

LMV721-N/LMV722 10MHz, Low Noise, Low Voltage, and Low Power Operational Amplifier

Check for Samples: LMV721-N, LMV722-N

FEATURES

- (For Typical, 5 V Supply Values; Unless Otherwise Noted)
- **Ensured 2.2V and 5.0V Performance**
- Low Supply Current LMV721-N/2 930µA/Amplifier at 2.2V
- **High Unity-Gain Bandwidth 10MHz**
- Rail-to-Rail Output Swing
 - at 600Ω Load 120mV from Either Rail at 2.2V
 - at 2kΩ Load 50mV from Either Rail at 2.2V
- **Input Common Mode Voltage Range Includes** Ground
- Silicon Dust, SC70-5 Package 2.0x2.0x1.0 mm
- Input Voltage Noise 9 nV/ \sqrt{Hz} at f = 1KHz

APPLICATIONS

- **Cellular an Cordless Phones**
- **Active Filter and Buffers**
- **Laptops and PDAs**
- **Battery Powered Electronics**

DESCRIPTION

The LMV721-N (Single) and LMV722 (Dual) are low noise, low voltage, and low power op amps, that can be designed into a wide range of applications. The LMV721-N/LMV722 has a unity gain bandwidth of 10MHz, a slew rate of 5V/us, and a quiescent current of 930uA/amplifier at 2.2V.

The LMV721-N/722 are designed to provide optimal performance in low voltage and low noise systems. They provide rail-to-rail output swing into heavy loads. The input common-mode voltage range includes ground, and the maximum input offset voltage are 3.5mV (Over Temp) for the LMV721-N/LMV722. Their capacitive load capability is also good at low supply voltages. The operating range is from 2.2V to 5.5V.

The chip is built with TI's advanced Submicron Silicon-Gate BiCMOS process. The single version, LMV721-N, is available in 5 pin SOT-23 and a SC70 (new) package. The dual version, LMV722, is available in an SOIC-8 and VSSOP-8 package.

Typical Application

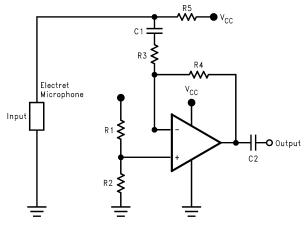


Figure 1. A Battery Powered Microphone Preamplifier



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

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Absolute Maximum Ratings (1)(2)

ESD Tolerance (3)	
Human Body Model	2000V
Machine Model	100V
Differential Input Voltage	± Supply Voltage
Supply Voltage (V ⁺ – V ⁻)	6V
Soldering Information	
Infrared or Convection (20 sec.)	235°C
Storage Temp. Range	−65°C to 150°C
Junction Temperature (4)	150°C

- (1) Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not ensured. For ensured specifications and the test conditions, see the Electrical Characteristics.
- (2) If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/ Distributors for availability and specifications.
- (3) Human body model, 1.5 k Ω in series with 100 pF. Machine model, 200 Ω in series with 100 pF.
- (4) The maximum power dissipation is a function of T_{J(max)}, θ_{JA}, and T_A. The maximum allowable power dissipation at any ambient temperature is P_D = (T_{J(max)}-T_A)/θ_{JA}. All numbers apply for packages soldered directly into a PC board.

Operating Ratings (1)

2.2V to 5.5V
-40°C ≤T _J ≤85°C
440°C/W
265 °C/W
190°C/W
235 °C/W
145°C/W

⁽¹⁾ Applies to both single-supply and split-supply operation. Continuous short circuit operation at elevated ambient temperature can result in exceeding the maximum allowed junction temperature of 150°C. Output currents in excess of 30 mA over long term may adversely affect reliability.

2.2V DC Electrical Characteristics

Unless otherwise specified, all limits specified for T_J = 25°C. V^+ = 2.2V, V^- = 0V, V_{CM} = $V^+/2$, V_O = $V^+/2$ and R $_L$ > 1 M Ω . Boldface limits apply at the temperature extremes.

	Parameter	Test Conditions	Typ ⁽¹⁾	Limit (2)	Units
V _{OS}	Input Offset Voltage		0.02	3 3.5	mV max
TCV _{OS}	Input Offset Voltage Average Drift		0.6		μV/°C
I _B	Input Bias Current		260		nA
Ios	Input Offset Current		25		nA
CMRR	Common Mode Rejection Ratio	$0V \le V_{CM} \le 1.3V$	88	70 64	dB min
PSRR	Power Supply Rejection Ratio	$2.2V \le V^+ \le 5V$, $V_0 = 0$ $V_{CM} = 0$	90	70 64	dB min
V_{CM}	Input Common-Mode Voltage Range	For CMRR ≥ 50dB	-0.30		V
			1.3		V
A _V	Large Signal Voltage Gain	R_L =600 Ω V_O = 0.75 V to 2.00 V	81	75 60	dB min
		$R_L = 2k\Omega$ $V_O = 0.50V$ to 2.10V	84	75 60	dB min

⁽¹⁾ Typical Values represent the most likely parametric norm.

⁽²⁾ All limits are specified by testing or statistical analysis.



2.2V DC Electrical Characteristics (continued)

Unless otherwise specified, all limits specified for $T_J = 25^{\circ}C$. $V^+ = 2.2V$, $V^- = 0V$, $V_{CM} = V^+/2$, $V_O = V^+/2$ and $R_L > 1$ M Ω . **Boldface** limits apply at the temperature extremes.

	Parameter	Test Conditions	Typ ⁽¹⁾	Limit (2)	Units	
Vo	Output Swing	put Swing $R_L = 600\Omega$ to $V^+/2$			V min	
			0.071	0.120 0.145	V max	
		$R_L = 2k\Omega$ to $V^+/2$	2.177	2.150 2.125	V min	
			0.056	0.080 0.105	V max	
lo	Output Current	Sourcing, $V_O = 0V$ $V_{IN}(diff) = \pm 0.5V$	14.9	10.0 5.0	mA min	
		Sinking, $V_O = 2.2V$ V_{IN} (diff) = $\pm 0.5V$	17.6	10.0 5.0	mA min	
l _S	Supply Current	LMV721-N	0.93	1.2 1.5	mA	
		LMV722	1.81	2.2 2.6	max	

2.2V AC Electrical Characteristics

Unless otherwise specified, all limits specified for $T_J = 25^{\circ}C$. $V^+ = 2.2V$, $V^- = 0V$, $V_{CM} = V^+/2$, $V_O = V^+/2$ and $R_L > 1$ M Ω .**Boldface** limits apply at the temperature extremes.

Parameter		Test Conditions	Typ ⁽¹⁾	Units	
SR	Slew Rate	(2)	4.9	V/µs	
GBW	Gain-Bandwidth Product		10	MHz	
Φ _m	Phase Margin		67.4	Deg	
G _m	Gain Margin		-9.8	dB	
e _n	Input-Referred Voltage Noise	f = 1 kHz	9	nV/√ Hz	
i _n	Input-Referred Current Noise	f = 1 kHz	0.3	pA/√Hz	
THD	Total Harmonic Distortion	$ f = 1 \text{ kHz } A_V = 1 $ $R_L = 600\Omega, \ V_O = 500 \ \text{mV}_{PP} $	0.004	%	

⁽¹⁾ Typical Values represent the most likely parametric norm.

5V DC Electrical Characteristics

Unless otherwise specified, all limits specified for $T_J = 25^{\circ}C$. $V^+ = 5V$, $V^- = 0V$, $V_{CM} = V^+/2$, $V_O = V^+/2$ and $R_L > 1$ M Ω . **Boldface** limits apply at the temperature extremes.

	Parameter	Typ ⁽¹⁾	Limit (2)	Units	
V _{OS}	Input Offset Voltage		-0.08 3 3.5	_	mV max
TCV _{OS}	Input Offset Voltage Average Drift		0.6		μV/°C
I _B	Input Bias Current		260		nA
los	Input Offset Current		25		nA
CMRR	Common Mode Rejection Ratio	0V ≤ V _{CM} ≤ 4.1V	89	70 64	dB min
PSRR	Power Supply Rejection Ratio	$2.2V \le V^{+} \le 5.0V$, $V_{O} = 0$ $V_{CM} = 0$	90	70 64	dB min
V_{CM}	Input Common-Mode Voltage Range	For CMRR ≥ 50dB	-0.30		V
			4.1		V

⁽¹⁾ Typical Values represent the most likely parametric norm.

⁽²⁾ Connected as voltage follower with 1V step input. Number specified is the slower of the positive and negative slew rate.

⁽²⁾ All limits are specified by testing or statistical analysis.



5V DC Electrical Characteristics (continued)

Unless otherwise specified, all limits specified for $T_J = 25^{\circ}C$. $V^+ = 5V$, $V^- = 0V$, $V_{CM} = V^+/2$, $V_O = V^+/2$ and $R_L > 1$ M Ω . **Boldface** limits apply at the temperature extremes.

	Parameter	Test Conditions	Typ ⁽¹⁾	Limit (2)	Units
A _V	Large Signal Voltage Gain	$R_L = 600\Omega$ $V_O = 0.75V \text{ to } 4.80V$	87	80 70	dB min
		$R_L = 2k\Omega,$ V _O = 0.70V to 4.90V,	94	85 70	dB min
Vo	Output Swing	$R_L = 600\Omega$ to $V^+/2$	4.882	4.840 4.815	V min
			0.134	0.190 0.215	V max
		$R_L = 2k\Omega$ to $V^+/2$	4.952	4.930 4.905	V min
			0.076	0.110 0.135	V max
I _O	Output Current	Sourcing, $V_O = 0V$ $V_{IN}(diff) = \pm 0.5V$	52.6	25.0 12.0	mA min
		Sinking, $V_O = 5V$ $V_{IN}(diff) = \pm 0.5V$	23.7	15.0 8.5	mA min
Is	Supply Current	LMV721-N	1.03	1.4 1.7	mA
		LMV722	2.01	2.4 2.8	max

5V AC Electrical Characteristics

Unless otherwise specified, all limits specified for $T_J=25^{\circ}C$. $V^+=5V$, $V^-=0V$, $V_{CM}=V^+/2$, $V_O=V^+/2$ and $R_L>1$ M Ω . **Boldface** limits apply at the temperature extremes.

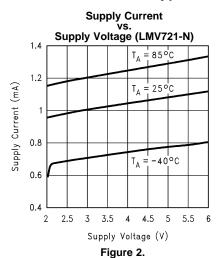
Parameter		Test Conditions	Typ ⁽¹⁾	Units	
SR	Slew Rate	(2)	5.25	V/µs	
GBW	Gain-Bandwidth Product		10.0	MHz	
Φ _m	Phase Margin		72	Deg	
G _m	Gain Margin		-11	dB	
e _n	Input-Related Voltage Noise	f = 1 kHz	8.5	nV/√ Hz	
i _n	Input-Referred Current Noise	f = 1 kHz	0.2	pa/√ Hz	
THD	Total Harmonic Distortion	$f = 1kHz$, $A_V = 1$ $R_L = 600\Omega$, $V_O = 1$ V_{PP}	0.001	%	

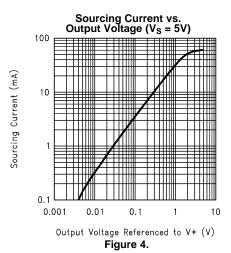
(1) Typical Values represent the most likely parametric norm.

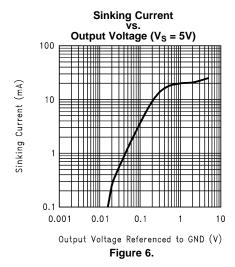
(2) Connected as voltage follower with 1V step input. Number specified is the slower of the positive and negative slew rate.

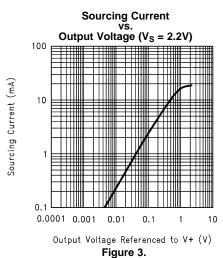


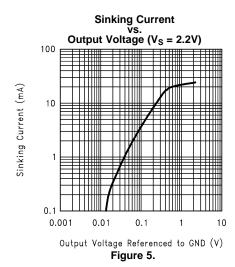
Typical Performance Characteristics

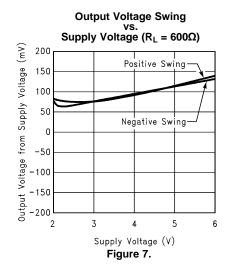






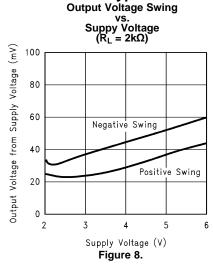


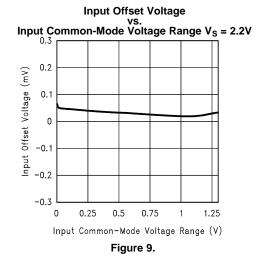


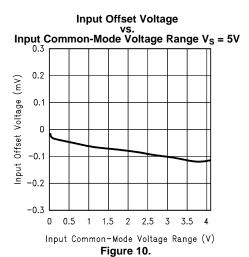


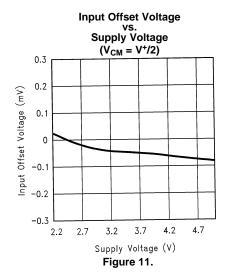


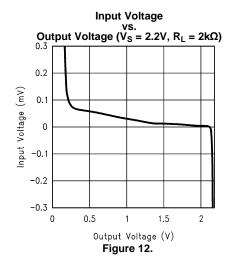
Typical Performance Characteristics (continued)

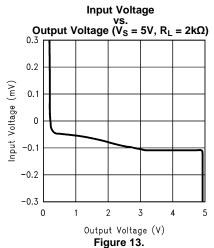














Typical Performance Characteristics (continued)

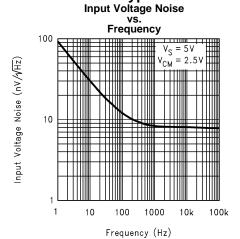
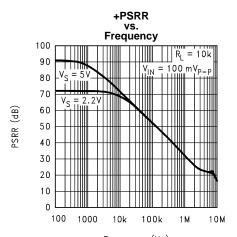
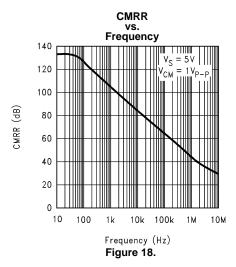
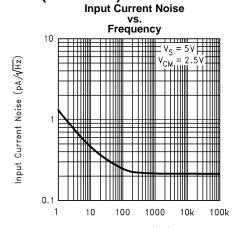


Figure 14.



Frequency (Hz) Figure 16.





Frequency (Hz) Figure 15.

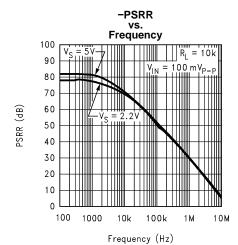


Figure 17.

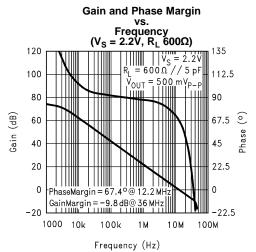
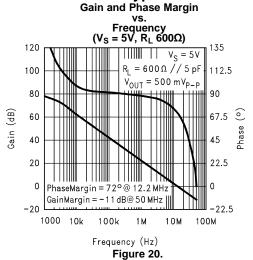


Figure 19.



Typical Performance Characteristics (continued)



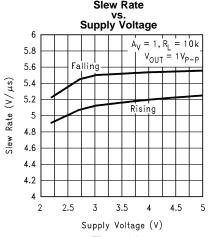


Figure 21.

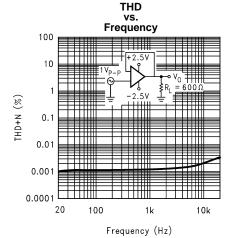


Figure 22.



APPLICATION NOTES

BENEFITS OF THE LMV721-N/722 SIZE

The small footprints of the LMV721-N/722 packages save space on printed circuit boards, and enable the design of smaller electronic products, such as cellular phones, pagers, or other portable systems. The low profile of the LMV721-N/722 make them possible to use in PCMCIA type III cards.

- **Signal Integrity** Signals can pick up noise between the signal source and the amplifier. By using a physically smaller amplifier package, the LMV721-N/722 can be placed closer to the signal source, reducing noise pickup and increasing signal integrity.
- **Simplified Board Layout** These products help you to avoid using long pc traces in your pc board layout. This means that no additional components, such as capacitors and resistors, are needed to filter out the unwanted signals due to the interference between the long pc traces.
- **Low Supply Current** These devices will help you to maximize battery life. They are ideal for battery powered systems.
- **Low Supply Voltage** TI provides ensured performance at 2.2V and 5V. These specifications ensure operation throughout the battery lifetime.
- **Rail-to-Rail Output** Rail-to-rail output swing provides maximum possible dynamic range at the output. This is particularly important when operating on low supply voltages.

Input Includes Ground Allows direct sensing near GND in single supply operation.

Protection should be provided to prevent the input voltages from going negative more than -0.3V (at 25°C). An input clamp diode with a resistor to the IC input terminal can be used.

CAPACITIVE LOAD TOLERANCE

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The LMV721-N/722 can directly drive 4700pF in unity-gain without oscillation. The unity-gain follower is the most sensitive configuration to capacitive loading. Direct capacitive loading reduces the phase margin of amplifiers. The combination of the amplifier's output impedance and the capacitive load induces phase lag. This results in either an underdamped pulse response or oscillation. To drive a heavier capacitive load, circuit in Figure 23 can be used.

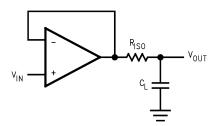


Figure 23. Indirectly Driving A capacitive Load Using Resistive Isolation

In Figure 23, the isolation resistor R_{ISO} and the load capacitor C_L form a pole to increase stability by adding more phase margin to the overall system. the desired performance depends on the value of R_{ISO} . The bigger the R_{ISO} resistor value, the more stable V_{OUT} will be. Figure 24 is an output waveform of Figure 23 using $100k\Omega$ for R_{ISO} and $2000\mu F$ for C_L .

Product Folder Links: LMV721-N LMV722-N



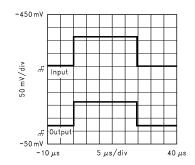


Figure 24. Pulse Response of the LMV721-N Circuit in Figure 23

The circuit in Figure 25 is an improvement to the one in Figure 23 because it provides DC accuracy as well as AC stability. If there were a load resistor in Figure 23, the output would be voltage divided by $R_{\rm ISO}$ and the load resistor. Instead, in Figure 25, $R_{\rm F}$ provides the DC accuracy by using feed-forward techniques to connect $V_{\rm IN}$ to $R_{\rm L}$. Caution is needed in choosing the value of $R_{\rm F}$ due to the input bias current of the LMV721-N/722. $C_{\rm F}$ and $R_{\rm ISO}$ serve to counteract the loss of phase margin by feeding the high frequency component of the output signal back to the amplifier's inverting input, thereby preserving phase margin in the overall feedback loop. Increased capacitive drive is possible by increasing the value of $C_{\rm F}$. This in turn will slow down the pulse response.

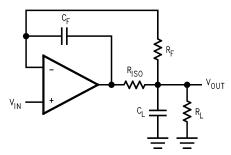


Figure 25. Indirectly Driving A Capacitive Load with DC Accuracy

INPUT BIAS CURRENT CANCELLATION

The LMV721-N/722 family has a bipolar input stage. The typical input bias current of LMV721-N/722 is 260nA with 5V supply. Thus a $100k\Omega$ input resistor will cause 26mV of error voltage. By balancing the resistor values at both inverting and non-inverting inputs, the error caused by the amplifier's input bias current will be reduced. The circuit in Figure 26 shows how to cancel the error caused by input bias current.

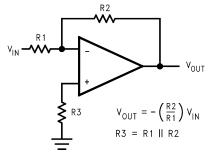


Figure 26. Cancelling the Error Caused by Input Bias Current



TYPICAL SINGLE-SUPPLY APPLICATION CIRCUITS

Difference Amplifier

The difference amplifier allows the subtraction of two voltages or, as a special case, the cancellation of a signal common to two inputs. It is useful as a computational amplifier, in making a differential to single-ended conversion or in rejecting a common mode signal.

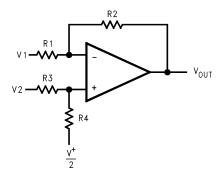


Figure 27. Difference Application

 $V_{OUT} = \left(\frac{R1 + R2}{R3 + R4}\right) \frac{R4}{R1} V_2 - \frac{R2}{R1} V_1 + \left(\frac{R1 + R2}{R3 + R4}\right) \frac{R3}{R1} \cdot \frac{V^+}{2}$ for R1 = R3 and R2 = R4 $V_{OUT} = \frac{R2}{R1} \left(V_2 - V_1\right) + \frac{V^+}{2}$ (2)

Instrumentation Circuits

The input impendance of the previous difference amplifier is set by the resistor R_1 , R_2 , R_3 and R_4 . To eliminate the problems of low input impendance, one way is to use a voltage follower ahead of each input as shown in the following two instrumentation amplifiers.

Three-op-amp Instrumentation Amplifier

The LMV721-N/722 can be used to build a three-op-amp instrumentation amplifier as shown in Figure 28

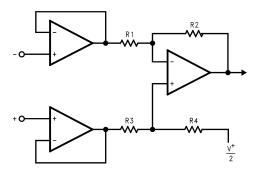


Figure 28. Three-op-amp Instrumentation Amplifier

The first stage of this instrumentation amplifier is a differential-input, differential-output amplifier, with two voltage followers. These two voltage followers assure that the input impedance is over $100M\Omega$. The gain of this instrumentation amplifier is set by the ratio of R_2/R_1 . R_3 should equal R_1 and R_4 equal R_2 . Matching of R_3 to R_1 and R_4 to R_2 affects the CMRR. For good CMRR over temperature, low drift resistors should be used. Making R_4 slightly smaller than R_2 and adding a trim pot equal to twice the difference between R_2 and R_4 will allow the CMRR to be adjusted for optimum.

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Two-op-amp Instrumentation Amplifier

A two-op-amp instrumentation amplifier can also be used to make a high-input impedance DC differential amplifier (Figure 29). As in the two-op-amp circuit, this instrumentation amplifier requires precise resistor matching for good CMRR. R_4 should equal to R_1 and R_3 should equal R_2 .

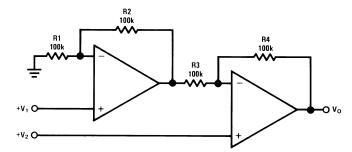


Figure 29. Two-op-amp Instrumentation Amplifier

$$V_0 = \left(1 + \frac{R4}{R3}\right)(V_2 - V_1)$$
, where R1 = R4 and R2 = R3
As shown: $V_0 = 2(V_2 - V_1)$

Single-Supply Inverting Amplifier

There may be cases where the input signal going into the amplifier is negative. Because the amplifier is operating in single supply voltage, a voltage divider using R_3 and R_4 is implemented to bias the amplifier so the input signal is within the input common-common voltage range of the amplifier. The capacitor C_1 is placed between the inverting input and resistor R_1 to block the DC signal going into the AC signal source, V_{IN} . The values of R_1 and C_1 affect the cutoff frequency, fc = $\frac{1}{2}\pi$ R_1C_1 .

As a result, the output signal is centered around mid-supply (if the voltage divider provides $V^+/2$ at the non-inverting input). The output can swing to both rails, maximizing the signal-to-noise ratio in a low voltage system.

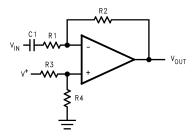


Figure 30. Single-Supply Inverting Amplifier

$$V_{OUT} = -\frac{R2}{R1}V_{IN}$$
 (4)

Active Filter

Simple Low-Pass Active Filter

The simple low-pass filter is shown in Figure 31. Its low-pass frequency gain ($\omega \to 0$) is defined by $-R_3/R_1$. This allows low-frequency gains other than unity to be obtained. The filter has a -20dB/decade roll-off after its corner frequency fc. R_2 should be chosen equal to the parallel combination of R_1 and R_3 to minimize error due to bias current. The frequency response of the filter is shown in Figure 32.



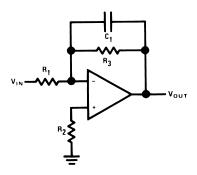


Figure 31. Simple Low-Pass Active Filter

$$A_{L} = -\frac{R_{3}}{R_{1}}$$

$$f_{c} = \frac{1}{2\pi R_{3} C_{1}}$$

$$R_{2} = R_{1} || R_{3}$$

$$(5)$$

$$\frac{Q_{0}}{R_{1}}$$

$$\frac{1}{R_{1}} || R_{2}$$

Figure 32. Frequency Response of Simple Low-pass Active Filter in Figure 31

Note that the single-op-amp active filters are used in to the applications that require low quality factor, $Q(\le 10)$, low frequency ($\le 5 \text{KHz}$), and low gain (≤ 10), or a small value for the product of gain times $Q(\le 100)$. The op amp should have an open loop voltage gain at the highest frequency of interest at least 50 times larger than the gain of the filter at this frequency. In addition, the selected op amp should have a slew rate that meets the following requirement:

Slew Rate \geq 0.5 x (ω_H V_{OPP}) X 10 $^{-6}$ V/ μ sec

where

- ω_H is the highest frequency of interest
- V_{OPP} is the output peak-to-peak voltage

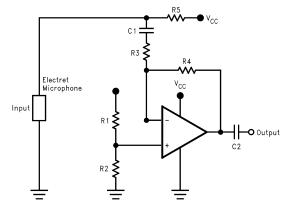


Figure 33. A Battery Powered Microphone Preamplifier



Here is a LMV721-N used as a microphone preamplifier. Since the LMV721-N is a low noise and low power op amp, it makes it an ideal candidate as a battery powered microphone preamplifier. The LMV721-N is connected in an inverting configuration. Resistors, $R_1=R_2=4.7k\Omega$, sets the reference half way between $V_{CC}=3V$ and ground. Thus, this configures the op amp for single supply use. The gain of the preamplifier, which is 50 (34dB), is set by resistors $R_3=10k\Omega$ and $R_4=500k\Omega$. The gain bandwidth product for the LMV721-N is 10 MHz. This is sufficient for most audio application since the audio range is typically from 20 Hz to 20kHz. A resistor $R_5=5k\Omega$ is used to bias the electret microphone. Capacitors $C_1=C_2=4.7\mu F$ placed at the input and output of the op amp to block out the DC voltage offset.

Connection Diagrams

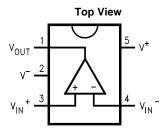


Figure 34. 5-Pin SC70 and SOT-23 Packages See Package Numbers DCK0005A AND DBV0005A

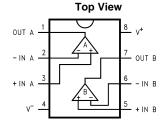


Figure 35. 8-Pin SOIC and VSSOP Packages See Package Numbers D0008A and DGK0008A





REVISION HISTORY

Changes from Revision G (March 2013) to Revision H					
•	Changed layout of National Data Sheet to TI format		14		

Product Folder Links: LMV721-N LMV722-N

www.ti.com

11-Nov-2025

PACKAGING INFORMATION

Orderable part number	Status	Material type	Package Pins	Package qty Carrier	RoHS	Lead finish/ Ball material	MSL rating/ Peak reflow	Op temp (°C)	Part marking (6)
						(4)	(5)		
LMV721M5/NOPB	Active	Production	SOT-23 (DBV) 5	1000 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	A30A
LMV721M5/NOPB.A	Active	Production	SOT-23 (DBV) 5	1000 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	A30A
LMV721M5X/NOPB	Active	Production	SOT-23 (DBV) 5	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	A30A
LMV721M5X/NOPB.A	Active	Production	SOT-23 (DBV) 5	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	A30A
LMV721M7/NOPB	Active	Production	SC70 (DCK) 5	1000 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	A20
LMV721M7/NOPB.A	Active	Production	SC70 (DCK) 5	1000 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	A20
LMV721M7X/NOPB	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	A20
LMV721M7X/NOPB.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	A20
LMV721M7X/NOPB.B	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	-	Call TI	Call TI	-40 to 85	
LMV722M/NOPB	Active	Production	SOIC (D) 8	95 TUBE	Yes	SN	Level-1-260C-UNLIM	-40 to 85	LMV 722M
LMV722M/NOPB.A	Active	Production	SOIC (D) 8	95 TUBE	Yes	SN	Level-1-260C-UNLIM	-40 to 85	LMV 722M
LMV722M/NOPB.B	Active	Production	SOIC (D) 8	95 TUBE	=	Call TI	Call TI	-40 to 85	
LMV722MM/NOPB	Active	Production	VSSOP (DGK) 8	1000 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	V722
LMV722MM/NOPB.A	Active	Production	VSSOP (DGK) 8	1000 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	V722
LMV722MMX/NOPB	Active	Production	VSSOP (DGK) 8	3500 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	V722
LMV722MMX/NOPB.A	Active	Production	VSSOP (DGK) 8	3500 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	V722
LMV722MX/NOPB	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	LMV 722M
LMV722MX/NOPB.A	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	LMV 722M
LMV722MX/NOPB.B	Active	Production	SOIC (D) 8	2500 LARGE T&R	-	Call TI	Call TI	-40 to 85	

⁽¹⁾ Status: For more details on status, see our product life cycle.

⁽²⁾ Material type: When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ RoHS values: Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

PACKAGE OPTION ADDENDUM

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(4) Lead finish/Ball material: Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(5) MSL rating/Peak reflow: The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) Part marking: There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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OTHER QUALIFIED VERSIONS OF LMV722-N:

Automotive : LMV722-Q1

NOTE: Qualified Version Definitions:

Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

PACKAGE MATERIALS INFORMATION

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TAPE AND REEL INFORMATION



A0	Dimension designed to accommodate the component width
В0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
LMV721M5/NOPB	SOT-23	DBV	5	1000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LMV721M5X/NOPB	SOT-23	DBV	5	3000	178.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
LMV721M7/NOPB	SC70	DCK	5	1000	178.0	8.4	2.25	2.45	1.2	4.0	8.0	Q3
LMV721M7X/NOPB	SC70	DCK	5	3000	178.0	8.4	2.25	2.45	1.2	4.0	8.0	Q3
LMV722MM/NOPB	VSSOP	DGK	8	1000	177.8	12.4	5.3	3.4	1.4	8.0	12.0	Q1
LMV722MMX/NOPB	VSSOP	DGK	8	3500	330.0	12.4	5.3	3.4	1.4	8.0	12.0	Q1
LMV722MX/NOPB	SOIC	D	8	2500	330.0	12.4	6.5	5.4	2.0	8.0	12.0	Q1



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*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	Pins SPQ Lengt		Width (mm)	Height (mm)
LMV721M5/NOPB	SOT-23	DBV	5	1000	208.0	191.0	35.0
LMV721M5X/NOPB	SOT-23	DBV	5	3000	208.0	191.0	35.0
LMV721M7/NOPB	SC70	DCK	5	1000	208.0	191.0	35.0
LMV721M7X/NOPB	SC70	DCK	5	3000	208.0	191.0	35.0
LMV722MM/NOPB	VSSOP	DGK	8	1000	208.0	191.0	35.0
LMV722MMX/NOPB	VSSOP	DGK	8	3500	367.0	367.0	35.0
LMV722MX/NOPB	SOIC	D	8	2500	367.0	367.0	35.0

PACKAGE MATERIALS INFORMATION

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TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
LMV722M/NOPB	D	SOIC	8	95	495	8	4064	3.05
LMV722M/NOPB.A	D	SOIC	8	95	495	8	4064	3.05





NOTES:

- 1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
 2. This drawing is subject to change without notice.
 3. Reference JEDEC MO-178.

- 4. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.25 mm per side.
- 5. Support pin may differ or may not be present.





NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.





NOTES: (continued)

- 8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
- 9. Board assembly site may have different recommendations for stencil design.





SMALL OUTLINE PACKAGE



NOTES:

PowerPAD is a trademark of Texas Instruments.

- 1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.

 2. This drawing is subject to change without notice.

 3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not
- exceed 0.15 mm per side.
- 4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
- 5. Reference JEDEC registration MO-187.



SMALL OUTLINE PACKAGE



NOTES: (continued)

- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
- 8. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged or tented.
- 9. Size of metal pad may vary due to creepage requirement.



SMALL OUTLINE PACKAGE



NOTES: (continued)

- 11. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
- 12. Board assembly site may have different recommendations for stencil design.







NOTES:

- 1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
 2. This drawing is subject to change without notice.
 3. Reference JEDEC MO-203.

- 4. Support pin may differ or may not be present.5. Lead width does not comply with JEDEC.
- 6. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.25mm per side





NOTES: (continued)

7. Publication IPC-7351 may have alternate designs.8. Solder mask tolerances between and around signal pads can vary based on board fabrication site.





NOTES: (continued)

- 9. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
- 10. Board assembly site may have different recommendations for stencil design.





SMALL OUTLINE INTEGRATED CIRCUIT



NOTES:

- 1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.
- 2. This drawing is subject to change without notice.
- 3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 [0.15] per side.
- 4. This dimension does not include interlead flash.
- 5. Reference JEDEC registration MS-012, variation AA.



SMALL OUTLINE INTEGRATED CIRCUIT



NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SMALL OUTLINE INTEGRATED CIRCUIT



NOTES: (continued)

- 8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
- 9. Board assembly site may have different recommendations for stencil design.



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