

MV54ACT399-X REV 0A0

Original Creation Date: 05/20/99
Last Update Date: 08/18/99
Last Major Revision Date: 05/20/99

Quad 2-Port Register

General Description

The ACT399 is the logical equivalent of a quad 2-input multiplexer feeding into four edge-triggered flip-flops. A common Select input determines which of the two 4-bit words is accepted. The selected data enters the flip-flops on the rising edge of the clock. The ACT399 is the 16-pin version of the ACT398, with only the Q outputs of the flip-flops available.

Industry Part Number

54ACT399

Prime Die

J399

NS Part Numbers

54ACT399E-QMLV*
54ACT399ERQMLV*
54ACT399J-QMLV**
54ACT399JRQMLV**
54ACT399W-QMLV***
54ACT399WRQMLV***

Controlling Document

5962-90934

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

- Select inputs from two data sources
- Fully positive edge-triggered operation
- Outputs source/sink 24 mA
- 54ACT399 has TTL-compatible inputs
- Standard Military Drawing (SMD):
 - ACT399: 5962-9093401V2A*, VEA**, VFA***
 - ACT399: 5962R9093401V2A*, 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 |

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 | 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 | 1, 2 | INPUT | | -0.1 | uA | 1 |
| | | | 1, 2 | INPUT | | -1.0 | uA | 2, 3 |
| VOL | Low Level Output Voltage | VCC=4.5V, VIH=2.0V, IOL=50.0uA, VIL=0.8V | 1, 2 | OUTPUT | | .10 | V | 1, 2, 3 |
| | | VCC=5.5V, VIH=2.0V, IOL=50.0uA, VIL=0.8V | 1, 2 | OUTPUT | | .10 | V | 1, 2, 3 |
| | | VCC=4.5V, VIH=2.0V, IOL=24.0mA, VIL=0.8V | 1, 2 | OUTPUT | | .36 | V | 1 |
| | | | 1, 2 | OUTPUT | | .50 | V | 2, 3 |
| | | VCC=5.5V, VIH=2.0V, IOL=24.0mA, VIL=0.8V | 1, 2 | OUTPUT | | .36 | V | 1 |
| | | | 1, 2 | OUTPUT | | .50 | V | 2, 3 |
| VIOL | Dynamic output current LOW | VCC=5.5V, VIH=2.0V, IOL=50.0mA, VIL=0.8V | 1, 2, 5 | OUTPUT | | 1.65 | V | 1, 2, 3 |
| VOH | High Level Output Voltage | VCC=4.5V, VIL=0.8V, VIH=2.0V, IOH=-50.0uA | 1, 2 | OUTPUT | 4.40 | | V | 1, 2, 3 |
| | | VCC=5.5V, VIL=0.8V, VIH=2.0V, IOH=-50.0uA | 1, 2 | OUTPUT | 5.40 | | V | 1, 2, 3 |
| | | VCC=4.5V, VIL=0.8V, VIH=2.0V, IOH=-24.0mA | 1, 2 | OUTPUT | 3.86 | | V | 1 |
| | | | 1, 2 | OUTPUT | 3.70 | | V | 2, 3 |
| | | VCC=5.5V, VIL=0.8V, VIH=2.0V, IOH=-24.0mA | 1, 2 | OUTPUT | 4.86 | | V | 1 |
| | | | 1, 2 | OUTPUT | 4.70 | | V | 2, 3 |
| VIOH | Dynamic output current HIGH | VCC=5.5V, VIL=0.8V, VIH=2.0V, IOH=-50.0mA | 1, 2, 5 | OUTPUT | 3.85 | | V | 1, 2, 3 |
| ICCH | Supply Current Outputs HIGH | VCC=5.5V, VINL=0.0V, VINH=5.5V | 1, 2 | VCC | | 100 | nA | 1 |
| | | | 1, 2 | VCC | | 80 | uA | 2, 3 |
| ICCL | Supply Current Outputs LOW | VCC=5.5V, VINL=0.0V, VINH=5.5V | 1, 2 | VCC | | 100 | nA | 1 |
| | | | 1, 2 | VCC | | 80 | uA | 2, 3 |
| ICCF | Supply Current Functional | VCC=5.5V, VINL=0.0V, VINH=5.5V | 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=1.0mA | 8, 9 | INPUT | 0.4 | 1.5 | V | 1 |

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 |
|--------|------------------------------|---------------------|-------|----------|------|------|------|------------|
| VIC- | Negative Input Clamp Voltage | VCC=Open, IM=-1.0mA | 8, 9 | INPUT | -0.4 | -1.5 | V | 1 |

AC PARAMETERS

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

| | | | | | | | | |
|------------|-------------------------|----------|---------|----------|-----|------|-----|-----------|
| tpLH | Propagation Delay | VCC=4.5V | 3, 4, 7 | CP to Q | 1.5 | 9.0 | ns | 9 |
| | | | 3, 4, 7 | CP to Q | 1.5 | 10.0 | ns | 10, 11 |
| tpHL | Propagation Delay | VCC=4.5V | 3, 4, 7 | CP to Q | 1.5 | 9.0 | ns | 9 |
| | | | 3, 4, 7 | CP to Q | 1.5 | 10.0 | ns | 10, 11 |
| ts(H/L)(1) | Setup Time HIGH or LOW | VCC=4.5V | 6 | In to CP | 3.0 | | ns | 9 |
| | | | 6 | In to CP | 3.5 | | ns | 10, 11 |
| th(H/L)(1) | Hold Time HIGH or LOW | VCC=4.5V | 6 | In to CP | 3.0 | | ns | 9, 10, 11 |
| ts(H/L)(2) | Setup Time HIGH or LOW | VCC=4.5V | 6 | S to CP | 5.0 | | ns | 9 |
| | | | 6 | S to CP | 6.0 | | ns | 10, 11 |
| th(H/L)(2) | Hold Time HIGH or LOW | VCC=4.5V | 6 | S to CP | 2.0 | | ns | 9 |
| | | | 6 | S to CP | 2.5 | | ns | 10, 11 |
| tw(H/L) | Pulse Width | VCC=4.5V | 6 | CP | 5.0 | | ns | 9, 10, 11 |
| Fmax | Maximum Clock Frequency | VCC=4.5V | 6 | | 95 | | MHz | 9 |
| | | | 6 | | 90 | | MHz | 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: GUARANTEED BUT NOT TESTED (DESIGN CHARACTERIZATION DATA).

Note 7: +25C & +125C MIN LIMITS GUARANTEED FOR 5.5V BY GUARDBANDING 4.5V MINIMUM LIMITS.

Note 8: SCREEN TESTED 100% ON EACH DEVICE AT +25C TEMPERATURE ONLY, SUBGROUP A1.

Note 9: SAMPLE TESTED (METHOD 5005, TABLE 1) AT +25C TEMPERATURE ONLY, SUBGROUP A1.

Revision History

| Rev | ECN # | Rel Date | Originator | Changes |
|-----|----------|----------|---------------|---------------------|
| 0A0 | M0003442 | 08/18/99 | Steve Lombard | Initial MDS Release |

National Semiconductor was acquired by Texas Instruments.

http://www.ti.com/corp/docs/investor_relations/pr_09_23_2011_national_semiconductor.html

This file is the datasheet for the following electronic components:

5962R9093401Q2A(54ACT399LMQB-RH) - [http://www.ti.com/product/5962r9093401q2a\(54act399lmb-rh\)?HQS=TI-null-null-dscatalog-df-pf-null-wwe](http://www.ti.com/product/5962r9093401q2a(54act399lmb-rh)?HQS=TI-null-null-dscatalog-df-pf-null-wwe)

54ACT399FMQB - <http://www.ti.com/product/54act399fmb?HQS=TI-null-null-dscatalog-df-pf-null-wwe>

54ACT399FM-MLS - <http://www.ti.com/product/54act399fm-mls?HQS=TI-null-null-dscatalog-df-pf-null-wwe>

54ACT399DMQB - <http://www.ti.com/product/54act399dmb?HQS=TI-null-null-dscatalog-df-pf-null-wwe>

5962R9093401VFA(54ACT399WRQMLV) - [http://www.ti.com/product/5962r9093401vfa\(54act399wrqmlv\)?HQS=TI-null-null-dscatalog-df-pf-null-wwe](http://www.ti.com/product/5962r9093401vfa(54act399wrqmlv)?HQS=TI-null-null-dscatalog-df-pf-null-wwe)

54ACT399LMQB - <http://www.ti.com/product/54act399lmb?HQS=TI-null-null-dscatalog-df-pf-null-wwe>

5962R9093401VEA(54ACT399JRQMLV) - [http://www.ti.com/product/5962r9093401vea\(54act399jrqmlv\)?HQS=TI-null-null-dscatalog-df-pf-null-wwe](http://www.ti.com/product/5962r9093401vea(54act399jrqmlv)?HQS=TI-null-null-dscatalog-df-pf-null-wwe)

5962R9093401V2A(54ACT399ERQMLV) - [http://www.ti.com/product/5962r9093401v2a\(54act399erqmlv\)?HQS=TI-null-null-dscatalog-df-pf-null-wwe](http://www.ti.com/product/5962r9093401v2a(54act399erqmlv)?HQS=TI-null-null-dscatalog-df-pf-null-wwe)

5962R9093401QFA(54ACT399FMQB-RH) - [http://www.ti.com/product/5962r9093401qfa\(54act399fmb-rh\)?HQS=TI-null-null-dscatalog-df-pf-null-wwe](http://www.ti.com/product/5962r9093401qfa(54act399fmb-rh)?HQS=TI-null-null-dscatalog-df-pf-null-wwe)

5962R9093401QEA(54ACT399DMQB-RH) - [http://www.ti.com/product/5962r9093401qea\(54act399dmb-rh\)?HQS=TI-null-null-dscatalog-df-pf-null-wwe](http://www.ti.com/product/5962r9093401qea(54act399dmb-rh)?HQS=TI-null-null-dscatalog-df-pf-null-wwe)



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