OBSOLETE PRODUCT
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Low Power, High Performance Operational Amplifier

The HA-2705 is a general purpose amplifier which operates at very low power levels without compromising large signal response characteristics or output drive capability. Advanced circuit design techniques and the use of vertical NPN and PNP transistors make possible the attainment of very high gain with a single stage of voltage amplification. This ensures closed loop stability even in the critical unity gain follower mode, without the use of external compensation components.

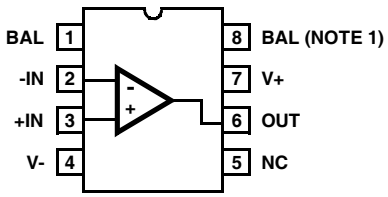
The circuit is intended for use in applications that require fast large signal response with low power dissipation and for instrumentation applications in which low offset voltage, low bias current drift, large voltage gain and high common mode rejection are necessary. Full output short circuit protection and the large differential input breakdown enable the device to withstand a variety of fault conditions.

Part Number Information

PART NUMBER	TEMPERATURE RANGE	PACKAGE
HA3-2705-5	0^{o}C to $+70^{o}$C	8 Lead Plastic DIP
HA9P2705-5	0^{o}C to $+70^{o}$C	8 Lead SOIC

Pinout

HA-2705
(PDIP, SOIC)
TOP VIEW



Features

- High Slew Rate 20V/μs
- Low Power Dissipation. . . . . 2.25mW at ±15.0V
- High Open Loop Gain . . . . . 300kV/V (R_L = 2kΩ)
- Low Input Bias Current. 5nA
- Low Offset Voltage. 1mV
- High CMRR 106dB
- Wide Power Supply Range . . . . . ±5.5V to ±20.0V
- Fully Internally Compensated
- Output Short Circuit Protected
- Offset Null Capability

Applications

- Instrumentation
- Battery Powered Circuits
- Portable Instruments
- Remote Data Logging

Absolute Maximum Ratings

Voltage Between V+ and V- Terminals 44.0V
Differential Input Voltage 18V
Input Voltage . . . . . V+ to V-
Junction Temperature (Hermetic) . . . . . .+175^{o}C
Junction Temperature (Plastic Package) . . . . . .+150^{o}C
Storage Temperature Range . . . . . .-65^{o}C ≤ T_A ≤ +150^{o}C
Lead Temperature (Soldering 10s) . . . . . .+300^{o}C
(SOIC - Lead Tips Only)

Operating Conditions

HA-2705-5 . . . . . 0^{o}C ≤ T_A ≤ +75^{o}C

Thermal Information

Thermal Resistance (Typical)	θ_{JA}
Plastic DIP Package	94^{o}C/W
SOIC Package	157^{o}C/W

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Electrical Specifications

V+ = +15V, V- = -15V, R_L = 5kΩ, Unless Otherwise Specified

PARAMETER	TEMP	HA-2705-5			UNITS
		MIN	TYP	MAX	
INPUT CHARACTERISTICS					
Offset Voltage (Note 1)	+25^{o}C	-	1.0	5.0	mV
	Full	-	-	7.0	mV
Bias Current	+25^{o}C	-	5.0	40.0	nA
	Full	-	-	70.0	nA
Offset Current	+25^{o}C	-	2.5	15.0	nA
	Full	-	-	40.0	nA
Common Mode Range	Full	±11.0	-	-	V
TRANSFER CHARACTERISTICS					
Large Signal Voltage Gain (Notes 2, 3)	+25^{o}C	200	300	-	kV/V
	Full	100	-	-	kV/V
Common Mode Rejection Ratio (Note 4)	Full	80	106	-	dB
Gain Bandwidth Product (Note 2)	+25^{o}C	-	1.0	-	MHz
Minimum Stable Gain	Full	1	-	-	V/V
OUTPUT CHARACTERISTICS					
Output Voltage Swing (Note 2)	+25^{o}C	±12.0	±13.0	-	V
	Full	±11.0	-	-	V
Output Current (Note 3)	+25^{o}C	-	10	-	mA
TRANSIENT RESPONSE CHARACTERISTICS					
Slew Rate (Notes 2, 6)	+25^{o}C	10	20	-	V/μs
POWER SUPPLY CHARACTERISTICS					
Supply Current	+25^{o}C	-	75	150	μA
	Full	-	-	200	μA
Power Supply Rejection Ratio (Note 5)	Full	80	100	-	dB

NOTES:

1. Can be adjusted to zero with 1MΩ potentiometer between Pins 1 and 8 with the wiper to V+.
2. R_L = 2kΩ, C_L = 100pF.
3. V_O = ±10.0V.
4. V_{CM} = ±5.0V.
5. V_S = ±10.0V to ±20.0V.
6. A_V = 5.

Die Characteristics

DIE DIMENSIONS:

70mils x 60mils x 19mils ±1mil

METALLIZATION:

Type: Al, 1% Cu
Thickness: 16kÅ ±2kÅ

GLASSIVATION:

Type: Nitride (Si_3N_4) over Silox (SiO_2, 5% Phos)
Silox Thickness: 12kÅ ±2kÅ
Nitride Thickness: 3.5kÅ ±2kÅ

DIE ATTACH:

Material: Silver Epoxy - Plastic DIP and SOIC
Silver Epoxy - TO-99 Metal Can

Metallization Mask Layout

HA-2705