Precision Micropower Shunt Voltage Reference

■GENERAL DESCRIPTION

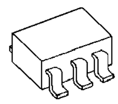
NJM2823 is a precision and low quiescent current shunt voltage reference.

Reference voltage form bandgap circuit has guaranteed the high accuracy of the ±0.4% with trimming. In addition the temperature drift of 15ppm/°C typ. was actualized by the temperature compensating circuit. The reference voltage circuit operates by consumed low quiescent current of the 60µA for low power technology.

The Output capacitor is unnecessary by the phase compensating circuit which is built in. Tolerates capacitive loads, it is easy to use for application.

It is suitable for data converters, instrumentation, and other applications where precision reference is required.

■PACKAGE OUTLINE

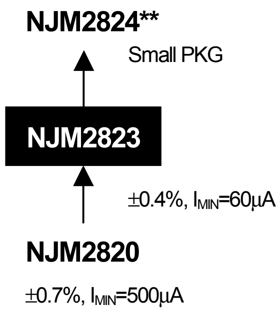


NJM2823F

■FEATURES

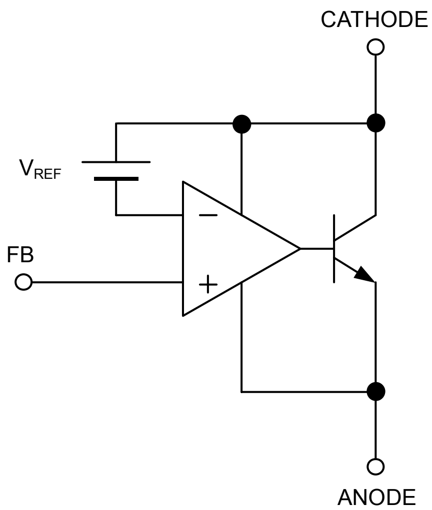
- Precision Reference Voltage 1136mV±0.4%
- Low temperature coefficient 15ppm/°C typ.
- Low Quiescent Current 60µA max.
- No Output Capacitor Required
- Tolerates Capacitive Loads
- Bipolar Technology
- Package Outline NJM2823F : SOT-23-5 (MTP5)

■PRODUCT VARIATION

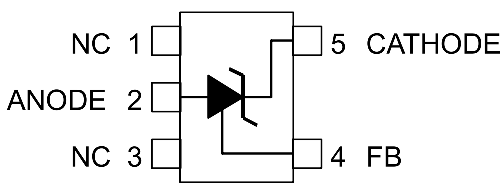


** Planning

■BLOCK DIAGRAM



■PIN CONFIGURATION



NJM2823F

■ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	MAXIMUM RATINGS	UNIT
Cathode Voltage	V_{KA}	14	V
Cathode Current	I_K	20	mA
Cathode-Anode Reverse Current	$-I_K$	10	mA
Power Dissipation	P_D	200	mW
Operating Temperature Range	T_{OPR}	-40 ~ +85	°C
Storage Temperature Range	T_{STG}	-40 ~ +125	°C

■RECOMMENDED OPERATING CONDITIONS (Ta=25°C)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Cathode Voltage	V_{KA}	V_{REF}	–	13	V
Cathode Current	I_K	0.06	–	12	mA

■ELECTRICAL CHARACTERISTICS (I_K=100µA,Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Reference Voltage	V_{REF}	$V_{FB}=V_A$	(*1)	1131.5	1136.0	1140.5	mV
Load Regulation	$\Delta V_{REF}/\Delta I_K$	$V_{FB}=V_A$, $I_{MIN}\leq I_K\leq$ 1mA	(*1)	–	0.15	1.1	mV
		$V_{FB}=V_A$, 1mA$\leq I_K\leq$ 12mA	(*1)	–	1.5	6	mV
Reference Voltage Change vs. Cathode Voltage Change	$\Delta V_{REF}/\Delta V_{KA}$	$\lvert V_{REF}\rvert \leq V_{KA}\leq$ 13V, R1=120kΩ, R2=val (Note 1)	(*2)	–	-0.52	-2.8	mV/V
Minimum Operating Current	I_{MIN}	$V_{FB}=V_A$	(*1)	–	20	60	µA
Feedback Current	I_{FB}	R1=∞, R2=120kΩ	(*2)	–	100	200	nA
Dynamic Impedance	$\lvert Z_{KA}\rvert$	$V_{FB}=V_A$, f$\leq$ 120Hz, I_K=1mA, $I_{AC}=0.1I_K$	(*1)	–	0.1	–	Ω

■TEMPERATURE CHARACTERISTICS (I_K=100µA, Ta=-40°C ~ 85°C)

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Reference Voltage Change (Note 2)	ΔV_{REF_T}	$V_{FB}=V_A$	(*1)	–	5.7 15	8.2 50	mV ppm/°C
Reference Input Current Change	ΔI_{FB_T}	R1=∞, R2=120kΩ	(*2)	–	200	–	nA

Note 1: $\lvert V_{REF}\rvert$···Reference voltage includes error.

Note 2: Reference Voltage Change is defined as

ΔV_{REF_T} [mV] = ± <V_{REF} × 0.4%> ± < Reference Voltage Change [ppm/°C] > × <-40°C ~ 25°C> × V_{REF} .

The maximum value of "Reference Voltage Change" is determined based on sampling evaluation from the 5 initial production lots, and thus not tested in the production test. Therefore, these values are for the reference design purpose only.

(*1): Test Circuit (Fig.1)

(*2): Test Circuit (Fig.2)

■TEST CIRCUIT

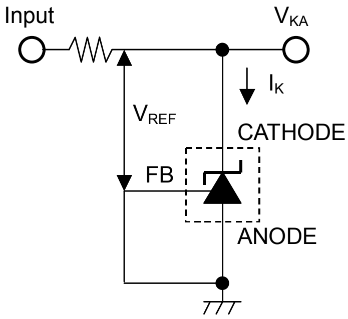


Fig.1 $V_{KA}=V_{REF}$ to test circuit

$V_{FB}=V_A$

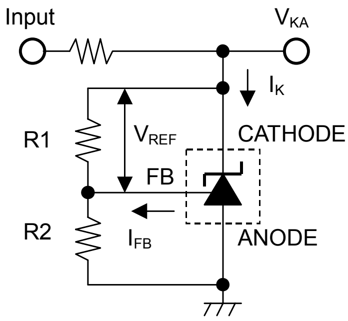
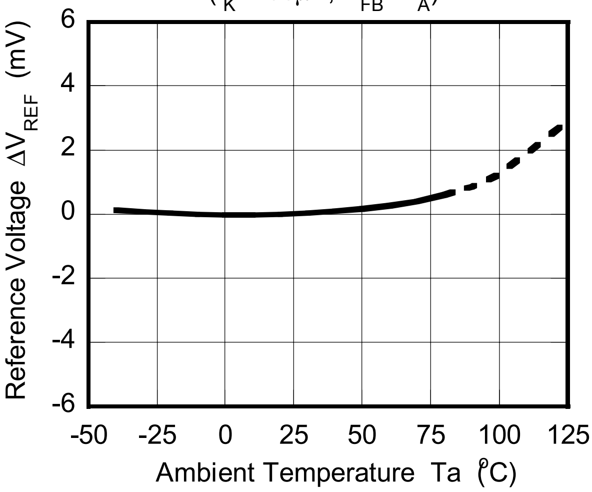


Fig.2 $V_{KA}>V_{REF}$ to test circuit

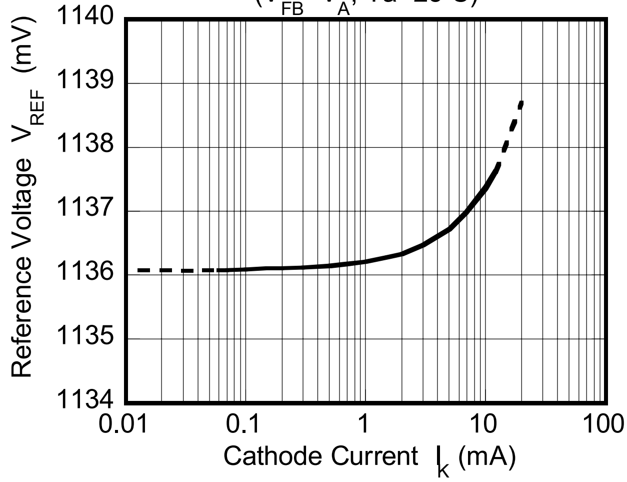
$$V_{KA} = V_{REF}\left(1+\frac{R2}{R1}\right)+I_{FB}\times R2$$

■TYPICAL CHARACTERISTICS

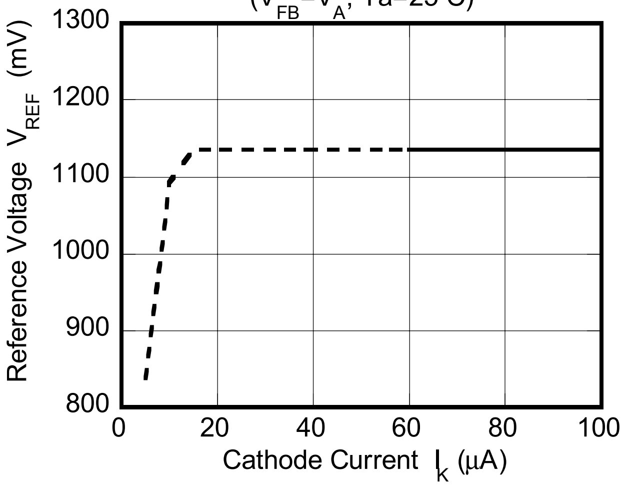
Reference Voltage vs. Temperature
(I_K=100μA, $V_{FB}=V_A$)



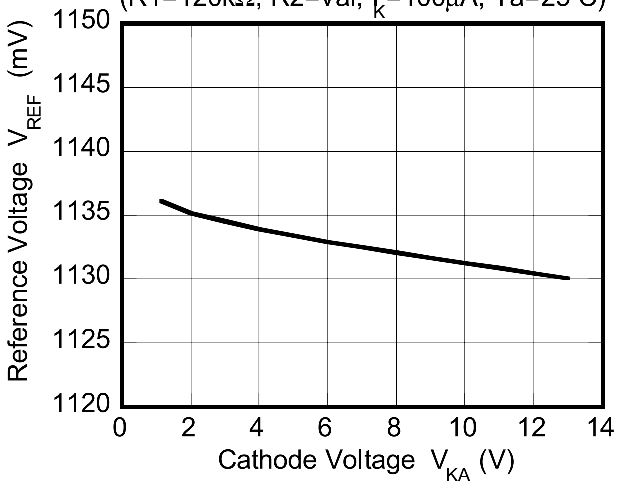
Reference Voltage vs. Cathode Current
($V_{FB}=V_A$, Ta=25°C)



Reference Voltage vs. Cathode Current
($V_{FB}=V_A$, Ta=25°C)



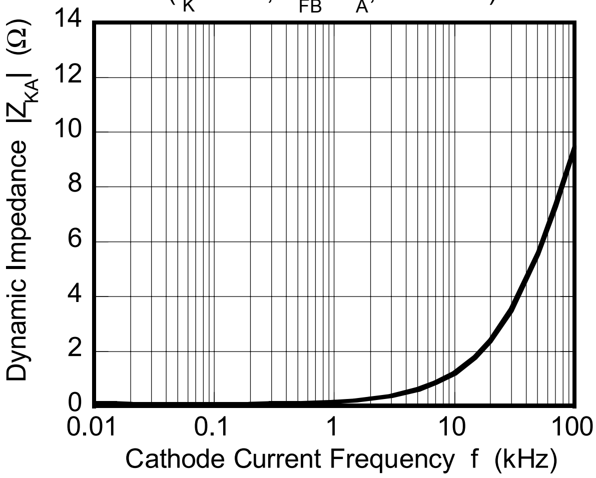
Reference Voltage vs. Cathode Voltage
(R1=120kΩ, R2=val, I_k=100μA, Ta=25°C)



■TYPICAL CHARACTERISTICS

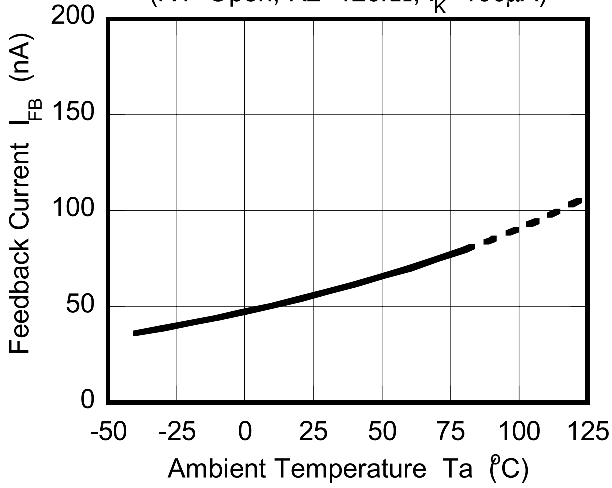
Dynamic Impedance

(I_K=1mA, V_{FB}=V_A, Ta=25°C)



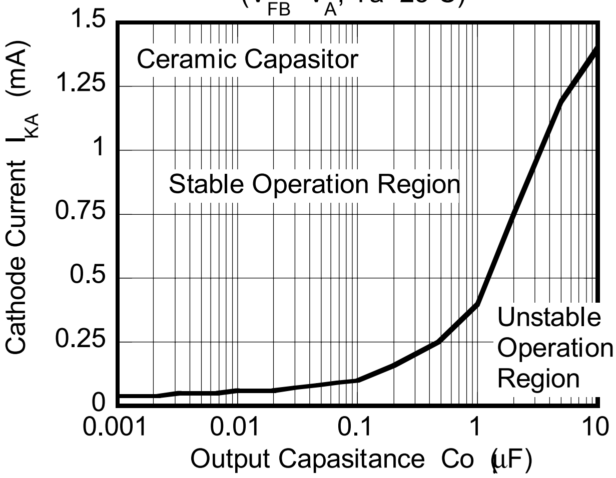
Feedback Current vs. Temperature

(R1=Open, R2=120kΩ, I_K=100μA)



Sefty Operating Boundary Condition

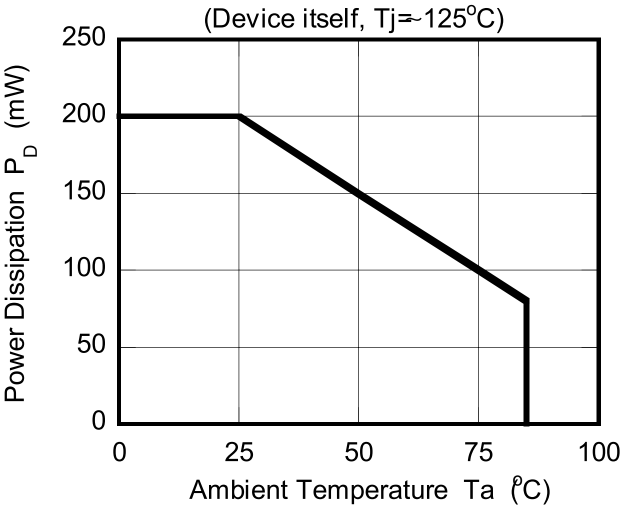
(V_{FB}=V_A, Ta=25°C)



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.

Power Dissipation vs. Temperature

(Device itself, Tj=~125°C)



MEMO

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