

**HIGH-VOLTAGE OPERATIONAL AMPLIFIER**

**DESCRIPTION**

The SG1536 series of monolithic amplifiers is designed specifically for use in high voltage applications up to  $\pm 40V$  and where high common-mode input ranges, high output voltage swings, and low input currents are required. These devices are internally compensated and are pin compatible with industry standard operational amplifiers.

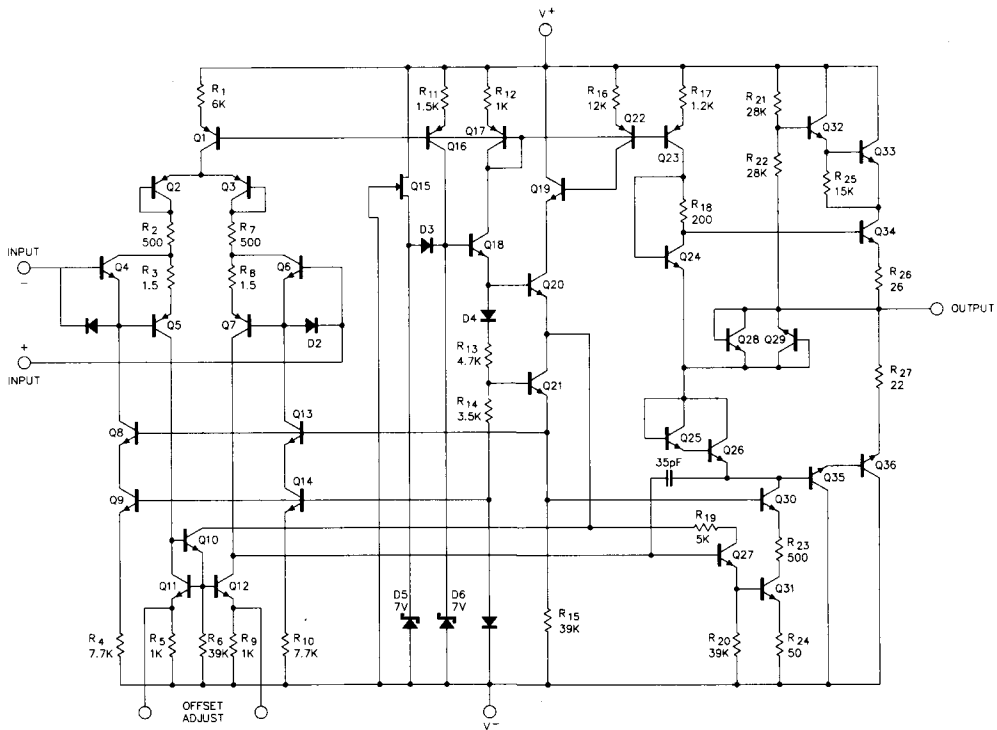
**FEATURES**

- High supply voltage capability
- High output voltage swing
- High common-mode voltage range
- Internal frequency compensation
- Input current 35nA maximum over temperature

**HIGH RELIABILITY FEATURES  
-SG1536**

- ◆ Available to MIL-STD-883 and DESC SMD
- ◆ SG level "S" processing available

**CIRCUIT SCHEMATIC**



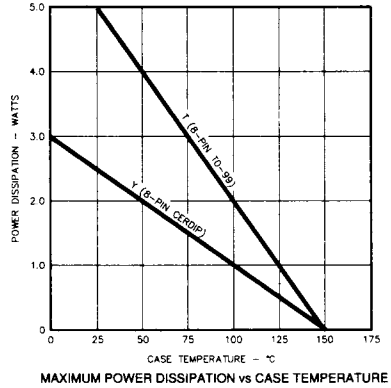
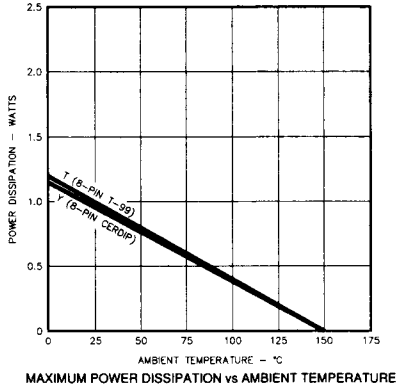
## ABSOLUTE MAXIMUM RATINGS (Note 1)

Supply Voltage	
SG1536	±40V
SG1436	±34V
Differential Input Signal	±(V <sup>+</sup> +  V <sup>-</sup> - 3) V
Common-Mode Input Swing	±V <sup>+</sup> , -( V <sup>-</sup> - 3) V

Output Short Circuit Duration (V <sup>+</sup> =  V <sup>-</sup> = 28V, V <sub>O</sub> = 0V)	5.0sec
Operating Junction Temperature	
Hermetic (T, Y-Package)	150°C
Storage Temperature Range	-65°C to 150°C
Lead Temperature (Soldering, 10 Seconds)	300°C

Note 1. Exceeding these ratings could cause damage to the device.

## THERMAL DERATING CURVES



## RECOMMENDED OPERATING CONDITIONS (Note 2)

Supply Voltage	
SG1536	±28V
SG1436	±15V

Operating Ambient Temperature Range (T <sub>J</sub> )	
SG1536	-55°C to 125°C
SG1436	0°C to 70°C

Note 2. Range over which the device is functional.

## ELECTRICAL SPECIFICATIONS

(Unless otherwise specified, these specifications apply for the operating ambient temperature of T<sub>A</sub> = 25°C, and V<sub>S</sub> = ±28V. Low duty cycle pulse testing techniques are used which maintains junction and case temperatures equal to the ambient temperature.)

Parameter	Test Conditions	SG1536			SG1436			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
<b>Input Offset Voltage</b>			2.0	5.0		5.0	10	mV
<b>Input Offset Current</b>	T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub>			7.0			14	mV
	T <sub>A</sub> = T <sub>MIN</sub>		1.0	3.0		5.0	10	nA
Input Bias Current	T <sub>A</sub> = T <sub>MAX</sub>			7.0			14	nA
	T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub>		8.0	20		15	40	nA
Differential Input Impedance	Open loop, ≤ 5.0Hz		10			10		MΩ
<b>Common-Mode Input Impedance</b>	f ≤ 5.0Hz		250			250		MΩ
<b>Common-Mode Input Voltage Range (Peak)</b>		±24	±25		±22	±25		V
<b>Common-Mode Rejection Ratio</b>		80	110		70	100		dB
<b>Large Signal Voltage Gain</b>	R <sub>L</sub> = 10KΩ, V <sub>O</sub> = ±10V R <sub>i</sub> = 100KΩ, V <sub>O</sub> = ±10V		200K			200K		V/V
Power Supply Rejection Ratio	T <sub>A</sub> = T <sub>MIN</sub> to T <sub>MAX</sub> V <sup>-</sup> constant, R <sub>S</sub> ≤ 10KΩ	100K	500K		70K	500K		V/V
	V <sup>+</sup> constant, R <sub>S</sub> ≤ 10KΩ f ≤ 5.0Hz	50K		100	50K		200	μV/V
Output Impedance			1.0			1.0		KΩ
<b>Short Circuit Output Current</b>			±17			±17		mA
Output Voltage Swing (Peak)	R <sub>L</sub> = 5.0 KΩ, V <sub>S</sub> = ±28V	±22			±22			V
	R <sub>L</sub> = 5.0 KΩ, V <sub>S</sub> = ±36V	±30			±30			V

ELECTRICAL SPECIFICATIONS (continued)

Parameter	Test Conditions	SG1536			SG1436			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
Power Bandwidth	$A_v = +1, R_L = 5.0K\Omega, THD \leq 5\%, V_o = 40V$ p-p		23		23			KHz
Unity Gain Crossover Frequency	Open loop		1.0		1.0			MHz
Slew Rate	Unity gain		2.0		2.0			V/ $\mu$ s
Phase Margin	Open loop, unity gain		50		50			deg
Gain Margin			18		18			dB
Equivalent Input Noise	$A_v = 100, R_s = 10K\Omega, f = 1.0KHz, BW = 1.0$ Hz		50		50			nV/ $\sqrt{Hz}$
Power Supply Current	$V_o = 0$		2.2	4.0	2.6	5.0		mA
Power Consumption			124	224	146	280		mW

CHARACTERISTIC CURVES

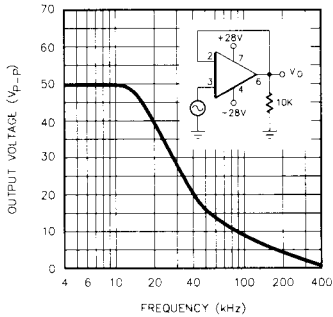


FIGURE 1. POWER BANDWIDTH

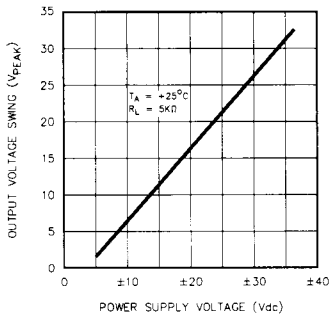


FIGURE 2. PEAK OUTPUT VOLTAGE SWING VS. POWER SUPPLY VOLTAGE

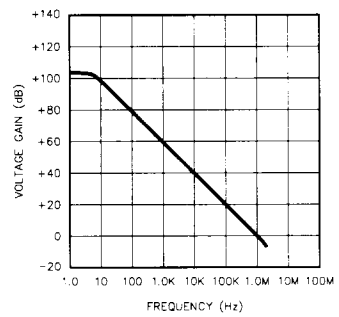


FIGURE 3. OPEN-LOOP FREQUENCY RESPONSE

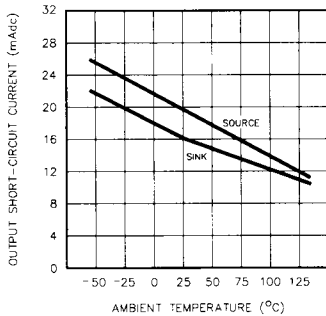


FIGURE 4. OUTPUT SHORT-CIRCUIT CURRENT VS. TEMPERATURE

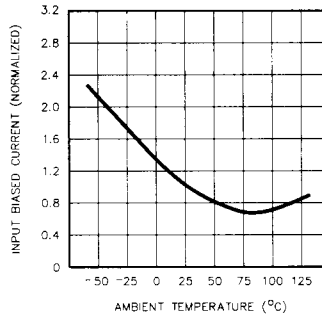


FIGURE 5. INPUT BIAS CURRENT VS. TEMPERATURE

TYPICAL APPLICATIONS

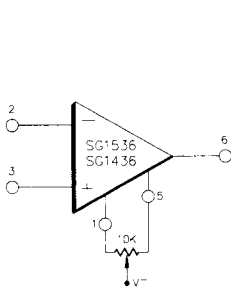


FIGURE 6 - VOLTAGE OFFSET NULL CIRCUIT

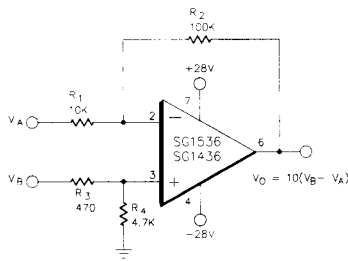


FIGURE 7 - DIFFERENTIAL AMPLIFIER WITH ±20V COMMON-MODE INPUT VOLTAGE RANGE

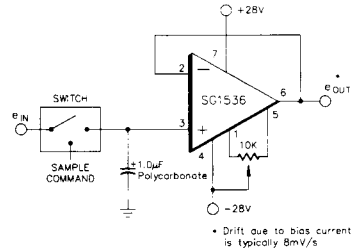


FIGURE 8 - LOW-DRIFT SAMPLE AND HOLD

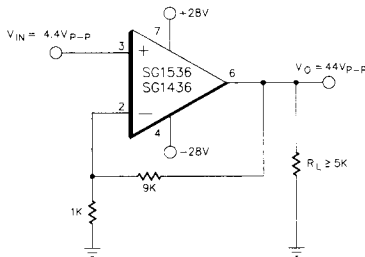


FIGURE 9 - TYPICAL NON-INVERTING X10 VOLTAGE AMPLIFIER

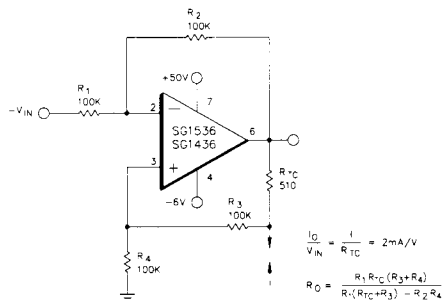


FIGURE 10 - VOLTAGE CONTROLLED CURRENT SOURCE OR TRANSCONDUCTANCE AMPLIFIER WITH 0 TO 40V COMPLIANCE

CONNECTION DIAGRAMS & ORDERING INFORMATION (See Notes Below)

Package	Part No.	Ambient Temperature Range	Connection Diagram
8-PIN METAL CAN T - PACKAGE	SG1536T/883B SG1536T SG1436T	-55°C to 125°C -55°C to 125°C 0°C to 70°C	
8-PIN CERAMIC DIP Y- PACKAGE	SG1536Y/883B SG1536Y SG1436Y	-55°C to 125°C -55°C to 125°C 0°C to 70°C	

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