



# LH0021-200 1.0 Amp Power Operational Amplifier

## General Description

The LH0021-200 is a general purpose operational amplifier capable of delivering large output currents not usually associated with conventional IC op amps. The LH0021 will provide output currents in excess of one ampere at voltage levels of  $\pm 12V$ . In addition, both the inputs and outputs are protected against overload. The devices are compensated with a single external capacitor and are free of any unusual oscillation or latchup problems.

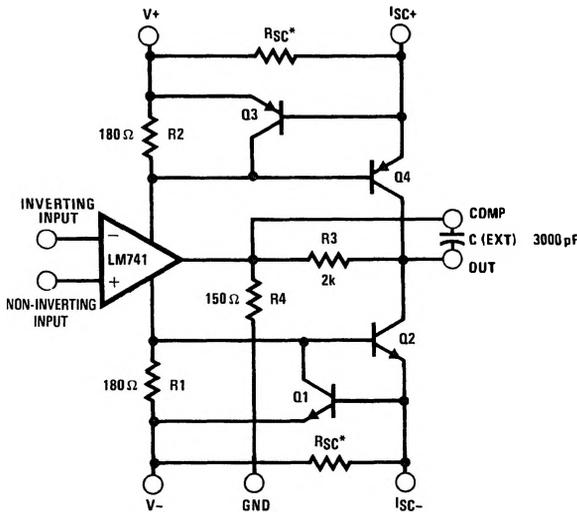
The excellent input characteristics and high output capability of the LH0021-200 make it an ideal choice for power applications such as DC servos, capstan drivers, deflection yoke drivers, and programmable power supplies.

The LH0021-200 is supplied in an 8-pin TO-3 package rated at 20W with a suitable heatsink. Also, the LH0021-200 is guaranteed over the temperature range of  $-55^{\circ}C$  to  $+200^{\circ}C$ .

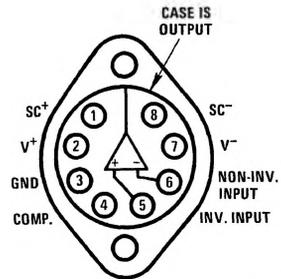
## Features

- 200°C Operation
- Output current 1.0A
- Output voltage swing  $\pm 12V$  into  $10\Omega$
- Wide full power bandwidth 15 kHz
- Low standby power 100 mW at  $\pm 15V$
- Low input offset voltage and current 1 mV and 20 nA
- High slew rate 3.0 V/ $\mu s$
- High open loop gain 100 dB
- Expected life in operation 160 Hours

## Schematic and Connection Diagrams



\*R<sub>SC</sub> external on "K" package



Top View

Order Number LH0021K-200  
See NS Package Number K08A

TL/K/8783-1

TL/K/8783-2

## Absolute Maximum Ratings

If Military/Aerospace specified devices are required, contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	±18V
Power Dissipation	See curves
Differential Input Voltage	±30V
Input Voltage (Note 1)	±15V
Peak Output Current LH0021-200 (Note 2)	2.0A

Output Short Circuit Duration (Note 3)	Continuous
Operating Temperature Range LH0021-200	-55°C to +200°C
Storage Temperature Range	-65°C to +225°C
Lead Temperature (Soldering, 10 sec.)	+260°C
Expected Operating Life at 200°C	160 Hrs.
ESD rating is to be determined.	

## DC Electrical Characteristics for LH0021-200 (Notes 4, 5 & 6)

Symbol	Parameter	Conditions	Limits			Units
			Min	Typ	Max	
	Input Offset Voltage	$R_S \leq 100\Omega$			15	mV
	Input Offset Current				500	nA
	Input Bias Current				2.0	$\mu$ A
	Input Resistance	$T_C = 25^\circ\text{C}$		1.0		M $\Omega$
	Common Mode Rejection Ratio	$R_S \leq 100\Omega, \Delta V_{CM} = \pm 10\text{V}$	60	90		dB
	Input Voltage Range	$V_S = \pm 15\text{V}$	±12			V
	Power Supply Rejection Ratio	$R_S \leq 100\Omega, \Delta V_S = \pm 10\text{V}$	60	96		dB
	Voltage Gain	$V_S = \pm 15\text{V}, V_O = \pm 10\text{V}$ $R_L = 100\Omega$	70			dB
	Output Voltage Swing	$V_S = \pm 15\text{V}, R_L = 100\Omega$	±10	±14		V
	Power Supply Current	$V_S = \pm 15\text{V}, V_{OUT} = 0$		2.5	5.0	mA

## AC Electrical Characteristics for LH0021-200 ( $T_A = 25^\circ\text{C}, V_S = \pm 15\text{V}, C_C = 3000\text{pF}$ )

Symbol	Parameter	Conditions	Limits			Units
			Min	Typ	Max	
	Slew Rate	$A_V = +1, R_L = 100\Omega$		3.0		V/ $\mu$ s
	Power Bandwidth	$R_L = 100\Omega$		20		kHz

**Note 1:** Rating applies for supply voltages greater than ±15V. For supplies less than ±15V, rating is equal to supply voltages.

**Note 2:** Rating applies for LH0021K-200 with  $R_{SC} = 0\Omega$ .

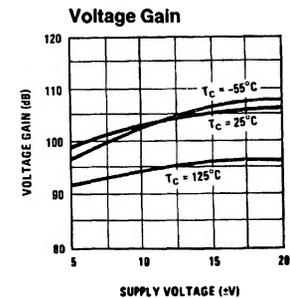
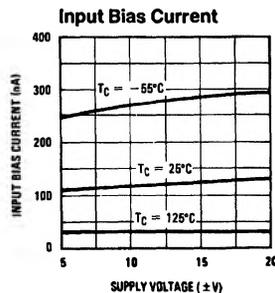
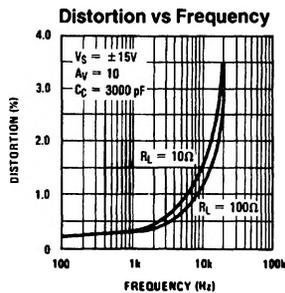
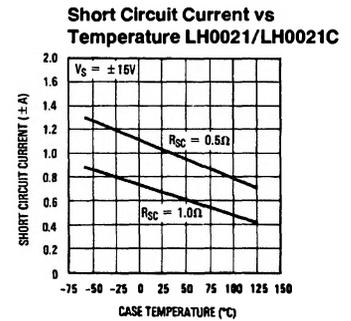
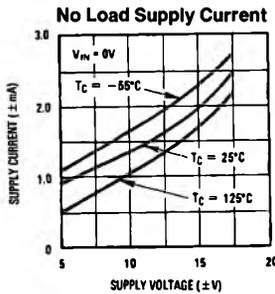
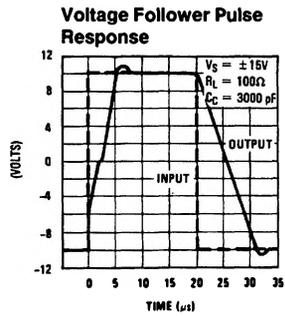
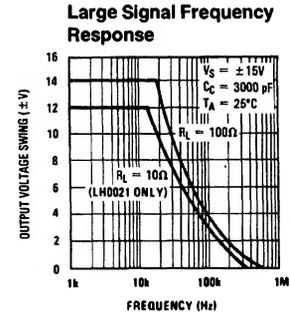
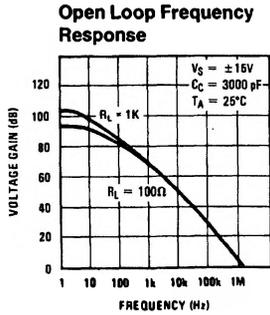
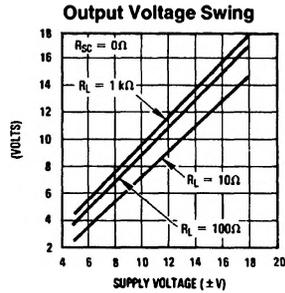
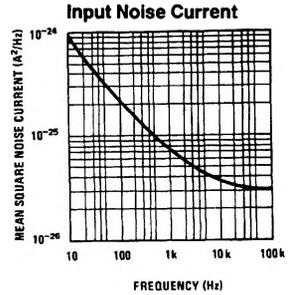
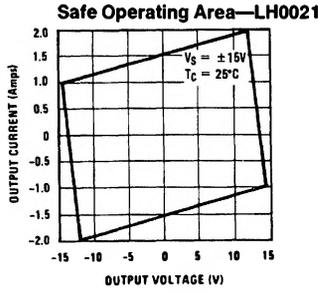
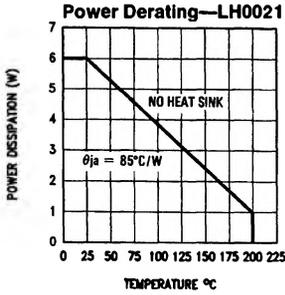
**Note 3:** Rating applies as long as package rating is not exceeded.

**Note 4:** Test conditions are  $V_S = \pm 15\text{V}, R_S = 100\Omega, C_C = 3000\text{pF}$  and apply for  $-55^\circ\text{C} \leq T_A \leq 200^\circ\text{C}$  unless otherwise specified.

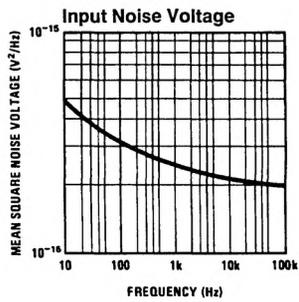
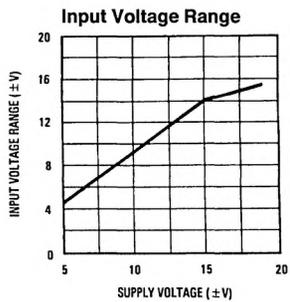
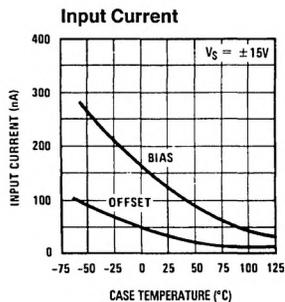
**Note 5:** For further information, see the LH0021/LH0021C Datasheet.

**Note 6:** In order to limit maximum junction temperature to +225°C it may be necessary to operate with  $V_S < \pm 15\text{V}$  when  $T_A$  or  $T_C$  exceeds specific values depending on the  $P_D$  within the device package. Total  $P_D$  is the sum of quiescent and load-related dissipation.

# Typical Performance Characteristics



# Typical Performance Characteristics (Continued)



TL/K/8783-4

For further applications information see the LH0021/LH0041 Datasheet.