SGS-THOMSON MICROELECTRONICS

LB1013

85V DUAL OP-AMP

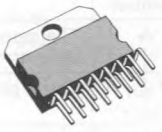
- OPERATES FROM 5 TO 85V ; DUAL OR SINGLE POWER SUPPLY OPERATION
- BIAS IS SET EXTERNALLY
- TYPICAL ft = 1MHz
- OPEN LOOP GAIN ; 50dB @ 3kHz
- PROVIDES OUTPUT CURRENTS FROM ± 40mA TO ± 80mA DEPENDING UPON -THE IBIAS VALUE
- OPERATING TEMPERATURE RANGE : FROM - 25°C TO + 100°C

APPLICATIONS

- TRANSCONDUCTANCE AMPLIFIERS FOR TELEPHONE LINE DRIVING
- VOLTAGE FOLLOWERS
- AUDIO AMPLIFIERS
- GENERAL PURPOSE CIRCUITS REQUIRING HIGH-VOLTAGE, HIGH-POWER OP-AMPS

DESCRIPTION

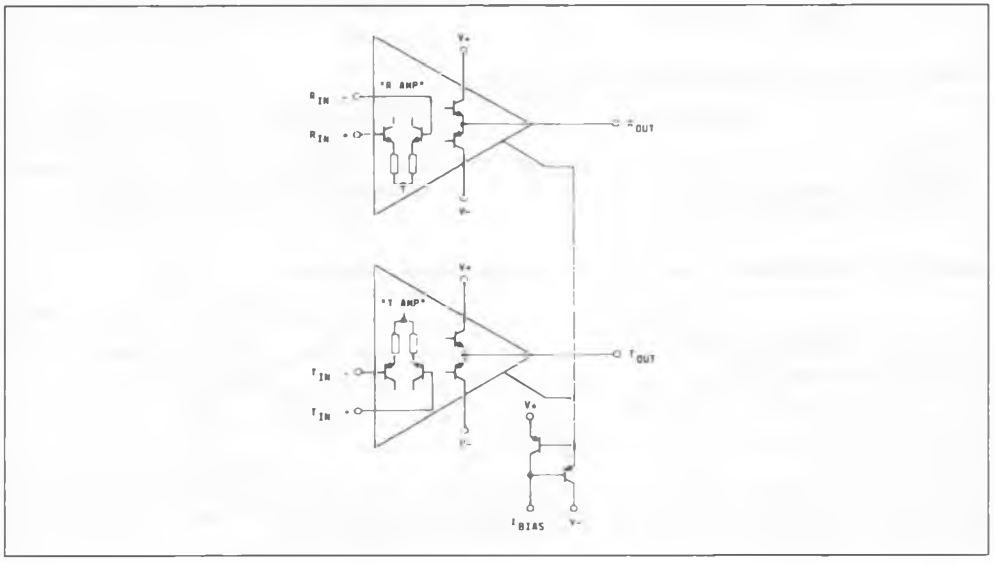
The LB1013 HIGH-VOLTAGE OP-AMP operates off of a single power supply from 5 to 85 volts. The amplifiers are internally compensated and are designed to operate in the audio band. This device is powered up with a 40µA current supplied to the IBIAS pin.
External circuitry is required to provide short-circuit protection.



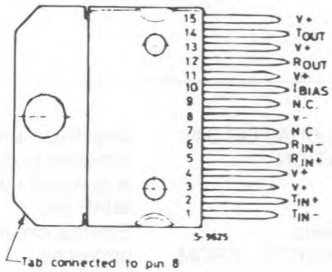
Multiwatt 15

ORDER CODE : LB1013AW

Figure 1 : High Voltage Dual Op-Amp Diagram.



PIN CONNECTION



PIN DESCRIPTION

Pin	Symbol	Function
3, 4, 11, 13, 15	V+	The more positive supply-voltage is connected to the five pins designated as V+. Either V+ or V– can be connected to ground.
14 12	T_{OUT} R_{OUT}	These pins are the Op-amp outputs for "T" and "R" amplifier respectively.
8	V–	The more negative supply-voltage is connected to the case. Either V– or V+ can be connected to ground.
1 2	T_{IN-} T_{IN+}	These pins are the non-inverting and the inverting inputs respectively for the "T" amplifier.
5 6	R_{IN+} R_{IN-}	These pins are the non-inverting and the inverting pins respectively for the "R" amplifier.
10	I_{BIAS}	A current source (or a suitable value resistor to V-) can be connected to this pin. A negative current flow must be present before the device becomes operational.
7, 9	NC	Not connected.

TYPICAL DEVICE CHARACTERISTICS (T_A = 25°C)

Parameter	I_{BIAS} = 40µA	I_{BIAS} = 80µA
Slew Rate	2V/µsec	4V/µsec
Output Current	± 40mA	± 80mA
Power Supply Rejection Ratio	45dB	45dB

ABSOLUTE MAXIMUM RATINGS (at 25°C unless otherwise specified)

Parameter	Value	Unit
Ambient Operating Temperature Range	– 25 to + 100	°C
Storage Temperature Range	– 40 to + 125	°C
Pin Temperature (Soldering Time = 15sec.)	300	°C
Power Dissipation (see note under Outline Drawing)	2	W
Voltage (V+ to V–)	85	V

Stressed in excess of those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions in excess of those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS (T_A = 25C, V+ = 25V, V– = 25V, I_{BIAS} connects through 1.25MΩ to V– unless otherwise specified)

Parameter	Test Conditions		Min.	Typ.	Max.	Unit
Open Loop Gain	f = 100Hz		75			dB
	f = 1KHz		55			dB
Input Offset Voltage					± 5.0	mV
Input Bias Current	Inverting and Non-inverting Pins				± 1.0	µA
Input Offset Current					± 1.0	µA
Common Mode Rejection Ratio	V– = – 30V, V_{CM} = ± 20V		80			dB
Output Voltage Swing ("T" Amplifier)	V+ = 38V ; V– = – 38V Non-inverting Input = GND : R_L = 1kΩ ΔV (Inverting Input = ± 0.5V) V_{HIGH} V_{LOW}		 34.6 – 34.6			V
Output Voltage Swing ("R" Amplifier)	V+ = 38V ; V– = – 38V Non-inverting Input = GND : R_L = 1kΩ ΔV (Inverting Input = ± 0.5V) V_{HIGH} V_{LOW}		 34.6 – 34.6			
Power Supply Currents (Amplifiers activated under no-load conditions)	Test Circuit (see figure 2) V+ = 42.5V ; V– = – 42.5V I_{V+} I_{V-}				 1.1 – 1.1	mA
Power Supply Leakage Current (Amplifier Off)	Test Circuit (see figure 2) V+ = 35V ; V– = – 35V ; IBIAS = (open) I_{V+} I_{V-}				 ± 10 ± 10	µA
Output Leakage Currents (Amplifier Off)	Test Circuit (see figure 3) V+ = 35V ; V– = – 35V IBIAS = (open) V_{LOAD} = + 30V V_{LOAD} = – 30V				 ± 10 ± 10	µA
T_{OUT} to V+ Fault Current	Test Circuit (see figure 4) V+ = 35V ; V– = – 35V ; t = 100ms	V_{LOAD} = + 35V	41		47	mA
T_{OUT} to V– Fault Current		V_{LOAD} = – 35V	– 41		– 47	
R_{OUT} to V+ Fault Current		V_{LOAD} = + 35V	41		47	
R_{OUT} to V– Fault Current		V_{LOAD} = – 35V	– 41		– 47	

Figure 2 : Power Supply Current, Test Circuit (for this test, connect both op-amps as shown above).

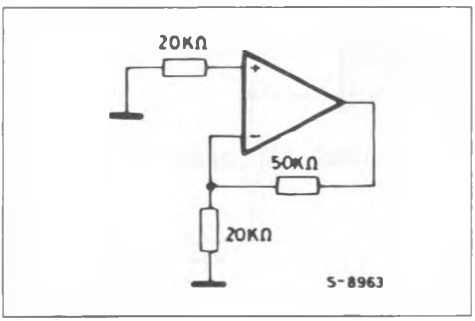


Figure 3 : Output Leakage Current, Test Circuit (the current through this 10K resistor is the "Leakage Current").

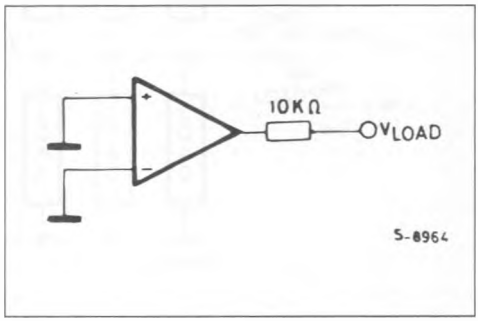


Figure 4 : Fault Current Test Circuit.

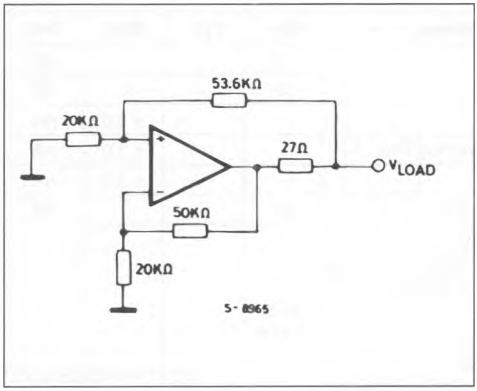
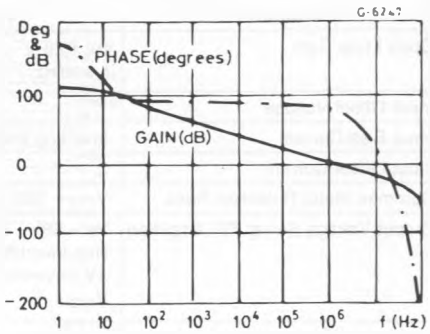
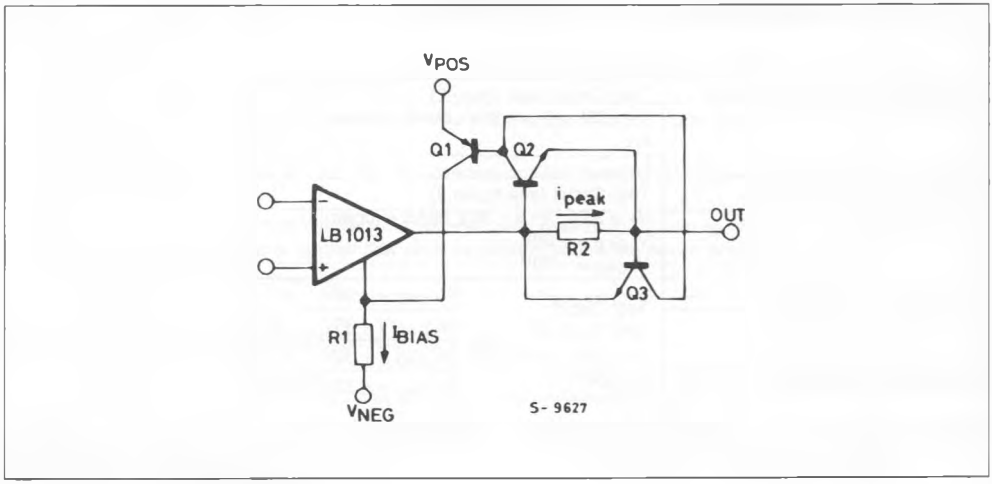


Figure 5 : Typical Characteristics : Gain/phase vs. Frequency.



SHORT-CIRCUIT PROTECTION

Figure 6 : AD External Circuitry for Short-circuit Protection.



Notes : 1. Q1, Q2, Q3 ; $BV_{CEO} > 90$ Volts

2. $R1 = \dfrac{V_{POS} - V_{NEG} - 1.2V}{I_{BIAS}}$

3. $R2 = \dfrac{0.6V}{I_{peak}}$

APPLICATION

The simplified schematic shown below illustrates an application as a transconductance amplifier for telephone line drive applications. Other applications include high voltage/power voltage followers, audio amplifiers and circuits where high-voltage, high-power op-amp capability are required.

The equations relating to the circuit shown below are as follows :

$$I_T = \frac{V_C - V_D}{R1} \bullet \frac{R2}{R3}$$

$$I_R = \frac{V_C - V_D}{R1} \bullet \frac{R2}{R3}$$

for R1 & R2 > > R3

Figure 7 : Simplified Line Feed Operation.

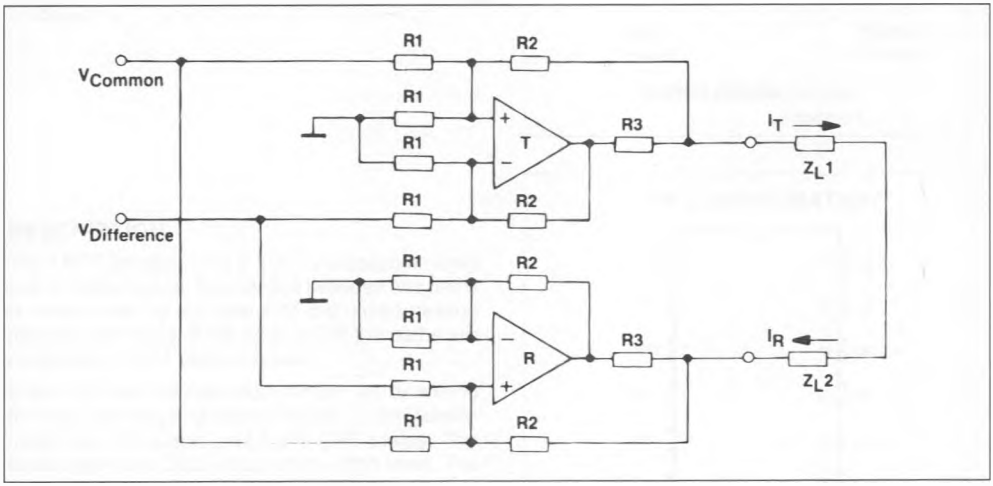


Figure 8 : Typical Voltage Follower Application.