

### Linear Integrated Systems

**LS-508A**

#### FEATURES:

- Replaces ..... HI508A, DG508A
- Analog Overvoltage Protection ..... 70Vpp
- Break-Before-Make Switching
- Dielectrically Isolated—No Latchup
- 44V Maximum Power Supply
- Analog Signals Range .....  $\pm 15V$
- Access Time (TYF) ..... 500ns
- Standby Power (TYP) ..... 7.5mW

#### DESCRIPTION

The LS-508A is an 8-channel, single ended CMOS analog multiplexer with Active Overvoltage Protection circuitry. This added protection allows the device to withstand analog inputs signals that greatly exceed either power supply voltage without damaging the device or disturbing the signal path of other channels. Analog inputs can withstand constant 70 volt peak-to-peak levels while digital inputs can sustain a continuous fault of up to 4 volts greater than either power supply. These features make the LS-508A ideal for use in systems where the analog inputs originate from external equipment. The LS-508A has dielectric isolation construction and improved radiation hardened CMOS processing which makes this chip indispensable in military or space applications. Consult factory for radiation resistance details.

#### PRODUCT HIGHLIGHTS:

1. Typically survives static discharge (EDS) beyond 4000 volts.
2. Active Overvoltage Protection circuitry assures signal fidelity.

3. TTL or CMOS compatible over full operating temperature range.
4. Ideal for Data Acquisition, Industrial Control and Communication Systems.
5. Radiation hardenable; contact factory representative for details.

#### ABSOLUTE MAXIMUM RATINGS (Note 1)

Voltage between Supply Pins	44V
V+ to Ground	22V
V- to Ground	25V

#### Digital Input Overvoltage:

$V_{EN}, V_A$	$V_{Supply}(+)$	+4V
	$V_{Supply}(-)$	-4V
or 20 mA, whichever occurs first.		

#### Analog Input Overvoltage:

$V_S$	$V_{Supply}(+)$	+20V
	$V_{Supply}(-)$	-20V

Continuous Current, S or D ..... 20 mA

Peak Current, S or D

(Pulsed at 1 ms, 10% duty cycle max): ..... 40 mA

Power Dissipation\* (CERDIP) ..... 1.28W

Operating Temperature Range:

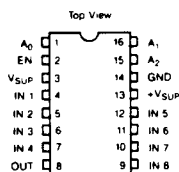
LS-508A -A, -B ..... -55°C to +125°C

LS-508A -C ..... 0°C to +75°C

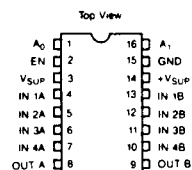
Storage Temperature Range ..... -65°C to +150°C

\*Derate 12.8 mW/°C above  $T_A = 75^\circ C$

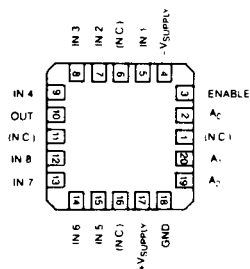
#### PIN CONNECTIONS



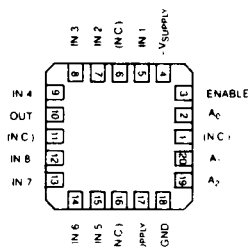
**16-PIN HERMETIC DIP  
16-PIN PLASTIC DIP**



**16-PIN PLASTIC SOIC**

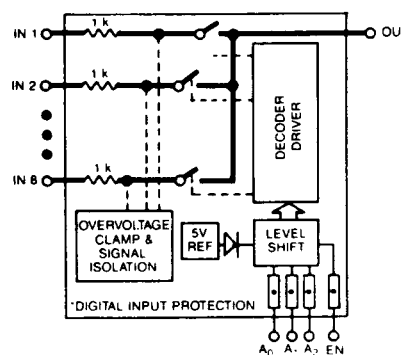


**LCC PACKAGE  
(RC-SUFFIX)**



**PLCC PACKAGE  
(PRC-SUFFIX)**

#### FUNCTIONAL DIAGRAM



**LS-508A**

#### TRUTH TABLE

**LS-508A**

A <sub>2</sub>	A <sub>1</sub>	A <sub>0</sub>	EN	"ON" CHANNEL
X	X	X	L	NONE
L	L	L	H	1
L	L	H	H	2
L	H	L	H	3
L	H	H	H	4
H	L	L	H	5
H	L	H	H	6
H	H	L	H	7
H	H	H	H	8

**ELECTRICAL CHARACTERISTICS** Supplies = +15V, +15V; V<sub>AH</sub>(Logic Level High) = +4.0V, V<sub>AL</sub>(Logic Level Low) = +0.8V. (Unless otherwise specified). For Test Conditions, consult Factory.

PARAMETER	TEMP	MIN	LS-508A -A, -B TYP	(-2, -8) MAX	hi-rel 160hr @ 125°C MIN	LS-508A -C TYP	(-5) MAX	UNITS
<b>Analog Channel Characteristics</b>								
*V <sub>S</sub> , Analog Signal Range	Full	-15	—	+15	—	—	+15	V
*R <sub>ON</sub> , On Resistance (Note 2)	+25°C	—	1.2	1.5	—	1.5	1.8	KΩ
	Full	—	1.5	1.8	—	1.8	2.0	KΩ
*I <sub>S</sub> (OFF), Off Input Leakage Current (Note 3)	+25°C	—	0.03	—	—	0.03	—	nA
	Full	—	—	50	—	—	50	nA
*I <sub>D</sub> (OFF), Off Output Leakage Current (Note 3)	+25°C	—	0.1	—	—	0.1	—	nA
	Full	—	—	200	—	—	200	nA
*I <sub>D</sub> (OFF), with Input Overvoltage Applied (Note 4)	25°C	—	4.0	—	—	4.0	—	nA
	Full	—	—	2.0	—	—	—	μA
*I <sub>D</sub> (ON), On Channel Leakage Current (Note 3)	+25°C	—	0.1	—	—	0.1	—	nA
	Full	—	—	200	—	—	200	nA
<b>Digital Input Characteristics</b>								
*V <sub>AL</sub> , Input Low Threshold (Note 8)	Full	—	—	0.8	—	—	0.8	V
*V <sub>AH</sub> , Input High Threshold	Full	4.0	—	—	4.0	—	—	V
*I <sub>A</sub> , Input Leakage Current (High or Low) (Note 5)	Full	—	—	1.0	—	—	1.0	μA
<b>Switching Characteristics</b>								
*t <sub>A</sub> , Access Time	+25°C	—	0.5	—	—	0.5	—	μs
	Full	—	—	1.0	—	—	1.0	μs
*t <sub>OPEN</sub> , Break-Before-Make Delay	+25°C	25	80	—	25	80	—	ns
*t <sub>ON</sub> (EN), Enable Delay (ON)	+25°C	—	300	500	—	300	—	ns
	Full	—	—	1000	—	—	1000	ns
*t <sub>OFF</sub> (EN), Enable Delay (OFF)	+25°C	—	300	500	—	300	—	ns
	Full	—	—	1000	—	—	1000	ns
*t <sub>S</sub> , Settling Time (0.1%)	+25°C	—	1.2	—	—	1.2	—	μs
(0.01%)	+25°C	—	3.5	—	—	3.5	—	μs
"OFF Isolation" (Note 6)	+25°C	50	68	—	50	68	—	dB
C <sub>S</sub> (OFF), Channel Input Capacitance (Note 9)	+25°C	—	5	—	—	5	—	pF
C <sub>D</sub> (OFF), Channel Output Capacitance (Note 9)	+25°C	—	25	—	—	25	—	pF
C <sub>A</sub> , Digital Input Capacitance (Note 9)	+25°C	—	5	—	—	5	—	pF
C <sub>DS</sub> (OFF), Input to Output Capacitance (Note 9)	+25°C	—	0.1	—	—	0.1	—	pF
<b>Power Requirements</b>								
P <sub>D</sub> , Power Dissipation	Full	—	7.5	—	—	7.5	—	mW
*I <sub>+</sub> , Current (Note 7)	Full	—	0.5	2.0	—	0.5	2.0	mA
*I <sub>-</sub> , Current (Note 7)	Full	—	0.02	1.0	—	0.02	1.0	mA

\*100% tested for LS508 A, Grade A Leakage currents not tested at -55°C.

## NOTES:

1. Absolute maximum ratings are limiting values, applied individually, beyond which the serviceability of the circuit may be impaired. Functional operations under any of these conditions is not necessarily implied.
2. V<sub>OUT</sub> = ±10V, I<sub>OUT</sub> = -100 μA.
3. Ten nanoamps is the practical lower limit for high speed measurement in the production test environment.
4. Analog Overvoltage = ±33V.

5. Digital input leakage is primarily due to the clamp diodes (see Schematic). Typical leakage is less than 1nA at 25°C.
6. V<sub>EN</sub> = 0.8V, R<sub>L</sub> = 1K, C<sub>L</sub> = 15 pF, V<sub>S</sub> = 7, V<sub>RMS</sub>, f = 100kHz. Worst case isolation occurs on channel 4 due to proximity of the output pins.
7. V<sub>EN</sub>, V<sub>A</sub> = 0V or 4.0V.
8. To drive from DTL/TTL Circuits, 1kΩ pull-up resistors to +5.0V supply are recommended.
9. Not tested. Guaranteed by design and process characterization.

## LS-508A ORDERING INFORMATION

HERMETIC DIP 16-PIN	LCC 20-PIN	PLCC 20-PIN PLASTIC	PLASTIC DIP 16-PIN	SOIC 16-PIN PLASTIC	OPERATING TEMP RANGE
LS-508A-AZ, BZ —	LS-508A-ARC —	— LS-508A-CPRC	— LS-508A-CP	— LS-508A-CS	MIL/IND. IND./COM.

All commercial and industrial temperature range parts are available with burn-in. For ordering information call the factory.