

# 74ACT158

## Quad 2-Input Multiplexer

### Features

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

### General Description

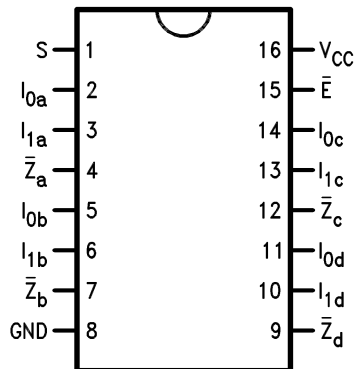
The ACT158 is a high-speed quad 2-input multiplexer. It selects four bits of data from two sources using the common Select and Enable inputs. The four buffered outputs present the selected data in the inverted form. The ACT158 can also be used as a function generator.

### Ordering Information

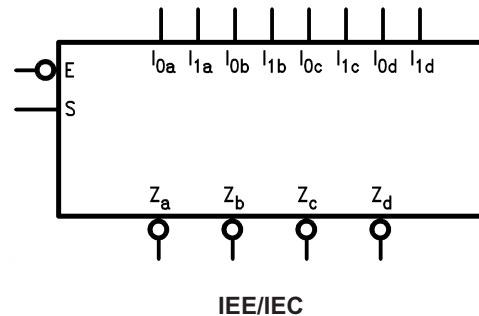
Order Number	Package Number	Package Description
74ACT158SC	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
74ACT158SJ	M16D	16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74ACT158MTC	MTC16	16-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153,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

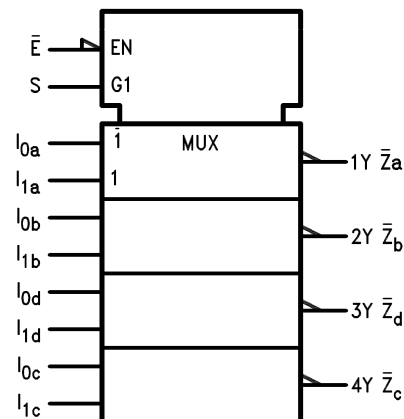


### Logic Symbols



### 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



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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

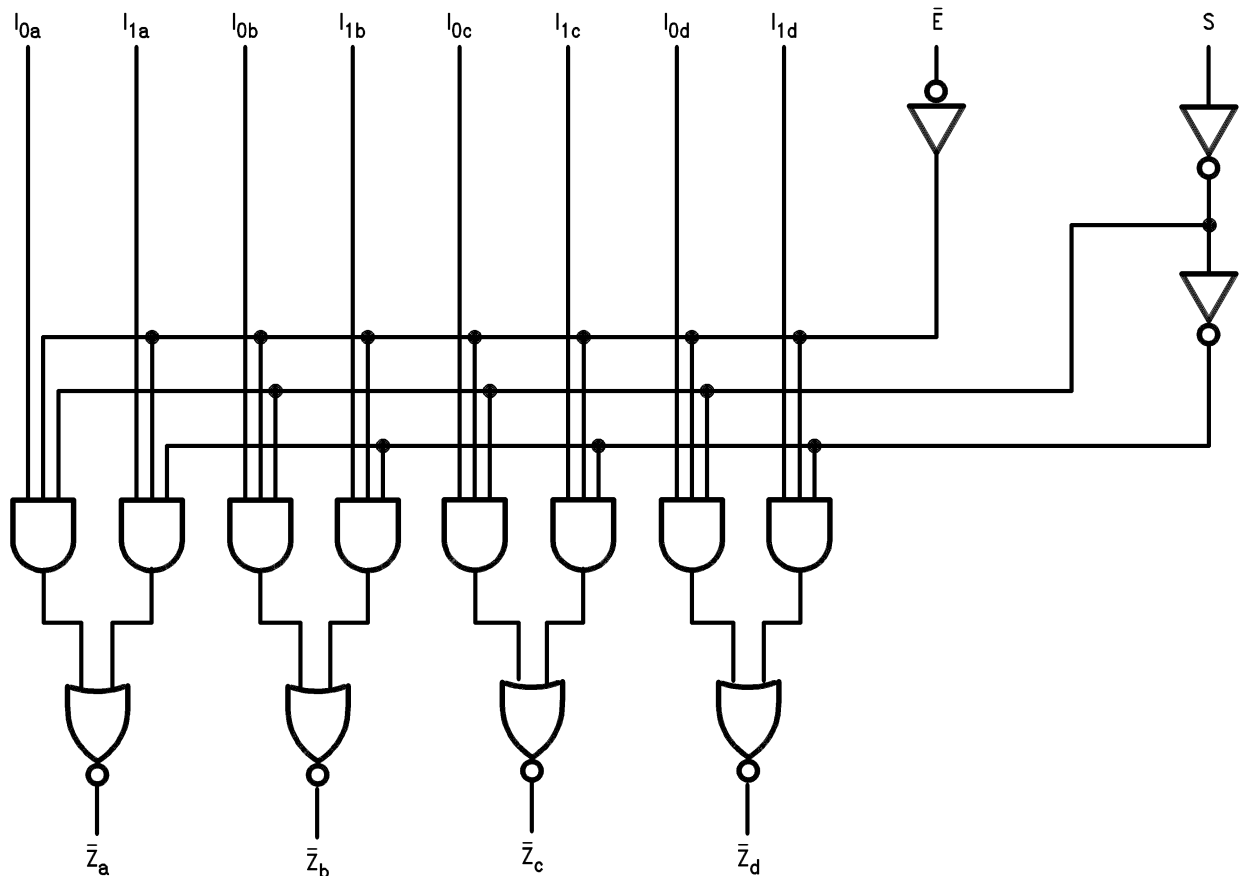
Inputs				Outputs
$\bar{E}$	S	I <sub>0</sub>	I <sub>1</sub>	$\bar{Z}$
H	X	X	X	H
L	L	L	X	H
L	L	H	X	L
L	H	X	L	H
L	H	X	H	L

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	$\pm 50mA$
$I_{CC}$ or $I_{GND}$	DC $V_{CC}$ or Ground Current per Output Pin	$\pm 50mA$
$T_{STG}$	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 <sub>CC</sub> (V)	Conditions	T <sub>A</sub> = +25°C		T <sub>A</sub> = -40°C to +85°C		Units	
				Typ.	Guaranteed Limits				
V <sub>IH</sub>	Minimum HIGH Level Input Voltage	4.5	V <sub>OUT</sub> = 0.1V or V <sub>CC</sub> - 0.1V	1.5	2.0	2.0		V	
		5.5		1.5	2.0	2.0			
V <sub>IL</sub>	Maximum LOW Level Input Voltage	4.5	V <sub>OUT</sub> = 0.1V or V <sub>CC</sub> - 0.1V	1.5	0.8	0.8		V	
		5.5		1.5	0.8	0.8			
V <sub>OH</sub>	Minimum HIGH Level Output Voltage	4.5	I <sub>OUT</sub> = -50μA	4.49	4.4	4.4		V	
		5.5		5.49	5.4	5.4			
		4.5	V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> : I <sub>OH</sub> = -24mA			3.86	3.76		
		5.5	I <sub>OH</sub> = -24mA <sup>(1)</sup>			4.86	4.76		
V <sub>OL</sub>	Maximum LOW Level Output Voltage	4.5	I <sub>OUT</sub> = 50μA	0.001	0.1	0.1		V	
		5.5		0.001	0.1	0.1			
		4.5	V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> : I <sub>OL</sub> = 24mA			0.36	0.44		
		5.5	I <sub>OL</sub> = 24mA <sup>(1)</sup>			0.36	0.44		
I <sub>IN</sub>	Maximum Input Leakage Current	5.5	V <sub>I</sub> = V <sub>CC</sub> , GND		±0.1	±1.0		μA	
I <sub>CCT</sub>	Maximum I <sub>CC</sub> /Input	5.5	V <sub>I</sub> = V <sub>CC</sub> - 2.1V	0.6		1.5		mA	
I <sub>OLD</sub>	Minimum Dynamic Output Current <sup>(2)</sup>	5.5	V <sub>OLD</sub> = 1.65V Max.			75		mA	
I <sub>OHD</sub>		5.5	V <sub>OHD</sub> = 3.85V Min.			-75		mA	
I <sub>CC</sub>	Maximum Quiescent Supply Current	5.5	V <sub>IN</sub> = V <sub>CC</sub> 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 <sub>CC</sub> (V) <sup>(3)</sup>	T <sub>A</sub> = +25°C, C <sub>L</sub> = 50 pF			T <sub>A</sub> = -40°C to +85°C, C <sub>L</sub> = 50 pF		Units
			Min.	Typ.	Max.	Min.	Max.	
t <sub>PLH</sub>	Propagation Delay, S to $\bar{Z}_n$	5.0	2.5	6.0	9.5	2.0	11.0	ns
t <sub>PHL</sub>	Propagation Delay, S to $\bar{Z}_n$	5.0	1.5	5.5	9.0	1.5	10.0	ns
t <sub>PLH</sub>	Propagation Delay, $\bar{E}$ to $\bar{Z}_n$	5.0	1.5	5.5	9.5	1.5	10.5	ns
t <sub>PHL</sub>	Propagation Delay, $\bar{E}$ to $\bar{Z}_n$	5.0	1.5	5.5	9.5	1.5	10.5	ns
t <sub>PLH</sub>	Propagation Delay, I <sub>n</sub> to $\bar{Z}_n$	5.0	1.5	4.5	8.0	1.0	8.5	ns
t <sub>PHL</sub>	Propagation Delay, I <sub>n</sub> to $\bar{Z}_n$	5.0	1.5	4.0	6.5	1.0	7.5	ns

**Note:**

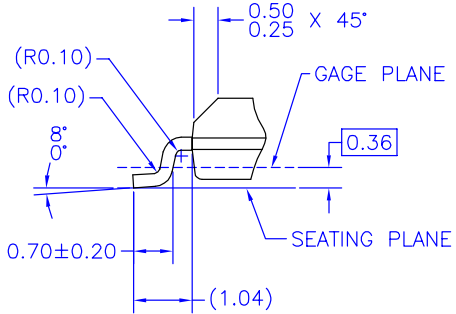
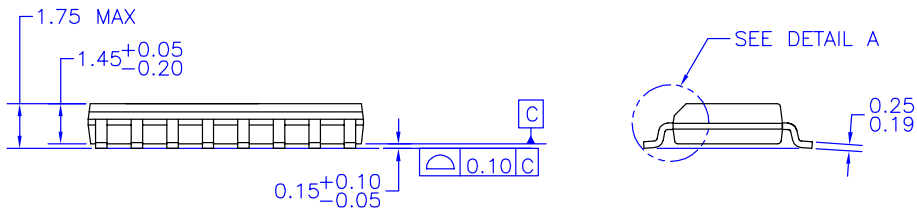
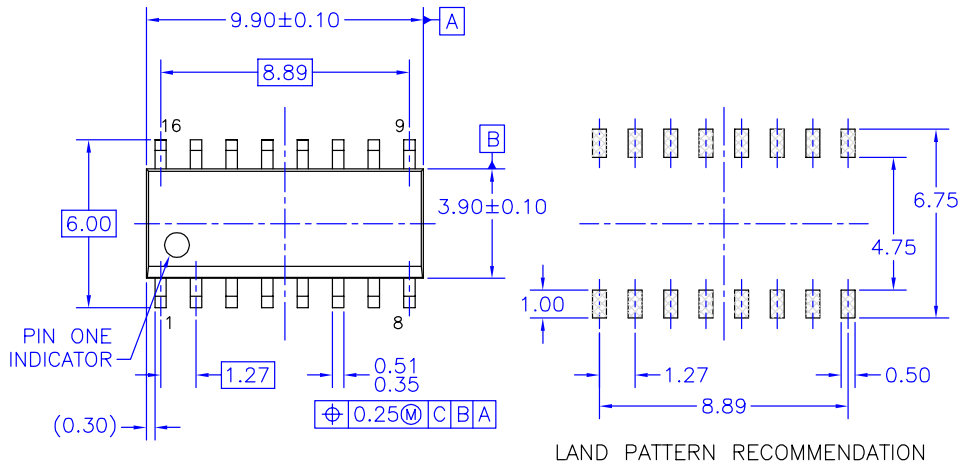
3. Voltage Range 5.0 is 5.0V ± 0.5V

## Capacitance

Symbol	Parameter	Conditions	Typ.	Units
C <sub>IN</sub>	Input Capacitance	V <sub>CC</sub> = OPEN	4.5	pF
C <sub>PD</sub>	Power Dissipation Capacitance	V <sub>CC</sub> = 5.0V	45.0	pF

**Physical Dimensions**

Dimensions are in millimeters unless otherwise noted.



NOTES: UNLESS OTHERWISE SPECIFIED

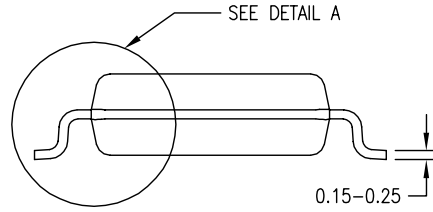
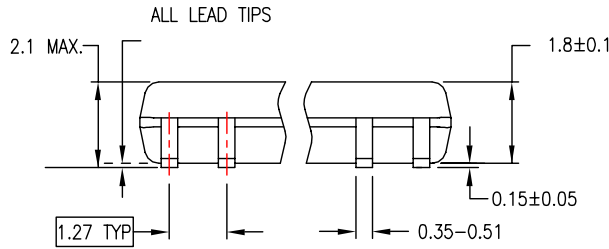
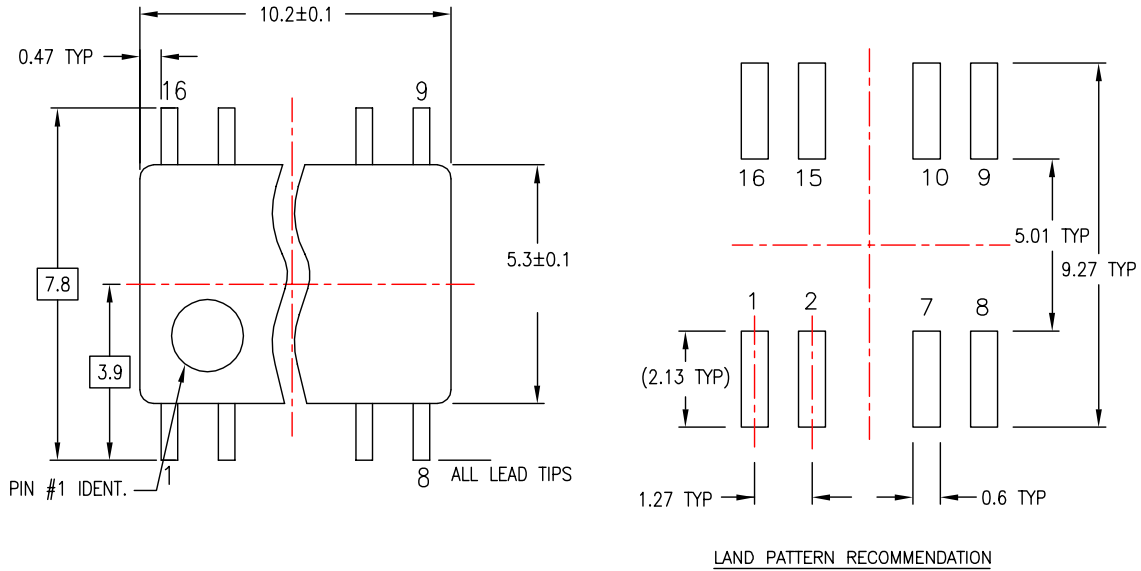
- A) THIS PACKAGE CONFORMS TO JEDEC MS-012, VARIATION AC, ISSUE C, DATED MAY 1990.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS.
- D) STANDARD LEAD FINISH:  
200 MICRONS / 5.08 MICRONS MIN.  
LEAD/TIN (SOLDER) ON COPPER.

M16AREVK

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

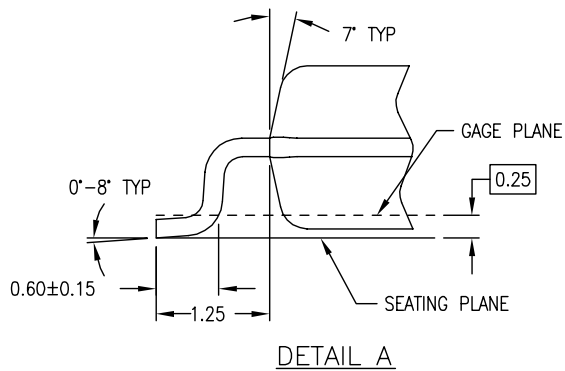
**Physical Dimensions** (Continued)

Dimensions are in millimeters unless otherwise noted.



DIMENSIONS ARE IN MILLIMETERS

- NOTES:  
 A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.  
 B. DIMENSIONS ARE IN MILLIMETERS.  
 C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

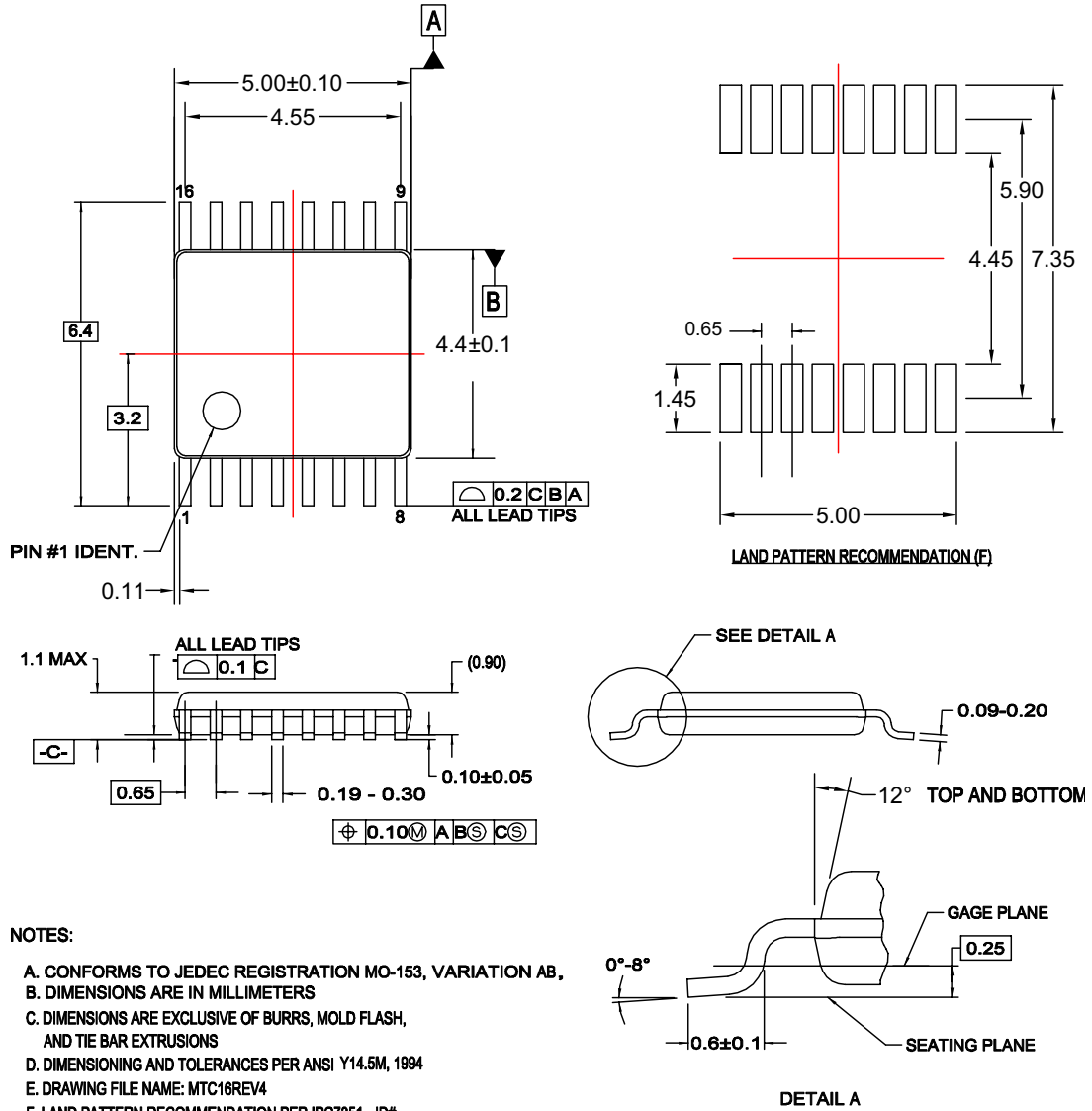


M16DREVC

**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.



**NOTES:**

- A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AB,
- B. DIMENSIONS ARE IN MILLIMETERS
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS
- D. DIMENSIONING AND TOLERANCES PER ANSI Y14.5M, 1994
- E. DRAWING FILE NAME: MTC16REV4
- F. LAND PATTERN RECOMMENDATION PER IPC7351 - ID# TSOP65P640X110-16N

MTC16rev4


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





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EnSigna <sup>™</sup>	OPTOLOGIC <sup>®</sup>	SuperSOT <sup>™</sup> -3	
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FAST <sup>®</sup>	POP <sup>™</sup>	SyncFET <sup>™</sup>	
FASTr <sup>™</sup>	Power220 <sup>®</sup>	TCM <sup>™</sup>	
FPS <sup>™</sup>	Power247 <sup>®</sup>	The Power Franchise <sup>®</sup>	
FRFET <sup>®</sup>	PowerEdge <sup>™</sup>	 ™	
GlobalOptoisolator <sup>™</sup>	PowerSaver <sup>™</sup>	TinyBoost <sup>™</sup>	
GTO <sup>™</sup>	PowerTrench <sup>®</sup>	TinyBuck <sup>™</sup>	

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Rev. I24