AS321

LOW POWER SINGLE OPERATIONAL AMPLIFIER

Description

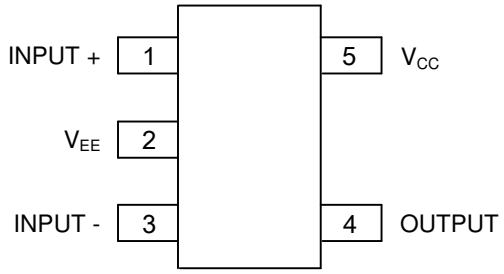
The AS321 is a high gain and internally frequency compensated operational amplifier specifically designed to operate from a single power supply. Operation from split power supply is also possible and the low power supply current drain is independent of the magnitude of the power supply voltages. Typical 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.

Pin Assignments

(Top View)



(SOT-23-5/ K Package)

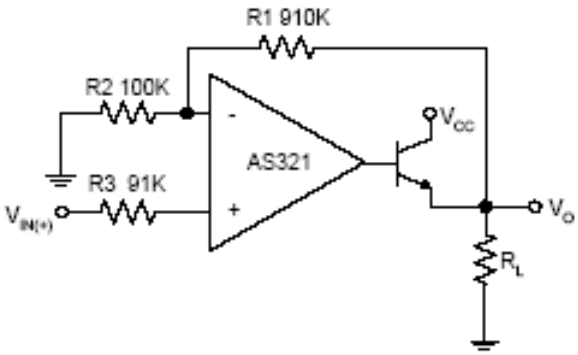
Features

- 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

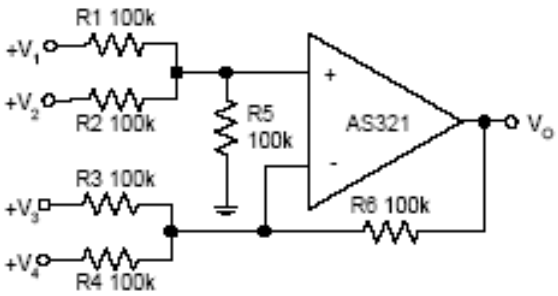
Applications

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

Typical Applications Circuit

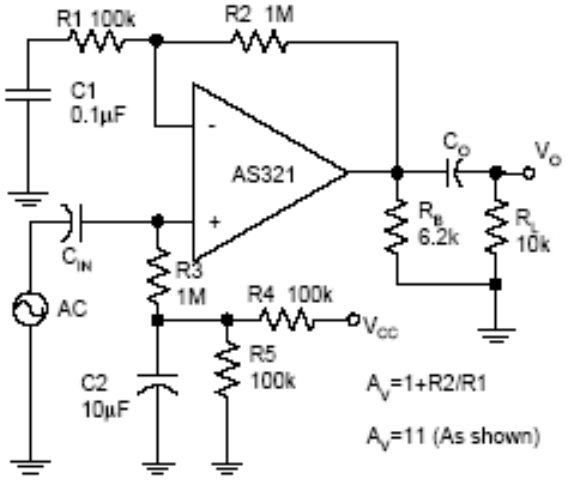


Power Amplifier

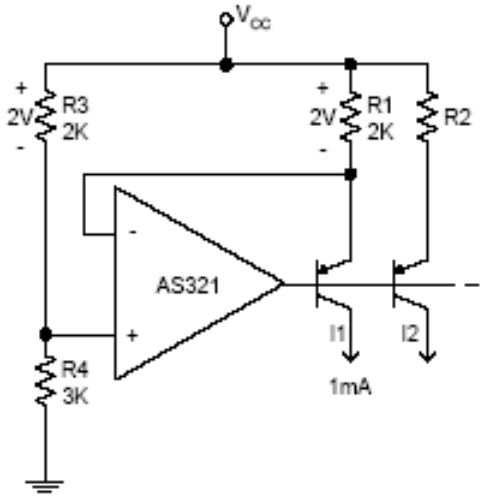


DC Summing Amplifier

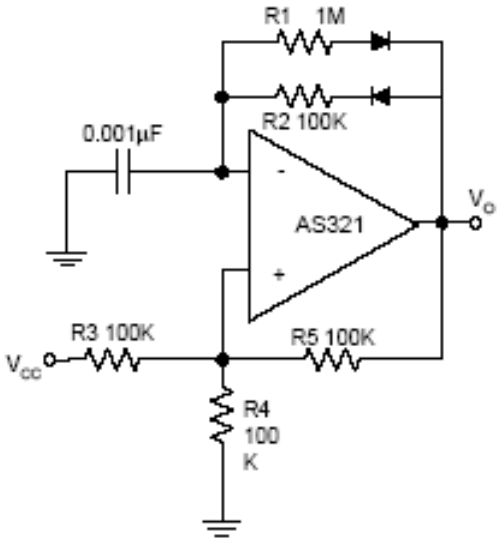
Typical Applications Circuit (Cont.)



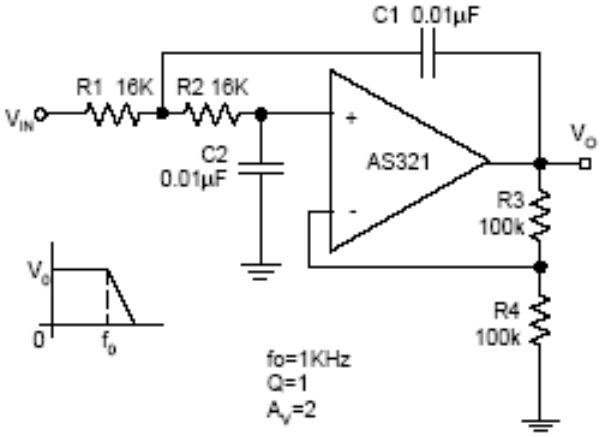
AC Coupled Non-Inverting Amplifier



Fixed Current Sources

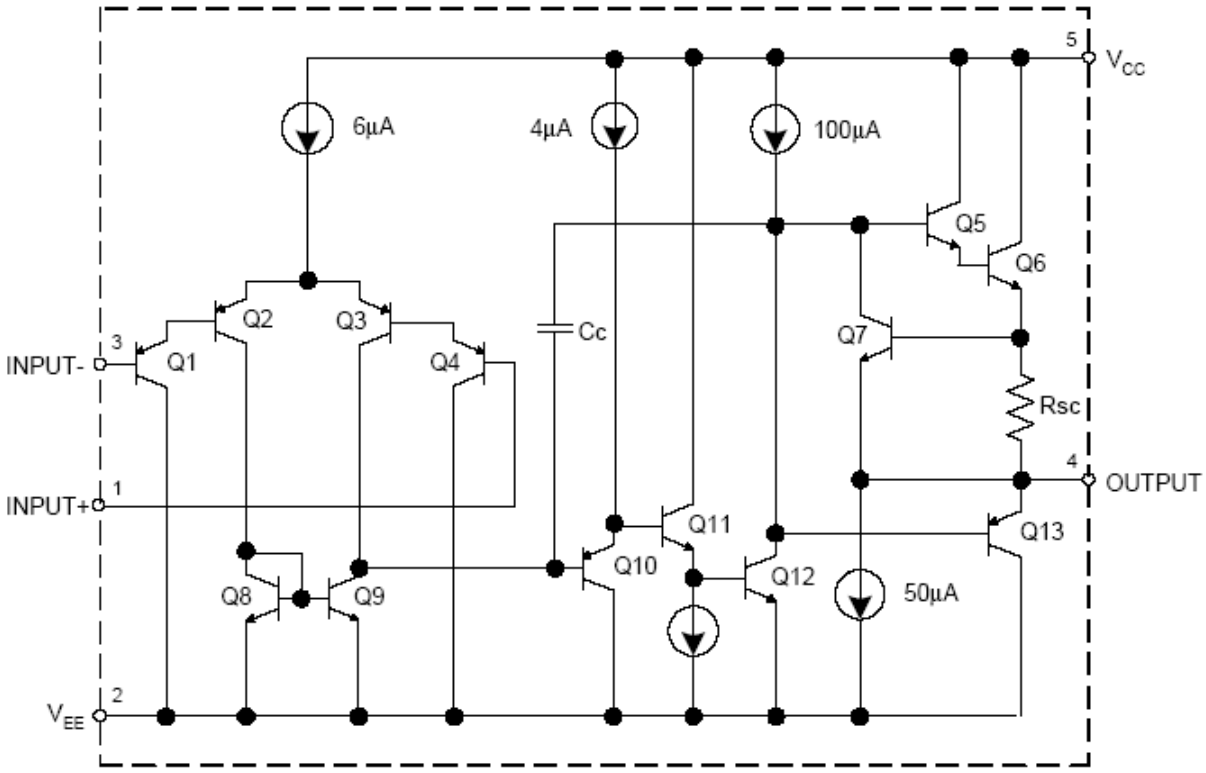


Pulse Generator



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
T_J	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
V_{CC}	Supply Voltage	3	36	V
T_A	Ambient Operating Temperature Range	-40	+85	°C

Electrical Characteristics (Limits in standard typeface are for T_A = +25°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	Typ	Max	Unit
V_{IO}	Input Offset Voltage		V_O = 1.4V, R_S = 0Ω, V_{CC} = 5V to 30V (Note 3)	–	2	5	mV
				–	–	**7**	
$\Delta V_{IO}/\Delta T$	Average Temperature Coefficient of Input Offset Voltage		T_A = -40°C to +85°C	–	**7**	–	µV/°C
I_{BIAS}	Input Bias Current		I_{IN}+ or I_{IN}-, V_{CM} = 0V	–	20	100	nA
				–	–	**200**	
I_{IO}	Input Offset Current		I_{IN}+ - I_{IN}-, V_{CM} = 0V	–	5	30	nA
				–	–	**100**	
V_{CM}	Input Common Mode Voltage Range (Note 4)		V_{CC} = 30V, CMRR ≥ 50dB	0	–	V_{CC}-1.5	V
I_{CC}	Supply Current		R_L = ∞, V_{CC} = 5V	–	0.35	0.80	mA
				–	**0.45**	**1.0**	
			R_L = ∞, V_{CC} = 30V	–	0.45	1.2	
				–	**0.65**	**1.5**	
G_V	Large Signal Voltage Gain		V_{CC} = 15V, V_O = 1V to 11V, R_L ≥ 2kΩ	85	100	–	dB
				80	–	–	
CMRR	Common Mode Rejection Ratio		V_{CM} = 0V to (V_{CC}-1.5)V, R_S ≤ 10kΩ	60	70	–	dB
				60	–	–	
PSRR	Power Supply Rejection Ratio		V_{CC} = 5V to 30V, R_S ≤ 10kΩ	70	100	–	dB
				60	–	–	
I_{SOURCE}	Output Current	Source	V_{IN}+ = 1V, V_{IN}- = 0V, V_{CC} = 15V, V_O = 2V	20	40	–	mA
				20	–	–	
I_{SINK}		Sink	V_{IN}+ = 0V, V_{IN}- = 1V, V_{CC} = 15V, V_O = 2V	10	15	–	mA
				5	–	–	
			V_{IN}+ = 0V, V_{IN}- = 1V, V_{CC} = 15V, V_O = 0.2V	12	50	–	µA
I_{SC}	Output Short Circuit Current to Ground		V_{CC} = 15V	–	40	60	mA
V_{OH}	Output Voltage Swing		V_{CC} = 30V, R_L = 2kΩ	26	–	–	V
				26	–	–	
			V_{CC} = 30V, R_L = 10kΩ	27	28	–	
				27	–	–	
V_{OL}			V_{CC} = 5V, R_L = 10kΩ	–	5	20	mV
				–	–	**30**	
THD	Total Harmonic Distortion		f = 1kHz, AV = 20dB, R_L = 2kΩ, V_O = 2Vp-p, C_L = 100pF, V_{CC} = 30V	–	0.015	–	%
Φ_M	Phase Margin		–	–	60	–	Deg
θ_{JC}	Thermal Resistance (Junction to Case)		SOT-23-5	–	101	–	°C/W

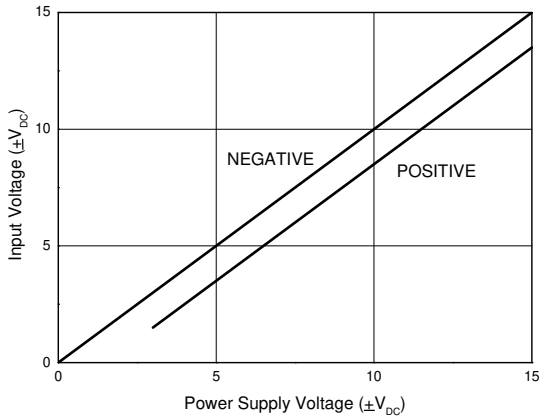
Notes: 2. Limits over the full temperature are guaranteed by design, but not tested in production.

3. Over the full input common-mode range 0V to V_{CC}-1.5V (at +25°C).

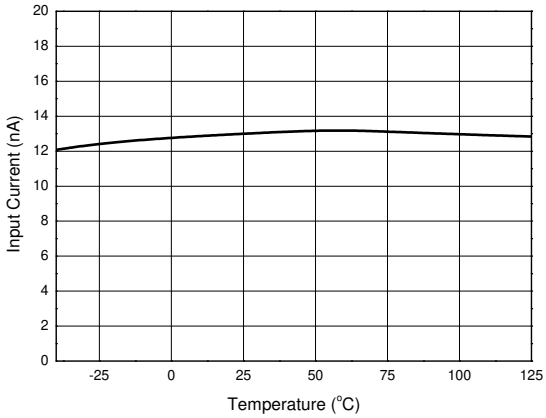
4. The input common-mode voltage of either input signal voltage should not be allowed to go negatively by more than 0.3V (at +25°C). The upper end of the common-mode voltage range is V_{CC}-1.5V (at +25°C), but either or both inputs can go to +36V without damages, independent of the magnitude of the V_{CC}.

Performance Characteristics

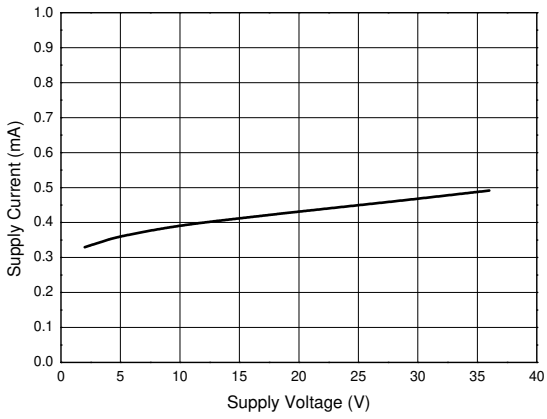
Input Voltage Range



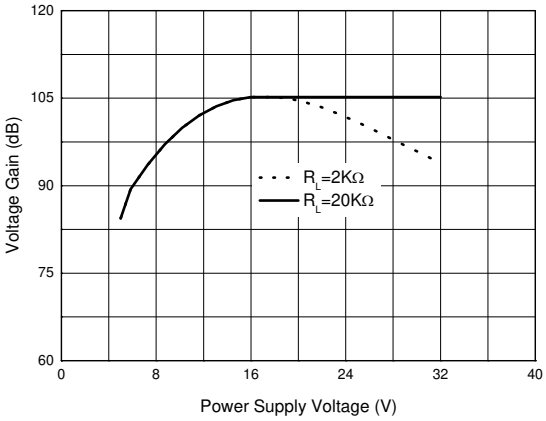
Input Current



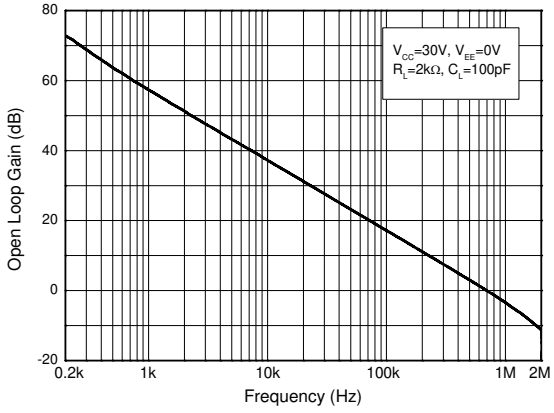
Supply Current



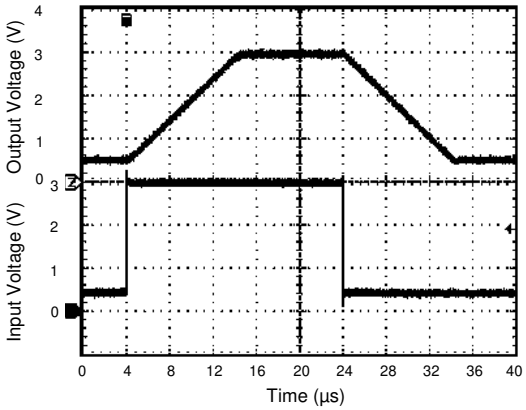
Voltage Gain



Open Loop Gain vs. Frequency

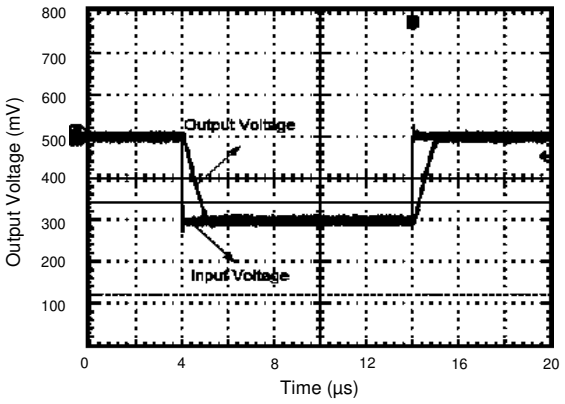


Voltage Follower Pulse Response

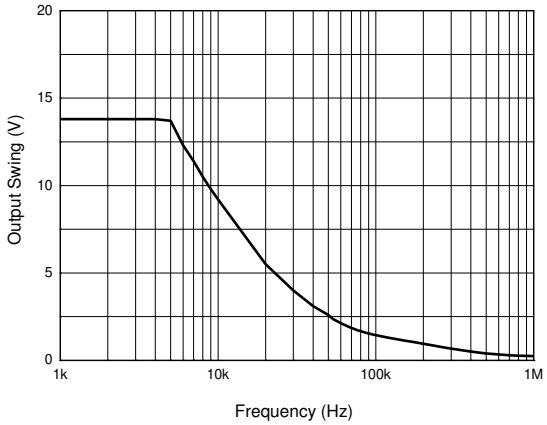


Performance Characteristics (Cont.)

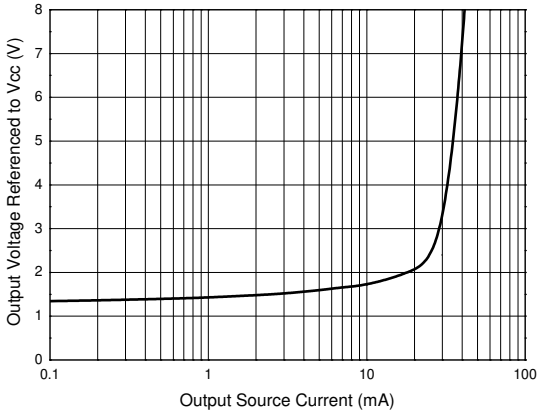
Voltage Follower Pulse Response (Small Signal)



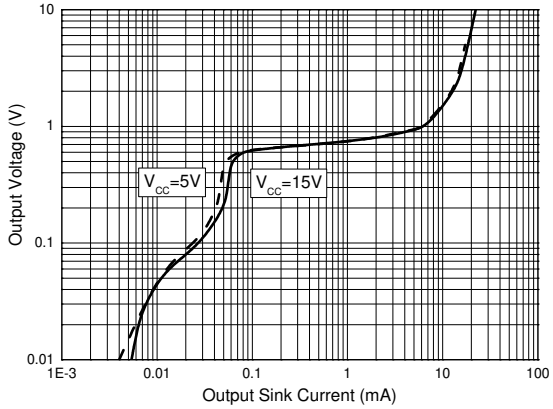
Large Signal Frequency Response



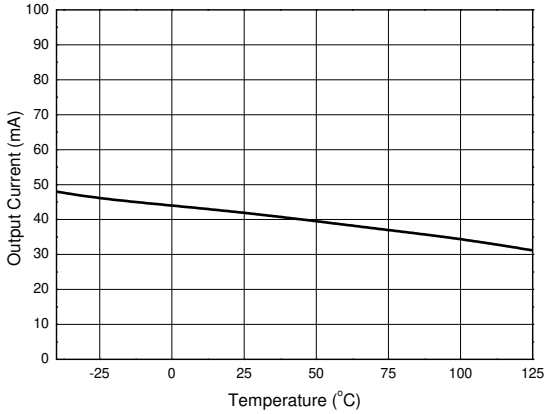
Output Characteristics: Current Sourcing



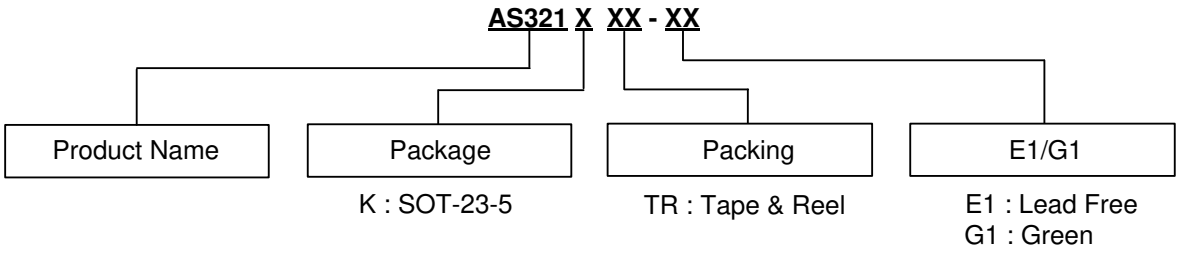
Output Characteristics: Current Sinking



Current Limiting



Ordering Information

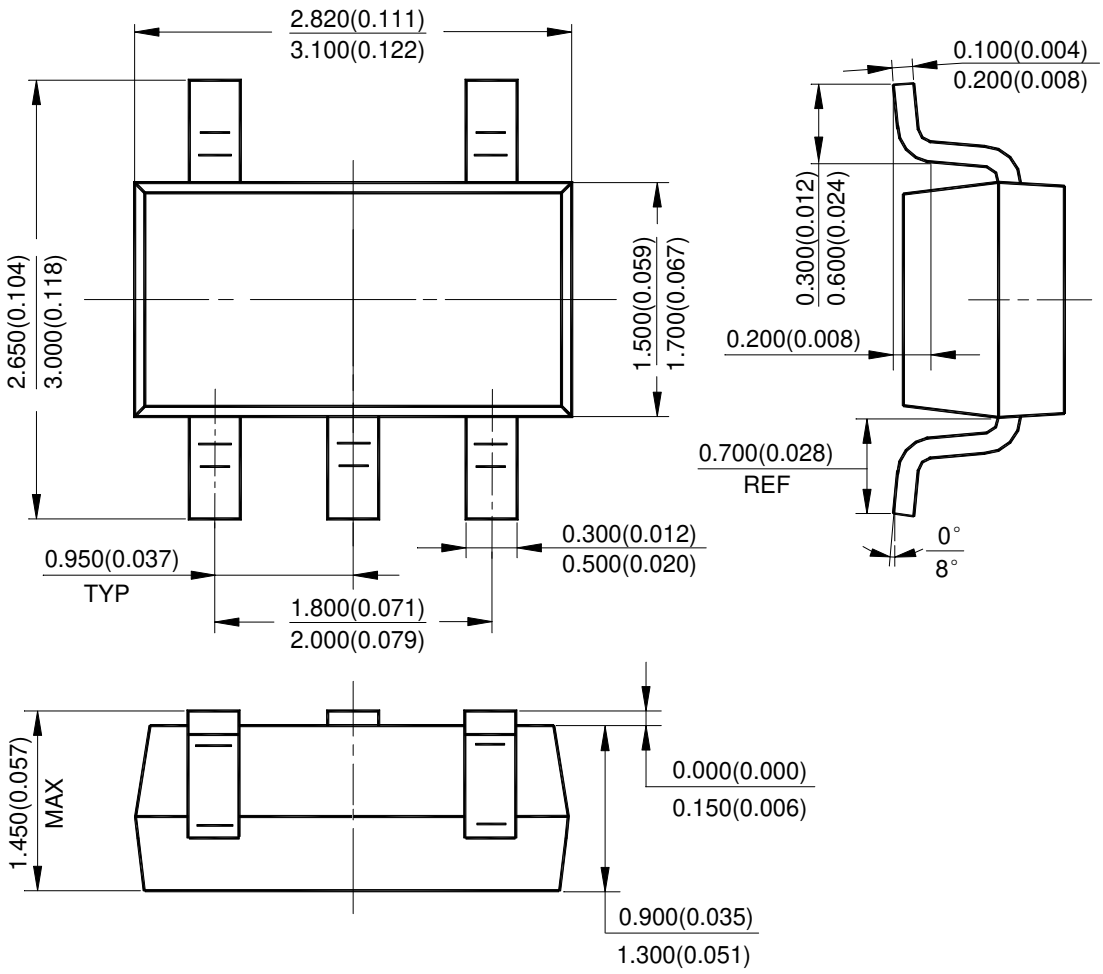


Diodes IC's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant.
Products with "G1" suffix are available in green packages.

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

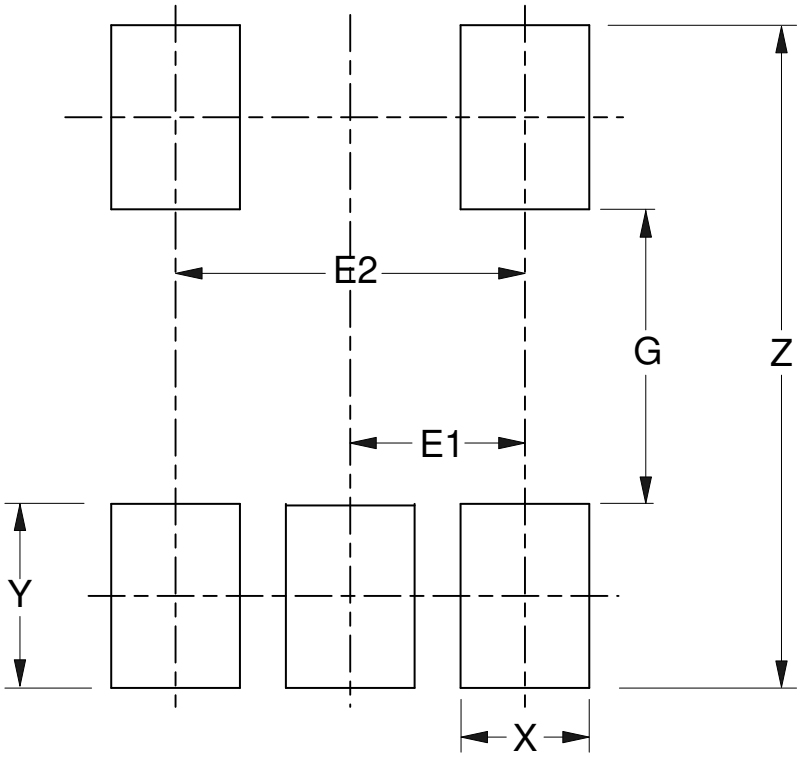
Package Outline Dimensions (All dimensions in mm(inch).)

(1) Package Type: SOT-23-5



Suggested Pad Layout

(1) Package Type: SOT-23-5



Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E1 (mm)/(inch)	E2 (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

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