iC-HQ

QUAD HIGH-PERFORMANCE OPAMP

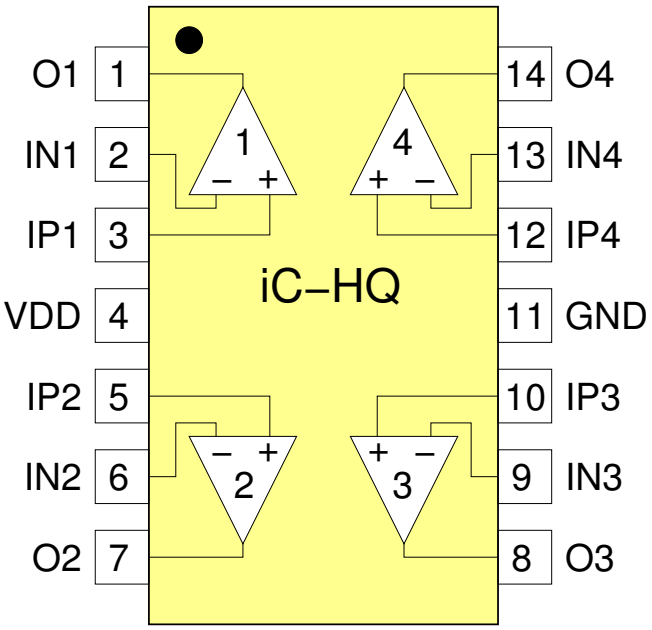
The iC-HQ contains four precision OPAMPs, operated from a common 5 V supply. The offset of less than 1 µV allows operation with a very high gain. The continuous offset cancellation principle results in ultra low offset temperature drift as well as exceptional suppression of the 1/f noise below 1 kHz.

Applications

– Measuring amplifiers
– Instrumentation amplifiers
– Signal conditioners
– Encoder applications
– Audio applications
– High-impedance buffers
– A/D and D/A converters
– Battery operated devices
– GND-sensing applications

Features

– Ultra low offset (< 1 µV) and offset drift
– Very low load dependent offset shift
– Built-in offset measurement for each OPAMP
– 5 V single supply
– Low supply current, typ. 350 µA/OPAMP
– Unity gain stability
– Input common mode range down to 0 V
– 1 mA rail-to-rail output
– Very low 1/f noise
– 140 dB open loop gain
– 130 dB common mode rejection ratio
– 135 dB power supply rejection ratio
– 2.5 V/µs slew rate
– 3.5 MHz gain-bandwidth product
– Tight matching of bandwidth and slew rate among all 4 OPAMPs
– Short circuit proof outputs



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All parameters influencing precision, like open loop gain, power supply rejection ratio, common mode rejection ratio and load rejection are extremely high and add to the offset voltage only in the sub-µV range.

The 3.5 MHz gain-bandwidth makes this quad OPAMP ideally suited for signal processing tasks, where high frequencies have to be processed at a high gain. Unity gain stability is provided, thus the OPAMPs can also operate as buffers.

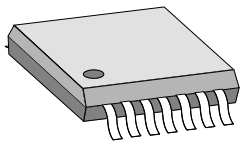
The low supply current of 1.4 mA is particularly advantageous in battery operated devices. The input common mode range includes GND. The rail-to-rail outputs are capable of 1 mA and are unlimited short-circuit proof.

The input current I(IPx), I(INx) is typically below 5 pA at room temperature and below 100 pA throughout the whole temperature range.

Pin Functions

No.	Name	Pin Function
1	O1	Output OPAMP1
2	IN1	Neg. input OPAMP1
3	IP1	Pos. input OPAMP1
4	VDD	Supply voltage
5	IP2	Pos. input OPAMP2
6	IN2	Neg. input OPAMP2
7	O2	Output OPAMP2
8	O3	Output OPAMP3
9	IN3	Neg. input OPAMP3
10	IP3	Pos. input OPAMP3
11	GND	Ground
12	IP4	Pos. input OPAMP4
13	IN4	Neg. input OPAMP4
14	O4	Output OPAMP4

Pin Configuration TSSOP14



Key Specifications

General	
Permissible Supply Voltage	4.5 to 5.5 V
Supply Current in VDD Total iC, all 4 OPAMPs without load	2 mA max.
Common Mode Rejection Ratio ΔVos ΔVcm at ΔVcm = 3.5 V	min. 125 dB
Power Supply Rejection Ratio	min. 125 dB
Open Loop Gain RL = 1 kΩ	min. 130 dB
Offset Shift vs. Power Dissipation ΔVos at ΔPv(O1...4) = 1 mW	± 0.3 µV

Inputs	
Offset Voltage Vcm = 1.5 V, closed loop operation	± 1 µV
Offset Voltage Drift Tj = -40...125 °C	± 0.01 µV°C
Input Current I(IP), I(IN)	typ. 5 pA
Input Offset Current	± 400 pA max.
Input Voltage Range	-0.1 to VDD - 1.1 V

Outputs	
Saturation Voltage hi Vs_{hi} = VDD - V(O), I = -1.2 mA	600 mV max.
Saturation Voltage lo I = 1.2 mA	250 mV max.

Dynamic Parameters	
Slew Rate at the outputs RL = 10 kΩ, Av = -1, CL = 15 pF	typ. 2.5 V/µs
Gain bandwith product RL = 10 kΩ, CL = 15 pF	3.5 MHz
Noise Voltage Referenced to the input up to 1 Hz	600 nV_{SS}
Noise density f = 3.5 kHz...3.5MHz f = 3.5 kHz...3.5MHz f = 100 Hz...5 kHz f = 1...100 Hz	 38 nV/√Hz 70 nV/√Hz 134 nV/√Hz 160 nV/√Hz

iC-Haus
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