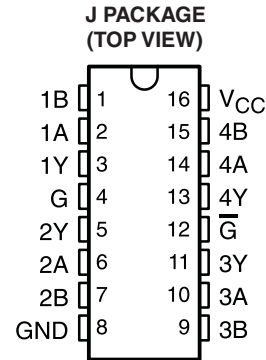


QML CLASS V RS-422 QUADRUPLE DIFFERENTIAL LINE RECEIVER

Check for Samples: [AM26LS33A-SP](#)

FEATURES

- **AM26LS33A Devices Meet or Exceed the Requirements of ANSI TIA/EIA-422-B, TIA/EIA-423-B, and ITU Recommendations V.10 and V.11**
- **±15-V Common-Mode Range With ±500-mV Sensitivity**
- **Input Hysteresis . . . 50 mV Typical**
- **Operate From a Single 5-V Supply**
- **Low-Power Schottky Circuitry**
- **3-State Outputs**
- **Complementary Output-Enable Inputs**
- **Input Impedance . . . 12 kΩ Minimum**
- **Designed to Be Interchangeable With Advanced Micro Device AM26LS33™**
- **QML-V Qualified, SMD 5962-78020**
- **Military Temperature Range (-55°C to 125°C)**
- **Rad-Tolerant: 25 kRad (Si) TID ⁽¹⁾**



- (1) Radiation tolerance is a typical value based upon initial device qualification with dose rate = 10 mrad/sec. Radiation Lot Acceptance Testing is available - contact factory for details.

DESCRIPTION

The AM26LS33A is a quadruple differential line receiver for balanced and unbalanced digital data transmission. The enable function is common to all four receivers and offers a choice of active-high or active-low input. The 3-state outputs permit connection directly to a bus-organized system. Fail-safe design ensures that, if the inputs are open, the outputs always are high.

Compared to the AM26LS33, the AM26LS33A incorporates an additional stage of amplification to improve sensitivity. The input impedance has been increased, resulting in less loading of the bus line. The additional stage has increased propagation delay; however, this does not affect interchangeability in most applications.

The AM26LS33A is characterized for operation over the temperature range of -55°C to 125°C.

ORDERING INFORMATION⁽¹⁾

T _A	PACKAGE ⁽²⁾	ORDERABLE PART NUMBER	TOP-SIDE MARKING
-55°C to 125°C	CDIP - J	5962-7802007VEA	5962-7802007VEA

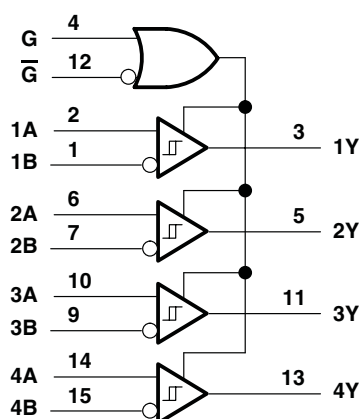
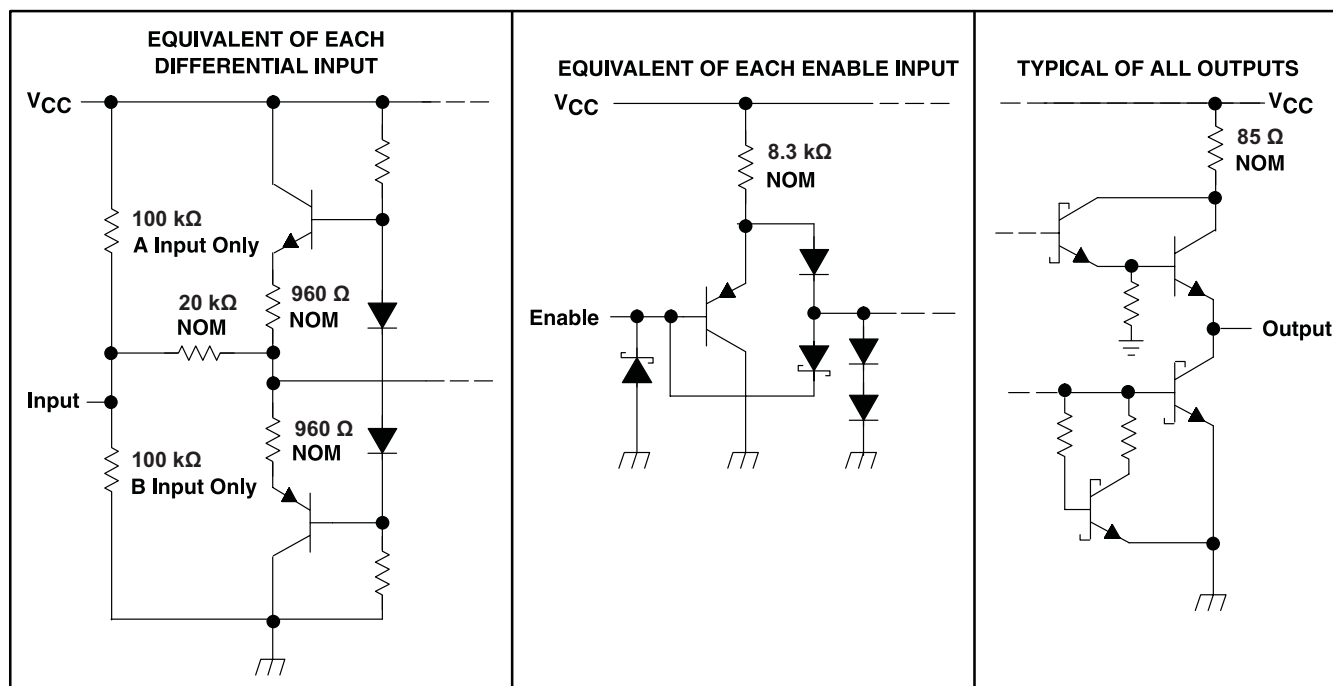
- (1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at www.ti.com.
- (2) Package drawings, thermal data, and symbolization are available at www.ti.com/packaging.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

Table 1. FUNCTION TABLE
Each Receiver

DIFFERENTIAL A–B	ENABLES		OUTPUT Y
	G	\bar{G}	
$V_{ID} \geq V_{IT+}$	H	X	H
	X	L	H
$V_{IT-} \leq V_{ID} \leq V_{IT+}$	H	X	?
	X	L	?
$V_{ID} \leq V_{IT-}$	H	X	L
	X	L	L
X	L	H	Z
Open	H	X	H
	X	L	H

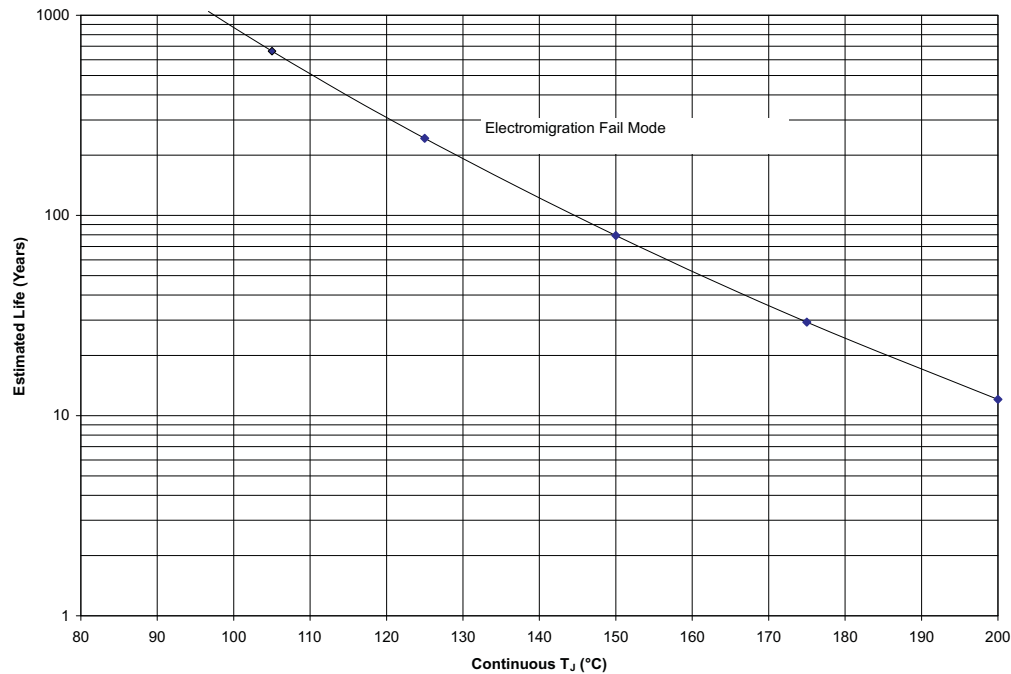
LOGIC DIAGRAM (POSITIVE LOGIC)

SCHEMATICS OF INPUTS AND OUTPUTS


ABSOLUTE MAXIMUM RATINGS⁽¹⁾

over operating free-air temperature range (unless otherwise noted)

		MIN	MAX	UNIT
V_{CC}	Supply voltage ⁽²⁾		7	V
V_I	Input voltage	Any differential input	±25	V
		Other inputs	7	
V_{ID}	Differential input voltage ⁽³⁾		±25	V
	Continuous total power dissipation	See Dissipation Ratings Table		
	Lead temperature 1.6 mm (1/16 inch) from case for 60 seconds		300	°C
T_{stg}	Storage temperature range	–65	150	°C

- (1) Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) All voltage values, except differential voltages, are with respect to the network ground terminal.
- (3) Differential voltage values are at the noninverting (A) input terminals with respect to the inverting (B) input terminals.



- A. See datasheet for absolute maximum and minimum recommended operating conditions.
- B. Silicon operating life design goal is 10 years at 105°C junction temperature (does not include package interconnect life).

Figure 1. AM26LS33A 16/J Package Operating Life Derating Chart

RECOMMENDED OPERATING CONDITIONS

		MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			V
V_{IL}	Low-level input voltage			0.8	V
V_{IC}	Common-mode input voltage			± 15	V
I_{OH}	High-level output current			-440	μA
I_{OL}	Low-level output current			8	mA
T_A	Operating free-air temperature	-55		125	$^{\circ}C$

ELECTRICAL CHARACTERISTICS

over recommended ranges of V_{CC} , V_{IC} , and operating free-air temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP ⁽¹⁾	MAX	UNIT
V_{IT+}	Positive-going input threshold voltage $V_O = V_{OHmin}$, $I_{OH} = -440 \mu A$ $-15 V \leq V_{IC} \leq 15 V$			0.5	V
V_{IT-}	Negative-going input threshold voltage $V_O = 0.45 V$, $I_{OL} = 8 mA$ $-15 V \leq V_{IC} \leq 15 V$	-0.5 ⁽²⁾			V
V_{hys}	Hysteresis voltage ($V_{IT+} - V_{IT-}$)		50		mV
V_{IK}	Enable-input clamp voltage $V_{CC} = 4.5 V$, $I_I = -18 mA$			-1.5	V
V_{OH}	High-level output voltage $V_{CC} = 4.5 V$, $V_{ID} = 1 V$, $V_{I(G)} = 0.8 V$, $I_{OH} = -440 \mu A$	2.5			V
V_{OL}	Low-level output voltage $V_{CC} = 4.5 V$, $V_{ID} = -1 V$, $V_{I(G)} = 0.8 V$			0.4	V
				0.45	
I_{OZ}	Off-state (high-impedance state) output current $V_{CC} = 5.5 V$			20	μA
				-20	
I_I	Line input current $V_I = 15 V$,			1.2	mA
	$V_I = -15 V$,			-1.7	
$I_{I(EN)}$	Enable input current $V_I = 5.5 V$, $V_{CC} = 5.5 V$			100	μA
I_H	High-level enable current $V_I = 2.7 V$, $V_{CC} = 5.5 V$			20	μA
I_L	Low-level enable current $V_I = 0.4 V$, $V_{CC} = 5.5 V$			-0.36	mA
r_i	Input resistance $V_{IC} = -15 V$ to $15 V$, One input to ac ground	12	15		k Ω
I_{OS}	Short-circuit output current ⁽³⁾ $V_{CC} = MAX$, $V_{ID} = 1 V$, $V_O = 0 V$	-15		-85	mA
I_{CC}	Supply current $V_{CC} = MAX$, data inputs = GND, All outputs disabled		52	70	mA

(1) All typical values are at $V_{CC} = 5 V$, $T_A = 25^{\circ}C$, and $V_{IC} = 0$.

(2) The algebraic convention, in which the less positive (more negative) limit is designated as minimum, is used in this data sheet for threshold levels only.

(3) Not more than one output should be shorted to ground at a time, and duration of the short circuit should not exceed one second.

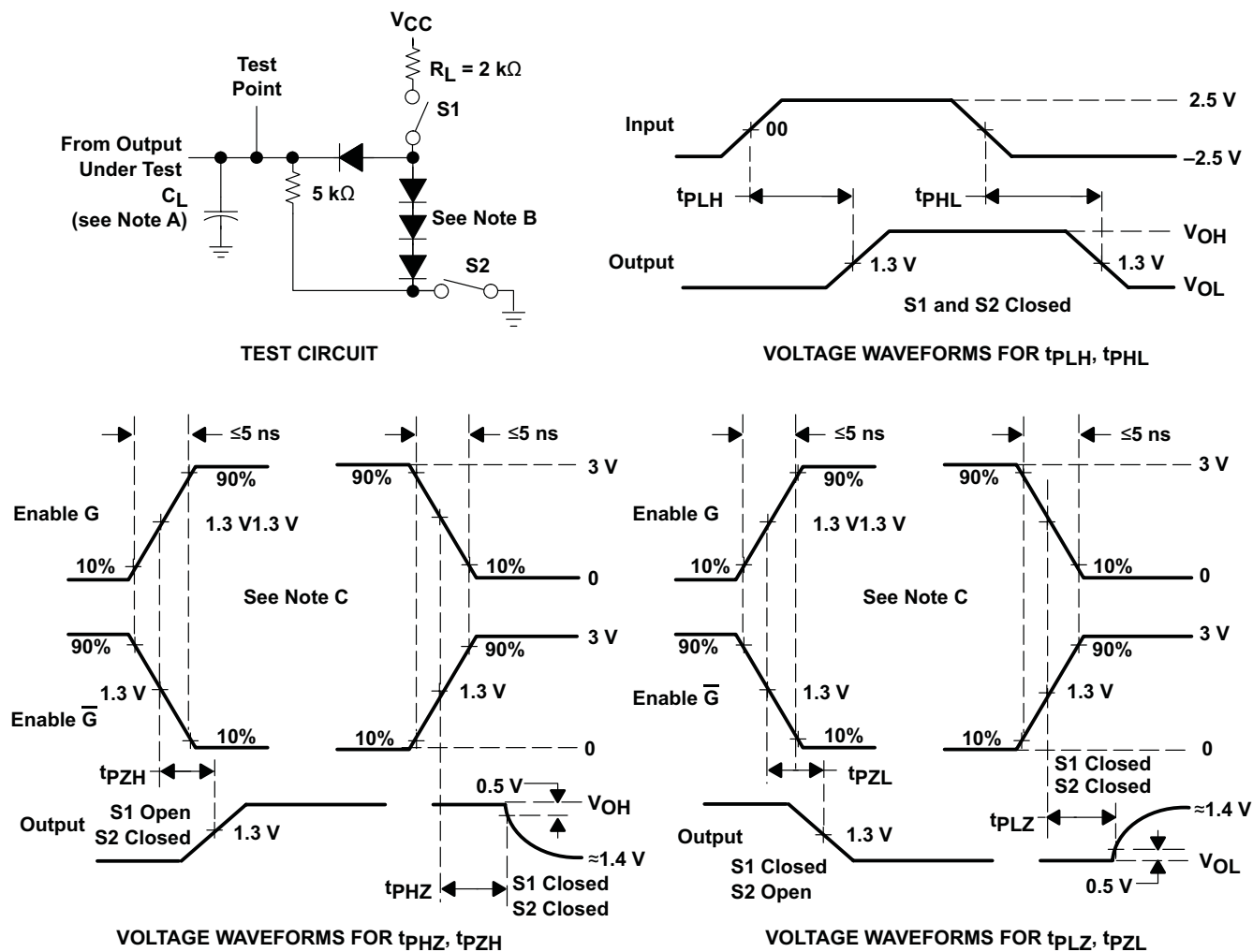
SWITCHING CHARACTERISTICS

$V_{CC} = 5\text{ V}$, over operating free-air temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS		MIN	TYP ⁽¹⁾	MAX	UNIT
t_{PLH}	Propagation delay time, low-to-high-level output	$C_L = 15\text{ pF}$,	See Figure 2		20	35	ns
			$T_A = -55^\circ\text{C}$ to 125°C			53	
t_{PHL}	Propagation delay time, high-to-low-level output	$C_L = 15\text{ pF}$,	See Figure 2		22	35	ns
			$T_A = -55^\circ\text{C}$ to 125°C			53	
t_{PZH}	Output enable time to high level	$C_L = 15\text{ pF}$,	See Figure 2		17	25	ns
			$T_A = -55^\circ\text{C}$ to 125°C			38	
t_{PZL}	Output enable time to low level	$C_L = 15\text{ pF}$,	See Figure 2		20	25	ns
			$T_A = -55^\circ\text{C}$ to 125°C			38	
t_{PHZ}	Output disable time from high level	$C_L = 15\text{ pF}$,	See Figure 2		21	30	ns
			$T_A = -55^\circ\text{C}$ to 125°C			45	
t_{PLZ}	Output disable time from low level	$C_L = 15\text{ pF}$,	See Figure 2		30	40	ns
			$T_A = -55^\circ\text{C}$ to 125°C			60	

(1) All typical values are at $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$, and $V_{IC} = 0$.

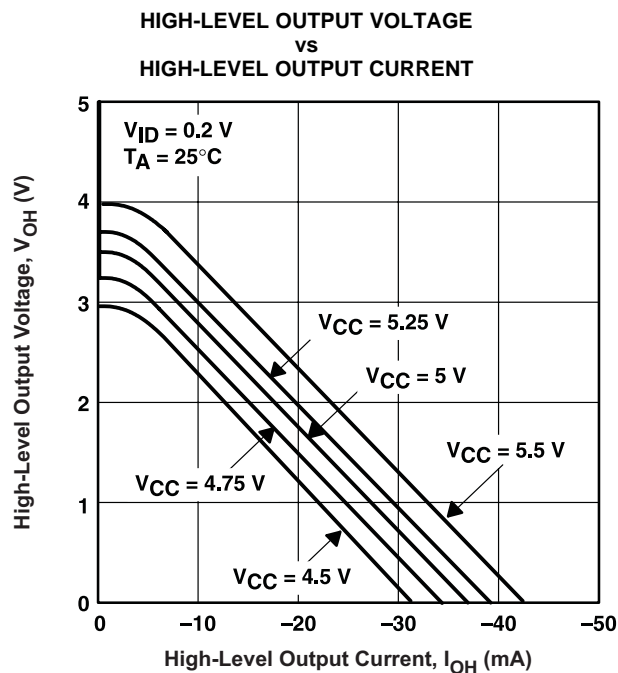
PARAMETER MEASUREMENT INFORMATION



- NOTES: A. C_L includes probe and jig capacitance.
 B. All diodes are 1N3064 or equivalent.
 C. Enable G is tested with \bar{G} high; \bar{G} is tested with G low.

Figure 2. Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS



† $V_{CC} = 5.5$ V and $V_{CC} = 4.5$ V applies to M-suffix devices only.

Figure 3.

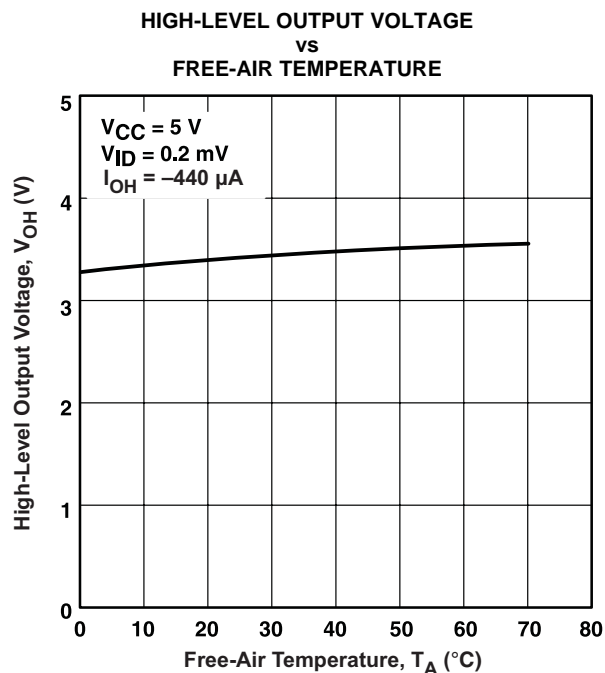


Figure 4.

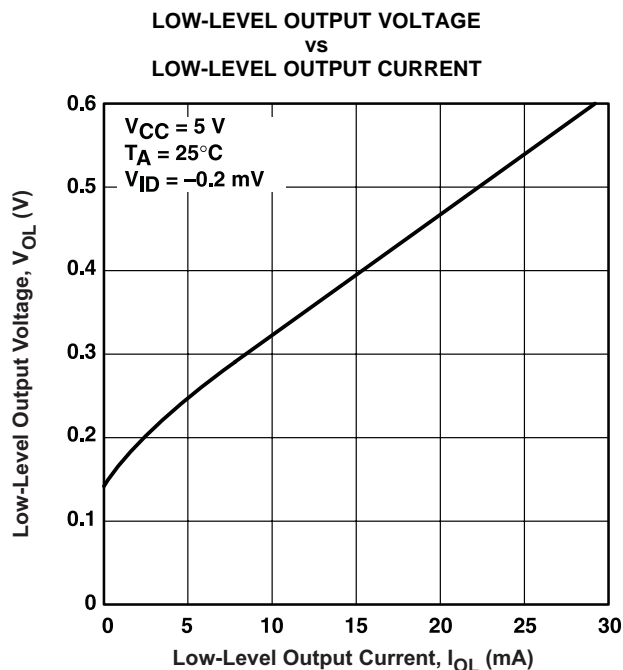


Figure 5.

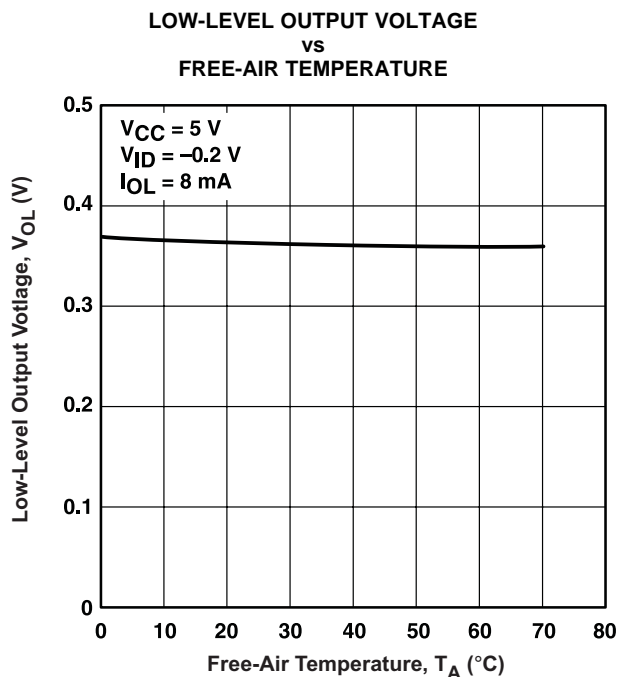


Figure 6.

TYPICAL CHARACTERISTICS (continued)

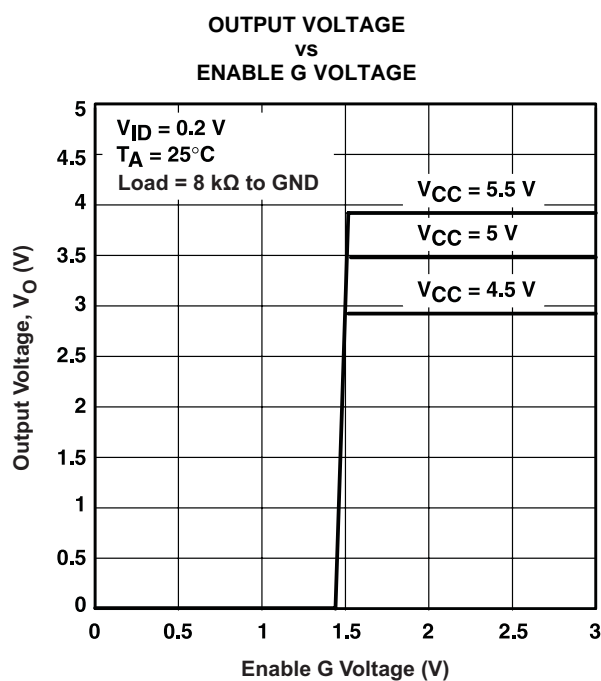


Figure 7.

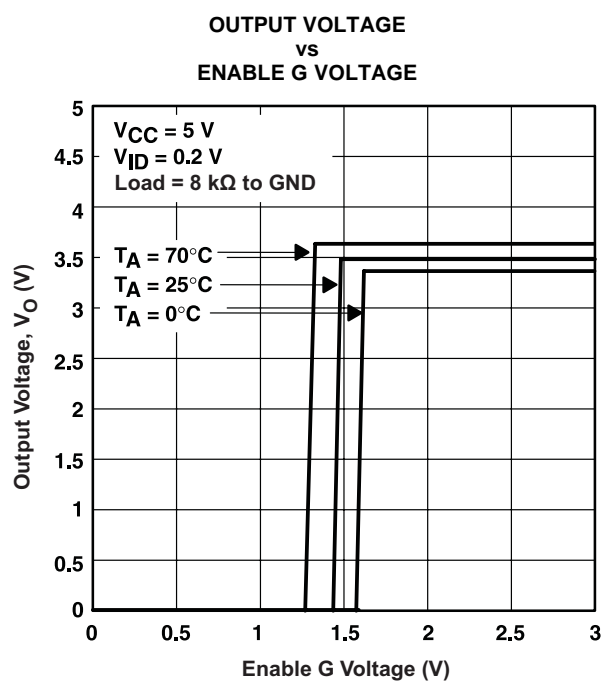


Figure 8.

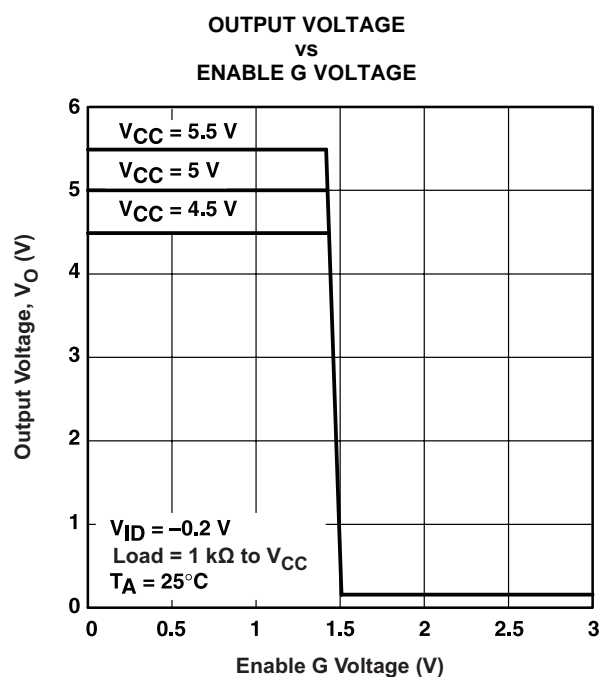


Figure 9.

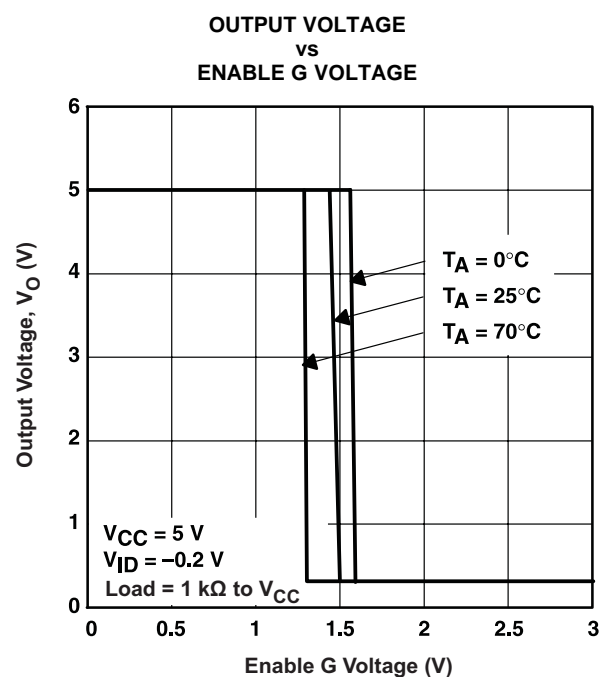


Figure 10.

TYPICAL CHARACTERISTICS (continued)

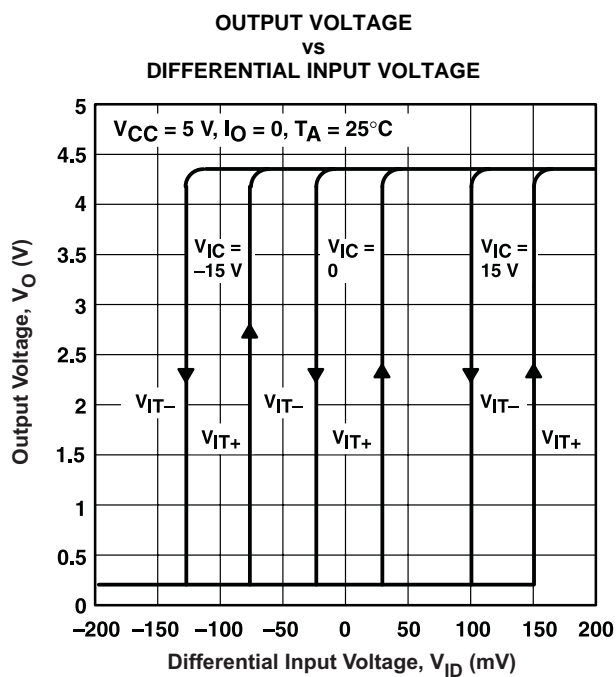
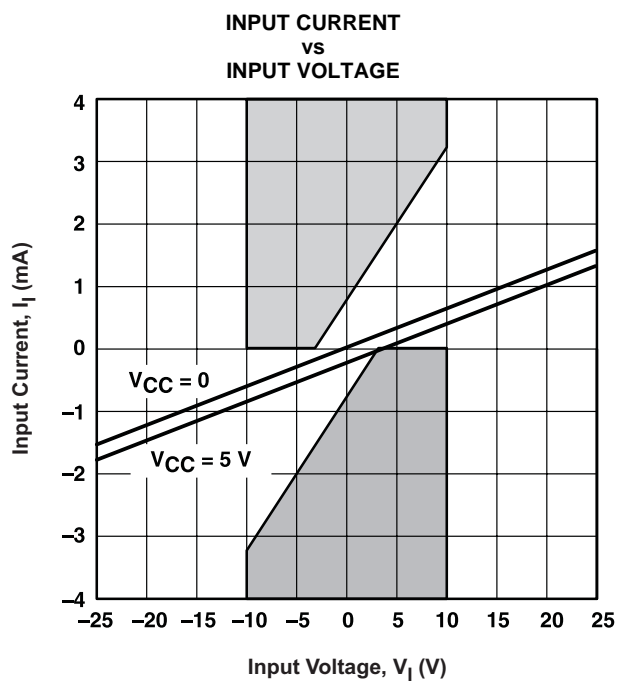


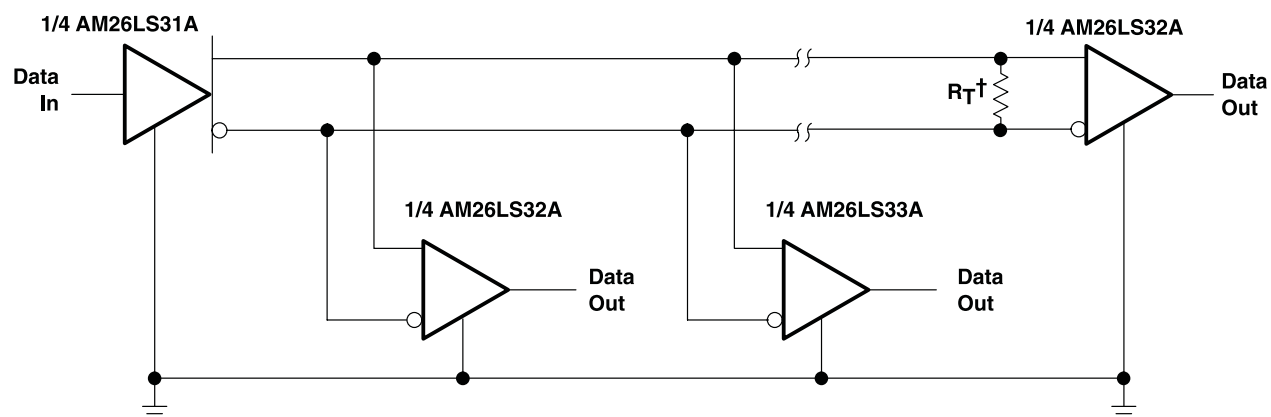
Figure 11.



The unshaded area shows requirements of paragraph 4.2.1 of ANSI Standards EIA/TIA-422-B and EIA/TIA-423-B.

Figure 12.

APPLICATION INFORMATION



† R_T equals the characteristic impedance of the line.

Figure 13. Circuit with Multiple Receivers

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
5962-7802007VEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	

⁽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.

OBSOLETE: 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.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

OTHER QUALIFIED VERSIONS OF AM26LS33A-SP :

● Catalog: [AM26LS33A](#)

● Military: [AM26LS33AM](#)

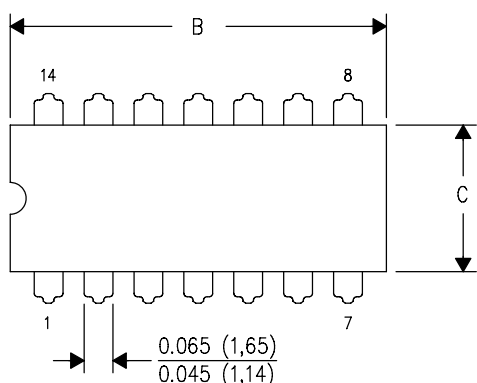
NOTE: Qualified Version Definitions:

-
- Catalog - TI's standard catalog product
 - Military - QML certified for Military and Defense Applications

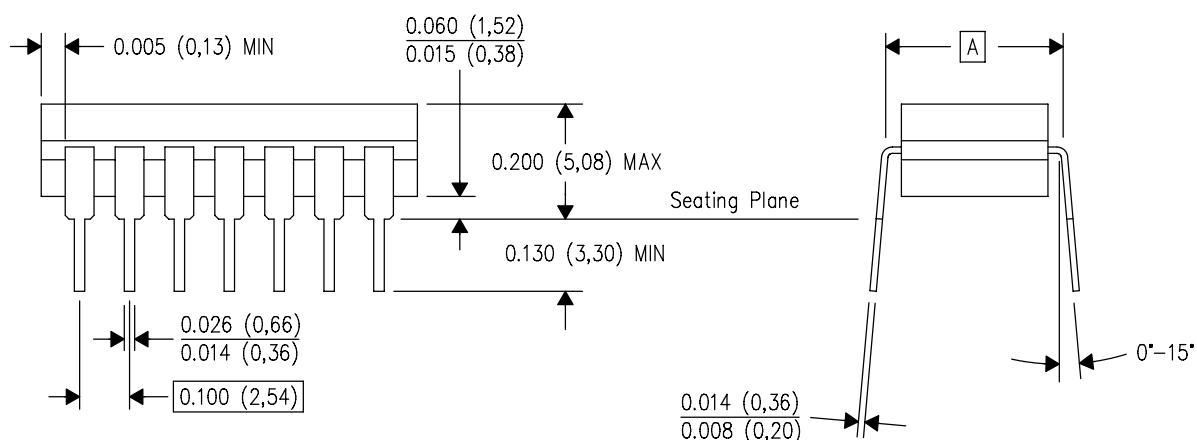
J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



PINS ** DIM	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package is hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46C and to discontinue any product or service per JESD48B. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components which meet ISO/TS16949 requirements, mainly for automotive use. Components which have not been so designated are neither designed nor intended for automotive use; and TI will not be responsible for any failure of such components to meet such requirements.

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Mobile Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Automotive and Transportation	www.ti.com/automotive
Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Video and Imaging	www.ti.com/video

TI E2E Community e2e.ti.com

AMEYA360

Components Supply Platform

Authorized Distribution Brand :



Website :

Welcome to visit www.ameya360.com

Contact Us :

➤ Address :

401 Building No.5, JiuGe Business Center, Lane 2301, Yishan Rd
Minhang District, Shanghai , China

➤ Sales :

Direct +86 (21) 6401-6692
Email amall@ameya360.com
QQ 800077892
Skype ameyasales1 ameyasales2

➤ Customer Service :

Email service@ameya360.com

➤ Partnership :

Tel +86 (21) 64016692-8333
Email mkt@ameya360.com