

Standard Products

# MUX8520 16-Channel Analog Multiplexer Module Radiation Tolerant & ESD Protected

[www.aeroflex.com/mux](http://www.aeroflex.com/mux)

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## FEATURES

- 16 Channels provided by one multiplexer
- Radiation performance
  - Total dose: 300 krads(Si), Dose rate = 50 - 300 rads(Si)/s
  - SEU: Immune up to 120 MeV-cm<sup>2</sup>/mg
  - SEL: Immune by process design
- Full military temperature range
- Low power consumption < 15mW
- One address bus A<sub>0</sub>~A<sub>3</sub>, and one enable line
- All channel inputs protected by ±20V nominal Transorbbs
- Fast access time 1500ns typical
- Break-Before-Make switching
- High analog input impedance (power on or off )
- Designed for aerospace and high reliability space applications
- Packaging – Hermetic ceramic
  - 56 leads, 0.80" Sq x 0.20"Ht quad flat pack
  - Typical Weight 6 grams

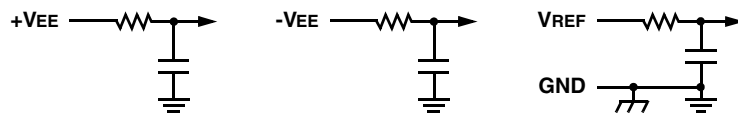
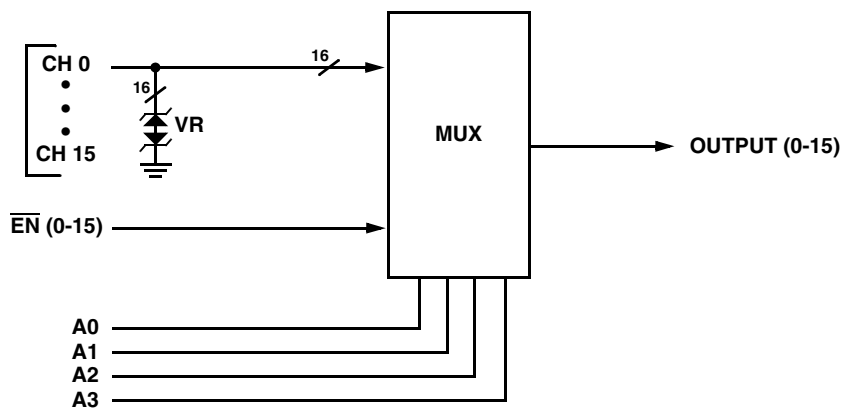
## GENERAL DESCRIPTION

Aeroflex's MUX8520 is a radiation tolerant, 16 channel multiplexer MCM (Multi Chip Module) with electrostatic discharge (ESD) protection on all channel inputs.

The MUX8520 has been specifically designed to meet exposure to radiation environments. It is available in a 56 lead High Temperature Co-Fired Ceramic (HTCC) Quad Flatpack (CQFP). It is guaranteed operational from -55°C to +125°C. Available screened in accordance with MIL-PRF-38534, the MUX8520 is ideal for demanding military and space applications.

## ORGANIZATION AND APPLICATION

The MUX8520 consists of one 16 channel multiplexer arranged as shown in the block diagram, addressable by bus A<sub>0</sub>~A<sub>3</sub> including enable which connects the addressed channel to a single output.



## MUX8520: 16-CHANNEL ANALOG MUX BLOCK DIAGRAM

## ABSOLUTE MAXIMUM RATINGS 1/

Parameter	Range	Units
Case Operating Temperature Range	-55 to +125	°C
Storage Temperature Range	-65 to +150	°C
Supply Voltage +VEE (Pin 18) -VEE (Pin 46) VREF (Pin 39)	+16.5 -16.5 +16.5	V V V
Digital Input Overvoltage VEN (Pin 13), VA (Pins 14,15,16,17)	< VREF +4 > GND -4	V V
Analog Input Over Voltage VIN	±18V	V

Notes:

1/ All measurements are made with respect to ground.

NOTICE: Stresses above those listed under "Absolute Maximums Rating" may cause permanent damage to the device. These are stress rating only; functional operation beyond the "Operation Conditions" is not recommended and extended exposure beyond the "Operation Conditions" may affect device reliability.

## RECOMMENDED OPERATING CONDITIONS 1/

Symbol	Parameter	Typical	Units
+VEE	+15V Power Supply Voltage	+15.0	V
-VEE	-15V Power Supply Voltage	-15.0	V
VREF	Reference Voltage	+5.00	V
VAL	Logic Low Level	+0.8	V
VAH	Logic High Level	+4.0	V

1/ Power Supply turn-on sequence shall be as follows: +VEE, -VEE, followed by VREF.

## DC ELECTRICAL PERFORMANCE CHARACTERISTICS 1/

(Tc = -55°C TO +125°C, +VEE = +15V, -VEE = -15V, VREF = +5.0V -- UNLESS OTHERWISE SPECIFIED)

Parameter	Symbol	Conditions	Min	Max	Units
Supply Current	+IEE	VEN(0-15) = VA(0-3) = 0	0.05	0.5	mA
	-IEE	VEN(0-15) = VA(0-3) = 0	-0.5	-0.05	mA
	+ISBY	VEN(0-15) = 4V, VA(0-3) = 0 6/	0.05	0.5	mA
	-ISBY	VEN(0-15) = 4V, VA(0-3) = 0 6/	-0.5	-0.05	mA
Address Input Current	I <sub>AL</sub> (0-3)A	VA = 0V	-1	1	μA
	I <sub>AH</sub> (0-3)A	VA = 5V	-1	1	μA
Enable Input Current	I <sub>ENL</sub> (0-15)	VEN(0-15) = 0V	-1	1	μA
	I <sub>ENH</sub> (0-15)	VEN(0-15) = 5V	-1	1	μA

## DC ELECTRICAL PERFORMANCE CHARACTERISTICS 1/ (continued)

(T<sub>C</sub> = -55°C TO +125°C, +V<sub>EE</sub> = +15V, -V<sub>EE</sub> = -15V, V<sub>REF</sub> = +5.0V -- UNLESS OTHERWISE SPECIFIED)

Parameter	Symbol	Conditions	Min	Max	Units	
Positive Input Leakage Current (CH0-CH15)	+ISOFFOUTPUT(ALL)	V <sub>IN</sub> = +10V, V <sub>EN</sub> = 4V, output and all unused MUX inputs under test = -10V 2/, 3/	-100	+700	nA	
Negative Input Leakage Current (CH0-CH15)	-ISOFFOUTPUT(ALL)	V <sub>IN</sub> = -10V, V <sub>EN</sub> = 4V, output and all unused MUX inputs under test = +10V 2/, 3/	-100	+700	nA	
Positive Output Leakage Current OUTPUT (pin 12)	+IDOFFOUTPUT(ALL)	V <sub>OUT</sub> = +10V, V <sub>EN</sub> = 4V, output and all unused MUX inputs under test = -10V 3/, 4/	-100	+100	nA	
Negative Output Leakage Current OUTPUT (pin 12)	-IDOFFOUTPUT(ALL)	V <sub>OUT</sub> = -10V, V <sub>EN</sub> = 4V, output and all unused MUX inputs under test = +10V 3/, 4/	-100	+100	nA	
Input Clamped Voltage (CH0-CH15)	+VCLMP	V <sub>EN</sub> = 4V, all unused MUX inputs under test are open. 3/	+25°C	18.0	23.0	V
			+125°C	18.0	23.5	V
			-55°C	17.5	22.5	V
Input Clamped Voltage (CH0-CH15)	-VCLMP		+25°C	-23.0	-18.0	V
			+125°C	-23.5	-18.0	V
			-55°C	-22.5	-17.5	V
Switch ON Resistance OUTPUTS (pin 12)	RDS(ON)(0-15) <sub>A</sub>	V <sub>IN</sub> = +15V, V <sub>EN</sub> = 0.8V, I <sub>OUT</sub> = -1mA 2/, 3/, 5/	500	3000	Ω	
	RDS(ON)(0-15) <sub>B</sub>	V <sub>IN</sub> = +5V, V <sub>EN</sub> = 0.8V, I <sub>OUT</sub> = -1mA 2/, 3/, 5/	500	3000	Ω	
	RDS(ON)(0-15) <sub>C</sub>	V <sub>IN</sub> = -5V, V <sub>EN</sub> = 0.8V, I <sub>OUT</sub> = +1mA 2/, 3/, 5/	500	3000	Ω	

Notes:

- 1/ Measure inputs sequentially. Ground all unused inputs of the device under test. V<sub>A</sub> is the applied input voltage to the address lines A(0-3).
- 2/ V<sub>IN</sub> is the applied input voltage to the input channels (CH0-CH15).
- 3/ V<sub>EN</sub> is the applied input voltage to the enable line EN(0-15).
- 4/ V<sub>OUT</sub> is the applied input voltage to the output line OUTPUT (0-15)
- 5/ Negative current is the current flowing out of each of the MUX pins. Positive current is the current flowing into each MUX pin.
- 6/ Not tested, guaranteed to the specified limits.

## SWITCHING CHARACTERISTICS

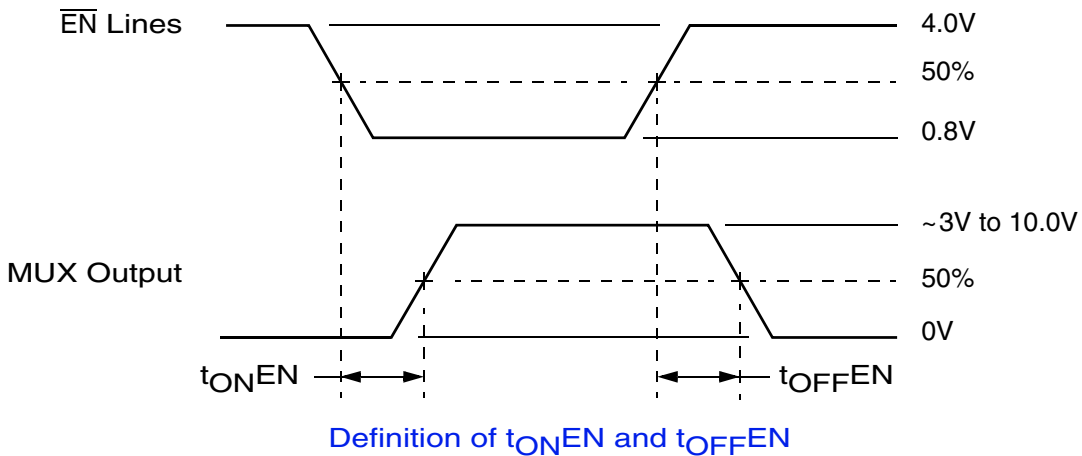
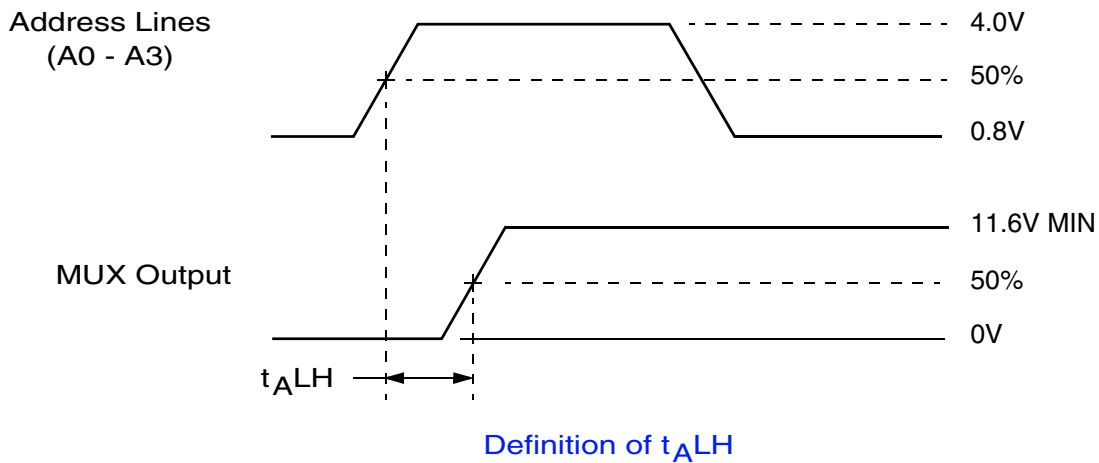
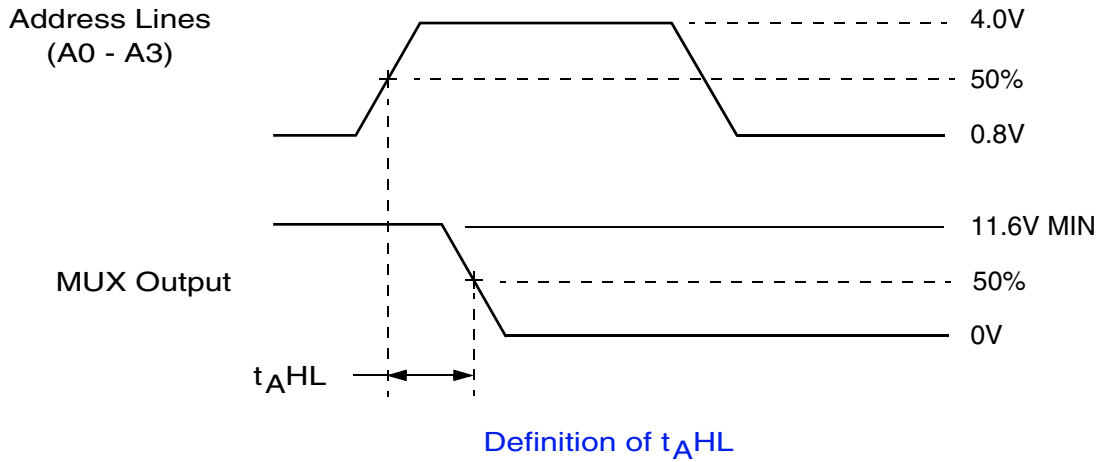
(T<sub>C</sub> = -55°C TO +125°C, +V<sub>EE</sub> = +15V, -V<sub>EE</sub> = -15V, V<sub>REF</sub> = +5.0V - UNLESS OTHERWISE SPECIFIED)

Parameter	Symbol	Conditions	Min	Max	Units
Switching Test MUX	t <sub>AHL</sub>	R <sub>L</sub> = 10KΩ, C <sub>L</sub> = 50pF	10	1500	ns
	t <sub>ALH</sub>	R <sub>L</sub> = 10KΩ, C <sub>L</sub> = 50pF T <sub>c</sub> = +25°C, +125°C T <sub>c</sub> = -55°C	10 10	2000 5000	ns ns
	t <sub>ONEN</sub>	R <sub>L</sub> = 1KΩ, C <sub>L</sub> = 50pF	10	1500	ns
	t <sub>OFFEN</sub>		10	1000	ns

### TRUTH TABLE (CH0–CH15)

A3	A2	A1	A0	$\overline{\text{EN}}$ (0-15)	"ON" CHANNEL <u>1/</u>
X	X	X	X	H	NONE
L	L	L	L	L	CH0
L	L	L	H	L	CH1
L	L	H	L	L	CH2
L	L	H	H	L	CH3
L	H	L	L	L	CH4
L	H	L	H	L	CH5
L	H	H	L	L	CH6
L	H	H	H	L	CH7
H	L	L	L	L	CH8
H	L	L	H	L	CH9
H	L	H	L	L	CH10
H	L	H	H	L	CH11
H	H	L	L	L	CH12
H	H	L	H	L	CH13
H	H	H	L	L	CH14
H	H	H	H	L	CH15

1/ Between (CH0-CH15) and OUTPUT (0-15)



NOTE:  $f = 10\text{KHz}$ , Duty cycle = 50%.

### MUX8520 SWITCHING DIAGRAMS

## PIN NUMBERS & FUNCTIONS

MUX8520 – 56 Leads Ceramic QUAD Flat Pack			
Pin #	Function	Pin #	Function
1	CH0	29	NC
2	CH1	30	NC
3	CH2	31	NC
4	CH3	32	NC
5	CH4	33	NC
6	CH5	34	NC
7	GND	35	GND
8	GND	36	GND
9	CH6	37	NC
10	CH7	38	NC
11	CASE GND	39	VREF
12	OUTPUT (0-15)	40	NC
13	$\overline{EN}$ (0-15)	41	NC
14	A0	42	NC
15	A1	43	NC
16	A2	44	NC
17	A3	45	NC
18	+VEE	46	-VEE
19	CH15	47	NC
20	CH14	48	NC
21	GND	49	GND
22	GND	50	GND
23	CH13	51	NC
24	CH12	52	NC
25	CH11	53	NC
26	CH10	54	NC
27	CH9	55	NC
28	CH8	56	NC

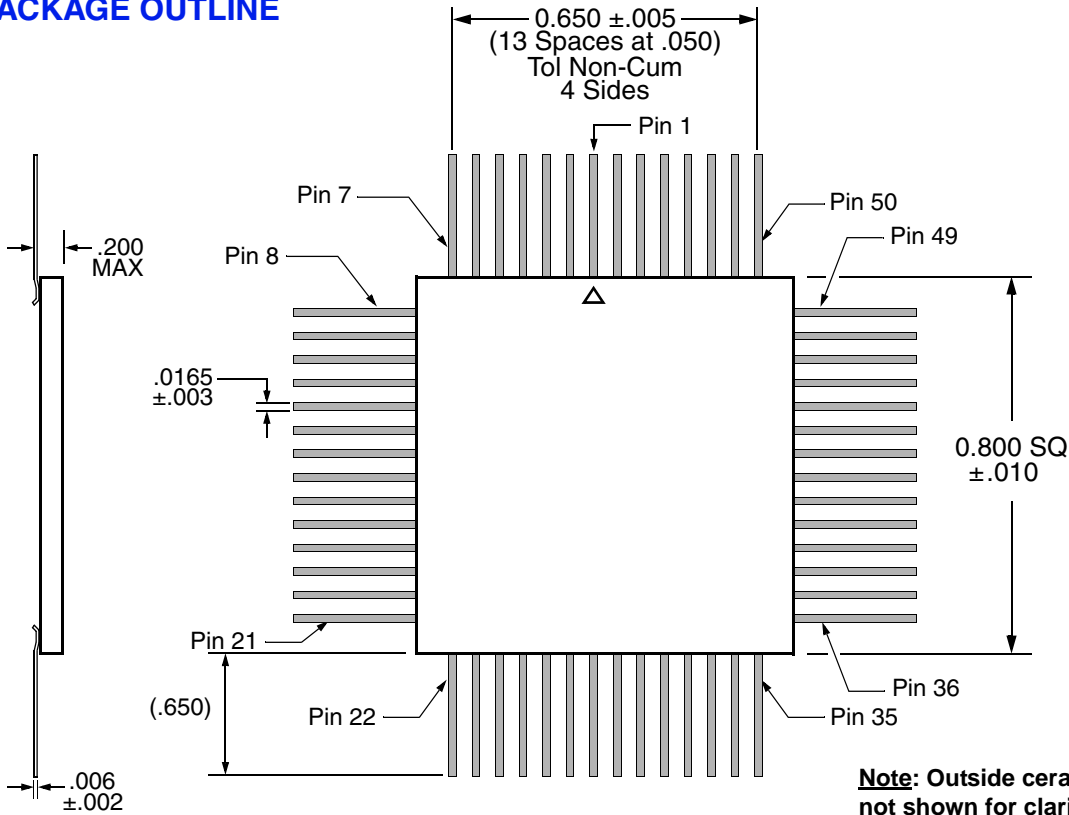
**Notes:**

1. It is recommended that all "NC" or "no connect pin", be grounded. This eliminates or minimizes any ESD or static buildup.
2. Package lid is internally connected to circuit ground (Pins 7, 8, 11, 21, 22, 35, 36, 49, 50).

## ORDERING INFORMATION

Model	DSCC SMD #	Screening	Package
MUX8520-7	-	Commercial Flow, +25°C testing only	QUAD Flat Pack
MUX8520-S	-	Military Temperature, -55°C to +125°C Screened in accordance with the individual Test Methods of MIL-STD-883 for Space Applications	
MUX8520-201-1S	5962-0922901KXC	In accordance with DSCC SMD	

### PACKAGE OUTLINE



#### EXPORT CONTROL:

This product is controlled for export under the International Traffic in Arms Regulations (ITAR). A license from the U.S. Department of State is required prior to the export of this product from the United States.

#### EXPORT WARNING:

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