

74ACT158

Quad 2-Input Multiplexer

Features

- I_{CC} reduced by 50%
- Outputs source/sink 24mA
- TTL-compatible inputs

General Description

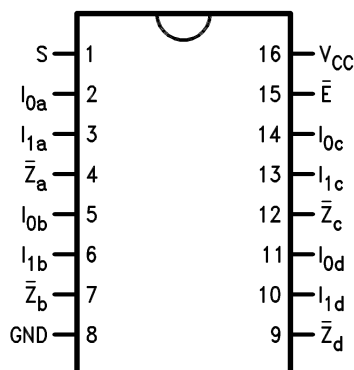
The ACT158 is a high-speed quad 2-input multiplexer. It selects four bits of data from two sources using the common Select and Enable inputs. The four buffered outputs present the selected data in the inverted form. The ACT158 can also be used as a function generator.

Ordering Information

Order Number	Package Number	Package Description
74ACT158SC	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
74ACT158SJ	M16D	16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74ACT158MTC	MTC16	16-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

Device also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering number.
Pb-Free package per JEDEC J-STD-020B.

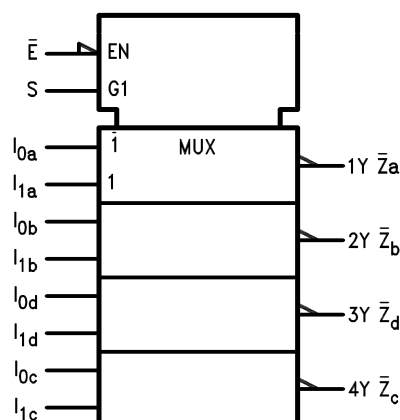
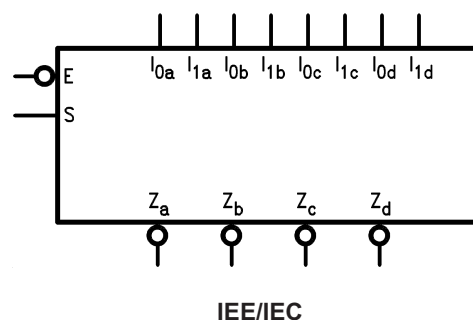
Connection Diagram



Pin Description

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
$\bar{Z}_a-\bar{Z}_d$	Inverted Outputs

Logic Symbols



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Functional Description

The ACT158 quad 2-input multiplexer selects four bits of data from two sources under the control of a common Select input (S) and presents the data in inverted form at the four outputs. The Enable input ($\bar{E}$) is active-LOW. When $\bar{E}$ is HIGH, all of the outputs ($\bar{Z}$) are forced HIGH regardless of all other inputs. The ACT158 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.

A common use of the ACT158 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 ACT158 can generate four functions of two variables with one variable common. This is useful for implementing gating functions.

Truth Table

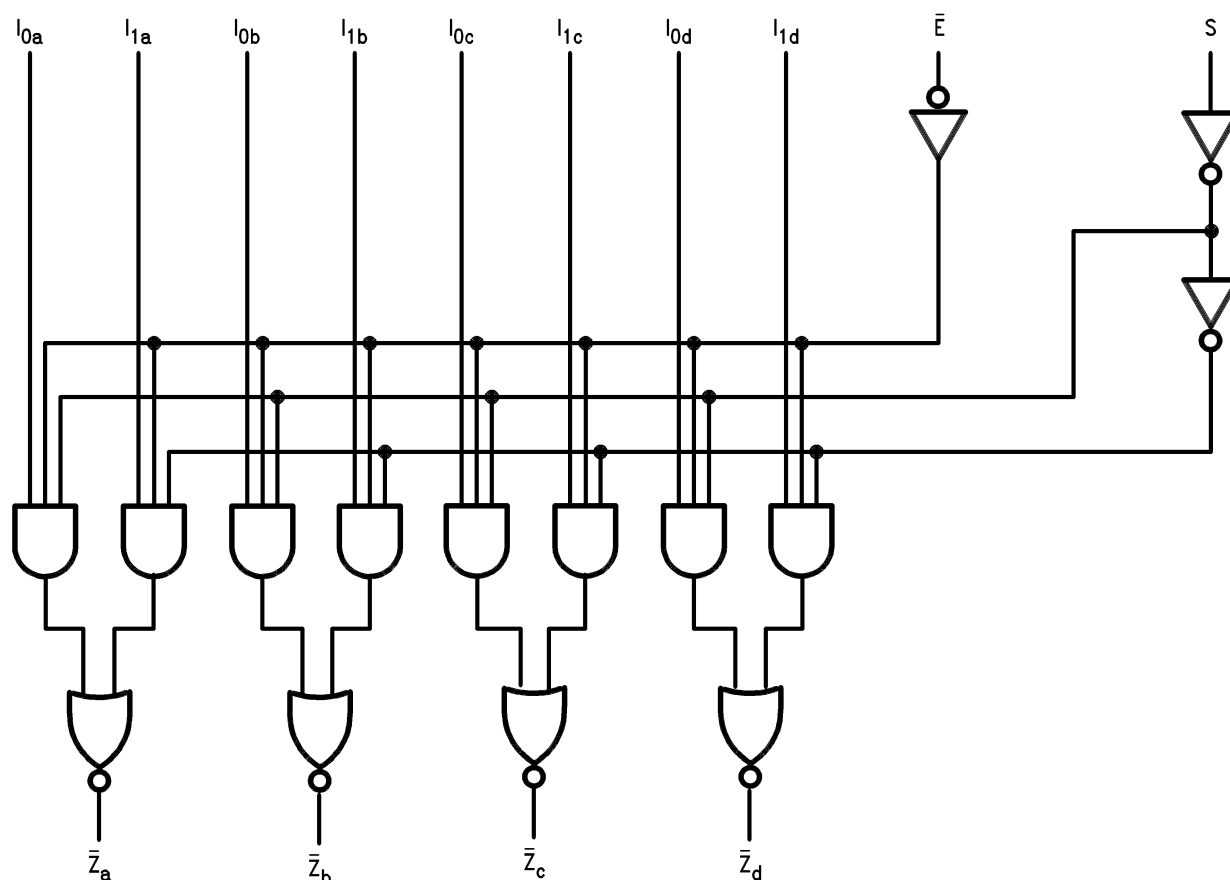
Inputs				Outputs
$\bar{E}$	S	I_0	I_1	$\bar{Z}$
H	X	X	X	H
L	L	L	X	H
L	L	H	X	L
L	H	X	L	H
L	H	X	H	L

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.

Figure 1.

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Rating
V_{CC}	Supply Voltage	−0.5V to +7.0V
I_{IK}	DC Input Diode Current $V_I = -0.5V$ $V_I = V_{CC} + 0.5V$	−20mA +20mA
V_I	DC Input Voltage	−0.5V to $V_{CC} + 0.5V$
I_{OK}	DC Output Diode Current $V_O = -0.5V$ $V_O = V_{CC} + 0.5V$	−20mA +20mA
V_O	DC Output Voltage	−0.5V to $V_{CC} + 0.5V$
I_O	DC Output Source or Sink Current	±50mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current per Output Pin	±50mA
T_{STG}	Storage Temperature	−65°C to +150°C
T_J	Junction Temperature	140°C

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to absolute maximum ratings.

Symbol	Parameter	Rating
V_{CC}	Supply Voltage	4.5V to 5.5V
V_I	Input Voltage	0V to V_{CC}
V_O	Output Voltage	0V to V_{CC}
T_A	Operating Temperature	−40°C to +85°C
$\Delta V / \Delta t$	Minimum Input Edge Rate, V_{IN} from 0.8V to 2.0V, V_{CC} @ 4.5V, 5.5V	125mV/ns

DC Electrical Characteristics

Symbol	Parameter	V _{CC} (V)	Conditions	T _A = +25°C		T _A = −40°C to +85°C		Units
				Typ.	Guaranteed Limits			
V _{IH}	Minimum HIGH Level Input Voltage	4.5	V _{OUT} = 0.1V or V _{CC} − 0.1V	1.5	2.0	2.0		V
		5.5		1.5	2.0	2.0		
V _{IL}	Maximum LOW Level Input Voltage	4.5	V _{OUT} = 0.1V or V _{CC} − 0.1V	1.5	0.8	0.8		V
		5.5		1.5	0.8	0.8		
V _{OH}	Minimum HIGH Level Output Voltage	4.5	I _{OUT} = −50μA	4.49	4.4	4.4		V
		5.5		5.49	5.4	5.4		
		4.5	V _{IN} = V _{IL} or V _{IH} : I _{OH} = −24mA		3.86	3.76		
		5.5	I _{OH} = −24mA ⁽¹⁾		4.86	4.76		
V _{OL}	Maximum LOW Level Output Voltage	4.5	I _{OUT} = 50μA	0.001	0.1	0.1		V
		5.5		0.001	0.1	0.1		
		4.5	V _{IN} = V _{IL} or V _{IH} : I _{OL} = 24mA		0.36	0.44		
		5.5	I _{OL} = 24mA ⁽¹⁾		0.36	0.44		
I _{IN}	Maximum Input Leakage Current	5.5	V _I = V _{CC} , GND		±0.1	±1.0		μA
I _{CCT}	Maximum I _{CC} /Input	5.5	V _I = V _{CC} − 2.1V	0.6		1.5		mA
I _{OLD}	Minimum Dynamic Output Current ⁽²⁾	5.5	V _{OLD} = 1.65V Max.			75		mA
I _{OHD}		5.5	V _{OHD} = 3.85V Min.			−75		mA
I _{CC}	Maximum Quiescent Supply Current	5.5	V _{IN} = V _{CC} or GND		4.0	40.0		μA

Notes:

1. All outputs loaded; thresholds on input associated with output under test.
2. Maximum test duration 2.0ms, one output loaded at a time.

AC Electrical Characteristics

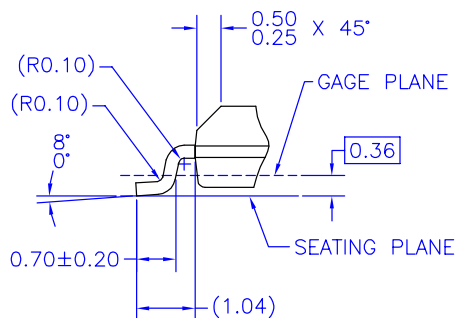
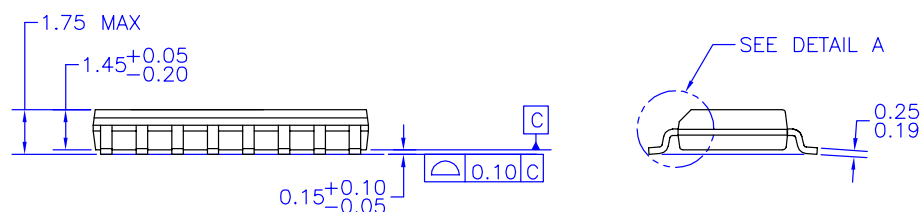
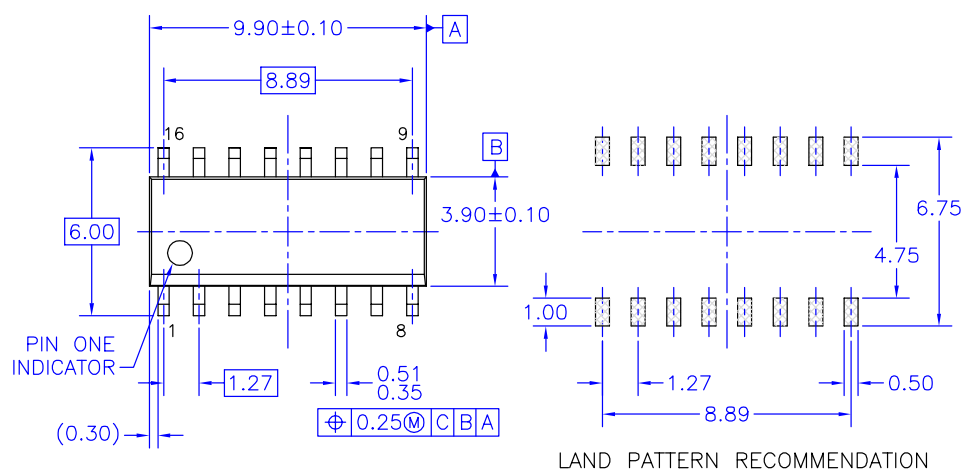
Symbol	Parameter	V_{CC} (V) ⁽³⁾	$T_A = +25^\circ\text{C}$, $C_L = 50\text{ pF}$			$T_A = -40^\circ\text{C to } +85^\circ\text{C}$, $C_L = 50\text{ pF}$		Units
			Min.	Typ.	Max.	Min.	Max.	
t_{PLH}	Propagation Delay, S to $\bar{Z}_n$	5.0	2.5	6.0	9.5	2.0	11.0	ns
t_{PHL}	Propagation Delay, S to $\bar{Z}_n$	5.0	1.5	5.5	9.0	1.5	10.0	ns
t_{PLH}	Propagation Delay, $\bar{E}$ to $\bar{Z}_n$	5.0	1.5	5.5	9.5	1.5	10.5	ns
t_{PHL}	Propagation Delay, $\bar{E}$ to $\bar{Z}_n$	5.0	1.5	5.5	9.5	1.5	10.5	ns
t_{PLH}	Propagation Delay, I_n to $\bar{Z}_n$	5.0	1.5	4.5	8.0	1.0	8.5	ns
t_{PHL}	Propagation Delay, I_n to $\bar{Z}_n$	5.0	1.5	4.0	6.5	1.0	7.5	ns

Note:3. Voltage Range 5.0 is $5.0\text{V} \pm 0.5\text{V}$ **Capacitance**

Symbol	Parameter	Conditions	Typ.	Units
C_{IN}	Input Capacitance	$V_{CC} = \text{OPEN}$	4.5	pF
C_{PD}	Power Dissipation Capacitance	$V_{CC} = 5.0\text{V}$	45.0	pF

Physical Dimensions

Dimensions are in millimeters unless otherwise noted.



DETAIL A
SCALE: 2:1

M16AREVK

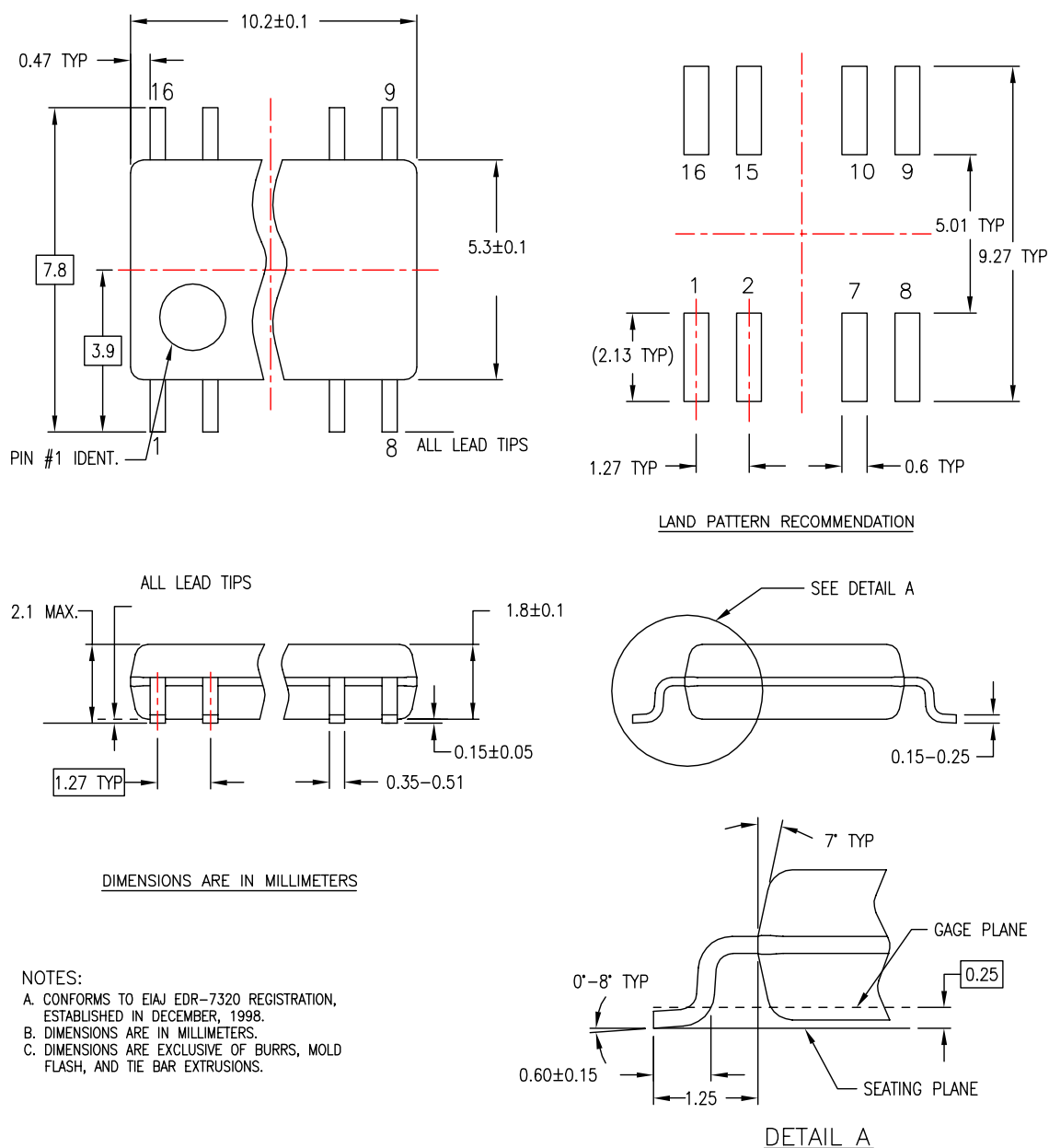
NOTES: UNLESS OTHERWISE SPECIFIED

- A) THIS PACKAGE CONFORMS TO JEDEC MS-012, VARIATION AC, ISSUE C, DATED MAY 1990.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS.
- D) STANDARD LEAD FINISH:
200 MICROINCHES / 5.08 MICRONS MIN.
LEAD/TIN (SOLDER) ON COPPER.

Figure 2. 16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow Package Number M16A

Physical Dimensions (Continued)

Dimensions are in millimeters unless otherwise noted.

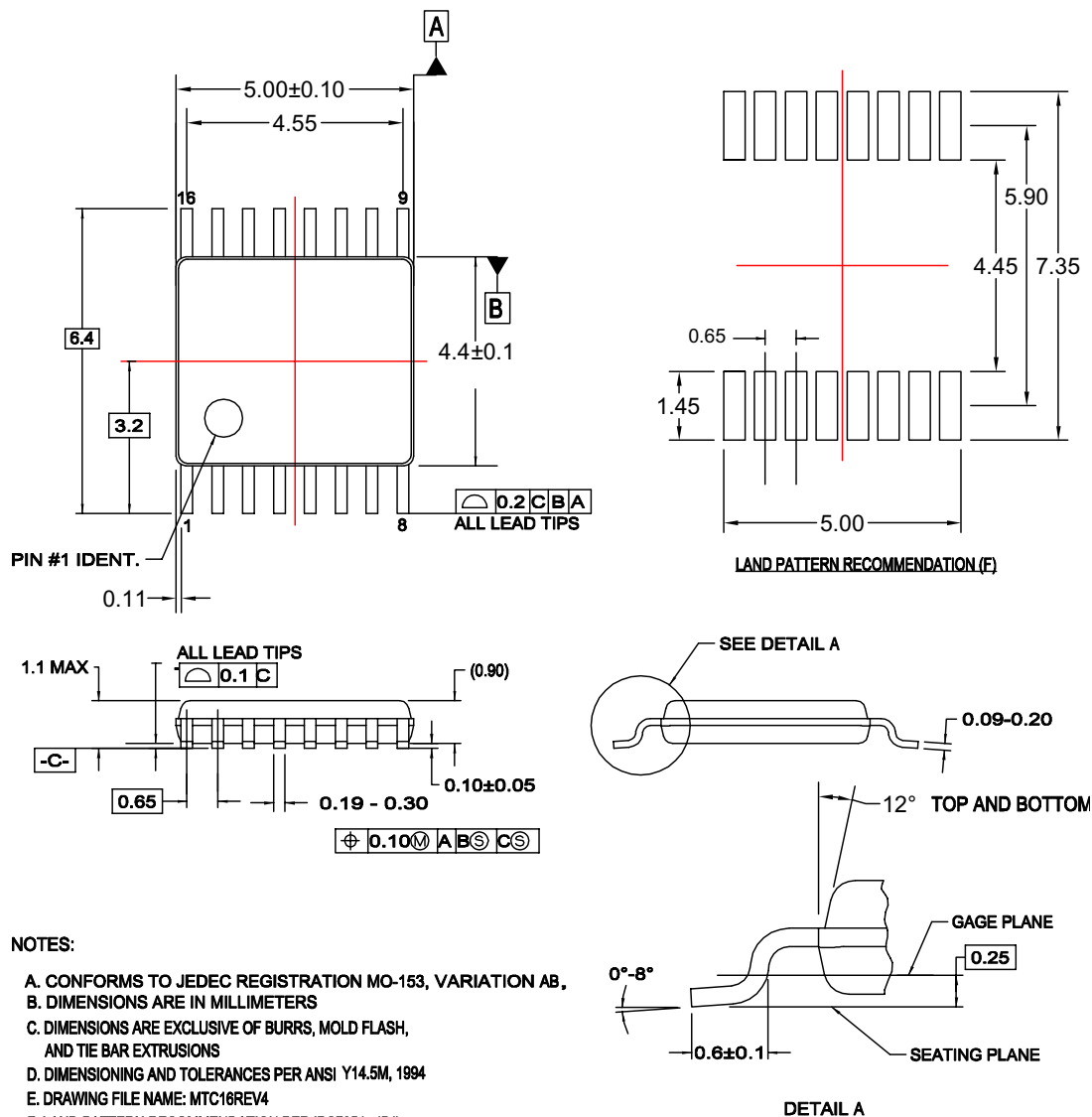


M16DREVC

**Figure 3. 16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M16D**

Physical Dimensions (Continued)

Dimensions are in millimeters unless otherwise noted.



MTC16rev4

Figure 4. 16-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide Package Number MTC16



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