LINEAR SYSTEMS

Single 8-Channel CMOS Analog Multiplexer with Active Overvoltage Protection

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 ..... ±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 indispensible 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

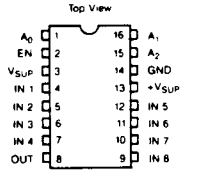
Digital Input Overvoltage:
V_{EN}, V_A $V_{Supply}(+)$ ..... +4V
$V_{Supply}(-)$ ..... −4V
or 20 mA, whichever occurs first.

Analog Input Overvoltage:
V_S $V_{Supply}(+)$ ..... +20V
$V_{Supply}(-)$ ..... −20V

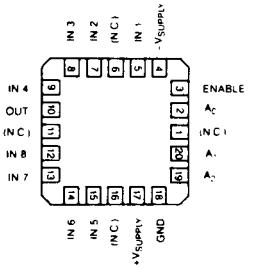
Continuous Current, S or D ..... 20 mA
Peak Current, S or D
(Pulsed at 1 ms, 10% duty cycle max): ..... 40 mA
Power Dissipaton* (CERDIP) 1.28W
Operating Temperature Range:
LS-508A −A, −B ..... −55°C to +125°C
LS-508A −C ..... 0°C to +75°C
Storage Temperature Range ..... −65°C to +150°C

*Derate 12.8 mW/°C above T_A =75°C

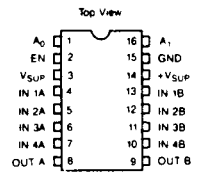
PIN CONNECTIONS



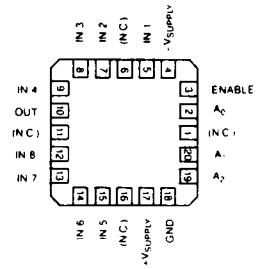
16-PIN HERMETIC DIP
16-PIN PLASTIC DIP



LCC PACKAGE
(RC-SUFFIX)

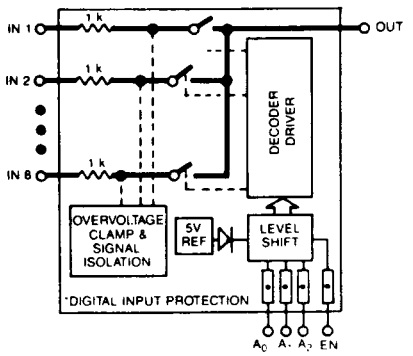


16-PIN PLASTIC SOIC



PLCC PACKAGE
(PRC-SUFFIX)

FUNCTIONAL DIAGRAM



LS-508A

TRUTH TABLE

LS-508A

A_2	A_1	A_0	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_{AH}(Logic Level High) = +4.0V, V_{AL}(Logic Level Low) = +0.8V. (Unless otherwise specified). For Test Conditions, consult Factory.

PARAMETER	TEMP	LS-508A -A, -B MIN	LS-508A -A, -B TYP	LS-508A -A, -B MAX (-2, -8) hi-rel 160hr@125C	LS-508A -C MIN	LS-508A -C TYP	LS-508A -C MAX (-5)	UNITS
Analog Channel Characteristics								
*V_S, Analog Signal Range	Full	-15	—	+15	-15	—	+15	V
*R_{ON}, 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_S (OFF), Off Input Leakage Current (Note 3)	+25°C	—	0.03	—	—	0.03	—	nA
	Full	—	—	50	—	—	50	nA
*I_D (OFF), Off Output Leakage Current (Note 3)	+25°C	—	0.1	—	—	0.1	—	nA
	Full	—	—	200	—	—	200	nA
*I_D (OFF), with Input Overvoltage Applied (Note 4)	25°C	—	4.0	—	—	4.0	—	nA
	Full	—	—	2.0	—	—	—	μA
*I_D (ON), On Channel Leakage Current (Note 3)	+25°C	—	0.1	—	—	0.1	—	nA
	Full	—	—	200	—	—	200	nA
Digital Input Characteristics								
*V_{AL}, Input Low Threshold (Note 8)	Full	—	—	0.8	—	—	0.8	V
*V_{AH}, Input High Threshold	Full	4.0	—	—	4.0	—	—	V
*I_A, Input Leakage Current (High or Low) (Note 5)	Full	—	—	1.0	—	—	1.0	μA
Switching Characteristics								
*t_A, Access Time	+25°C	—	0.5	—	—	0.5	—	μs
	Full	—	—	1.0	—	—	1.0	μs
*t_{OPEN}, Break-Before-Make Delay	+25°C	25	80	—	25	80	—	ns
*$t_{ON\ (EN)}$, Enable Delay (ON)	+25°C	—	300	500	—	300	—	ns
	Full	—	—	1000	—	—	1000	ns
*T_{OFF} (EN), Enable Delay (OFF)	+25°C	—	300	500	—	300	—	ns
	Full	—	—	1000	—	—	1000	ns
*t_S, 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
$C_{S\ (OFF)}$, Channel Input Capacitance (Note 9)	+25°C	—	5	—	—	5	—	pF
$C_{D\ (OFF)}$, Channel Output Capacitance (Note 9)	+25°C	—	25	—	—	25	—	pF
C_A, Digital Input Capacitance (Note 9)	+25°C	—	5	—	—	5	—	pF
$C_{DS\ (OFF)}$, Input to Output Capacitance (Note 9)	+25°C	—	0.1	—	—	0.1	—	pF
Power Requirements								
P_D, Power Dissipation	Full	—	7.5	—	—	7.5	—	mW
*I+, Current (Note 7)	Full	—	0.5	2.0	—	0.5	2.0	mA
*I-, 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_{OUT} = ±10V, I_{OUT} = -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_{EN} = 0.8V, R_L = 1K, C_L = 15 pF, V_S = 7, V_{RMS}, f = 100kHz. Worst case isolation occurs on channel 4 due to proximity of the output pins.
7. V_{EN}, V_A = 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	—	—	—	MIL/IND.
—	—	LS-508A-CPRC	LS-508A-CP	LS-508A-CS	IND./COM.

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