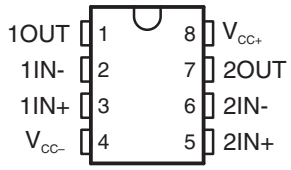
FEATURES

- **Low Supply Current…20 μA Typ**
- **Single Power Supply**
- **Rail-to-Rail Common-Mode Input Voltage Range**
- **Push-Pull Output Circuit**
- **Low Input-Bias Current**

DCT OR DDU PACKAGE
(TOP VIEW)



APPLICATIONS

- **Battery Packs for Sensing Battery Voltage**
- **MP3 Players, Digital Cameras, PMPs**
- **Cellular Phones, PDAs, Notebook Computers**
- **Test Equipment**
- **General-Purpose Low-Voltage Applications**

DESCRIPTION/ORDERING INFORMATION

The TLV7256 is a CMOS-type general-purpose dual comparator capable of single power-supply operation and using lower supply currents than the conventional bipolar comparators. Its push-pull output can connect directly to local ICs such as TTL and CMOS circuits.

ORDERING INFORMATION(1)

T_A	PACKAGE(2)		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 85°C	SSOP – DCT	Reel of 3000	TLV7256IDCTR	PREVIEW
		Reel of 250	TLV7256IDCTT	
	VSSOP – DDU	Reel of 3000	TLV7256IDDUR	YAUA

(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, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

Typical Application Circuit

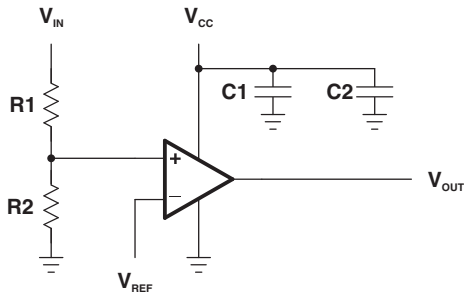


Figure 1. Threshold Detector

Absolute Maximum Ratings(1)

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

			MIN	MAX	UNIT
V_{CC}	Supply voltage		1.5	7	V
V_{ID}	Differential input voltage				V
V_I	Input voltage		V_{CC-}	V_{CC+}	V
I_O	Output current			±35	mA
θ_{JA}	Thermal resistance, junction to ambient(2)	DCT package		220	°C/W
		DDU package		227	
P_D	Power dissipation	DCT package		250	mW
		DDU package		200	
T_A	Operating free-air temperature range		–40	85	°C
T_{stg}	Storage temperature range		–55	125	°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) Package thermal impedance is calculated according to JESD 51-7.

Recommended Operating Conditions

		MIN	MAX	UNIT
V_{CC}	Supply voltage	1.8	5	V
T_A	Operating free-air temperature	–40	85	°C

Electrical Characteristics

V_{CC+} = 5 V, V_{CC-} = GND, T_A = 25°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A	MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage		25°C		±2	±7	mV
			–40°C to 85°C			±8	
I_{IO}	Input offset current		25°C		2		pA
I_I	Input bias current		25°C		4		pA
V_{CM}	Common-mode input voltage		25°C	0		V_{CC}	V
CMRR	Common-mode rejection ratio	ΔV_{CM} = 5 V	25°C	48	65		dB
		0 ≤ V_{CM} ≤ 5 V	–40°C to 85°C	48			
I_{CC}	Supply current	Output = High, V_{IN} = 5 V	25°C		37	51	µA
		Output = Low, V_{IN} = 5 V			40	60	
		Output = High, V_{IN} = 5 V	–40°C to 85°C			61	
		Output = Low, V_{IN} = 5 V				70	
		Output = High, V_{IN} = 2.5 V	25°C		20	32	
		Output = Low, V_{IN} = 2.5 V			26	42	
		Output = High, V_{IN} = 2.5 V	–40°C to 85°C			40	
		Output = Low, V_{IN} = 2.5 V				53	
A_{VD}	Voltage gain	V_D = 3 V, 1 V ≤ V_{OUT} ≤ 4 V	25°C		88		dB
I_{sink}	Sink current	V_{OL} = 0.5 V	25°C	25	33		mA
			–40°C to 85°C	20			
I_{source}	Source current	V_{OH} = 4.5 V	25°C	30	35		mA
			–40°C to 85°C	25			
V_{OL}	Low-level output voltage	I_{sink} = 5 mA	25°C		0.07	0.12	V
			–40°C to 85°C			0.20	
V_{OH}	High-level output voltage	I_{source} = 5 mA	25°C	4.9	4.93		V
			–40°C to 85°C	4.85			

Electrical Characteristics

V_{CC+} = 2.7 V, V_{CC-} = GND, T_A = 25°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A	MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage		25°C		±2	±8	mV
			–40°C to 85°C			±9	
I_{IO}	Input offset current		25°C		2		pA
I_I	Input bias current		25°C		4		pA
V_{CM}	Common-mode input voltage		25°C	0		V_{CC}	V
CMRR	Common-mode rejection ratio	ΔV_{CM} = 2.7 V	25°C	42	57		dB
		0 ≤ V_{CM} ≤ 2.7 V	–40°C to 85°C	42			
I_{CC}	Supply current	Output = High, V_{IN} = 2.7 V	25°C		30	55	µA
		Output = Low, V_{IN} = 2.7 V			36	55	
		Output = High, V_{IN} = 2.7 V	–40°C to 85°C			65	
		Output = Low, V_{IN} = 2.7 V				65	
		Output = High, V_{IN} = 1.35 V	25°C		30	48	
		Output = Low, V_{IN} = 1.35 V			35	55	
		Output = High, V_{IN} = 1.35 V	–40°C to 85°C			55	
		Output = Low, V_{IN} = 1.35 V				65	
A_{VD}	Voltage gain	V_D = 1.7 V, 0.5 V ≤ V_{OUT} ≤ 2.2 V	25°C		88		dB
I_{sink}	Sink current	V_{OL} = 0.5 V	25°C	13	18		mA
			–40°C to 85°C	11			
I_{source}	Source current	V_{OH} = 2.2 V	25°C	15	20		mA
			–40°C to 85°C	13			
V_{OL}	Low-level output voltage	I_{sink} = 5 mA	25°C		0.11	0.16	V
			–40°C to 85°C			0.19	
V_{OH}	High-level output voltage	I_{source} = 5 mA	25°C	2.54	2.60		V
			–40°C to 85°C	2.45			

Electrical Characteristics

V_{CC+} = 1.8 V, V_{CC-} = GND, T_A = 25°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A	MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage		25°C		±2	±8	mV
			–40°C to 85°C			±9	
I_{IO}	Input offset current		25°C		2		pA
I_I	Input bias current		25°C		4		pA
V_{CM}	Common-mode input voltage		25°C	0		V_{CC} – 0.3	V
CMRR	Common-mode rejection ratio	ΔV_{CM} = 5 V	25°C	40	55		dB
		0 ≤ V_{CM} ≤ 5 V	–40°C to 85°C	40			
I_{CC}	Supply current	Output = High, V_{IN} = 1.8 V	25°C		30	55	µA
		Output = Low, V_{IN} = 1.8 V			33	47	
		Output = High, V_{IN} = 1.8 V	–40°C to 85°C			60	
		Output = Low, V_{IN} = 1.8 V				51	
		Output = High, V_{IN} = 0.9 V	25°C		20	32	
		Output = Low, V_{IN} = 0.9 V			25	37	
		Output = High, V_{IN} = 0.9 V	–40°C to 85°C			34	
		Output = Low, V_{IN} = 0.9 V				40	
A_{VD}	Voltage gain	V_D = 1.1 V, 0.4 V ≤ V_{OUT} ≤ 1.5 V	25°C		88		dB
I_{sink}	Sink current	V_{OL} = 0.5 V	25°C	6	9		mA
			–40°C to 85°C	5			
I_{source}	Source current	V_{OH} = 2.2 V	25°C	5	9		mA
			–40°C to 85°C	4			
V_{OL}	Low-level output voltage	I_{sink} = 5 mA	25°C		0.2	0.34	V
			–40°C to 85°C			0.39	
V_{OH}	High-level output voltage	I_{source} = 5 mA	25°C	1.3	1.6		V
			–40°C to 85°C	1.2			

Switching Characteristics

V_{CC+} = 5 V, V_{CC-} = GND, T_A = 25°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS	TYP	UNIT
t_{PLH}	Propagation delay time (turn on)	Overdrive = 100 mV	680	ns
		TTL step input	500	
t_{PHL}	Propagation delay time (turn off)	Overdrive = 100 mV	250	ns
		TTL step input	380	
t_{TLH}	Response time	Overdrive = 100 mV	60	ns
t_{THL}			8	

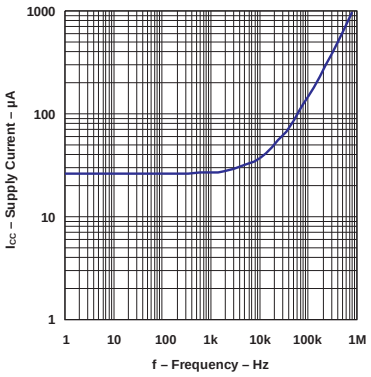
Switching Characteristics

V_{CC+} = 3 V, V_{CC-} = GND, T_A = 25°C (unless otherwise noted)

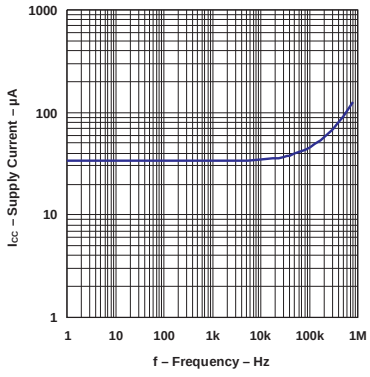
PARAMETER		TEST CONDITIONS	TYP	UNIT
t_{PLH}	Propagation delay time (turn on)	Overdrive = 100 mV	550	ns
t_{PHL}	Propagation delay time (turn off)	Overdrive = 100 mV	250	ns
t_{TLH}	Response time	Overdrive = 100 mV	30	ns
t_{THL}			8	

TYPICAL CHARACTERISTICS

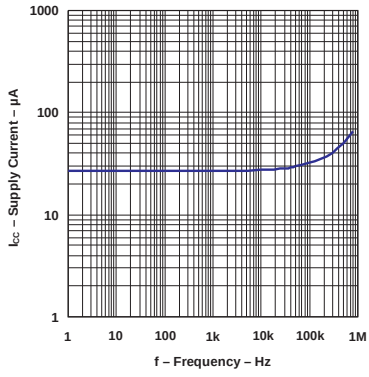
SUPPLY CURRENT vs FREQUENCY V_{CC} = 5 V



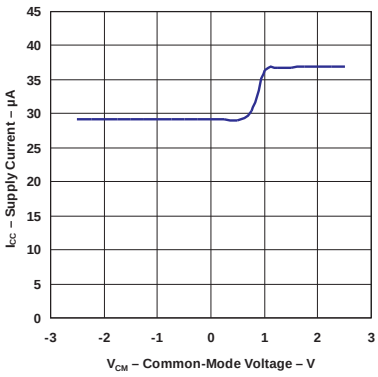
SUPPLY CURRENT vs FREQUENCY V_{CC} = 2.7 V



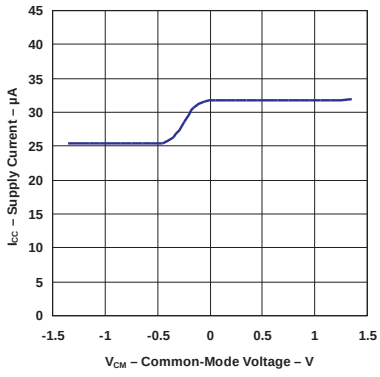
SUPPLY CURRENT vs FREQUENCY V_{CC} = 1.8 V



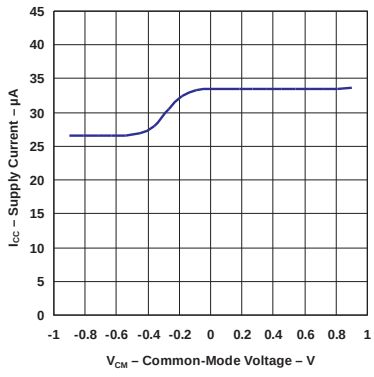
SUPPLY CURRENT vs COMMON-MODE VOLTAGE V_{CC} = ±2.5 V



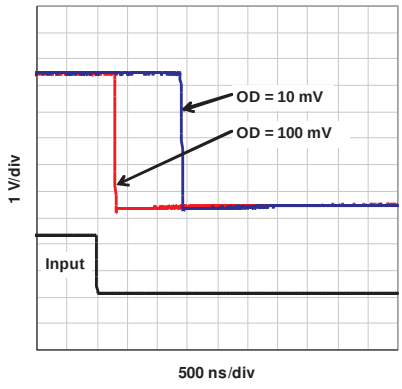
SUPPLY CURRENT vs COMMON-MODE VOLTAGE V_{CC} = ±1.35 V



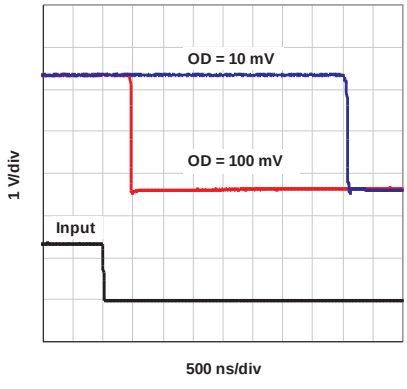
SUPPLY CURRENT vs COMMON-MODE VOLTAGE V_{CC} = ±0.9 V



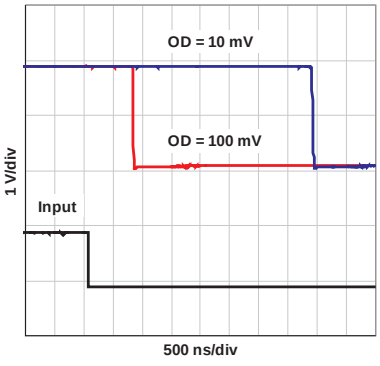
PROPAGATION DELAY TIME, HIGH TO LOW V_{CC} = 5 V



PROPAGATION DELAY TIME, HIGH TO LOW V_{CC} = 2.7 V

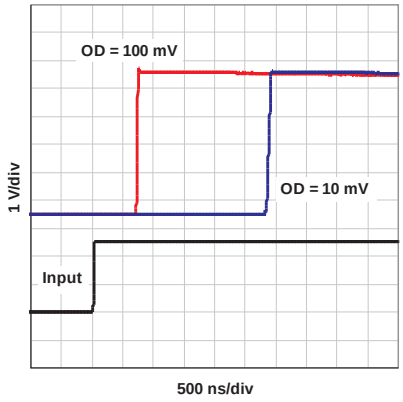


PROPAGATION DELAY TIME, HIGH TO LOW V_{CC} = 1.8 V

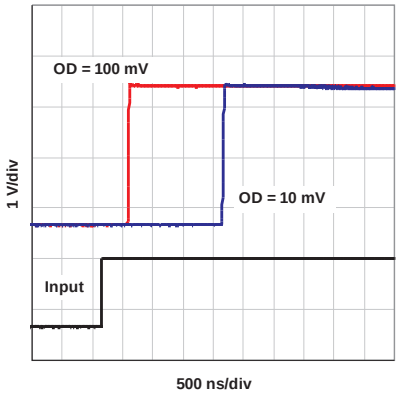


TYPICAL CHARACTERISTICS (continued)

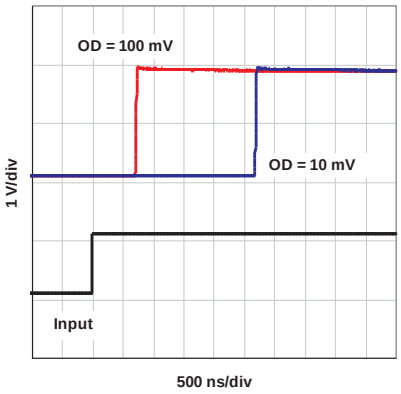
PROPAGATION DELAY TIME, LOW TO HIGH
V_{CC} = 5 V



PROPAGATION DELAY TIME, LOW TO HIGH
V_{CC} = 2.7 V



PROPAGATION DELAY TIME, LOW TO HIGH
V_{CC} = 1.8 V



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)
TLV7256IDDUR	Active	Production	VSSOP (DDU) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	YAUA
TLV7256IDDUR.A	Active	Production	VSSOP (DDU) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	YAUA
TLV7256IDDURG4	Active	Production	VSSOP (DDU) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	YAUA
TLV7256IDDURG4.A	Active	Production	VSSOP (DDU) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	YAUA

(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.

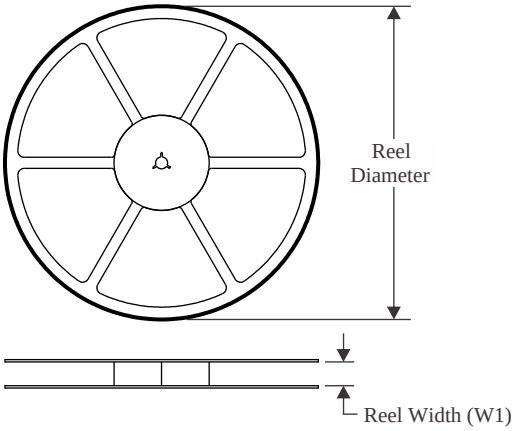
(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will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

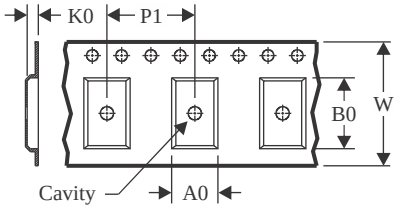
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

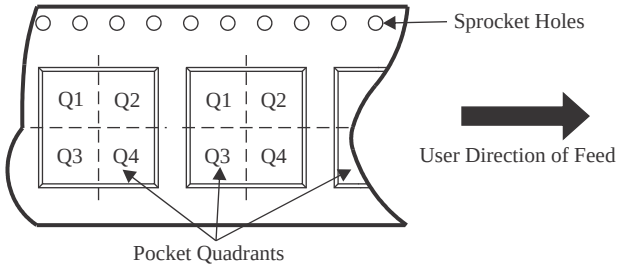


TAPE DIMENSIONS



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

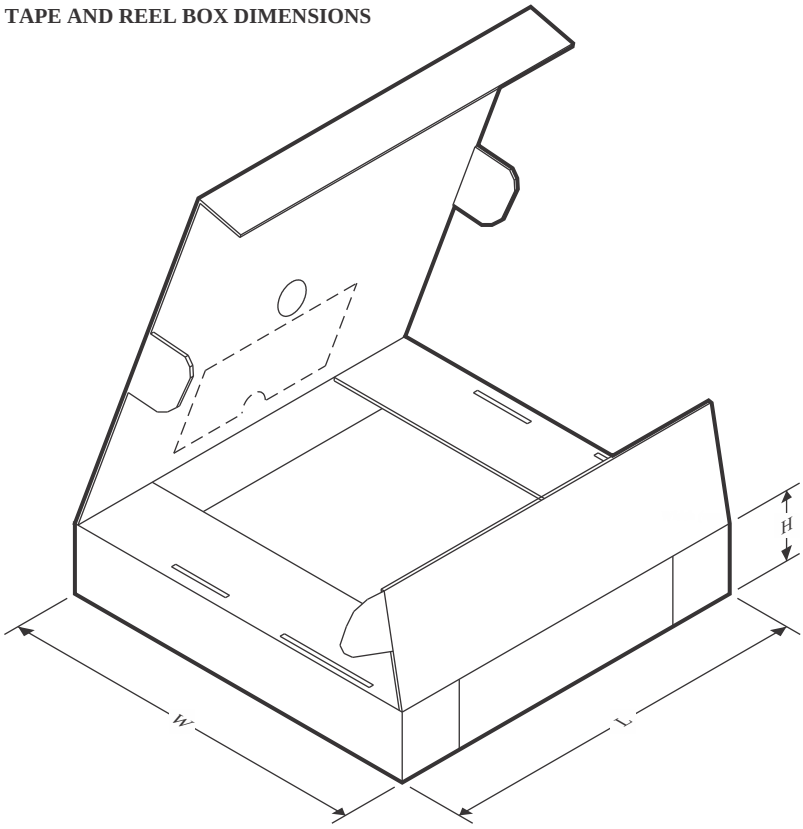
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
TLV7256IDDUR	VSSOP	DDU	8	3000	180.0	8.4	2.25	3.35	1.05	4.0	8.0	Q3
TLV7256IDDURG4	VSSOP	DDU	8	3000	180.0	8.4	2.25	3.35	1.05	4.0	8.0	Q3

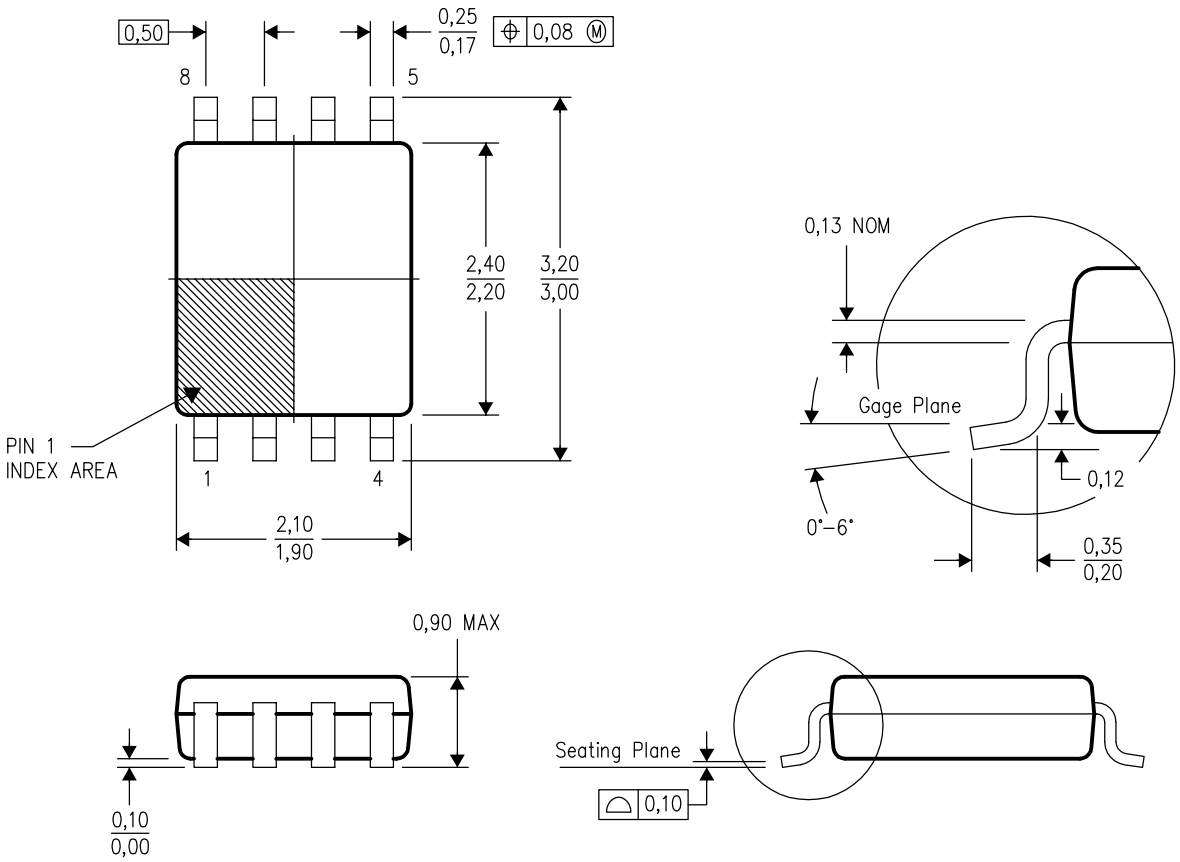
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TLV7256IDDUR	VSSOP	DDU	8	3000	202.0	201.0	28.0
TLV7256IDDURG4	VSSOP	DDU	8	3000	202.0	201.0	28.0

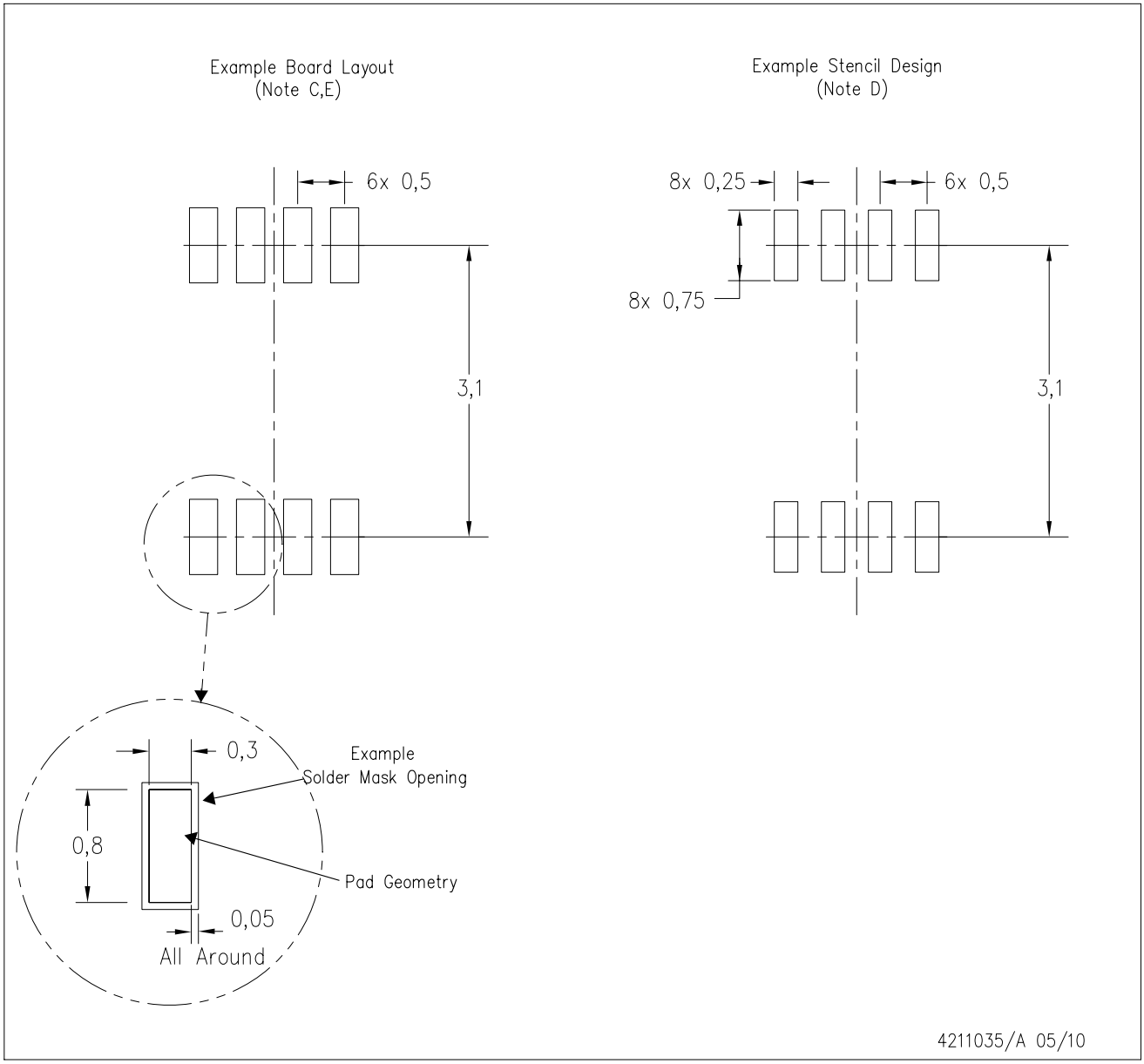
DDU (R–PDSO–G8) PLASTIC SMALL–OUTLINE PACKAGE



4205140/A 05/03

NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion.
D. Falls within JEDEC MO–187 variation CA.

DDU (S–PDSO–G8) PLASTIC SMALL OUTLINE PACKAGE (DIE UP)



NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Publication IPC–7351 is recommended for alternate designs.
D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC–7525.
E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI’s products are provided subject to TI’s Terms of Sale or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI’s provision of these resources does not expand or otherwise alter TI’s applicable warranties or warranty disclaimers for TI products.

TI objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265