Rochester Electronics

Datasheet

PART NUMBER

54ACT151SFA-R-ROCA

Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All re-creations are done with the approval of the Original Component Manufacturer. (OCM)

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.

54AC151/54ACT151 8-Input Multiplexer

Check for Samples: 54AC151, 54ACT151

FEATURES

- **I_{CC} Reduced by 50%**
- **Outputs Source/Sink 24 mA**
- **'ACT151 has TTL-Compatible Inputs**
- **Standard Microcircuit Drawing (SMD)**
  - **'AC151: 5962-87691**
  - **'ACT151: 5962-88756**
- **54AC151 Now Qualified to 300Krad RHA Designation, Refer to the SMD for More Information**

DESCRIPTION

The 'AC/'ACT151 is a high-speed 8-input digital multiplexer. It provides, in one package, the ability to select one line of data from up to eight sources. The 'AC/'ACT151 can be used as a universal function generator to generate any logic function of four variables. Both true and complementary outputs are provided.

Logic Symbols

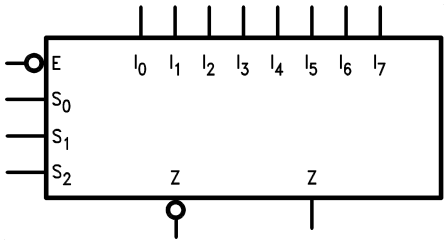


Figure 1.

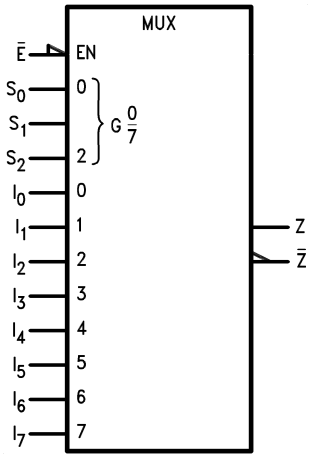


Figure 2. IEEE/IEC

Pin Names	Description
I_0–I_7	Data Inputs
S_0–S_2	Select Inputs
$\overline{E}$	Enable Input
Z	Data Output
$\overline{Z}$	Inverted Data Output

Connection Diagrams

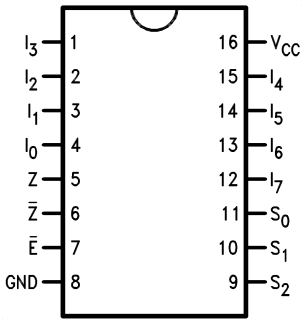


Figure 3. 16-Pin CDIP or CLGA
See NFE0016A or NAD0016A Package

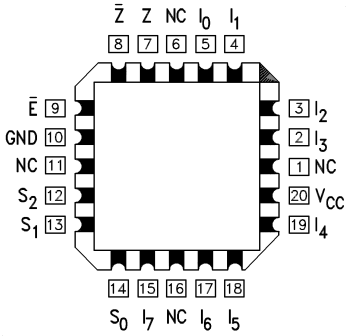


Figure 4. 20-Pin LCCC
See NAJ0020A Package

Truth Table(1)

Inputs				Outputs	
$\bar{E}$	S_2	S_1	S_0	$\bar{Z}$	Z
H	X	X	X	H	L
L	L	L	L	$\bar{I}_0$	I_0
L	L	L	H	$\bar{I}_1$	I_1
L	L	H	L	$\bar{I}_2$	I_2
L	L	H	H	$\bar{I}_3$	I_3
L	H	L	L	$\bar{I}_4$	I_4
L	H	L	H	$\bar{I}_5$	I_5
L	H	H	L	$\bar{I}_6$	I_6
L	H	H	H	$\bar{I}_7$	I_7

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

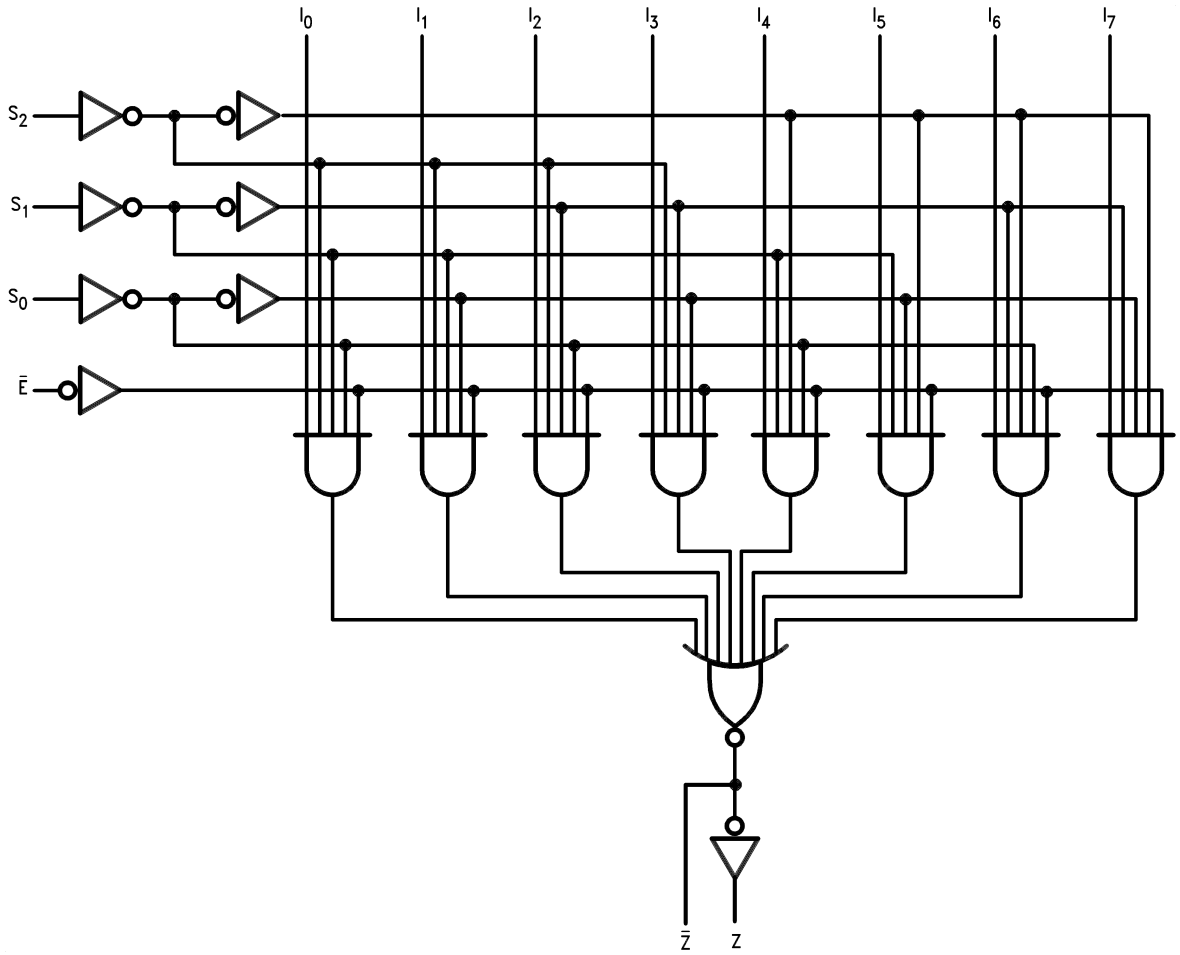
Functional Description

The 'AC/'ACT151 is a logic implementation of a single pole, 8-position switch with the switch position controlled by the state of three Select inputs, S_0, S_1, S_2. Both true and complementary outputs are provided. The Enable input ($\overline{E}$) is active LOW. When it is not activated, the complementary output is HIGH and the true output is LOW regardless of all other inputs. The logic function provided at the output is:

$$Z = \overline{E} \bullet (I_0 \bullet \overline{S}_0 \bullet \overline{S}_1 \bullet \overline{S}_2 + I_1 \bullet S_0 \bullet \overline{S}_1 \bullet \overline{S}_2 + I_2 \bullet \overline{S}_0 \bullet S_1 \bullet \overline{S}_2 + I_3 \bullet S_0 \bullet S_1 \bullet \overline{S}_2 + I_4 \bullet \overline{S}_0 \bullet \overline{S}_1 \bullet S_2 + I_5 \bullet S_0 \bullet \overline{S}_1 \bullet \overline{S}_2 + I_6 \bullet \overline{S}_0 \bullet S_1 \bullet S_2 + I_7 \bullet S_0 \bullet S_1 \bullet S_2)$$

The 'AC/'ACT151 provides the ability, in one package to select from eight sources of data or control information. By proper manipulation of the inputs, the 'AC/'ACT151 can provide any logic function of four variables and its complement.

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 (ΔV/Δt) '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 (ΔV/Δt) '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 T_A = −55°C to +125°C Ensured Limits	Units	Conditions
V_{IH}	Minimum High Level Input Voltage	3.0	2.1		V_{OUT} = 0.1V
		4.5	3.15	V	or V_{CC} − 0.1V
		5.5	3.85		
V_{IL}	Maximum Low Level Input Voltage	3.0	0.9		V_{OUT} = 0.1V
		4.5	1.35	V	or V_{CC} − 0.1V
		5.5	1.65		
V_{OH}	Minimum High Level Output Voltage	3.0	2.9		I_{OUT} = −50 µA
		4.5	4.4	V	
		5.5	5.4		
					V_{IN} = V_{IL} or V_{IH} (1)
		3.0	2.4		I_{OH} = −12 mA
		4.5	3.7	V	I_{OH} = −24 mA
		5.5	4.7		I_{OH} = −24 mA
V_{OL}	Maximum Low Level Output Voltage	3.0	0.1		I_{OUT} = 50 µA
		4.5	0.1	V	
		5.5	0.1		
					V_{IN} = V_{IL} or V_{IH} (1)
		3.0	0.50		I_{OL} = 12 mA
		4.5	0.50	V	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 T_A = −55°C to +125°C Ensured Limits	Units	Conditions
V_{IH}	Minimum High Level Input Voltage	4.5 5.5	2.0 2.0	V	V_{OUT} = 0.1V or V_{CC} − 0.1V
V_{IL}	Maximum Low Level Input Voltage	4.5 5.5	0.8 0.8	V	V_{OUT} = 0.1V or V_{CC} − 0.1V
V_{OH}	Minimum High Level Output Voltage	4.5 5.5	4.4 5.4	V	I_{OUT} = −50 µA
		 4.5 5.5	 3.70 4.70	V	V_{IN} = V_{IL} or V_{IH} (1) I_{OH} = −24 mA I_{OH} = −24 mA
V_{OL}	Maximum Low Level Output Voltage	4.5 5.5	0.1 0.1	V	I_{OUT} = 50 µA
		 4.5 5.5	 0.50 0.50	V	V_{IN} = V_{IL} or V_{IH} (1) I_{OL} = 24 mA I_{OL} = 24 mA
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 T_A = −55°C to +125°C C_L = 50 pF		Units	Fig. No.
			Min	Max		
t_{PLH}	Propagation Delay	3.3	1.0	22.0	ns	
	S_n to Z or $\overline{Z}$	5.0	1.0	15.5		
t_{PHL}	Propagation Delay	3.3	1.0	22.0	ns	
	S_n to Z or $\overline{Z}$	5.0	1.0	15.5		
t_{PLH}	Propagation Delay	3.3	1.0	15.5	ns	
	$\overline{E}$ to Z or $\overline{Z}$	5.0	1.0	12.0		
t_{PHL}	Propagation Delay	3.3	1.0	15.5	ns	
	$\overline{E}$ to Z or $\overline{Z}$	5.0	1.0	12.0		
t_{PLH}	Propagation Delay	3.3	1.0	16.0	ns	
	I_n to Z or $\overline{Z}$	5.0	1.0	12.0		
t_{PHL}	Propagation Delay	3.3	1.0	18.0	ns	
	I_n to Z or $\overline{Z}$	5.0	1.0	13.0		

(1) Voltage Range 3.3 is 3.3V ±0.3V.
Voltage Range 5.0 is 5.0V ±0.5V.

AC Electrical Characteristics

Symbol	Parameter	V_{CC} (V) (1)	54ACT T_A = −55°C to +125°C C_L = 50 pF		Units	Fig. No.
			Min	Max		
t_{PLH}	Propagation Delay S_n to Z	5.0	1.0	19.5	ns	
t_{PHL}	Propagation Delay S_n to Z	5.0	1.0	20.0	ns	
t_{PLH}	Propagation Delay S_n to $\overline{Z}$	5.0	1.0	19.5	ns	
t_{PHL}	Propagation Delay S_n to $\overline{Z}$	5.0	1.0	20.0	ns	
t_{PLH}	Propagation Delay $\overline{E}$ to Z	5.0	1.0	12.0	ns	
t_{PHL}	Propagation Delay $\overline{E}$ to Z	5.0	1.0	12.5	ns	
t_{PLH}	Propagation Delay $\overline{E}$ to $\overline{Z}$	5.0	1.0	12.0	ns	
t_{PHL}	Propagation Delay $\overline{E}$ to $\overline{Z}$	5.0	1.0	12.5	ns	
t_{PLH}	Propagation Delay I_n to Z	5.0	1.0	15.0	ns	
t_{PHL}	Propagation Delay I_n to Z	5.0	1.0	16.0	ns	
t_{PLH}	Propagation Delay I_n to $\overline{Z}$	5.0	1.0	15.0	ns	
t_{PHL}	Propagation Delay I_n to $\overline{Z}$	5.0	1.0	16.0	ns	

(1) Voltage Range 5.0 is 5.0V ±0.5V.

Capacitance

Symbol	Parameter	Typ	Units	Conditions
C_{IN}	Input Capacitance	4.5	pF	V_{CC} = OPEN
C_{PD}	Power Dissipation Capacitance	70.0	pF	V_{CC} = 5.0V

REVISION HISTORY

Changes from Revision B (April 2013) to Revision C	Page
• Changed layout of National Data Sheet to TI format	8

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