

MV54AC251-X REV 0A0

 Original Creation Date: 12/19/97
 Last Update Date: 04/12/99
 Last Major Revision Date: 12/19/97

8-Input Multiplexer With TRI-STATE Outputs
General Description

The AC251 is a high-speed 8-input digital multiplexer. It provides, in one package, the ability to select one bit of data from up to eight sources. It can be used as a universal function generator to generate any logic function of four variables. Both assertion and negation outputs are provided.

Industry Part Number

54AC251

Prime Die

Z251

NS Part Numbers

 54AC251E-QMLV*
 54AC251ERQMLV*
 54AC251J-QMLV**
 54AC251JRQMLV**
 54AC251W-QMLV***
 54AC251WRQMLV***

Controlling Document

5962-8769201

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (°C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55

Features

- Multifunctional capability
- On-chip select logic decoding
- Inverting and noninverting TRI-STATE outputs
- Outputs source/sink 24 mA
- Standard Military Drawing (SMD)
 - 54AC251: 5962-8769201V2A*, VEA**, VFA***
 - 54AC251: 5962R876901V2A*, VEA**, VFA***

(Absolute Maximum Ratings)

(Note 1)

Supply Voltage (Vcc)	-0.5V to +7.0V
DC Input Diode Current (Iik)	
Vi = -0.5V	-20 mA
Vi = Vcc +0.5V	+20 mA
DC Input Voltage (Vi)	-0.5V to Vcc +0.5V
DC Output Diode Current (Iok)	
Vo = -0.5V	-20 mA
Vo = Vcc +0.5V	+20 mA
DC Output Voltage (Vo)	-0.5V to Vcc +0.5V
DC Output Source or Sink Current (Io)	±50 mA
DC Vcc or Ground Current per Output Pin (Icc or Ignd)	±50 mA
Storage Temperature (Tstg)	-65 C to +150 C
Junction Temperature (Tj)	175 C
Thermal Resistance, junction-to-case (jc)	See Mil-Std-1835
Maximum Power Dissipation (pd)	500 mW
Lead temperature (soldering, 10 seconds)	+300C

Note 1: Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specification should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. National does not recommend operation of FACT™ circuits outside databook specifications.

Recommended Operating Conditions

Supply Voltage (Vcc)	2.0V to 6.0V
Input Voltage (Vi)	0V to Vcc
Output Voltage (Vo)	0V to Vcc
Operating Temperature (Ta)	-55 C to +125 C
Minimum Input Edge Rate (Delta V/Delta t)	
AC Devices	
Vin from 30% to 70% of Vcc	
Vcc @ 3.0V, 4.5V, 5.5V	125 mV/ns

Electrical Characteristics

DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: VCC 3.0V to 5.5V, Temperature Range: -55C to 125C.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
IIH	High Level Input Current	VCC=5.5V, VM=5.5V, VINL=0.0V	1, 2	INPUT		0.1	uA	1
			1, 2	INPUT		1.0	uA	2, 3
IIL	Low Level Input Current	VCC=5.5V, VM=0.0V, VINH=5.5V	1, 2	INPUT		-0.1	uA	1
			1, 2	INPUT		-1.0	uA	2, 3
VOL	Low Level Output Voltage	VCC=3.0V, VIH=2.1V, VIL=0.9V, IOL=12.0mA, VINH=3.0V, VINL=0.0V	1, 2	OUTPUT		.36	V	1
			1, 2	OUTPUT		.50	V	2, 3
		VCC=3.0V, VIH=2.1V, VIL=0.9V, IOL=50.0uA, VINH=3.0V, VINL=0.0V	1, 2	OUTPUT		.10	V	1, 2, 3
			1, 2	OUTPUT		.10	V	1, 2, 3
		VCC=5.5V, VIH=3.85V, VIL=1.65V, IOL=24.0mA, VINH=5.5V, VINL=0.0V	1, 2	OUTPUT		.36	V	1
			1, 2	OUTPUT		.50	V	2, 3
		VCC=5.5V, VIH=3.85V, VIL=1.65V, IOL=50.0uA, VINH=5.5V, VINL=0.0V	1, 2	OUTPUT		.10	V	1, 2, 3
			1, 2	OUTPUT		.36	V	1
VCC=4.5V, VIH=3.15V, VIL=1.35V, IOL=24.0mA, VINH=4.5V, VINL=0.0V	1, 2	OUTPUT		.50	V	2, 3		
	1, 2	OUTPUT		.36	V	1		
VIOL	Dynamic Output Current Low	VCC=5.5V, VIH=3.85V, VIL=1.65V, IOL=50.0mA, VINH=5.5V, VINL=0.0V	1, 2, 5	OUTPUT		1.65	V	1, 2, 3
			1, 2	OUTPUT		1.65	V	1, 2, 3
VOH	High Level Output Voltage	VCC=3.0V, VIH=2.1V, VIL=0.9V, IOH=-50.0uA, VINH=3.0V, VINL=0.0V	1, 2	OUTPUT	2.90		V	1, 2, 3
			1, 2	OUTPUT	2.56		V	1
		VCC=3.0V, VIH=2.1V, VIL=.90V, IOH=-12.0mA, VINH=3.0V, VINL=0.0V	1, 2	OUTPUT	2.40		V	2, 3
			1, 2	OUTPUT	2.40		V	2, 3
		VCC=5.5V, VIH=3.85V, VIL=1.65V, IOH=-24.0mA, VINH=5.5V, VINL=0.0V	1, 2	OUTPUT	4.86		V	1
			1, 2	OUTPUT	4.70		V	2, 3
		VCC=4.5V, VIH=3.15V, VIL=1.35V, IOH=-24.0mA, VINH=4.5V, VINL=0.0V	1, 2	OUTPUT	3.86		V	1
			1, 2	OUTPUT	3.70		V	2, 3
VCC=4.5V, VIH=3.15V, VIL=1.35V, IOH=-50.0uA, VINH=4.5V, VINL=0.0V	1, 2	OUTPUT	4.40		V	1, 2, 3		
	1, 2	OUTPUT	4.40		V	1, 2, 3		
VCC=5.5V, VIH=3.85V, VIL=1.65V, IOH=-50.0uA, VINH=5.5V, VINL=0.0V	1, 2	OUTPUT	5.40		V	1, 2, 3		
	1, 2	OUTPUT	5.40		V	1, 2, 3		
VIOH	Dynamic Output Current High	VCC=5.5V, VIH=3.85V, VIL=1.65V, IOH=-50.0mA, VINH=5.5V, VINL=0.0V	1, 2, 5	OUTPUT	3.85		V	1, 2, 3
			1, 2	OUTPUT	3.85		V	1, 2, 3
ICCH	Supply Current Outputs HIGH	VCC=5.5V, VINH=5.5V, VINL=0.0V	1, 2	VCC		100	nA	1
			1, 2	VCC		80	uA	2, 3

Electrical Characteristics

DC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: VCC 3.0V to 5.5V, Temperature Range: -55C to 125C.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
ICCL	Supply Current Outputs LOW	VCC=5.5V, VINL=0.0V	1, 2	VCC		100	nA	1
			1, 2	VCC		80	uA	2, 3
ICCZ	Supply Current Outputs Tri-State	VCC=5.5V, VINH=5.5V, VINL=0.0V	1, 2	VCC		100	nA	1
			1, 2	VCC		80	uA	2, 3
ICCF	Supply Current Functional	VCC=5.5V, VINH=5.5V, VINL=0.0V	1, 2	VCC		100	nA	1
			1, 2	VCC		80	uA	2, 3
IOZH	Maximum TRI-STATE Leakage Current High	VCC=3.0V, VM=3.0V, VINH=3.0V, VINL=0.0V, VIH=2.1V	1, 2	OUTPUT		0.25	uA	1
			1, 2	OUTPUT		5.0	uA	2, 3
		VCC=4.5V, VM=4.5V, VINH=4.5V, VINL=0.0V, VIH=3.15V	1, 2	OUTPUT		0.25	uA	1
			1, 2	OUTPUT		5.0	uA	2, 3
		VCC=5.5V, VM=5.5V, VINH=5.5V, VINL=0.0V, VIH=3.85V	1, 2	OUTPUT		0.25	uA	1
			1, 2	OUTPUT		5.0	uA	2, 3
IOZL	Maximum TRI-STATE Leakage Current Low	VCC=3.0V, VM=0.0V, VINH=3.0V, VINL=0.0V, VIH=2.1V	1, 2	OUTPUT		-0.25	uA	1
			1, 2	OUTPUT		-5.0	uA	2, 3
		VCC=4.5V, VM=0.0V, VINH=4.5V, VINL=0.0V, VIH=3.15V	1, 2	OUTPUT		-0.25	uA	1
			1, 2	OUTPUT		-5.0	uA	2, 3
		VCC=5.5V, VM=0.0V, VINH=5.5V, VINL=0.0V, VIH=3.85V	1, 2	OUTPUT		-0.25	uA	1
			1, 2	OUTPUT		-5.0	uA	2, 3
VIC+	Positive Input Clamp Voltage	VCC=0.0V, IM=1.0mA	7, 8	INPUT	0.40	1.5	V	1
VIC-	Negative Input Clamp Voltage	VCC=Open, IM=-1.0mA	7, 8	INPUT	-0.40	-1.5	V	1

AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: CL=50pf, RL=500 OHMS, TRISE=3ns, TFALL=3ns, Temp Range: -55C to 125C.

tpLH(1)	Propagation Delay	VCC=4.5V	3, 4, 6	In to Z or \bar{Z}	1.5	10.0	ns	9
			3, 4, 6	In to Z or \bar{Z}	1.5	12.0	ns	10, 11
tpHL(1)	Propagation Delay	VCC=4.5V	3, 4, 6	In to Z or \bar{Z}	1.5	10.0	ns	9
			3, 4, 6	In to Z or \bar{Z}	1.5	12.0	ns	10, 11

Electrical Characteristics

AC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
 AC: CL=50pf, RL=500 OHMS, TRISE=3ns, TFALL=3ns, Temp Range: -55C to125C.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpLH(2)	Propagation Delay	VCC=4.5V	3, 4, 6	Sn to Z or \bar{Z}	1.5	12.5	ns	9
			3, 4, 6	Sn to Z or \bar{Z}	1.5	15.5	ns	10, 11
tpHL(2)	Propagation Delay	VCC=4.5V	3, 4, 6	Sn to Z or \bar{Z}	1.5	12.5	ns	9
			3, 4, 6	Sn to Z or \bar{Z}	1.5	15.5	ns	10, 11
tpZH(1)	Output Enable Time	VCC=4.5V	3, 4, 6	$\bar{O}E$ to Z or \bar{Z}	1.5	8.0	ns	9
			3, 4, 6	$\bar{O}E$ to Z or \bar{Z}	1.5	10.0	ns	10, 11
tpZL(1)	Output Enable Time	VCC=4.5V	3, 4, 6	$\bar{O}E$ to Z or \bar{Z}	1.5	8.0	ns	9
			3, 4, 6	$\bar{O}E$ to Z or \bar{Z}	1.5	10.0	ns	10, 11
tpHZ(1)	Output Disable Time	VCC=4.5V	3, 4, 6	$\bar{O}E$ to Z or \bar{Z}	1.5	9.5	ns	9
			3, 4, 6	$\bar{O}E$ to Z or \bar{Z}	1.5	11.0	ns	10, 11
tpLZ(1)	Output Disable Time	VCC=4.5V	3, 4, 6	$\bar{O}E$ to Z or \bar{Z}	1.5	8.0	ns	9
			3, 4, 6	$\bar{O}E$ to Z or \bar{Z}	1.5	10.0	ns	10, 11
tpLH(3)	Propagation Delay	VCC=3.0V	3, 4	In to Z or \bar{Z}	1.0	14.0	ns	9
			3, 4	In to Z or \bar{Z}	1.0	17.0	ns	10, 11
tpHL(3)	Propagation Delay	VCC=3.0V	3, 4	In to Z or \bar{Z}	1.0	14.0	ns	9
			3, 4	In to Z or \bar{Z}	1.0	16.5	ns	10, 11
tpLH(4)	Propagation Delay	VCC=3.0V	3, 4	Sn to Z or \bar{Z}	1.0	17.5	ns	9
			3, 4	Sn to Z or \bar{Z}	1.0	21.0	ns	10, 11
tpHL(4)	Propagation Delay	VCC=3.0V	3, 4	Sn to Z or \bar{Z}	1.0	17.5	ns	9
			3, 4	Sn to Z or \bar{Z}	1.0	21.0	ns	10, 11

Electrical Characteristics

AC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: CL=50pf, RL=500 OHMS, TRISE=3ns, TFALL=3ns, Temp Range: -55C to125C.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpZH(2)	Output Enable Time	VCC=3.0V	3, 4	\overline{OE} to Z or \overline{Z}	1.0	11.0	ns	9
			3, 4	\overline{OE} to Z or \overline{Z}	1.0	13.0	ns	10, 11
tpZL(2)	Output Enable Time	VCC=3.0V	3, 4	\overline{OE} to Z or \overline{Z}	1.0	11.0	ns	9
			3, 4	\overline{OE} to Z or \overline{Z}	1.0	13.0	ns	10, 11
tpHZ(2)	Output Disable Time	VCC=3.0V	3, 4	\overline{OE} to Z or \overline{Z}	1.0	11.5	ns	9
			3, 4	\overline{OE} to Z or \overline{Z}	1.0	14.0	ns	10, 11
tpLZ(2)	Output Disable Time	VCC=3.0V	3, 4	\overline{OE} to Z or \overline{Z}	1.0	11.0	ns	9
			3, 4	\overline{OE} to Z or \overline{Z}	1.0	13.0	ns	10, 11

Note 1: SCREEN TESTED 100% ON EACH DEVICE AT +25C & +125C TEMPERATURE, SUBGROUPS 1, 2, 7, & 8.

Note 2: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C, 125C, & -55C TEMPERATURE, SUBGROUPS A1, 2, 3, 7, & 8.

Note 3: SCREEN TESTED 100% ON EACH DEVICE AT +25C TEMPERATURE ONLY, SUBGROUP A9.

Note 4: SAMPLE TESTED (METHOD 5005, TABLE 1) ON EACH MFG. LOT AT +25C, +125C, -55C TEMPERATURE, SUBGROUPS A9, 10, & 11.

Note 5: TRANSMISSION LINE DRIVING TEST, GUARDBAND LIMITS SET FOR +25C, 2MSEC DURATION MAX.

Note 6: MIN LIMITS GUARANTEED FOR 5.5V BY GUARDBANDING 4.5V MIN. LIMITS.

Note 7: SCREEN TESTED 100% ON EACH DEVICE AT +25C TEMPERATURE ONLY, SUBGROUP A1.

Note 8: SAMPLE TESTED (METHOD 5005, TABLE 1) AT +25C TEMPERATURE ONLY, SUBGROUP A1.

Revision History

Rev	ECN #	Rel Date	Originator	Changes
0A0	M0002709	04/12/99	Linda Collins	Initial MDS Release