1.1MHz Rail-To-Rail I/O CMOS Operational Amplifier

■ Description

The LN321 (single) is rail-to-rail input and output voltage feedback amplifier offering low cost. It has a wide input common-mode voltage range and output voltage swing, and takes the minimum operating supply voltage down to 2.1V and the maximum recommended supply voltage is 5.5V. All are specified over the extended –40°C to +125°C temperature range.

The LN321 provides 1.1MHz bandwidth at a low current consumption of 42μA per amplifier. Very low input bias currents of 0.5pA, enable LN321 to be used for integrators, photodiode amplifiers, and piezoelectric sensors. Rail-to-rail inputs and outputs are useful to designers buffering ASIC in single-supply systems.

Applications for this amplifier include safety monitoring, portable equipment, battery and power supply control, and signal conditioning and interfacing for transducers in very low power systems.

■ Applications

- ASIC input or output amplifiers
- Audio Output
- Handheld devices
- Mobile phones
- Notebook
- PCMCIA card
- Battery-powered devices

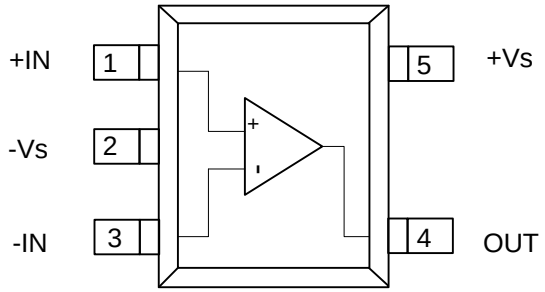
■ Features

- Low cost
- Rail-to-Rail input / output
- Unity-gain stable
- Slew rate: 0.52 (V/μs)
- Minimum power supply rejection ratio: 72dB
- Minimum common mode rejection ratio: 76dB
- Offset voltage: typically 0.8mV, 3.5mV maximum
- Gain bandwidth product: 1.1MHz
- Very low input bias current: 0.5pA
- Operating voltage range: 2.1V to 5.5V
- Input voltage range: 0.1V to +5.6 V (V_S = 5.5V)
- Quiescent current: 42μA

■ Package

- SOT-23-5

■ Pin Configuration



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■ Absolute Maximum Rating

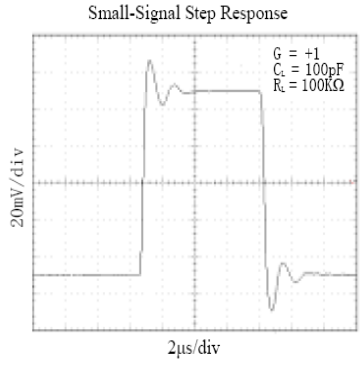
Parameter	Symbol	Maximum Rating	Unit
Supply voltage	V_{DD}	7.5	V
Common-mode input voltage	V_{CM}	(-VS)-0.5 to (+VS)+0.5	V
Storage temperature	Tstg	-55—150	℃
Junction temperature	—	150	℃
ESD susceptibility	HBM	4000	V
	MM	400	V

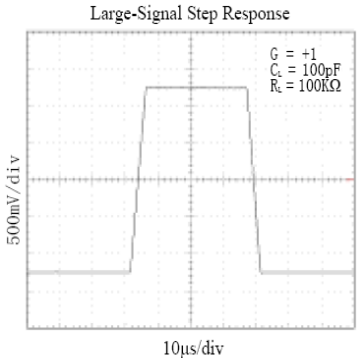
■ ELECTRICAL SPECIFICATIONS

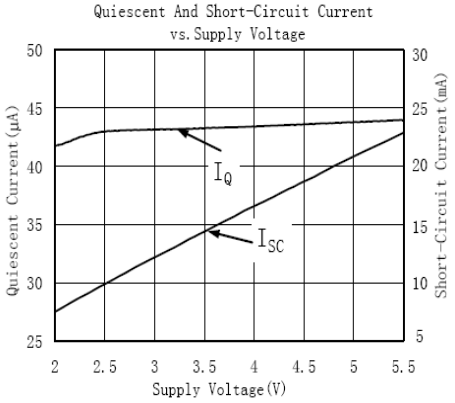
V_S=+5V R_L=100KΩ V_{OUT}=V_S/2 (T_A = 25°C, unless otherwise specified)

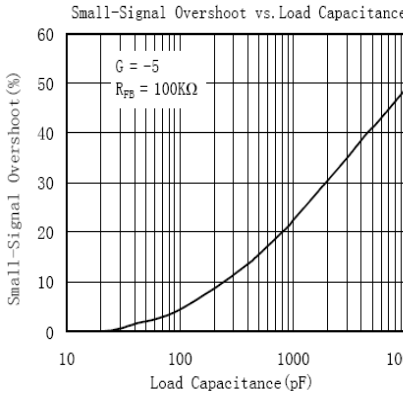
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
V_{OS}	Input offset voltage			±0.8	±5.4	mV
I_B	Input bias current			0.5		pA
I_{OS}	Input offset current			0.5		pA
V_{CM}	Common-Mode voltage range	V_S＝5.5V	-0.1		5.6	V
CMRR	Common-Mode rejection ratio	V_S＝5.5V ,V_{CM}＝-0.1V－4V	72	88		dB
		V_S＝5.5V ,V_{CM}＝-0.1V－5.6V	57	78		dB
A_{OL}	Open-Loop voltage gain	R_L=5K, V_O=0.1V-4.9V	78	90		dB
		R_L=100K, V_O=0.035V-4.965V	82	94		dB
Δ V_{OS}/Δ T	Input offset voltage drift			2.7		μV/℃
V_{SW}	Output voltage swing from rail	R_L=100K		0.008		V
I_{OUT}	Output current		18	23		mA
VDD	Operating voltage range		2.1		5.5	
PSRR	Power supply rejection ratio	V_S=+2.5V to +5.5V, V_{CM}=(-V_S)+0.5V	70	92		
I_Q	Quiescent current	I_{OUT}=0		42	60	μA
GBP	Gain-bandwidth product	CL=100pF		1.1		MHz
SR	Slew rate			0.052		V/μs

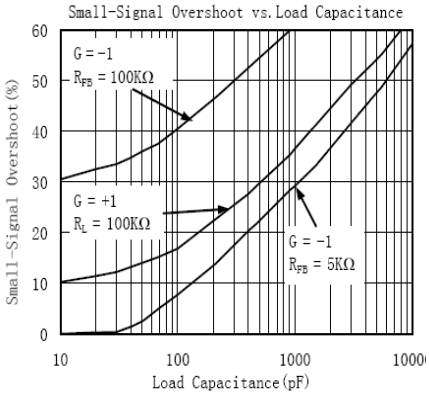
■ Typical Operating Characteristics

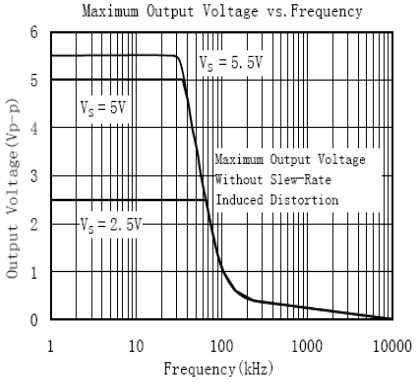




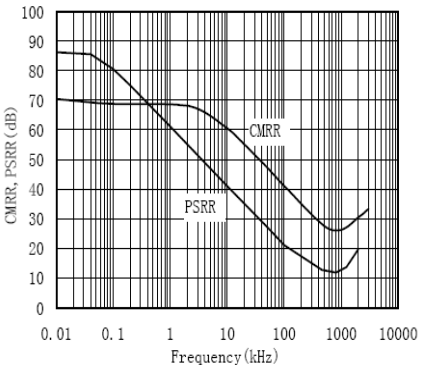




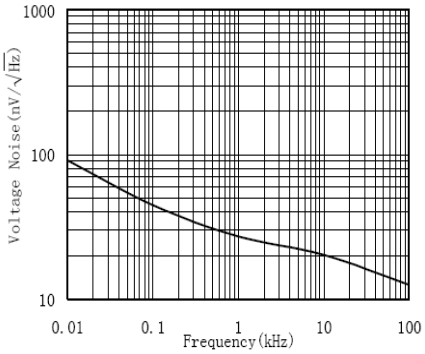




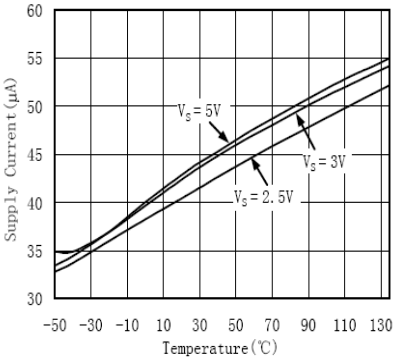
CMRR And PSRR vs. Frequency



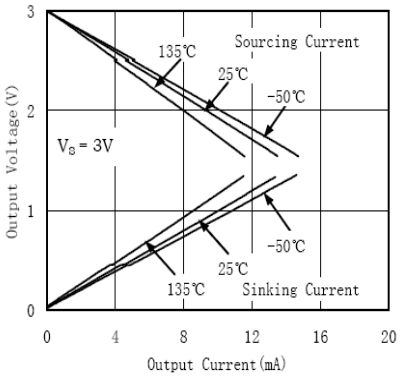
Input Voltage Noise Spectral Density vs. Frequency



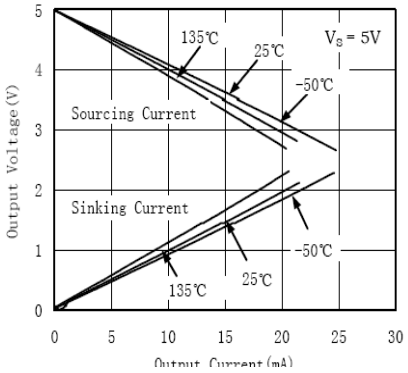
Supply Current vs. Temperature



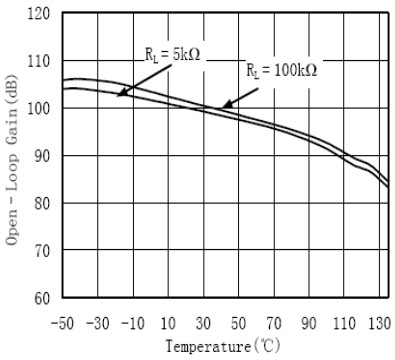
Output Voltage Swing vs. Output Current



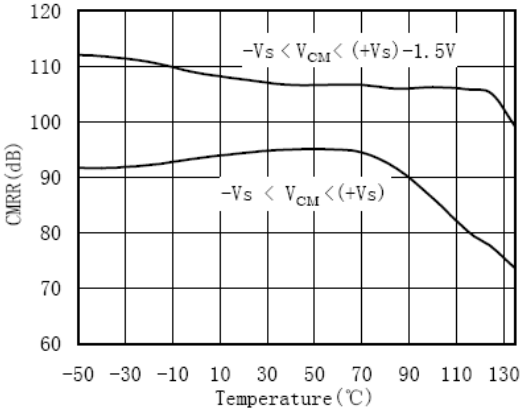
Output Voltage Swing vs. Output Current



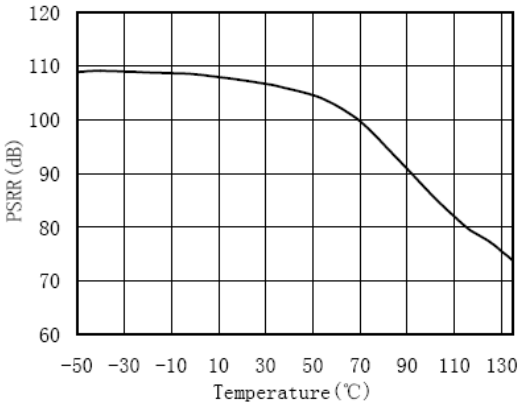
Open-Loop Gain vs. Temperature



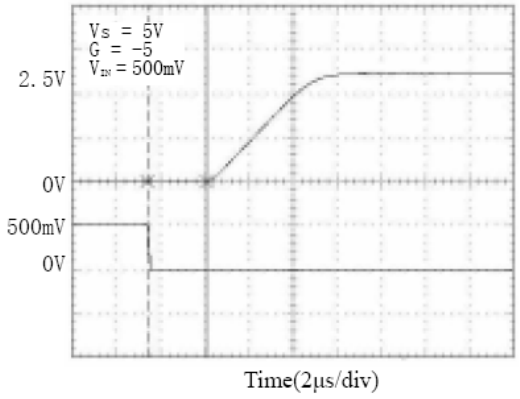
Common-Mode Rejection Ratio
vs. Temperature



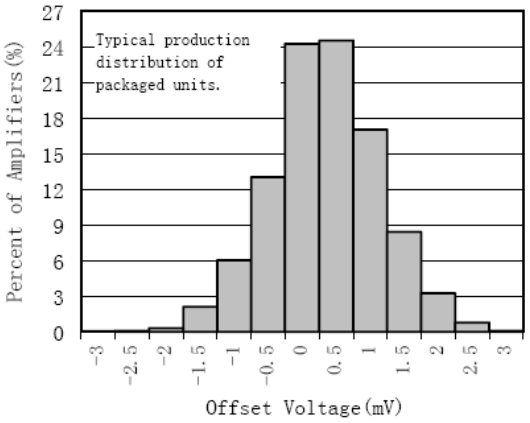
Power-Supply Rejection Ratio
vs. Temperature



Overload Recovery Time

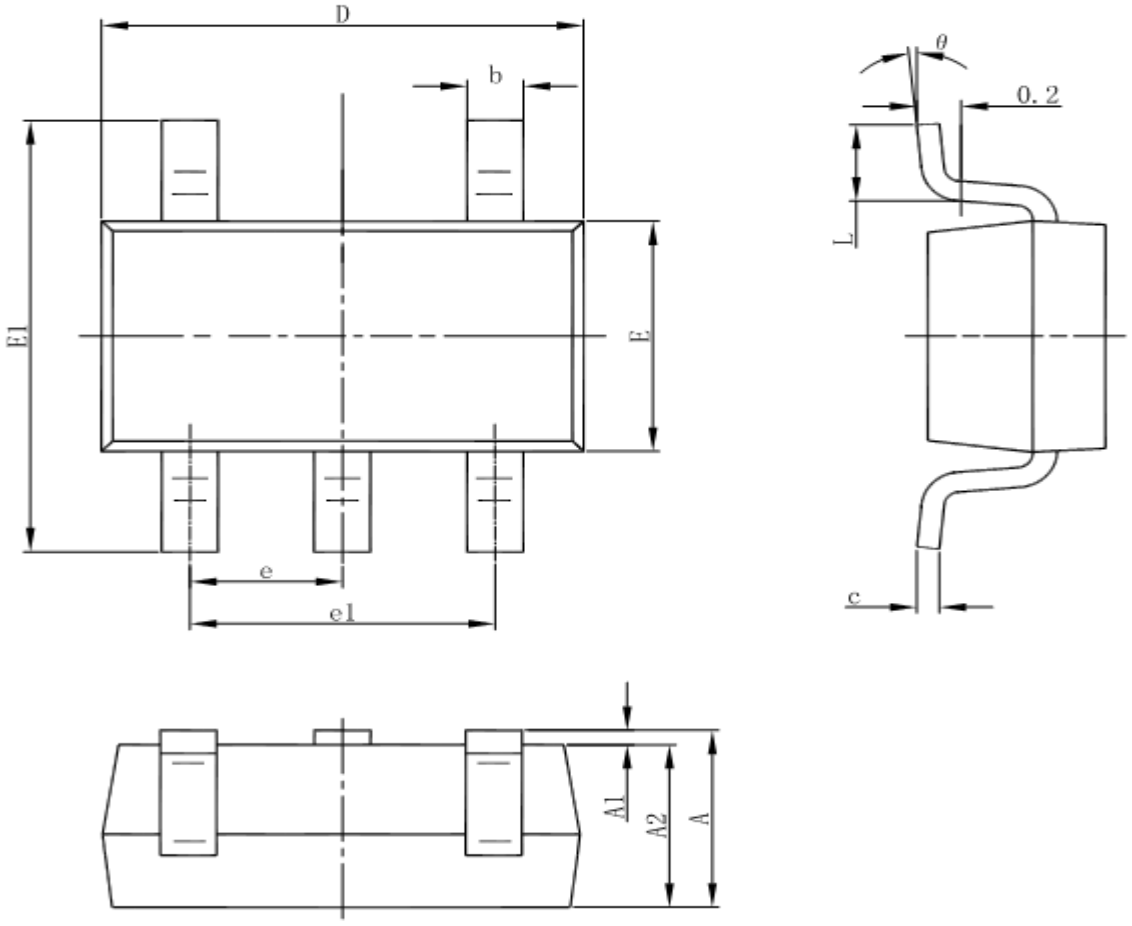


Offset Voltage Production Distribution



■ Package Information

- **SOT-23-5**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°