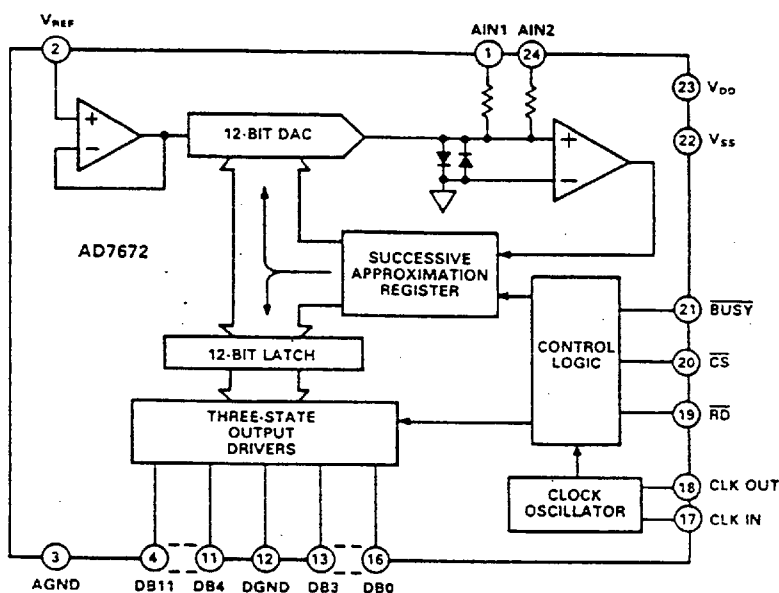


12 Bit A/D Converter - Radiation Hardened 7672RP

Class S Screening
High Speed BiCMOS

*For Space
Applications*

SEI's 7672RP (RP for RAD-PAK[®]) high speed BiCMOS microcircuit features a minimum 100 kilorad (Si) total dose tolerance. Fully equivalent to the commercial 7672, the 7672RP combines Maxim's advanced BiCMOS, mixed technology process and SEI's radiation hardened RAD-PAK[®] packaging. The 7672RP uses an accurate high-speed DAC and comparator in an otherwise conventional successive-approximation loop to achieve conversion times as low as 3 μ s while dissipating only 110 mW of power. The 7672RP is designed to be used with an external reference voltage. This allows the user to choose a reference whose performance suits the application or to drive a number of the 7672RPs from a single system reference, since the reference input is buffered and draws very little current. For digital signal processing applications where absolute accuracy and temperature coefficients may be unimportant, a low cost reference can be used. For optimal precision, a high accuracy reference where an absolute 12-bit accuracy can be obtained over a wide temperature range may be used. Capable of surviving space environments, the 7672RP is ideal for satellite, spacecraft, and space probe missions. RAD-PAK[®] incorporates radiation shielding in the microcircuit package. It eliminates box shielding while providing lifetime in orbit. The 7672RP has a 100 krad (Si) total dose survivability.



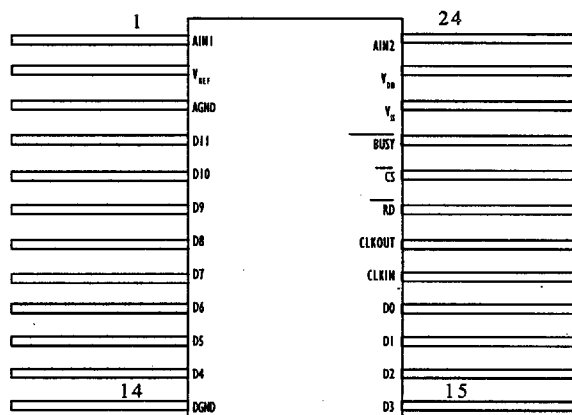
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INCORPORATED

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9011241 0000309 3T9

Radiation Hardened 7672RP

BiCMOS 12Bit
Analog to Digital Converter



PIN CONFIGURATION

TOP VIEW

Features:

- 12 Bit Resolution and Accuracy
- Pin Compatible with MX7672, AD7672
- RAD-PAK® Radiation Hardened
Against Natural Space Radiation
- Total Dose Hardness >100 krad (Si)
 - Single Event Upset LET = 20 MeV(mg/cm²)
 - No Single Event Latchup
- Package:
 - 24 Pin RAD-PAK® flat pack (640 mils x 420 mils)
 - Weight – 4.8 grams
- Fast Conversion Times:
 - 7672RP-05: 5 usec
 - 7672RP-10: 10 usec
- Low 110 mW Typical Power Consumption
 - Corrects all single-bit errors
 - Detects all double and some triple-bit errors
- High Speed BiMOS Technology
 - Choice of +5V, +10V, or ±5V Input Ranges
 - Buffered Reference Input
 - Operates with +5V and -12V Power Supplies
 - Fast 125 ns Bus-Access Time
- Screening per TM 5004
- QCI per TM5005

Specifications and design are subject to change without notice.



January 1996

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7672RP ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNITS
Positive Supply Voltage	V_{dd}	-0.3	7.0	V
Negative Supply Voltage	V_{ss}	+0.3	-17	V
AGND to DGND		-0.3	$V_{dd}+0.3$	V
AIN1, AIN2 to AGND		-15	+15	V
Digital Input Voltage	V_{IN}	-0.3	$V_{dd}+0.3$	V
Digital Output Voltage	V_{OUT}	-0.3	$V_{dd}+0.3$	V
VREF to AGND		$V_{ss}-0.3$	$V_{dd}+0.3$	V
Power Dissipation to +75°C	P_d		1000	mW
Power Dissipation above +75°C (Derate)			10	mW/°C
Storage Temperature Range	T_s	-65	+150	°C
Operating Temperature Range	T_A	-55	+125	°C

7672RP RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Positive Supply voltage	V_{dd}	4.75	5.25	V
Negative Supply Voltage	V_{ss}	-13.2	-10.8	V
V_{REF} Input range		-5.05	-4.95	V
Power Dissipation $V_{dd} = 5V, V_{ss} = -12V$	P_d		179	mW



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7672RP ELECTRICAL CHARACTERISTICS¹

PARAMETER	SYMBOL	MIN	MAX	UNIT
Integral Nonlinearity	INL	-3/4	+3/4	LSB
Differential Nonlinearity	DNL	-0.9	+0.9	LSB
Unipolar Offset Error $T_A = +25\text{ }^{\circ}\text{C}$ $T_A = -55\text{ to }+125\text{ }^{\circ}\text{C}$		-3 -4	+3 +4	LSB
Unipolar Gain Error $T_A = +25\text{ }^{\circ}\text{C}$ $T_A = -55\text{ to }+125\text{ }^{\circ}\text{C}$		-4 -6	+4 +6	LSB
Bipolar Zero Error $T_A = +25\text{ }^{\circ}\text{C}$ $T_A = -55\text{ to }+125\text{ }^{\circ}\text{C}$		-3 -4	+3 +4	LSB
Bipolar Gain Error $T_A = +25\text{ }^{\circ}\text{C}$ $T_A = -55\text{ to }+125\text{ }^{\circ}\text{C}$		-4 -6	+4 +6	LSB

Notes:

1. $V_{dd} = 5 \pm 5\%$ Volts; $V_{ss} = -12 \pm 10\%$ Volts; $V_{REF} = -5$ Volts; $T_A = -55\text{ to }+125\text{ }^{\circ}\text{C}$

7672RP DC ELECTRICAL CHARACTERISTICS¹

PARAMETER	SYMBOL	MIN	MAX	UNIT
Input Low Voltage	V_{IL}		0.8	V
Input High Voltage	V_{IH}	2.4		V
Output Low Voltage: $I_{sink} = 1.6\text{ mA}$	V_{OL}		0.4	V
Output High Voltage: $I_{source} = 200\text{ }\mu\text{A}$	V_{OH}	4.0		V
Input Leakage Current	I_{IN}			μA
Output Leakage Current	I_{CC}	-10	+10	μA
Input Capacitance ²	C_{IN}		10	pF
Output Capacitance ²	C_{OUT}		15	pF
Power Supply Rejection, V_{dd}		-2	+2	LSB
Power Supply Rejection, V_{ss}		-1	+1	LSB
Analog Input Current (AIN1 or AIN2)				μA
V_{REF} Input Current		-3	+3	μA

Notes:

1. $V_{dd} = 5 \pm 5\%$ Volts; $V_{ss} = -12 \pm 10\%$ Volts; $V_{REF} = -5$ Volts; $T_A = -55\text{ to }+125\text{ }^{\circ}\text{C}$.
2. Guaranteed by design.



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7672RP TIMING CHARACTERISTICS^{1,3}

PARAMETER	SYMBOL	MIN	MAX	UNIT
Conversion Time, -03 device Synchronous Clk, 12.5	t_{CONV}		3.125	us
Conversion Time, -05 device Synchronous Clk, 12.5	t_{CONV}		5.0	us
Conversion Time, -10 device Synchronous Clk, 12.5	t_{CONV}		10.0	us
Conversion Time, -03 device Asynchronous Clk, 12-13	t_{CONV}	3.0	3.25	us
Conversion Time, -05 device Asynchronous Clk, 12-13	t_{CONV}	4.8	5.2	us
Conversion Time, -10 device Asynchronous Clk, 12-13	t_{CONV}	9.6	10.4	us
CS\ to RD\ Setup Time ²	t_1	0		ns
RD\ to BUSY\ Delay: $C_L = 50$ pF	t_2		270	ns
Data Access Time ⁴ : $C_L = 50$ pF	t_3		170	ns
RD\ Pulse Width ²	t_4	t_5		ns
CS\ to RD\ Hold Time ²	t_6	0		ns
Data Setup Time After BUSY\ ⁴ : $C_L = 100$ pF	t_7		100	ns
Bus Relinquish Time ⁵	t_8		90	ns
Delay Between Read Operations	t_9	200		ns
CLKIN to BUSY\ Delay ²	t_{10}		180	ns
RD\ to CLKIN Setup/Hold Time ²	t_{10}	25	100	ns

Notes:

1. $V_{dd} = +5$ Volts; $V_{ss} = -12$ Volts; 1LSB = FS/4096; $T_A = +25$ °C; Performance over power supply tolerance is guaranteed by power supply rejection test.
2. Guaranteed by design.
3. All inputs are 0V to +5V swing with $t_r = t_f = 5$ ns (10 to 90% of +5V) and timed from a voltage level of +1.6V.
4. t_3 and t_7 are measured with the load circuits of Figure 1 and are defined as the time required for an output to cross +0.8V or +2.4V.
5. t_7 is defined as the time required for the data line to change 0.5V when

7672RP Package Ordering Guide

Package Style	Case Outline	1/	Description
D	D-24		24 Pin Dual In Line Package
F	F-24		24 Pin Flat Package

Note:

- 1/ For outline information, see Appendix A (Package Information - Outline Dimension)



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