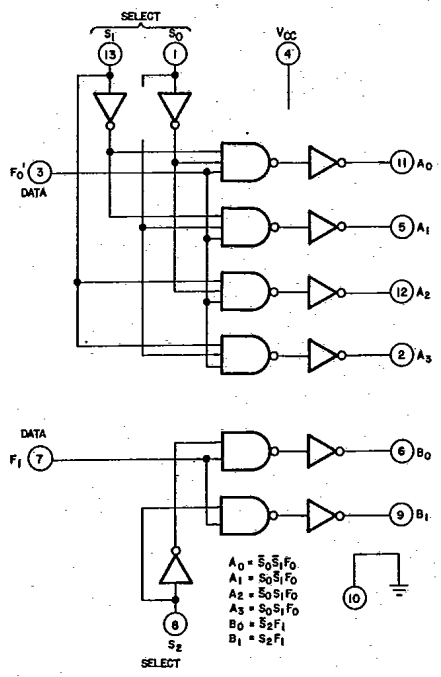
SYLVANIA

INTEGRATED CIRCUITS ARRAYS

Demultiplexer
SM221 and SM223

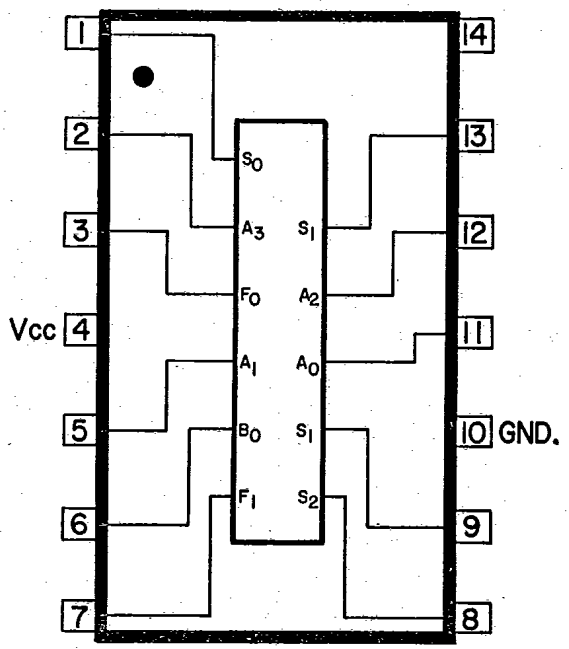
Monolithic Digital Functional Arrays For Military Temp. Range -55°C to +125°C • Industrial 0°C to +75°C

SM221, SM223 Demultiplexer



Logic Diagram

SM221 and SM223



Pin Connections

The SM221 and SM223 Demultiplexers, described in this data sheet, are part of Sylvania's line of Monolithic Digital Functional Arrays.

These devices are high speed, silicon, integrated circuit arrays designed to perform the opposite function of their companion circuits, the SM211 and SM213. That is, the SM211 and SM213 function as multiplexers or encoders, while the SM221 and SM223 function as demultiplexers or decoders.

The SM221 and SM223 arrays are offered in 14-lead flat pack (TO-85) or Sylvania's ceramic 14-lead dual-in-line plug-in package.

FUNCTIONAL DESCRIPTION

The Demultiplexer Arrays consist of two decoding sections. In one section, the data input may be steered to any one of four identical outputs under control of two selection variables. In the other section, another data input may be routed to either of two identical outputs depending on the state of one selection line. The output inverter/drivers provide the "true" states of the input data allowing direct entry into subsequent systems without extra gate inversion. An obvious application for this type of device is as a demultiplexer operating on a serial data line and converting to parallel data. The original parallel data would have been multiplexed into serial form by a Sylvania SM211 or SM213 array. Thus, the SM210 and SM220 series devices make an ideal pair in systems where it is desired to multiplex many data lines, transmit on one or two lines, and convert back to the original data form at the receiving end for processing.

SM-----0022/-1X

SPECIAL FEATURES

1. Each package decodes one data line into four outputs and another data line into two outputs.
2. High speed: Typically less than 12 nanoseconds delay from data input to any output.
3. Complete compatibility with all SUHL* I and II devices and other Sylvania arrays.
4. High fanout: 7 SUHL I loads.
5. High capacitance drive.
6. High noise immunity: ±400 milliwatts over the temperature range.
7. Wide logic swing: Typical logic "0" = 0.25 volts, logic "1" = 3.25 volts.
8. Low output impedance in "0" and "1" state reduces noise pickup.
9. Buffered outputs.
10. Single 5-volt power supply.
11. Each input is protected by a clamp diode.

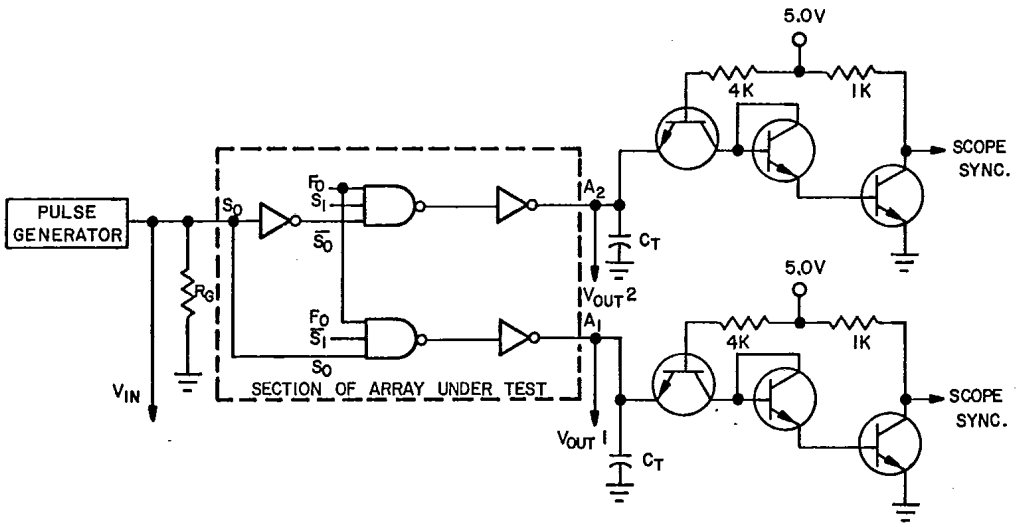
*Sylvania Universal High-Level Logic

RATINGS

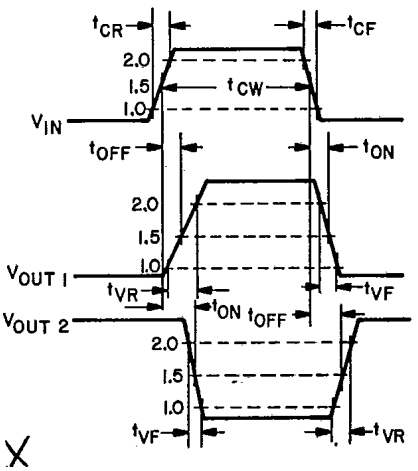
VOLTAGE	Min.	Typ.	Max.	TEMPERATURE	Min.	Typ.	Max.
Supply Voltage (10-millisecond pulse, 50% duty cycle)			7 Vdc	Operating Temperature:			
Supply Voltage (Operating):				SM221 (Military)	−55°C		+125°C
SM221 (Military)	4.5V	5.0V	5.5 Vdc	SM223 (Industrial)	0°C		+ 75°C
SM223 (Industrial)	4.75V	5.0V	5.25 Vdc	Storage Temperature	−65°C		+200°C
Input Voltage			5.5 Vdc				
Output Voltage			5.5 Vdc				

TYPICAL SWITCHING CHARACTERISTICS

Parameters @ V_{CC} = 5.0 Volts, T_A = +25°C, C_T = 15 pF, FO = 1					
Signal Path	tON	tOFF	tVR	tVF	Units
Any input to any output	20	20	4	2.5	nsec Max.



Illustrating a two-gate path from a control input to one output and a three-gate path from the same control input to another output. When $\bar{S}_1$ F_0 = 1, output A_1 follows the input and appears after two gate delays. When $\bar{S}_1$ F_0 = 1, output A_2 is the inverse of the input and appears after three gate delays.

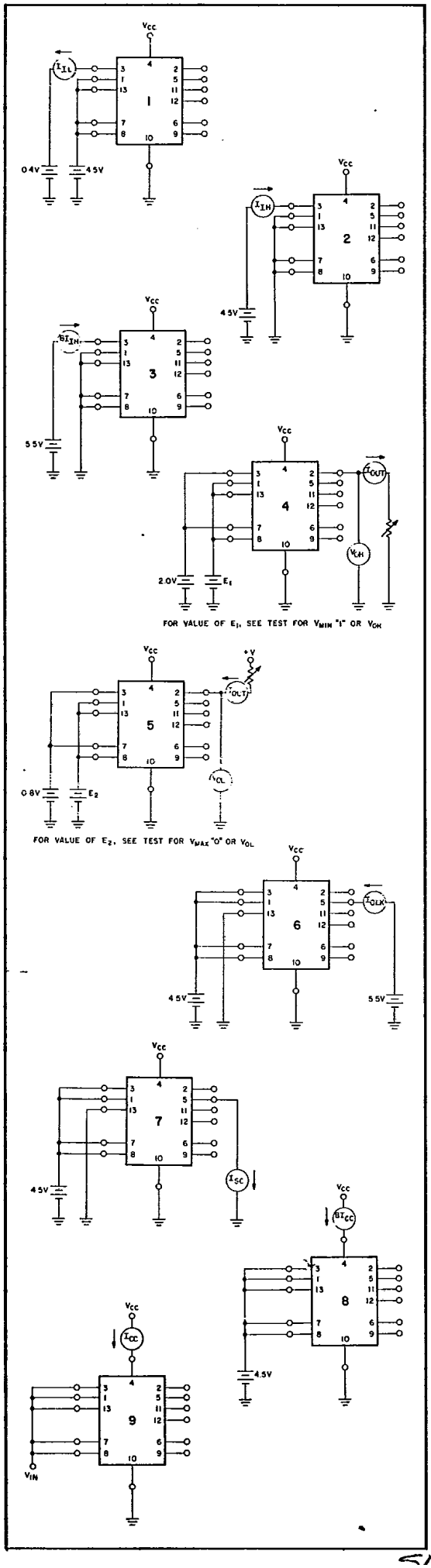


Notes:

1. PRR = 2 MHz
2. t_{CW} = 200 nsec
3. V_{CA} = 3.0 Volts
4. t_{CR}, t_{CF} ≦ 10 nsec
5. R_G = Output Impedance of Pulse Generator, Typ. 50 Ω
6. Transistors 2N2784 or Equivalent.
7. C_T = Total Output Capacitance Including Probe, Wiring and Load

SM- -0022 1-2 X

TEST FIGURES

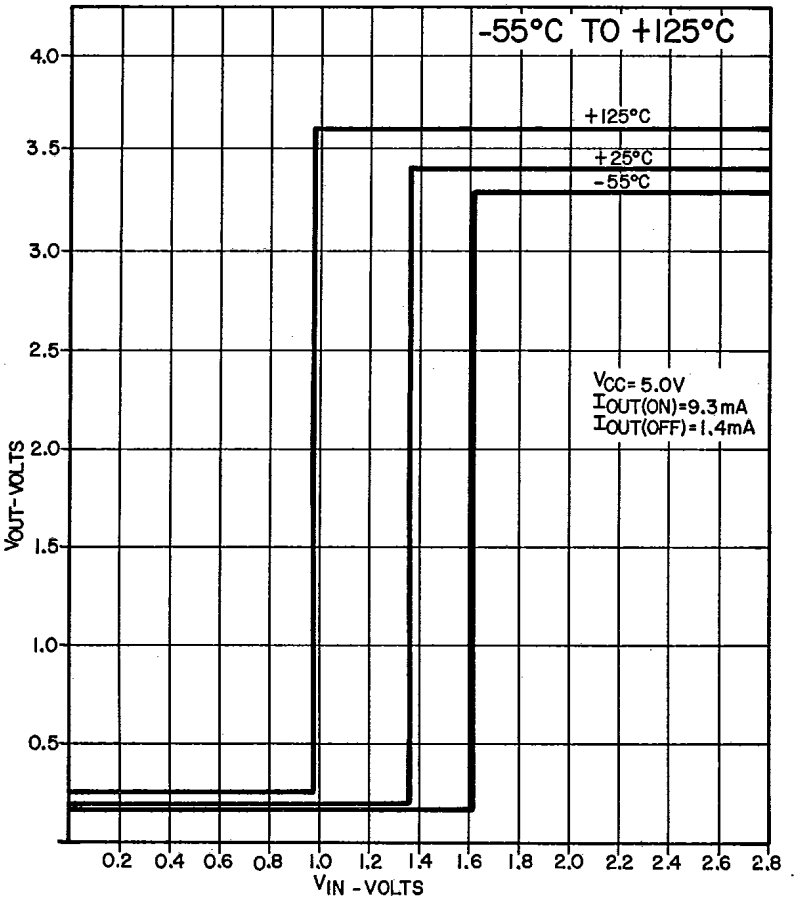


ELECTRICAL CHARACTERISTICS

Parameters	Symbol	SM221 @ −55°C to +125°C Units	SM223 @ 0°C to +75°C Units	Test Fig. No.
INPUT				
Input Load Current, S_0 and S_1	I_{IL}	4.0 mA Max.	4.5 mA Max.	1
S_2	I_{IL}	2.66 mA Max.	3.0 mA Max.	
F_0	I_{IL}	5.33 mA Max.	6.0 mA Max.	
F_1	I_{IL}	2.66 mA Max.	3.0 mA Max.	
@ V_{IN} =		0.4 Volts	0.4 Volts	
Other Inputs		4.5 Volts	4.5 Volts	
V_{CC}		5.5 Volts	5.25 Volts	
Input Leakage Current, S_0 and S_1	I_{IH}	0.3 mA Max.	0.3 mA Max.	2
S_2	I_{IH}	0.2 mA Max.	0.2 mA Max.	
F_0	I_{IH}	0.4 mA Max.	0.4 mA Max.	
F_1	I_{IH}	0.2 mA Max.	0.2 mA Max.	
@ V_{IN} =		4.5 Volts	4.5 Volts	
Other Inputs		0 Volts	0 Volts	
V_{CC}		5.5 Volts	5.25 Volts	
Input Breakdown Current, S_0 and S_1	BI_{IH}	3 mA Max.	3 mA Max.	3
S_2	BI_{IH}	2 mA Max.	2 mA Max.	
F_0	BI_{IH}	4 mA Max.	4 mA Max.	
F_1	BI_{IH}	2 mA Max.	2 mA Max.	
@ V_{IN} =		5.5 Volts	5.5 Volts	
Other Inputs		0 Volts	0 Volts	
V_{CC}		5.5 Volts	5.25 Volts	
Logic "1" Threshold Voltage	V_{MIN} "1"	2.0 Volts	2.0 Volts	4
Minimum input voltage which Will function as a logic "1"				
Other Inputs		4.5 Volts	4.5 Volts	
V_{CC}		4.5 Volts	4.75 Volts	
Logic "0" Threshold Voltage	V_{MAX} "0"	0.8 Volts	0.8 Volts	5
Maximum input voltage which will function as a logic "0"				
Other Inputs		4.5 Volts	4.5 Volts	
V_{CC}		4.5 Volts	5.25 Volts	
OUTPUT				
Output Leakage Current	I_{OLK}	0.25 mA Max.	0.25 mA Max.	6
@ V_{OUT} =		5.5 Volts	5.5 Volts	
Inputs F_0 and F_1		4.5 Volts	4.5 Volts	
Inputs S_0, S_1, S_2: adjusted to set output under test to logic "1"				
V_{CC}		5.5 Volts	5.25 Volts	
Output Short Circuit Current	I_{SC}	25 mA Min.	25 mA Min.	7
		100 mA Max.	100 mA Max.	
@ V_{OUT} =		0 Volts	0 Volts	
Inputs F_0 and F_1		4.5 Volts	4.5 Volts	
Inputs S_0, S_1, S_2: adjusted to set output under test to logic "1"				
V_{CC}		5.0 Volts	5.0 Volts	
Logic "0" Level	V_{OL}	0.4 Volts Max.	0.4 Volts Max.	5
@ I_{OUT} =		9.3 mA	11.6 mA	
Inputs F_0 and F_1		0.8 Volts	0.8 Volts	
Other Inputs		2.0 Volts	2.0 Volts	
V_{CC}		4.5 Volts	4.75 Volts	
Logic "1" Level	V_{OH}	2.4 Volts Min.	2.4 Volts Min.	4
@ I_{OUT} =		1.4 mA	1.4 mA	
Inputs F_0 and F_1		2.0 Volts	2.0 Volts	
Inputs S_0, S_1, S_2: adjusted to appropriate threshold condition which will set output under test to logic "1"				
V_{CC}		4.5 Volts	4.75 Volts	
POWER REQUIREMENTS				
Breakdown Current	BI_{CC}	92 mA Max.	108 mA Max.	8
Inputs		4.5 Volts	4.5 Volts	
V_{CC} (10 millisecond pulse, 50% duty cycle) 25°C only		7.0 Volts	7.0 Volts	
Current Drain, "ON" State	I_{CC} "0"	66 mA Max.	75 mA Max.	9
Inputs		0 Volts	0 Volts	
V_{CC}		5.0 Volts	5.0 Volts	
Current Drain, "OFF" State*	I_{CC} "1"	58 mA Max.	67 mA Max.	9
Inputs		4.5 Volts	4.5 Volts	
V_{CC}		5.0 Volts	5.0 Volts	

*There is no true "OFF" State (all outputs at logic "1"). Only one output in each section may be at logic "1" at one time.

SM221 AND SM223
TYPICAL TRANSFER CHARACTERISTICS



ORDERING INFORMATION

SM221 and SM223 arrays are currently offered for operation over the Military temperature range of −55°C to +125°C and Industrial/Commercial temperature range of 0°C to +75°C. A two-digit suffix is used to denote choice of package. Thus, orders should be placed as follows:

14-lead hermetic flat pack. . . . . SM221-02 or SM223-02
14-lead hermetic plug-in package. . . . . SM221-03 or SM223-03

The nearest Sylvania sales office or distributor will be happy to accept your order or provide further information.