GP103A

Dual Operational Amplifier and Voltage Reference

Description

The GP103A is a monolithic IC that includes one independent op-amp and another op-amp foe 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.

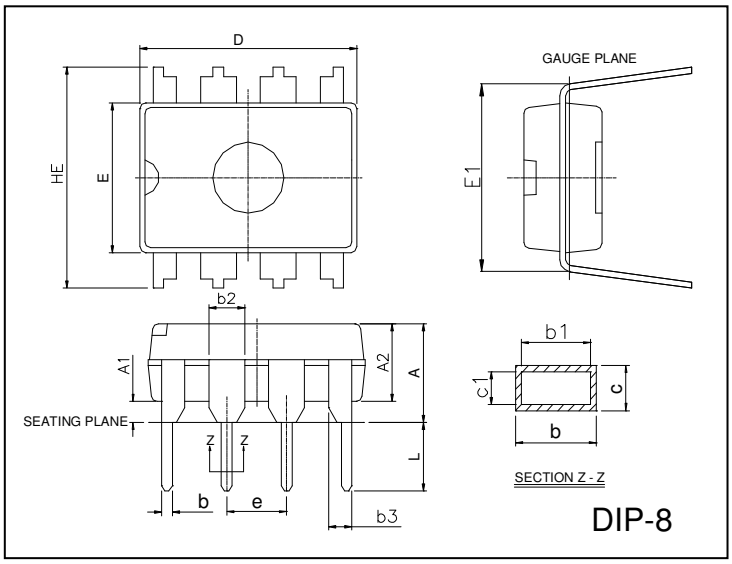
Operational Amplifier

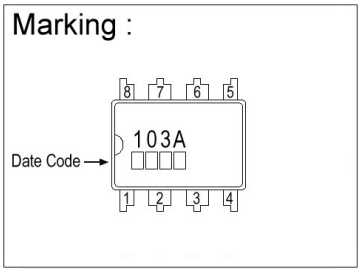
- Low Input Offset Voltage: 0.5mV(typ.)
- Low Supply Current :350uA/op. (@Vcc=5V)
- Medium Bandwidth (unity gain) : 0.9MHz
- Large Output Voltage Swing: 0V to (Vcc-1.5V)
- Input Common Mode voltage Range Includes Ground
- Wide Power Supply Range: 3 to 32V±1.5 to ±16V

Voltage Reference

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

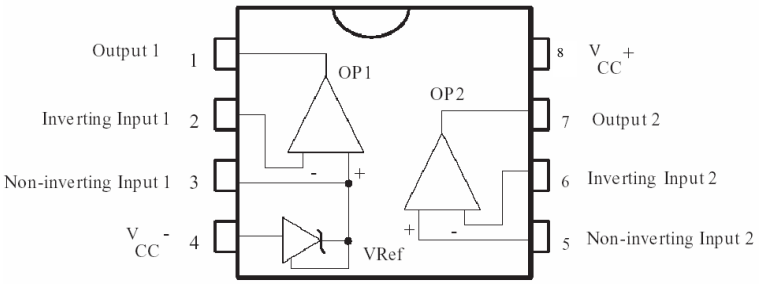
Package Dimensions





REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	-	0.5334	c1	0.203	0.279
A1	0.381	-	D	9.017	10.16
A2	2.921	4.953	E	6.096	7.112
b	0.356	0.559	E1	7.620	8.255
b1	0.356	0.508	e	2.540 BSC	
b2	1.143	1.778	HE	-	10.92
b3	0.762	1.143	L	2.921	3.810
c	0.203	0.356			

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	℃
Operating Ambient Temperature Range	T_{oper}	-40 ~ + 105	℃
Thermal Resistance junction Ambient Temperature	$R_{\theta JA}$	150	℃/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, Tmin < T_A < Tmax	-	0.7	1.2	mA
		V_{CC}^+=30V, no load, Tmin < T_A < Tmax	-	-	2	mA

Operator2 (independent op-amp)

V_{CC}^+=+5V, V_{CC}=Ground, V_O=1.4V T_A=25℃ (unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Offset Voltage	V_{io}	T_A=25℃ Tmin ≤ T_A ≤ Tmax	- -	0.5 -	3 5	mV
Input Offset Voltage Drift	DV_{io}		-	7	-	uV/℃
Input Offset Current	I_{io}	Tmin ≤ T_A ≤ Tmax	- -	2 -	30 50	nA
Input Bias Current	I_{ib}	Tmin ≤ T_A ≤ Tmax	- -	20 -	150 200	nA
Large Signal Voltage Gain	Avd	V_{CC}=15V, R_L=2k, V_O=1.4V to 11.4V Tmin ≤ T_A ≤ Tmax	50 25	100 -	- -	V/mV
Supply Voltage Rejection Ratio	SVR	V_{CC}=5V to 30V	65	100	-	dB
Input Common Mode Voltage Range	Vicm	V_{CC}=+30V (note1) Tmin ≤ T_A ≤ Tmax	0 0	- -	(V_{CC}^+)-1.5 (V_{CC}^+)-2.0	V
Common Mode Rejection Ratio	CMR	Tmin ≤ T_A ≤ Tmax	70 60	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℃ Tmin ≤ T_A ≤ Tmax	27 27	28 -	- -	V
Low Level Output Voltage	V_{OL}	R_L=10k Tmin ≤ T_A ≤ Tmax	- -	5 -	20 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℃ (unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Offset Voltage	V_{io}	Vicm=0V, T_A=25℃ Tmin ≤ T_A ≤ Tmax	- -	0.5 -	3 5	mV
Input Offset Voltage Drift	DV_{io}		-	7	-	uV/℃
Input Bias Current	I_{ib}	Negative input	-	20	-	nA
Large Signal Voltage Gain	Avd	Vicm=0V V_{CC}=15V, R_L=2k	-	100	-	V/mV
Supply Voltage Rejection Ratio	SVR	Vicm=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℃ Tmin ≤ T_A ≤ Tmax	27 27	28 -	- -	V
Low Level Output Voltage	V_{OL}	R_L=10k Tmin ≤ T_A ≤ Tmax	- -	5 -	20 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℃ Tmin ≤ T_A ≤ Tmax	2.49 2.48	2.5 -	2.51 2.52	V
Reference Input Voltage Deviation Over Temp. Range	△V_{ref}	V_{KA}=V_{ref}, I_K=10mA , Tmin ≤ T_A ≤ Tmax	-	5	24	mV
Minimum Cathode Current for Regulation	I_{min}	V_{KA}=V_{ref}	-	0.5	1	mA
Dynamic Impedance (note2)	$\lvert Z_{KA} \rvert$	V_{KA}=V_{ref}, △I_K=1 to 100mA, f<1kHz	-	0.2	0.5	Ω

Note2: The Dynamic impedance is defined as $\lvert Z_{KA} \rvert = \triangle V_{KA} / \triangle I_K$

Characteristics Curve

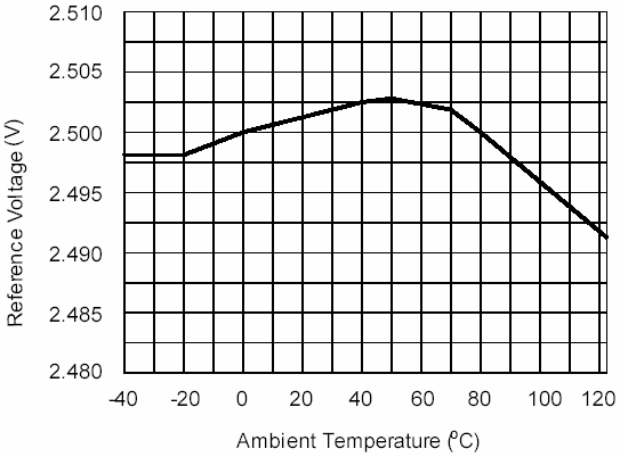


Fig 1. Reference Voltage vs. Ambient Temperature

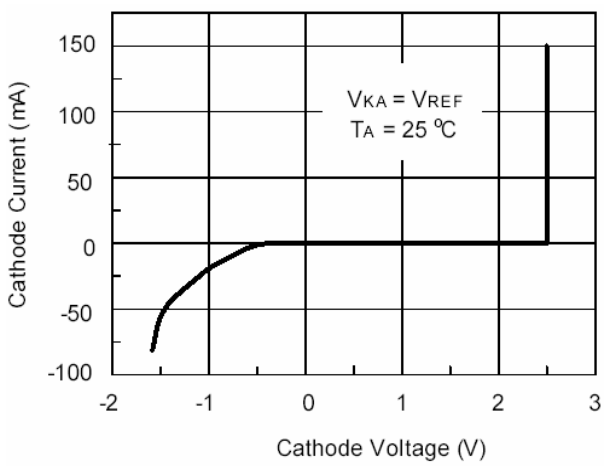


Fig 2. Cathode Current vs. Cathode Voltage

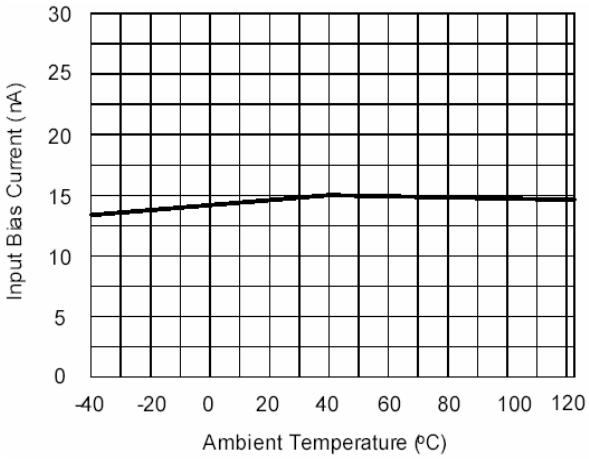


Fig 3. Input Bias Current vs. Ambient Temperature

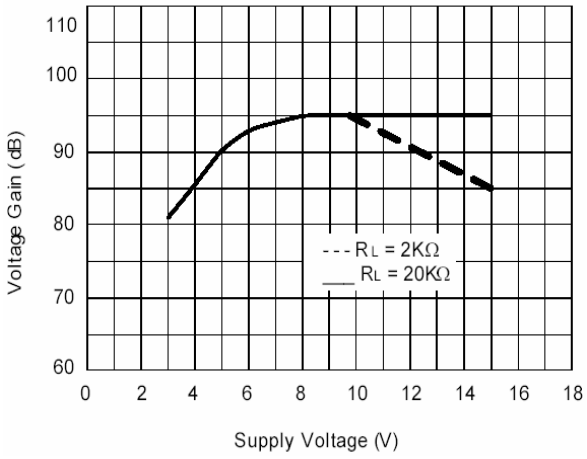


Fig 4. Operational Amplifier Voltage Gain

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