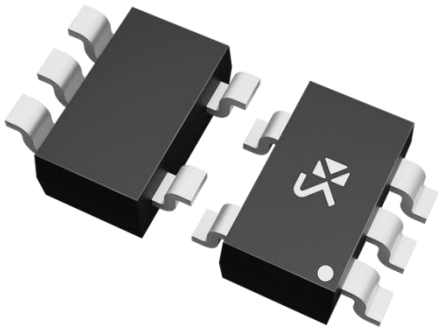
LM321

Low Power Single Operational Amplifiers

Features

- Internal frequency compensation
- Output short circuit protection
- Low power: 0.3mA(typ.)@VCC=5V
- Single power supply voltage range: 3V~32V
- Dual power supply voltage range: ±1.5V~±16V
- Gain bandwidth product: 1.0MHz



SOT-23-5

Applications

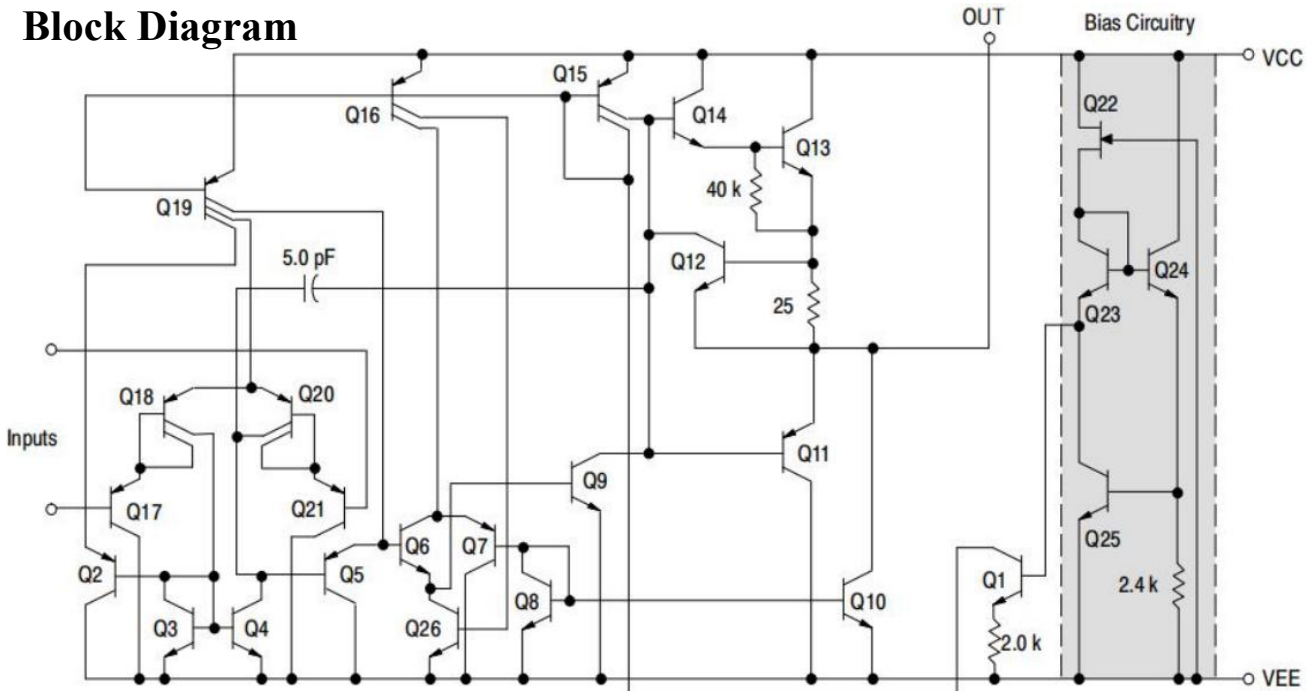
- Charger
- Power application
- Desktop computers and motherboards
- Communication infrastructure

Description

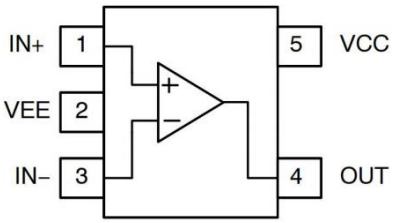
The LM321 is a single-channel low-power differential operational amplifier. It can be powered by a single power supply or a dual power supply. The LM321 has a high open-loop gain, internal compensation, a wide common-mode input range, good temperature stability, and the feature of output short-circuit protection. It can operates under power voltages ranging from as low as 3.0V to as high as 32V, and the common-mode input range includes the negative power supply. This eliminates the need for external biasing, and it can also drive large-capacity loads.

The LM321 is available in a SOT23－5 package, allowing for low-cost integration into various applications without sacrificing valuable board space.

Block Diagram



Pin Description

Pin Number	Pin Name	I/O	Description	Pin Configuration Diagram
1	IN+	I	Non-inverting input	
2	VEE	P	Negative supply	
3	IN-	I	Inverting input	
4	OUT	O	Output	
5	VCC	P	Positive supply	

Absolute Maximum Ratings (T_A=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	32/±16	V
Differential Input Voltage	V_{ID}	±32	V
Common-mode Input Voltage	V_{ICM}	-0.3~V_{CC}	V
Maximum Operating Junction Temperature	T_J	150	℃
Operating Ambient Temperature	T_A	-20~+85	℃
Storage Temperature	T_{STG}	-65~+150	℃
Lead Temperature(Soldering , 10 s)	T_W	260	℃

Electrical Characteristics(T_A=25℃, V_{CC}=5.0V, VEE=GND, unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Input Offset Voltage	V_{IO}	V_{CC}=5V to 32V, V_{ICM}=$V_{ICM(min)}$, V_O=1.4V		±2	±5	mV
Input Offset Current	I_{IO}	V_O=1.4V		±10	±50	nA
Input Bias Current	I_B	V_O=1.4V		±50	±250	nA
Input Common-mode Voltage Range	V_{ICM}	V_{CC}=5V to 32V	V_{EE}		V_{CC}-1.5	V
Open-loop Voltage Gain	A_{OL}	V_{CC}=15V,V_O=1V to 11V; R_L≥10kΩ,connected to V_{EE}		100		V/mV
Common-mode Rejection Ratio	C_{MRR}	V_{CC}=5V to 32V, V_{ICM}=$V_{ICM(min)}$		80		dB

Power Supply Rejection Ratio	P_{SRR}	V_{CC}=5V to 32V,f=20kHz			90		dB
Channel Isolation Degree	CS	f=1kHz to 20kHz			120		dB
Output High Level Voltage	V_{OH}	V_{CC}=15V,V_{ID}=1V	I_{OUT}=-50uA		13.6		V
			I_{OUT}=-1mA		13.5		V
			I_{OUT}=-5mA		13.4		V
		V_{CC}=32V,V_{ID}=1V	R_L=2kΩ		30		V
Output Low Level Voltage	V_{OL}	V_{CC}=15V,V_{ID}=-1V	I_{OUT}=50uA		0.1		V
			I_{OUT}=1mA		0.3		V
			I_{OUT}=5mA		0.7		V
		V_{CC}=32V,V_{ID}=-1V	R_L=2kΩ		1.0		V
Output Short-circuit Current	I_{SC}	V_{CC}=10V,V_{EE}=-10V,V_O=0V			±40	±60	mA
Supply Current	I_{CC1}	V_{CC}=5V,V_O=1/2V_{CC},No load			0.3		mA
	I_{CC2}	V_{CC}=32V,V_O=1/2V_{CC},No load			0.4		mA
Gain Bandwidth Product	GBWP				1		MHz
Slew Rate	S_R				0.4		V/uS

Typical Applications

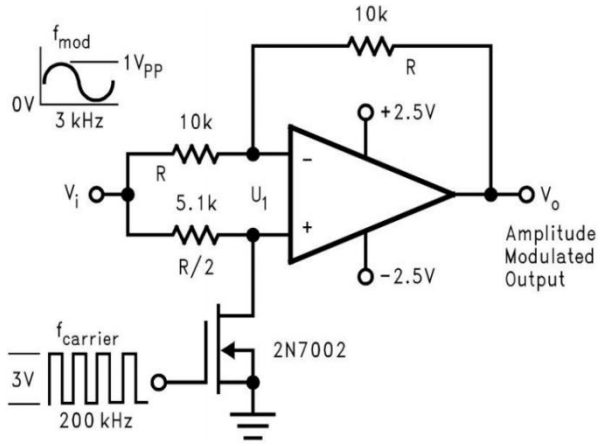


Fig.1 Amplitude Modulator Circuit

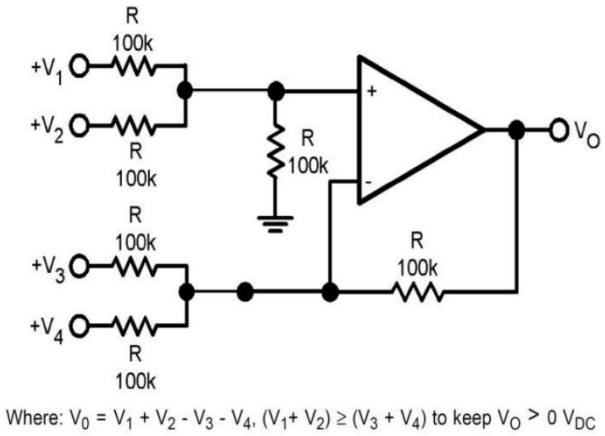


Fig.2 DC Adder Amplifier(V_{IN}≥0V_{DC}),V_O≥V_{DC}

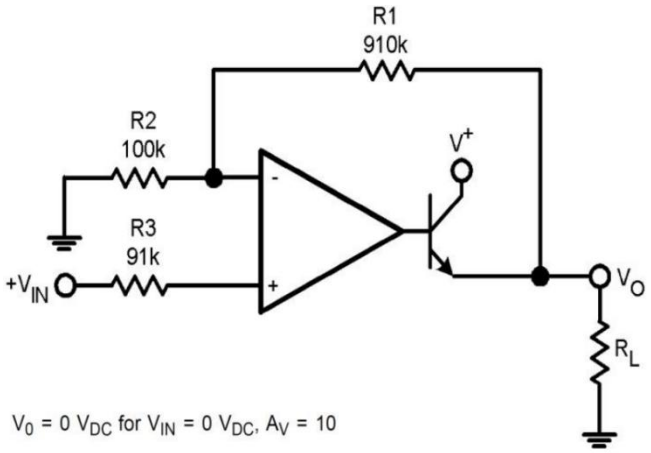


Fig.3 Power Amplifier

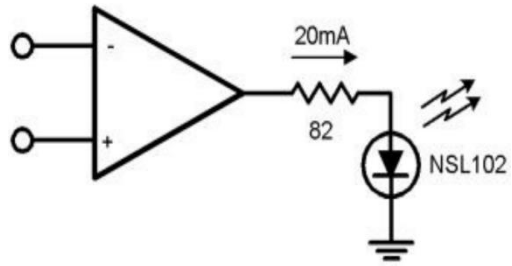


Fig.4 LED Driver

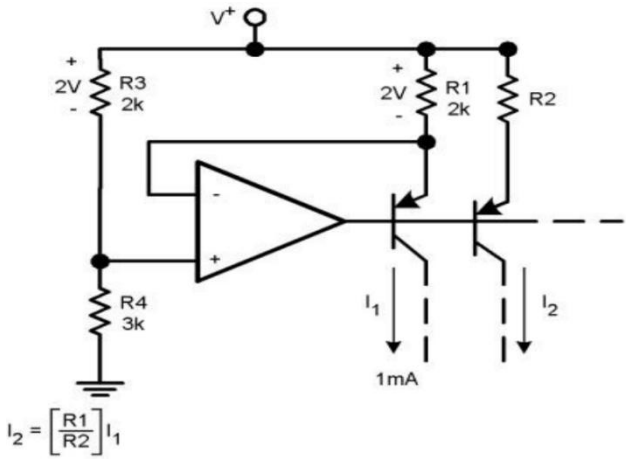


Fig.5 Fixed Current Source

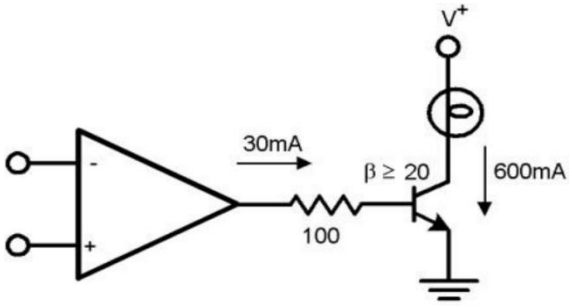


Fig.6 Lamp Driver

Typical Characteristics

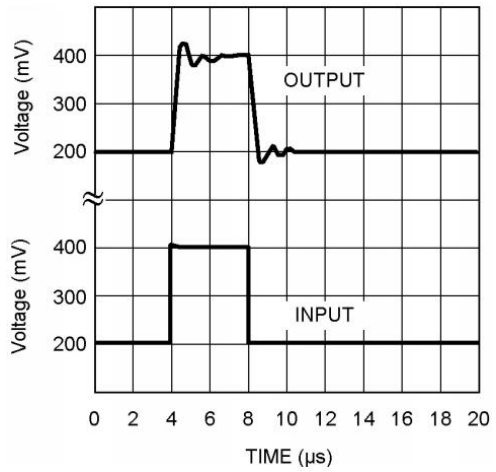


Fig.7 Small signal pulse response

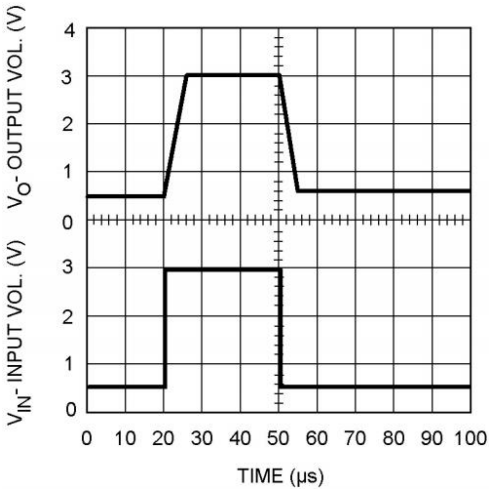


Fig.8 Large signal pulse response

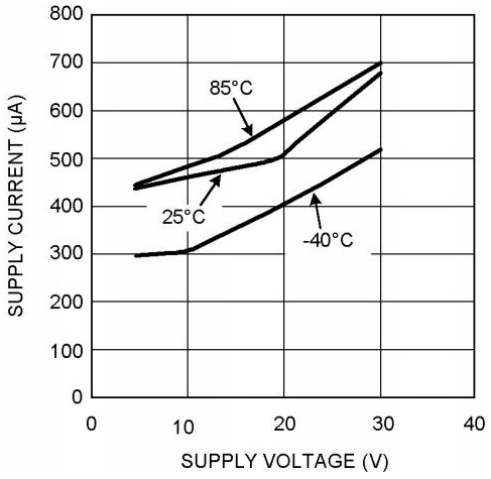


Fig.9 Supply Current vs. Supply Voltage

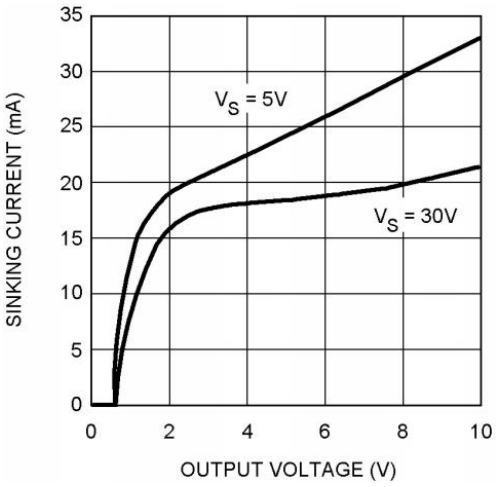


Fig.10 Sinking Current vs. Output Voltage

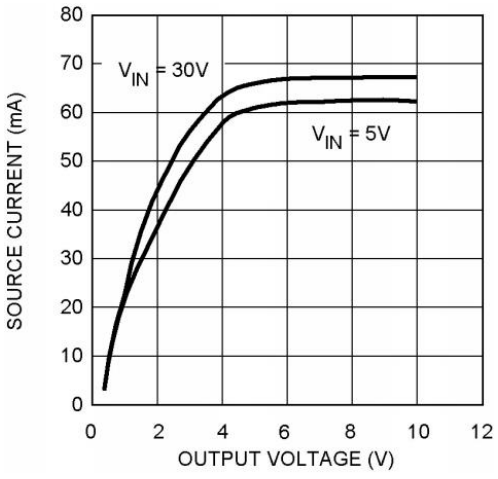


Fig.11 Source Current vs. Output Voltage

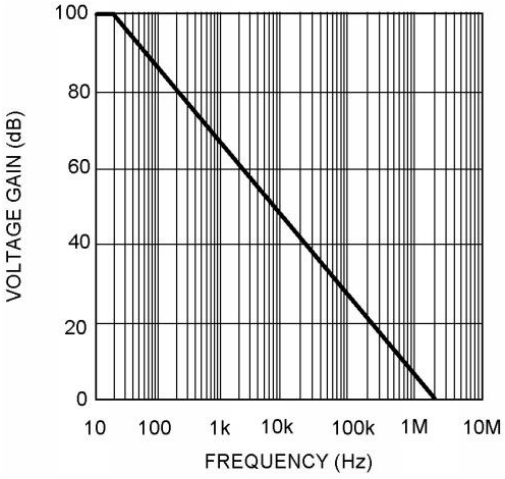
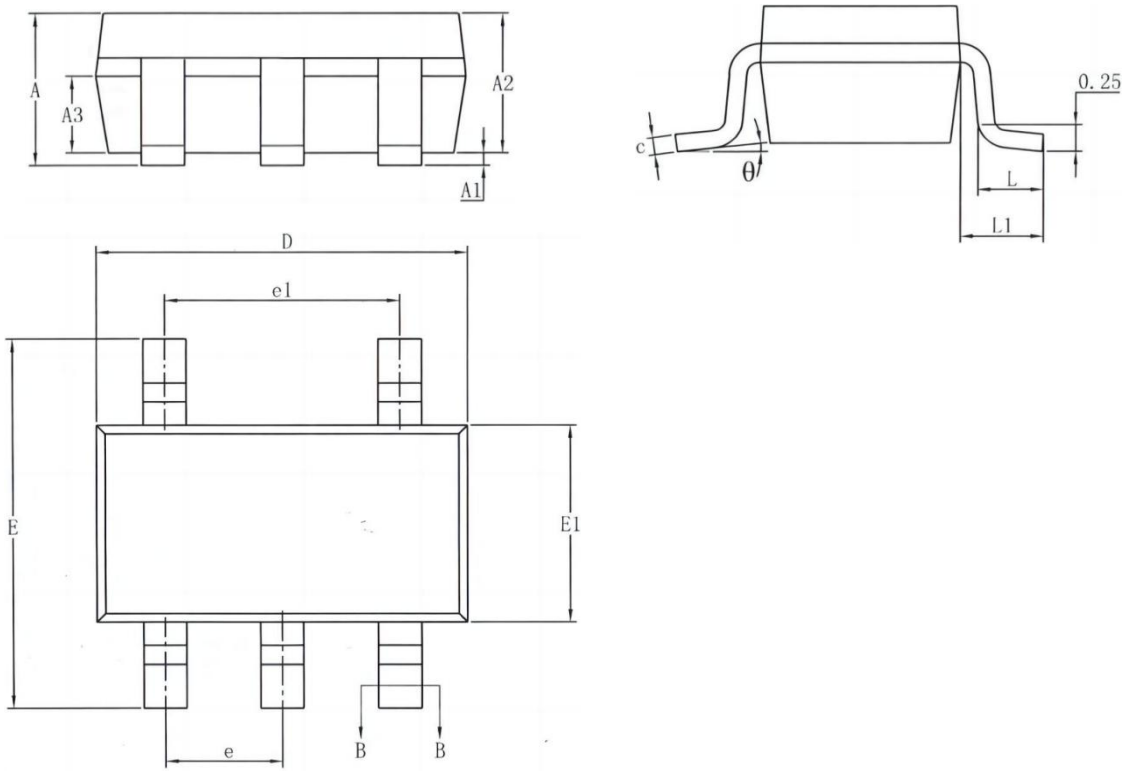


Fig.12 Open Loop Frequency Response

Package Information

SOT-23-5

Dimensions in mm



Symbol	Dimensions In Millimeters			Symbol	Dimensions In Millimeters		
	Min	Nom	Max		Min	Nom	Max
A	-	-	1.25	D	2.82	2.92	3.02
A1	0.04	-	0.10	E	2.60	2.80	3.00
A2	1.00	1.10	1.20	E1	1.50	1.60	1.70
A3	0.60	0.65	0.70	e	0.95 BSC		
b	0.33	-	0.41	e1	1.90 BSC		
b1	0.32	0.35	0.38	L	0.30	-	0.60
c	0.15	-	0.19	L1	0.60 REF		
c1	0.14	0.15	0.16	θ	0°	-	8°

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