

Logic Diagram

### FEATURES:

- RAD-PAK® Technology
- - Total Dose Hardness > 100 Krads(Si)
- Package:
  - 8 Pin RAD-PAK® Flat Package
- Excellent  $TCV_{OS}$ 
  - 21 $\mu$ V/C MAX
- Low Input Offset Voltage:
  - 150mV Max
- Low Supply Current:
  - 100 $\mu$ A
- Single Supply Operation:
  - +5 to +30 Volts
- Low Input Offset Voltage Drift
  - 0.75 $\mu$ V/C
- High Open Loop Gain:
  - 2000V/mV
- Low Input Bias Current
- Wide Common Mode Voltage Range

**DESCRIPTION:** The OP220RP (RP for RAD-PAK®) monolithic dual operational amplifier microcircuit features a minimum 100 kilorad (Si) total dose tolerance. Using Maxwells radiation hardened RAD-PAK® packaging technology, the OP220RP can be used either in single or dual supply operation. The OP220RP is the first micropower precision dual operational amplifier capable of surviving space environments. The OP220RP is ideal for satellite, spacecraft, and space probe missions. The patented radiation hardened RAD-PAK® technology incorporates radiation shielding in the microcircuit package. It eliminates the need for box shielding while providing a lifetime in orbit. This product is available in Class E, I, B and S screening.

TABLE 1. OP220 PINOUT DESCRIPTION

PIN	SYMBOL	DESCRIPTION
1	Out A	Output Amplifier A
2	-IN A	Inverting Input Amplifier A
3	+ IN A	Non-Inverting Input Amplifier A
4	-V	Negative Supply Voltage
5	+ IN B	Non-Inverting Input Amplifier B
6	-IN B	Inverting Input Amplifier B
7	Out B	Output Amplifier B
8	+V	Positive Supply Voltage

TABLE 2. OP220 ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Supply Voltage		--	±18	V
Differential Input Voltage		--	30	V
Input Voltage	$V_I$	--	Supply Voltage	V
Output Short-Circuit Duration		Indefinite		
Power Dissipation	$P_D$		500	mW
Storage Temperature Range	$T_S$	-65	150	°C
Operating Temperature Range	$T_A$	-55	125	°C

TABLE 3. DELTA LIMITS

PARAMETER	VARIATION
$I_{SY}$	±10% of specified value in Table 4

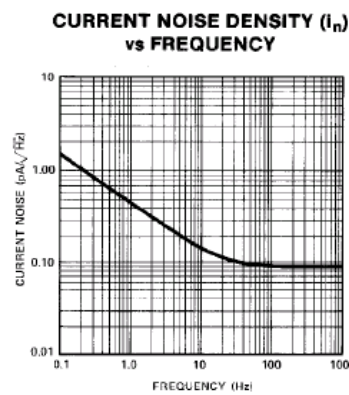
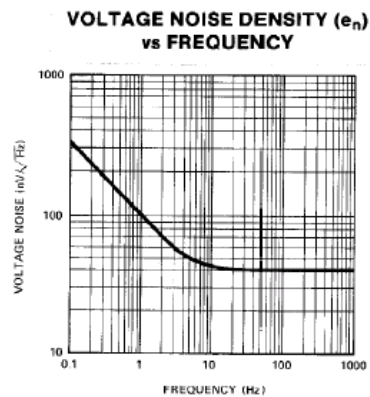
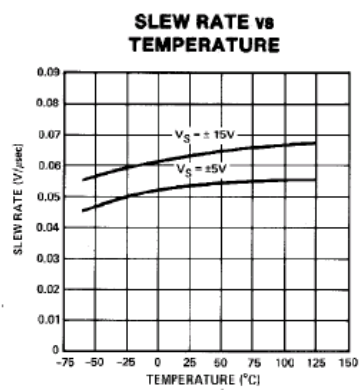
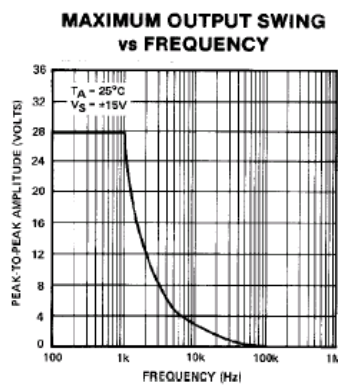
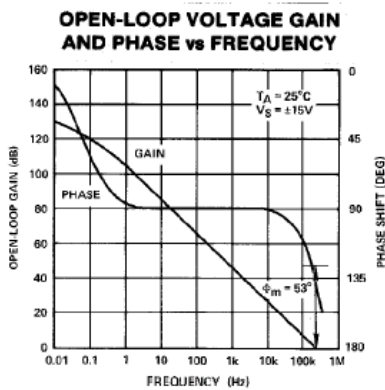
TABLE 4. OP220 ELECTRICAL CHARACTERISTICS  
( $V_S = \pm 2.5V$  TO  $\pm 15V$ ,  $T_A = -55$  TO  $+125^\circ C$ , UNLESS OTHERWISE SPECIFIED)

PARAMETER	SYMBOL	TEST CONDITIONS	SUBGROUPS	MIN	TYP	MAX	UNITS
Supply Current Both Amplifiers	$I_{SY}$	$V_S = \pm 2.5V$ , No Load $V_S = \pm 15V$ , No Load	1, 2, 3	-- --	135 190	170 250	$\mu A$
Common-Mode Rejection Ratio	CMRR	$V_S = \pm 15V$ $T_A = 25^\circ C$	4	90	100		dB
Power Supply Rejection Ratio	PSRR	$V_S = \pm 2.5V$ TO $V_S = \pm 15V$ $T_A = 25^\circ C$	1, 2, 3	--	6	18	$\mu V/V$

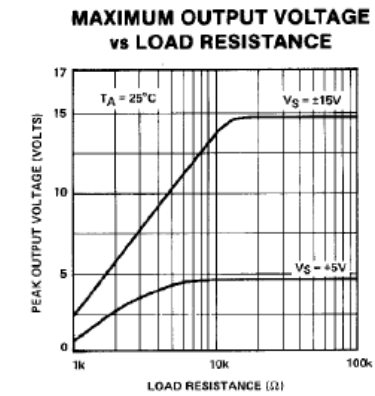
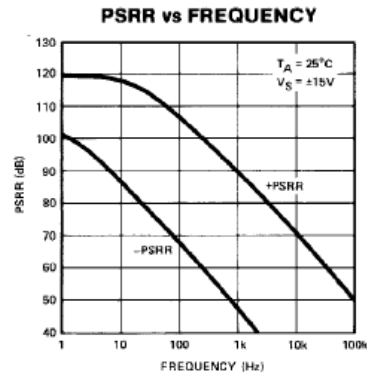
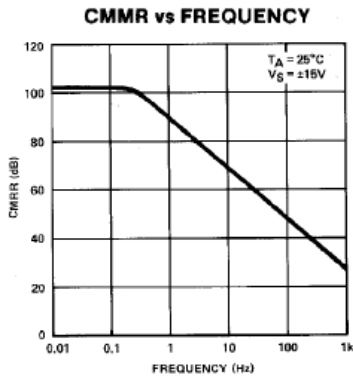
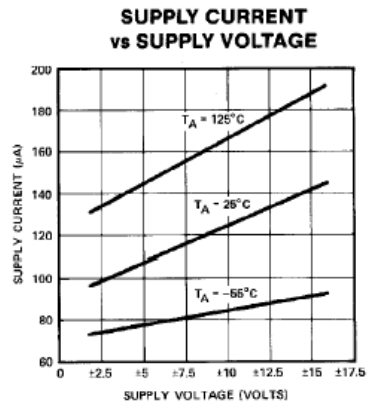
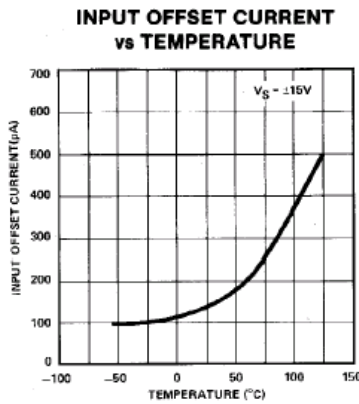
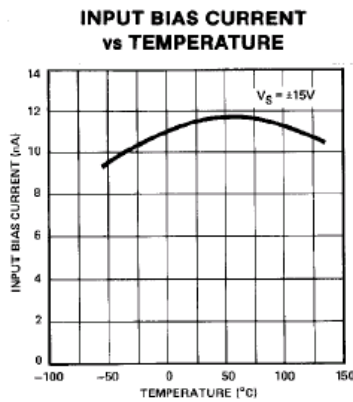
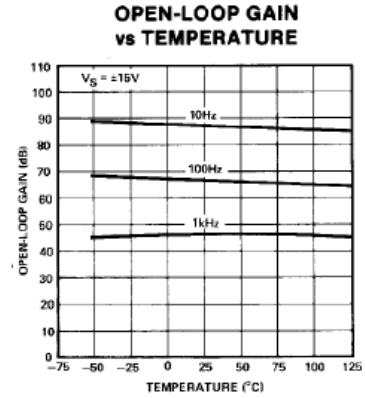
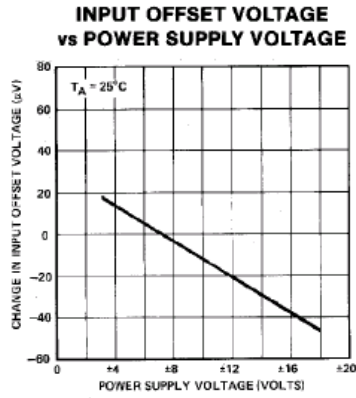
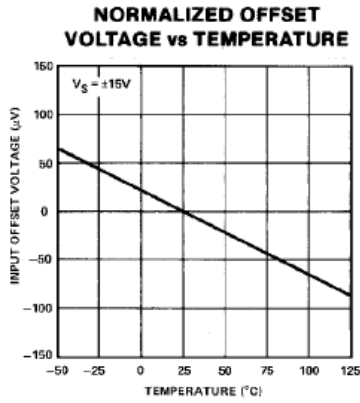
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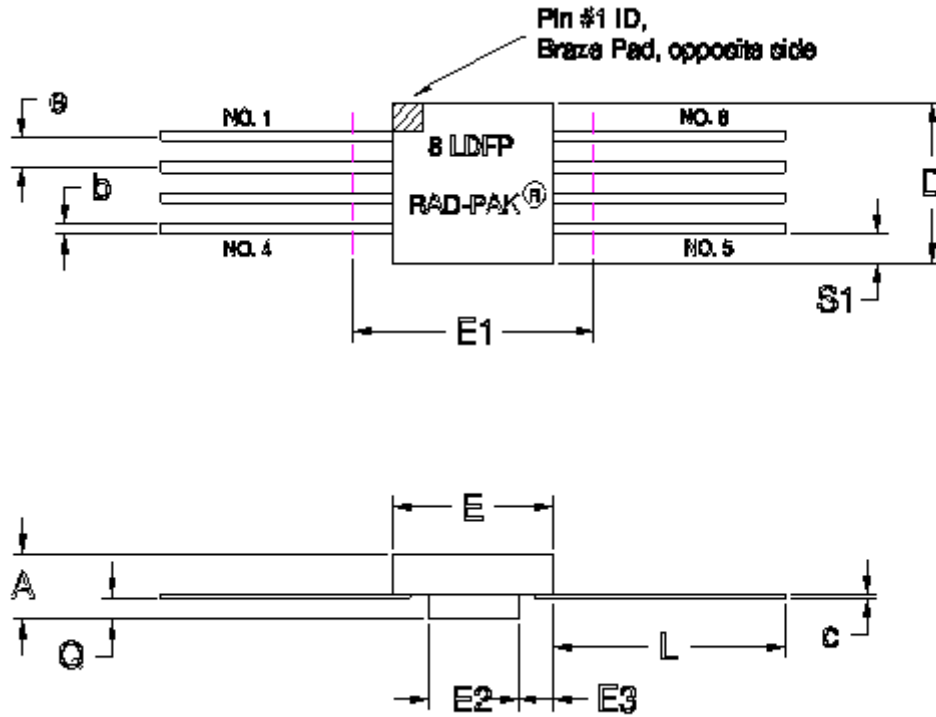
PARAMETER	SYMBOL	TEST CONDITIONS	SUBGROUPS	MIN	TYP	MAX	UNITS
Input Offset Voltage	$V_{OS}$	$V_S = \pm 15V$	1, 2, 3		120	300	$\mu V$
Input Offset Voltage Drift	$TCV_{OS}$	$V_S = \pm 15V$	1, 2, 3		0.75	--	$\mu V/^\circ C$
Input Offset Current	$I_{OS}$	$V_{CM} = 0$	1, 2, 3	--	0.5	2	nA
Input Offset Current Drift		$R_S = 0\Omega$	1, 2, 3	--	10	--	$pA/^\circ C$
Input Bias Current	$I_B$	$V_{CM} = 0$	1, 2, 3	--	12	20	nA
Input Common-Mode Voltage Range	$I_{VR}$	$V_S = \pm 15V$	1, 2, 3	-15		13.2	V
Large Signal Voltage Gain	$A_{VO}$	$V_S = \pm 15V$ $V_O = \pm 10V$ $R_L = 50K\Omega$	1, 2, 3	500	1000		V/mV
Output Voltage Swing	$V_O$	$V_S = \pm 15V, R_L = 50K\Omega$	1, 2, 3	-13.8	--	13.8	V

## Typical Performance Characteristics



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8-PIN RAK-PAK® FLAT PACKAGE

SYMBOL	DIMENSION		
	MIN	NOM	MAX
A	0.119	0.132	0.149
b	0.010	0.017	0.022
c	0.004	0.005	0.009
D	0.250	0.255	0.260
E	0.250	0.255	0.260
E1	--	--	0.290
E2	0.125	0.145	0.150
E3	0.045	0.055	--
e	0.050 BSC		
L	0.338	0.348	0.358
Q	0.021	0.025	0.045
S1	0.005	0.019	--
N	8		

F8-01

Note: All dimensions in inches.

## Important Notice:

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