

LINEAR INTEGRATED CIRCUITS

DUAL OPERATIONAL AMPLIFIERS

DESCRIPTION

The SG2101A is a dual version of the SG101A Operational Amplifier and consists of two independent dice in the same package.

The SG2101A is a general-purpose internally compensated operational amplifier. It has excellent input bias current and drift characteristics in addition to short circuit protection and is pin compatible with Industry standard operational amplifiers.

The SG2101A is guaranteed and fully characterized over the full military ambient temperature range of -55°C to 125°C.

FEATURES

- Dual Independent SG101A
- Offset voltage 3mV maximum over temperature
- Input bias current 100nA maximum over temperature
- Offset current 20nA maximum over temperature
- Guaranteed drift characteristics
- Offsets guaranteed over entire common-mode range

HIGH RELIABILITY FEATURES - SG2101A

- ♦ Available to MIL-STD - 883
- ♦ MIL - M38510 / 10105BEA - JAN2101AJ
- ♦ SG level "S" processing available

OPERATING CONDITIONS & ELECTRICAL SPECIFICATIONS

(All information is identical to the SG101A. Consult data sheet for specifics.)

CONNECTION DIAGRAMS & ORDERING INFORMATION

Package	Part No.	Ambient Temperature Range	Connection Diagram
16-PIN CERAMIC DIP J - PACKAGE	SG2101AJ/883B SG2101AJ	-55°C to 125°C -55°C to 125°C	
16-PIN CERAMIC FLAT PACK F - PACKAGE	SG2101AF/883B SG2101AF	-55°C to 125°C -55°C to 125°C	

Note 1. Contact factory for JAN and DESC product availability.
2. All parts are viewed from the top.

OPERATIONAL AMPLIFIERS

DESCRIPTION

The SG101A/201A/301A is a general purpose internally compensated operational amplifier. It has excellent input bias current and drift characteristics in addition to short circuit protection and is pin compatible with industry standard operational amplifiers.

The SG101A is guaranteed and fully characterized over the full military ambient temperature range of -55°C to 125°C while the SG201A is electrically identical, except its performance is guaranteed from -25°C to 85°C. The 301A is designed for commercial applications of 0°C to 70°C.

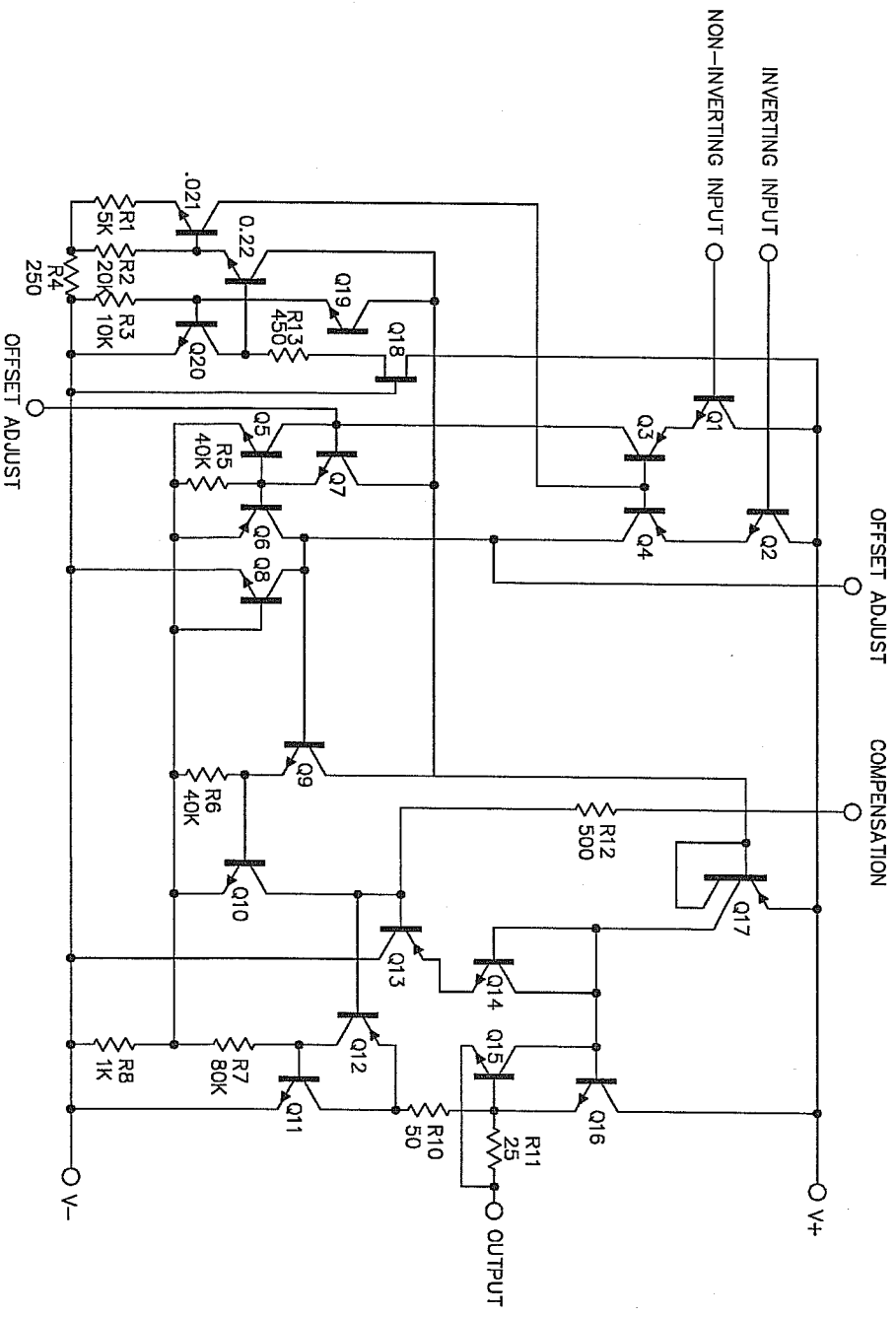
FEATURES

- Offset voltage 3mV maximum over temperature
- Input bias current 100nA maximum over temperature
- Offset current 20nA maximum over temperature
- Guaranteed drift characteristics
- Offsets guaranteed over entire common mode range

HIGH RELIABILITY FEATURES - SG101A

- ◆ Available to MIL-STD-883
- ◆ MIL-M38510/10103BGA - JAN101AT
- ◆ MIL - M38510 / 10103BHA - JAN101AF
- ◆ SG level "S" processing available

SCHEMATIC DIAGRAM



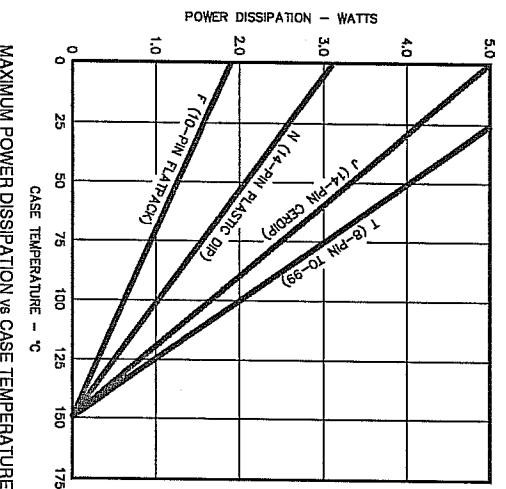
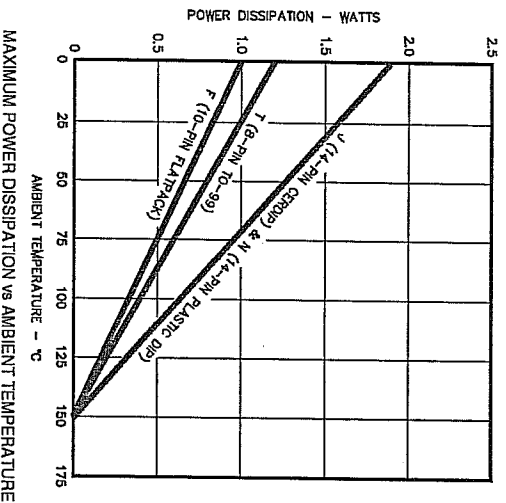
ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply Voltage	SG101A/201A	±22V
SG301A	±18V	
Differential Input Voltage	.....	±30V
Input Voltage (Note 2)	.....	±15V

Operating Junction Temperature	.....	150°C
Hermetic (T, J, F Packages)	.....	150°C
Plastic (N Package)	.....	150°C
Storage Temperature Range	.....	-65°C to 150°C
Output Short Circuit Duration (Note 3)	.....	Indefinite
Lead Temperature (Soldering, 10 Seconds)	.....	300°C

- Note 1. Exceeding these ratings could cause damage to the device.
 Note 2. For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.
 Note 3. Continuous short circuit is allowed for case temperatures to 125°C and ambient temperatures to 70°C.

THERMAL DERATING CURVES



RECOMMENDED OPERATING CONDITIONS (Note 4 & 5)

Supply Voltage	SG101A/201A	±5V to ±20V
SG301A	±5V to ±18V	

Operating Ambient Temperature Range

SG101A	-55°C to 125°C
SG201A	-25°C to 85°C
SG301A	0°C to 70°C

Note 4. Range over which the device is functional.
 Note 5. $R_L = 2K\Omega$, $C_L = 100pF$.

ELECTRICAL SPECIFICATIONS

(Unless otherwise stated, these specifications apply for the operating ambient temperature of $T_A = 25^\circ C$ and $\pm 5V \leq V_S \leq \pm 20V$, and $C_L = 30pF$. Low duty cycle pulse testing techniques are used which maintains junction and case temperatures equal to the ambient temperature.)

Parameter	Test Conditions	SG101A/SG201A			SG301A			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
Input Offset Voltage	$R_S \leq 50K\Omega$	0.7	2.0		2.0	7.5		mV
Input Offset Current	$T_A = T_{MIN}$ to T_{MAX}	1.5	10		3.0	50		nA
Input Bias Current	$T_A = T_{MIN}$ to T_{MAX}	30	20		70	250		nA
Input Resistance (Note 5)	$T_A = T_{MIN}$ to T_{MAX}	1.5	4		0.5	2		MΩ
Supply Current	$V_S = \pm 20V$ $T_A = 125^\circ C$	1.8	3.0					mA
	$V_S = \pm 15V$	1.2	2.5					mA
Large Signal Voltage Gain	$V_S = \pm 15V$, $V_{OUT} = \pm 10V$, $R_L \geq 2K\Omega$ $V_S = \pm 15V$, $V_{OUT} = \pm 10V$, $R_L \geq 2K\Omega$	50	160		25	160	3.0	V/mV
Output Voltage Swing	$T_A = T_{MIN}$ to T_{MAX} $V_S = \pm 15V$, $R_L = 10K\Omega$ $V_S = \pm 15V$, $R_L = 2K\Omega$	25			25			V/mV
Input Voltage Range	$V_S = \pm 20V$, $T_A = T_{MIN}$ to T_{MAX} $V_S = \pm 15V$, $T_A = T_{MIN}$ to T_{MAX}	±12	±14		±12	±14		V
Common Mode Rejection Ratio	$R_S \leq 10K\Omega$, $T_A = T_{MIN}$ to T_{MAX} $R_S \leq 10K\Omega$, $T_A = T_{MIN}$ to T_{MAX}	80	±15		80	±15		dB
Supply Voltage Rejection Ratio	$R_S \leq 10K\Omega$, $T_A = T_{MIN}$ to T_{MAX}	80	96		80	96		dB

ELECTRICAL SPECIFICATIONS (continued)

Parameter	Test Conditions	SG107/SG207		SG307		Units	
		Min.	Typ. Max.	Min.	Typ. Max.		
Average Temperature Coefficient of Input Offset Voltage (Note 5)	$T_A = T_{MIN}$ to T_{MAX}		3.0	15		$\mu\text{V}/^\circ\text{C}$	
Average Temperature Coefficient of Input Offset Current (Note 5)	$25^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$ $-55^\circ\text{C} \leq T_A \leq 25^\circ\text{C}$ $25^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$ $0^\circ\text{C} \leq T_A \leq 25^\circ\text{C}$		0.01	0.1		$\text{nA}/^\circ\text{C}$	
			0.02	0.2		$\text{nA}/^\circ\text{C}$	
					0.01	0.3	$\text{nA}/^\circ\text{C}$
					0.02	0.6	$\text{nA}/^\circ\text{C}$

Note 5. These parameters, although guaranteed, are not tested in production.

CHARACTERISTIC CURVES

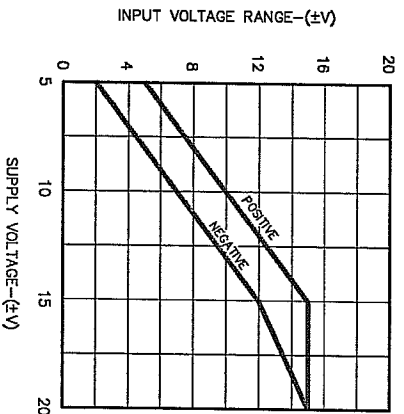


FIGURE 1. INPUT VOLTAGE RANGE VS. SUPPLY VOLTAGE

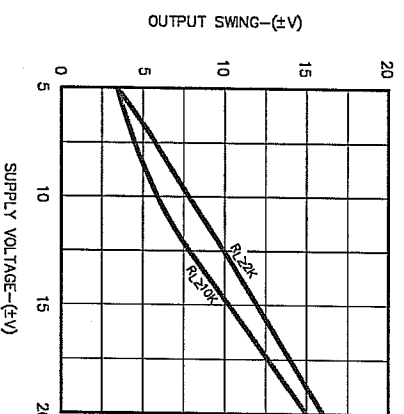


FIGURE 2. OUTPUT SWING VS. SUPPLY VOLTAGE

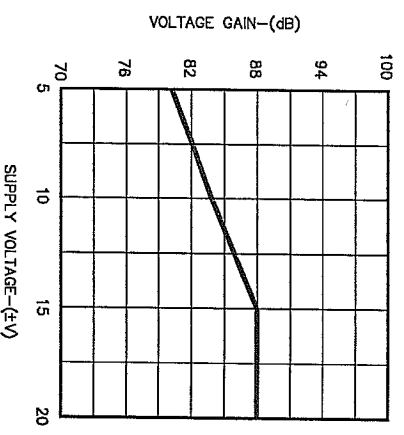


FIGURE 3. MINIMUM VOLTAGE GAIN

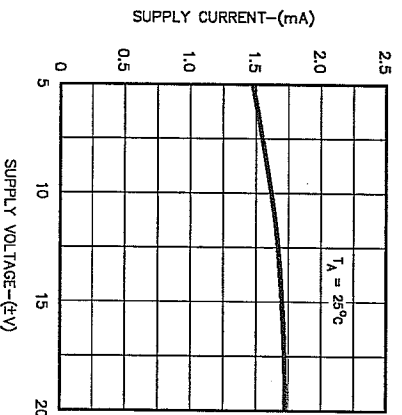


FIGURE 4. SUPPLY CURRENT VS. SUPPLY VOLTAGE

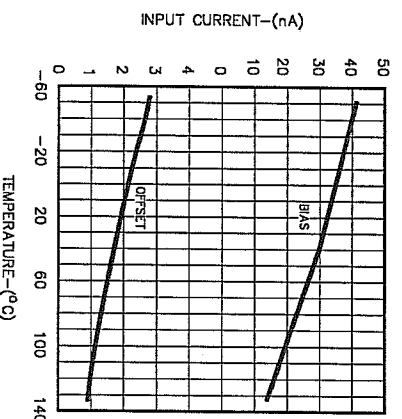


FIGURE 5. INPUT CURRENT VS. TEMPERATURE

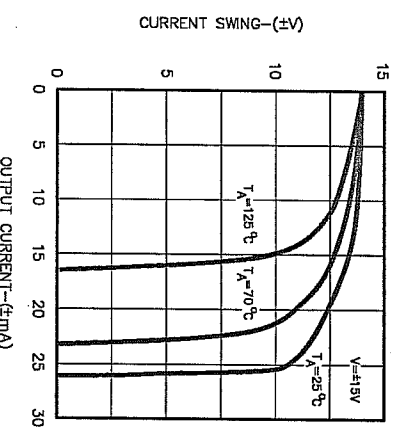


FIGURE 6. CURRENT LIMITING

CHARACTERISTIC CURVES

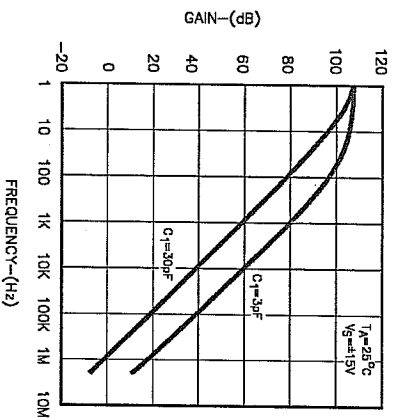


FIGURE 7. OPEN LOOP FREQUENCY RESPONSE

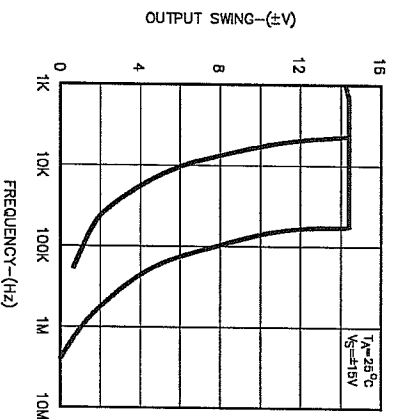


FIGURE 8. LARGE SIGNAL FREQUENCY RESPONSE

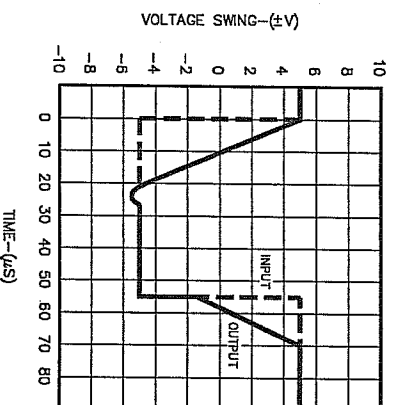


FIGURE 9. VOLTAGE FOLLOWER PULSE RESPONSE

CONNECTION DIAGRAMS & ORDERING INFORMATION (See Notes Below)

Package	Part No.	Ambient Temperature Range	Connection Diagram
14-PIN CERAMIC DIP J - PACKAGE	SG101AJ/883B SG101AJ SG201AJ SG301AJ	-55°C to 125°C -55°C to 125°C -25°C to 85°C 0°C to 70°C	<p> <input type="checkbox"/> 1 N.C. <input type="checkbox"/> 2 N.C. <input type="checkbox"/> 3 OFFSET ADJUST <input type="checkbox"/> 4 INVERTING INPUT <input type="checkbox"/> 5 NON-INVERTING INPUT <input type="checkbox"/> 6 V- <input type="checkbox"/> 7 N.C. <input type="checkbox"/> 8 N.C. <input type="checkbox"/> 9 N.C. <input type="checkbox"/> 10 COMPENSATION <input type="checkbox"/> 11 V+ <input type="checkbox"/> 12 COMPENSATION <input type="checkbox"/> 13 N.C. <input type="checkbox"/> 14 N.C. </p> <p> NON-INVERTING INPUT INVERTING INPUT OFFSET ADJUST V- V+ COMPENSATION OFFSET ADJUST </p>
14-PIN PLASTIC DIP N - PACKAGE	SG201AN SG301AN	-25°C to 85°C 0°C to 70°C	<p> <input type="checkbox"/> 1 N.C. <input type="checkbox"/> 2 N.C. <input type="checkbox"/> 3 OFFSET ADJUST <input type="checkbox"/> 4 INVERTING INPUT <input type="checkbox"/> 5 NON-INVERTING INPUT <input type="checkbox"/> 6 V- <input type="checkbox"/> 7 N.C. <input type="checkbox"/> 8 N.C. <input type="checkbox"/> 9 N.C. <input type="checkbox"/> 10 COMPENSATION <input type="checkbox"/> 11 V+ <input type="checkbox"/> 12 COMPENSATION <input type="checkbox"/> 13 N.C. <input type="checkbox"/> 14 N.C. </p> <p> NON-INVERTING INPUT INVERTING INPUT OFFSET ADJUST V- V+ COMPENSATION OFFSET ADJUST </p>
8-PIN METAL CAN T - PACKAGE	SG101AT/883B SG101AT SG201AT SG301AT	-55°C to 125°C -55°C to 125°C -25°C to 85°C 0°C to 70°C	<p> <input type="checkbox"/> 1 OFFSET ADJUST <input type="checkbox"/> 2 INVERTING INPUT <input type="checkbox"/> 3 NON-INVERTING INPUT <input type="checkbox"/> 4 V- <input type="checkbox"/> 5 V+ <input type="checkbox"/> 6 OUTPUT <input type="checkbox"/> 7 OFFSET ADJUST <input type="checkbox"/> 8 COMPENSATION </p> <p> COMPENSATION OFFSET ADJUST INVERTING INPUT NON-INVERTING INPUT V- V+ OUTPUT OFFSET ADJUST </p>
10-PIN CERAMIC FLAT PACK F - PACKAGE	SG101AF/883B SG101AF	-55°C to 125°C -55°C to 125°C	<p> <input type="checkbox"/> 1 N.C. <input type="checkbox"/> 2 OFFSET ADJUST <input type="checkbox"/> 3 INVERTING INPUT <input type="checkbox"/> 4 NON-INVERTING INPUT <input type="checkbox"/> 5 V- <input type="checkbox"/> 6 N.C. <input type="checkbox"/> 7 N.C. <input type="checkbox"/> 8 COMPENSATION <input type="checkbox"/> 9 V+ <input type="checkbox"/> 10 OUTPUT <input type="checkbox"/> 11 V+ <input type="checkbox"/> 12 OUTPUT <input type="checkbox"/> 13 OFFSET ADJUST <input type="checkbox"/> 14 N.C. </p> <p> N.C. OFFSET ADJUST INVERTING INPUT NON-INVERTING INPUT V- N.C. N.C. COMPENSATION V+ OUTPUT V+ OUTPUT OFFSET ADJUST N.C. </p>

Note 1. Contact factory for JAN and DESC product availability.
 2. All packages are viewed from the top.