AM26C31-EP
QUADRUPLE DIFFERENTIAL LINE DRIVER

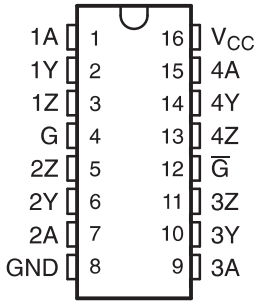
SLLS871–NOVEMBER 2007

FEATURES

- **Controlled Baseline**
  - **One Assembly**
  - **One Test Site**
  - **One Fabrication Site**
- **Extended Temperature Performance of –55°C to 125°C**
- **Enhanced Diminishing Manufacturing Sources (DMS) Support**
- **Enhanced Product-Change Notification**
- **Qualification Pedigree** (1)
- **Meets or Exceeds the Requirements of TIA/EIA-422-B and ITU Recommendation V.11**
- **Low Power, I_{CC} = 100 μA Typ**
- **Operates From a Single 5 V Supply**
- **High Speed, $t_{PLH} = t_{PHL}$ = 7 ns Typ**
- **Low Pulse Distortion, $t_{sk(p)}$ = 0.5 ns Typ**
- **High Output Impedance in Power-Off Conditions**
- **Improved Replacement for AM26LS31**

(1) Component qualification in accordance with JEDEC and industry standards to ensure reliable operation over an extended temperature range. This includes, but is not limited to, Highly Accelerated Stress Test (HAST) or biased 85/85, temperature cycle, autoclave or unbiased HAST, electromigration, bond intermetallic life, and mold compound life. Such qualification testing should not be viewed as justifying use of this component beyond specified performance and environmental limits.

AM26C31... D PACKAGE



DESCRIPTION/ORDERING INFORMATION

The AM26C31 is a differential line driver with complementary outputs, designed to meet the requirements of TIA/EIA -422-B and ITU (formerly CCITT). The 3-state outputs have high-current capability for driving balanced lines, such as twisted-pair or parallel-wire transmission lines, and they provide the high-impedance state in the power-off condition. The enable functions are common to all four drivers and offer the choice of an active-high (G) or active-low ($\overline{G}$) enable input. BiCMOS circuitry reduces power consumption without sacrificing speed.

The AM26C31 is characterized for operation over extended temperature range of –55°C to 125°C.

ORDERING INFORMATION(1)

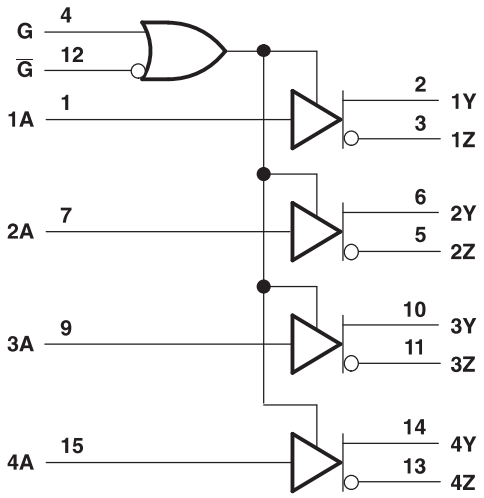
T_A	PACKAGE(2)		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–55°C to 125°C	SOIC – D	Reel of 2500	AM26C31MDREP	26C31EP

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

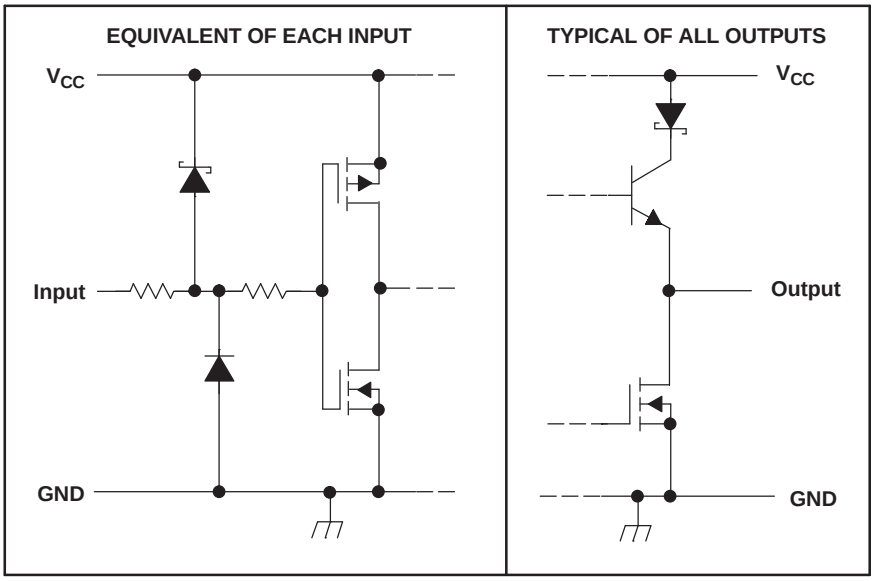
FUNCTION TABLE
(each driver)

INPUT A	ENABLES		OUTPUT	
	G	$\overline{G}$	Y	Z
H	H	X	H	L
L	H	X	L	H
H	X	L	H	L
L	X	L	L	H
X	L	H	Z	Z

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 range(2)	–0.5	7	V
V_I	Input voltage range	–0.5	V_{CC} + 0.5	V
V_{ID}	Differential input voltage range	–14	14	V
V_O	Output voltage range	–0.5	7	V
I_{IK} or I_{OK}	Input or output clamp current		±20	mA
I_O	Output current		±150	mA
	V_{CC} current		200	mA
	GND current		–200	mA
θ_{JA}	Package thermal impedance(3)(4)		73	°C/W
T_J	Operating virtual junction temperature		150	°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 output voltage (V_{OD}), are with respect to the network ground terminal.
(3) Maximum power dissipation is a function of $T_J(max)$, θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) – T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.
(4) The package thermal impedance is calculated in accordance with JESD 51-7.

RECOMMENDED OPERATING CONDITIONS

		MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	4.5	5	5.5	V
V_{ID}	Differential input voltage		±7		V
V_{IH}	High-level input voltage	2			V
V_{IL}	Low-level input voltage			0.8	V
I_{OH}	High-level output current			–20	mA
I_{OL}	Low-level output current			20	mA
T_A	Operating free-air temperature	–55		125	°C

ELECTRICAL CHARACTERISTICS

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS		MIN	TYP(1)	MAX	UNIT
V_{OH}	High-level output voltage	I_O = –20 mA		2.2	3.4		V
V_{OL}	Low-level output voltage	I_O = 20 mA			0.2	0.4	V
$\|V_{OD}\|$	Differential output voltage magnitude	R_L = 100 Ω, See Figure 1		2	3.1		V
$\Delta\|V_{OD}\|$	Change in magnitude of differential output voltage(2)	R_L = 100 Ω, See Figure 1				±0.4	V
V_{OC}	Common-mode output voltage	R_L = 100 Ω, See Figure 1				3	V
$\Delta\|V_{OC}\|$	Change in magnitude of common-mode output voltage(2)	R_L = 100 Ω, See Figure 1				±0.4	V
I_I	Input current	V_I = V_{CC} or GND				±1	µA
$I_{O(off)}$	Driver output current with power off	V_{CC} = 0	V_O = 6 V			100	µA
			V_O = –0.25 V			–100	
I_{OS}	Driver output short-circuit current	V_O = 0				–170	mA
I_{OZ}	High-impedance off-state output current	V_O = 2.5 V				20	µA
		V_O = 0.5 V				–20	
I_{CC}	Quiescent supply current	I_O = 0	V_I = 0 V or 5 V			100	µA
		I_O = 0	V_I = 2.4 V or 0.5 V(3)			3.2	mA
C_I	Input capacitance				6		pF

(1) All typical values are at V_{CC} = 5 V and T_A = 25°C.
(2) $\Delta|V_{OD}|$ and $\Delta|V_{OC}|$ are the changes in magnitude of V_{OD} and V_{OC}, respectively, that occur when the input is changed from a high level to a low level.
(3) This parameter is measured per input. All other inputs are at 0 V or 5 V.

SWITCHING CHARACTERISTICS

over recommended ranges of supply voltage and 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	S1 is open,	See Figure 2		7	12	ns
t_{PHL}	Propagation delay time, high- to low-level output	S1 is open,	See Figure 2		6.5	12	ns
$t_{sk(p)}$	Pulse skew time ($\|t_{PLH} - t_{PHL}\|$)	S1 is open,	See Figure 2		0.5	4	ns
$t_{r(OD)}$, $t_{f(OD)}$	Differential output rise and fall times	S1 is open,	See Figure 3		5	12	ns
t_{PZH}	Output enable time to high level	S1 is closed,	See Figure 4		10	19	ns
t_{PZL}	Output enable time to low level	S1 is closed,	See Figure 4		10	19	ns
t_{PHZ}	Output disable time from high level	S1 is closed,	See Figure 4		7	16	ns
t_{PLZ}	Output disable time from low level	S1 is closed,	See Figure 4		7	16	ns
C_{pd}	Power dissipation capacitance (each driver)(2)	S1 is open,	See Figure 2		100		pF

(1) All typical values are at V_{CC} = 5 V, T_A = 25°C.
(2) C_{pd} is used to estimate the switching losses according to $P_D = C_{pd} \times V_{CC}^2 \times f$, where f is the switching frequency.

PARAMETER MEASUREMENT INFORMATION

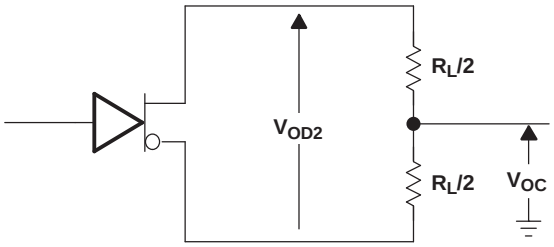
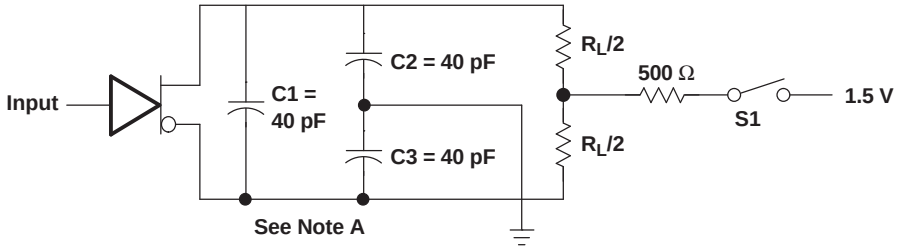
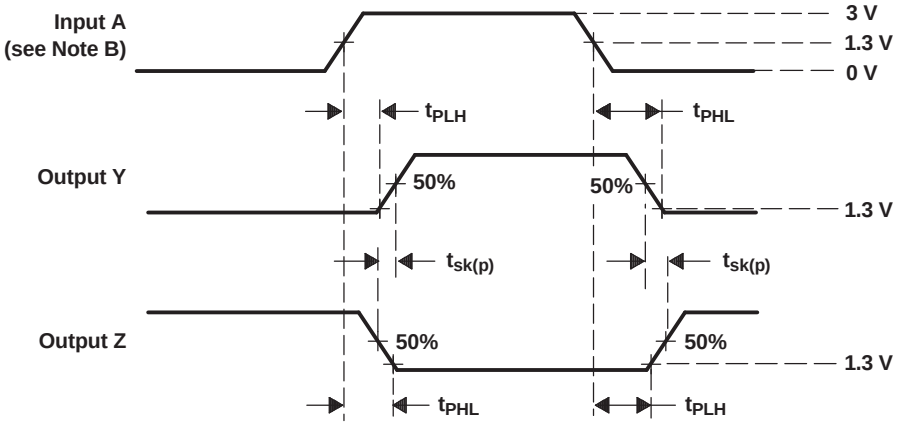


Figure 1. Differential and Common-Mode Output Voltages



TEST CIRCUIT

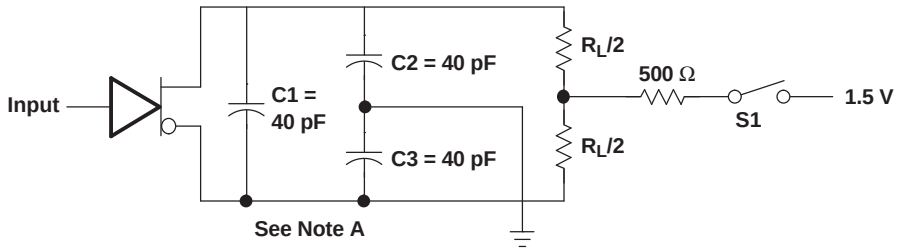


A. C1, C2, and C3 include probe and jig capacitance.

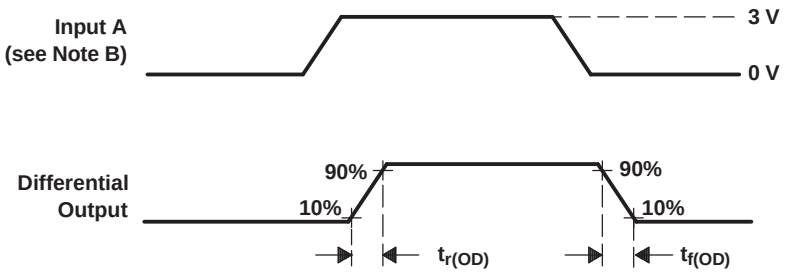
B. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, duty cycle ≤ 50%, and t_r, t_f ≤ 6 ns.

Figure 2. Propagation Delay Time and Skew Waveforms and Test Circuit

PARAMETER MEASUREMENT INFORMATION (continued)



TEST CIRCUIT



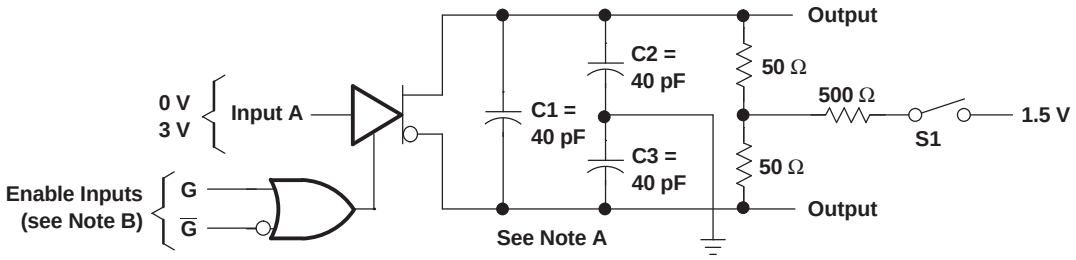
VOLTAGE WAVEFORMS

A. C1, C2, and C3 include probe and jig capacitance.

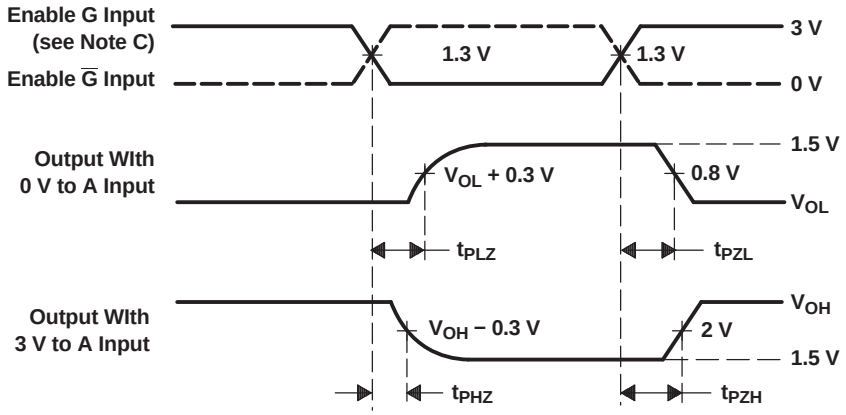
B. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, duty cycle ≤ 50%, and t_r, t_f ≤ 6 ns.

Figure 3. Differential Output Rise and Fall Time Waveforms and Test Circuit

PARAMETER MEASUREMENT INFORMATION (continued)



TEST CIRCUIT



VOLTAGE WAVEFORMS

A. C1, C2, and C3 include probe and jig capacitance.

B. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, duty cycle ≤ 50%, t_r < 6 ns, and t_f < 6 ns.

C. Each enable is tested separately.

Figure 4. Output Enable and Disable Time Waveforms and Test Circuit

TYPICAL CHARACTERISTICS

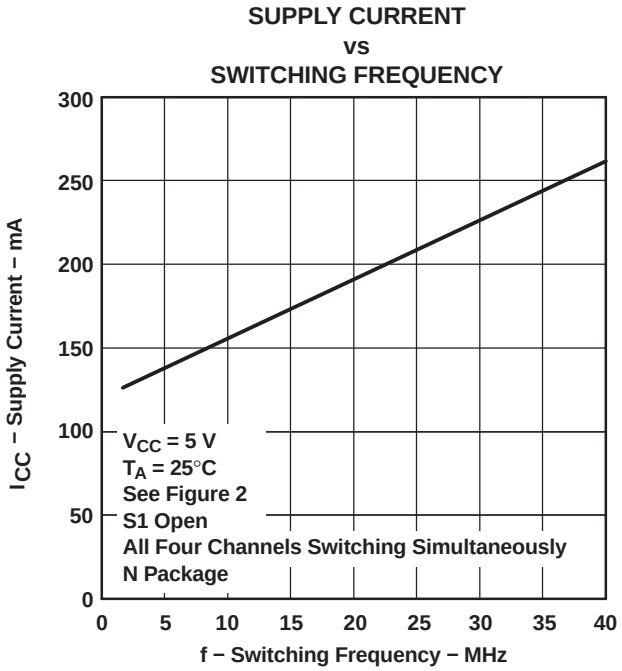


Figure 5.

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package | Pins	Package qty | Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
AM26C31MDREP	Active	Production	SOIC (D) | 16	2500 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	26C31EP
AM26C31MDREP.A	Active	Production	SOIC (D) | 16	2500 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	26C31EP
V62/07647-01XE	Active	Production	SOIC (D) | 16	2500 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	26C31EP

(1) **Status:** For more details on status, see our product life cycle.

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

(4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

OTHER QUALIFIED VERSIONS OF AM26C31-EP :

- Catalog : AM26C31

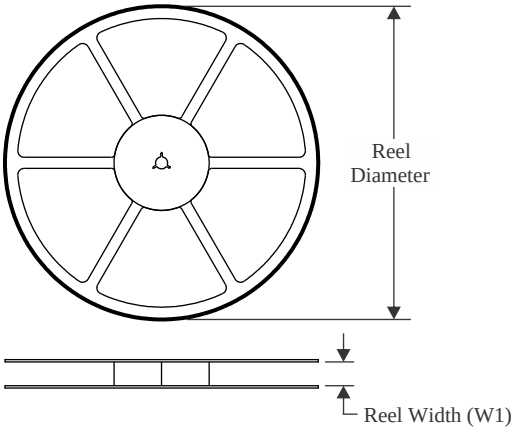
- Military : AM26C31M

NOTE: Qualified Version Definitions:

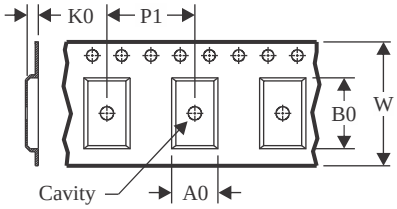
- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

TAPE AND REEL INFORMATION

REEL DIMENSIONS

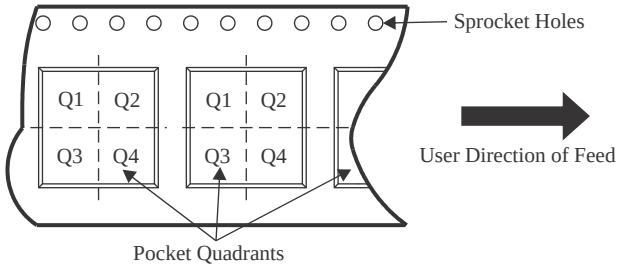


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

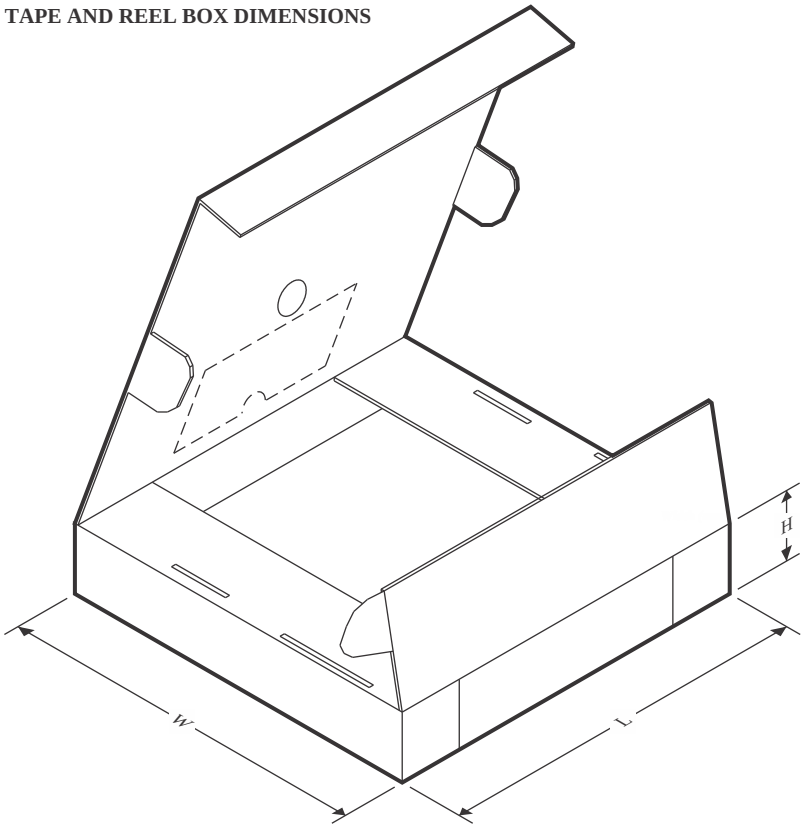
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
AM26C31MDREP	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1

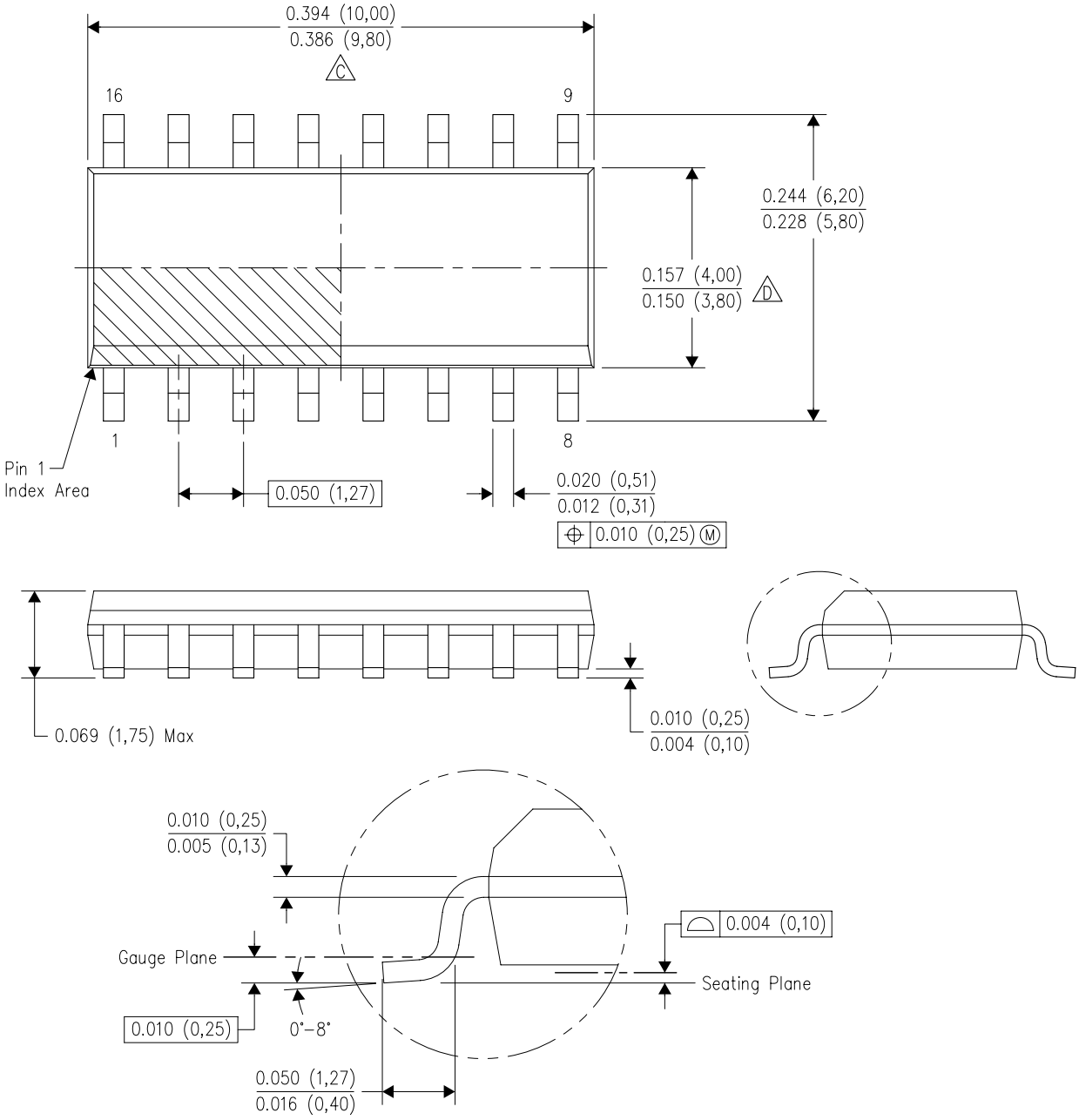
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
AM26C31MDREP	SOIC	D	16	2500	340.5	336.1	32.0

D (R–PDSO–G16) PLASTIC SMALL OUTLINE



NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
D. Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
E. Reference JEDEC MS–012 variation AC.

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