National Semiconductor

MICROCIRCUIT DATA SHEET

MV54ACT399-X REV 0A0

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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

Controlling Document

5962-90934

NS Part Numbers

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

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (^{O}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)	$\pm$50 mA
DC Vcc or Ground Current per Output Pin (Icc or Ignd)	$\pm$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 TM 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