MC74AC151, MC74ACT151

1-of-8 Decoder/Demultiplexer

The MC74AC151/74ACT151 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 MC74AC151/74ACT151 can be used as a universal function generator to generate any logic function of four variables. Both true and complementary outputs are provided.

- Outputs Source/Sink 24 mA
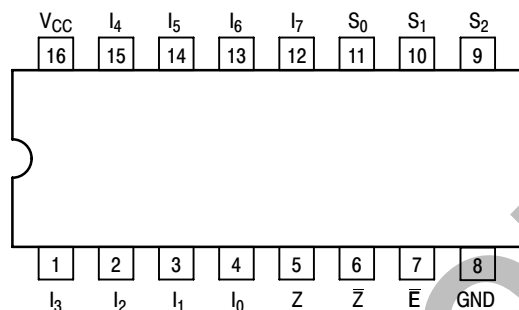- ′ACT151 Has TTL Compatible Inputs

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

Pin 16: V_{CC}, Pin 15: I_4, Pin 14: I_5, Pin 13: I_6, Pin 12: I_7, Pin 11: S_0, Pin 10: S_1, Pin 9: S_2

Pin 1: I_3, Pin 2: I_2, Pin 3: I_1, Pin 4: I_0, Pin 5: Z, Pin 6: $\overline{Z}$, Pin 7: $\overline{E}$, Pin 8: GND

PIN ASSIGNMENT

PIN	FUNCTION
I_0–I_7	Data Inputs
S_0–S_2	Select Inputs
$\overline{E}$	Enable Input
Z	Data Output
$\overline{Z}$	Inverted Data Output

TRUTH TABLE

Inputs				Outputs	
$\overline{E}$	S_2	S_1	S_0	$\overline{Z}$	Z
H	X	X	X	H	L
L	L	L	L	$\overline{I_0}$	I_0
L	L	L	H	$\overline{I_1}$	I_1
L	L	H	L	$\overline{I_2}$	I_2
L	L	H	H	$\overline{I_3}$	I_3
L	H	L	L	$\overline{I_4}$	I_4
L	H	L	H	$\overline{I_5}$	I_5
L	H	H	L	$\overline{I_6}$	I_6
L	H	H	H	$\overline{I_7}$	I_7

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

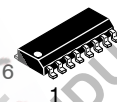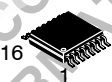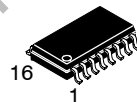## ON Semiconductor™
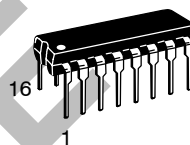
DIP−16
N SUFFIX
CASE 648

SO−16
D SUFFIX
CASE 751B

TSSOP−16
DT SUFFIX
CASE 948F

EIAJ−16
M SUFFIX
CASE 966

ORDERING INFORMATION

Device	Package	Shipping
MC74AC151N	PDIP−16	25 Units/Rail
MC74ACT151N	PDIP−16	25 Units/Rail
MC74AC151D	SOIC−16	48 Units/Rail
MC74ACT151D	SOIC−16	48 Units/Rail
MC74AC151DR2	SOIC−16	2500 Tape & Reel
MC74ACT151DR2	SOIC−16	2500 Tape & Reel
MC74AC151DT	TSSOP−16	96 Units/Rail
MC74ACT151DT	TSSOP−16	96 Units/Rail
MC74AC151DTR2	TSSOP−16	2500 Tape & Reel
MC74ACT151DTR2	TSSOP−16	2500 Tape & Reel
MC74AC151M	EIAJ−16	50 Units/Rail
MC74ACT151M	EIAJ−16	50 Units/Rail

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 7 of this data sheet.
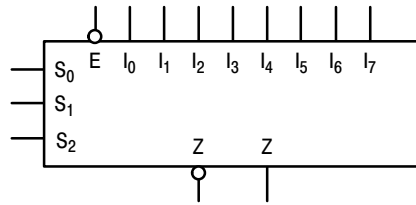
MC74AC151, MC74ACT151

Figure 2. Logic Symbol

FUNCTIONAL DESCRIPTION

The MC74AC151/74ACT151 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:

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

The MC74AC151/74ACT151 provides the ability, in one package, to select from eight sources of data or control information. By proper manipulation of the inputs, the MC74AC151/74ACT151 can provide any logic function of four variables and its complement.
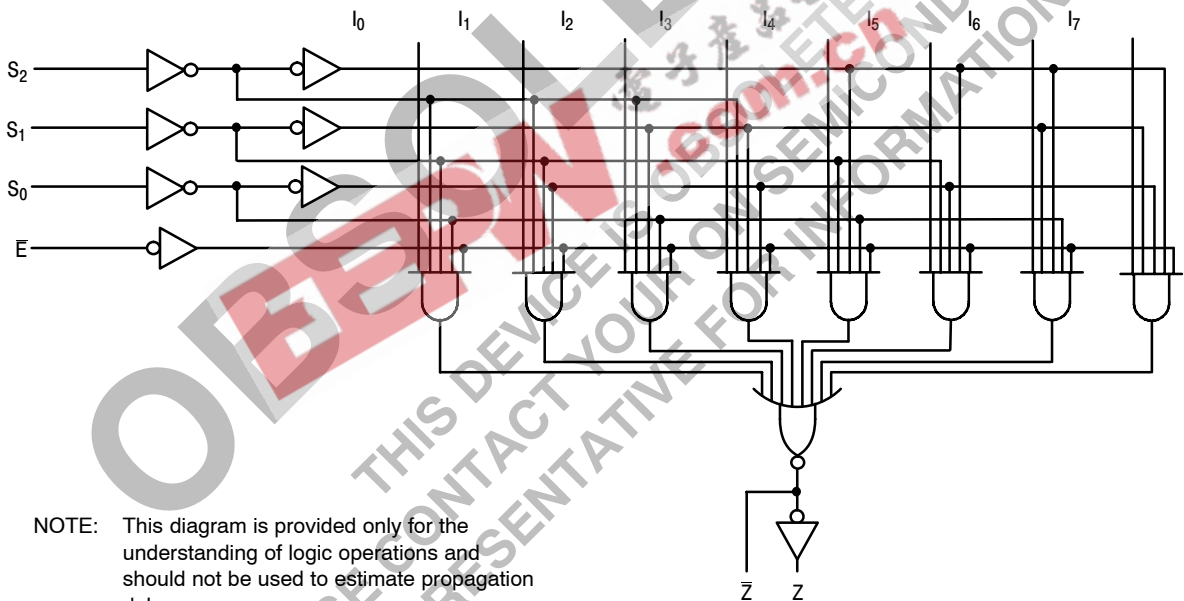

NOTE: This diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Figure 3. Logic Diagram

MC74AC151, MC74ACT151

MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	−0.5 to +7.0	V
V_{IN}	DC Input Voltage (Referenced to GND)	−0.5 to V_{CC} +0.5	V
V_{OUT}	DC Output Voltage (Referenced to GND)	−0.5 to V_{CC} +0.5	V
I_{IN}	DC Input Current, per Pin	±20	mA
I_{OUT}	DC Output Sink/Source Current, per Pin	±50	mA
I_{CC}	DC V_{CC} or GND Current per Output Pin	±50	mA
T_{stg}	Storage Temperature	−65 to +150	°C

*Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Typ	Max	Unit
V_{CC}	Supply Voltage	'AC	2.0	5.0	6.0	V
		'ACT	4.5	5.0	5.5	
V_{IN}, V_{OUT}	DC Input Voltage, Output Voltage (Ref. to GND)		0	–	V_{CC}	V
t_r, t_f	Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs	V_{CC} @ 3.0 V	–	150	–	ns/V
		V_{CC} @ 4.5 V	–	40	–	
		V_{CC} @ 5.5 V	–	25	–	
t_r, t_f	Input Rise and Fall Time (Note 2) 'ACT Devices except Schmitt Inputs	V_{CC} @ 4.5 V	–	10	–	ns/V
		V_{CC} @ 5.5 V	–	8.0	–	
T_J	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

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.

MC74AC151, MC74ACT151

DC CHARACTERISTICS

Symbol	Parameter	V_{CC} (V)	74AC T_A = +25°C		74AC T_A = −40°C to +85°C	Unit	Conditions
			Typ	Guaranteed Limits	Guaranteed 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	I_{OUT} = 50 μA
		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 I_{OL} 24 mA 24 mA
I_{IN}	Maximum Input Leakage Current	5.5	–	±0.1	±1.0	μA	V_I = V_{CC}, GND
I_{OLD}	†Minimum Dynamic Output Current	5.5	–	–	75	mA	V_{OLD} = 1.65 V Max
I_{OHD}		5.5	–	–	−75	mA	V_{OHD} = 3.85 V Min
I_{CC}	Maximum Quiescent Supply Current	5.5	–	8.0	80	μA	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}.

MC74AC151, MC74ACT151

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

Symbol	Parameter	V_CC* (V)	74AC T_A = +25°C C_L = 50 pF			74AC T_A = −40°C to +85°C C_L = 50 pF		Unit	Fig. No.
			Min	Typ	Max	Min	Max		
t_{PLH}	Propagation Delay S_n to Z or $\overline{Z}$	3.3 5.0	3.0 2.5	11.5 8.5	18.0 13.0	3.0 2.0	20.0 15.0	ns	3–6
t_{PHL}	Propagation Delay S_n to Z or $\overline{Z}$	3.3 5.0	2.5 2.0	12 8.5	18.0 13.0	2.5 1.5	20.0 15.0	ns	3–6
t_{PLH}	Propagation Delay $\overline{E}$ to Z or $\overline{Z}$	3.3 5.0	2.5 2.0	8.0 6.0	13.0 10.0	2.0 1.5	14.0 11.0	ns	3–6
t_{PHL}	Propagation Delay $\overline{E}$ to Z or $\overline{Z}$	3.3 5.0	1.5 1.5	8.5 6.5	13.0 10.0	1.5 1.5	14.0 11.0	ns	3–6
t_{PLH}	Propagation Delay I_n to Z or $\overline{Z}$	3.3 5.0	2.5 1.5	9.5 7.0	14.0 10.5	2.0 1.5	15.5 11.0	ns	3–5
t_{PHL}	Propagation Delay I_n to Z or $\overline{Z}$	3.3 5.0	2.5 1.5	9.5 7.0	15.0 11.0	2.0 1.5	16.0 12.0	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

Symbol	Parameter	V_CC (V)	74ACT T_A = +25°C Typ	74ACT T_A = −40°C to +85°C Guaranteed Limits	Unit	Conditions
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 V or V_{CC} − 0.1 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 / 4.4 5.4 / 5.4	V	I_{OUT} = −50 μA
		4.5 5.5	– –	3.86 / 3.76 4.86 / 4.76	V	*V_{IN} = V_{IL} or V_{IH} I_{OH} −24 mA −24 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	I_{OUT} = 50 μA
		4.5 5.5	– –	0.36 / 0.44 0.36 / 0.44	V	*V_{IN} = V_{IL} or V_{IH} I_{OL} 24 mA 24 mA
I_{IN}	Maximum Input Leakage Current	5.5	±0.1	±1.0	μA	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 V
I_{OLD}	†Minimum Dynamic Output Current	5.5	–	75	mA	V_{OLD} = 1.65 V Max
I_{OHD}		5.5	–	−75	mA	V_{OHD} = 3.85 V Min
I_{CC}	Maximum Quiescent Supply Current	5.5	8.0	80	μA	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.

MC74AC151, MC74ACT151

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

Symbol	Parameter	V_CC* (V)	74ACT T_A = +25°C C_L = 50 pF			74ACT T_A = −40°C to +85°C C_L = 50 pF		Unit	Fig. No.
			Min	Typ	Max	Min	Max		
t_{PLH}	Propagation Delay S_n to Z	5.0	3.5	–	15.5	3.0	17.0	ns	3–6
t_{PHL}	Propagation Delay S_n to Z	5.0	3.5	–	15.5	3.0	16.5	ns	3–6
t_{PLH}	Propagation Delay S_n to $\overline{Z}$	5.0	3.5	–	15	3.0	16.5	ns	3–6
t_{PHL}	Propagation Delay S_n to $\overline{Z}$	5.0	4.0	–	16.5	3.5	18.5	ns	3–6
t_{PLH}	Propagation Delay $\overline{E}$ to Z	5.0	2.5	–	9.5	2.5	10.0	ns	3–6
t_{PHL}	Propagation Delay $\overline{E}$ to Z	5.0	2.5	–	9.0	2.5	10.0	ns	3–6
t_{PLH}	Propagation Delay $\overline{E}$ to $\overline{Z}$	5.0	2.5	–	8.5	2.5	9.5	ns	3–6
t_{PHL}	Propagation Delay $\overline{E}$ to $\overline{Z}$	5.0	3.0	–	10.0	2.5	10.5	ns	3–6
t_{PLH}	Propagation Delay I_n to Z	5.0	3.5	–	11.5	3.0	12.5	ns	3–6
t_{PHL}	Propagation Delay I_n to Z	5.0	3.5	–	12.0	3.0	13.5	ns	3–6
t_{PLH}	Propagation Delay I_n to $\overline{Z}$	5.0	3.5	–	12.0	3.0	13.0	ns	3–6
t_{PHL}	Propagation Delay I_n to $\overline{Z}$	5.0	4.0	–	12.5	3.0	14.0	ns	3–6

*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	70	pF	V_{CC} = 5.0 V

MC74AC151, MC74ACT151

MARKING DIAGRAMS

DIP−16	**SO−16**	**TSSOP−16**	**EIAJ−16**
MC74AC151N AWLYYWW	AC151 AWLYWW	AC 151 ALYW	74AC151 ALYW
MC74ACT151N AWLYYWW	ACT151 AWLYWW	ACT 151 ALYW	74ACT151 ALYW
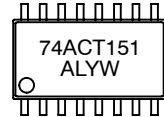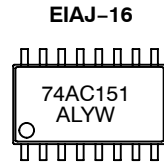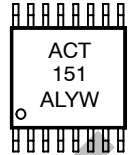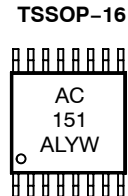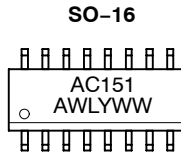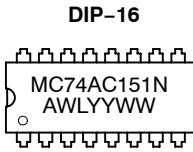
A = Assembly Location
WL, L = Wafer Lot
YY, Y = Year
WW, W = Work Week

MC74AC151, MC74ACT151

PACKAGE DIMENSIONS

PDIP–16
N SUFFIX
16 PIN PLASTIC DIP PACKAGE
CASE 648–08
ISSUE R
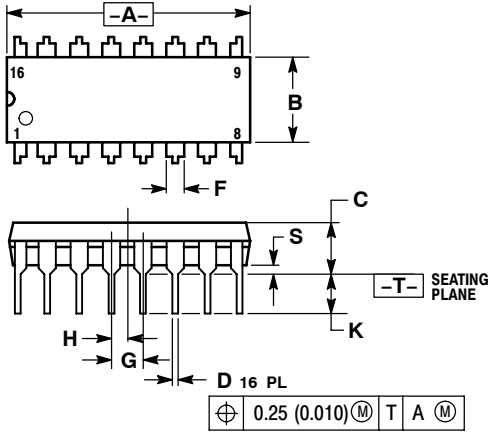
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.740	0.770	18.80	19.55
B	0.250	0.270	6.35	6.85
C	0.145	0.175	3.69	4.44
D	0.015	0.021	0.39	0.53
F	0.040	0.70	1.02	1.77
G	0.100 BSC		2.54 BSC	
H	0.050 BSC		1.27 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.130	2.80	3.30
L	0.295	0.305	7.50	7.74
M	0 °	10 °	0 °	10 °
S	0.020	0.040	0.51	1.01

SO–16
D SUFFIX
16 PIN PLASTIC SOIC PACKAGE
CASE 751B–05
ISSUE J
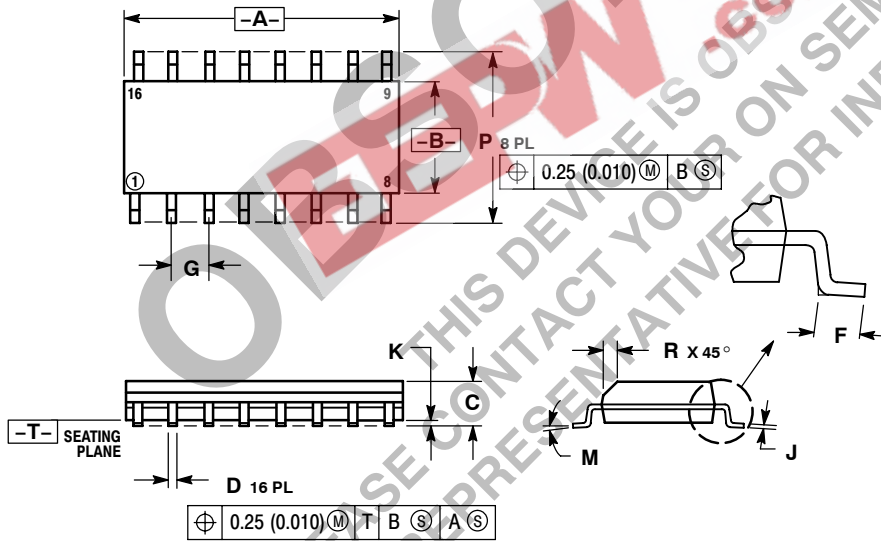
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	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

MC74AC151, MC74ACT151

PACKAGE DIMENSIONS

TSSOP−16
DT SUFFIX
16 PIN PLASTIC TSSOP PACKAGE
CASE948F−01
ISSUE O
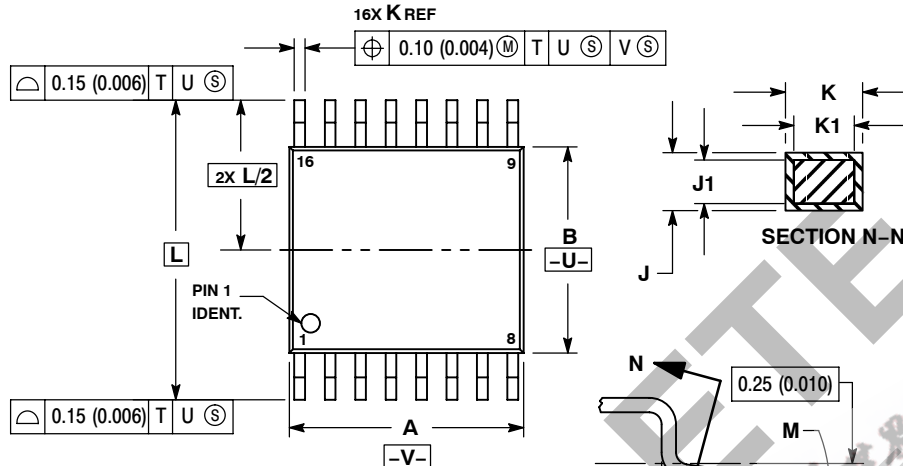
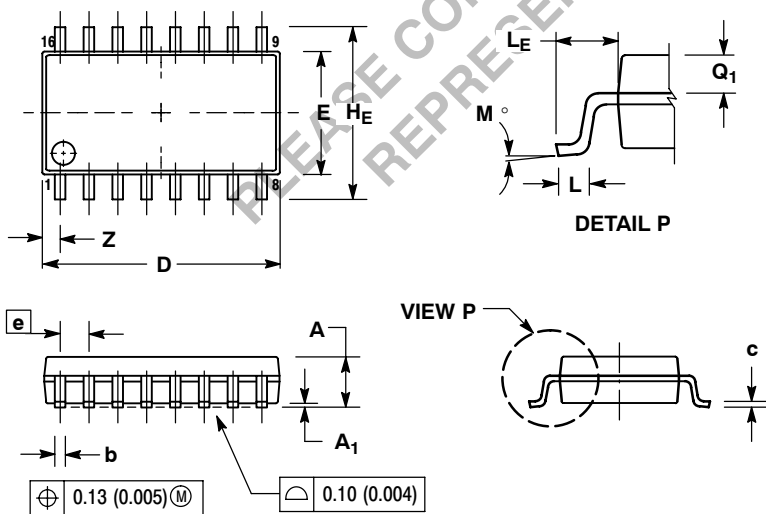**SECTION N−N**

DETAIL E

DETAIL E

SEATING PLANE

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE −W−.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.90	5.10	0.193	0.200
B	4.30	4.50	0.169	0.177
C	---	1.20	---	0.047
D	0.05	0.15	0.002	0.006
F	0.50	0.75	0.020	0.030
G	0.65 BSC		0.026 BSC	
H	0.18	0.28	0.007	0.011
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
M	0°	8°	0°	8°

EIAJ−16
M SUFFIX
16 PIN PLASTIC EIAJ PACKAGE
CASE966−01
ISSUE O

DETAIL P

VIEW P

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS AND ARE MEASURED AT THE PARTING LINE. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
5. THE LEAD WIDTH DIMENSION (b) DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE LEAD WIDTH DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSIONS AND ADJACENT LEAD TO BE 0.46 (0.018).

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	---	2.05	---	0.081
A1	0.05	0.20	0.002	0.008
b	0.35	0.50	0.014	0.020
c	0.18	0.27	0.007	0.011
D	9.90	10.50	0.390	0.413
E	5.10	5.45	0.201	0.215
e	1.27 BSC		0.050 BSC	
HE	7.40	8.20	0.291	0.323
L	0.50	0.85	0.020	0.033
LE	1.10	1.50	0.043	0.059
M	0°	10°	0°	10°
Q1	0.70	0.90	0.028	0.035
Z	---	0.78	---	0.031

MC74AC151, MC74ACT151

PUBLICATION ORDERING INFORMATION

MC74AC151/D