

**MV54ACT257-X REV 0A0**

 Original Creation Date: 11/20/97  
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## Quad 2-Input Multiplexer With TRI-State Outputs

### General Description

The ACT257 is a quad 2-input multiplexer with 3-state outputs. Four bits of data from two sources can be selected using a Common Data Select input. The four outputs present the selected data in true (noninverted) form. The outputs may be switched to a high impedance state by placing a logic HIGH on the common Output Enable ( $\overline{OE}$ ) input, allowing the outputs to interface directly with bus-oriented systems.

### Industry Part Number

54ACT257

### Prime Die

J257

### NS Part Numbers

 54ACT257E-QMLV\*  
 54ACT257ERQMLV\*  
 54ACT257J-QMLV\*\*  
 54ACT257JRQMLV\*\*\*  
 54ACT257W-QMLV\*\*\*  
 54ACT257WRQMLV\*\*\*

### Controlling Document

5962-89689

### Processing

MIL-STD-883, Method 5004

### Quality Conformance Inspection

MIL-STD-883, Method 5005

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

**Features**

- Multiplexer expansion by tying outputs together
- Noninverting TRI-STATE outputs
- Outputs source/sink 24 mA
- ACT257 has TTL-compatible inputs
- Standard Military Drawing (SMD)
  - ACT257: 5962-8968901V2A\*, VEA\*\*, VFA\*\*\*
  - ACT257: 5962R8968901V2A\*, 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)	
CDIP	175 C
Thermal Resistance, junction-to-case (jc)	See MIL-STD-1835
Maximum Power Dissipation, (pd)	500 mW
Lead Temperature (soldering, 10 seconds)	+300 C

Note 1: Absolute maximum ratings are those values beyond which damage to the device may occur. The databook specifications 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)	4.5V to 5.5V
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)	
ACT Devices	
Vin from 0.8V to 2.0V	
Vcc @ 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 4.5V to 5.5V, Temp 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, VINL=0.0V	1, 2	INPUT		-0.1	uA	1
			1, 2	INPUT		-1.0	uA	2, 3
VOL	Low Level Output Voltage	VCC=4.5V, VINH=4.5V, VIH=2.0V, VIL=0.8V, IOL=50.0uA	1, 2	OUTPUT		.10	V	1, 2, 3
		VCC=5.5V, VINH=5.5V, VIH=2.0V, VIL=0.8V, IOL=50.0uA	1, 2	OUTPUT		.10	V	1, 2, 3
		VCC=4.5V, VINH=4.5V, VIH=2.0V, VIL=0.8V, IOL=24.0mA	1, 2	OUTPUT		.36	V	1
		1, 2	OUTPUT		.50	V	2, 3	
		VCC=5.5V, VINH=5.5V, VIH=2.0V, VIL=0.8V, IOL=24.0mA	1, 2	OUTPUT		.36	V	1
		1, 2	OUTPUT		.50	V	2, 3	
VVOL	Dynamic output current LOW	VCC=5.5V, VINH=5.5V, VIL=0.8V, IOL=50.0mA	1, 2, 5	OUTPUT		1.65	V	1, 2, 3
VOH	High Level Output Voltage	VCC=4.5V, VIH=2.0V, VIL=0.8V, IOH=-50.0uA	1, 2	OUTPUT	4.40		V	1, 2, 3
		VCC=5.5V, VIH=2.0V, VIL=0.8V, IOH=-50.0uA	1, 2	OUTPUT	5.40		V	1, 2, 3
		VCC=4.5V, VIH=2.0V, VIL=0.8V, IOH=-24.0mA	1, 2	OUTPUT	3.86		V	1
		1, 2	OUTPUT	3.70		V	2, 3	
		VCC=5.5V, VIH=2.0V, VIL=0.8V, IOH=-24.0mA	1, 2	OUTPUT	4.86		V	1
		1, 2	OUTPUT	4.70		V	2, 3	
VVOH	Dynamic output current HIGH	VCC=5.5V, VIH=2.0V, VIL=0.8V, IOH=-50.0mA	1, 2, 5	OUTPUT	3.85		V	1, 2, 3
IOZH	Maximum TRI-STATE Output Current	VCC=4.5V, VM=4.5V, VINL=0.0V, VIH=2.0V	1, 2	OUTPUT		0.25	uA	1
			1, 2	OUTPUT		5.0	uA	2, 3
		VCC=5.5V, VM=5.5V, VINL=0.0V, VIH=2.0V	1, 2	OUTPUT		0.25	uA	1
			1, 2	OUTPUT		5.0	uA	2, 3
IOZL	Maximum TRI-STATE Output Current	VCC=4.5V, VM=0.0V, VINH=4.5V, VIH=2.0V	1, 2	OUTPUT		-0.25	uA	1
			1, 2	OUTPUT		-5.0	uA	2, 3
		VCC=5.5V, VM=0.0V, VINH=5.5V, VIH=2.0V	1, 2	OUTPUT		-0.25	uA	1
			1, 2	OUTPUT		-5.0	uA	2, 3

## Electrical Characteristics

### DC PARAMETERS (Continued)

(The following conditions apply to all the following parameters, unless otherwise specified.)  
DC: VCC 4.5V to 5.5V, Temp Range: -55C to 125C.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
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
ICCL	Supply Current Outputs LOW	VCC=5.5V, VINL=0.0V	1, 2	VCC		100	nA	1
			1, 2	VCC		80	uA	2, 3
IC CZ	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
ICCT	Supply Current per Input	VCC=5.5V, VIHT=VCC-2.1V	1, 2	VCC		1.0	mA	1
			1, 2	VCC		1.6	mA	2, 3
VIC+	Positive Input Clamp Voltage	VCC=0.0V, IM=1.0 mA	7, 8	INPUT	0.40	1.50	V	1
VIC-	Negative Input Clamp Voltage	VCC=Open, IM=-1.0 mA	7, 8	INPUT	-0.40	-1.5	V	1

## Electrical Characteristics

### AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)  
AC: CL=50pF, RL=500 OHMS, TRISE/TFALL=3.0nS, Temp Range: -55C to 125C.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
tpLH(1)	Propagation Delay	VCC=4.5V	3, 4, 6	In to Zn	1.5	7.0	ns	9
			3, 4, 6	In to Zn	1.5	8.0	ns	10, 11
tpHL(1)	Propagation Delay	VCC=4.5V	3, 4, 6	In to Zn	1.5	7.5	ns	9
			3, 4, 6	In to Zn	1.5	9.5	ns	10, 11
tpLH(2)	Propagation Delay	VCC=4.5V	3, 4, 6	Sn to Zn	1.5	9.0	ns	9
			3, 4, 6	Sn to Zn	1.5	11.0	ns	10, 11
tpHL(2)	Propagation Delay	VCC=4.5V	3, 4, 6	Sn to Zn	1.5	9.5	ns	9
			3, 4, 6	Sn to Zn	1.5	11.5	ns	10, 11
tpZH	Output Enable Time	VCC=4.5V	3, 4, 6	$\overline{OE}$ to Zn	1.5	8.0	ns	9
			3, 4, 6	$\overline{OE}$ to Zn	1.5	9.5	ns	10, 11
tpZL	Output Enable Time	VCC=4.5V	3, 4, 6	$\overline{OE}$ to Zn	1.5	8.0	ns	9
			3, 4, 6	$\overline{OE}$ to Zn	1.5	9.5	ns	10, 11
tpHZ	Output Disable Time	VCC=4.5V	3, 4, 6	$\overline{OE}$ to Zn	1.5	9.0	ns	9
			3, 4, 6	$\overline{OE}$ to Zn	1.5	10.5	ns	10, 11
tpLZ	Output Disable Time	VCC=4.5V	3, 4, 6	$\overline{OE}$ to Zn	1.5	8.0	ns	9
			3, 4, 6	$\overline{OE}$ to Zn	1.5	9.5	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, 2 MSEC DURATION MAX.

Note 6: MIN LIMITS GUARANTEED FOR 5.5V BY GUARDBANDING 4.5V MINIMUM 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	M0002623	07/30/99	Linda Collins	Initial MDS Release