

LOW POWER SINGLE OPERATIONAL AMPLIFIER

Description

The AS321 is a high gain and internally frequency compensated operational amplifier specifically designed to operate from a single power supply. Operation from split power supply is also possible and the low power supply current drain is independent of the magnitude of the power supply voltages. Typical applications include battery charger, active filters, general purpose controllers and most conventional operational amplifier circuits.

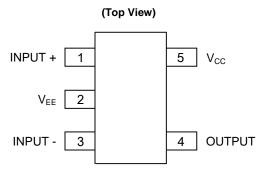
The AS321 is compatible with industry standard 321.

The AS321 is available in SOT-23-5 packages.

Features

- Excellent Phase Margin: 60 deg.
- Large Voltage Gain: 100dB (Typical)
- Low Input Bias Current: 20nA (Typical)
- Low Input Offset Voltage: 2mV (Typical)
- Low Supply Current: 0.35mA at V_{CC} = 5V
- Wide Power Supply Voltage:
 - Single Supply: 3V to 36V
 - Dual Supplies: ±1.5V to ±18V
- Wide Input Common Mode Voltage Range: 0V to V_{CC}-1.5V

Pin Assignments

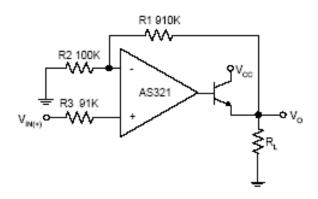


(SOT-23-5/ K Package)

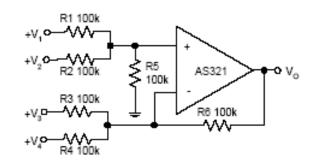
Applications

- Battery Charger
- Active Filters
- General Purpose Controllers, Instruments

Typical Applications Circuit



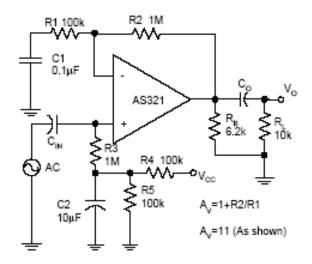
Power Amplifier



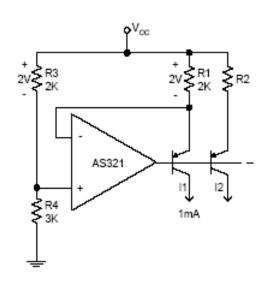
DC Summing Amplifier



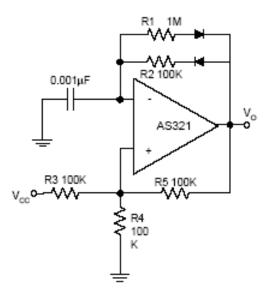
Typical Applications Circuit (Cont.)



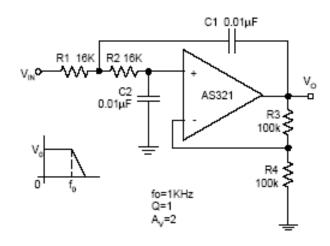
AC Coupled Non-Inverting Amplifier



Fixed Current Sources



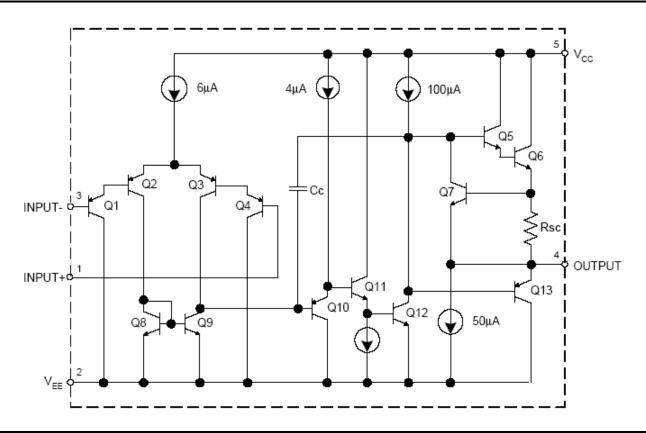
Pulse Generator



DC Coupled Low-Pass Active Filter



Functional Block Diagram



Absolute Maximum Ratings (Note 1)

Symbol	Parameter	Rating	Unit
V _S (V _{CC} -V _{EE})	Power Supply Voltage	40	V
V_{ID}	Differential Input Voltage	40	V
V _{IN}	Input Voltage	-0.3 to 40	V
θ_{JA}	Thermal Resistance to Ambient	260	°C/W
TJ	Operating Junction Temperature	+150	°C
T _{STG}	Storage Temperature Range	-65 to +150	°C
T _{LEAD}	Lead Temperature (Soldering, 10 Seconds)	+260	°C

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
Vcc	Supply Voltage	3	36	V
T _A	Ambient Operating Temperature Range	-40	+85	°C





AS321

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Electrical Characteristics (Limits in standard typeface are for $T_A = +25^{\circ}C$, **bold** typeface applies over -40°C to +85°C (Note 2), $V_{CC} = 5V$, $V_{EE} = 0V$, $V_{O} = 1.4V$, unless otherwise specified.)

Symbol	Parameter		Conditions	Min	Тур	Max	Unit
.,			$V_{O} = 1.4V, R_{S} = 0\Omega, V_{CC} = 5V \text{ to } 30V$	-	2	5	
V _{IO}	Input Offset Volta	age	(Note 3)	_	_	7	mV
ΔV _{IO} /ΔT	Average Temperature Coefficient of Input Offset Voltage		$T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$	_	7	_	μV/°C
	land Bing O				20	100	nA
BIAS	I _{BIAS} Input Bias Current		I_{IN} + or I_{IN} -, V_{CM} = 0V	_	_	200	
	In must Offer at Course			_	5	30	nA
I _{IO}	Input Offset Curr	ent	I_{IN} + - I_{IN} -, V_{CM} = 0V	_	_	100	
V _{CM}	Input Common M Range (Note 4)	lode Voltage	V _{CC} = 30V, CMRR ≥ 50dB	0	_	V _{cc} -1.5	V
			- · · · · · ·	_	0.35	0.80	
	Committee Comment		$R_L = \infty$, $V_{CC} = 5V$	_	0.45	1.0	mA
Icc	Supply Current		D - " \	_	0.45	1.2	
			$R_L = \infty$, $V_{CC} = 30V$	_	0.65	1.5	
	Laura Cianal Val	ana Cain		85	100	_	dB
G_{V}	Large Signal Volt	tage Gain	$V_{CC} = 15V, V_{O} = 1V \text{ to } 11V, R_{L} \ge 2k\Omega$	80	_	_	
OMPR			$V_{CM} = 0V$ to $(V_{CC}-1.5)V$, $R_S \le 10k\Omega$	60	70	-	dB
CMRR	Common Mode F	Rejection Ratio		60	_	-	
2022		5	$V_{CC} = 5V \text{ to } 30V, R_S \le 10k\Omega$	70	100	-	dB
PSRR	Power Supply Re	ejection Ratio		60	_	_	
			V_{IN} + = 1V, V_{IN} - = 0V, V_{CC} = 15V, V_{O} =	20	40	_	^
SOURCE	Output Current Sink	2V	20	_	_	mA	
		Sink	V_{IN} + = 0V, V_{IN} - = 1V, V_{CC} = 15V, V_{O} = 2V	10	15	-	mA
lauw				5	_	-	
I _{SINK}			V_{IN} + = 0V, V_{IN} - = 1V, V_{CC} = 15V, V_{O} = 0.2V	12	50	-	μΑ
I _{sc}	Output Short Circuit Current to Ground		V _{CC} = 15V	_	40	60	mA
			$V_{CC} = 30V$, $R_L = 2k\Omega$	26	_	-	
.,		26		_	_		
V _{OH}				27	28	_	V
	Output Voltage Swing		$V_{CC} = 30V$, $R_L = 10k\Omega$	27	_	_	
			V =V 5 (0) 5	_	5	20	
V _{OL}	V _{OL}		$V_{CC} = 5V$, $R_L = 10k\Omega$	_	_	30	mV
THD	Total Harmonic Distortion		$f = 1kHz$, $AV = 20dB$, $R_L = 2k\Omega$, $V_O = 2Vp-p$, $C_L = 100pF$, $V_{CC} = 30V$	_	0.015	_	%
Фм	Phase Margin		-	_	60	-	Deg
θ _{JC}	Thermal Resistance (Junction to Case)		SOT-23-5		101		°C/W

Notes:

Document number: DS36976 Rev. 2 - 2

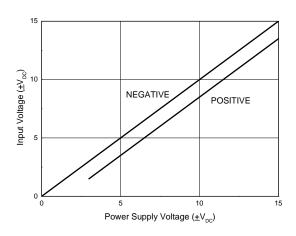
- $2. \ Limits \ over the full temperature \ are \ guaranteed \ by \ design, \ but \ not \ tested \ in \ production.$
- 3. Over the full input common-mode range 0V to $\ensuremath{V_{\text{CC}}}\xspace\text{-}1.5\ensuremath{\text{V}}$ (at +25°C).
- 4. The input common-mode voltage of either input signal voltage should not be allowed to go negatively by more than 0.3V (at $+25^{\circ}$ C). The upper end of the common-mode voltage range is V_{CC} -1.5V (at $+25^{\circ}$ C), but either or both inputs can go to +36V without damages, independent of the magnitude of the V_{CC} .

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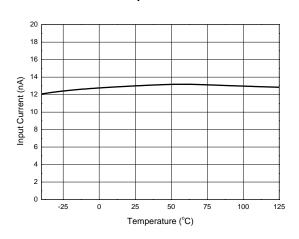


Performance Characteristics

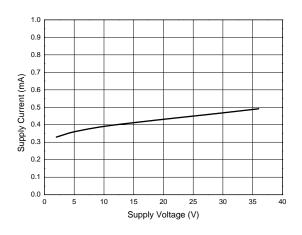
Input Voltage Range



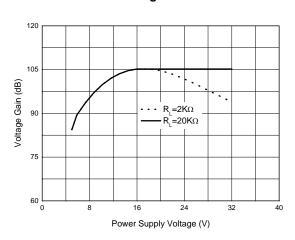
Input Current



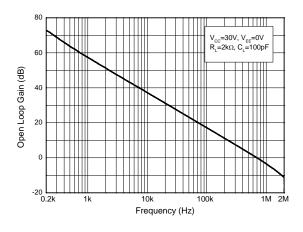
Supply Current



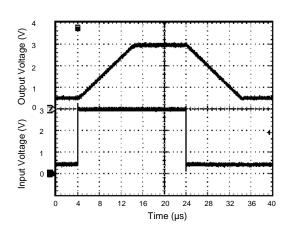
Voltage Gain



Open Loop Gain vs. Frequency



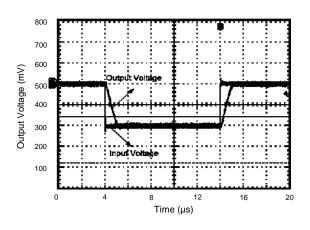
Voltage Follower Pulse Response



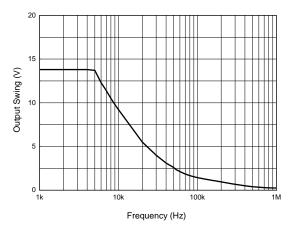


Performance Characteristics (Cont.)

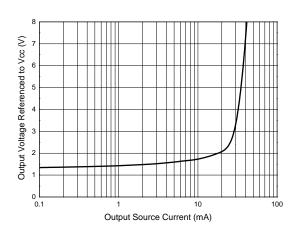
Voltage Follower Pulse Response (Small Signal)



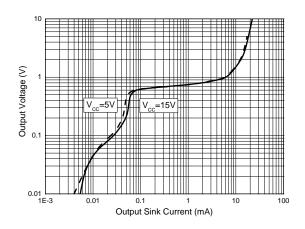
Large Signal Frequency Response



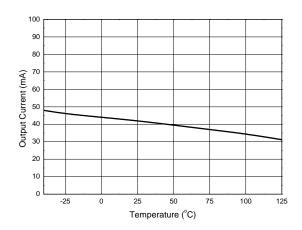
Output Characteristics: Current Sourcing



Output Characteristics: Current Sinking

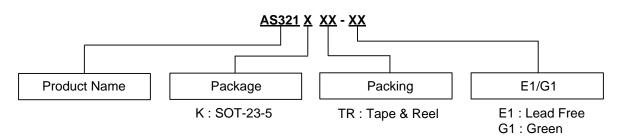


Current Limiting





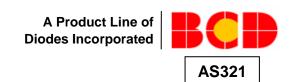
Ordering Information



Diodes IC's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant. Products with "G1" suffix are available in green packages.

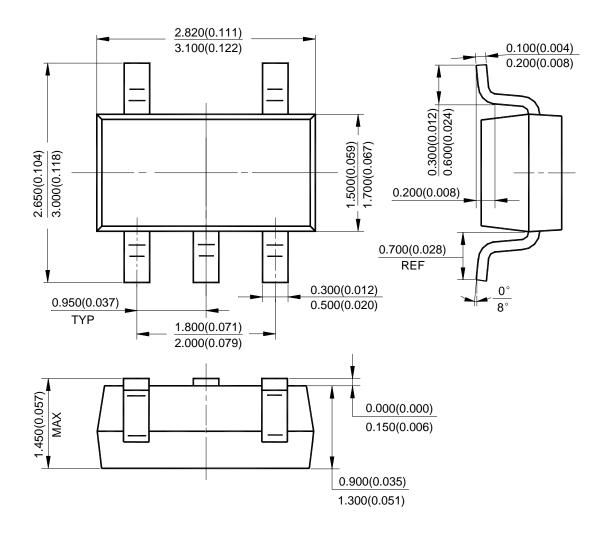
Dankana	Temperature	Part Number		Marking ID		- · · -
Package	Range	Lead Free	Green	Lead Free	Green	Packing Type
SOT-23-5	-40°C to +85°C	AS321KTR-E1	AS321KTR-G1	E6T	G6T	Tape & Reel





Package Outline Dimensions (All dimensions in mm(inch).)

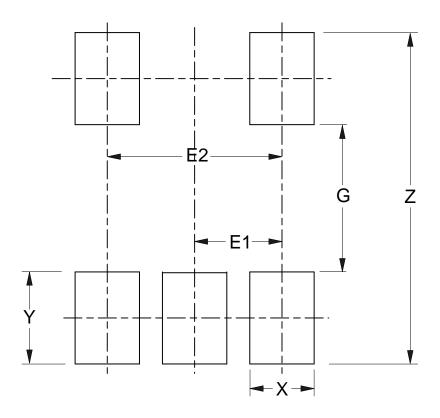
(1) Package Type: SOT-23-5





Suggested Pad Layout

(1) Package Type: SOT-23-5



Dimensions	Z	G	X	Y	E1	E2
Dimensions	(mm)/(inch)	(mm)/(inch)	(mm)/(inch)	(mm)/(inch)	(mm)/(inch)	(mm)/(inch)
Value	3.600/0.142	1.600/0.063	0.700/0.028	1.000/0.039	0.950/0.037	1.900/0.075



AS321

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