# signetics

# HIGH PERFORMANCE AMPLIFIER

# LM101
# LM201

## LINEAR INTEGRATED CIRCUITS

## DESCRIPTION

The LM101 and LM201 are high performance operational amplifiers featuring high gain, short circuit protection, simplified compensation and excellent temperature stability.

## FEATURES

- SHORT CIRCUIT PROTECTION
- OFFSET VOLTAGE NULL CAPABILITY
- LARGE COMMON-MODE AND DIFFERENTIAL VOLTAGE RANGES
- LOW POWER CONSUMPTION
- NO LATCH UP

## ABSOLUTE MAXIMUM RATINGS

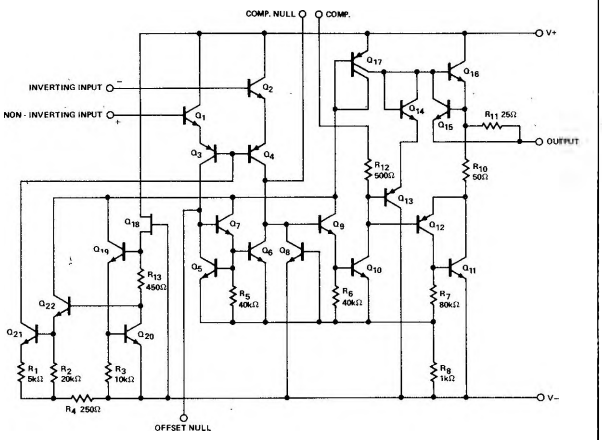
| | | |
|---|---|---|
| Supply Voltage | | ±22V |
| Power Dissipation (Note 1) | | 500mW |
| Differential Input Voltage | | ±30V |
| Input Voltage (Note 2) | | ±15V |
| Output Short Circuit Duration | | Indefinite |
| Operating Temperature Range | LM101 | −55°C to 125°C |
| | LM201 | 0°C to 70°C |
| Storage Temperature Range | | −65°C to 150°C |
| Lead Temperature (Soldering, 60 sec.) | | 300°C |

NOTES

1. Absolute maximum rating holds for all packages. The maximum junction temperature is 150°C for the LM101 and 100°C for the LM201. For operation at elevated temperatures, derate according to appropriate thermal resistances given under package information.

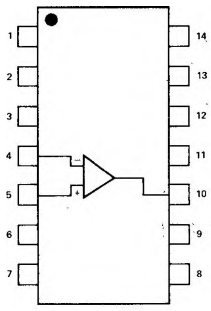
2. For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

## EQUIVALENT CIRCUIT




## PIN CONFIGURATIONS

### A & F PACKAGE (Top View)



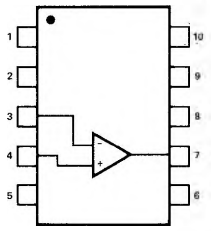
1. NC
2. NC
3. Freq. Comp./Offset Null
4. Inverting Input
5. Noninverting Input
6. $V^-$
7. NC
8. NC
9. Offset Null
10. Output
11. $V^+$
12. Freq. Comp.
13. NC
14. NC

ORDER PART NOS.

LM10IN-14, LM20IN-14 } Silicone

LM101D, LM201D } Ceramic

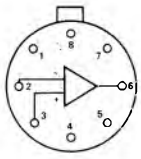
### G PACKAGE



1. NC
2. Bal/Comp
3. Input
4. Input
5. $V^-$
6. Bal
7. Output
8. $V^+$
9. Comp
10. NC

ORDER PART NOS.
LM101F/LM201F

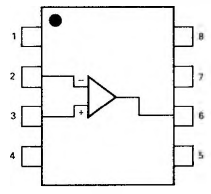
### T PACKAGE



1. Freq. Comp/Offset Null
2. Inverting Input
3. Noninverting Input
4. $V^-$
5. Offset Null
6. Output
7. $V^+$
8. Freq. Comp.

ORDER PART NOS.
LM101H/LM201H

### V PACKAGE



1. Freq. Comp./Offset Null
2. Inverting Input
3. Noninverting Input
4. $V^-$
5. Offset Null
6. Output
7. $V^+$
8. Freq. Comp.

ORDER PART NO. LM201N

## ELECTRICAL CHARACTERISTICS

$-55°C \leq T_A \leq 125°C$, $\pm 15V \leq V_S \leq \pm 20V$ and $C_1 = 30$ pF unless otherwise specified).

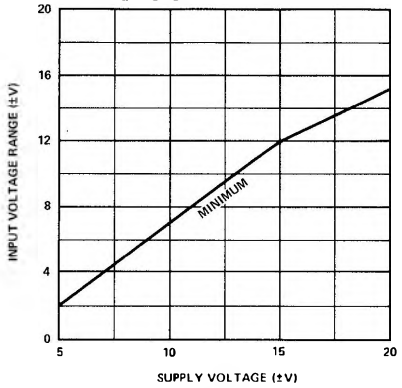
| LM101 PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|
| Input Offset Voltage | $T_A = 25°C$, $R_s \leq 10k\Omega$ | | 1.0 | 5.0 | mV |
| Input Offset Current | $T_A = 25°C$ | | 40 | 200 | nA |
| Input Bias Current | $T_A = 25°C$ | | 120 | 500 | nA |
| Input Resistance | $T_A = 25°C$ | 300 | 800 | | kΩ |
| Supply Current | $T_A = 25°C$, $V_s = \pm 20V$ | | 1.8 | 3.0 | mA |
| Large Signal Voltage Gain | $T_A = 25°C$, $V_s = \pm 15V$<br>$V_{OUT} = \pm 10V$, $R_L \geq 2k\Omega$ | 50 | 160 | | V/mV |
| Input Offset Voltage | $R_s \leq 10k\Omega$ | | | 6.0 | mV |
| Average Temperature Coefficient of Input Offset Voltage | $R_s \leq 50\Omega$ | | 3.0 | | μV/°C |
| | $R_s \leq 10k\Omega$ | | 6.0 | | μV/°C |
| Input Offset Current | $T_A = +125°C$ | | 10 | 200 | nA |
| | $T_A = -55°C$ | | 100 | 500 | nA |
| Input Bias Current | $T_A = -55°C$ | | 0.28 | 1.5 | μA |
| Supply Current | $T_A = +125°C$, $V_s = \pm 20V$ | | 1.2 | 2.5 | mA |
| Large Signal Voltage Gain | $V_s = \pm 15V$, $V_{OUT} = \pm 10V$<br>$R_L \geq 2k\Omega$ | 25 | | | V/mV |
| Output Voltage Swing | $V_s = \pm 15V$, $R_L = 10k\Omega$ | ±12 | ±14 | | V |
| | $R_L = 2k\Omega$ | ±10 | ±13 | | V |
| Input Voltage Range | $V_s = \pm 15V$ | ±12 | | | V |
| Common Mode Rejection Ratio | $R_s \leq 10k\Omega$ | 70 | 90 | | dB |
| Supply Voltage Rejection Ratio | $R_s \leq 10k\Omega$ | 70 | 90 | | dB |

| LM201 PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|
| Input Offset Voltage | $T_A = 25°C$, $R_s \leq 10k\Omega$ | | 2.0 | 7.5 | mV |
| Input Offset Current | $T_A = 25°C$ | | 100 | 500 | nA |
| Input Bias Current | $T_A = 25°C$ | | 0.25 | 1.5 | μA |
| Input Resistance | $T_A = 25°C$ | 100 | 400 | | kΩ |
| Supply Current | $T_A = 25°C$, $V_s = \pm 20V$ | | 1.8 | 3.0 | mA |
| Large Signal Voltage Gain | $T_A = 25°C$, $V_s = \pm 15V$<br>$V_{OUT} = \pm 10V$, $R_L \geq 2k\Omega$ | 20 | 150 | | V/mV |
| Input Offset Voltage | $R_s \leq 10k\Omega$ | | | 10 | mV |
| Average Temperature Coefficient of Input Offset Voltage | $R_s \leq 50\Omega$ | | 6 | | μV/°C |
| | $R_s \leq 10k\Omega$ | | 10 | | μV/°C |
| Input Offset Current | $T_A = +70°C$ | | 50 | 400 | nA |
| | $T_A = 0°C$ | | 150 | 750 | nA |
| Input Bias Current | $T_A = 0°C$ | | 0.32 | 2.0 | μA |
| Large Signal Voltage Gain | $V_s = \pm 15V$, $V_{OUT} = \pm 10V$<br>$R_L \geq 2k\Omega$ | 15 | | | V/mV |
| Output Voltage Swing | $V_S = \pm 15V$, $R_L = 10k\Omega$ | ±12 | ±14 | | V |
| | $R_L = 2k\Omega$ | ±10 | ±13 | | V |
| Input Voltage Range | $V_s = \pm 15V$ | ±12 | | | V |
| Common Mode Rejection Ratio | $R_s \leq 10k\Omega$ | 65 | 90 | | dB |
| Supply Voltage Rejection Ratio | $R_s \leq 10k\Omega$ | 70 | 90 | | dB |

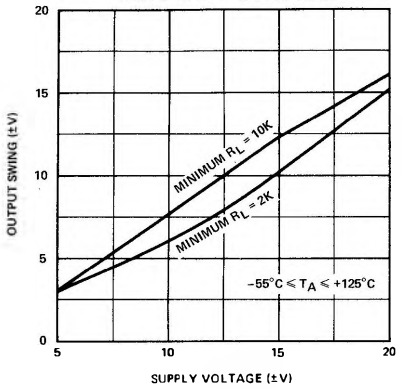
## TYPICAL CHARACTERISTIC CURVES

### LM101

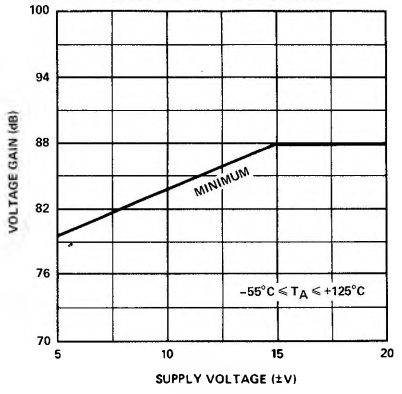
**INPUT VOLTAGE RANGE VERSUS SUPPLY VOLTAGE**




**OUTPUT SWING VERSUS SUPPLY VOLTAGE**

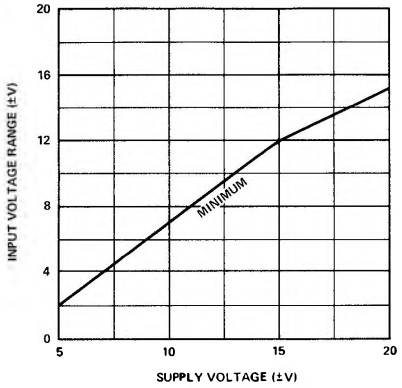



**VOLTAGE GAIN VERSUS SUPPLY VOLTAGE**

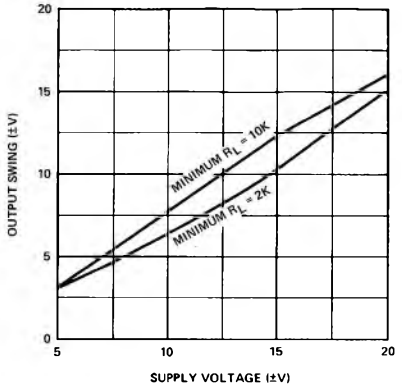



### LM201

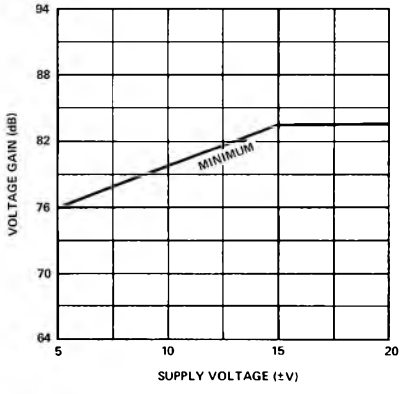
**INPUT VOLTAGE RANGE VERSUS SUPPLY VOLTAGE**




**OUTPUT SWING VERSUS SUPPLY VOLTAGE**



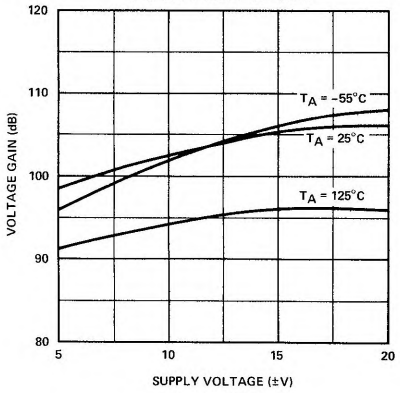

**VOLTAGE GAIN VERSUS SUPPLY VOLTAGE**



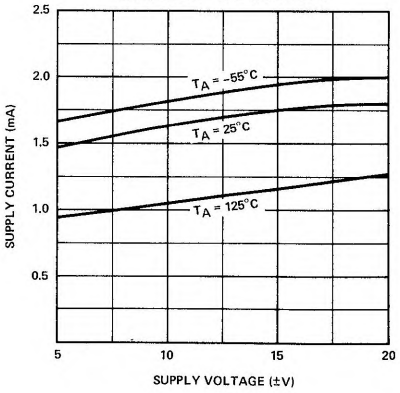
## TYPICAL CHARACTERISTIC CURVES (Cont'd.)

### LM101

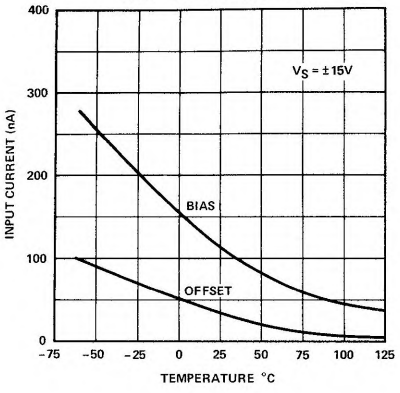
#### VOLTAGE GAIN




#### SUPPLY CURRENT

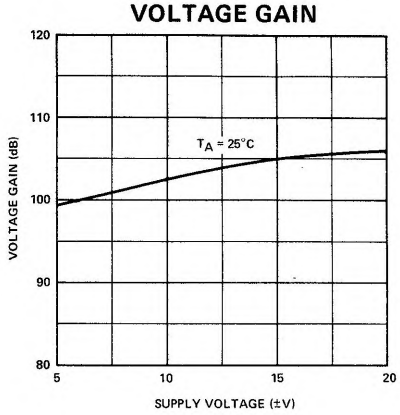



#### INPUT CURRENT

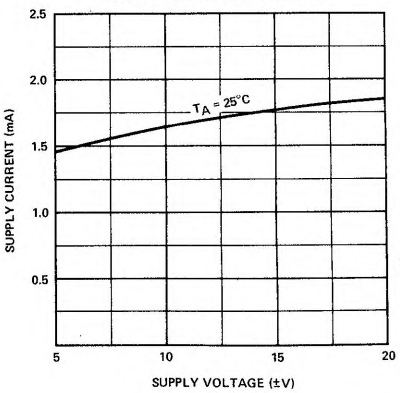



### LM201

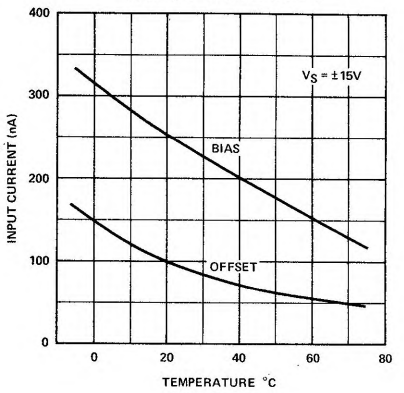
#### VOLTAGE GAIN




#### SUPPLY CURRENT



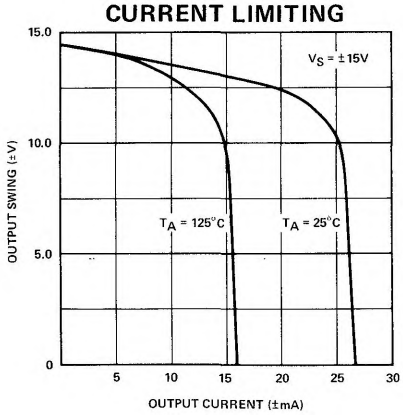

#### INPUT CURRENT



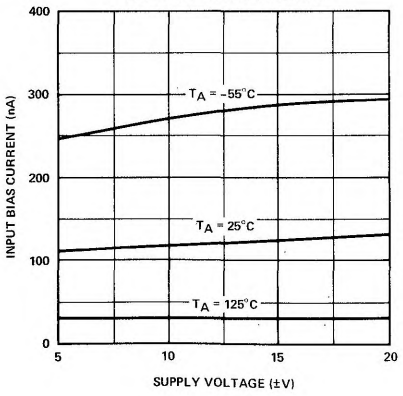
## TYPICAL CHARACTERISTIC CURVES (Cont'd.)

### LM101

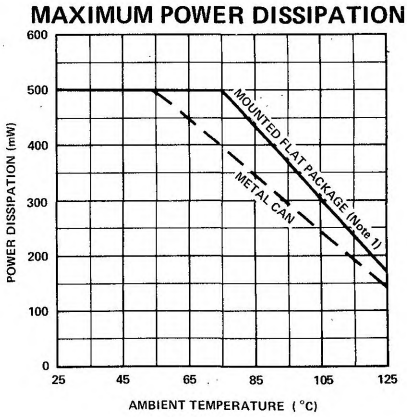
#### CURRENT LIMITING




#### INPUT CURRENT

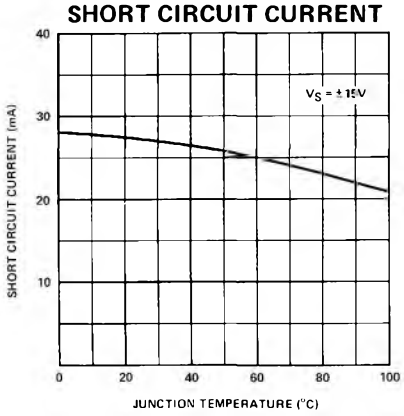



#### MAXIMUM POWER DISSIPATION

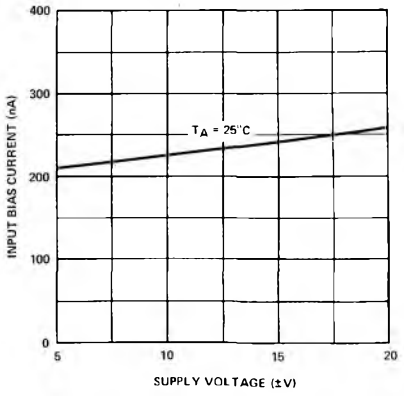



### LM201

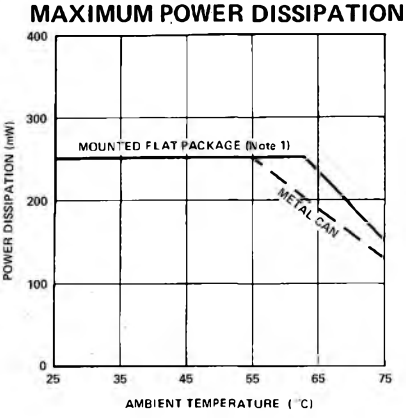
#### SHORT CIRCUIT CURRENT




#### INPUT CURRENT

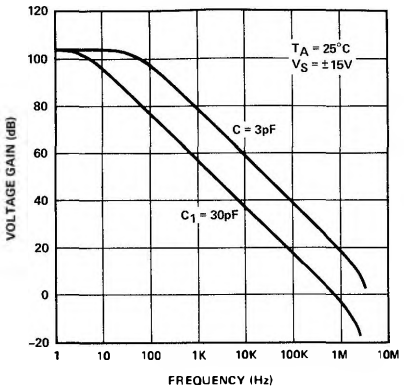



#### MAXIMUM POWER DISSIPATION

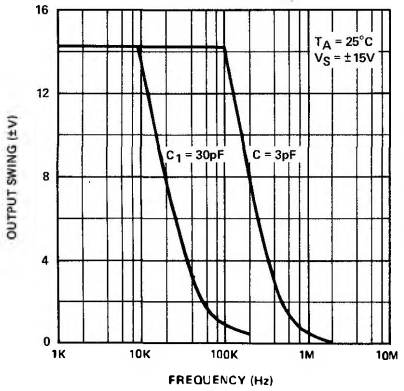


## TYPICAL CHARACTERISTIC CURVES (Cont'd.)

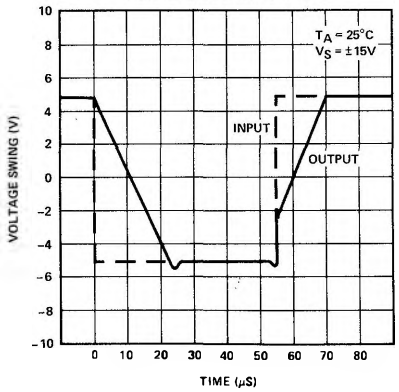
### OPEN LOOP FREQUENCY RESPONSE




### LARGE SIGNAL FREQUENCY RESPONSE

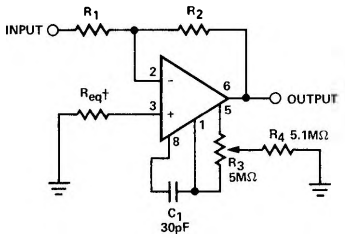



### VOLTAGE FOLLOWER PULSE RESPONSE



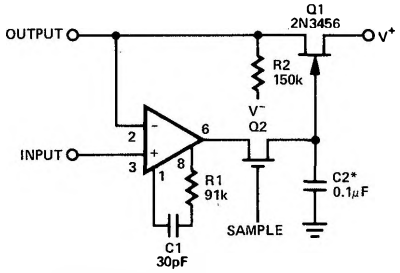

## TYPICAL APPLICATIONS (Pin numbers shown refer to T or V package only)

### INVERTING AMPLIFIER WITH BALANCING CIRCUIT




†May be zero or equal to parallel combination of $R_1$ and $R_2$ for minimum offset.

### LOW DRIFT SAMPLE AND HOLD




*POLYCARBONATE DIELECTRIC CAPACITOR