



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 voltages 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:

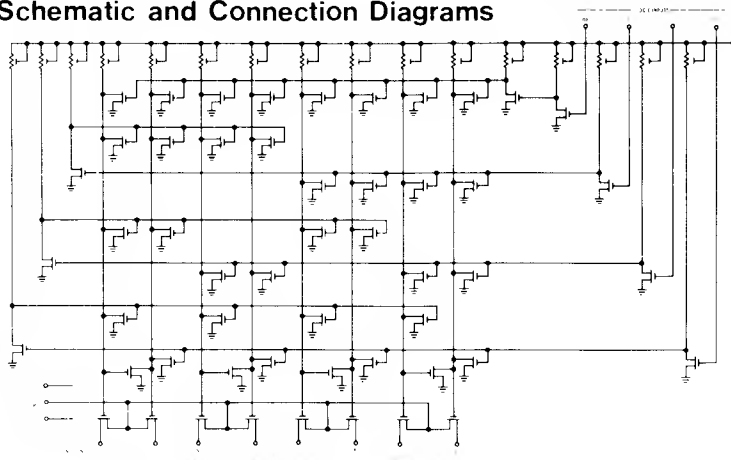
- TTL/DTL compatible input logic levels
- Operation from standard +5V and -15V supplies
- Wide analog voltage range — $\pm 5V$
- One-of-eight decoder on chip
- Output enable control

- Low ON resistance — 150Ω
- Input gate protection
- Low leakage currents — 0.5 nA

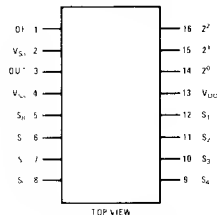
The AM3705/AM3705C is designed as a low cost analog multiplex switch to fulfill a wide variety of data acquisition and data distribution applications including cross-point switching, MUX front ends for A/D converters, process controllers, automatic test gear, programmable power supplies and other military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

The AM3705 is specified for operation over the -55°C to $+125^{\circ}\text{C}$ military temperature range. The AM3705C is specified for operation over the -25°C to $+85^{\circ}\text{C}$ temperature range.

Schematic and Connection Diagrams

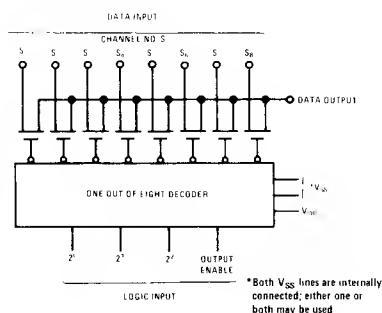


Dual In-Line Package



Order Number
AM3705D or AM3705CD
See Package 15
AM3705F or AM3705CF
See Package 24

Block Diagram (MIL-STD-806B)



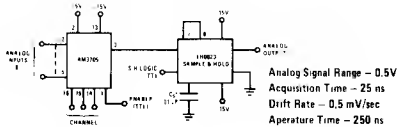
*Both V_{SS} lines are internally connected; either one or both may be used

Truth Table

LOGIC INPUTS				CHANNEL	
Z^0	Z^1	Z^2	OE	C/V	O/V
L	L	L	H	S_0	S_0
L	L	L	H	S_1	S_1
L	L	L	H	S_2	S_2
L	L	L	H	S_3	S_3
L	L	L	H	S_4	S_4
L	L	L	H	S_5	S_5
L	L	L	H	S_6	S_6
L	L	L	H	S_7	S_7
L	L	L	H	S_8	S_8
X	X	X	L	OFF	OFF

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

Absolute Maximum Ratings

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

Electrical Characteristics (Note 3)

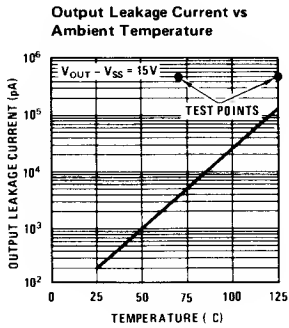
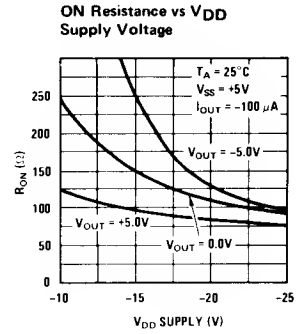
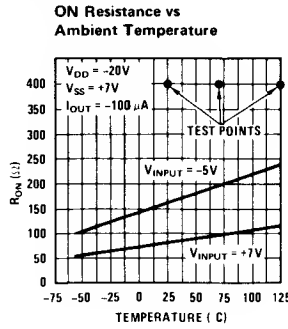
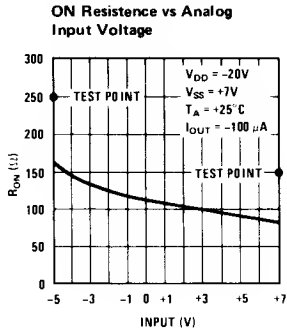
PARAMETER	SYMBOL	CONDITIONS	LIMITS			UNITS
			MIN	TYP	MAX	
ON Resistance	R_{ON}	$V_{IN} = V_{SS}, I_{OUT} = 100 \mu A$		80	250	Ω
ON Resistance	R_{ON}	$V_{IN} = -5V, I_{OUT} = -100 \mu A$		160	400	Ω
ON Resistance	R_{ON}	$V_{IN} = -5V, I_{OUT} = -100 \mu A$ $T_A = +125^\circ C$			400	Ω
AM3705C		$T_A = +70^\circ C$			400	Ω
ON Resistance	R_{ON}	$V_{IN} = +5V, V_{DD} = -15V,$ $I_{OUT} = 100 \mu A$		100		Ω
ON Resistance	R_{ON}	$V_{IN} = 0V, V_{DD} = 15V,$ $I_{OUT} = -100 \mu A$		150		Ω
ON Resistance	R_{ON}	$V_{IN} = -5V, V_{DD} = -15V,$ $I_{OUT} = -100 \mu A$		250		Ω
OFF Resistance	R_{OFF}			10^{10}		Ω
Output Leakage Current	I_{LO}	$V_{SS} - V_{OUT} = 15V$		0.5	10	nA
AM3705	I_{LO}	$V_{SS} - V_{OUT} = 15V, T_A = +125^\circ C$		150	500	nA
AM3705C	I_{LO}	$V_{SS} - V_{OUT} = 15V, T_A = +70^\circ C$		35	500	nA
Data Input Leakage Current	I_{LDI}	$V_{SS} - V_{IN} = 15V$		0.1	3.0	nA
AM3705	I_{LDI}	$V_{SS} - V_{IN} = 15V, T_A = +125^\circ C$		25	500	nA
AM3705C	I_{LDI}	$V_{SS} - V_{IN} = 15V, T_A = +70^\circ C$		0.5	500	nA
Logic Input Leakage Current	I_{LI}	$V_{SS} - V_{Logic In} = 15V$		0.01	1	μA
AM3705	I_{LI}	$V_{SS} - V_{Logic In} = 15V, T_A = +125^\circ C$		0.5	10	μA
AM3705C	I_{LI}	$V_{SS} - V_{Logic In} = 15V, T_A = +70^\circ C$		0.5	10	μA
Logic Input LOW Level	V_{IL}	$V_{SS} = -5.0V$		0.5	1.0	V
Logic Input LOW Level	V_{IL}		V_{DD}		$V_{SS} - 4.0$	V
Logic Input HIGH Level	V_{IH}	$V_{SS} = -5.0V$	3.0	3.5		V
Logic Input HIGH Level	V_{IH}		$V_{SS} - 2.0$		$V_{SS} + 0.3$	V
Channel Switching Time-Positive	t^+	Switching Time		300		ns
Channel Switching Time-Negative	t^-	Test Circuit		600		ns
Channel Separation		$f = 1$ kHz		62		dB
Output Capacitance	C_{db}	$V_{SS} - V_{OUT} = 0, f = 1$ MHz		35		pF
Data Input Capacitance	C_{db}	$V_{SS} - V_{DIP} = 0, f = 1$ MHz		6.0		pF
Logic Input Capacitance	C_{cg}	$V_{SS} - V_{Logic In} = 0, f = 1$ MHz		6.0		pF
Power Dissipation	P_D	$V_{DD} = -31V, V_{SS} = 0V$		125	175	mW

Note 1: All voltages referenced to V_{SS} .

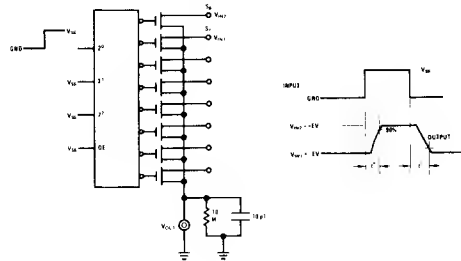
Note 2: Ratings applies for ambient temperatures to $+25^\circ C$, derate linearly at 3 mW/ $^\circ C$ for ambient temperatures above $+25^\circ C$.

Note 3: Specifications apply for $T_A = 25^\circ C$, $-24V \leq V_{DD} \leq -20V$, and $+5.0V \leq V_{SS} \leq +7.0V$; unless otherwise specified (all voltages are referenced to ground).

Typical Performance Characteristics

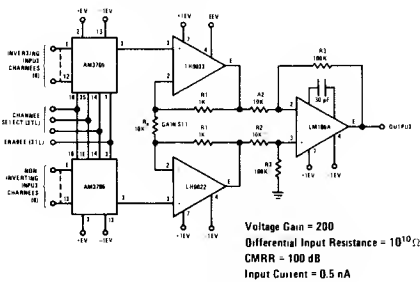


Switching Time Test Circuit

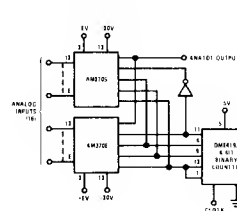


Typical Applications (Continued)

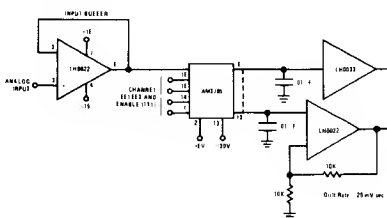
Differential Input MUX



16-Channel Commutator



8-Channel Demultiplexer with Sample and Hold



Wide Input Range Analog Switch

