Quad 2-Input Multiplexer

The MC74AC157/74ACT157 is a high-speed quad 2-input multiplexer. Four bits of data from two sources can be selected using the common Select and Enable inputs. The four outputs present the selected data in the true (non-inverted) form.

The MC74AC157/74ACT157 can also be used as a function generator.

Features

- Outputs Source/Sink 24 mA
- 'ACT157 Has TTL Compatible Inputs
- These are Pb-Free Devices

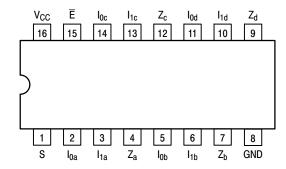


Figure 1. Pinout: 16-Lead Packages Conductors
(Top View)

TRUTH TABLE

	Inp	Outputs		
Ē	S	I ₀	I ₁	Z
Н	Х	X X	Х	L
L	Н	Х	L	L
L	Н	X	Н	Н
L	L	L	X	L
L	L	Н	Χ	Н

H = HIGH Voltage Level L = LOW Voltage Level

X = Immaterial



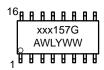
ON Semiconductor®

www.onsemi.com

MARKING DIAGRAMS



SOIC-16 D SUFFIX CASE 751B





TSSOP-16 DT SUFFIX CASE 948F



= AC or ACT = Assembly Location

WL or L = Wafer Lot Y = Year WW or W = Work Week G or ■ = Pb-Free Package

(Note: Microdot may be in either location)

PIN NAMES

PIN	FUNCTION
I _{0a} –I _{0d}	Source 0 Data Inputs
I _{1a} –I _{1d}	Source 0 Data Inputs
Ē	Enable Input
S	Select Input
Z _a –Z _d	Outputs

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

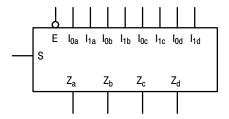


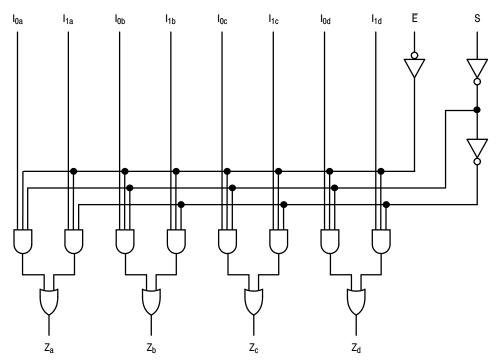
Figure 2. Logic Symbol

FUNCTIONAL DESCRIPTION

The MC74AC157/74ACT157 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 ($\overline{\rm E}$) is active–LOW. When $\overline{\rm E}$ is HIGH, all of the outputs (Z) are forced LOW regardless of all other inputs. The MC74AC157/74ACT157 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:

$$\begin{split} Z_a &= \overline{E} \bullet (I_{1a} \bullet S + I_{0a} \bullet \overline{S}) \\ Z_b &= \overline{E} \bullet (I_{1b} \bullet S + I_{0b} \bullet \overline{S}) \\ Z_c &= \overline{E} \bullet (I_{1c} \bullet S + I_{0c} \bullet \overline{S}) \\ Z_d &= \overline{E} \bullet (I_{1d} \bullet S + I_{0d} \bullet \overline{S}) \end{split}$$

A common use of the MC74AC157/74ACT157 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 MC74AC157/74ACT157 can generate any four of the sixteen different functions of two variables with one variable common. This is useful for implementing gating functions.



NOTE: This diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Figure 3. Logic Diagram

MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V _{CC}	DC Supply Voltage		-0.5 to +7.0	V
VI	DC Input Voltage		$-0.5 \le V_{I} \le V_{CC} + 0.5$	V
Vo	DC Output Voltage	(Note 1)	$-0.5 \le V_{O} \le V_{CC} + 0.5$	V
I _{IK}	DC Input Diode Current		±20	mA
I _{OK}	DC Output Diode Current		±50	mA
Io	DC Output Sink/Source Current		±50	mA
I _{CC}	DC Supply Current per Output Pin		±50	mA
I _{GND}	DC Ground Current per Output Pin		±50	mA
T _{STG}	Storage Temperature Range		-65 to +150	°C
TL	Lead temperature, 1 mm from Case for 10 Seconds		260	°C
TJ	Junction temperature under Bias		+150	°C
θ_{JA}	Thermal Resistance (Note 2)	SOIC TSSOP	69.1 103.8	°C/W
P _D	Power Dissipation in Still Air at 65°C (Note 3)	SOIC TSSOP	500 500	mW
MSL	Moisture Sensitivity		Level 1	
F _R	Flammability Rating Oxygen Inc	dex: 30% – 35%	UL 94 V-0 @ 0.125 in	
V _{ESD}		Model (Note 4) Model (Note 5) Model (Note 6)	> 2000 > 200 > 1000	V
I _{Latch-Up}	Latch-Up Performance Above V _{CC} and Below GND a	at 85°C (Note 7)	±100	mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

- 1. Io absolute maximum rating must be observed.
- 2. The package thermal impedance is calculated in accordance with JESD51-7.
- 3. 500 mW at 65°C; derate to 300 mW by 10 mW/ from 65°C to 85°C.
- 4. Tested to EIA/JESD22-A114-A.
- 5. Tested to EIA/JESD22-A115-A.
- 6. Tested to JESD22-C101-A.
- 7. Tested to EIA/JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Тур	Max	Unit	
	Oursely Velland	'AC	2.0	5.0	6.0	
V _{CC}	Supply Voltage	'ACT	4.5	5.0	5.5	V
V _{IN} , V _{OUT}	DC Input Voltage, Output Voltage (Ref. to GND)	•	0	-	V _{CC}	V
		V _{CC} @ 3.0 V	_	150	-	
t_r , t_f	Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs	V _{CC} @ 4.5 V	-	40	-	ns/V
		V _{CC} @ 5.5 V	_	25	-	
	Input Rise and Fall Time (Note 2)	V _{CC} @ 4.5 V	-	10	-	ns/V
t _r , t _f	'ACT Devices except Schmitt Inputs	V _{CC} @ 5.5 V	-	8.0	-	
TJ	Junction Temperature (PDIP)	_	-	140	°C	
T _A	Operating Ambient Temperature Range	-40	25	85	°C	
I _{OH}	Output Current – High	-	-	-24	mA	
I _{OL}	Output Current – Low	_	-	24	mA	

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

1. V_{IN} from 30% to 70% V_{CC}; see individual Data Sheets for devices that differ from the typical input rise and fall times.

2. V_{IN} from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

DC CHARACTERISTICS

	Parameter		74	AC	74AC		
Symbol		V _{CC} (V)	T _A = +25°C		T _A = -40°C to +85°C	Unit	Conditions
			Тур	Guar	anteed Limits		
V _{IH}	Minimum High Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	2.1 3.15 3.85	2.1 3.15 3.85	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V
V _{IL}	Maximum Low Level Input Voltage	3.0 4.5 5.5	1.5 2.25 2.75	0.9 1.35 1.65	0.9 1.35 1.65	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V
V _{OH}	Minimum High Level Output Voltage	3.0 4.5 5.5	2.99 4.49 5.49	2.9 4.4 5.4	2.9 4.4 5.4	V	I _{OUT} = -50 μA
		3.0 4.5 5.5	- - -	2.56 3.86 4.86	2.46 3.76 4.76	V	* V _{IN} = V _{IL} or V _{IH} -12 mA I_{OH} -24 mA -24 mA
V _{OL}	Maximum Low Level Output Voltage	3.0 4.5 5.5	0.002 0.001 0.001	0.1 0.1 0.1	0.1 0.1 0.1	V	Ι _{ΟUT} = 50 μΑ
		3.0 4.5 5.5	- - -	0.36 0.36 0.36	0.44 0.44 0.44	V	* V _{IN} = V _{IL} or V _{IH} 12 mA IOL 24 mA 24 mA
I _{IN}	Maximum Input Leakage Current	5.5	-	±0.1	±1.0	μΑ	$V_I = V_{CC}$, GND
I _{OLD}	†Minimum Dynamic	5.5	-	_	75	mA	V _{OLD} = 1.65 V Max
I _{OHD}	Output Current	5.5	-	-	-75	mA	V _{OHD} = 3.85 V Min
Icc	Maximum Quiescent Supply Current	5.5	-	8.0	80	μΑ	$V_{IN} = V_{CC}$ or GND

^{*}All outputs loaded; thresholds on input associated with output under test. †Maximum test duration 2.0 ms, one output loaded at a time.

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

AC CHARACTERISTICS (For Figures and Waveforms - See Section 3 of the ON Semiconductor FACT Data Book, DL138/D)

			74AC 74AC						
Symbol	Parameter	V _{CC} * (V)	T _A = +25°C C _L = 50 pF			$T_A = -40$ °C to +85°C $C_L = 50$ pF		Unit	Fig. No.
			Min	Тур	Max	Min	Max		
t _{PLH}	Propagation Delay S to Z _n	3.3 5.0	1.5 1.5	7.0 5.5	11.5 9.0	1.5 1.5	13.0 10.0	ns	3–6
t _{PHL}	Propagation Delay S to Z _n	3.3 5.0	1.5 1.5	6.5 5.0	11.0 8.5	1.5 1.0	12.0 9.5	ns	3–6
t _{PLH}	Propagation Delay \overline{E} to Z_n	3.3 5.0	1.5 1.5	7.0 5.5	11.5 9.0	1.5 1.5	13.0 10.0	ns	3–6
t _{PHL}	Propagation Delay \overline{E}_n to Z_n	3.3 5.0	1.5 1.5	6.5 5.5	11.0 9.0	1.5 1.0	12 9.5	ns	3–6
t _{PLH}	Propagation Delay I_n to Z_n	3.3 5.0	1.5 1.5	5.0 4.0	8.5 6.5	1.0 1.0	9.0 7.0	ns	3–5
t _{PHL}	Propagation Delay I_n to Z_n	3.3 5.0	1.5 1.5	5.0 4.0	8.0 6.5	1.0 1.0	9.0 7.0	ns	3–5

^{*}Voltage Range 3.3 V is 3.3 V ± 0.3 V. *Voltage Range 5.0 V is 5.0 V ± 0.5 V.

DC CHARACTERISTICS

	Parameter		74ACT T _A = +25°C		74ACT			
Symbol		V _{CC} (V)			T _A = -40°C to +85°C	Unit	Conditions	
			Тур	Guar	anteed Limits			
V _{IH}	Minimum High Level Input Voltage	4.5 5.5	1.5 1.5	2.0 2.0	2.0 2.0	V	$V_{OUT} = 0.1 \text{ V}$ or $V_{CC} - 0.1 \text{ V}$	
V _{IL}	Maximum Low Level Input Voltage	4.5 5.5	1.5 1.5	0.8 0.8	0.8 0.8	V	V _{OUT} = 0.1 V or V _{CC} – 0.1 V	
V _{OH}	Minimum High Level Output Voltage	4.5 5.5	4.49 5.49	4.4 5.4	4.4 5.4	V	I _{OUT} = -50 μA	
		4.5 5.5	- -	3.86 4.86	3.76 4.76	V	$^{*}V_{IN} = V_{IL} \text{ or } V_{IH} \\ -24 \text{ mA} \\ I_{OH} \qquad -24 \text{ mA}$	
V _{OL}	Maximum Low Level Output Voltage	4.5 5.5	0.001 0.001	0.1 0.1	0.1 0.1	V	Ι _{ΟυΤ} = 50 μΑ	
		4.5 5.5	- -	0.36 0.36	0.44 0.44	V	$^*V_{IN} = V_{IL} \text{ or } V_{IH}$ $^{24} \text{ mA}$ ^{1}OL $^{24} \text{ mA}$	
I _{IN}	Maximum Input Leakage Current	5.5	-	±0.1	±1.0	μΑ	$V_I = V_{CC}$, GND	
ΔI_{CCT}	Additional Max. I _{CC} /Input	5.5	0.6	_	1.5	mA	$V_{I} = V_{CC} - 2.1 \text{ V}$	
I _{OLD}	†Minimum Dynamic	5.5	_	_	75	mA	V _{OLD} = 1.65 V Max	
I _{OHD}	Output Current	5.5	-	_	- 75	mA	V _{OHD} = 3.85 V Min	
Icc	Maximum Quiescent Supply Current	5.5	-	8.0	80	μΑ	V _{IN} = V _{CC} or GND	

^{*}All outputs loaded; thresholds on input associated with output under test. †Maximum test duration 2.0 ms, one output loaded at a time.

AC CHARACTERISTICS (For Figures and Waveforms – See Section 3 of the ON Semiconductor FACT Data Book, DL138/D)

			74ACT 74AC			CT			
Symbol	Parameter	V _{CC} * (V)	T _A = +25°C C _L = 50 pF			$T_A = -40^{\circ}C$ to +85°C $C_L = 50 \text{ pF}$		Unit	Fig. No.
			Min	Тур	Max	Min	Max		
t _{PLH}	Propagation Delay S to Z _n	5.0	2.0	1	9.0	1.5	10.0	ns	3–6
t _{PHL}	Propagation Delay S to Z _n	5.0	2.0	1	9.5	2.0	10.5	ns	3–6
t _{PLH}	Propagation Delay \overline{E}_n to Z_n	5.0	1.5	1	10	1.5	11.5	ns	3–6
t _{PHL}	Propagation Delay \overline{E}_n to Z_n	5.0	1.5	ı	8.5	1.0	9.0	ns	3–6
t _{PLH}	Propagation Delay I_n to Z_n	5.0	1.5	ı	7.0	1.0	8.5	ns	3–5
t _{PHL}	Propagation Delay I_n to Z_n	5.0	1.5	ı	7.5	1.0	8.5	ns	3–5

^{*}Voltage Range 5.0 V is 5.0 V ± 0.5 V.

CAPACITANCE

Symbol	Parameter	Value – Typ	Unit	Test Conditions
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = 5.0 V
C _{PD}	Power Dissipation Capacitance	50	pF	V _{CC} = 5.0 V

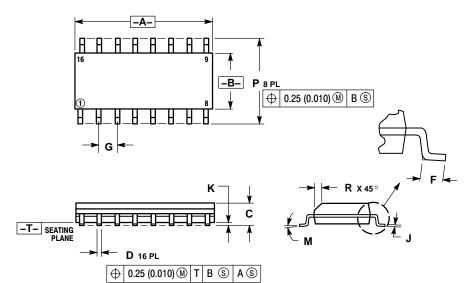
ORDERING INFORMATION

Device Order Number	Package	Shipping [†]
MC74AC157DG	SOIC-16 (Pb-Free)	48 Units / Rail
MC74AC157DR2G	SOIC-16 (Pb-Free)	2500 Tape & Reel
MC74AC157DTR2G	TSSOP-16 (Pb-Free)	2500 Tape & Reel
MC74ACT157DG	SOIC-16 (Pb-Free)	48 Units / Rail
MC74ACT157DR2G	SOIC-16 (Pb-Free)	2500 Tape & Reel
MC74ACT157DTR2G	TSSOP-16 (Pb-Free)	2500 Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

PACKAGE DIMENSIONS

SOIC-16 **D SUFFIX** CASE 751B-05 ISSUE K



- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI
- THE PROPERTY OF THE PROPERTY O
- PROTRUSION.

 MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.

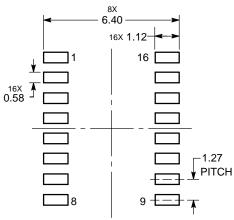
 DIMENSION D DOES NOT INCLUDE DAMBAR
 PROTRUSION. ALLOWABLE DAMBAR PROTRUSION.

 SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D

 DIMENSION AT MAXIMUM MATERIAL CONDITION.

	8411 1 18	IETERS	INC	HES	
	WILLIN	IEIERO	INC	пЕЭ	
DIM	MIN	MAX	MIN	MAX	
Α	9.80	10.00	0.386	0.393	
В	3.80	4.00	0.150	0.157	
C	1.35	1.75	0.054	0.068	
D	0.35	0.49	0.014	0.019	
F	0.40	1.25	0.016	0.049	
G	1.27	BSC	0.050	BSC	
J	0.19	0.25	0.008	0.009	
K	0.10	0.25	0.004	0.009	
M	0°	7°	0°	7°	
P	5.80	6.20	0.229	0.244	
R	0.25	0.50	0.010	0.019	

SOLDERING FOOTPRINT*

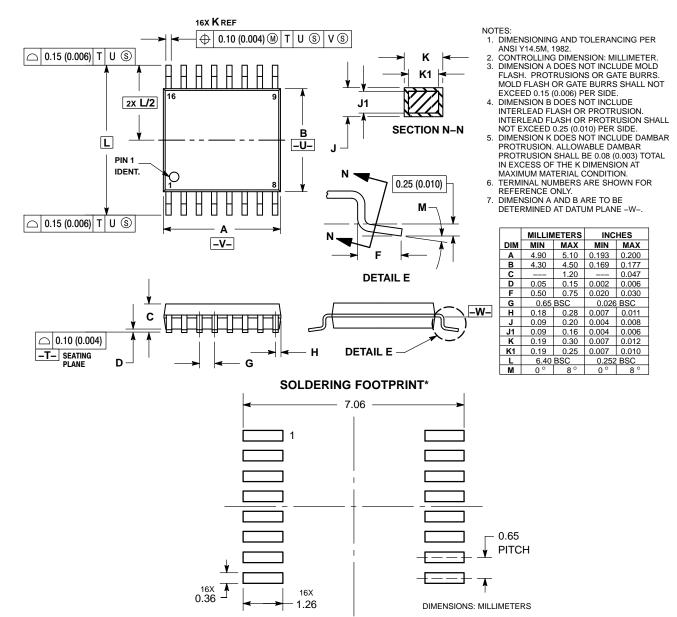


DIMENSIONS: MILLIMETERS

^{*}For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PACKAGE DIMENSIONS

TSSOP-16 DT SUFFIX CASE 948F ISSUE B



*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

ON Semiconductor and the are registered trademarks of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries. SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical expents. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor P.O. Box 5163, Denver, Colorado 80217 USA Phone: 303–675–2175 or 800–344–3860 Toll Free USA/Canada Fax: 303–675–2176 or 800–344–3867 Toll Free USA/Canada Email: orderlit@onsemi.com N. American Technical Support: 800–282–9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910

Japan Customer Focus Center Phone: 81–3–5817–1050 ON Semiconductor Website: www.onsemi.com

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Multiplexer Switch ICs category:

Click to view products by ON Semiconductor manufacturer:

Other Similar products are found below:

M74HCT4066ADTR2G ADG506ATE/883B DG406BDN-T1-E3 JM38510/19004BXA HEF4051BP 5962-8512704XA

NLAS5223CMUTAG NLV14051BDG NLVHC4051ADTR2G JM38510/19002BXA 016400E ADV3014KSTZ PI3V512QE FSA644UCX

FSA9591UCX FSSD07BQX MAX7356ETG NLV74HCT4851ADRG 7705201EC MAX4634ETBT MAX4578CAP+ PI2SSD3212NCE

MAX3997ETM+ NLV14052BDTR2G PI3L100QE PI3DBS12412AZLEX PI3V512QEX MAX4969CTO+ PI3DBS12212AZBEX

PI3DBS16415ZHEX MAX7367EUP+T MAX7369EUP+ MAX7357ETG+T NLV74HC4053ADR2G NLVAST4051DTR2G

PI3DBS12412AZHEX ADG5209BCPZ-RL7 PS509WEX PS509QEX PS508QEX PS508WEX ADG5209FBRUZ-RL7 ADG5208FBRUZ-RL7 MAX14984ETG+ MAX14984ETG+T HV2818/R4X HV2918/R4X CBTU02044HEJ PS508LEX PS509LEX