	mV
Reference Input Current Change	ΔI_{REF}	$R1=10k\Omega, R2=\infty(*2)$	—	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.

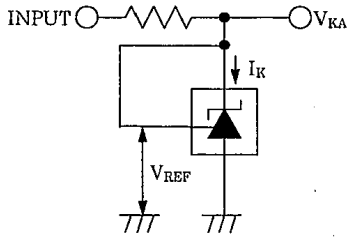
$|V_{REF}|$...Reference voltage includes error.

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

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

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

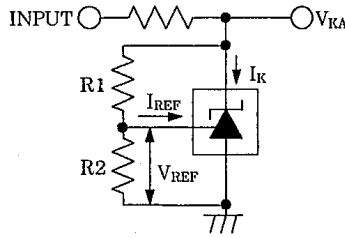
■ TEST CIRCUIT



1、 $V_{KA} = V_{REF}$

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

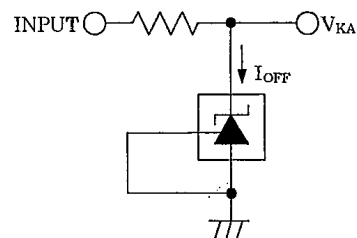
(Fig.1)



2、 $V_{KA} > V_{REF}$

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

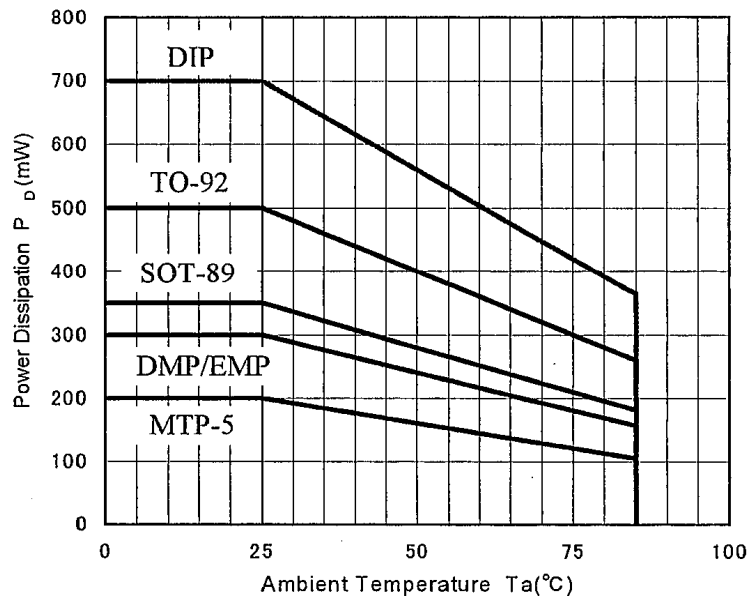
(Fig.2)



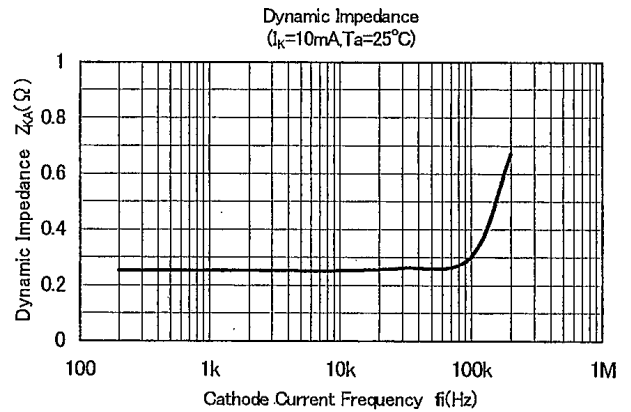
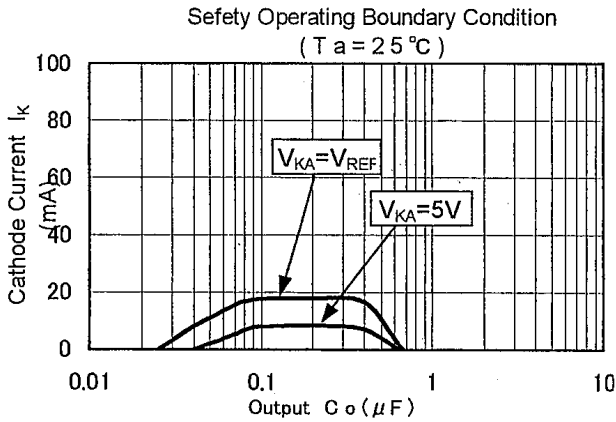
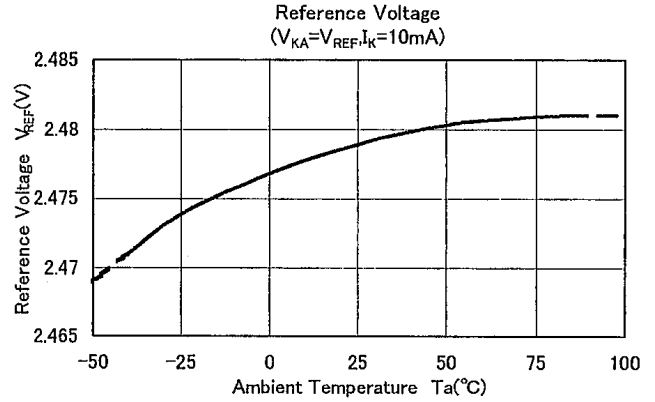
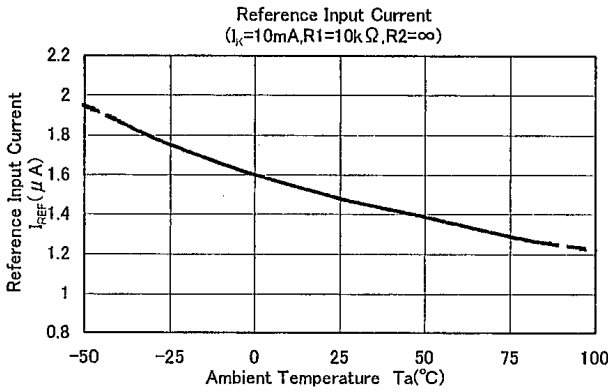
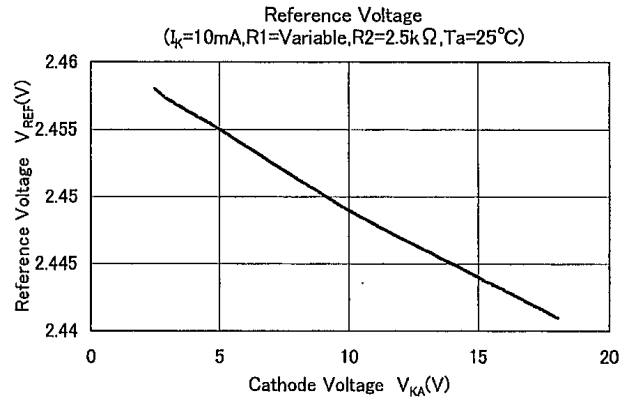
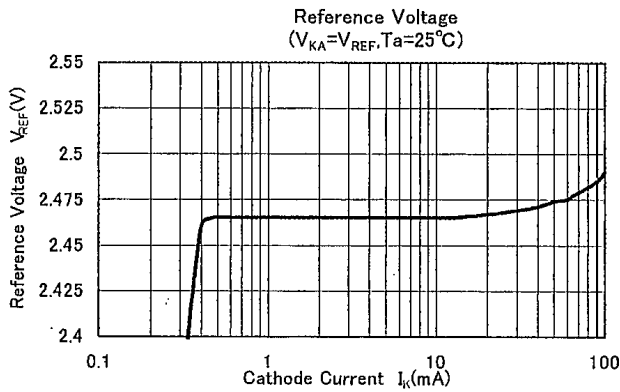
3、 I_{OFF}

(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

6

MEMO

[CAUTION]

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