Data Sheet August 1999 File Number 3543.3

Radiation Hardened Single 8/Differential 4 Channel CMOS Analog Multiplexers with Active Overvoltage Protection

The HS-0548RH and HS-0549RH are radiation hardened analog multiplexers with Active Overvoltage Protection and guaranteed r_{ON} matching. Analog input levels may greatly exceed either power supply without damaging the device or disturbing the signal path of other channels. Active protection circuitry assures that signal fidelity is maintained even under fault conditions that would destroy other multiplexers. Analog inputs can withstand constant 70V peak-to-peak levels with ±15V supplies and digital inputs will sustain continuous faults up to 4V greater than either supply. In addition, signal sources are protected from short circuiting should multiplexer supply loss occur: each input presents 1kΩ of resistance under this condition. These features make the HS-0548RH and HS-0549RH ideal for use in systems where the analog inputs originate from external equipment or separately powered circuitry. Both devices are fabricated with 44V dielectrically isolated CMOS technology. The HS-0548 is an 8 channel device and the HS-0549 is a 4 channel differential version. If input overvoltage protection is not needed, the HS-0508 and HS-509 multiplexers are recommended.

Specifications for Rad Hard QML devices are controlled by the Defense Supply Center in Columbus (DSCC). The SMD numbers listed here must be used when ordering.

Detailed Electrical Specifications for these devices are contained in SMD 5962-95694. A "hot-link" is provided on our homepage for downloading. http://www.intersil.com/spacedefense/space.htm

Ordering Information

ORDERING NUMBER	INTERNAL MKT. NUMBER	TEMP. RANGE (^oC)
5962D9569401VEA	HS1-0548RH-Q	-55 to 125
5962D9569401VEC	HS1B-0548RH-Q	-55 to 125
5962D9569402VEA	HS1-0549RH-Q	-55 to 125
5962D9569402VEC	HS1B-0549RH-Q	-55 to 125

Features

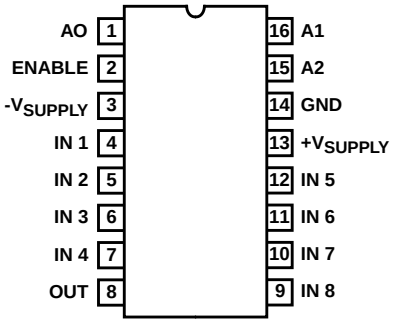
- Electrically Screened to SMD # 5962-95694
- QML Qualified per MIL-PRF-38535 Requirements
- Gamma Dose . . . . . 1 x 10^4RAD(Si)
- No Latch-Up
- No Channel Interaction During Overvoltage
- Guaranteed r_{ON} Matching
- Maximum Power Supply 44V
- Break-Before-Make Switching
- Analog Signal Range . . . . . ±15V
- Access Time 1.0µs

Applications

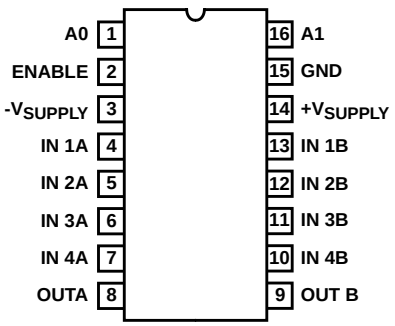
- Data Acquisition Systems
- Control Systems
- Telemetry

Pinouts

HS-0548RH GDIP1-T16 (CERDIP)
OR CDIP2-T16 (SBDIP)
TOP VIEW

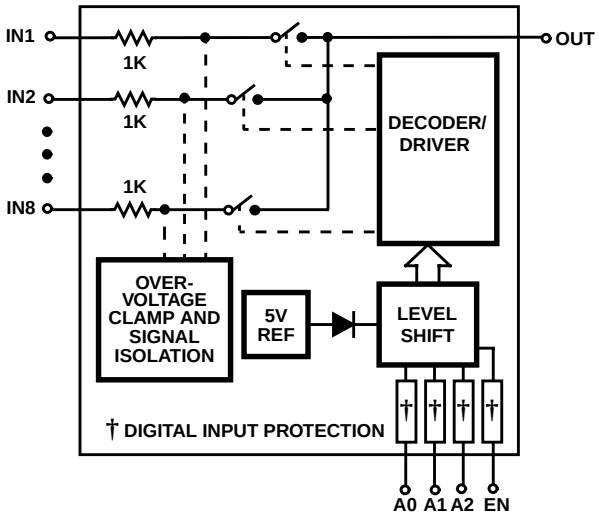


HS-0549RH GDIP1-T16 (CERDIP)
OR CDIP2-T16 (SBDIP)
TOP VIEW

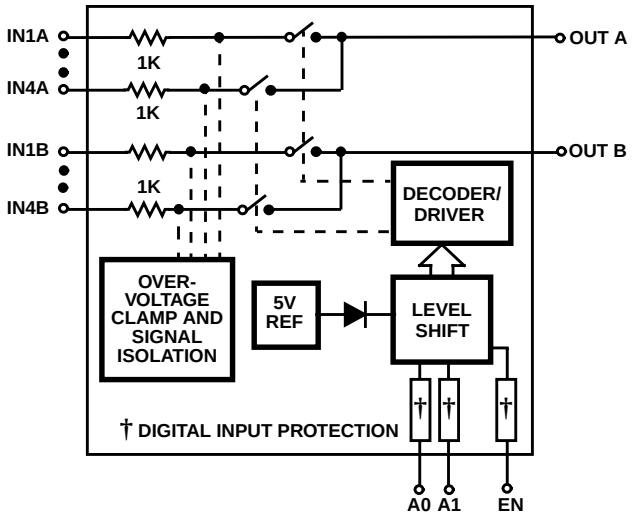


Functional Diagrams

HS-0548



HS-0549



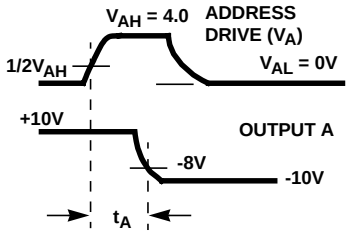
HS-0548 TRUTH TABLE

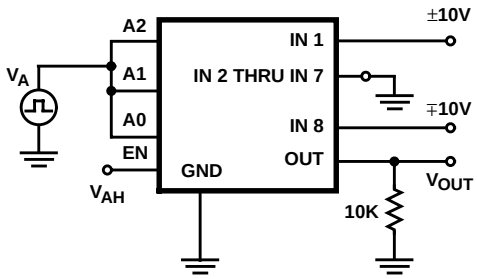
A2	A1	A0	EN	"ON" CHANNEL
X	X	X	L	NONE
L	L	L	H	1
L	L	H	H	2
L	H	L	H	3
L	H	H	H	4
H	L	L	H	5
H	L	H	H	6
H	H	L	H	7
H	H	H	H	8

HS-0549 TRUTH TABLE

A1	A0	EN	"ON" CHANNEL PAIR
X	X	L	NONE
L	L	H	1
L	H	H	2
H	L	H	3
H	H	H	4

Switching Waveforms





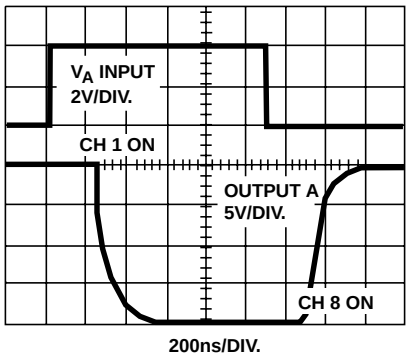


FIGURE 1. ACCESS TIME

Switching Waveforms (Continued)

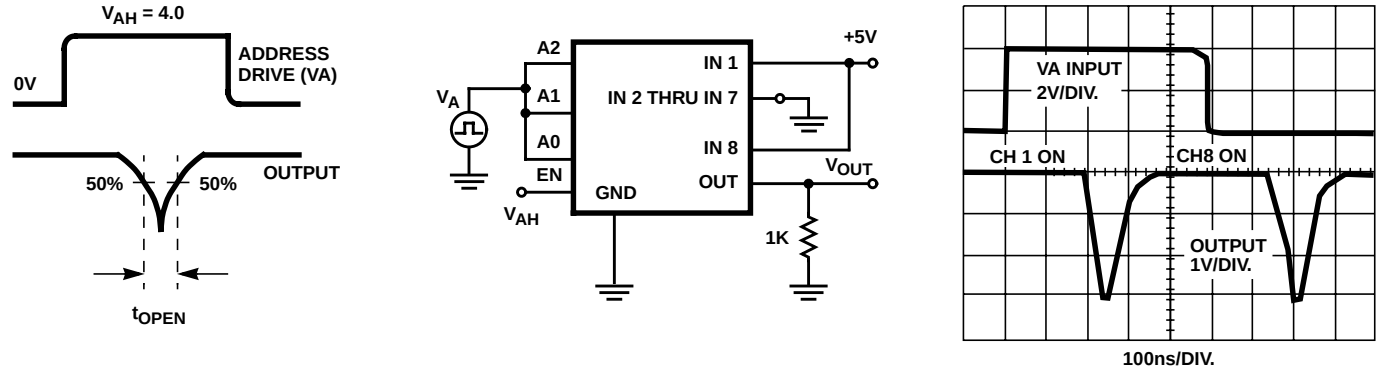


FIGURE 2. BREAK-BEFORE-MAKE DELAY (t_{OPEN})

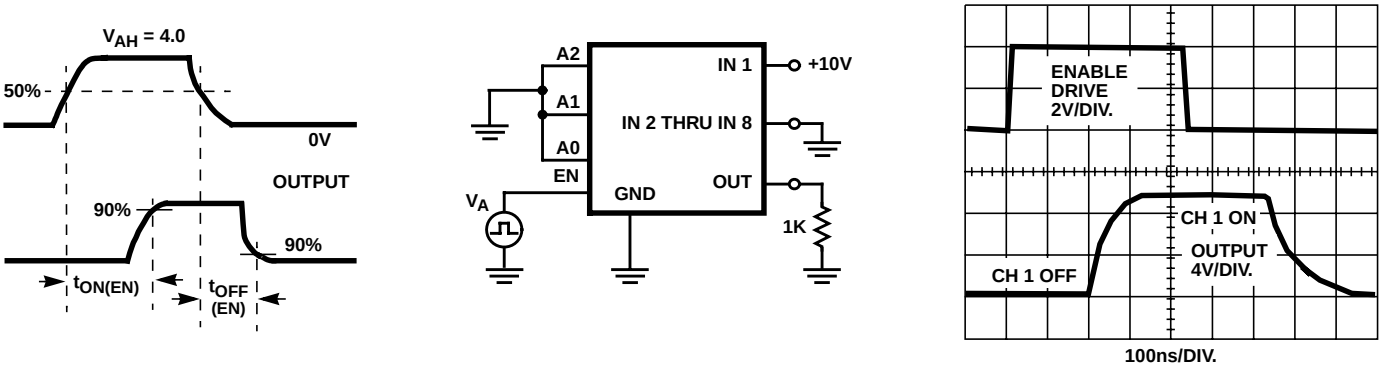


FIGURE 3. ENABLE DELAY $t_{ON(EN)}$, $t_{OFF(EN)}$

Schematic Diagrams

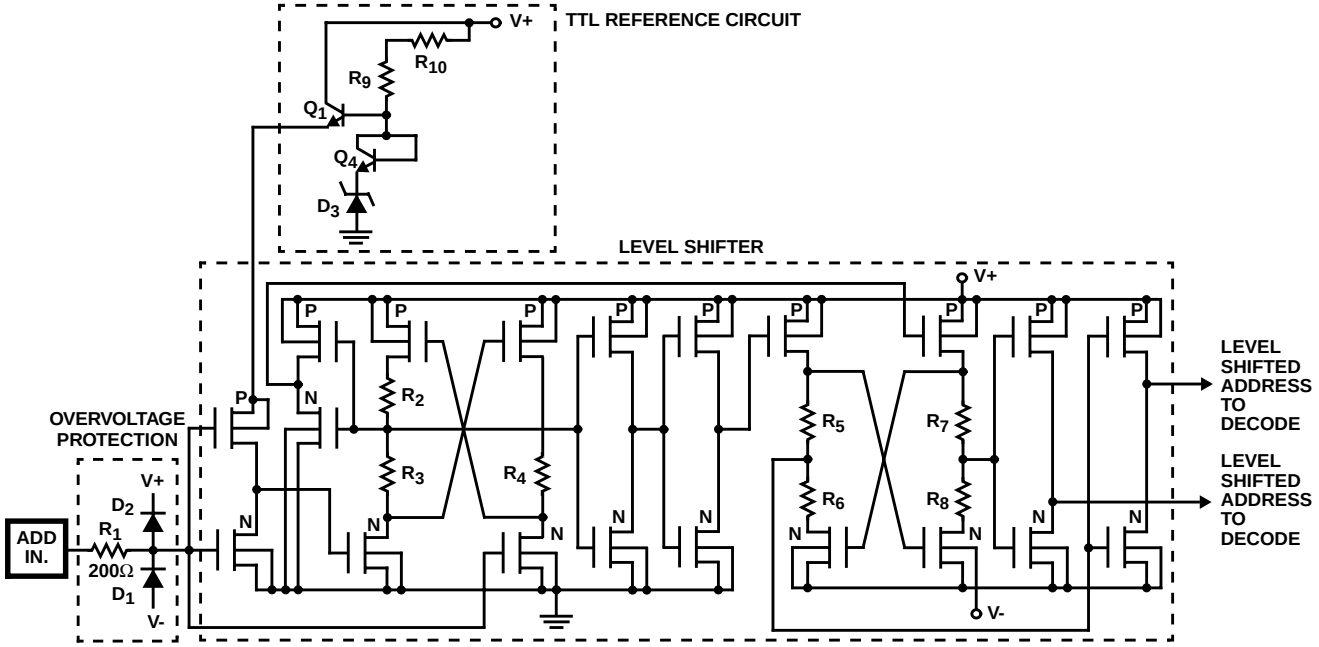


FIGURE 4. ADDRESS INPUT BUFFER AND LEVEL SHIFTER

Schematic Diagrams (Continued)

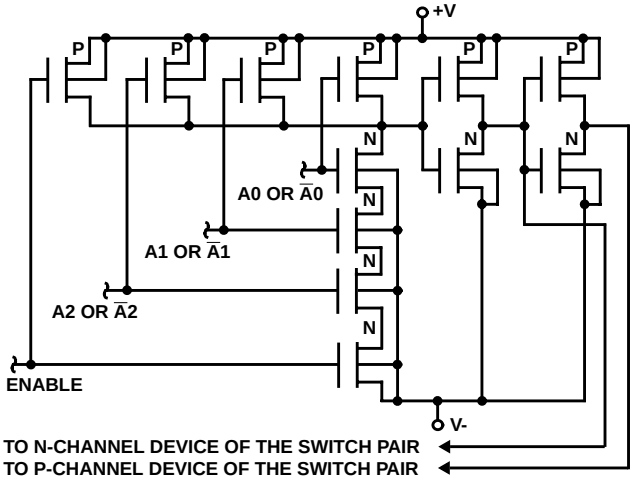


FIGURE 5. ADDRESS DECODER

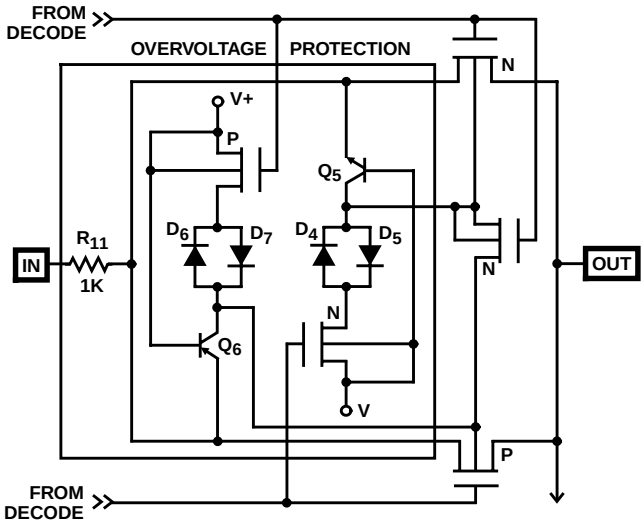
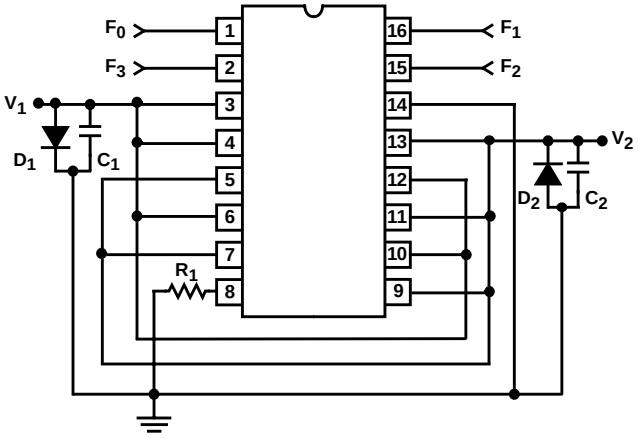


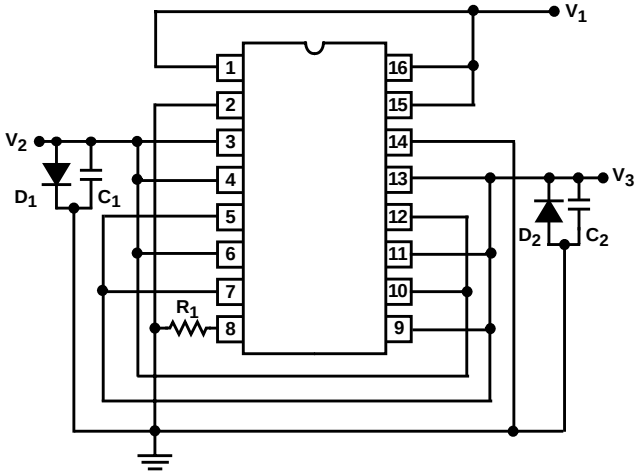
FIGURE 6. MULTIPLEX SWITCH

Burn-In/Life Test Circuits



HS-0548RH
DYNAMIC BURN-IN AND LIFE TEST CIRCUIT

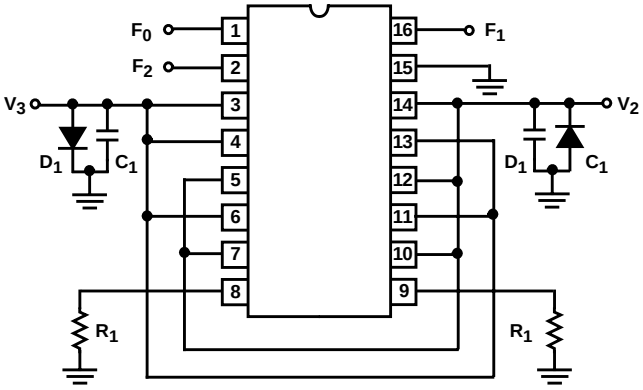
V_1 = -15V maximum, -16V minimum
V_2 = +15V minimum, +16V maximum
R_1 = 10kΩ ±5% 1/4W
C_1 = C_2 = 0.01µF minimum (per socket) or 0.1µF minimum (per row)
D_1 = D_2 = 1N4002 (or equivalent)
F_0 = 100kHz 50% duty cycle; V_{IL} = 0.8V Max; V_{IH} = 4.0V Min.
F_1 = $F_{0/2}$
F_2 = $F_{1/2}$
F_3 = $F_{2/2}$



HS-0548RH
STATIC BURN-IN TEST CIRCUIT

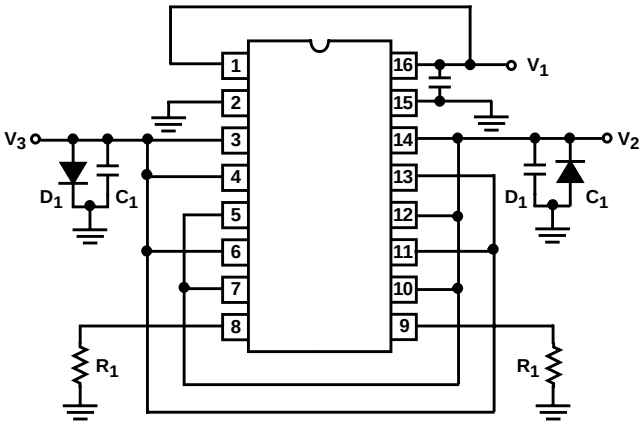
V_1 = 5V minimum, 6V maximum
V_2 = -15V maximum, -16V minimum
V_3 = +15V minimum, +16V maximum
R_1 = 10kΩ ±5% 1/4W
C_1 = C_2 = 0.01µF minimum (per socket) or 0.1µF minimum (per row)
D_1 = D_2 = 1N4002 (or equivalent)

Burn-In/Life Test Circuits (Continued)



HS-0549RH
DYNAMIC BURN-IN AND LIFE TEST CIRCUIT

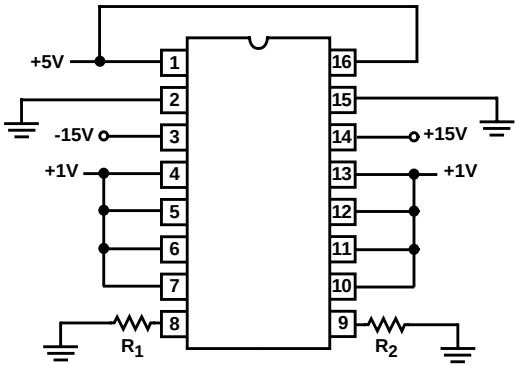
V_2 = +15.5V, ±.0.5V
V_3 = -15.5V, ±0.5V
R_1 = 10kΩ, ±5%
C_1 = 0.01µF minimum (per socket)
D_1 = 1N4002 or equivalent (per board)
F_0 = 100kHz, ±10%; $F_1 = F_{0/2}$; $F_2 = F_{1/2}$, 50% duty cycle, V_{IL} = 0.8V Max; V_{IH} = 4.0V Min



HS-0549RH
STATIC BURN-IN TEST CIRCUIT

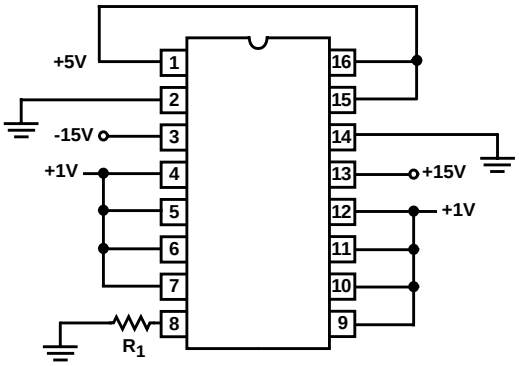
V_1 = +5.5V, ±0.5V
V_2 = +15.5V, ±0.5V
V_3 = -15.5V, ±0.5V
R_1 = 10kΩ, ±10%
C_1 = 0.01µF minimum (per socket)
D_1 = 1N4002 or equivalent (per board)

Irradiation Circuits



HS-0549RH

$R_1 = R_2 = 10k\Omega \pm 5\%$



HS-0548RH

$R_1 = 10k\Omega \pm 5\%$

Die Characteristics

DIE DIMENSIONS:

83 mils x 108 mils x 19 mils

INTERFACE MATERIALS:

Glassivation:

Type: Nitride
Thickness: 7kÅ ±0.7kÅ

Top Metallization:

Type: Al
Thickness: 16kÅ ±2kÅ

Substrate:

CMOS, DI

ASSEMBLY RELATED INFORMATION:

Substrate Potential:

Floating

ADDITIONAL INFORMATION:

Worst Case Current Density:

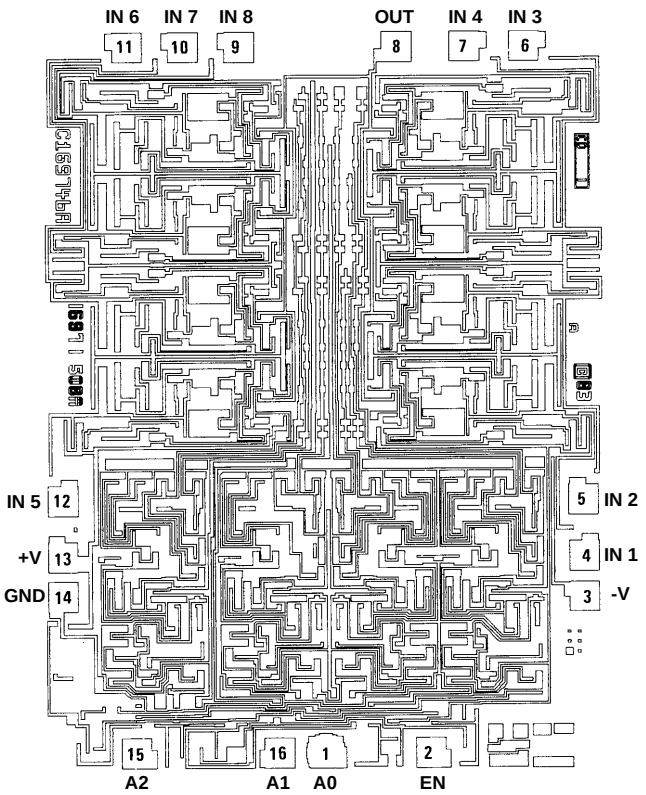
1.4×10^5 A/cm^2

Transistor Count:

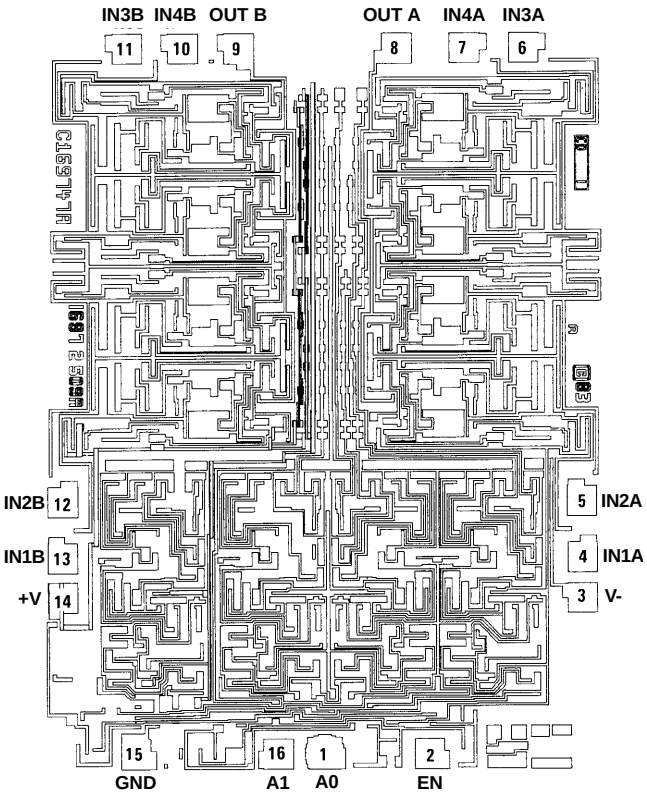
253

Metallization Mask Layout

HS-0548RH



HS-0549RH



NOTE: Pad Numbers Correspond to DIP Pin Numbers Only

All Intersil semiconductor products are manufactured, assembled and tested under **ISO9000** quality systems certification.