

DS26C32AMQML Quad Differential Line Receiver

 Check for Samples: [DS26C32AMQML](#)

FEATURES

- CMOS Design for Low Power
- $\pm 0.2V$ Sensitivity Over Input Common Mode Voltage Range
- Input Fail-Safe Circuitry
- Inputs Won't Load Line When $V_{CC} = 0V$
- Meets the Requirements of EIA Standard RS-422
- TRI-STATE Outputs for Connection to System Buses

DESCRIPTION

The DS26C32A is a quad differential line receiver designed to meet the RS-422, RS-423, and Federal Standards 1020 and 1030 for balanced and unbalanced digital data transmission, while retaining the low power characteristics of CMOS.

The DS26C32A has an input sensitivity of 200 mV over the common mode input voltage range of $\pm 7V$. The DS26C32A features internal pull-up and pull-down resistors which prevent output oscillation on unused channels.

The DS26C32A provides an enable and disable function common to all four receivers, and features TRI-STATE outputs with 6 mA source and sink capability. This product is pin compatible with the DS26LS32A and the AM26LS32.

CONNECTION DIAGRAMS

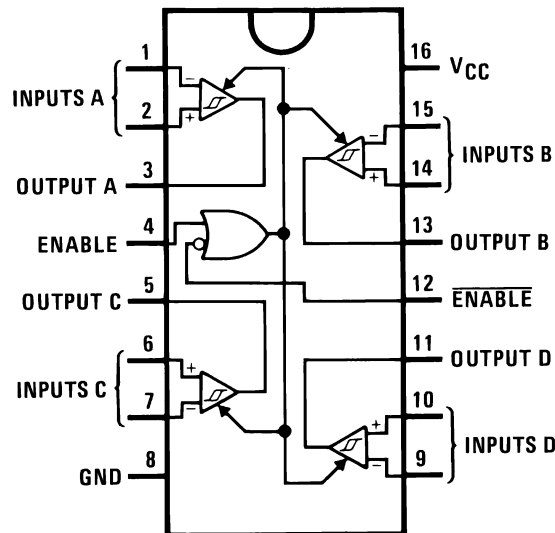


Figure 1. CDIP and CLGA Packages-Top View
See Package Numbers NFE0016A, NAC0016A, or NAD0016A



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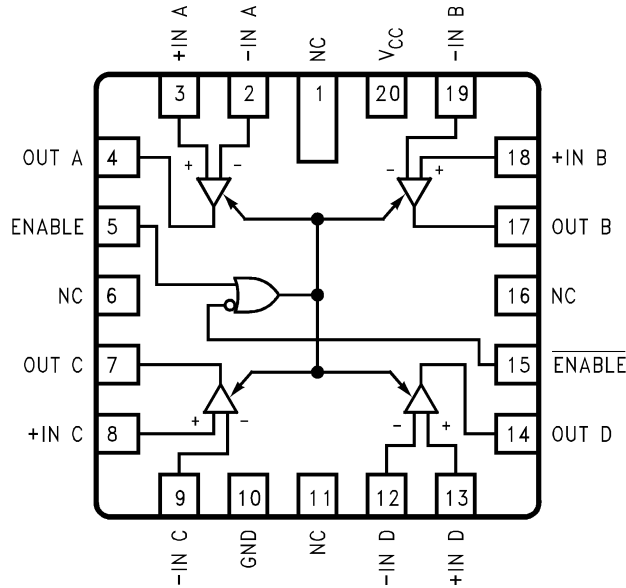
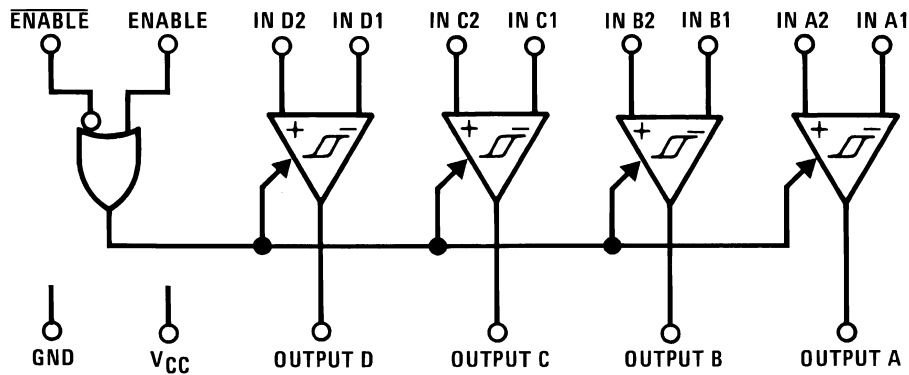


Figure 2. 20-Lead LCCC Package-Top View
See Package Number NAJ0020A

Logic Diagram



Truth Table (1)

ENABLE	ENABLE	Input	Output
L	H	X	Z
All Other Combinations of Enable Inputs		$V_{ID} \geq V_{Th} (Max)$	H
		$V_{ID} \leq V_{Th} (Min)$	L
		Open	H

(1) Z = TRI-STATE



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

Absolute Maximum Ratings⁽¹⁾⁽²⁾

Supply Voltage (V_{CC})	7V
Common Mode Range (V_{CM})	$\pm 14V$
Differential Input Voltage (V_{Diff})	$\pm 14V$
Enable Input Voltage (V_I)	7V
Storage Temperature Range (T_{stg})	$-65^{\circ}C \leq T_A \leq +150^{\circ}C$
Lead Temperature (Soldering 4 sec.)	260°C

- (1) Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not verify specific performance limits. For verified specifications and test conditions, see the Electrical Characteristics. The verified specifications apply only for the test conditions listed. Some performance characteristics may degrade when the device is not operated under the listed test conditions.
- (2) Unless otherwise specified, all voltages are referenced to ground.

Recommended Operating Conditions

	Min	Max	Units
Supply Voltage (V_{CC})	4.50	5.50	V
Operating Temperature Range (T_A)	-55	+125	°C

Quality Conformance Inspection
Table 1. Mil-Std-883, Method 5005 - Group A

Subgroup	Description	Temp °C
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55
12	Settling time at	+25
13	Settling time at	+125
14	Settling time at	-55

DS26C32AM Electrical Characteristics DC Parameters

Parameter	Test Conditions	Notes	Min	Max	Unit	Sub-groups
V_{TH}	Minimum Differential Input Voltage $V_{CC} = 5V, V_O = V_{OH}$ or V_{OL} , $-7 < V_{CM} < +7$		-200	+200	mV	1, 2, 3
R_I	Input Resistance $V_{CC} = 5V, -7 < V_{CM} < +7$, One input AC Gnd		4.5	11	K Ω	1, 2, 3
I_I	Input Current $V_{CC} = 5V, V_I = +10V$, Other Input = Gnd			+1.8	mA	1, 2, 3
				-2.7	mA	1, 2, 3
V_{OH}	Logical "1" Output Voltage $V_{CC} = 4.5V, V_{Diff} = +1V$, $I_O = -6.0mA$		3.8		V	1, 2, 3
V_{OL}	Logical "0" Output Voltage $V_{CC} = 5.5V, V_{CC} = Max$, $V_{Diff} = -1V, I_O = 6.0mA$			0.3	V	1, 2, 3

DS26C32AM Electrical Characteristics DC Parameters (continued)

Parameter		Test Conditions	Notes	Min	Max	Unit	Sub-groups
V _{IH}	Minimum Enable High Level Voltage		(1)	2.0		V	1, 2, 3
V _{IL}	Maximum Enable Low Level Voltage		(1)		0.8	V	1, 2, 3
I _{OZ}	Maximum TRI-STATE Output Leakage Current	V _O = V _{CC} or Gnd, $\bar{\text{Enable}} = V_{IH}$			±5.0	μA	1, 2, 3
I _I	Maximum Enable Input Current	V _I = V _{CC} or Gnd			±1.0	μA	1, 2, 3
I _{CC}	Quiescent Power Supply Current	V _{Diff} = +1V, V _{CC} = 5.5V			25	mA	1, 2, 3

(1) Parameter tested Go-No-Go only.

DS26C32AM Electrical Characteristics AC Parameters - Propagation Delay Time

The following conditions apply, unless otherwise specified. V_{CC} = 5V ±10%, C_{CL} = 50pF, V_{Diff} = 2.5V

Parameter		Test Conditions	Notes	Min	Max	Unit	Sub-groups
t _{PLH}	Input to Output Prop Delay	V _{CM} = 0V			35	ns	9, 10, 11
t _{PHL}	Input to Output Prop Delay	V _{CM} = 0V			35	ns	9, 10, 11
t _{Rise}	Output Rise Time	V _{CM} = 0V			9	ns	9, 10, 11
t _{Fall}	Output Fall Time	V _{CM} = 0V			9	ns	9, 10, 11
t _{PLZ}	Output Disable Time	R _L = 1000Ω			29	ns	9, 10, 11
t _{PZL}	Output Enable Time	R _L = 1000Ω			29	ns	9, 10, 11
t _{PHZ}	Output Disable Time	R _L = 1000Ω			29	ns	9, 10, 11
t _{PZH}	Output Enable Time	R _L = 1000Ω			29	ns	9, 10, 11

Typical Performance Characteristics

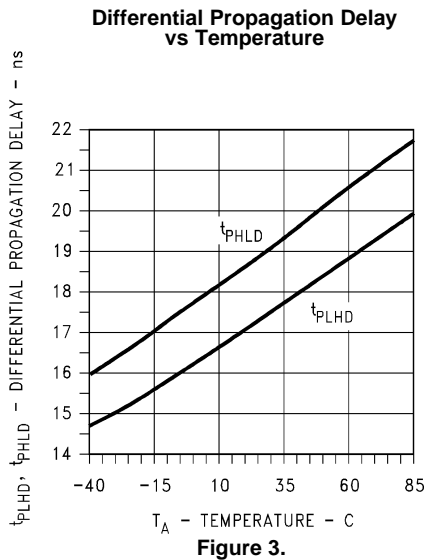


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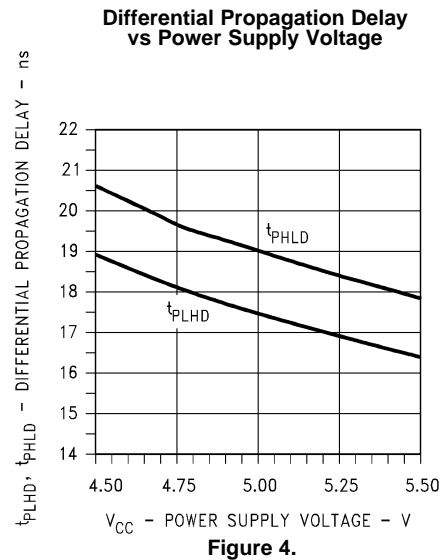


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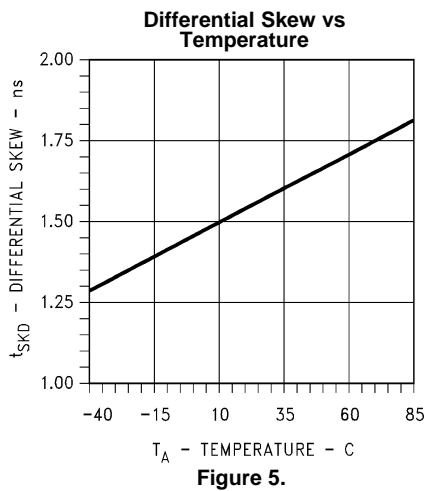


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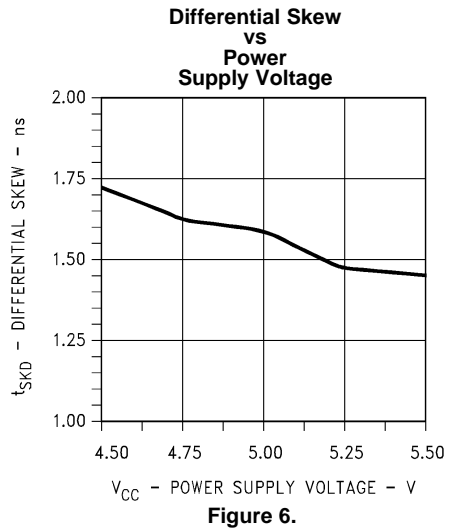


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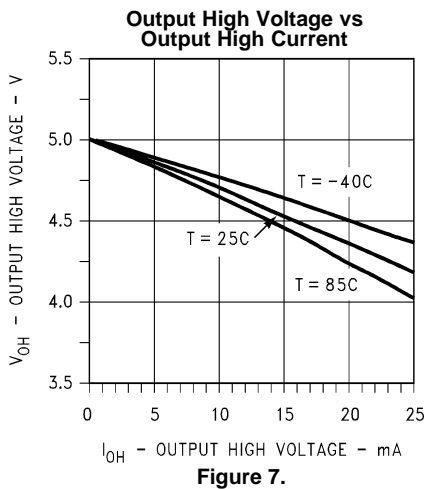


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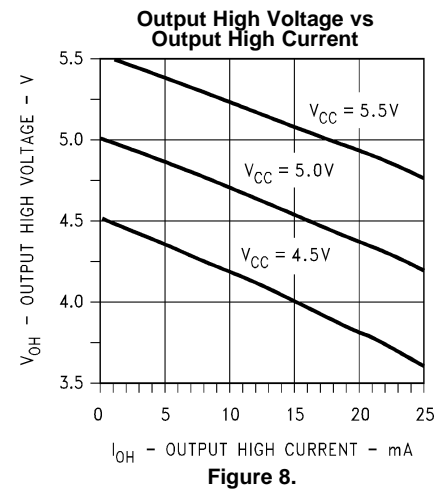


Figure 8.

Typical Performance Characteristics (continued)

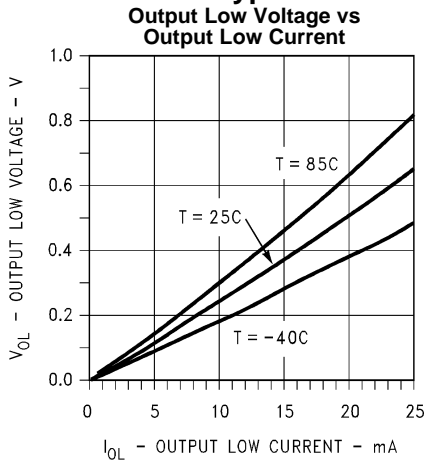


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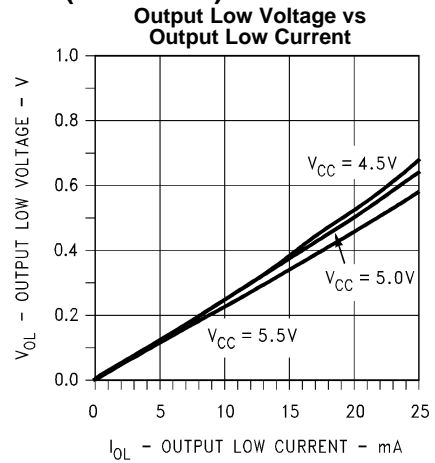


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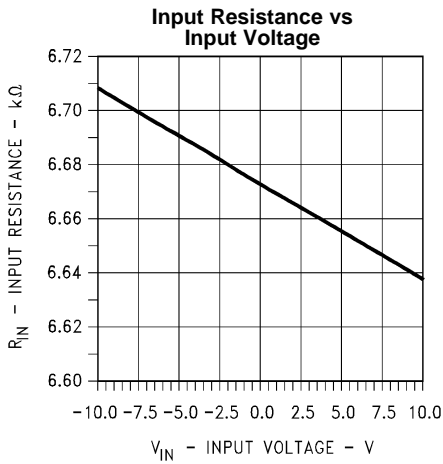


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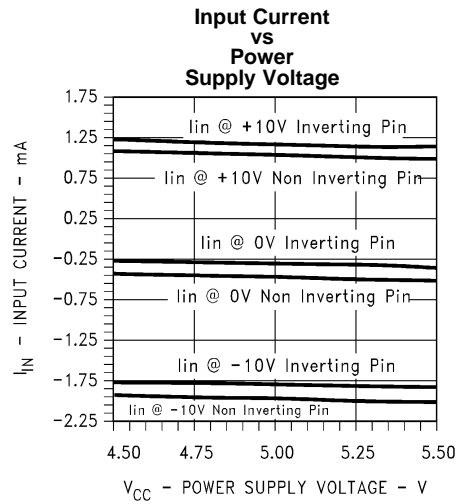


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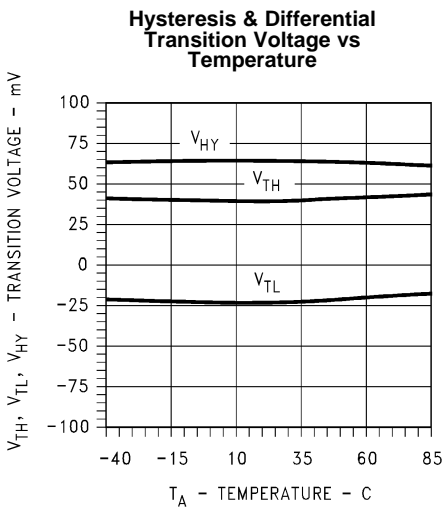


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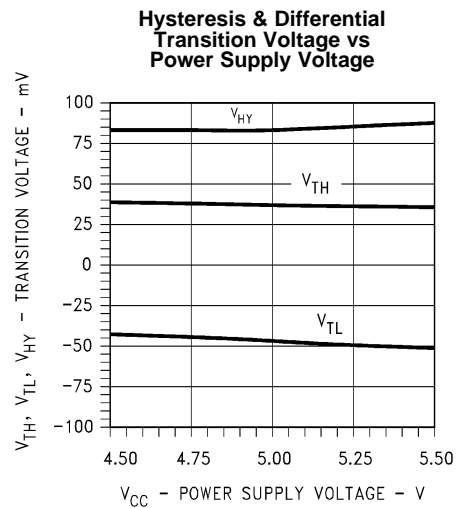


Figure 14.

Typical Performance Characteristics (continued)

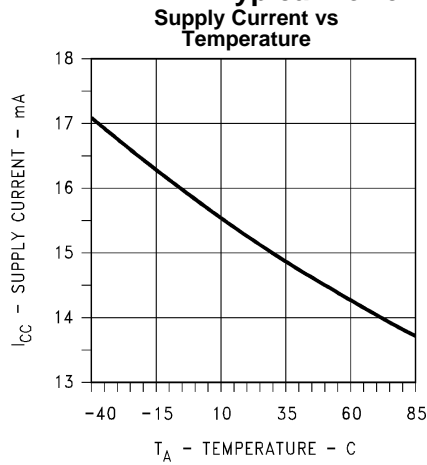


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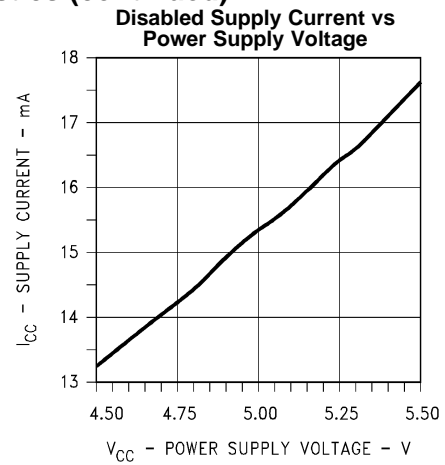


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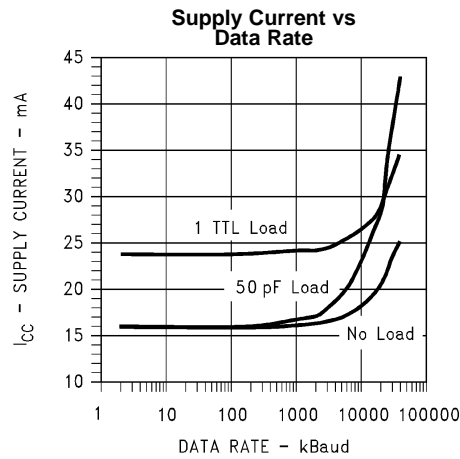
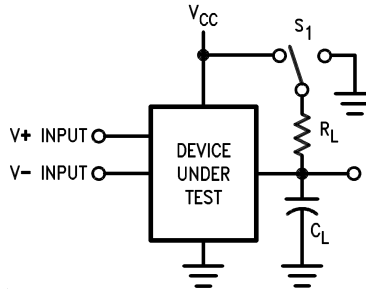


Figure 17.

AC TEST CIRCUIT AND SWITCHING TIME WAVEFORMS



C_L includes load and test jig capacitance.
 $S_1 = V_{CC}$ for t_{PZL} and t_{PLZ} measurements.
 $S_1 = \text{Gnd}$ for t_{PZH} and t_{PHZ} measurements.

Figure 18. Test Circuit for TRI-STATE Output Tests

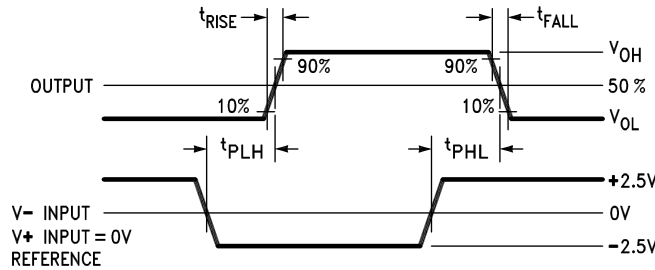


Figure 19. Propagation Delay

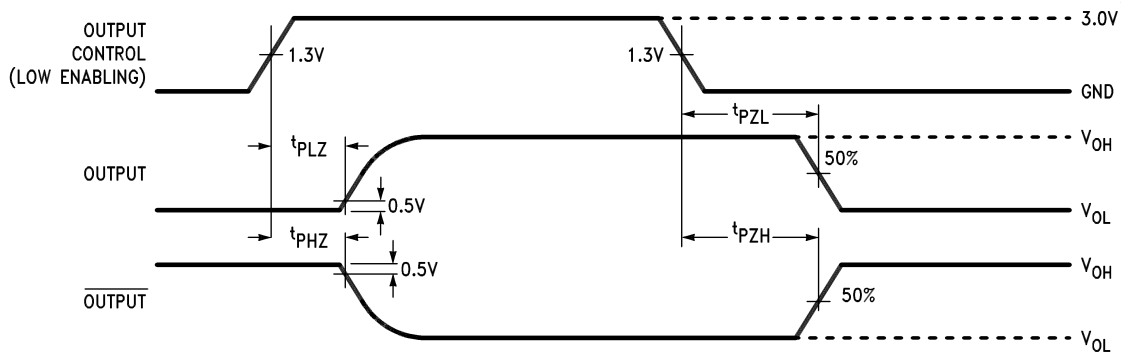
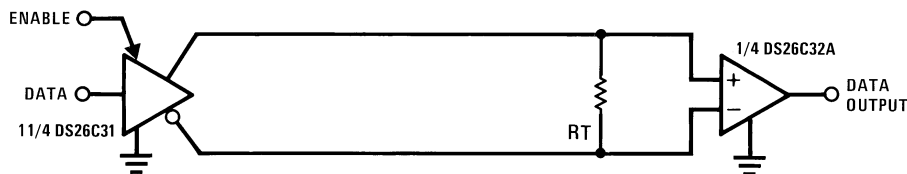


Figure 20. TRI-STATE Output Enable and Disable Waveforms

TYPICAL APPLICATIONS

Figure 21. Two-Wire Balanced Systems, RS-422



REVISION HISTORY

Released	Revision	Section	Changes
10/26/2010	*	New Release, Corporate format	MDS data sheets converted into one Corp. data sheet format. MNDS26C32AM-X Rev 0B0 will be archived.
4/15/2013	A		Changed layout of National Data Sheet to TI format

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
5962-9164001M2A	ACTIVE	LCCC	NAJ	20	50	TBD	Call TI	Call TI	-55 to 125	DS26C32AME /883 Q 5962-91640 01M2A ACO 01M2A >T	Samples
5962-9164001MEA	ACTIVE	CDIP	NFE	16	25	TBD	Call TI	Call TI	-55 to 125	DS26C32AMJ/883 5962-9164001MEA Q	Samples
5962-9164001MFA	ACTIVE	CFP	NAD	16	19	TBD	Call TI	Call TI	-55 to 125	DS26C32AMW /883 Q 5962-91640 01MFA ACO 01MFA >T	Samples
5962-9164001MXA	ACTIVE	CFP	NAC	16	42	TBD	Call TI	Call TI	-55 to 125	DS26C32AMWG /883 Q 5962-91640 01MXA ACO 01MXA >T	Samples
DS26C32AME/883	ACTIVE	LCCC	NAJ	20	50	TBD	Call TI	Call TI	-55 to 125	DS26C32AME /883 Q 5962-91640 01M2A ACO 01M2A >T	Samples
DS26C32AMJ/883	ACTIVE	CDIP	NFE	16	25	TBD	Call TI	Call TI	-55 to 125	DS26C32AMJ/883 5962-9164001MEA Q	Samples
DS26C32AMW/883	ACTIVE	CFP	NAD	16	19	TBD	Call TI	Call TI	-55 to 125	DS26C32AMW /883 Q 5962-91640 01MFA ACO 01MFA >T	Samples
DS26C32AMWG/883	ACTIVE	CFP	NAC	16	42	TBD	Call TI	Call TI	-55 to 125	DS26C32AMWG /883 Q 5962-91640 01MXA ACO 01MXA >T	Samples

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSELETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

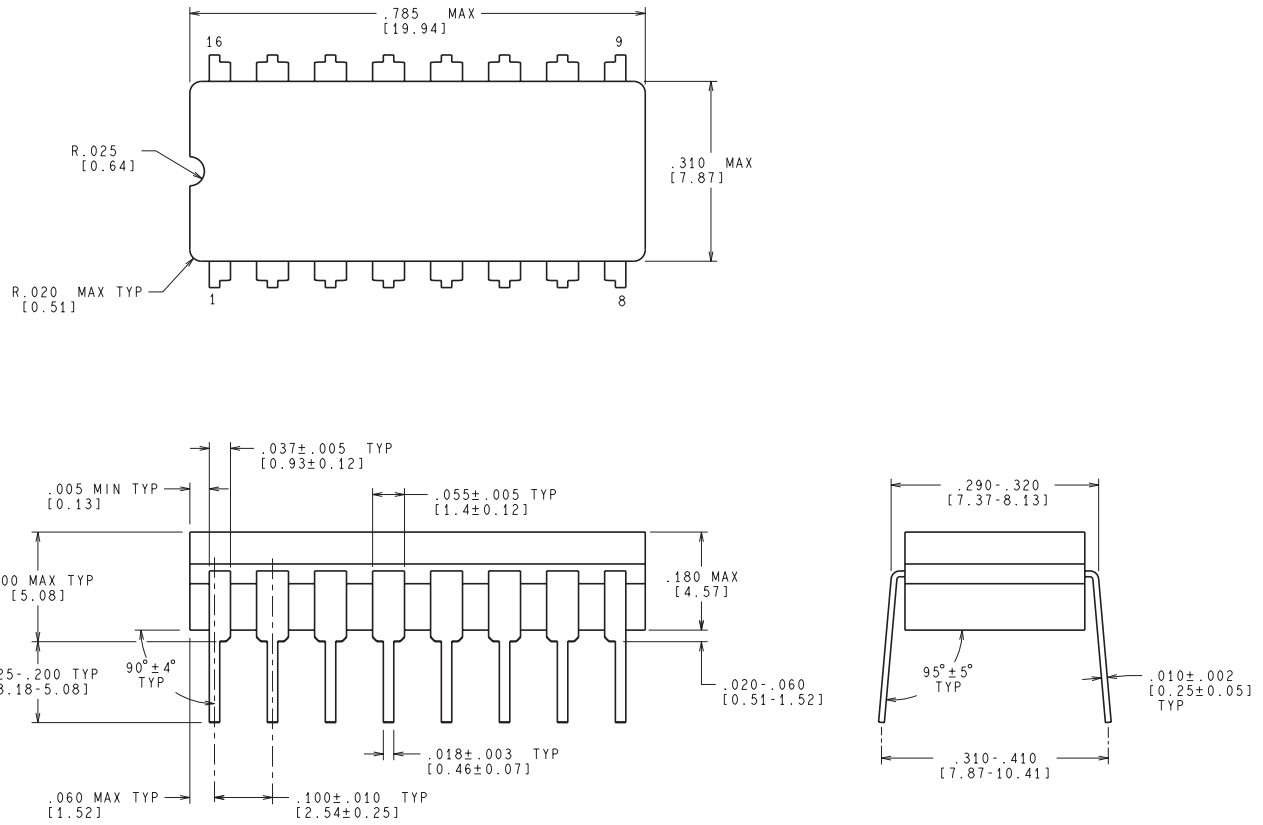
⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

⁽⁴⁾ Multiple Top-Side Markings will be inside parentheses. Only one Top-Side Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Top-Side Marking for that device.

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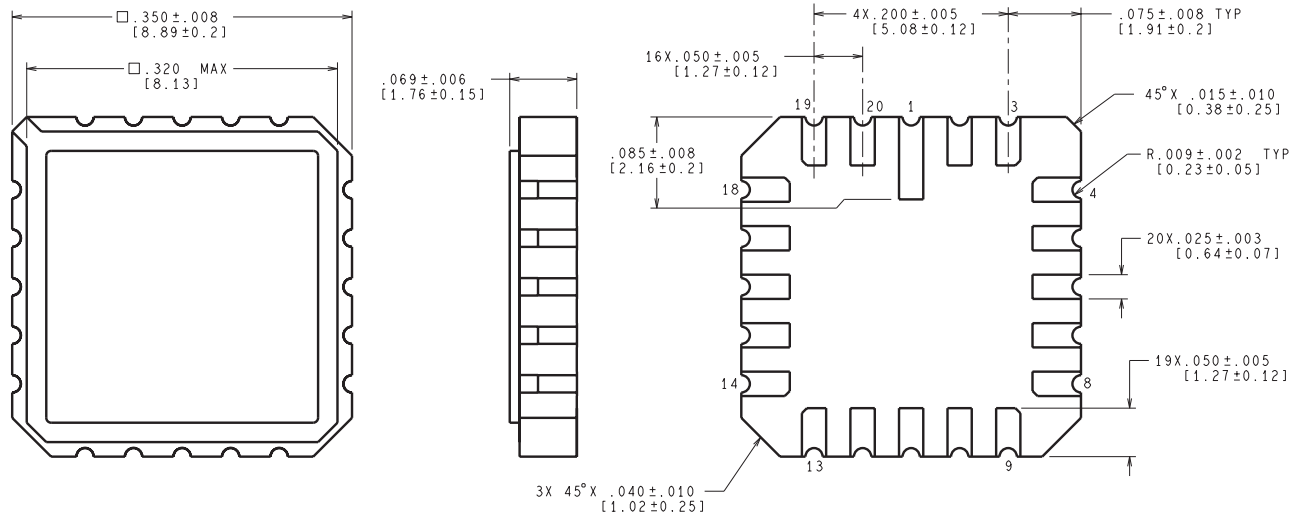
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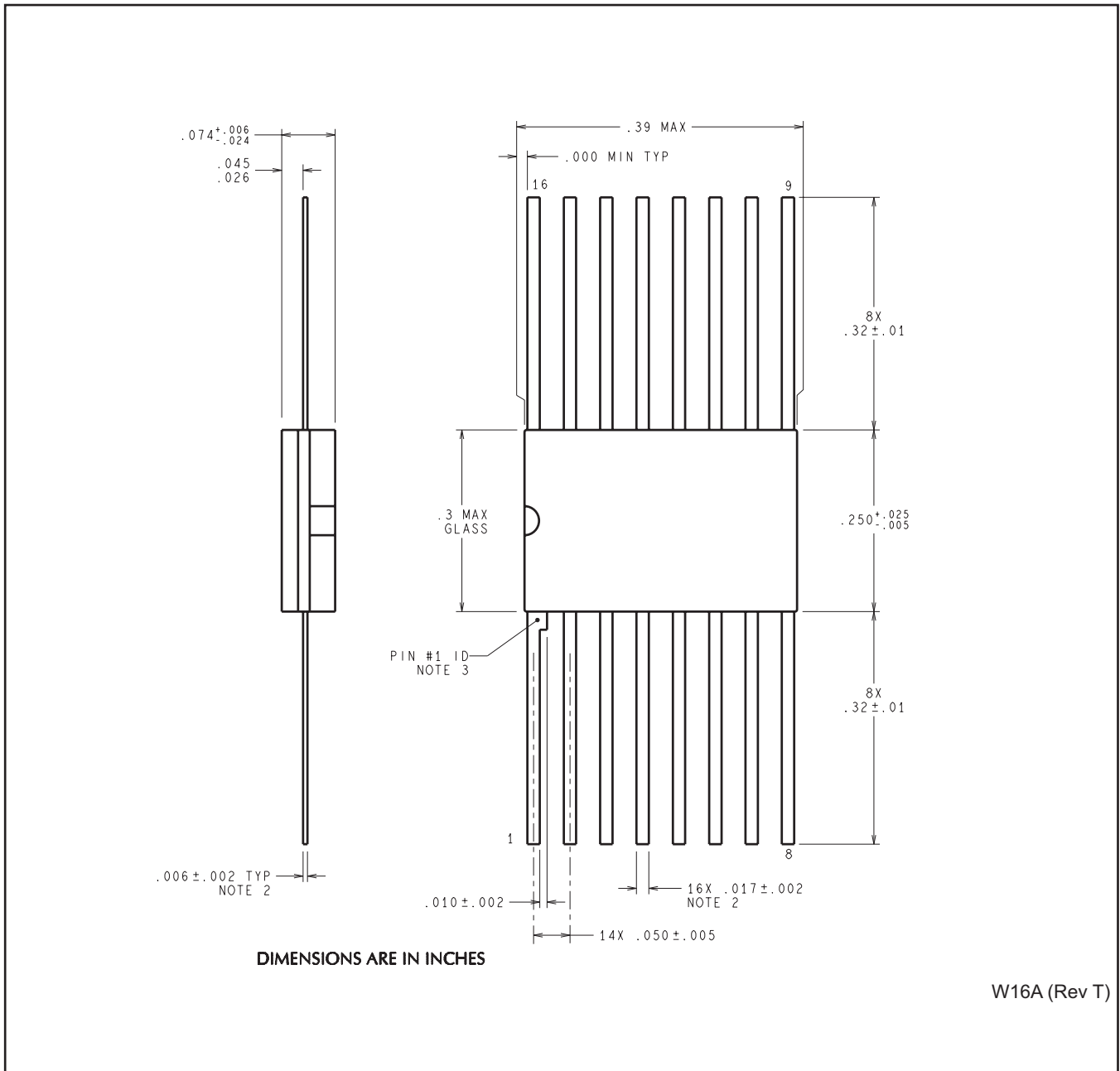
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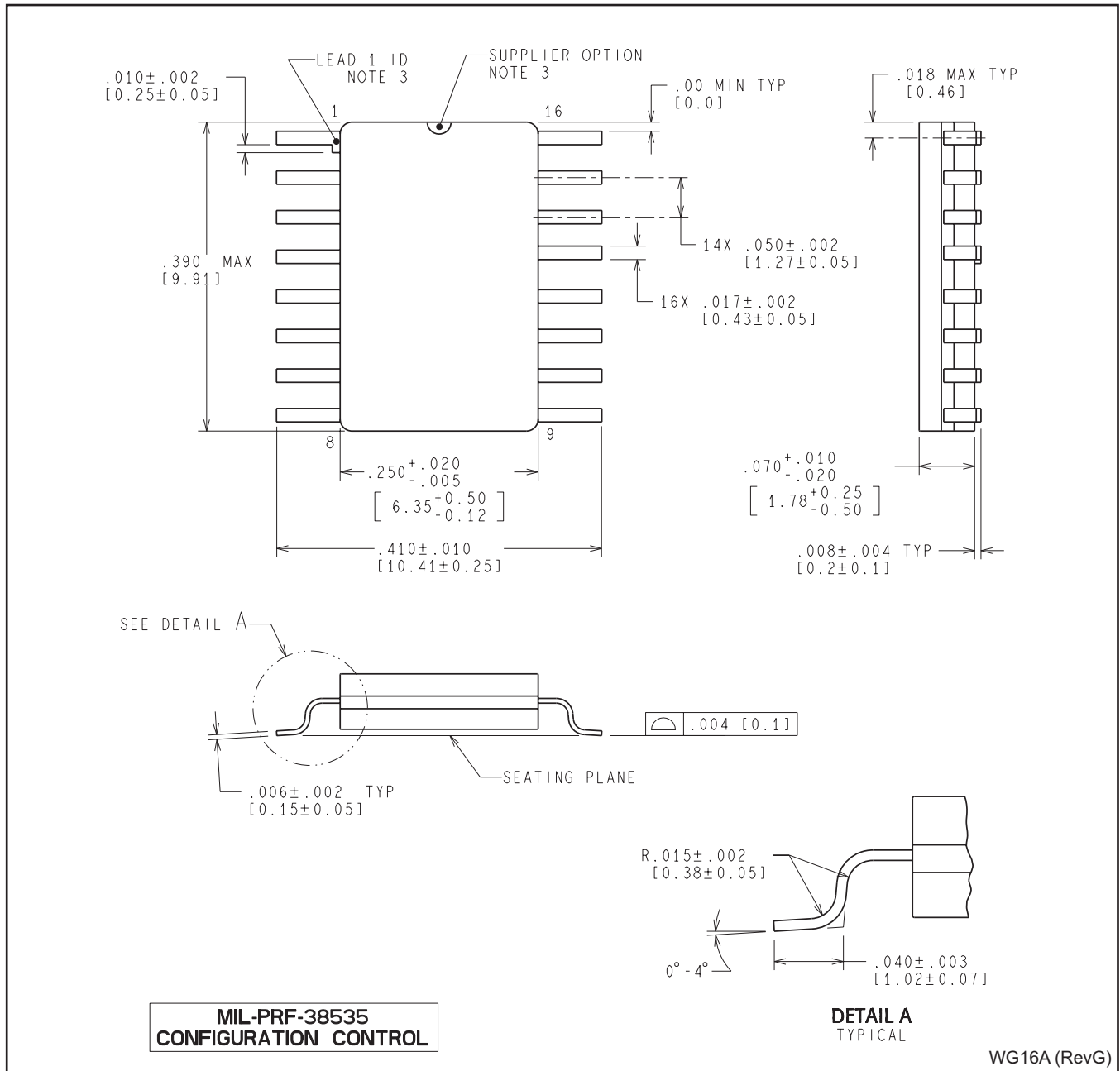
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E20A (Rev F)

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NAC0016A



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