

54AC153 • 54ACT153 Dual 4-Input Multiplexer

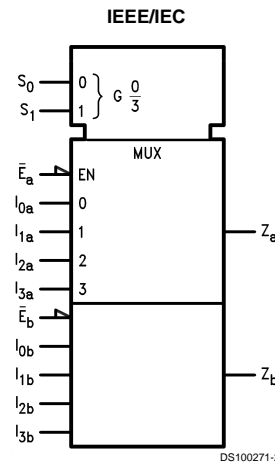
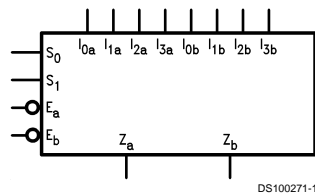
General Description

The 'AC/ACT153 is a high-speed dual 4-input multiplexer with common select inputs and individual enable inputs for each section. It can select two lines of data from four sources. The two buffered outputs present data in the true (non-inverted) form. In addition to multiplexer operation, the 'AC/ACT153 can act as a function generator and generate any two functions of three variables.

Features

- I_{CC} reduced by 50%
- Outputs source/sink 24 mA
- 'ACT153 has TTL-compatible inputs
- Standard Microcircuit Drawings (SMD)
 - 'AC153: 5962-87625
 - 'ACT153: 5962-87698

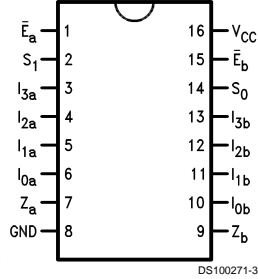
Logic Symbols



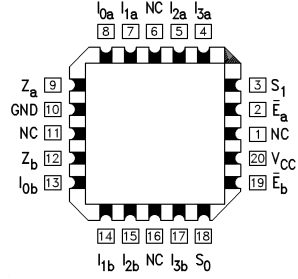
Pin Names	Description
I_{0a} – I_{3a}	Side A Data Inputs
I_{0b} – I_{3b}	Side B Data Inputs
S_0, S_1	Common Select Inputs
\bar{E}_a	Side A Enable Input
\bar{E}_b	Side B Enable Input
Z_a	Side A Output
Z_b	Side B Output

Connection Diagrams

Pin Assignment
for DIP and Flatpak



Pin Assignment
for LCC



Functional Description

The 'AC/ACT153 is a dual 4-input multiplexer. It can select two bits of data from up to four sources under the control of the common Select inputs (S_0 , S_1). The two 4-input multiplexer circuits have individual active-LOW Enables (\bar{E}_a , \bar{E}_b) which can be used to strobe the outputs independently. When the Enables (\bar{E}_a , \bar{E}_b) are HIGH, the corresponding outputs Z_a , Z_b) are forced LOW. The 'AC/ACT153 is the logic implementation of a 2-pole, 4-position switch, where the position of the switch is determined by the logic levels supplied to the Select inputs. The logic equations for the outputs are shown below.

$$Z_a = \bar{E}_a \cdot (I_{0a} \cdot \bar{S}_1 \cdot \bar{S}_0 + I_{1a} \cdot \bar{S}_1 \cdot S_0 + I_{2a} \cdot S_1 \cdot \bar{S}_0 + I_{3a} \cdot S_1 \cdot S_0)$$

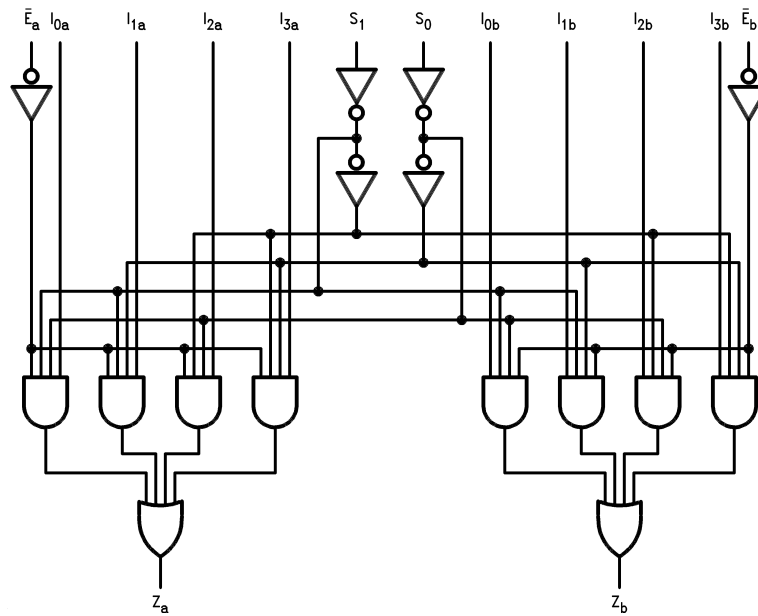
$$Z_b = \bar{E}_b \cdot (I_{0b} \cdot \bar{S}_1 \cdot \bar{S}_0 + I_{1b} \cdot \bar{S}_1 \cdot S_0 + I_{2b} \cdot S_1 \cdot \bar{S}_0 + I_{3b} \cdot S_1 \cdot S_0)$$

Truth Table

Select Inputs		Inputs (a or b)					Output
S_0	S_1	\bar{E}	I_0	I_1	I_2	I_3	Z
X	X	H	X	X	X	X	L
L	L	L	L	X	X	X	L
L	L	L	H	X	X	X	H
H	L	L	X	L	X	X	L
H	L	L	X	H	X	X	H
L	H	L	X	X	L	X	L
L	H	L	X	X	H	X	H
H	H	L	X	X	X	L	L
H	H	L	X	X	X	H	H

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

Logic Diagram



DS100271-5

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

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

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

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}	
V_{CC} @ 3.3V, 4.5V, 5.5V	125 mV/ns
Minimum Input Edge Rate ($\Delta V/\Delta t$)	
'ACT Devices	
V_{IN} from 0.8V to 2.0V	
V_{CC} @ 4.5V, 5.5V	125 mV/ns

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.

DC Characteristics for 'AC Family Devices

Symbol	Parameter	V_{CC} (V)	54AC	Units	Conditions	
			$T_A =$ -55°C to +125°C			
			Guaranteed 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	$I_{OUT} = -50 \mu A$	
		4.5	4.4			
		5.5	5.4			
			3.0	2.4	V	(Note 2) $V_{IN} = V_{IL}$ or V_{IH} $I_{OH} = -12 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ $I_{OH} = -24 \text{ mA}$
			4.5	3.7		
			5.5	4.7		
V_{OL}	Maximum Low Level Output Voltage	3.0	0.1	V	$I_{OUT} = 50 \mu A$	
		4.5	0.1			
		5.5	0.1			
			3.0	0.50	V	(Note 2) $V_{IN} = V_{IL}$ or V_{IH} $I_{OL} = 12 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ $I_{OL} = 24 \text{ mA}$
			4.5	0.50		
			5.5	0.50		
I_{IN}	Maximum Input Leakage Current	5.5	±1.0	µA	$V_I = V_{CC}, GND$	
I_{OLD}	Minimum Dynamic Output Current (Note 3)	5.5	50	mA	$V_{OLD} = 1.65V \text{ Max}$	
I_{OHD}		5.5	-50	mA	$V_{OHD} = 3.85V \text{ Min}$	

DC Characteristics for 'AC Family Devices (Continued)

Symbol	Parameter	V _{CC} (V)	54AC	Units	Conditions
			T _A = -55°C to +125°C		
			Guaranteed Limits		
I _{CC}	Maximum Quiescent Supply Current	5.5	80.0	μA	V _{IN} = V _{CC} or GND

Note 2: All outputs loaded; thresholds on input associated with output under test.

Note 3: Maximum test duration 2.0 ms, one output loaded at a time.

Note 4: I_{IN} and I_{CC} @ 3.0V are guaranteed to be less than or equal to the respective limit @ 5.5V V_{CC}.

I_{CC} for 54AC @ 25°C is identical to 74AC @ 25°C.

DC Characteristics for 'ACT Family Devices

Symbol	Parameter	V _{CC} (V)	54ACT	Units	Conditions
			T _A = -55°C to +125°C		
			Guaranteed 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	(Note 5) V _{IN} = V _{IL} or V _{IH} 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	(Note 5) V _{IN} = V _{IL} or V _{IH} 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 (Note 6)	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

Note 5: All outputs loaded; thresholds on input associated with output under test.

Note 6: Maximum test duration 2.0 ms, one output loaded at a time.

Note 7: I_{CC} for 54ACT @ 25°C is identical to 74ACT @ 25°C.

AC Electrical Characteristics

Symbol	Parameter	V _{CC} (V) (Note 8)	54AC		Units
			T _A = -55°C to +125°C C _L = 50 pF		
			Min	Max	
t _{PLH}	Propagation Delay S _n to Z _n	3.3	1.0	19.5	ns
		5.0	1.0	14.0	
t _{PHL}	Propagation Delay S _n to Z _n	3.3	1.0	18.0	ns
		5.0	1.0	13.5	
t _{PLH}	Propagation Delay Ē to Z _n	3.3	1.0	16.5	ns
		5.0	1.0	12.5	
t _{PHL}	Propagation Delay Ē to Z _n	3.3	1.0	14.0	ns
		5.0	1.0	10.0	
t _{PLH}	Propagation Delay I _n to Z _n	3.3	1.0	16.0	ns
		5.0	1.0	11.5	
t _{PHL}	Propagation Delay I _n to Z _n	3.3	1.0	14.5	ns
		5.0	1.0	10.5	

Note 8: Voltage Range 3.3 is 3.3V ±0.3V
Voltage Range 5.0 is 5.0V ±0.5V

AC Electrical Characteristics

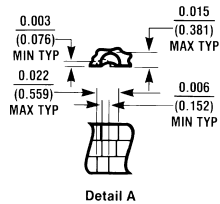
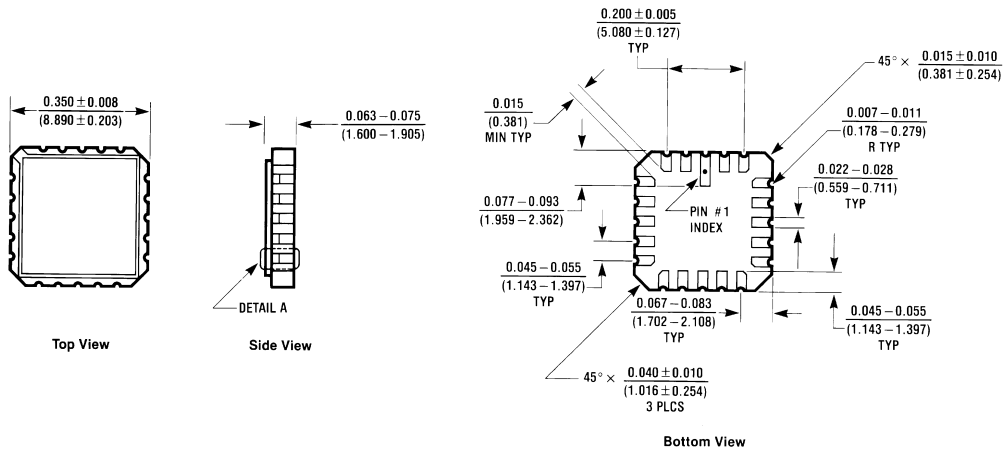
Symbol	Parameter	V _{CC} (V) (Note 9)	54ACT		Units
			T _A = -55°C to +125°C C _L = 50 pF		
			Min	Max	
t _{PLH}	Propagation Delay S _n to Z _n	5.0	1.0	15.0	ns
t _{PHL}	Propagation Delay S _n to Z _n	5.0	1.0	14.5	ns
t _{PLH}	Propagation Delay Ē _n to Z _n	5.0	1.0	13.5	ns
t _{PHL}	Propagation Delay Ē _n to Z _n	5.0	1.0	11.5	ns
t _{PLH}	Propagation Delay I _n to Z _n	5.0	1.0	12.5	ns
t _{PHL}	Propagation Delay I _n to Z _n	5.0	1.0	12.0	ns

Note 9: Voltage Range 5.0 is 5.0V ±0.5V

Capacitance

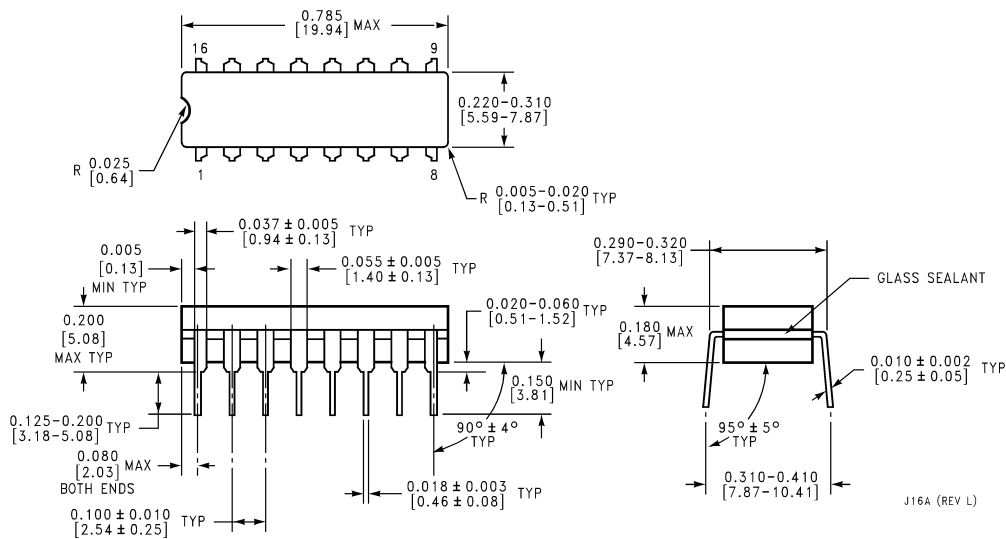
Symbol	Parameter	Typ	Units	Conditions
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = OPEN
C _{PD}	Power Dissipation Capacitance	65.0	pF	V _{CC} = 5.0V

Physical Dimensions inches (millimeters) unless otherwise noted



20 Terminal Ceramic Leadless Chip Carrier (L)
 NS Package Number E20A

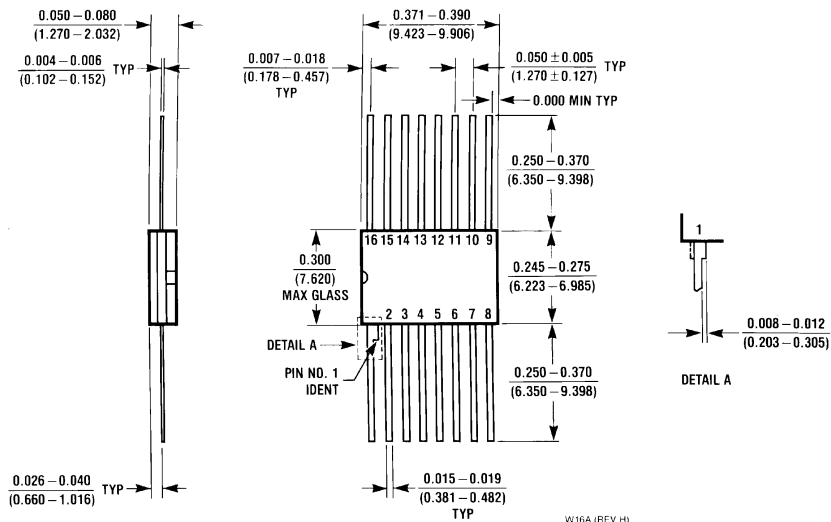
E20A (REV D)



16-Lead Ceramic Dual-In-Line Package (D)
 NS Package Number J16A

J16A (REV L)

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



**16-Lead Ceramic Flatpak (F)
NS Package Number W16A**

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



National Semiconductor Corporation
Americas
Tel: 1-800-272-9959
Fax: 1-800-737-7018
Email: support@nsc.com

National Semiconductor Europe
Fax: +49 (0) 1 80-530 85 86
Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 1 80-530 85 85
English Tel: +49 (0) 1 80-532 78 32
Français Tel: +49 (0) 1 80-532 93 58
Italiano Tel: +49 (0) 1 80-534 16 80

National Semiconductor Asia Pacific Customer Response Group
Tel: 65-2544466
Fax: 65-2504466
Email: sea.support@nsc.com

National Semiconductor Japan Ltd.
Tel: 81-3-5620-6175
Fax: 81-3-5620-6179

www.national.com

 National Semiconductor Corporation Home	Design · Purchasing · Quality · Company · Jobs
	

[Products](#) > [Military/Aerospace](#) > [Logic](#) > [FACT AC](#) > [54AC153](#)

 [Product Folder](#)

54AC153 Dual 4-Input Multiplexer

Contents

- [General Description](#)
- [Features](#)
- [Datasheet](#)
- [Package Availability, Models, Samples & Pricing](#)



General Description

The 'AC/'ACT153 is a high-speed dual 4-input multiplexer with common select inputs and individual enable inputs for each section. It can select two lines of data from four sources. The two buffered outputs present data in the true (non-inverted) form. In addition to multiplexer operation, the 'AC/'ACT153 can act as a function generator and generate any two functions of three variables.

Features


- I_{CC} reduced by 50%
 - Outputs source/sink 24 mA
 - 'ACT153 has TTL-compatible inputs
 - Standard Microcircuit Drawings (SMD) - 'AC153: 5962-87625 - 'ACT153: 5962-87698
-

Datasheet

Title	Size (in Kbytes)	Date	 View Online	 Download	 Receive via Email
54AC153 54ACT153 Dual 4-Input Multiplexer	150 Kbytes	10- Sep-98	View Online	Download	Receive via Email

Please use [Adobe Acrobat](#) to view PDF file(s).
If you have trouble printing, see [Printing Problems](#).

Package Availability, Models, Samples & Pricing

Part Number	Package		Status	Models		Samples & Electronic Orders	Budgetar
	Type	# pins		SPICE	IBIS		Quantity
5962-87625012A	LCC	20	Full production	N/A	N/A	.	50+
5962-8762501EA	Cerdip	16	Full production	N/A	N/A	.	50+
5962-8762501FA	Cerpack	16	Full production	N/A	N/A	 Order	50+
JM38510/76202B2	LCC	20	Full production	N/A	N/A	.	50+
JM38510R76202B2	LCC	20	Full production	N/A	N/A	.	50+
JM38510R76202BE	Cerdip	16	Full production	N/A	N/A	.	50+

JM38510/76202BF	Cerpack	16	Full production	N/A	N/A	.	50+
JM38510R76202BF	Cerpack	16	Full production	N/A	N/A	.	50+
JM38510R76202S2	LCC	20	Full production	N/A	N/A	.	50+
JM38510R76202SE	Cerdip	16	Full production	N/A	N/A	.	50+
JM38510/76202SF	Cerpack	16	Lifetime buy	N/A	N/A	.	50+
JM38510R76202SF	Cerpack	16	Full production	N/A	N/A	.	50+
54AC153 MDA	die		Full production	N/A	N/A	.	

[Information as of 7-Mar-2001]

Quick Search

[Parametric Search](#)

[System Diagrams](#)

[Product Tree](#)

[Home](#)

[About Languages](#) . [Website Guide](#) . [About "Cookies"](#) . National is [QS 9000 Certified](#)
[Site Terms & Conditions of Use](#) . Copyright 2001 © National Semiconductor Corporation
[Privacy/Security Statement](#) . [Preferences](#) . [Feedback](#)