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

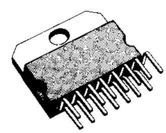
APPLICATIONS

- 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.

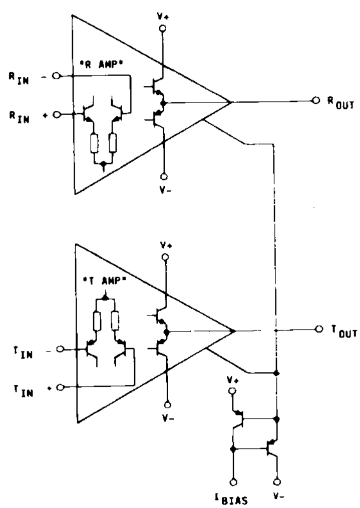
External circuitry is required to provide short-circuit protection.



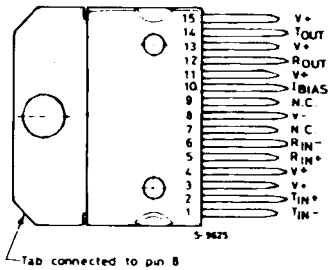
Multiwatt 15

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			V
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	mA
R_{OUT} to V+ Fault Current	V_{LOAD} = + 35V	41		47	mA
R_{OUT} to V– Fault Current	V_{LOAD} = – 35V	– 41		– 47	mA

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

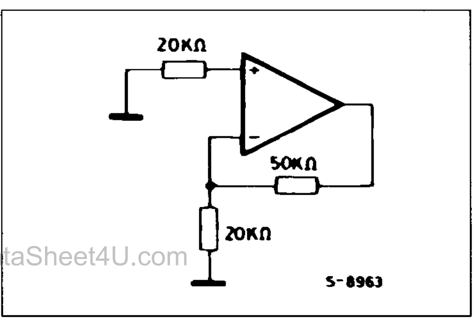


Figure 3 : Output Leakage Current, Test Circuit (the current through this 10K resistor is the "Leakage Current").

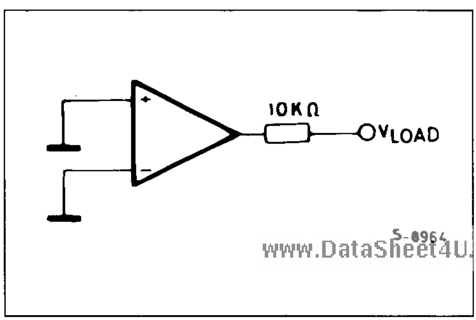


Figure 4 : Fault Current Test Circuit.

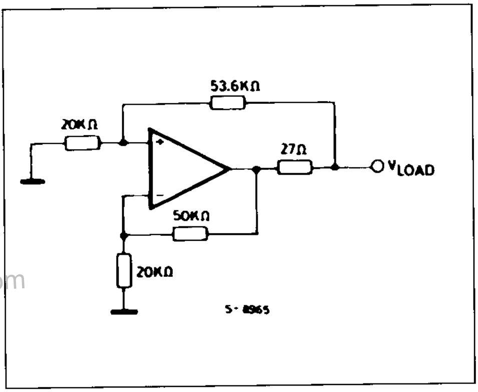
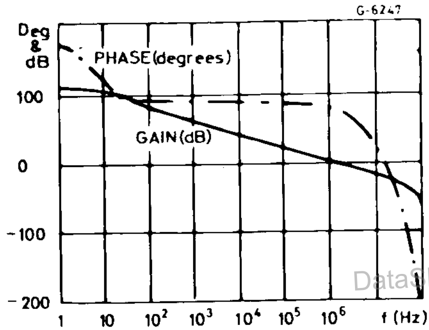
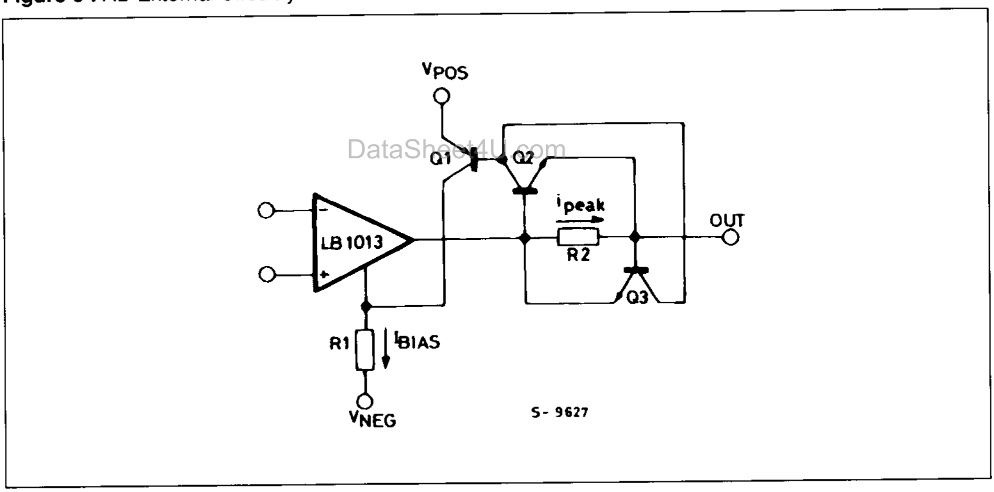


Figure 5 : Typical Characteristics : Gain/phase vs. Frequency.



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 :

for R1 & R2 > > R3

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

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

Figure 7 : Simplified Line Feed Operation.

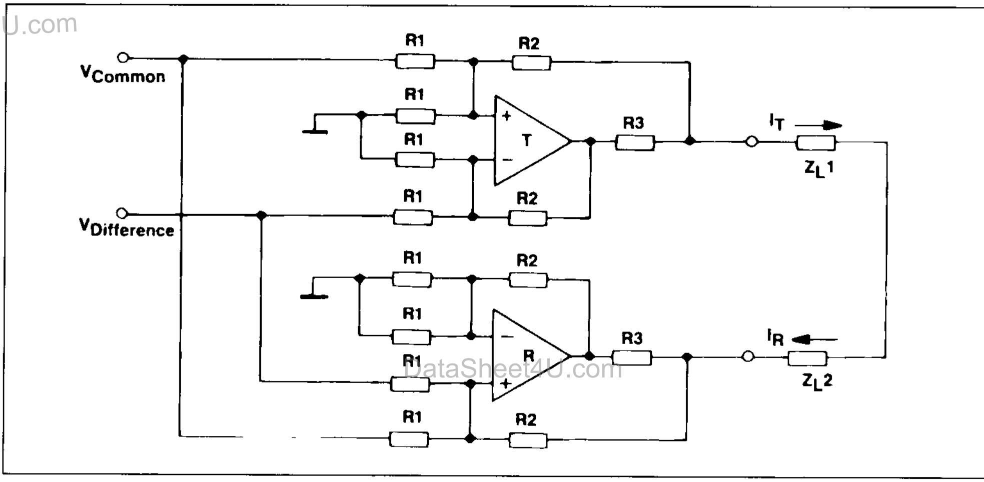


Figure 8 : Typical Voltage Follower Application.