Rochester Electronics

Datasheet

AM26LS29

Quad Three-State Single Ended RS-423 Line Driver

The AM26LS29 is a quad single ended line driver, designed for digital data transmission. The AM26LS29 meets all the requirements of EIA Standard RS-423 and Federal STD 1030. It features four buffered outputs with high source and sink current, and output short circuit protection.

A slew rate control pin allows the use of an external capacitor to control slew rate for suppression of near end cross talk to receivers in the cable. The AM26LS29 is constructed using advanced lowpower Schottky processing.

Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All re-creations are done with the approval of the Original Component Manufacturer. (OCM)

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceeds the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
    - Class Q Military
    - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
    - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OCM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

FOR REFERENCE ONLY

FINAL

Am26LS29

Quad Three-State Single Ended RS-423 Line Driver

Advanced Micro Devices

DISTINCTIVE CHARACTERISTICS

- Four single ended line drivers in one package for maximum package density
- Output short-circuit protection
- Individual rise time control for each output
- High capacitive load drive capability
- Low I_{CC} and I_{EE} power consumption (26mW/driver typ.)
- Meets all requirements of RS-423
- Three-state outputs for bus oriented systems
- Outputs do not clamp line with power off. Outputs are in high-impedance state over entire transmission line voltage range of RS-423
- Low current PNP inputs compatible with TTL, MOS and CMOS
- Available in military and commercial temperature range
- Advanced low power Schottky processing

GENERAL DESCRIPTION

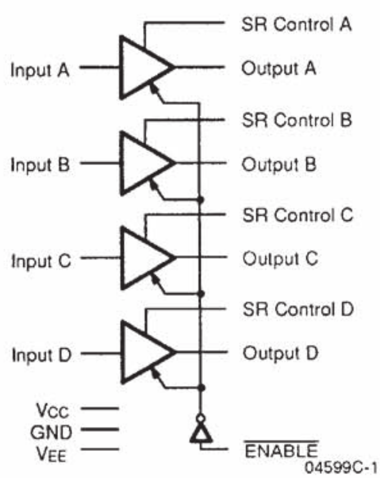
The Am26LS29 is a quad single ended line driver, designed for digital data transmission. The Am26LS29 meets all the requirements of EIA Standard RS-423 and Federal STD 1030. It features four buffered outputs with high source and sink current, and output short circuit protection.

A slew rate control pin allows the use of an external capacitor to control slew rate for suppression of near end cross talk to receivers in the cable.

The Am26LS29 has three-state outputs for bus oriented systems. The outputs in the high-impedance state will not clamp the line over the transmission line voltage of RS-423. A typical full duplex system would use the Am26LS29 line driver and up to twelve Am26LS32 line receivers or an Am26LS32 line receiver and up to thirty-two Am26LS29 line drivers with only one enabled at a time and all others in the three-state mode.

The Am26LS29 is constructed using advanced low-power Schottky processing.

BLOCK DIAGRAM



Publication# 04599 Rev. C Amendment/0
Issue Date: September 1993

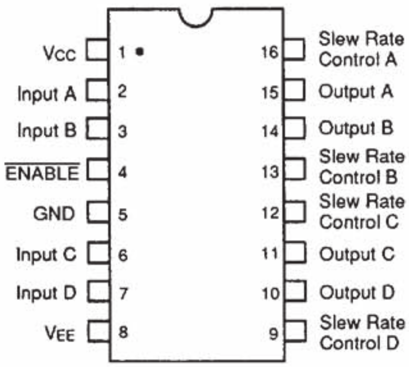
RELATED PRODUCTS

Part Number	Description
26LS30	Dual Differential RS-422 Party Line/Quad Single Ended RS-423 Line Driver
26LS32	Quad Differential Line Receiver
26LS33	Quad Differential Line Receiver

CONNECTION DIAGRAMS

Top View

DIP



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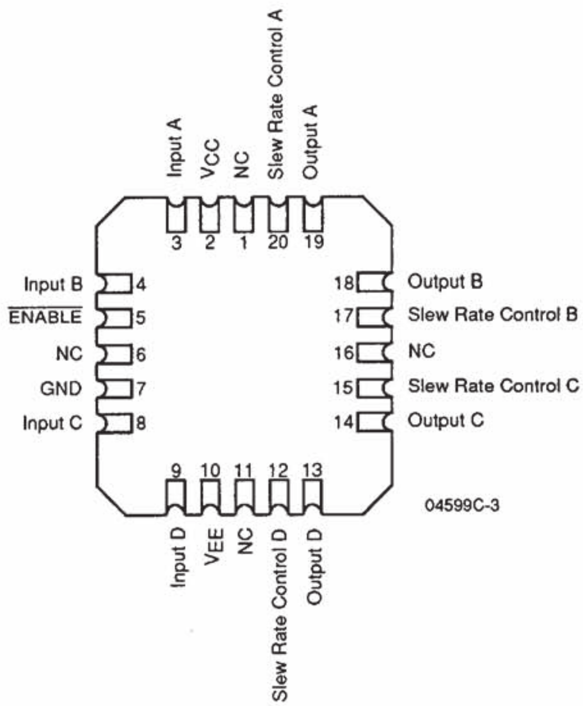
PLCC



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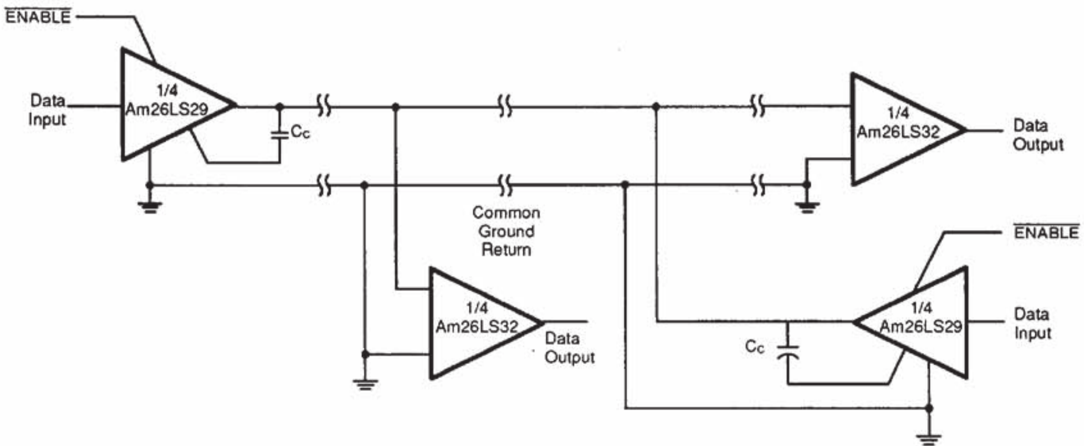
Note:
Pin 1 is marked for orientation

TYPICAL APPLICATION



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ORDERING INFORMATION
Standard Products

AMD products are available in several packages and operating ranges. The ordering number (Valid Combination) is formed by a combination of:

AM26LS29 ___ **P** **C** **B** ___

ALTERNATE PACKAGING OPTION

OPTIONAL PROCESSING
Blank = Standard Processing
B = Burn-in

TEMPERATURE RANGE
C = Commercial (0°C to 70°C)
M = Military (-55°C to +125°C

PACKAGE TYPE
P = 16-Pin Plastic DIP (PD 016)
D = 16-Pin Ceramic DIP (CD 016)
S = 16-Pin Small Outline (SO 016)
J = 20-Pin Plastic Leadless Chip Carrier (PL 020)

SPEED OPTION
Not Applicable

DEVICE NUMBER/DESCRIPTION
Am26LS29
Quad Three-state Single Ended RS-423 Line Driver

Valid Combinations	
AM26LS29	PC, PCB, DC, DCB, SC, JC, DMB

Valid Combinations

The Valid Combinations lists configurations planned to be supported in volume for this device. Consult the local AMD sales office to confirm availability of specific valid combinations and to check on newly released combinations.

ABSOLUTE MAXIMUM RATINGS

Storage Temperature Range ..... −65°C to +165°C

Supply Voltage:

V+ .... 7.0 V

V− .... −7.0 V

Power Dissipation .... 165 mW

Input Voltage .... −1.5 V to +15 V

Enable Voltage .... ±15 V

Output Sink Current .... 300°C

Stresses above those listed under Absolute Maximum Ratings may cause permanent device failure. Functionality at or above these limits is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability.

OPERATING RANGES

Commercial (C) Devices

Temperature (T_A) .... 0°C to +70°C

Supply Voltage (V_{CC}) .... +4.75 V to +5.25 V

(V_{EE}) .... −4.75 V to −5.25 V

Military (M) Devices

Temperature (T_A) .... −55 to +125°C

Supply Voltage (V_{CC}) .... +4.75 V to +5.5 V

(V_{EE}) .... −4.75 V to −5.5 V

Operating ranges define those limits between which the functionality of the device is guaranteed.

DC CHARACTERISTICS over COMMERCIAL operating range unless otherwise specified

Parameter Symbol	Parameter Description	Test Conditions		Min	Typ (Note 1)	Max	Unit
V_O	Output Voltage	$\|V_{CC}\| = \|V_{EE}\|$ = Min	V_{IN} . 2.4 V	4.0	4.4	6.0	V
$\overline{V_O}$		$R_L = \infty$(Note 3)	V_{IN} . 0.4 V	−4.0	−4.4	−6.0	V
V_T	Output Voltage (Note 4)	$\|V_{CC}\| = \|V_{EE}\|$ = Min	V_{IN} . 2.4 V	3.6	4.1		V
$\overline{V_T}$		R_L = 450 Ω	V_{IN} . 0.4 V	−3.6	−4.1		V
$\|V_T\| - \|\overline{V_T}\|$	Output Unbalance (Note 4)	$\|V_{CC}\| = \|V_{EE}\|$, R_L = 450 Ω			0.02	0.4	V
I_X+	Output Leakage Power Off	$V_{CC} = V_{EE}$ = 0V	V_O . 10 V			100	µA
I_X-			V_O . −10 V			−100	µA
I_S+	Output Short Circuit Current (Note 6)	$\|V_{CC}\| = \|V_{EE}\|$ = Max	V_{IN} . 2.4 V	−20	−80	−150	mA
I_S-		V_O . 0 V	V_{IN} . 0.4 V	20	80	150	mA
I_{CC}	Positive Supply Current	V_{IN} = 0.4 V, $R_L = \|\infty$, $\|V_{CC}\| = \|V_{EE}\|$ = Max		18	30	mA	
I_{EE}	Negative Supply Current	V_{IN} = 0.4 V, $R_L = \|\infty$, $\|V_{CC}\| = \|V_{EE}\|$ = Max			−10	−22	mA
I_O	Off State (High Impedance) Output Current	V_{CC} = Max	V_O . 10 V			100	µA
		$\|V_{CC}\| = \|V_{EE}\|$ = Max	V_O . −10 V			−100	µA
V_{IH}	High Level Input Voltage	(Note 7)		2.0			V
V_{IL}	Low Level Input Voltage	(Note 7)				0.8	V
I_{IH}	High Level Input Current	V_{IN} = 2.4 V, $\|V_{CC}\| = \|V_{EE}\|$ = Max				40	µA
		$V_{IN} \le$ 15 V, V_{CC} = 5.5 V, V_{EE} = −5.0 (Note 5)				100	µA
I_{IL}	Low Level Input Current	V_{IN} = 0.4 V, $\|V_{CC}\| = \|V_{EE}\|$ = Max			−30	−200	µA
V_I	Input Clamp Voltage	I_{IN} = −12mA, V_{CC} = Min, V_{EE} = Max				−1.5	V

Notes:

1. *Typical limits are at V_{CC}= 5.0 V, V_{EE} = −5.0 V, 25°C ambient and maximum loading.*
2. *Symbols and definitions correspond to EIA RS-423 where applicable.*
3. *Output voltage is +3.9 V minimum and −3.9 V minimum at −55°C.*
4. *This parameter is tested by forcing an equivalent current.*
5. *V_{EE} = −5.0 V due to tester limitation.*
6. *Not more than one output should be shorted at a time. Duration of short circuit test should not exceed one second.*
7. *Input thresholds are tested during DC tests and may be done in combination with testing of other DC parameters.*

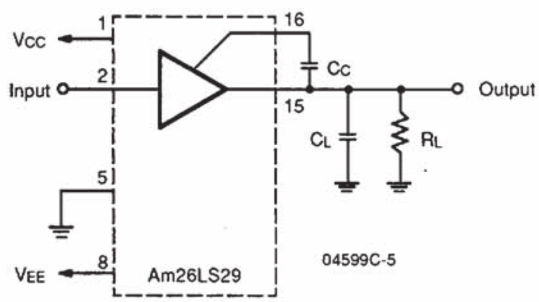
SWITCHING CHARACTERISTICS (T_A = +25°C, V_{CC} = 5.0V, V_{EE} = –5.0 V)

Parameter Symbol	Parameter Description	Test Conditions		Min	Typ	Max	Unit
t_r	Rise Time	R_L = 450 Ω, C_L = 500 pF, Fig. 1	C_C = 50 pF		3.0		µs
			C_C = 0 pF		120	300	ns
t_f	Fall Time	R_L = 450 Ω, C_L = 500 pF, Fig. 1	C_C = 50 pF		3.0		µs
			C_C = 0 pF		120	300	ns
t_{pdh}	Output Propagation Delay	R_L = 450 Ω, C_L = 500 pF, C_C = 0 pF			180	300	ns
t_{pdl}	Output Propagation Delay	R_L = 450 Ω, C_L = 500 pF, C_C = 0 pF			180	300	ns
t_{LZ}	Output Enable to Output	R_L = 100 Ω, C_L = 500 pF, C_C = 0 pF, Fig. 2			180	300	ns
t_{HZ}					200	350	
t_{ZL}		R_L = 100 Ω, C_L = 500 pF, C_C = 0 pF, Fig. 2			200	350	
t_{ZH}					180	300	

AC CHARACTERISTICS (T_A = –55°C to +125°C, V_{CC} = 4.75 V to 5.5 V, V_{EE} = 4.75 V to 5.5 V)

Parameter Symbol	Parameter Description	Test Conditions	Min	Typ	Max	Unit
t_r	Rise Time	R_L = 450 Ω, C_L = 500 pF, C_C = 0 pF			450	µs
t_f	Fall Time	R_L = 450 Ω, C_L = 500 pF, C_C = 0 pF			450	µs
t_{pdh}	Output Propagation Delay	R_L = 450 Ω, C_L = 500 pF, C_C = 0 pF			450	ns
t_{pdl}	Output Propagation Delay	R_L = 450 Ω, C_L = 500 pF, C_C = 0 pF			450	ns
t_{LZ}	Output Enable to Output	R_L = 100 Ω, C_L = 500 pF, C_C = 0 pF			400	ns
t_{HZ}		R_L = 100 Ω, C_L = 500 pF, C_C = 0 pF			400	ns
t_{ZL}		R_L = 100 Ω, C_L = 500 pF, C_C = 0 pF			400	ns
t_{ZH}		R_L = 100 Ω, C_L = 500 pF, C_C = 0 pF			400	ns

SWITCHING TEST CIRCUIT



SWITCHING TEST WAVEFORM

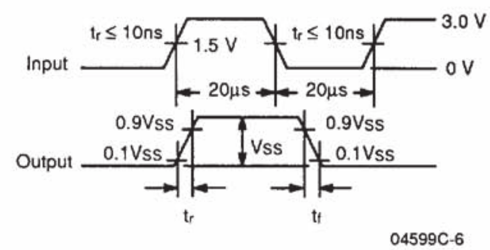
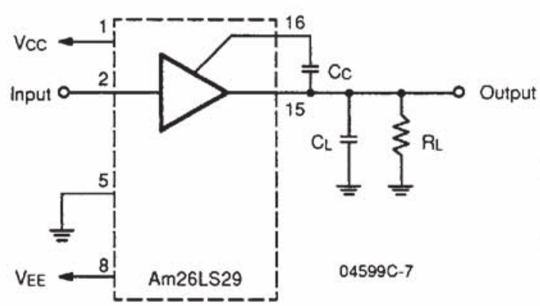


Figure 1. Rise Time Control

SWITCHING TEST CIRCUIT



SWITCHING TEST WAVEFORM

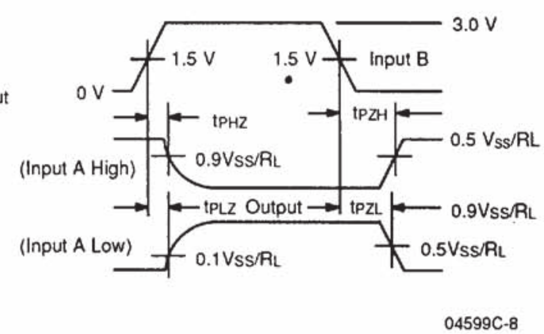
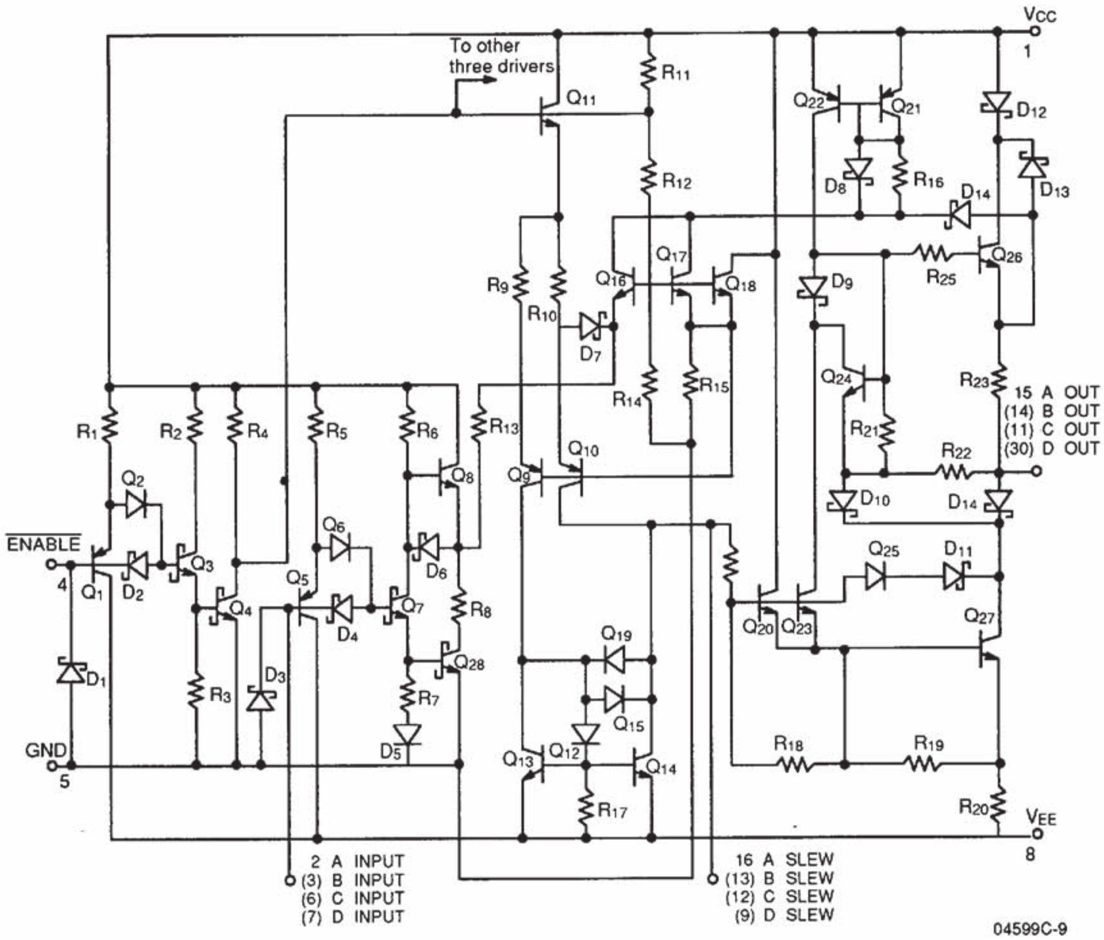


Figure 2. Three-State Delays

Am26LS29 EQUIVALENT CIRCUIT



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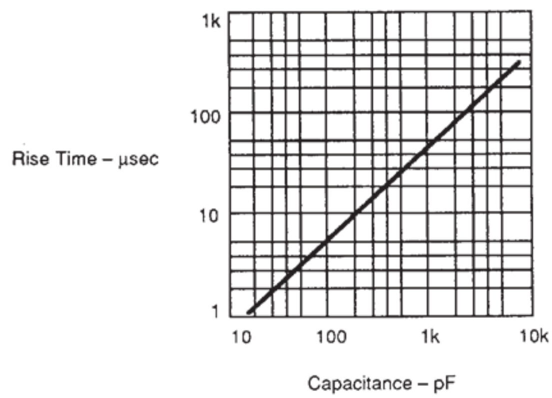
TYPICAL PERFORMANCE CURVES

Slew Rate (Rise or Fall Time) Versus External Capacitor



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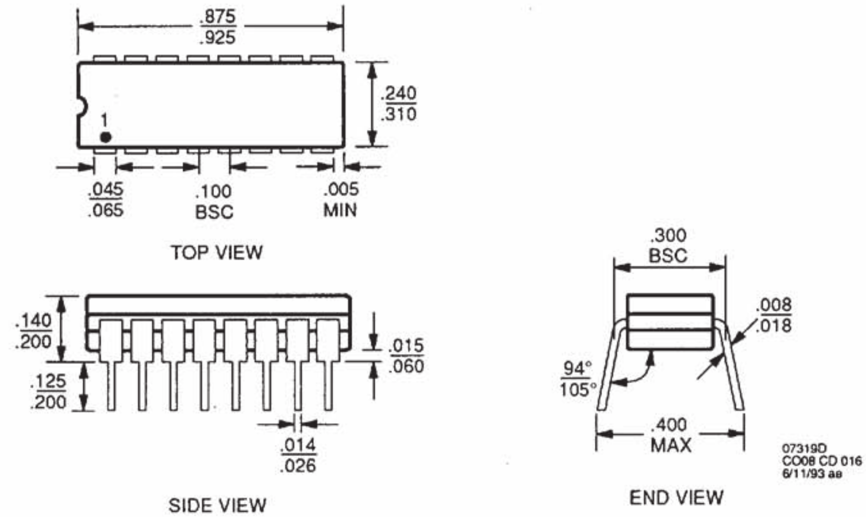
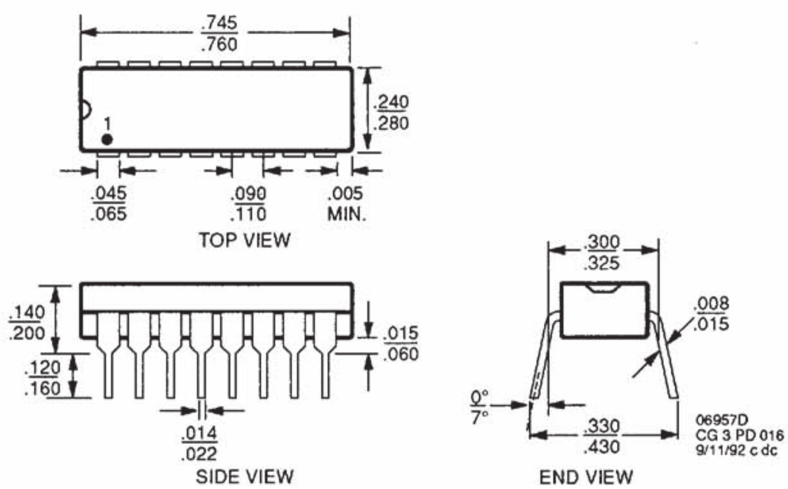
PHYSICAL DIMENSIONS*

CD 016
16-Pin Ceramic DIP (measured in inches)



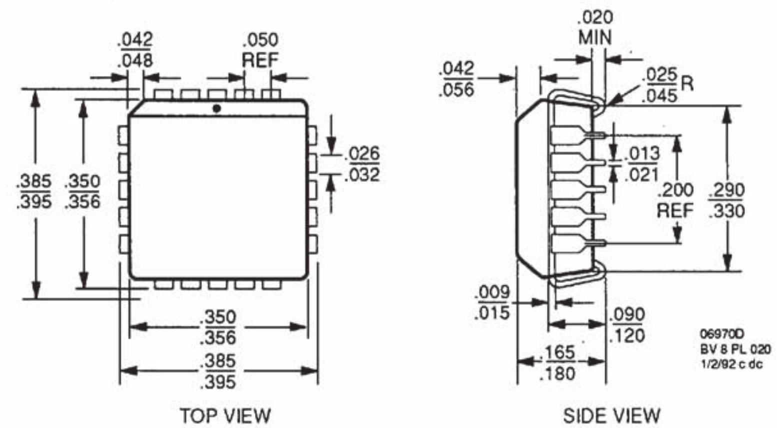
PD 016
16-Pin Plastic DIP (measured in inches)



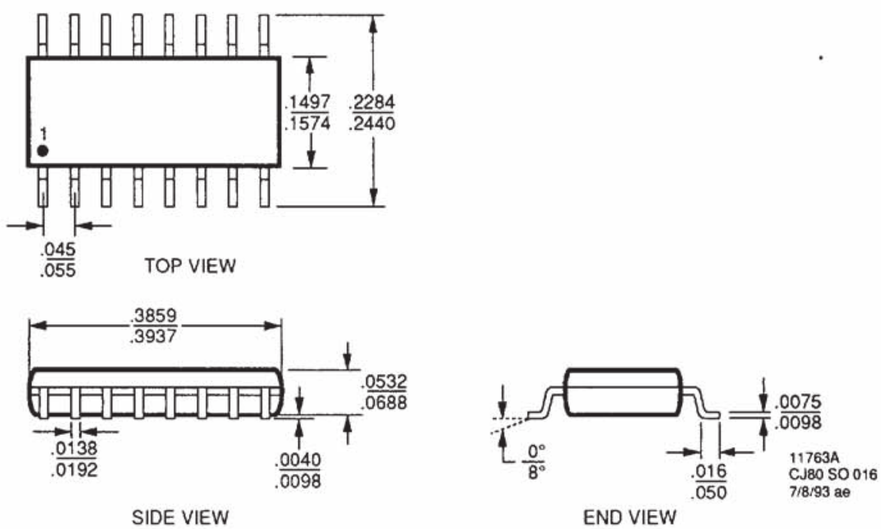
For reference only. BSC is an ANSI standard for Basic Space Centering.

PHYSICAL DIMENSIONS

PL 020
20-Pin Plastic Leadless Chip Carrier (measured in inches)



SO 016
16-Pin Small Outline (measured in inches)



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