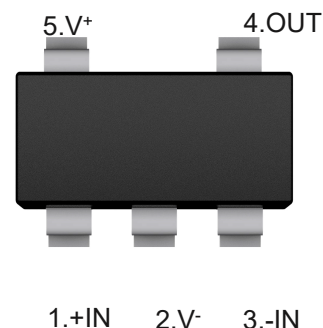# Low Power Single Operational Amplifier

Description

LM321 is a low power, wide power range performance operational amplifier；The static current is only 430 μA per amplifier (5V) with high unit gain frequency and A voltage swing rate of 0.4V/μs.Input common model circuit includes ground, so the device can operate in single - and dual-power applications.It can also comfortably drive large capacity loads.

5.V⁺   4.OUT

1.+IN   2.V⁻   3.-IN

SOT-23-5

Features

- Low quiescent current

- Low input bias current

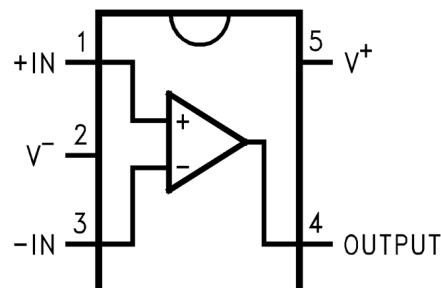- Wide range of supply voltage

- High capacity load stability

Application

- Communication infrastructure

- Battery charger

- Power supply

Pin arrangement diagram

+IN 1   5 V⁺

V⁻ 2

−IN 3   4 OUTPUT

Absolute Maximum Ratings (T$_A$=25℃)

Parameter	Symbol	Value	Units
Supply Voltage	V$_{CC}$	24 or ±12	V
Differential Input Voltage	V$_{ID}$	24	V
Input Voltage	V$_{IN}$	-0.3~VCC	V
Power Dissipation	P$_D$	530	mW
Output Short Circuit to GND V≤15V,Ta=25℃	I$_O$	Continuous	
Input Current VIN<-0.3V	I$_{IN}$	50	mA
Junction Temperature	T$_J$	150	℃
Operating Temperature Range	T$_{OPR}$	0 to 70	℃
Storage Temperature Range	T$_{STG}$	-65 to 150	℃

Electrical Characteristics

At VCC=5V, unless otherwise noted.

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Input Offset Voltage	V$_{OS}$	Ta=25℃		--	±2	±5	mV
Input offset current	I$_{OS}$	Ta=25℃,IIN(+) - IIN(-) , VCM=0V		--	±3	±50	nA
Input bias current	I$_B$	Ta=25℃,IIN(+) or IIN(-) , VCM=0V		--	±45	±250	nA
Common-mode input voltage range	V$_{CM}$	Ta=25℃,V$^+$=24V		0	--	VCC-1.5	V
Supply current	I$_S$	V$_{CC}$=24V, R$_L$ =∞		--	0.7	2	mA
		V$_{CC}$=5V , R$_L$ =∞		--	0.5	1.2	
Common Mode Rejection	CMRR	V$_{CM}$ = 0~VCC-1.5V, Ta=25℃, DC		65	90	--	dB
Power Supply Rejection	PSRR	V$_{CC}$ = 5V~24V, Ta=25℃, DC		65	100	--	dB
Large signal voltage gain	A$_V$	V$_{CC}$ = 15V,T$_a$=25℃,R$_L$≥ 2kΩ(for V$_O$=1~11V)		25	100	--	V/mV
Output voltage swing	V$_O$	V$_{OH}$	V$_{CC}$ = 24V,R$_L$= 2 kΩ	22	--	--	V
			V$_{CC}$ = 24V,R$_L$=10 kΩ	22	--	--	V
		V$_{OL}$	V$_{CC}$ = 5V,R$_L$=10 kΩ	--	5	20	mV
Output Current Sourcing	I$_{Source}$	V$_{IN(+)}$ =1V,V$_{IN(-)}$ =0V,V$_{CC}$=15V, V$_O$=2V,Ta=25℃		20	40	--	mA
Output Current Sinking	I$_{SINK}$	V$_{IN(+)}$ =0V,V$_{IN(-)}$ =1V,V$_{CC}$=15V, V$_O$=2V,Ta=25℃		10	15	--	mA
		V$_{IN(+)}$ =0V,V$_{IN(-)}$ =1V,V$_{CC}$=15V, V$_O$=200mV,Ta=25℃		12	50	--	μA
Output Short Circuit to Ground	I$_O$	V$_{CC}$=15V,Ta=25℃		--	40	60	mA

Typical Applications
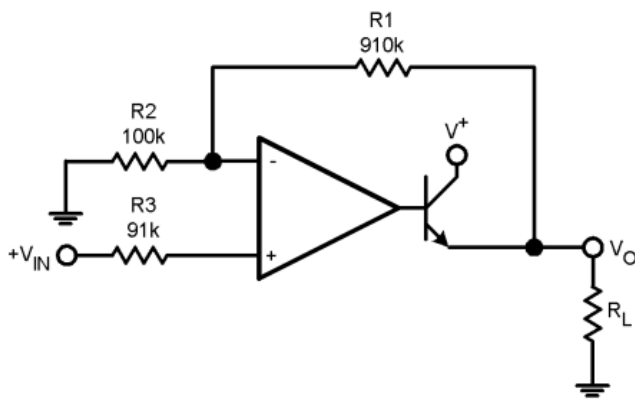

Amplitude modulator circuit

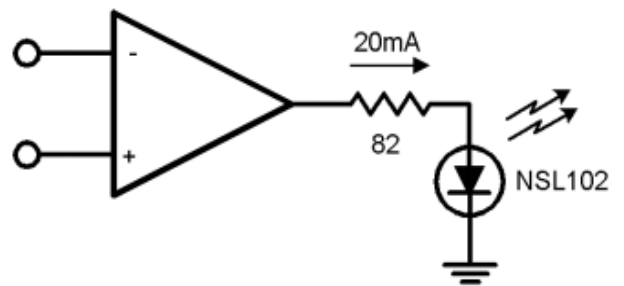Note：$V_O=V_1+V_2-V_3-V_4,(V_1+V_2) \geq (V_3+V_4)$ for $V_O \geq 0V_{DC}$

DC adder amplifier

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

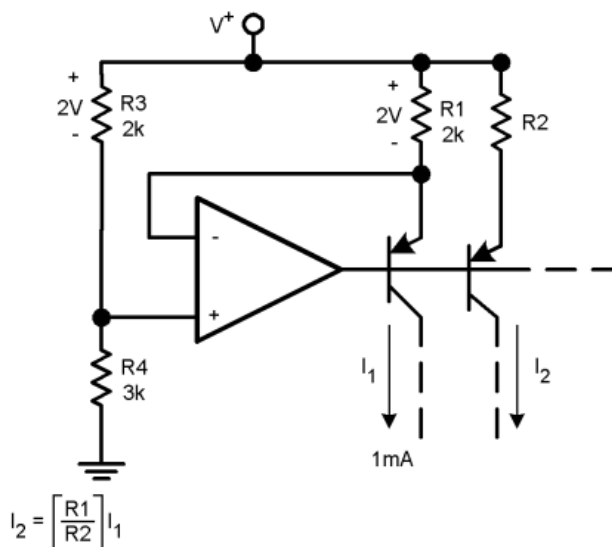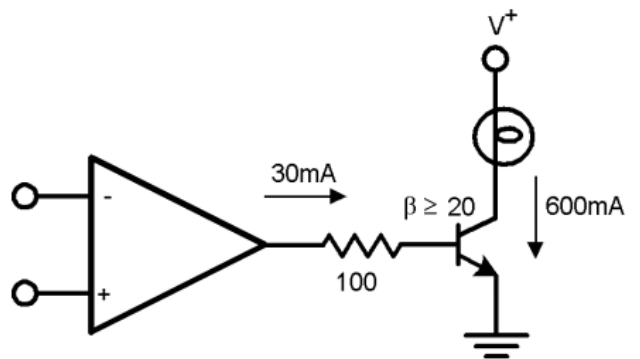$V_O=0V_{DC}$ for $V_{IN}=0V_{DC}$，$A_V=10$

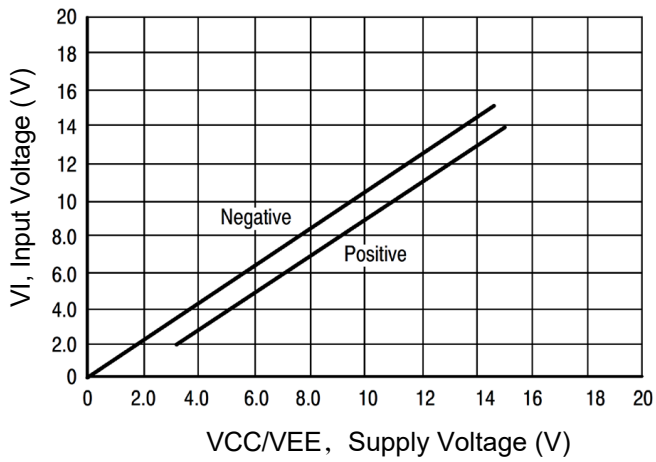Power Amplifier

LED Driver

$I_2 = \left[\dfrac{R1}{R2} \right] I_1$

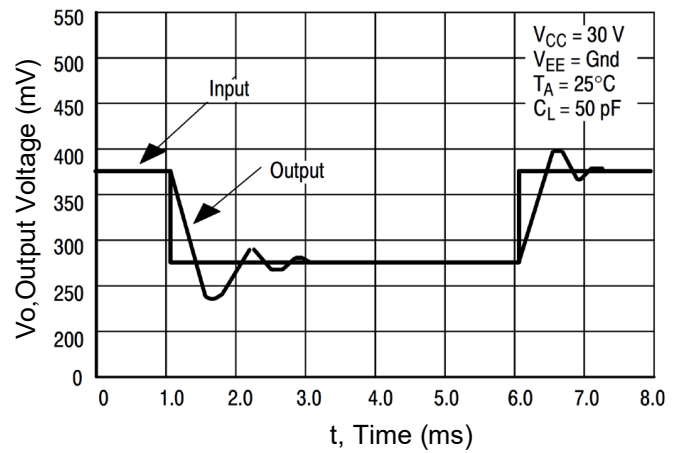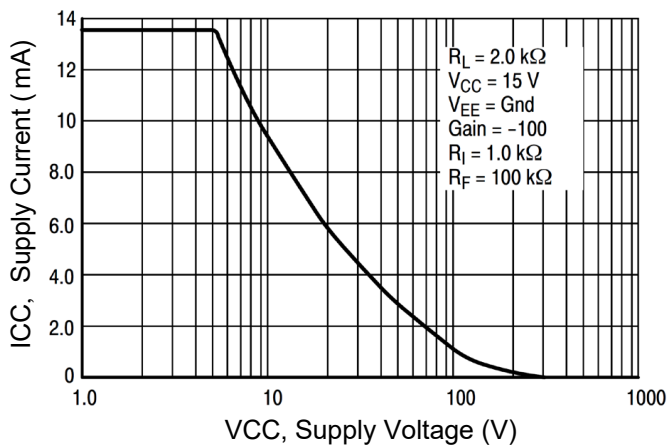Fixed current source

Lamp Driver
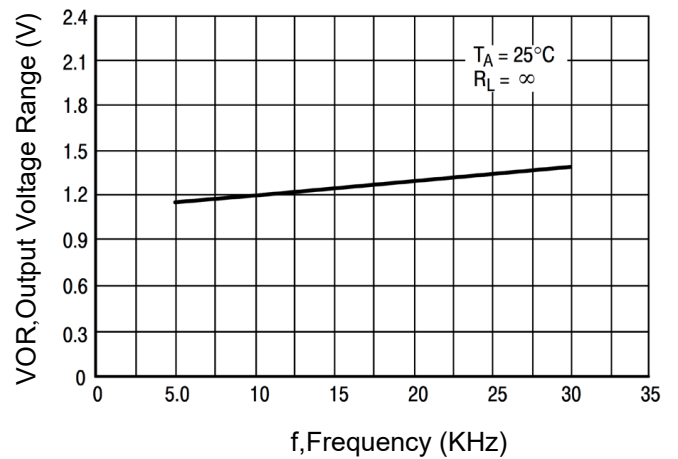
Typical characteristic curve

Input Voltage Range

Small signal voltage follower impulse
response (same direction)

Supply current (static power consumption)

Large signal frequency response

Package Outline

SOT-23-5
Dimensions in mm