



## AM3705/AM3705C 8-Channel MOS Analog Multiplexer

### General Description

The AM3705/AM3705C is an eight-channel MOS analog multiplex switch. TTL compatible logic inputs that require no level shifting or input pull-up resistors and operation over a wide range of supply voltage is obtained by constructing the device with low threshold P-channel enhancement MOS technology. To simplify external logic requirements, a one-of-eight decoder and an output enable are included in the device.

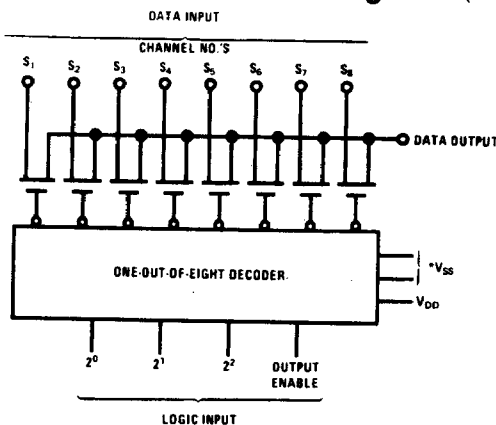
Important design features include:

- Low ON resistance - 150Ω
- Input gate protection
- Low leakage currents - 0.5 nA
- TTL/DTL compatible input logic levels
- Operation from standard +5V and -15V supplies
- Wide analog voltage range - ±5V
- One-of-eight decoder on chip
- Output enable control

The AM3705/AM3705C is designed as a low cost analog multiplex switch to fulfill a wide variety of data acquisition and data distribution applications including cross-point switching, MUX front ends for A/D converters, process controllers, automatic test gear, programmable power supplies and other military or industrial instrumentation applications.

The AM3705 is specified for operation over the -55°C to +125°C military temperature range. The AM3705C is specified for operation over the -25°C to +85°C temperature range.

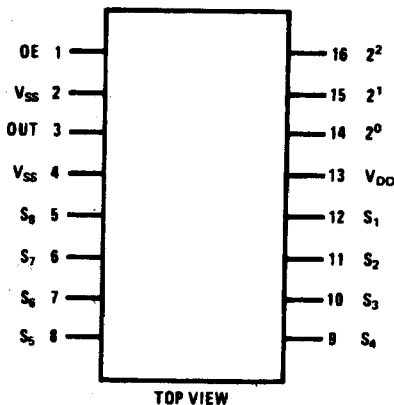
### Block and Connection Diagrams (MIL-STD-806B)



TL/H/5660-2

\*Both V<sub>SS</sub> lines are internally connected; either one or both may be used.

Dual-In-Line Package



TOP VIEW

TL/H/5660-6

Order Number AM3705D or AM3705CD  
See NS Package D16A  
Order Number AM3705F or AM3705CF  
See NS Package F16A

### Truth Table

LOGIC INPUTS			CHANNEL	
2 <sup>0</sup>	2 <sup>1</sup>	2 <sup>2</sup>	OE	ON
L	L	L	H	S <sub>1</sub>
H	L	L	H	S <sub>2</sub>
L	H	L	H	S <sub>3</sub>
H	H	L	H	S <sub>4</sub>
L	L	H	H	S <sub>5</sub>
H	L	H	H	S <sub>6</sub>
L	H	H	H	S <sub>7</sub>
H	H	H	H	S <sub>8</sub>
X	X	X	L	OFF

### Absolute Maximum Ratings

Positive Voltage on Any Pin (Note 1)	+0.3V	Operating Temperature Range AM3705	-55°C to +125°C
Negative Voltage on Any Pin (Note 1)	-35V	AM3705C	-25°C to +85°C
Source to Drain Current	±30mA	Storage Temperature Range	-65°C to +150°C
Logic Input Current	±0.1 mA	Lead Temperature (Soldering, 10 sec)	300°C
Power Dissipation (Note 2)	500 mW		

### Electrical Characteristics (Note 3)

Parameter	Symbol	Conditions	Limits			Units
			Min	Typ	Max	
ON Resistance	R <sub>ON</sub>	V <sub>IN</sub> = V <sub>SS</sub> ; I <sub>OUT</sub> = 100 μA		80	250	Ω
ON Resistance	R <sub>ON</sub>	V <sub>IN</sub> = -5V; I <sub>OUT</sub> = -100 μA		160	400	Ω
ON Resistance AM3705	R <sub>ON</sub>	V <sub>IN</sub> = -5V; I <sub>OUT</sub> = -100 μA T <sub>A</sub> = +125°C			400	Ω
AM3705C					400	Ω
ON Resistance	R <sub>ON</sub>	V <sub>IN</sub> = +5V; C <sub>DD</sub> = -15V; I <sub>OUT</sub> = 100 μA		100		Ω
ON Resistance	R <sub>ON</sub>	V <sub>IN</sub> = 0V, V <sub>DD</sub> = -55V, I <sub>OUT</sub> = -100 μA		150		Ω
ON Resistance	R <sub>ON</sub>	V <sub>IN</sub> = -5V; V <sub>DD</sub> = -15V I <sub>OUT</sub> = -100 μA		250		Ω
OFF Resistance	R <sub>OFF</sub>			10 <sup>10</sup>		Ω
Output Leakage Current AM3705	I <sub>LO</sub>	V <sub>SS</sub> - V <sub>OUT</sub> = 15V		0.5	10	nA
AM3705C		V <sub>SS</sub> - V <sub>OUT</sub> = 15V; T <sub>A</sub> = 125°C		150	500	nA
		V <sub>SS</sub> - V <sub>OUT</sub> = 15V; T <sub>A</sub> = 70°C		35	500	nA
Data Input Leakage Current AM3705	I <sub>LDI</sub>	V <sub>SS</sub> - V <sub>IN</sub> = 15V		0.1	3.0	nA
AM3705		V <sub>SS</sub> - V <sub>IN</sub> = 15V; T <sub>A</sub> = 125°C		25	500	nA
AM3705C		V <sub>SS</sub> - V <sub>IN</sub> = 15V; T <sub>A</sub> = 70°C		0.5	500	nA
Logic Input Leakage Current AM3705	I <sub>LI</sub>	V <sub>SS</sub> - V <sub>Logic In</sub> = 15V		.001	1	μA
AM3705C		V <sub>SS</sub> - V <sub>Logic In</sub> = 15V; T <sub>A</sub> = 125°C		.05	10	μA
		V <sub>SS</sub> - V <sub>Logic In</sub> = 15V; T <sub>A</sub> = 70°C		.05	10	μA
Logic Input LOW Level	V <sub>IL</sub>	V <sub>SS</sub> = +5.0V		0.5	1.0	V
Logic Input LOW Level	V <sub>IL</sub>		V <sub>DD</sub>		V <sub>SS</sub> - 4.0	V
Logic Input HIGH Level	V <sub>IH</sub>	V <sub>SS</sub> = +5.0V	3.0	3.5		V
Logic Input HIGH Level	V <sub>IH</sub>		V <sub>SS</sub> - 2.0		V <sub>SS</sub> + 0.3	V
Channel Switching Time-Positive	t <sup>+</sup>	} Switching Time } Test Circuit		300		ns
Channel Switching Time-Negative	t <sup>-</sup>			600		ns
Channel Separation		f = 1 kHz		62		dB
Output Capacitance	C <sub>db</sub>	V <sub>SS</sub> - V <sub>OUT</sub> = 0; f = 1 MHz		35		pF
Data Input Capacitance	C <sub>sb</sub>	V <sub>SS</sub> - V <sub>DIP</sub> = 0; f = 1 MHz		6.0		pF
Logic Input Capacitance	C <sub>cg</sub>	V <sub>SS</sub> - V <sub>Logic In</sub> = 0; f = 1 MHz		6.0		pF
Power Dissipation	P <sub>D</sub>	V <sub>DD</sub> = -31V, V <sub>SS</sub> = 0V		125	175	mW

Note 1: All voltages referenced to V<sub>SS</sub>.

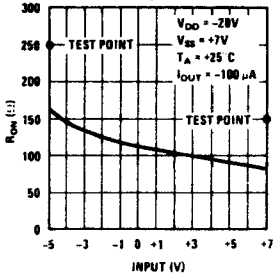
Note 2: Ratings applies for ambient temperatures to +25°C, derate linearly at 3 mW/°C for ambient temperatures above +25°.

Note 3: Specifications apply for T<sub>A</sub> = 25°C, -24V ≤ V<sub>DD</sub> ≤ -20V, and +5.0V ≤ V<sub>SS</sub> ≤ +7.0V; unless otherwise specified (all voltages are referenced to ground.)

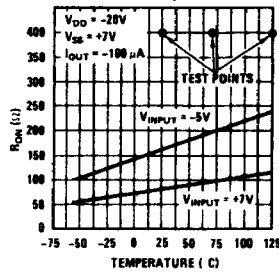
*max supply*  $I = \frac{175}{31} = 5.6 \text{ mA}$

## Typical Performance Characteristics

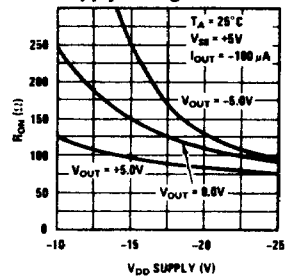
**ON Resistance vs Analog Input Voltage**



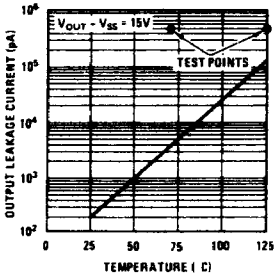
**ON Resistance vs Ambient Temperature**



**ON Resistance vs VDD Supply Voltage**

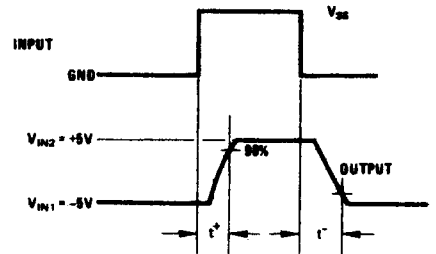
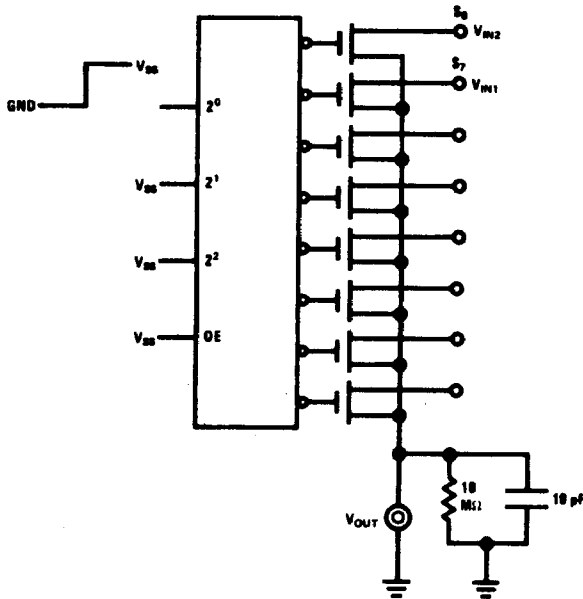


**Output Leakage Current vs Ambient Temperature**



TL/H/5680-3

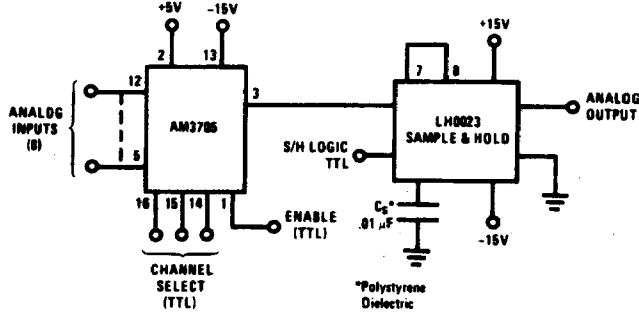
## Switching Time Test Circuit



TL/H/5680-4

# Typical Application

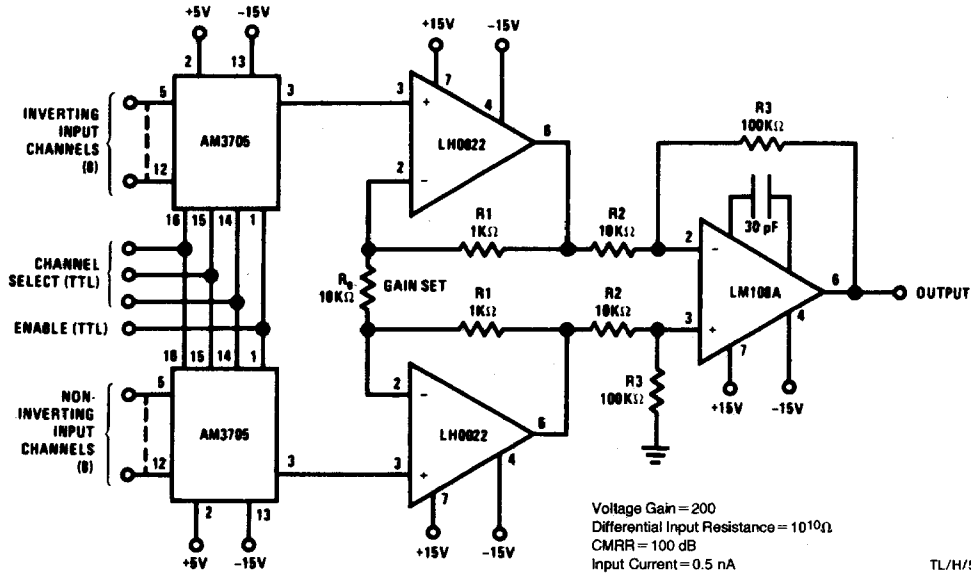
## Buffered 8-Channel Multiplex, Sample and Hold



Analog Signal Range - 0.5V  
 Acquisition Time - 25 ns  
 Drift Rate - 0.5 mV/sec  
 Aperture Time - 250 ns

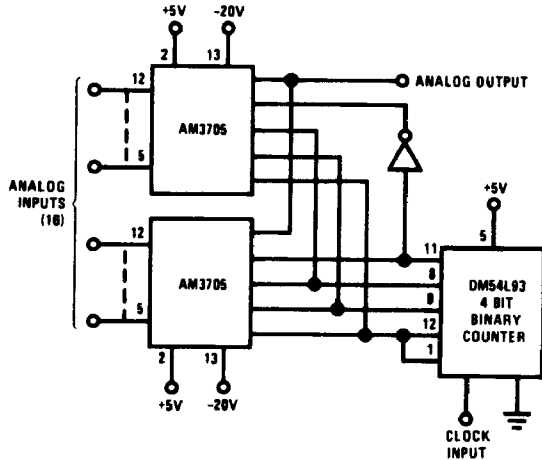
TL/H/5660-7

## Differential Input MUX



TL/H/5660-8

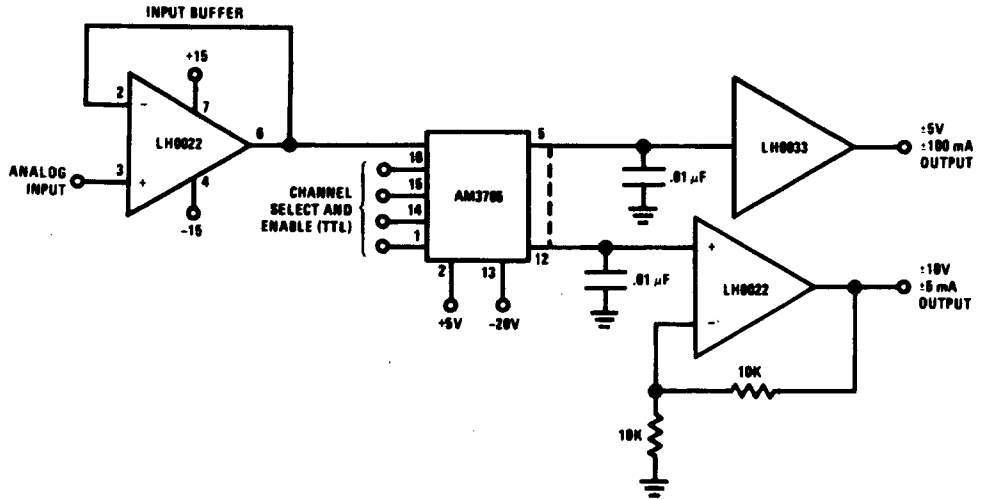
## 16-Channel Commutator



TL/H/5660-9

Typical Application (Continued)

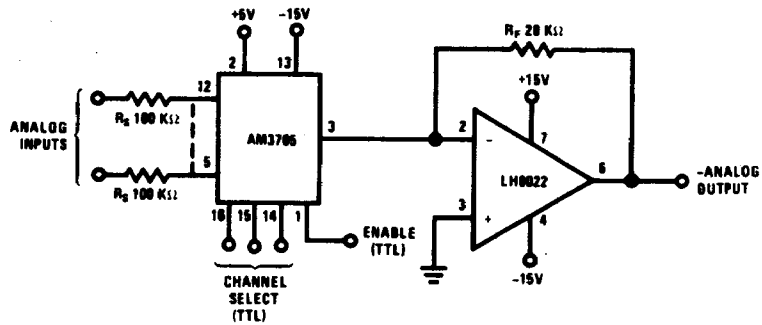
8-Channel Demultiplexer with Sample and Hold



Drift Rate-20 mV/sec

TL/H/5660-10

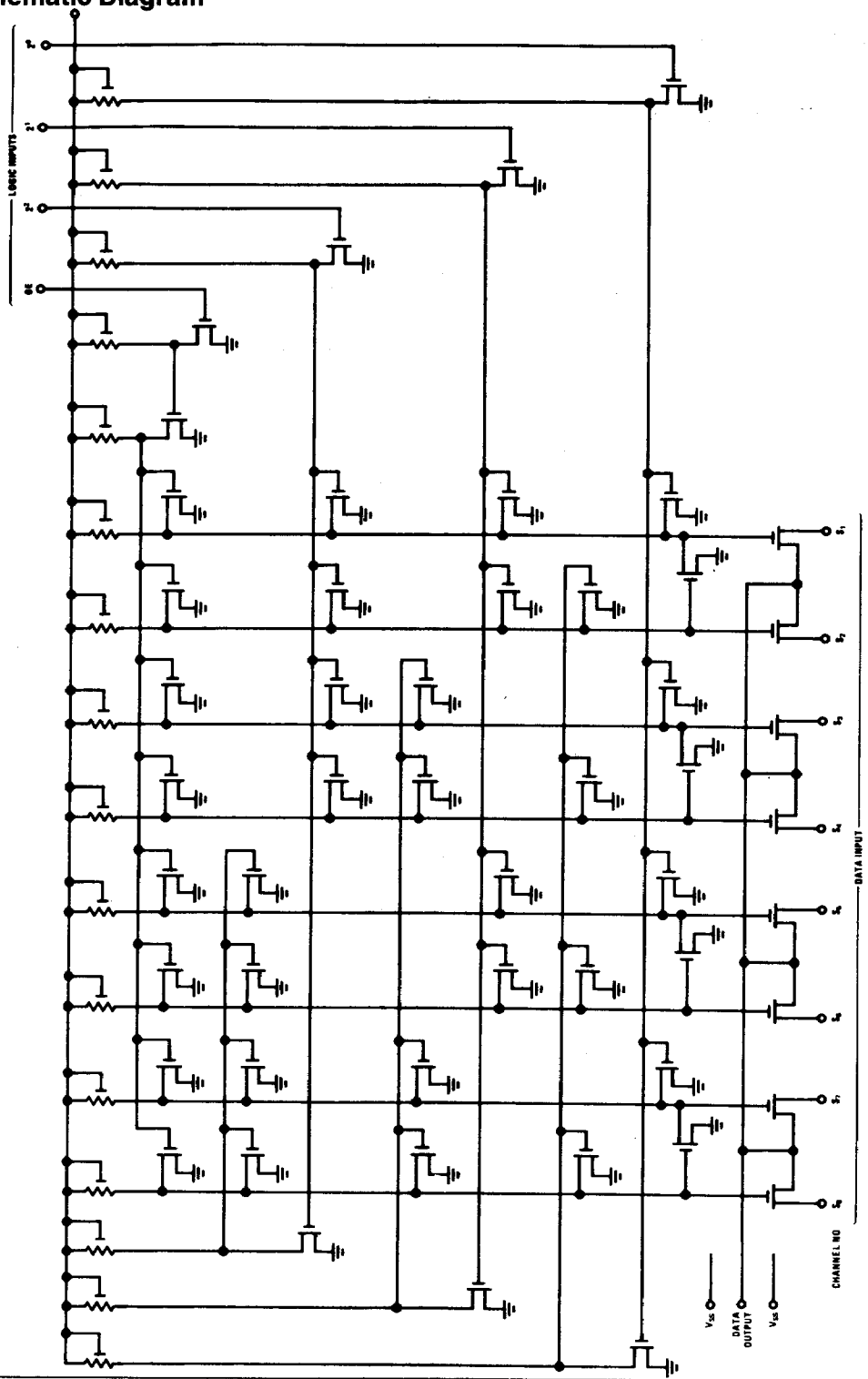
Wide Input Range Analog Switch



Analog Input Range-25V  
Slew Rate - 5 V/μs

TL/H/5660-11

### Schematic Diagram



This datasheet has been downloaded from:

[www.DatasheetCatalog.com](http://www.DatasheetCatalog.com)

Datasheets for electronic components.

# National Semiconductor was acquired by Texas Instruments.

[http://www.ti.com/corp/docs/investor\\_relations/pr\\_09\\_23\\_2011\\_national\\_semiconductor.html](http://www.ti.com/corp/docs/investor_relations/pr_09_23_2011_national_semiconductor.html)

This file is the datasheet for the following electronic components:

AM3705 - <http://www.ti.com/product/am3705?HQS=TI-null-null-dscatalog-df-pf-null-wwe>



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