

GSC103A Dual Operational Amplifier and Voltage Reference

Description

The GSC103A is a monolithic IC that includes one independent op-amp and another op-amp for which the non inverting input is wired to a 2.5V fixed Voltage Reference. This device is offering space and cost saving in many applications like power supply management or data acquisition system.

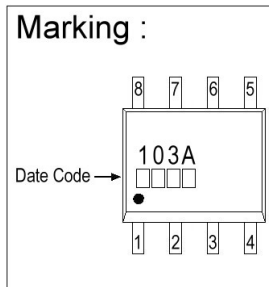
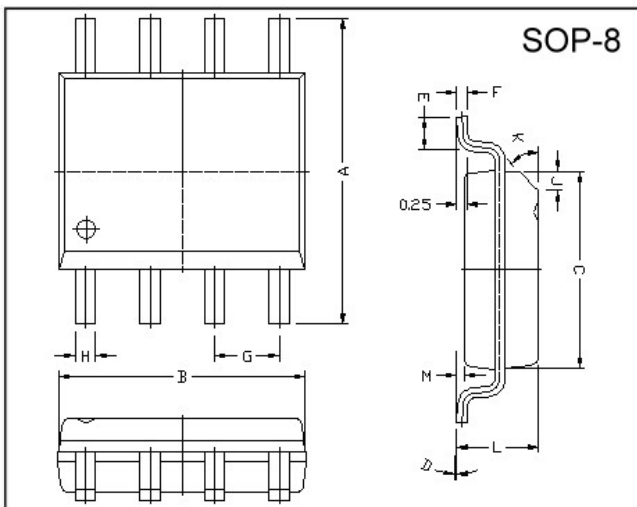
Operational Amplifier

- Low Input Offset Voltage: 0.5mV(typ.)
- Low Supply Current :350uA/op. (@V_{CC}=5V)
- Medium Bandwidth (unity gain) : 0.9MHz
- Large Output Voltage Swing: 0V to (V_{CC}-1.5V)
- Input Common Mode voltage Range Includes Ground
- Wide Power Supply Range: 3 to 32V±1.5 to ±16V

Voltage Reference

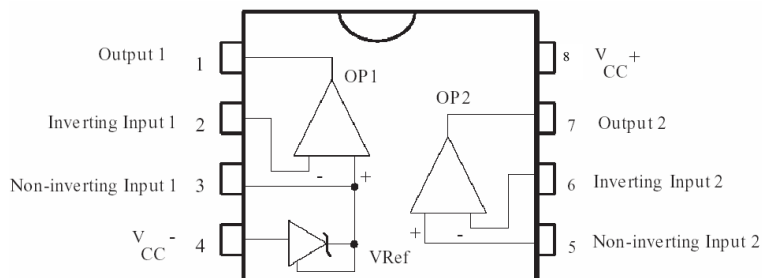
- Fixed Output Voltage Reference 2.5V
- 0.4% Voltage Precision
- Sink Current Capability: 1 to 100mA
- Typical Output Impedance: 0.2Ω

Package Dimensions



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	5.80	6.20	M	0.10	0.25
B	4.80	5.00	H	0.35	0.49
C	3.80	4.00	L	1.35	1.75
D	0°	8°	J	0.375 REF.	
E	0.40	0.90	K	45°	
F	0.19	0.25	G	1.27 TYP.	

Pin Connections



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage	V _{CC}	36	V
Differential Input Voltage	V _{id}	36	V
Input Voltage	V _i	-0.3 ~ +36V	V
Maximum Junction Temperature	T _J	150	°C
Operating Ambient Temperature Range	T _{oper}	-40 ~ + 105	°C
Thermal Resistance junction Ambient Temperature	R _{θJA}	175	°C/W

Electrical Characteristics

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Total Supply Current, Excluding Current in the Voltage Reference	I _{CC}	V _{CC} ⁺ =5V, no load, T _{min} < T _A < T _{max}	-	0.7	1.2	mA
		V _{CC} ⁺ =30V, no load, T _{min} < T _A < T _{max}	-	-	2	mA

Operator2 (independent op-amp)V_{CC}⁺=+5V, V_{CC}=Ground, V_O=1.4V T_A=25°C (unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Offset Voltage	V _{io}	T _A =25°C T _{min} ≤ T _A ≤ T _{max}	-	0.5	3	mV
Input Offset Voltage Drift	DV _{io}		-	7	-	uV/°C
Input Offset Current	I _{io}	T _{min} ≤ T _A ≤ T _{max}	-	2	30	nA
Input Bias Current	I _{ib}	T _{min} ≤ T _A ≤ T _{max}	-	20	150	nA
Large Signal Voltage Gain	A _{vd}	V _{CC} =15V, R _L =2k, V _O =1.4V to 11.4V T _{min} ≤ T _A ≤ T _{max}	50	100	-	V/mV
Supply Voltage Rejection Ratio	SVR	V _{CC} =5V to 30V	65	100	-	dB
Input Common Mode Voltage Range	V _{icm}	V _{CC} =+30V (note1) T _{min} ≤ T _A ≤ T _{max}	0	-	(V _{CC} ⁺)-1.5	V
Common Mode Rejection Ratio	CMR	T _{min} ≤ T _A ≤ T _{max}	70	85	-	dB
Output Current Source	I _{source}	V _{CC} =+15V, V _O =2V, V _{id} =+1V	20	40	-	mA
Short Circuit to Ground	I _o	V _{CC} =+15V	-	40	60	mA
Output Current Sink	I _{sink}	V _{CC} =+15V, V _O =2V, V _{id} =-1V	10	20	-	mA
High Level Output Voltage	V _{OH}	V _{CC} ⁺ =30V, R _L =10k, T _A =25°C T _{min} ≤ T _A ≤ T _{max}	27	28	-	V
Low Level Output Voltage	V _{OL}	R _L =10k T _{min} ≤ T _A ≤ T _{max}	-	5	20	mV
Slew Rate at Unity Gain	SR	V _i =0.5V to 3V, V _{CC} =15V, R _L =2k, C _L =100pF, Unity Gain	0.2	0.4	-	V/μs
Gain Bandwidth Product	GBP	V _{CC} =30V, R _L =2k, C _L =100pF f=100kHz, V _{in} =10mV	0.5	0.9	-	MHz
Total Harmonic Distortion	THD	V _{CC} =30V, R _L =2k, C _L =100pF V _O =2V _{PP} , f=1kHz, A _v =20dB	-	0.02	-	%

Note1: The common-mode voltage of either input signal voltage should not be allowed to go negative by more than 0.3V. The upper end of the common-mode voltage range is V_{CC}⁺ - 1.5V. But either of both input can go to +36V without damage.

Operator1 (op-amp with non-inverting input connected to the internal Vref)V_{CC}⁺=+5V, V_{CC}=Ground, V_O=1.4V T_A=25°C (unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Offset Voltage	V _{io}	V _{icm} =0V, T _A =25°C T _{min} ≤ T _A ≤ T _{max}	-	0.5	3	mV
Input Offset Voltage Drift	DV _{io}		-	7	-	uV/°C
Input Bias Current	I _{ib}	Negative input	-	20	-	nA
Large Signal Voltage Gain	A _{vd}	V _{icm} =0V V _{CC} =15V, R _L =2k	-	100	-	V/mV
Supply Voltage Rejection Ratio	SVR	V _{icm} =0V V _{CC} ⁺ =5V to 30V	65	100	-	dB
Output Current Source	I _{source}	V _{CC} =+15V, V _O =2V, V _{id} =+1V	20	40	-	mA
Short Circuit to Ground	I _o	V _{CC} =+15V	-	40	60	mA
Output Current Sink	I _{sink}	V _{CC} =+15V, V _O =2V, V _{id} =-1V	10	20	-	mA
High Level Output Voltage	V _{OH}	V _{CC} ⁺ =30V, R _L =10k, T _A =25°C T _{min} ≤ T _A ≤ T _{max}	27	28	-	V
Low Level Output Voltage	V _{OL}	R _L =10k T _{min} ≤ T _A ≤ T _{max}	-	5	20	mV
Slew Rate at Unity Gain	SR	V _i =0.5V to 2V, V _{CC} =15V, R _L =2k, C _L =100pF, Unity Gain	0.2	0.4	-	V/μs
Gain Bandwidth Product	GBP	V _{CC} =30V, R _L =2k, C _L =100pF f=100kHz, V _{in} =10mV	0.5	0.9	-	MHz
Total Harmonic Distortion	THD	V _{CC} =30V, R _L =2k, C _L =100pF V _O =2V _{PP} , f=1kHz, A _v =20dB	-	0.02	-	%

Voltage Reference

Parameter	Symbol	Test Conditions	Value	Unit
Cathode Current	I _k		1 to 100	mA

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Reference Input Voltage	V _{ref}	T _A =25°C T _{min} ≤ T _A ≤ T _{max}	2.49	2.5	2.51	V
Reference Input Voltage Deviation Over Temp. Range	ΔV _{ref}	V _{KA} =V _{ref} , I _k =10mA, T _{min} ≤ T _A ≤ T _{max}	-	5	24	mV
Minimum Cathode Current for Regulation	I _{min}	V _{KA} =V _{ref}	-	0.5	1	mA
Dynamic Impedance (note2)	Z _{KA}	V _{KA} =V _{ref} , ΔI _k =1 to 100mA, f<1kHz	-	0.2	0.5	Ω

Note2: The Dynamic impedance is defined as $|Z_{KA}| = \Delta V_{KA} / \Delta I_k$

Characteristics Curve

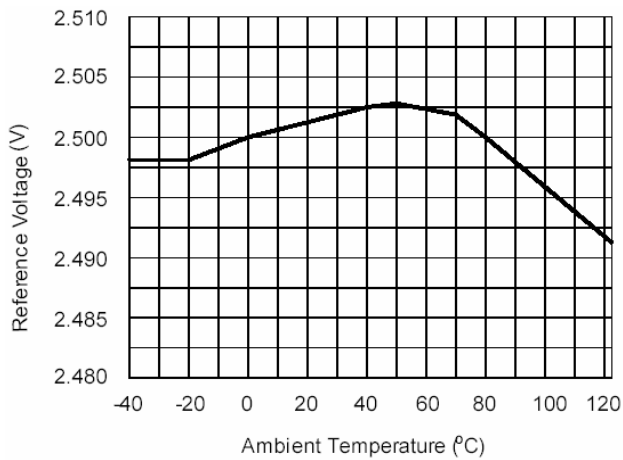


Fig 1. Reference Voltage vs. Ambient Temperature

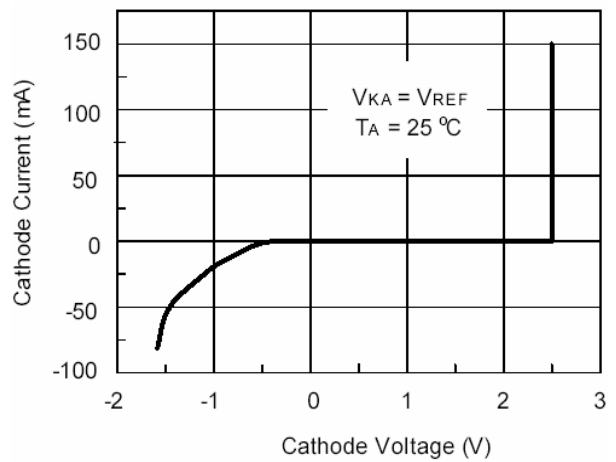


Fig 2. Cathode Current vs. Cathode Voltage

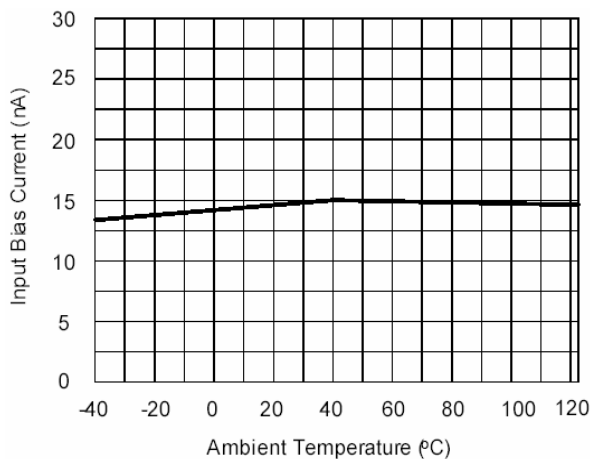


Fig 3. Input Bias Current vs. Ambient Temperature

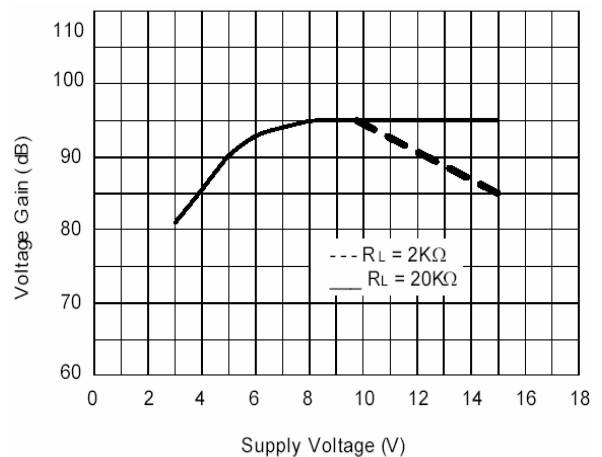


Fig 4. Operational Amplifier Voltage Gain

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