
PART NUMBER**54ACT157VFA-R-ROCA**

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Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceeds the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-38535
 - Class Q Military
 - Class V Space Level

Qualified Suppliers List of Distributors (QSLD)

- Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OCM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

54ACT157 • 54AC157 Quad 2-Input Multiplexer

Check for Samples: [54AC157](#), [54ACT157](#)

FEATURES

- I_{CC} and I_{OZ} Reduced by 50%
- Outputs Source/Sink 24 mA
- 'ACT157 has TTL-Compatible Inputs
- Standard Microcircuit Drawing (SMD)
 - 'AC157: 5962-89539
 - 'ACT157: 5962-89688

Logic Symbols

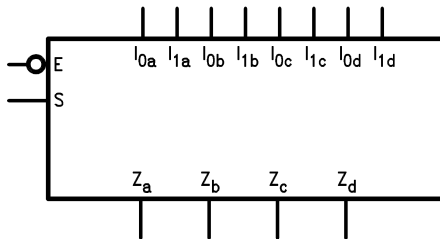


Figure 1.

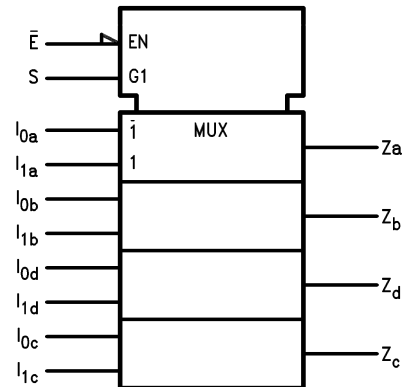


Figure 2. IEEE/IEC

Pin Names	Description
I_{0a} – I_{0d}	Source 0 Data Inputs
I_{1a} – I_{1d}	Source 1 Data Inputs
$\bar{E}$	Enable Input
S	Select Input
Z_a – Z_d	Outputs



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Connection Diagrams

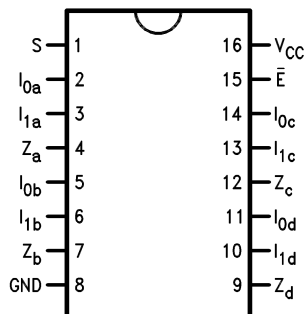


Figure 3. 16-Pin CDIP or CLGA
See NFE0016A or NAD0016A Package

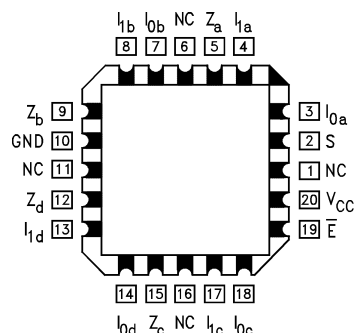


Figure 4. 20-Pin LCCC
See NAJ0020A Package

FUNCTIONAL DESCRIPTION

The 'AC/'ACT157 is a quad 2-input multiplexer. It selects four bits of data from two sources under the control of a common Select input (S). The Enable input ($\bar{E}$) is active-LOW. When $\bar{E}$ is HIGH, all of the outputs (Z) are forced LOW regardless of all other inputs. The 'AC/'ACT157 is the logic implementation of a 4-pole, 2-position switch where the position of the switch is determined by the logic levels supplied to the Select input. The logic equations for the outputs are shown below:

$$Z_a = \bar{E} \cdot (I_{1a} \cdot S + I_{0a} \cdot \bar{S})$$

$$Z_b = \bar{E} \cdot (I_{1b} \cdot S + I_{0b} \cdot \bar{S})$$

$$Z_c = \bar{E} \cdot (I_{1c} \cdot S + I_{0c} \cdot \bar{S})$$

$$Z_d = \bar{E} \cdot (I_{1d} \cdot S + I_{0d} \cdot \bar{S})$$

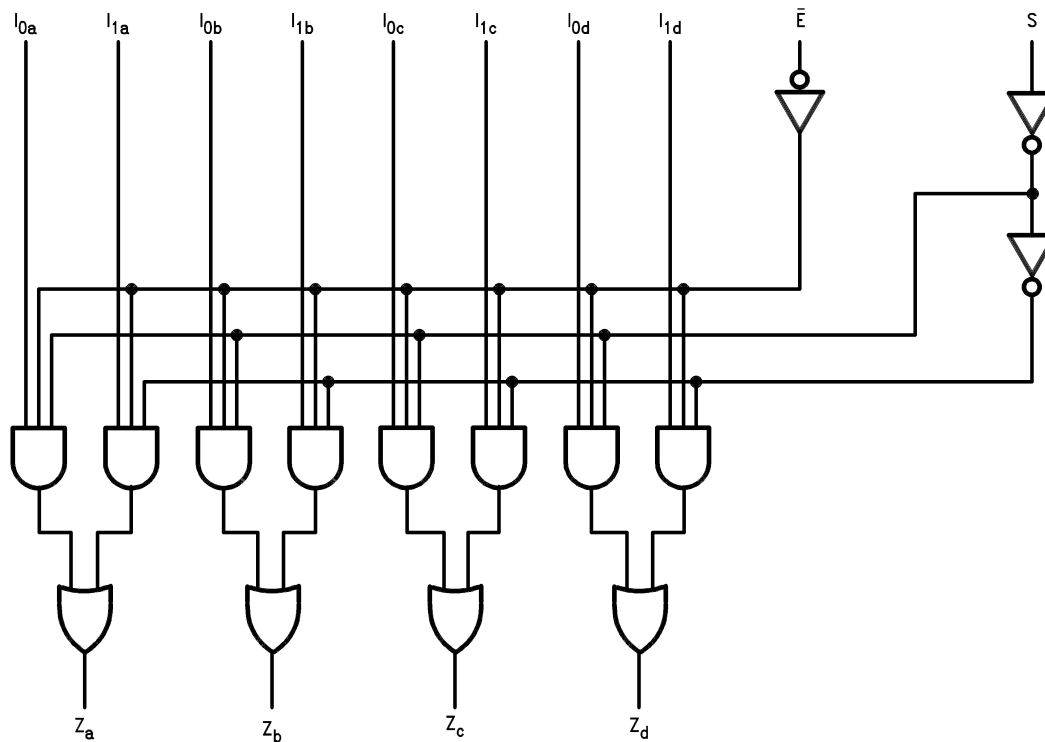
A common use of the 'AC/'ACT157 is the moving of data from two groups of registers to four common output busses. The particular register from which the data comes is determined by the state of the Select input. A less obvious use is as a function generator. The 'AC/'ACT157 can generate any four of the sixteen different functions of two variables with one variable common. This is useful for implementing gating functions.

Truth Table⁽¹⁾

Inputs				Outputs
$\bar{E}$	S	I_0	I_1	Z
H	X	X	X	L
L	H	X	L	L
L	H	X	H	H
L	L	L	X	L
L	L	H	X	H

- (1) H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

Logic Diagram



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

Absolute Maximum Ratings⁽¹⁾⁽²⁾

Supply Voltage (V_{CC})		–0.5V to +7.0V
DC Input Diode Current (I_{IK})	$V_I = -0.5V$	–20 mA
	$V_I = V_{CC} + 0.5V$	+20 mA
DC Input Voltage (V_I)		–0.5V to $V_{CC} + 0.5V$
DC Output Diode Current (I_{OK})	$V_O = -0.5V$	–20 mA
	$V_O = V_{CC} + 0.5V$	+20 mA
DC Output Voltage (V_O)		–0.5V to $V_{CC} + 0.5V$
DC Output Source or Sink Current (I_O)		±50 mA
DC V_{CC} or Ground Current per Output Pin (I_{CC} or I_{GND})		±50 mA
Storage Temperature (T_{STG})		–65°C to +150°C
Junction Temperature (T_J)	CDIP	175°C

- (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. TI does not recommend operation of FACT[®] circuits outside databook specifications.
- (2) If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/Distributors for availability and specifications.

Recommended Operating Conditions

Supply Voltage (V_{CC})	'AC	2.0V to 6.0V
	'ACT	4.5V to 5.5V
Input Voltage (V_I)		0V to V_{CC}
Output Voltage (V_O)		0V to V_{CC}
Operating Temperature (T_A)	54AC/ACT	–55°C to +125°C
Minimum Input Edge Rate ($\Delta V/\Delta t$) 'AC Devices	V_{IN} from 30% to 70% of V_{CC}	125 mV/ns
	V_{CC} @ 3.3V, 4.5V, 5.5V	
Minimum Input Edge Rate ($\Delta V/\Delta t$) 'ACT Devices	V_{IN} from 0.8V to 2.0V	125 mV/ns
	V_{CC} @ 4.5V, 5.5V	

DC Characteristics for 'AC Family Devices

Symbol	Parameter	V _{CC} (V)	54AC	Units	Conditions
			T _A = –55°C to +125°C		
			Ensured Limits		
V _{IH}	Minimum High Level Input Voltage	3.0	2.1	V	V _{OUT} = 0.1V or V _{CC} – 0.1V
		4.5	3.15		
		5.5	3.85		
V _{IL}	Maximum Low Level Input Voltage	3.0	0.9	V	V _{OUT} = 0.1V or V _{CC} – 0.1V
		4.5	1.35		
		5.5	1.65		
V _{OH}	Minimum High Level Output Voltage	3.0	2.9	V	I _{OUT} = –50 µA
		4.5	4.4		
		5.5	5.4		
	Minimum High Level Output Voltage	3.0	2.4	V	V _{IN} = V _{IL} or V _{IH} ⁽¹⁾
		4.5	3.7		I _{OH} = –12 mA
		5.5	4.7		I _{OH} = –24 mA
		5.5	4.7		I _{OH} = –24 mA
		5.5	4.7		I _{OH} = –24 mA
V _{OL}	Maximum Low Level Output Voltage	3.0	0.1	V	I _{OUT} = 50 µA
		4.5	0.1		
		5.5	0.1		
	Maximum Low Level Output Voltage	3.0	0.50	V	V _{IN} = V _{IL} or V _{IH} ⁽¹⁾
		4.5	0.50		I _{OL} = 12 mA
		5.5	0.50		I _{OL} = 24 mA
		5.5	0.50		I _{OL} = 24 mA
		5.5	0.50		I _{OL} = 24 mA
I _{IN}	Maximum Input Leakage Current	5.5	±1.0	µA	V _I = V _{CC} , GND
I _{OLD}	Minimum Dynamic Output Current ⁽²⁾	5.5	50	mA	V _{OLD} = 1.65V Max
I _{OHD}		5.5	–50	mA	V _{OHD} = 3.85V Min
I _{CC}	Maximum Quiescent Supply Current	5.5	80.0	µA	V _{IN} = V _{CC} or GND

(1) All outputs loaded; thresholds on input associated with output under test.

(2) Maximum test duration 2.0 ms, one output loaded at a time.

DC Characteristics for 'ACT Family Devices

Symbol	Parameter	V _{CC} (V)	54ACT	Units	Conditions
			T _A = –55°C to +125°C		
			Ensured Limits		
V _{IH}	Minimum High Level Input Voltage	4.5	2.0	V	V _{OUT} = 0.1V or V _{CC} – 0.1V
		5.5	2.0		
V _{IL}	Maximum Low Level Input Voltage	4.5	0.8	V	V _{OUT} = 0.1V or V _{CC} – 0.1V
		5.5	0.8		
V _{OH}	Minimum High Level Output Voltage	4.5	4.4	V	I _{OUT} = –50 µA
		5.5	5.4		
		4.5	3.70	V	V _{IN} = V _{IL} or V _{IH} ⁽¹⁾ I _{OH} = –24 mA I _{OH} = –24 mA
		5.5	4.70		
V _{OL}	Maximum Low Level Output Voltage	4.5	0.1	V	I _{OUT} = 50 µA
		5.5	0.1		
		4.5	0.50	V	V _{IN} = V _{IL} or V _{IH} ⁽¹⁾ I _{OL} = 24 mA I _{OL} = 24 mA
		5.5	0.50		
I _{IN}	Maximum Input Leakage Current	5.5	±1.0	µA	V _I = V _{CC} , GND
I _{CCT}	Maximum I _{CC} /Input	5.5	1.6	mA	V _I = V _{CC} – 2.1V
I _{OLD}	Minimum Dynamic Output Current ⁽²⁾	5.5	50	mA	V _{OLD} = 1.65V Max
I _{OHD}		5.5	–50	mA	V _{OHD} = 3.85V Min
I _{CC}	Maximum Quiescent Supply Current	5.5	80.0	µA	V _{IN} = V _{CC} or GND

(1) All outputs loaded; thresholds on input associated with output under test.

(2) Maximum test duration 2.0 ms, one output loaded at a time.

AC Electrical Characteristics

Symbol	Parameter	V _{CC} (V) ⁽¹⁾	54AC		Units	Fig. No.
			T _A = -55°C to +125°C			
			C _L = 50 pF			
			Min	Max		
t _{PLH}	Propagation Delay	3.3	1.0	16.0	ns	
	S to Z _n	5.0	1.0	12.0		
t _{PHL}	Propagation Delay	3.3	1.0	14.0	ns	
	S to Z _n	5.0	1.0	11.5		
t _{PLH}	Propagation Delay	3.3	1.0	16.0	ns	
	$\bar{E}$ to Z _n	5.0	1.0	12.0		
t _{PHL}	Propagation Delay	3.3	1.0	14.0	ns	
	$\bar{E}$ to Z _n	5.0	1.0	11.5		
t _{PLH}	Propagation Delay	3.3	1.0	11.0	ns	
	I _n to Z _n	5.0	1.0	9.0		
t _{PHL}	Propagation Delay	3.3	1.0	11.0	ns	
	I _n to Z _n	5.0	1.0	9.0		

- (1) Voltage Range 3.3 is 3.3V $\pm$ 0.3V.
Voltage Range 5.0 is 5.0V $\pm$ 0.5V.

AC Electrical Characteristics

Symbol	Parameter	V _{CC} (V) ⁽¹⁾	54ACT		Units	Fig. No.
			T _A = -55°C to +125°C			
			C _L = 50 pF			
			Min	Max		
t _{PLH}	Propagation Delay (S to Z _n)	5.0	1.0	11.5	ns	
t _{PHL}	Propagation Delay (S to Z _n)	5.0	1.0	11.5	ns	
t _{PLH}	Propagation Delay($\overline{E}$ to Z _n)	5.0	1.0	12.0	ns	
t _{PHL}	Propagation Delay($\overline{E}$ to Z _n)	5.0	1.0	10.0	ns	
t _{PLH}	Propagation Delay(I _n to Z _n)	5.0	1.0	8.5	ns	
t _{PHL}	Propagation Delay(I _n to Z _n)	5.0	1.0	9.0	ns	

(1) Voltage Range 5.0 is 5.0V $\pm$ 0.5V.

Capacitance

Symbol	Parameter	Typ	Units	Conditions
C_{IN}	Input Capacitance	4.5	pF	$V_{CC} = \text{OPEN}$
C_{PD}	Power Dissipation Capacitance	50.0	pF	$V_{CC} = 5.0\text{V}$

REVISION HISTORY

Changes from Revision A (April 2013) to Revision B

Page

- Changed layout of National Data Sheet to TI format [8](#)

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