

# YHM4502

## Low Power, Low Bias Current OP AMP with Internal Switch

### Features

- Single 1.6V to 5.5V Supply Voltage
- Low 18uA Quiescent Current
- 50nA Quiescent Current in Shutdown
- Ultra-Low 0.2pA Bias Current
- High Input Resistance: 14Gohm@10Hz
- Low Input Capacitance: 1.2pF
- Low Input Noise: 3.9uVpp
- Tiny 0.77mm x 1.17mm 6-bump WLP

### Applications

- Battery Powered Consumer Device
- Portable Medical Instrument
- Sensor Interface
- Smoke Detectors

### General Description

The YHM4502 is 1.6V to 5.5V single supply or  $\pm 0.8V$  to  $\pm 2.75V$  dual supply, featuring very low quiescent current and shutdown mode, making it suitable for a broad range of battery-powered applications such as portable medical instruments, portable consumer device, and smoke detectors. A combination of extremely low input bias currents, low input current noise and low input voltage noise allows interface to high-impedance sources such as photodiode and piezoelectric sensors.

The IC integrates an analog switch between IN+ and OUT. When send a pulse to  $\overline{\text{SHDN}}$ , analog switch turns on or turns off. This feature helps ECG AFE to build a lead on detection path when using this IC in front of ECG AFE.

The YHM4502 comes in a 2x3 array, 6-bump, 0.35mm pitch, 0.77mmx1.17mm wafer-level package (WLP).

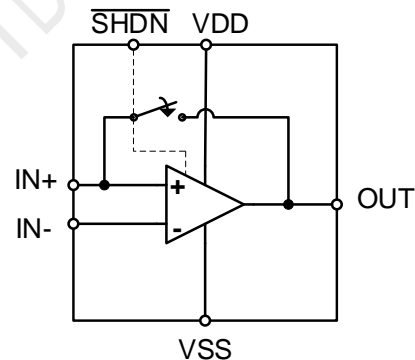


Fig 1. YHM4502 Internal Block Diagram

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### YHM4502 Pin Configurations

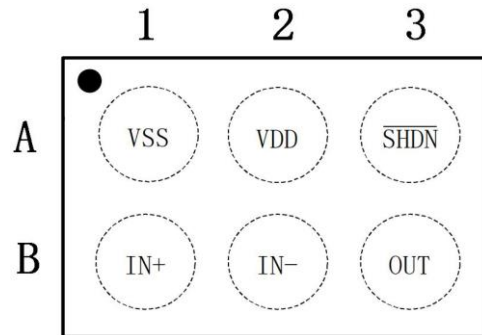


Fig 3. YHM4502 WLP-6 Pin Assignment(Top Through View)

### YHM4502 WLP Pin Descriptions

WLP	Name	Description
A1	VSS	Negative Supply Voltage
A2	VDD	Positive Supply Voltage. Bypass to GND with a 0.1 $\mu$ F capacitor
A3	$\overline{\text{SHDN}}$	Pull to VSS to activate shutdown mode. Keep High to enable AMP. Send a pulse to $\overline{\text{SHDN}}$ can enable or disable internal switch, see function table
B1	IN+	Positive Input
B2	IN-	Negative Input
B3	OUT	Output

### Function Table

$\overline{\text{SHDN}}$	OP AMP	SWITCH
Initial 0	Shutdown	Off
Pulse Width = 15 $\mu$ s $\pm$ 1 $\mu$ s	Shutdown	On
Pulse Width = 5 $\mu$ s $\pm$ 1 $\mu$ s	Shutdown	Off
keep high ( $t_{\text{DELAY}} = 45\mu$ s)	On	Off

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### 1 Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Disclaimer: YHMICROS reserves the right to make any change in circuit design, specification or other related things if needed without notice at any time.

Symbol	Parameters		Min.	Max.	Unit
VDD, $\overline{\text{SHDN}}$	VDD, $\overline{\text{SHDN}}$ to VSS		-0.3	6	V
IN+, IN-, OUT	IN+, IN-, OUT to GND		GND-0.3	VDD+0.3	V
I <sub>IN</sub>	Continuous Input Current (any pins)			±20	mA
I <sub>SHORT</sub>	Output Short-Circuit Duration to GND			10	s
t <sub>PD</sub>	Total Power Dissipation at T <sub>A</sub> =25°C				mW
T <sub>STG</sub>	Storage Junction Temperature		-65	+150	°C
T <sub>J</sub>	Operating Junction Temperature			+150	°C
T <sub>L</sub>	Lead Temperature (Soldering, 10 Seconds)			+260	°C
θ <sub>JA</sub>	Thermal Resistance, Junction-to-Ambient (100mm <sup>2</sup> pad of 1 oz. copper)				°C/W
IN+, IN-	Electrostatic Discharge Capability	Human Body Model, EIA/JESD22-A114	2		KV
		Charged Device Model, JESD22-C101	1		
All Other Pins	Electrostatic Discharge Capability	Human Body Model, EIA/JESD22-A114	2		KV
		Charged Device Model, JESD22-C101	1		

Note 1. Refer to JEDEC JESD51-7, use a 4-layerboard

### 2 Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance.

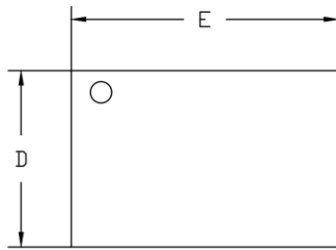
Parameters	Min.	Max.	Unit
Single Supply Voltage	1.6	5.5	V
Dual Supply Volage	±0.8	±2.75	V
Input Voltage	VSS	VDD-0.6	V
Ambient Operating Temperature, T <sub>A</sub>	-40	85	°C

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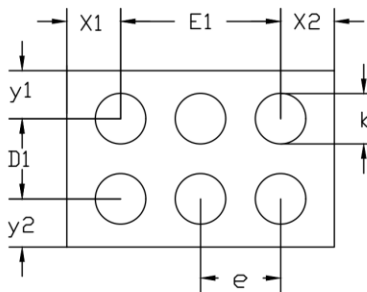
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### Package Dimensions

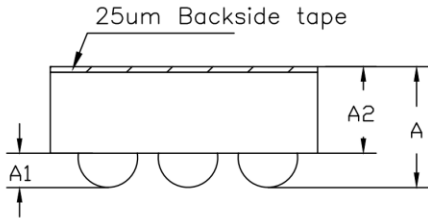
WLCSP-6 0.77x1.17x0.574



TOP VIEW  
(MARK SIDE)



BOTTOM VIEW  
(BALL SIDE)



SIDE VIEW

COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.529	0.574	0.619
A1	0.130	0.150	0.170
A2	0.399	0.424	0.449
D	0.750	0.770	0.790
D1	0.350BSC		
E	1.150	1.170	1.190
E1	0.700BSC		
b	0.200	0.220	0.240
e	0.350BSC		
x1	0.235 REF		
x2	0.235 REF		
y1	0.210 REF		
y2	0.210 REF		

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## Low Power, Low Bias Current OP AMP with Internal Switch

### Ordering Information

Part Number	Temp Range	Pin Package	Top Mark	MOQ
YHM4502W6T	-40°C to 85°C	6 WLCSP	YWW LOT	3000

*T = Tape and reel.*

*YWW: Data Code. Y = year, WW = week. For example, YWW = 112 means Year 2021, Week 12.*

*LOT: The last three number of LOTID.*

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