10MHz, Rail-to-Rail I/O CMOS Operational Amplifier

FEATURES

- **HIGH GAIN BANDWIDTH:10MHz**
- **RAIL-TO-RAIL INPUT AND OUTPUT**
  1mV Typical Vos
- **INPUT VOLTAGE RANGE: -0.1V to +5.6V with Vs = 5.5V**
- **SUPPLY RANGE: +2.5V to +5.5V**
- **SPECIFIED UP TO +125°C**
- ***Micro*SIZE PACKAGES: SOT353(SC70-5)**

APPLICATIONS

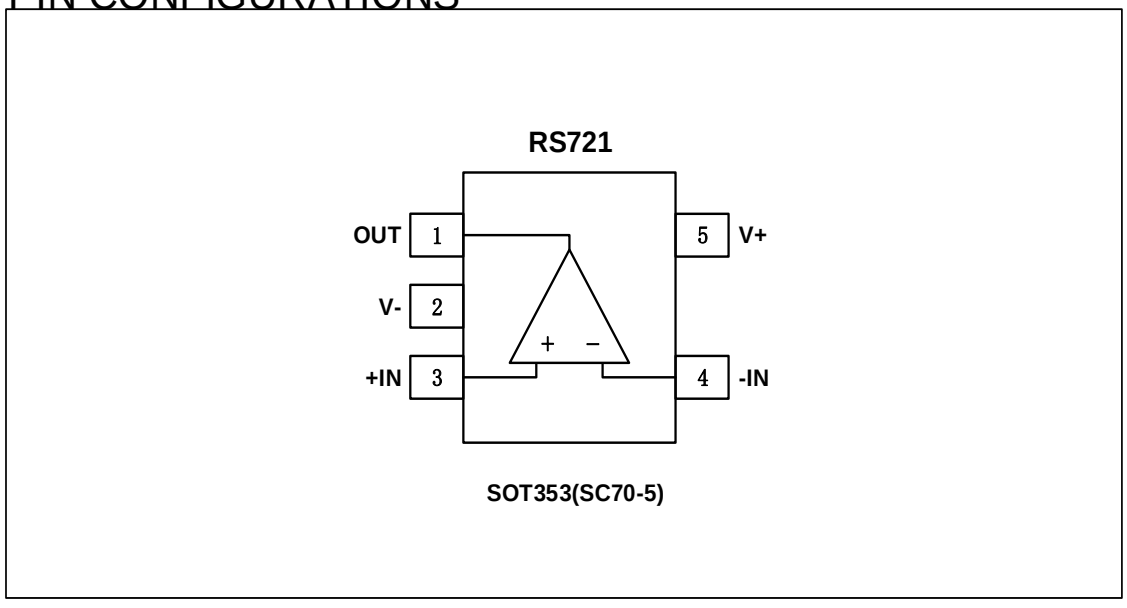
- **SENSORS**
- **PHOTODIODE AMPLIFICATION**
- **ACTIVE FILTERS**
- **TEST EQUIPMENT**
- **DRIVING A/D CONVERTERS**

DESCRIPTION

The RS721 offer low voltage operation and rail-to-rail input and output, as well as excellent speed/power consumption ratio, providing an excellent bandwidth (10MHz) and slew rate of 7V/us. The op-amps are unity gain stable and feature an ultra-low input bias current.

The devices are ideal for sensor interfaces, active filters and portable applications. The RS721 is specified at the full temperature range of −40°C to +125°C under single supplies of 2.5V to 5.5V or dual power supplies of ±1.25V to ±2.75V.

PIN CONFIGURATIONS



ABSOLUTE MAXIMUM RATINGS (1)

Supply Voltage, V+ to V-	7.0V
Input Terminals, Voltage (2)	– 0.5 to (V+) + 0.5V
Current (2)	±10mA
Storage Temperature	−65°C to +150°C
Operating Temperature	−40°C to +125°C
Junction Temperature	150°C
Package Thermal Resistance @ T_A = +25°C	
SOT23-5, SOT23-6	200°C/W
MSOP-10, SOIC-8	150°C/W
SOIC-14, TSSOP-14	100°C/W
Lead Temperature (Soldering, 10s)	260°C
ESD Susceptibility	
HBM	3000V
MM	200V

(1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified is not implied.

(2) Input terminals are diode-clamped to the power-supply rails. Input signals that can swing more than 0.5V beyond the supply rails should be current-limited to 10mA or less.

ESD SENSITIVITY CAUTION

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

PACKAGE/ORDERING INFORMATION

PRODUCT	ORDERING NUMBER	TEMPERATURE RANGE	PACKAGE LEAD	PACKAGE MARKING	PACKAGE OPTION
RS721	RS721XC5	-40℃~125℃	SOT353(SC70-5)	RS721	Tape and Reel,3000

ELECTRICAL CHARACTERISTICS

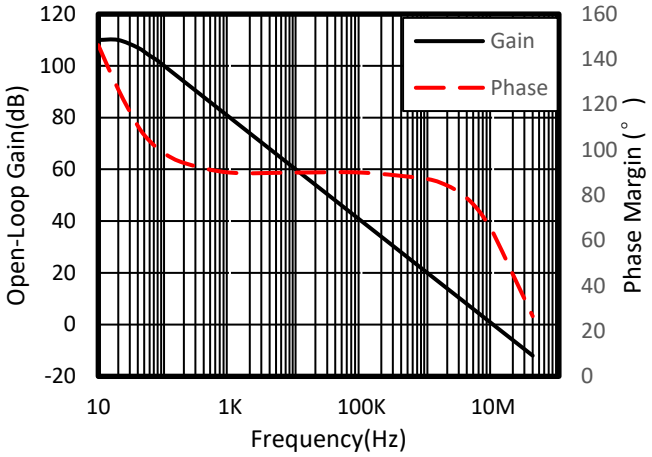
(At T_A = +25°C, Vs=5V, R_L = 10kΩ connected to Vs/2, and V_{OUT} = Vs/2, unless otherwise noted.)

PARAMETER		CONDITIONS	T_J	RS721			
				MIN	TYP	MAX	UNIT
POWER SUPPLY							
Vs	Operating Voltage Range		25°C	2.5		5.5	V
I_Q	Quiescent Current/Amplifier		25°C		1.15	1.55	mA
PSRR	Power-Supply Rejection Ratio	Vs= 2.5V to 5.5V Vcm =(V-)+0.5V	25°C	77	90		dB
			–40°C to 125°C	68			
INPUT							
Vos	Input Offset Voltage	Vcm=2.5V	25°C		±1	±3	mV
Vos TC	Input Offset Voltage Average Drift	-40°C to 125°C			2.6		uV/°C
I_B	Input Bias Current		25°C		1	10	pA
Ios	Input Offset Current		25°C		1	10	pA
Vcm	Common-Mode Voltage Range	Vs=5.5V	25°C	-0.1		5.6	V
CMRR	Common-Mode Rejection Ratio	Vs = 5.5V, Vcm =-0.1V to 4V	25°C	77	90		dB
			–40°C to 125°C	70			
		Vs = 5.5V, Vcm = -0.1V to 5.6V	25°C	63	80		
			–40°C to 125°C	60			
OUTPUT							
A_{OL}	Open-Loop Voltage Gain	R_L =2KΩ, Vo = 0.15V to 4.85V	25°C	96	105		dB
			–40°C to 125°C	75			
		R_L = 10kΩ, Vo = 0.05V to 4.95V	25°C	100	110		
			–40°C to 125°C	77			
	Output Swing From Rail	R_L = 2KΩ	25°C		52		mV
		R_L = 10kΩ	25°C		7		
Iout	Output Short-Circuit Current		25°C		150		mA
FREQUENCY RESPONSE							
SR	Slew Rate		25°C		7		V/us
GBP	Gain-Bandwidth Product		25°C		10		MHz
Φm	Phase Margin		25°C		62		°
t_s	Settling Time, 0.1%				0.2		us
	Overload Recovery Time	V_{IN} • Gain ⩾ Vs			0.35		us
NOISE							
e_n	Input-Referred Voltage Noise	f = 1 kHz	25°C		9.5		nV/ √ Hz
		f = 10 kHz	25°C		6.5		nV/ √ Hz

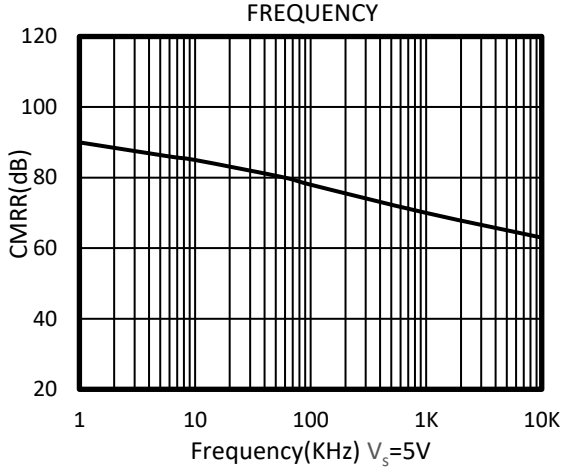
TYPICAL CHARACTERISTICS

At T_A = +25°C, Vs=5V, R_L = 10kΩ connected to $V_S/2$, V_{OUT} = $V_S/2$, unless otherwise noted.

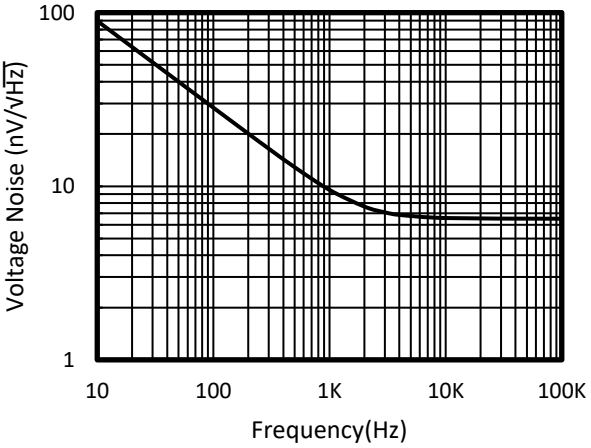
OPEN−LOOP GAIN AND PHASE vs FREQUENCY



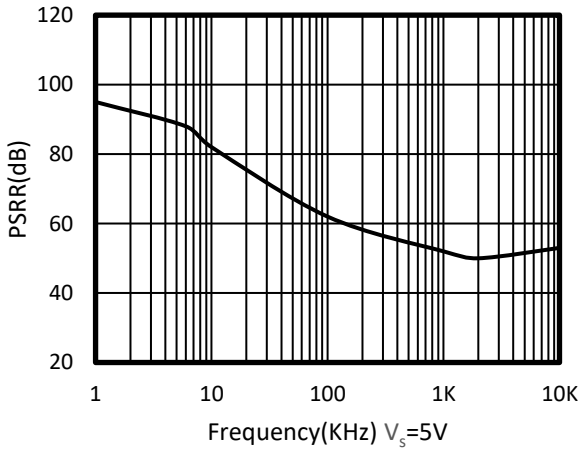
COMMON−MODE REJECTION RATIO vs FREQUENCY



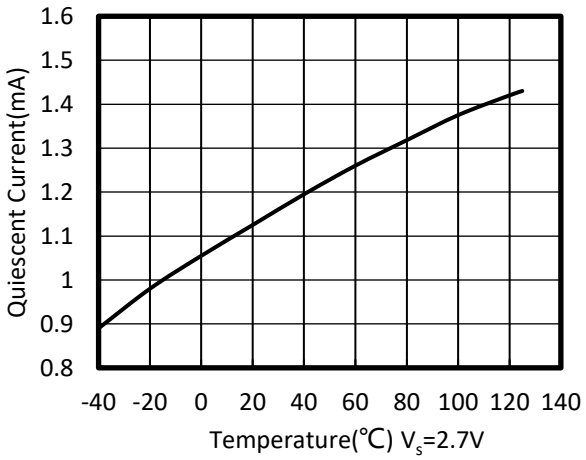
INPUT VOLTAGE NOISE SPECTRAL DENSITY vs FREQUENCY



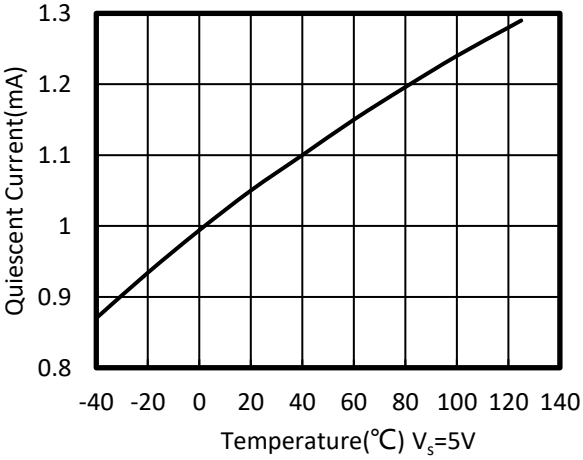
POWER−SUPPLY REJECTION RATIO vs FREQUENCY



QUIESCENT CURRENT vs TEMPERATURE



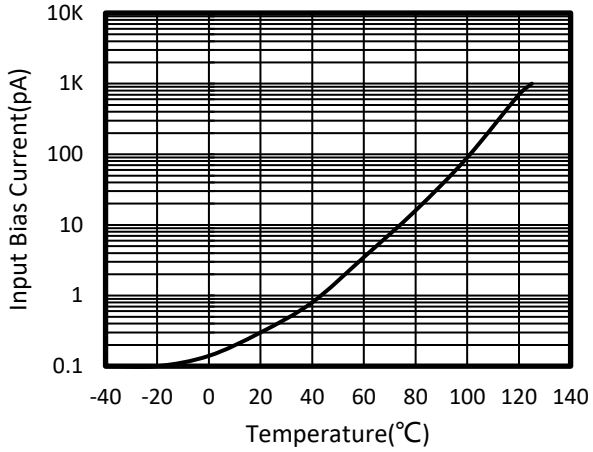
QUIESCENT CURRENT vs TEMPERATURE



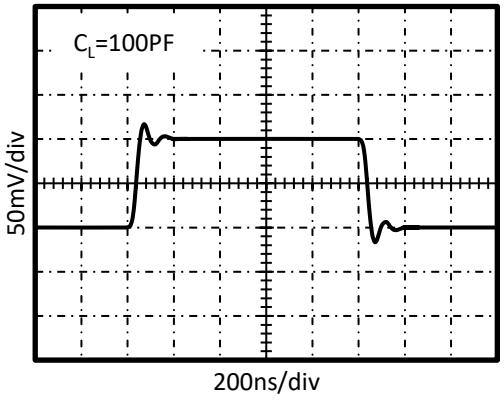
TYPICAL CHARACTERISTICS

At T_A = +25°C, Vs=5V, R_L = 10kΩ connected to $V_S/2$, V_{OUT} = $V_S/2$, unless otherwise noted.

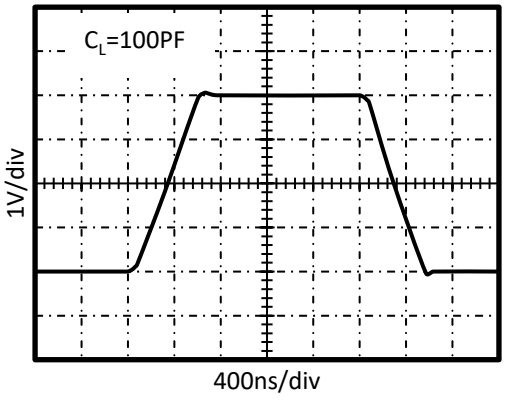
INPUT BIAS CURRENT vs TEMPERATURE



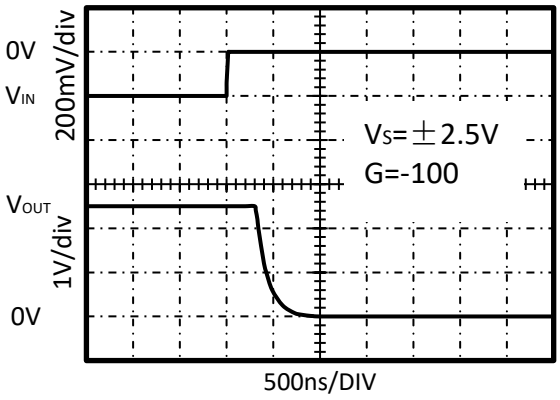
SMALL−SIGNAL STEP RESPONSE



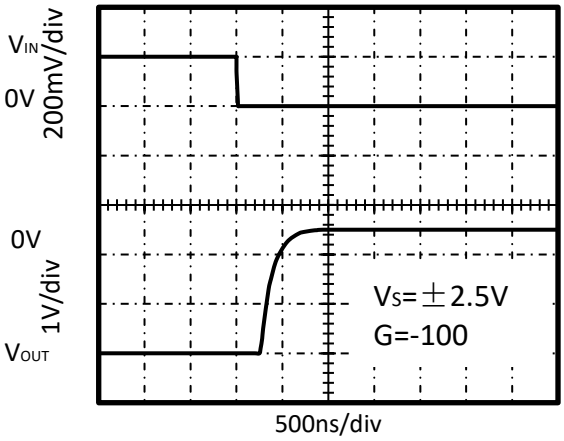
LARGE−SIGNAL STEP RESPONSE



POSITIVE OVERLOAD RECOVERY

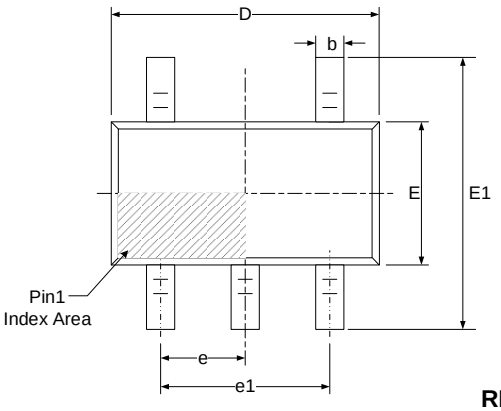


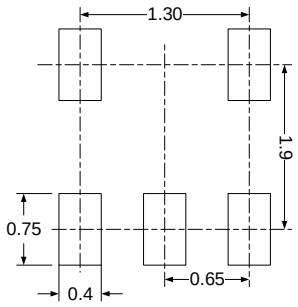
NEGATIVE OVERLOAD RECOVERY



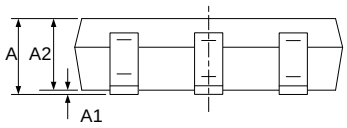
PACKAGE OUTLINE DIMENSIONS

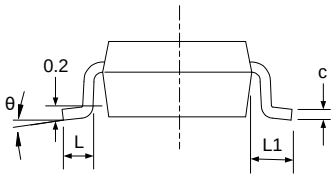
SOT353 (SC70-5)





RECOMMENDED LAND PATTERN (Unit: mm)





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650(BSC)		0.026(BSC)	
e1	1.300(BSC)		0.051(BSC)	
L	0.260	0.460	0.010	0.018
L1	0.525		0.021	
θ	0°	8°	0°	8°