TECH PUBLIC
台舟电子

LM321

1MHz, Low Power Single Op Amp

WWW.TECHPUBLIC.COM

Features

- General Purpose, Low Cost
- Gain Bandwidth Product: 1MHz
- Low supply current 100μA
- Offset Voltage: 5.0mV
- Low input bias current 45nA
- Low Input Offset Current 3nA
- Wide Supply Voltage Range: 3V to 32V
- Operating Temperature: -40°C ~ +85°C
- Type Package:SOT23-5

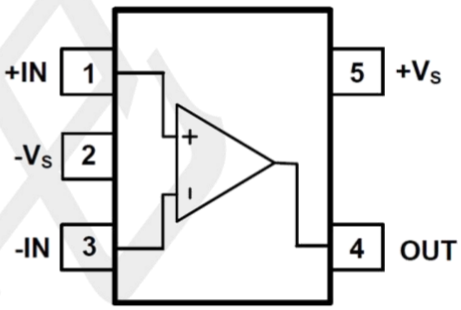
General Description

The LM321 brings performance and economy to low power systems . With a high unity gain frequency and a guaranteed 0.4V/μs slew rate, the quiescent current is only 100μA(5V). The input common mode range includes ground and therefore the device is able to operate in single supply applications as well as in dual supply applications. It is also capable of comfortably driving large capacitive loads. Overall the LM321 is a low power, wide supply range performance op amp that can be designed into a wide range of applications at an economical price without sacrificing valuable board space .

Applications

- Chargers
- Desktops
- Active Filters
- Medical Equipment
- Battery and Power Supply Control
- Industrial controls and instruments
- Communications infrastructure
- Piezo Electrical Transducer Amplifier

Pinout (top view)



Pin Configurations

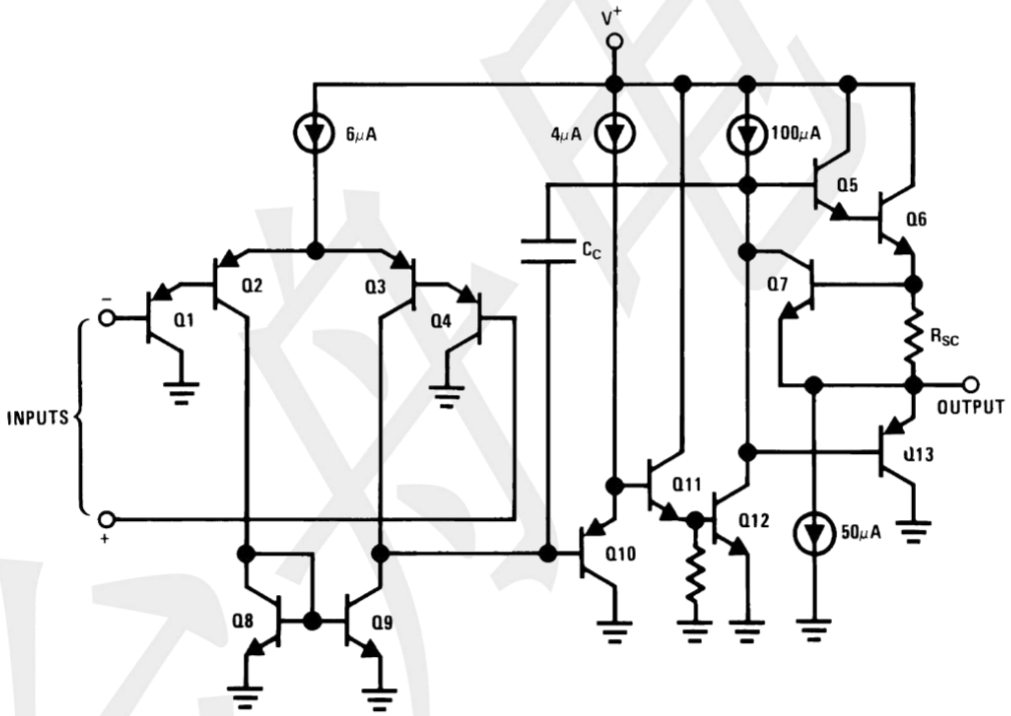
Pin Number	Pin Name	Pin Function
1	+IN	In-phase input
2	-Vs	Chip Supply Voltage(Negative)/GND
3	-IN	Reverse input
4	OUT	Output
5	+Vs	Chip Supply Voltage(Positive)/VDD

Absolute Maximum Ratings

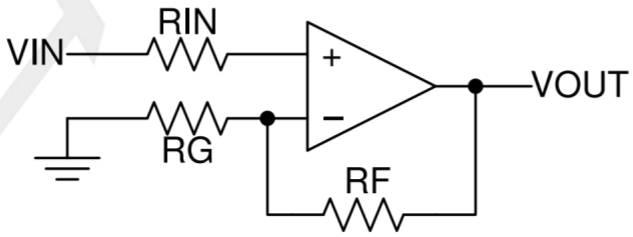
(@TA = +25°C, unless otherwise specified.)

Condition	Rating	UNIT
Power Supply Voltage	32V	V
Input Voltage	-0.3V~+32V	V
Output Short Circuit to GND +VDD≤15V and Ta=25°C, *2	Continuous	
Thermal Resistance to Ambient (θJA)	265	°C/W
Junction Temperature *3	150	°C
Operating Temperature Range	-40 ~ +85	
Storage Temperature Range	-65 ~ +150	

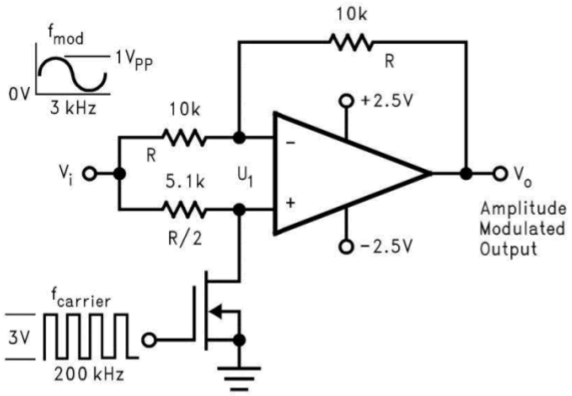
BLOCK DIAGRAM



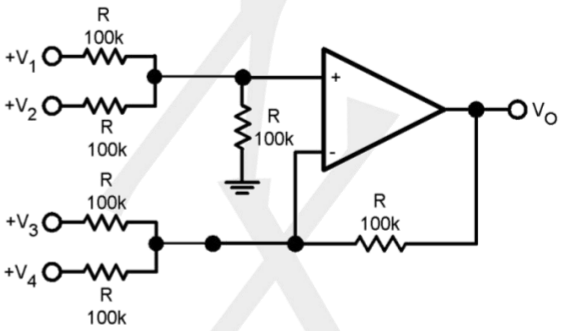
Power Supply Bypassing



Typical Application Circuit



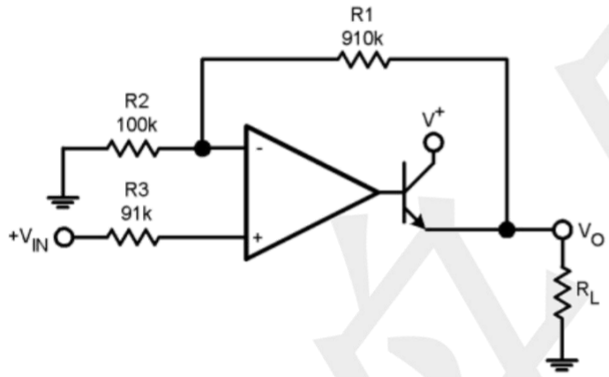
Amplitude modulator circuit



Note：$V_O=V_1+V_2-V_3-V_4$,$(V_1+V_2) \geq (V_3+V_4)$ for $V_O \geq 0V_{DC}$

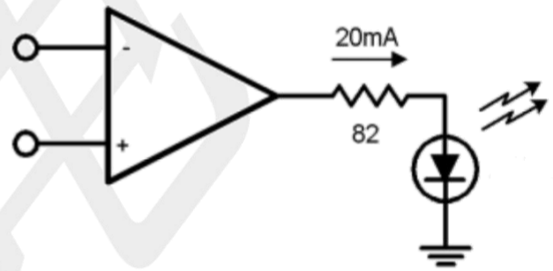
DC adder amplifier

(V_{IN}'S$\geq 0V_{DC}$,$V_O \geq V_{DC}$)

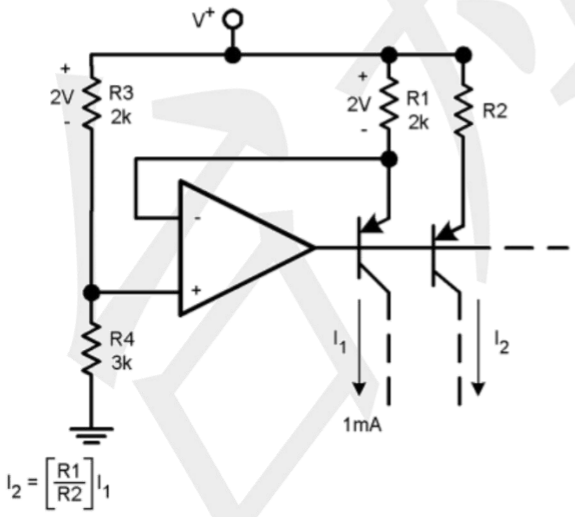


$V_O=0V_{DC}$ for $V_{IN}=0V_{DC}$，$A_V=10$

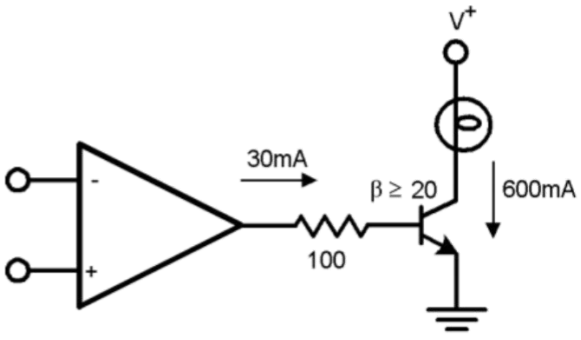
Power Amplifier



LED Driver



Fixed current source



Lamp Driver

Electrical Characteristics (At +VS = +5V, and TA = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	TEST Conditions		MIN	TYP	MAX	UNIT
Output Voltage Swing	V_{OH}	VDD=30V	RL=2kΩ	26	--	--	V
			RL=10kΩ	27	28	--	V
	V_{OL}	VDD=5V, RL=10kΩ		--	5	20	mV
Input Offset Voltage	V_{OS}	*4		--	2	5	mV
Input Bias Current	I_B	$I_{IN(+)}$ or $I_{IN(-)}$, VCM=0V, *6		--	45	150	nA
Input Offset Current	I_{OS}	$I_{IN(+)}$ - $I_{IN(-)}$, VCM=0V		--	3	30	nA
Common-Mode Voltage Range	V_{CM}	VDD=30V, *6		0	--	VDD-1.5	V
Supply Current	Over Full Temperature Range, RL=∞ on all Op Amps		VDD=30V	--	160	500	uA
			VDD=5V	--	100	300	uA
Large Signal Voltage Gain	VDD=15V,RL≥2kΩ(for Vo=1~11V)			50	100	--	V/mV
Common-Mode Rejection Ratio	CMRR	VCM=0~ VDD-1.5V		70	90	--	dB
Power-Supply Rejection Ratio	PSRR	VDD = 5V to 30V		75	100	--	dB
Amplifier-to-Amplifier Coupling	A_V	f=1 ～ 20kHz(input referred) *7		--	-120	--	dB
Output Current	Source	VIN(+)=1V, VIN(-)=0V, VDD=15V, Vo=2V		20	40	--	mV
	Sink	VIN(-)=1V, VIN(+)=0V, VDD=15V, Vo=2V		--	15	--	mV
		VIN(-)=1V, VIN(+)=0V, VDD=15V, Vo=200mV		--	50	--	uV
Output Short-Circuit Current	I_{SC}	VDD=15V, *2		--	40	85	mA

* **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 guaranteed.For guaranteed specifications and the test conditions, see the Electrical Characteristics.*2: Short circuits from the output to V can cause excessive heating and eventual destruction. When considering short circuits to ground, the maximum output current is approximately 40mA independent of the magnitude of V . At values of supply voltage in excess of +15V, continuous short-circuits can exceed the power dissipation ratings and cause eventual destruction. Destructive dissipation can result from simultaneous shorts on all amplifiers.*3: The maximum power dissipation is a function of TJ(MAX), θJA , and Ta. The maximum allowable power dissipation at any ambient temperature is PD = (TJ(MAX) - Ta)/ θJA . All numbers apply for packages soldered directly onto a PC board.*4: Vo=1.4V, Rs = 0Ω with V from 5V to 30V; and over the full input common-mode range (0V to V -1.5V) at25°C;*5: The direction of the input current is out of the IC due to the PNP input stage. This current is essentially constant, independent of the state of the output so no loading change exists on the input lines.*6: The input common-mode voltage of either input signal voltage should not be allowed to go negative by more than 0.3V (at 25°C). The upper end of them common-mode voltage range is V -1.5V (at 25°C), but either or both inputs can go to +32V without damage, independent of the magnitude of V .*7: Due to proximity of external components, insure that coupling is not originating via stray capacitance between these external parts. This typically can be detected as this type of capacitance increases at higher frequencies.

Typical Performance Characteristics (@TA = +25°C, unless otherwise specified.)

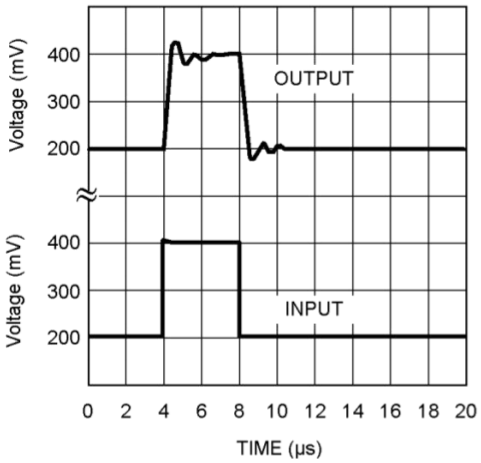


Figure 1. Small Signal Pulse Response

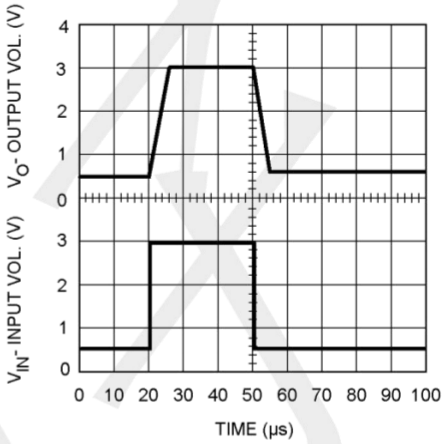


Figure 2. Large Signal Pulse Response

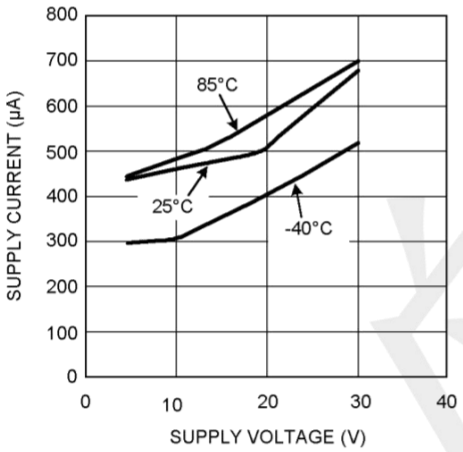


Figure 3. Supply Current vs. Supply Voltage

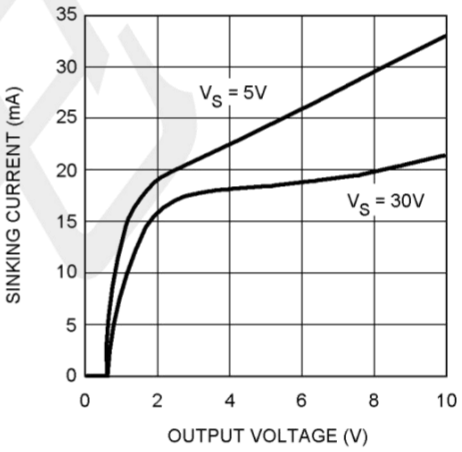


Figure 4. Sinking Current vs Output Voltage

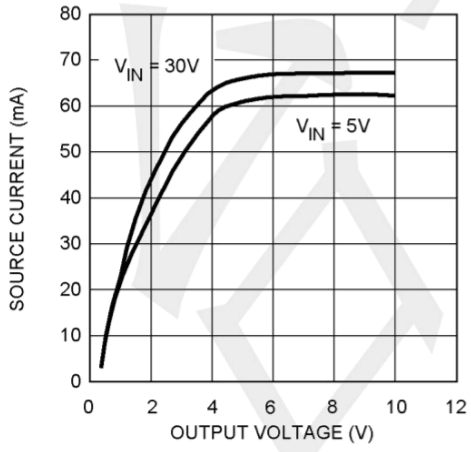


Figure 5. Source Current vs. Output Voltage

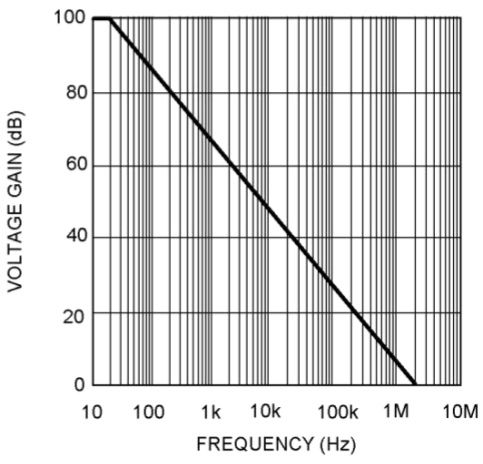
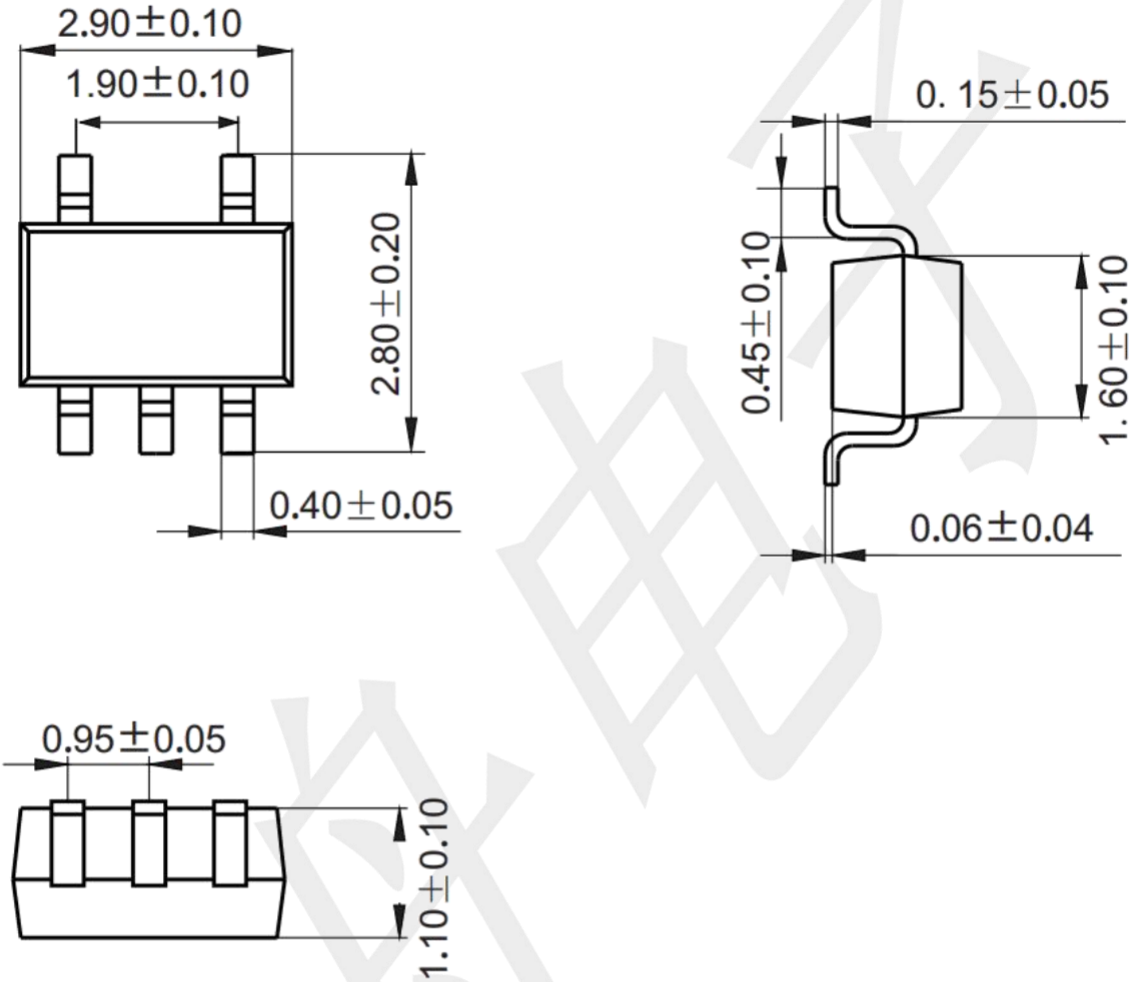


Figure 6. Open Loop Frequency Response

Package information (Unit: mm)

SOT23-5



Mounting Pad Layout (Unit: mm)