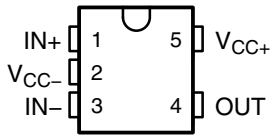
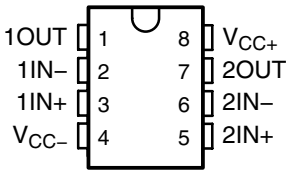
SLOS195H – FEBRUARY 1997 – REVISED JUNE 2007

- **Low Supply-Voltage Operation . . . V_{CC} = ±1 V Min**
- **Wide Bandwidth . . . 7 MHz Typ at V_{CC}± = ±2.5 V**
- **High Slew Rate . . . 3 V/μs Typ at V_{CC}± = ±2.5 V**
- **Wide Output Voltage Swing . . . ±2.4 V Typ at V_{CC}± = ±2.5 V, R_L = 10 kΩ**
- **Low Noise . . . 8 nV/√Hz Typ at f = 1 kHz**

TLV2361 . . . DBV PACKAGE
(TOP VIEW)



TLV2362 . . . D, DGK, P, PS, OR PW PACKAGE
(TOP VIEW)



description/ordering information

The TLV236x devices are high-performance dual operational amplifiers built using an original Texas Instruments bipolar process. These devices can be operated at a very low supply voltage (±1 V), while maintaining a wide output swing. The TLV236x devices offer a dramatically improved dynamic range of signal conditioning in low-voltage systems. The TLV236x devices also provide higher performance than other general-purpose operational amplifiers by combining higher unity-gain bandwidth and faster slew rate. With their low distortion and low-noise performance, these devices are well suited for audio applications.

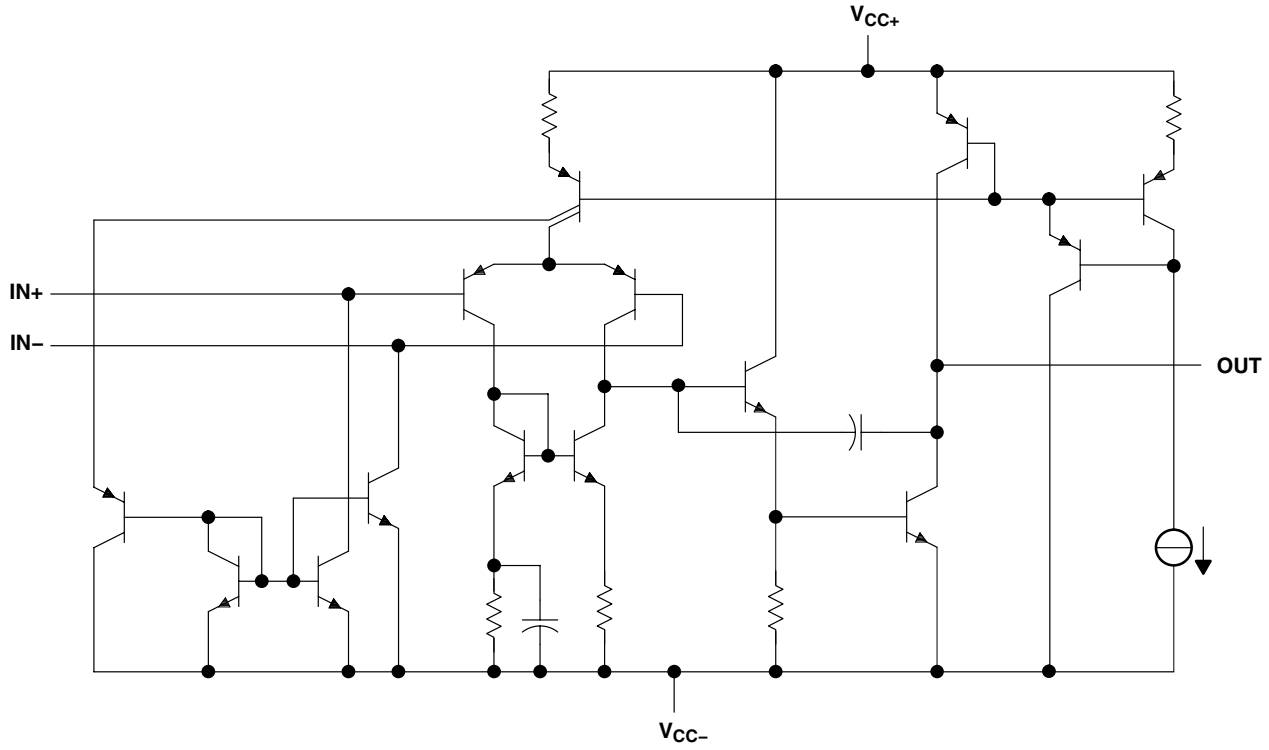
ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING‡
–0°C to 70°C	SOT-23-5 (DBV)	Reel of 3000	TLV2361CDBVR	YC3_
		Reel of 250	TLV2361CDBVT	
–40°C to 85°C	SOT-23-5 (DBV)	Reel of 3000	TLV2361IDBVR	YC4_
		Reel of 250	TLV2361IDBVT	
	MSOP/VSSOP (DGK)	Reel of 2500	TLV2362IDGKR	YBS
	PDIP (P)	Tube of 50	TLV2362IP	TLV2362IP
	SOIC (D)	Tube of 75	TLV2362ID	2362I
		Reel of 2500	TLV2362IDR	
	SOP (PS)	Reel of 2000	TLV2362IPSR	TY2362
	TSSOP (PW)	Tube of 150	TLV2362IPW	TY2362
		Reel of 2000	TLV2362IPWR	

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

‡ DBV: The actual top-side marking has one additional character that designates the wafer fab/assembly site.

equivalent schematic (each amplifier)



ACTUAL DEVICE COMPONENT COUNT		
COMPONENT	TLV2361	TLV2362
Transistors	30	46
Resistors	6	11
Diodes	1	1
Capacitors	2	4
JFET	1	1

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage, V_{CC+} (see Note 1) . . . . . 3.5 V
Supply voltage, V_{CC-} (see Note 1) . . . . . –3.5 V
Differential input voltage, V_{ID} (see Note 2) . . . . . ±3.5 V
Input voltage, V_I (any input) (see Notes 1 and 3) . . . . . $V_{CC}±$
Output voltage, V_O . . . . . ±3.5 V
Output current, I_O . . . . . 20 mA
Duration of short-circuit current at (or below) 25°C (output shorted to GND) . . . . . Unlimited
Package thermal impedance, θ_{JA} (see Notes 4 and 5): D package . . . . . 97°C/W
DBV package . . . . . 206°C/W
DGK package . . . . . 172°C/W
P package . . . . . 85°C/W
PS package . . . . . 95°C/W
PW package . . . . . 149°C/W
Operating virtual junction temperature, T_J . . . . . 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds . . . . . 260°C
Storage temperature range, T_{stg} . . . . . –65°C to 150°C

† 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.

NOTES: 1. All voltage values, except differential voltages, are with respect to the midpoint between V_{CC+} and V_{CC-}.
2. Differential voltages are at IN+ with respect to IN–.
3. All input voltage values must not exceed V_{CC}.
4. 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 $P_D = (T_J(max) – T_A)/\theta_{JA}$. Selecting the maximum of 150°C can affect reliability.
5. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions

			MIN	MAX	UNIT
V_{CC}	Supply voltage		±1	±2.5	V
T_A	Operating free-air temperature	TLV2361C	0	70	°C
		TLV2361I, TLV2362I	–40	85	

TLV2361 and TLV2362 electrical characteristics, $V_{CC}\pm$ = ±1.5 V (unless otherwise noted)

PARAMETER		TEST CONDITIONS			T_A	MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage	V_O = 0,	V_{IC} = 0		25°C		1	6	mV
					Full range			7.5	
I_{IO}	Input offset current	V_O = 0,	V_{IC} = 0		25°C		5	100	nA
					Full range			150	
I_{IB}	Input bias current	V_O = 0,	V_{IC} = 0		25°C		20	150	nA
					Full range			250	
V_{IC}	Common-mode input voltage	$\|V_{IO}\| \le$ 7.5 mV			25°C	±0.5			V
					Full range	±0.5			
V_{OM+}	Maximum positive-peak output voltage	R_L = 10 kΩ			25°C	1.2	1.4		V
		$R_L \ge$ 10 kΩ			Full range	1.2			
V_{OM-}	Maximum negative-peak output voltage	R_L = 10 kΩ			25°C	–1.2	–1.4		V
		$R_L \ge$ 10 kΩ			Full range	–1.2			
I_{CC}	Supply current (per amplifier)	V_O = 0,	No load		25°C		1.4	2.25	mA
					Full range			2.75	mA
A_{VD}	Large-signal differential voltage amplification	V_O = ±1 V,	R_L = 10 kΩ	TLV2361	25°C	60	80		dB
				TLV2362			55		
CMRR	Common-mode rejection ratio	V_{IC} = ±0.5 V			25°C		75		dB
k_{SVR}	Supply-voltage rejection ratio	$V_{CC}\pm$ = ±1.5 V to ±2.5 V			25°C		80		dB

TLV2361 and TLV2362 operating characteristics, $V_{CC}\pm$ = ±1.5 V, T_A = 25°C

PARAMETER		TEST CONDITIONS			TYP	UNIT
SR	Slew rate	A_V = 1,	V_I = ±0.5 V		2.5	V/μs
B_1	Unity-gain bandwidth	A_V = 40,	R_L = 10 kΩ,	C_L = 100 pF	6	MHz
V_n	Equivalent input noise voltage	R_S = 100 Ω,	R_F = 10 kΩ,	f = 1 kHz	9	nV/√Hz

TLV2361 and TLV2362 electrical characteristics, $V_{CC}\pm$ = ±2.5 V (unless otherwise noted)

PARAMETER		TEST CONDITIONS			T_A	MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage	V_O = 0,	V_{IC} = 0		25°C		1	6	mV
					Full range			7.5	
I_{IO}	Input offset current	V_O = 0,	V_{IC} = 0		25°C		5	100	nA
					Full range			150	
I_{IB}	Input bias current	V_O = 0,	V_{IC} = 0		25°C		20	150	nA
					Full range			250	
V_{IC}	Common-mode input voltage	$\|V_{IO}\| \le$ 7.5 mV			25°C	±1.5			V
					Full range	±1.4			
V_{OM+}	Maximum positive-peak output voltage	R_L = 10 kΩ			25°C	2	2.4		V
		$R_L \ge$ 10 kΩ			Full range	2			
V_{OM-}	Maximum negative-peak output voltage	R_L = 10 kΩ			25°C	–2	–2.4		V
		$R_L \ge$ 10 kΩ			Full range	–2			
I_{CC}	Supply current (per amplifier)	V_O = 0,	No load		25°C		1.75	2.5	mA
					Full range			3	
A_{VD}	Large-signal differential voltage amplification	V_O = ±1 V,	R_L = 10 kΩ	TLV2361	25°C	60	80		dB
				TLV2362			60		
CMRR	Common-mode rejection ratio	V_{IC} = ±0.5 V			25°C		85		dB
k_{SVR}	Supply-voltage rejection ratio	$V_{CC}\pm$ = ±1.5 V to ±2.5 V			25°C		80		dB

TLV2361 and TLV2362 operating characteristics, $V_{CC}\pm$ = ±2.5 V, T_A = 25°C

PARAMETER		TEST CONDITIONS			TYP	UNIT
SR	Slew rate	A_V = 1,	V_I = ±0.5 V		3	V/μs
B_1	Unity-gain bandwidth	A_V = 40,	R_L = 10 kΩ,	C_L = 100 pF	7	MHz
V_n	Equivalent input noise voltage	R_S = 100 Ω,	R_F = 10 kΩ,	f = 1 kHz	8	nV/√Hz
THD + N	Total harmonic distortion, plus noise	A_V = 1,	V_O = ±1.2 V,	R_L = 10 kΩ, f = 3 kHz	0.004	%

TYPICAL CHARACTERISTICS

Table of Graphs

GRAPH TITLE	FIGURE
Supply current vs Free-air temperature	1
Supply current vs Supply voltage	2
Maximum positive output voltage vs Output current	3
Maximum negative output voltage vs Output current	4
Maximum peak-to-peak output voltage vs Frequency	5
Equivalent input noise voltage vs Frequency	6
Total harmonic distortion vs Frequency	7
Total harmonic distortion vs Output voltage	8

TYPICAL CHARACTERISTICS

SUPPLY CURRENT vs FREE-AIR TEMPERATURE

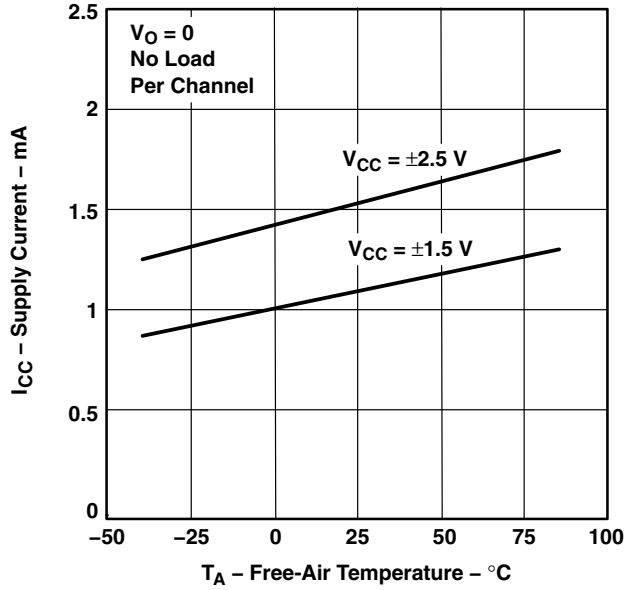


Figure 1

SUPPLY CURRENT vs SUPPLY VOLTAGE

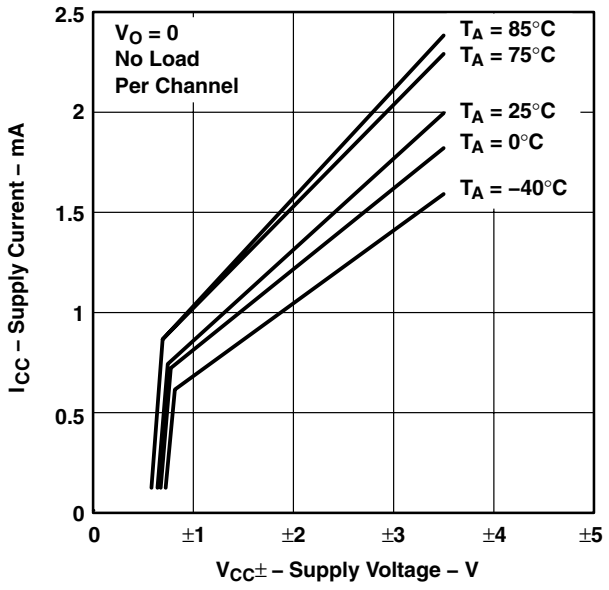


Figure 2

MAXIMUM POSITIVE OUTPUT VOLTAGE vs OUTPUT CURRENT

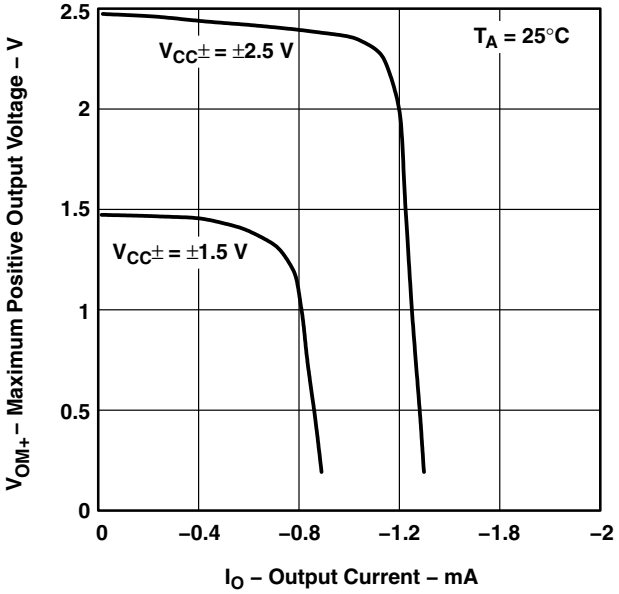


Figure 3

MAXIMUM NEGATIVE OUTPUT VOLTAGE vs OUTPUT CURRENT

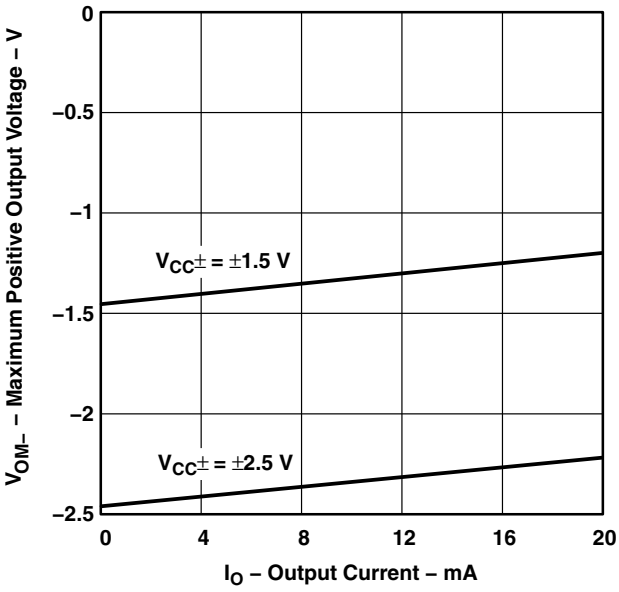


Figure 4

TYPICAL CHARACTERISTICS

MAXIMUM PEAK-TO-PEAK OUTPUT VOLTAGE vs FREQUENCY

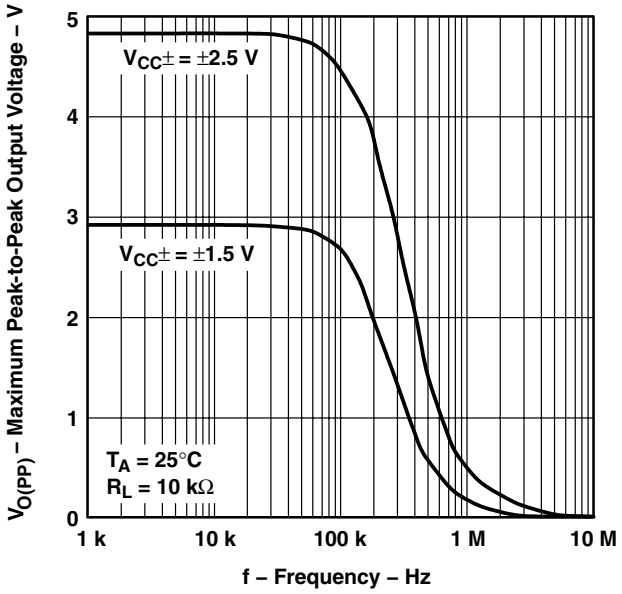


Figure 5

EQUIVALENT INPUT NOISE VOLTAGE vs FREQUENCY

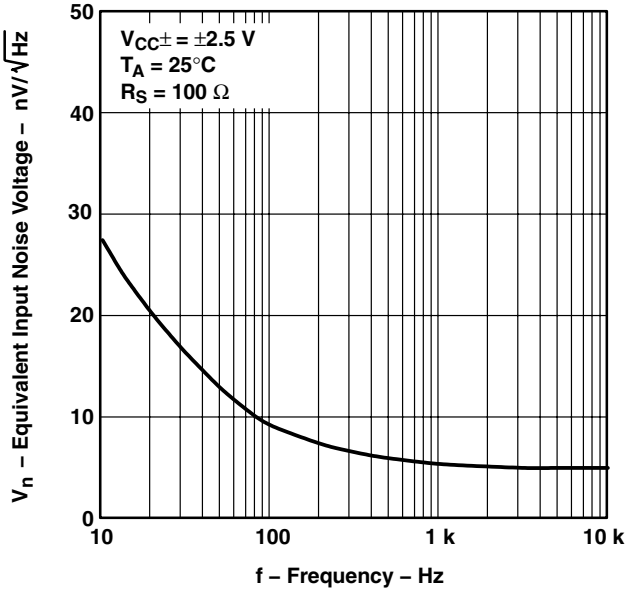


Figure 6

TOTAL HARMONIC DISTORTION vs FREQUENCY

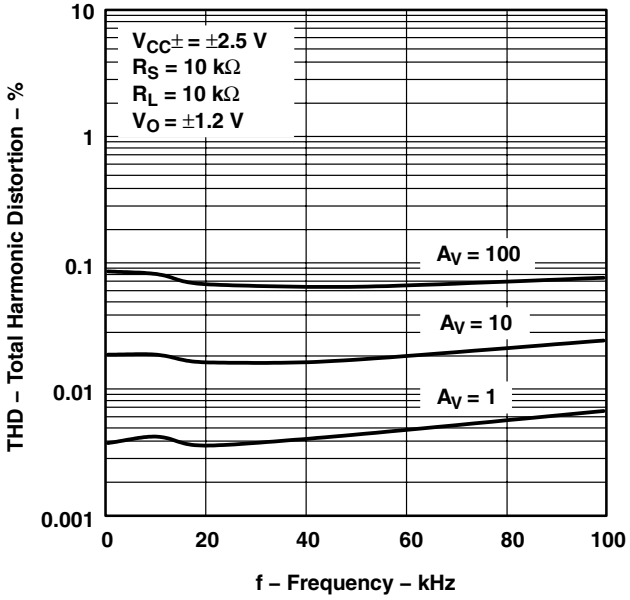


Figure 7

TOTAL HARMONIC DISTORTION vs OUTPUT VOLTAGE

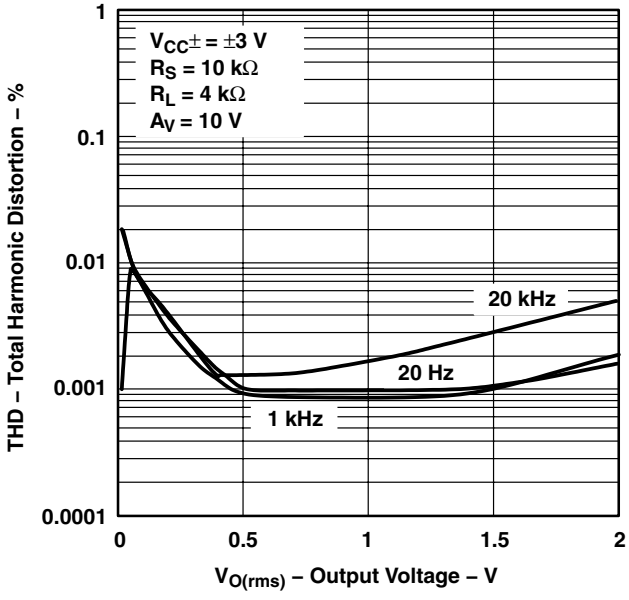


Figure 8

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)
TLV2361CDBVR	Active	Production	SOT-23 (DBV) | 5	3000 | LARGE T&R	Yes	NIPDAU | SN	Level-1-260C-UNLIM	0 to 70	(YC3B, YC3G, YC3J, YC3L)
TLV2361CDBVR.A	Active	Production	SOT-23 (DBV) | 5	3000 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	0 to 70	(YC3B, YC3G, YC3J, YC3L)
TLV2361CDBVT	Active	Production	SOT-23 (DBV) | 5	250 | SMALL T&R	Yes	NIPDAU | SN	Level-1-260C-UNLIM	0 to 70	(YC3B, YC3G, YC3J, YC3L)
TLV2361CDBVT.A	Active	Production	SOT-23 (DBV) | 5	250 | SMALL T&R	Yes	SN	Level-1-260C-UNLIM	0 to 70	(YC3B, YC3G, YC3J, YC3L)
TLV2361IDBVR	Active	Production	SOT-23 (DBV) | 5	3000 | LARGE T&R	Yes	NIPDAU | SN	Level-1-260C-UNLIM	-40 to 85	(YC4B, YC4G, YC4J, YC4L)
TLV2361IDBVR.A	Active	Production	SOT-23 (DBV) | 5	3000 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	(YC4B, YC4G, YC4J, YC4L)
TLV2361IDBVT	Active	Production	SOT-23 (DBV) | 5	250 | SMALL T&R	Yes	NIPDAU | SN	Level-1-260C-UNLIM	-40 to 85	(YC4B, YC4G, YC4J, YC4L)
TLV2361IDBVT.A	Active	Production	SOT-23 (DBV) | 5	250 | SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	(YC4B, YC4G, YC4J, YC4L)
TLV2362ID	Active	Production	SOIC (D) | 8	75 | TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2362I
TLV2362ID.A	Active	Production	SOIC (D) | 8	75 | TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2362I
TLV2362IDGKR	Active	Production	VSSOP (DGK) | 8	2500 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	(YBL, YBS, YBU, YYBS)
TLV2362IDGKR.A	Active	Production	VSSOP (DGK) | 8	2500 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	(YBL, YBS, YBU, YYBS)
TLV2362IDR	Active	Production	SOIC (D) | 8	2500 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2362I
TLV2362IDR.A	Active	Production	SOIC (D) | 8	2500 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	2362I
TLV2362IP	Active	Production	PDIP (P) | 8	50 | TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	TLV2362IP
TLV2362IP.A	Active	Production	PDIP (P) | 8	50 | TUBE	Yes	NIPDAU	N/A for Pkg Type	-40 to 85	TLV2362IP
TLV2362IPWR	Active	Production	TSSOP (PW) | 8	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	TY2362
TLV2362IPWR.A	Active	Production	TSSOP (PW) | 8	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	TY2362

(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.

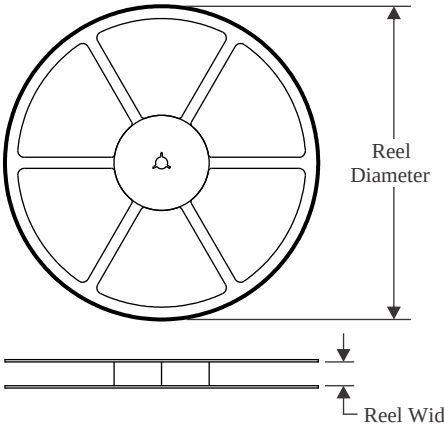
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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.

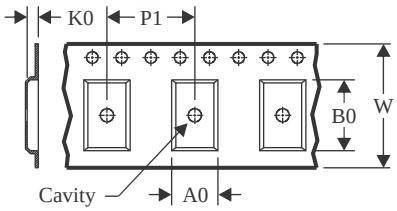
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

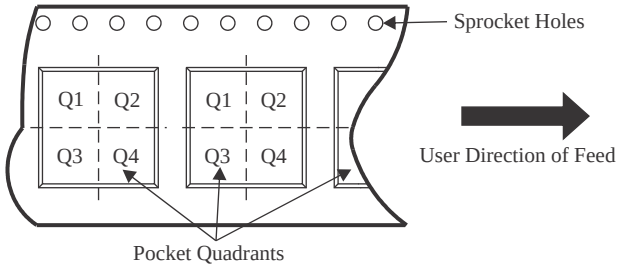


TAPE DIMENSIONS



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

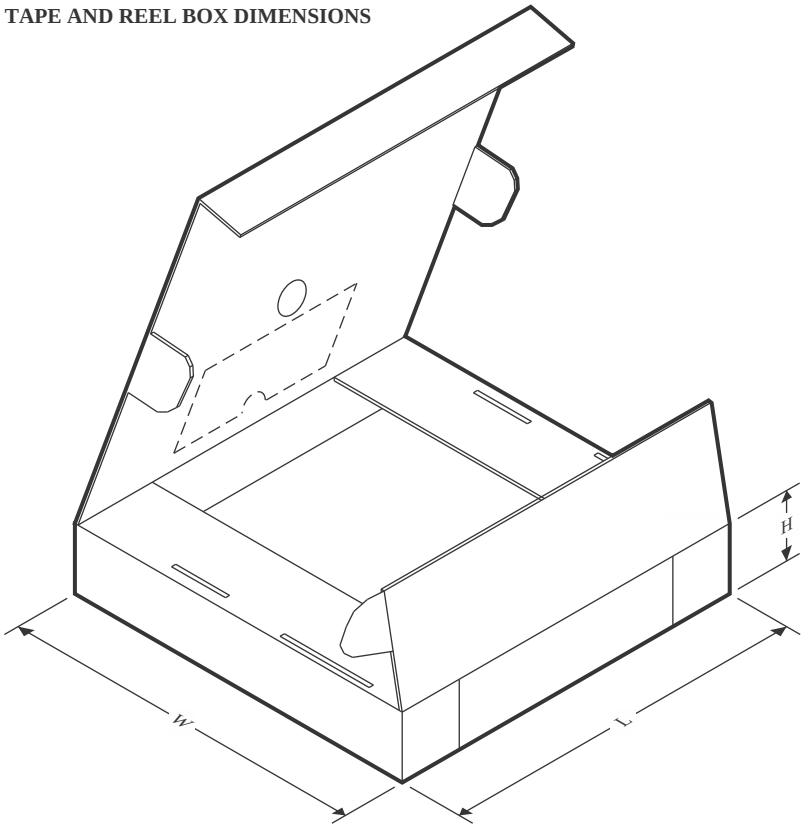
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
TLV2361CDBVR	SOT-23	DBV	5	3000	178.0	9.0	3.3	3.2	1.4	4.0	8.0	Q3
TLV2361CDBVR	SOT-23	DBV	5	3000	180.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
TLV2361CDBVT	SOT-23	DBV	5	250	178.0	9.0	3.3	3.2	1.4	4.0	8.0	Q3
TLV2361IDBVR	SOT-23	DBV	5	3000	180.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
TLV2361IDBVR	SOT-23	DBV	5	3000	178.0	9.0	3.3	3.2	1.4	4.0	8.0	Q3
TLV2361IDBVT	SOT-23	DBV	5	250	178.0	9.0	3.3	3.2	1.4	4.0	8.0	Q3
TLV2362IDGKR	VSSOP	DGK	8	2500	330.0	12.4	5.25	3.35	1.25	8.0	12.0	Q1
TLV2362IDR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
TLV2362IPWR	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1

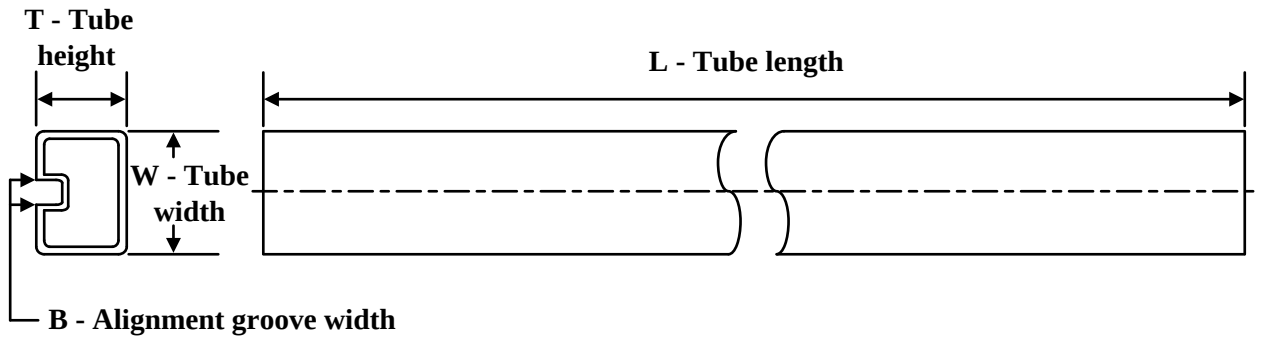
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TLV2361CDBVR	SOT-23	DBV	5	3000	180.0	180.0	18.0
TLV2361CDBVR	SOT-23	DBV	5	3000	203.0	203.0	35.0
TLV2361CDBVT	SOT-23	DBV	5	250	180.0	180.0	18.0
TLV2361IDBVR	SOT-23	DBV	5	3000	203.0	203.0	35.0
TLV2361IDBVR	SOT-23	DBV	5	3000	180.0	180.0	18.0
TLV2361IDBVT	SOT-23	DBV	5	250	180.0	180.0	18.0
TLV2362IDGKR	VSSOP	DGK	8	2500	366.0	364.0	50.0
TLV2362IDR	SOIC	D	8	2500	340.5	338.1	20.6
TLV2362IPWR	TSSOP	PW	8	2000	353.0	353.0	32.0

TUBE



*All dimensions are nominal

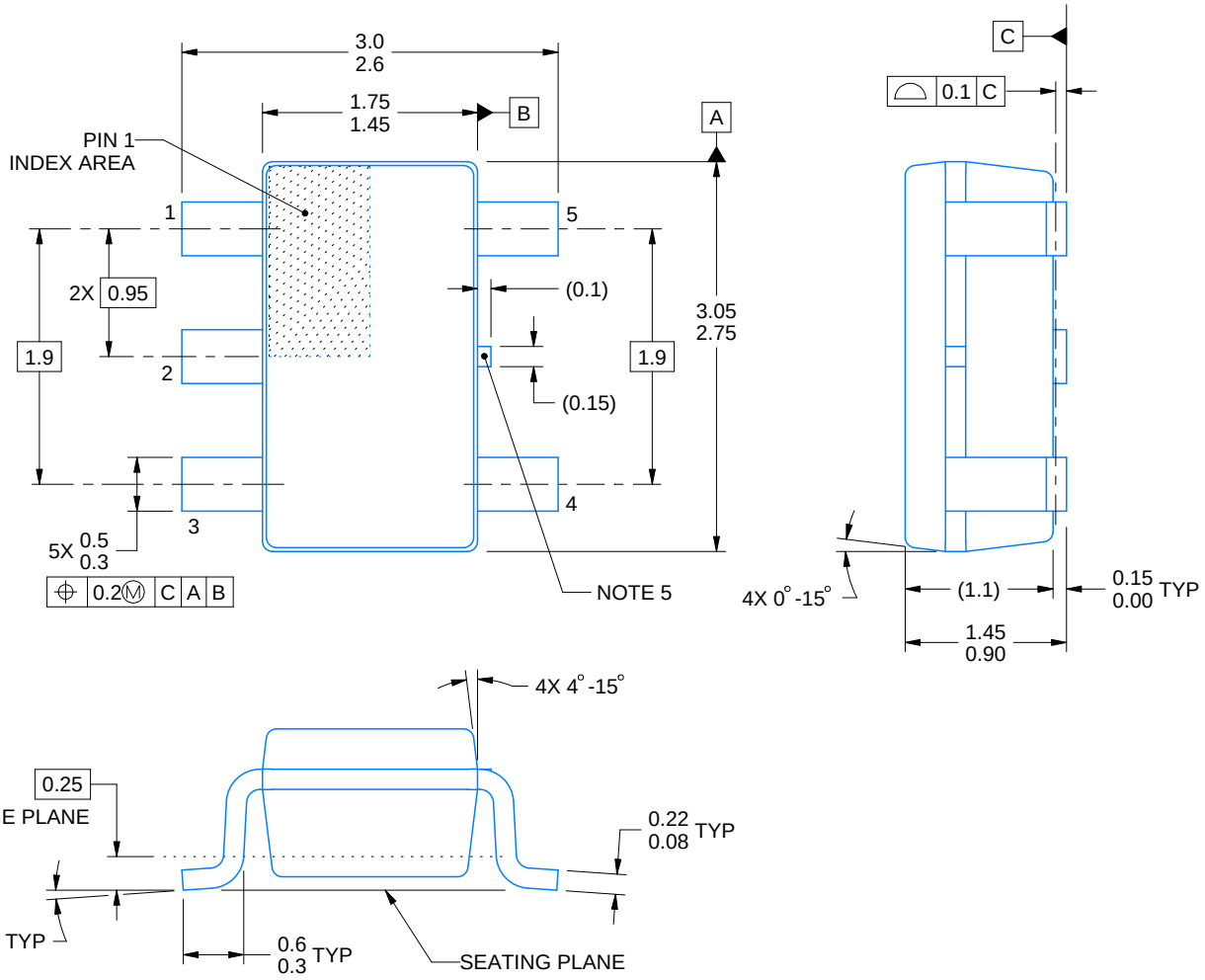
Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
TLV2362ID	D	SOIC	8	75	507	8	3940	4.32
TLV2362ID.A	D	SOIC	8	75	507	8	3940	4.32
TLV2362IP	P	PDIP	8	50	506	13.97	11230	4.32
TLV2362IP.A	P	PDIP	8	50	506	13.97	11230	4.32

PACKAGE OUTLINE

DBV0005A

SOT-23 - 1.45 mm max height

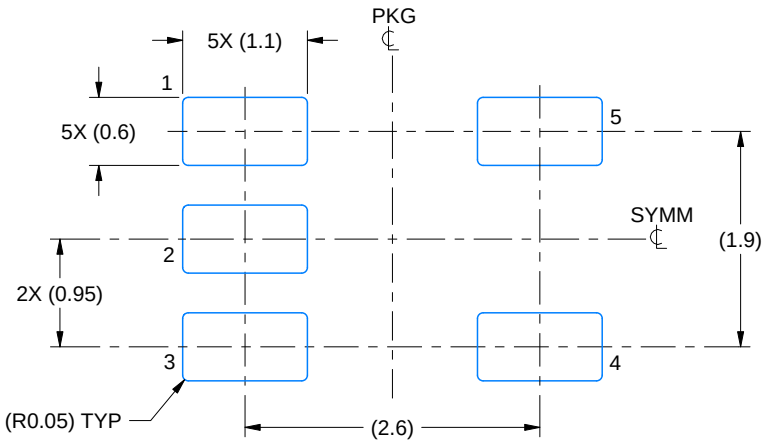
SMALL OUTLINE TRANSISTOR



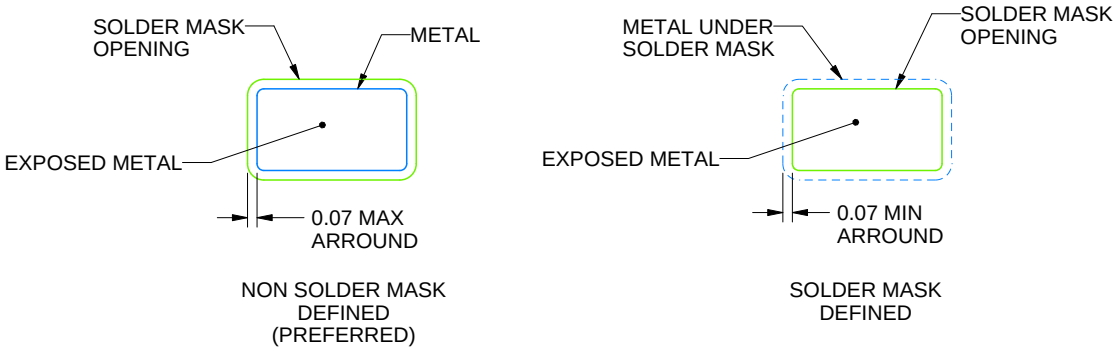
4214839/K 08/2024

NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Refernce JEDEC MO-178.
4. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.25 mm per side.
5. Support pin may differ or may not be present.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:15X

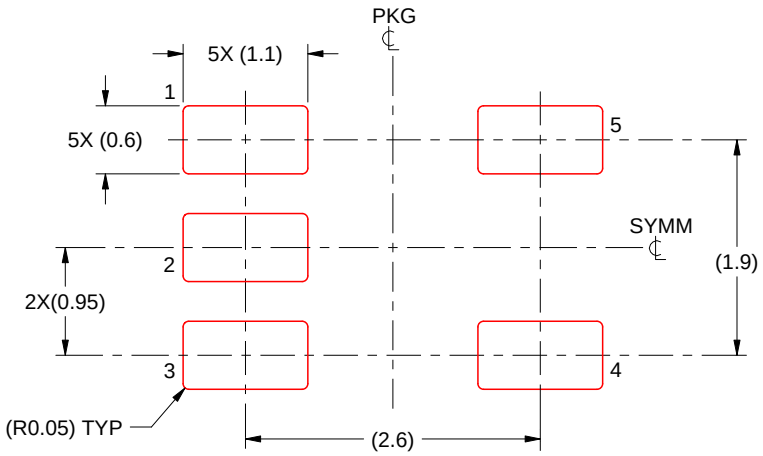


SOLDER MASK DETAILS

4214839/K 08/2024

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:15X

4214839/K 08/2024

NOTES: (continued)

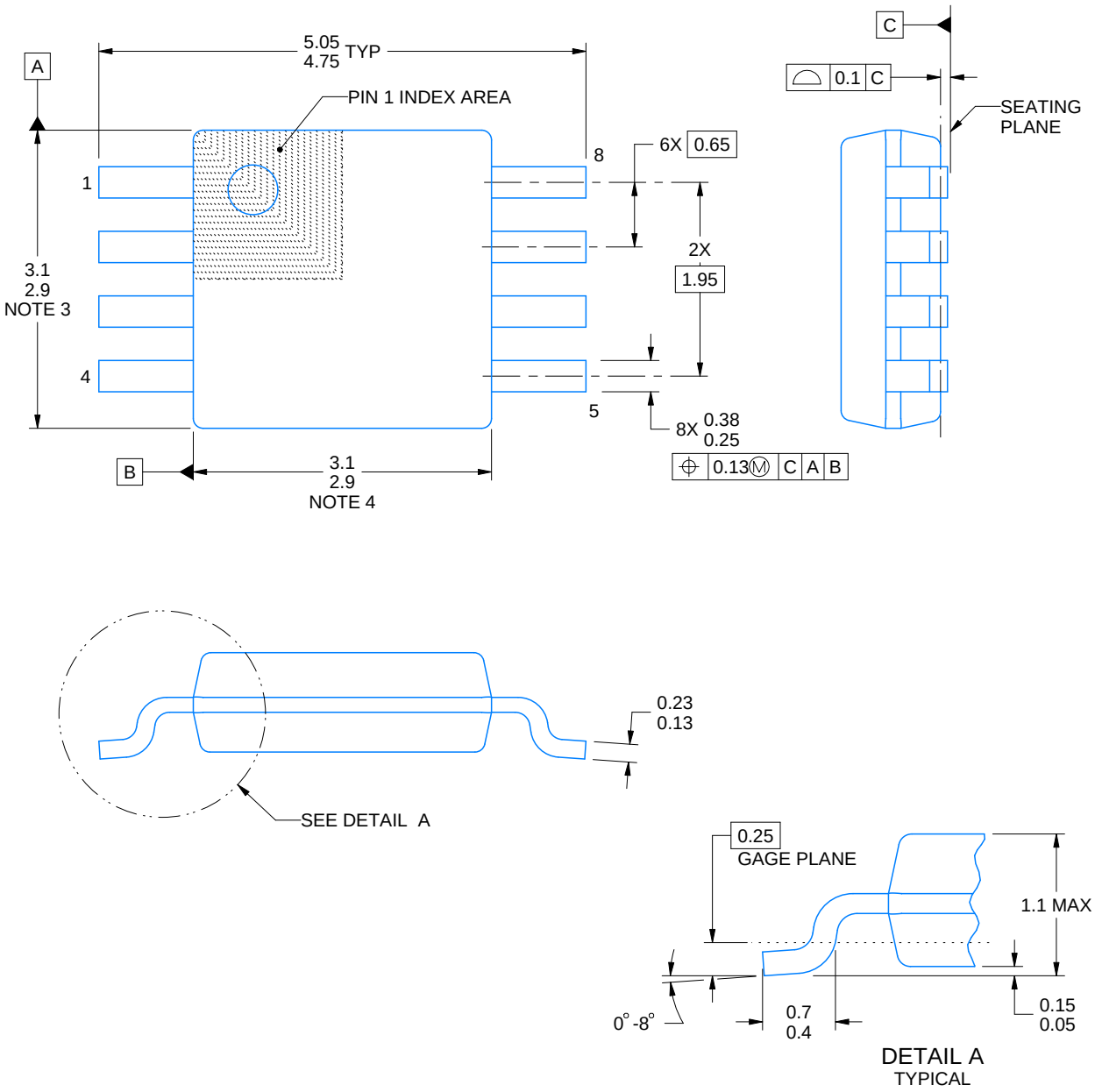
8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

PACKAGE OUTLINE

DGK0008A

VSSOP - 1.1 mm max height

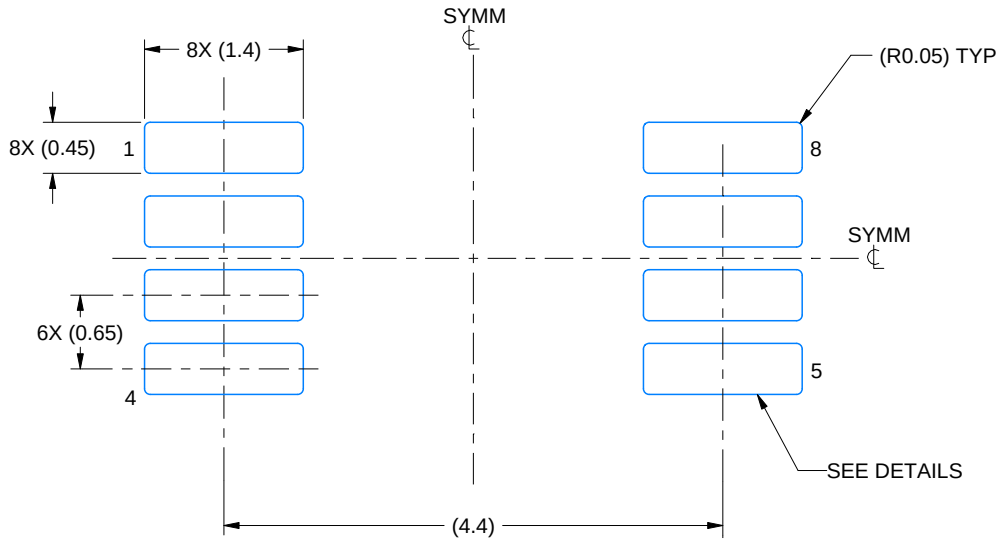
SMALL OUTLINE PACKAGE



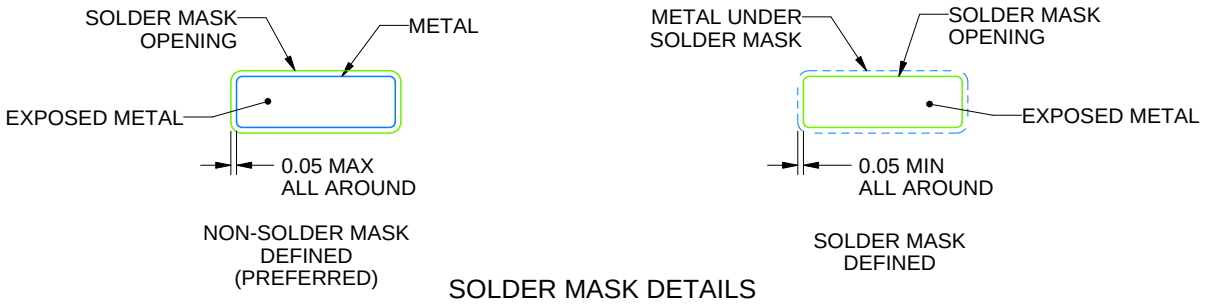
PowerPAD is a trademark of Texas Instruments.

NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-187.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 15X

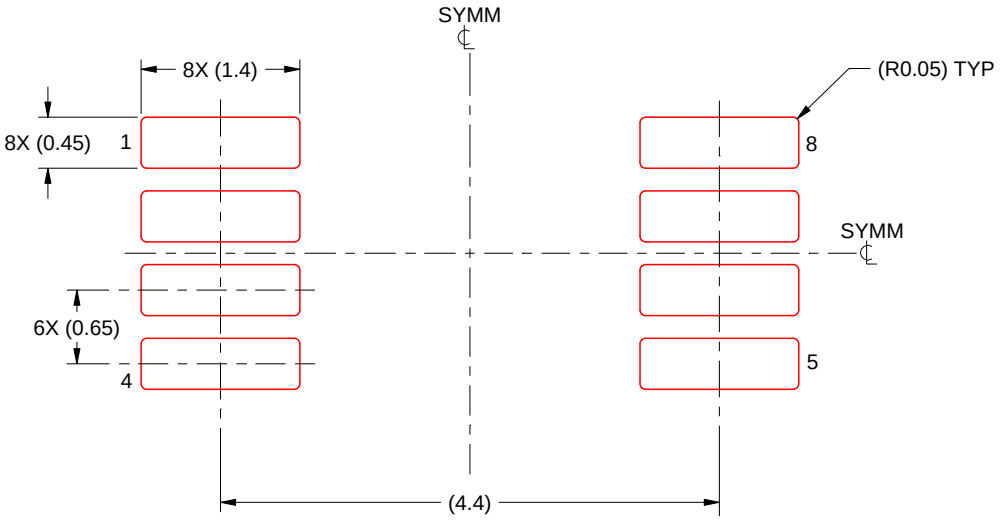


SOLDER MASK DETAILS

4214862/A 04/2023

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
8. Vias are optional depending on application, refer to device data sheet. If any vias are implemented, refer to their locations shown on this view. It is recommended that vias under paste be filled, plugged or tented.
9. Size of metal pad may vary due to creepage requirement.



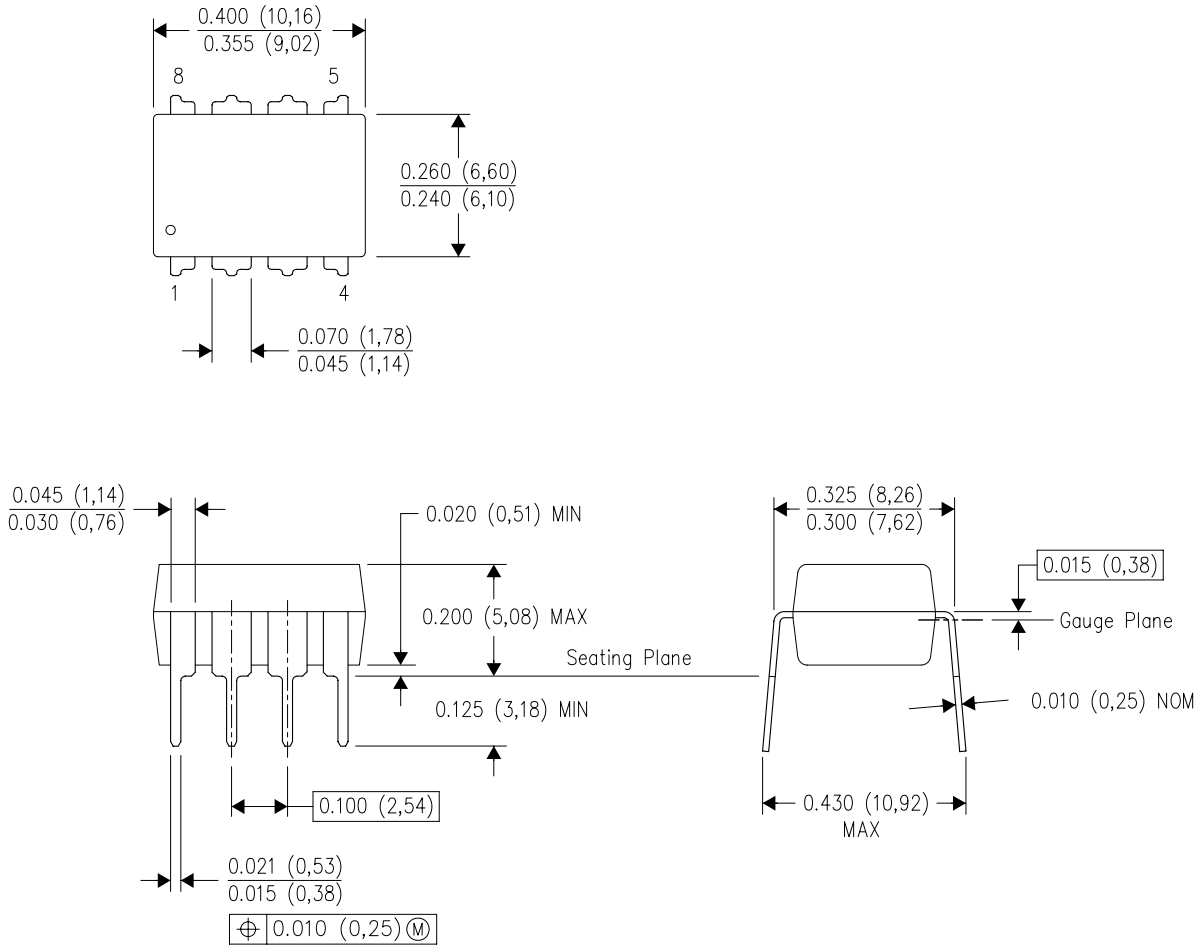
SOLDER PASTE EXAMPLE
SCALE: 15X

4214862/A 04/2023

NOTES: (continued)

11. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
12. Board assembly site may have different recommendations for stencil design.

P (R–PDIP–T8) PLASTIC DUAL–IN–LINE PACKAGE



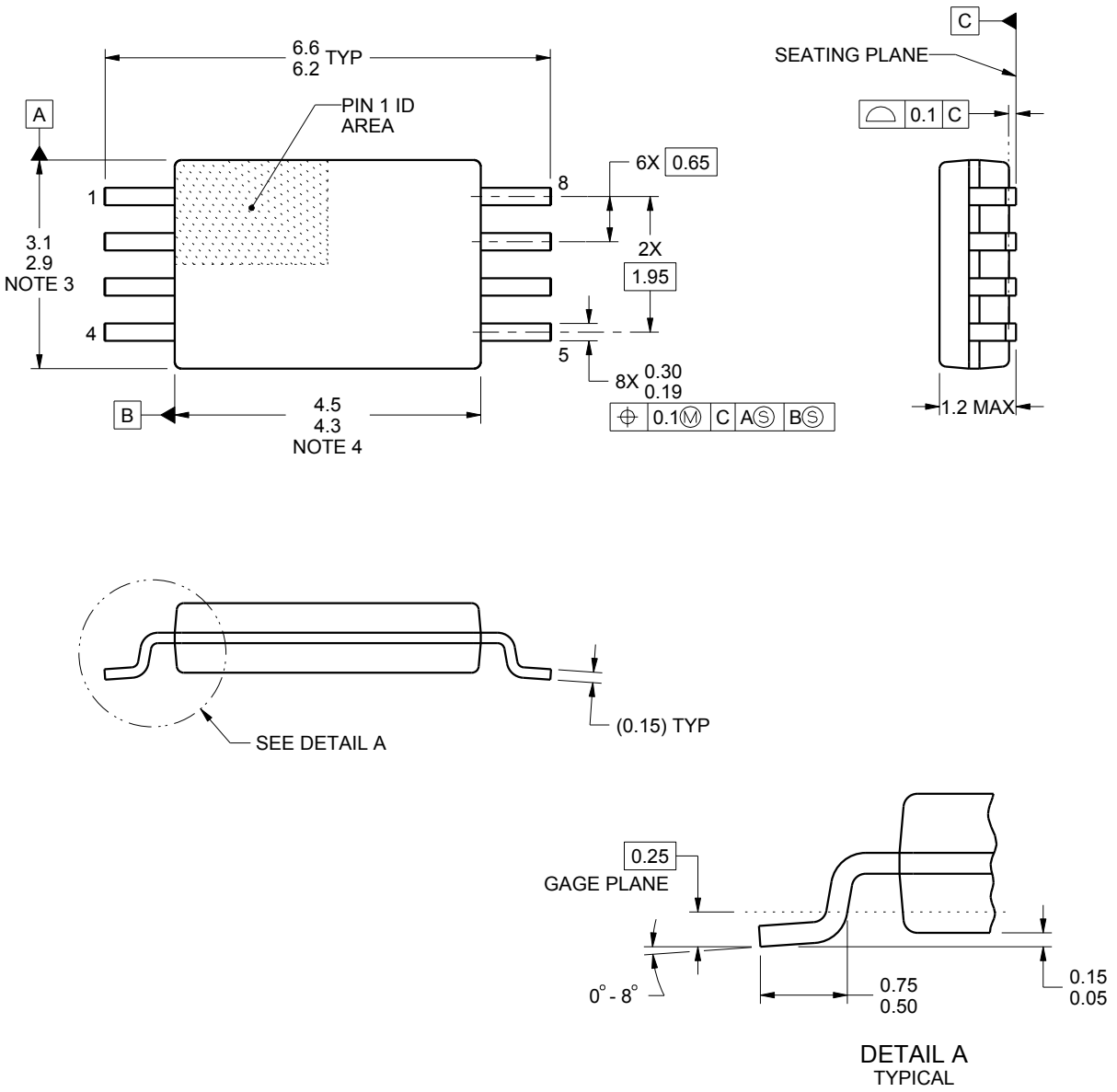
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001 variation BA.

PACKAGE OUTLINE

PW0008A

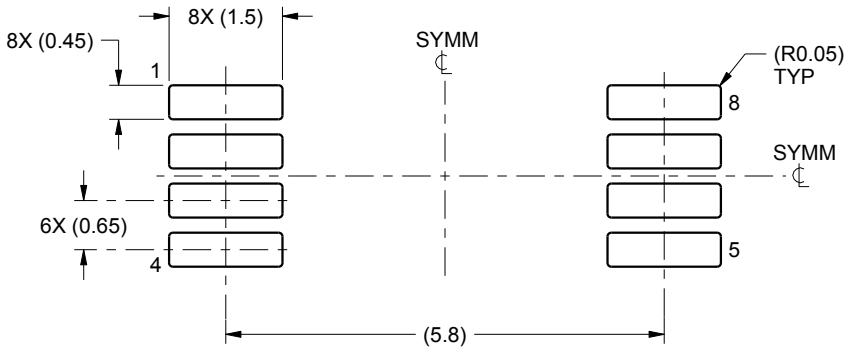
TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE

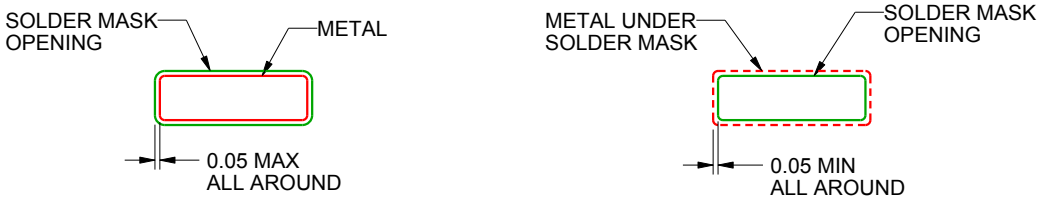


NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153, variation AA.



LAND PATTERN EXAMPLE
SCALE:10X

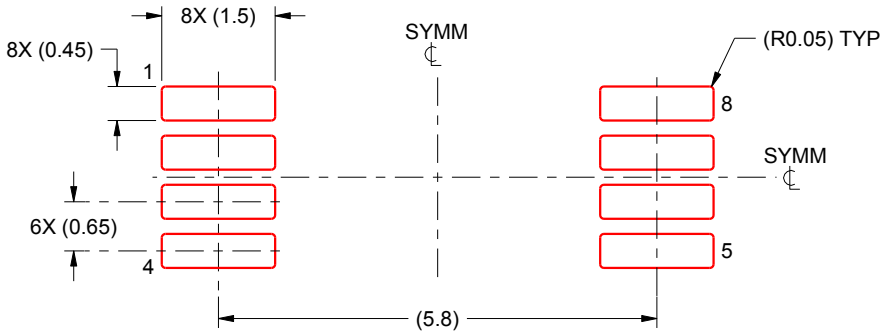


SOLDER MASK DETAILS
NOT TO SCALE

4221848/A 02/2015

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

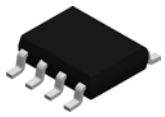


SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:10X

4221848/A 02/2015

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

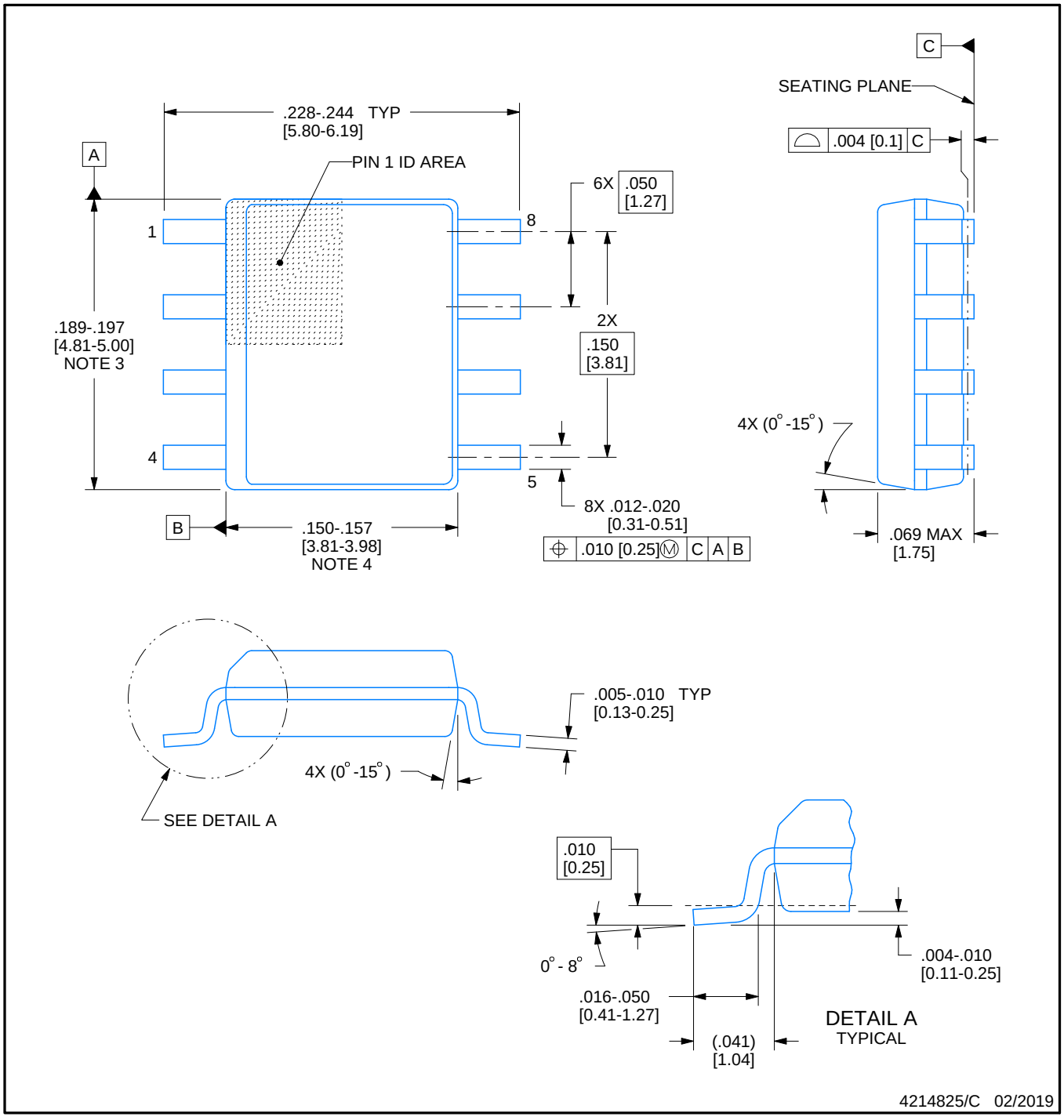


PACKAGE OUTLINE

D0008A

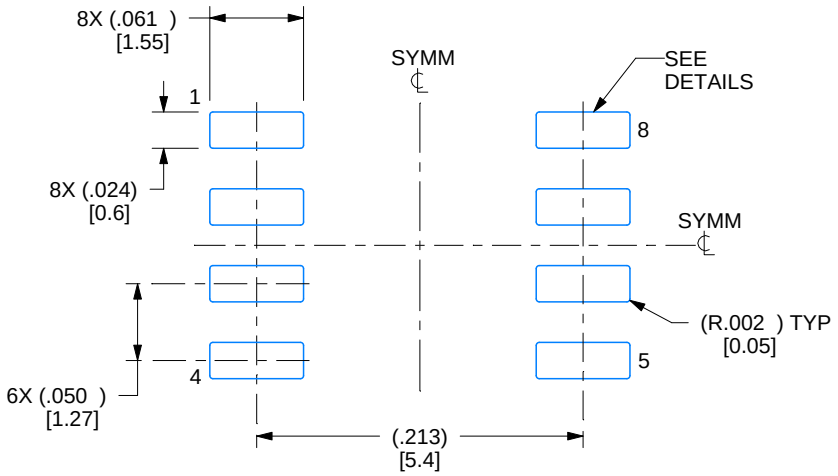
SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT

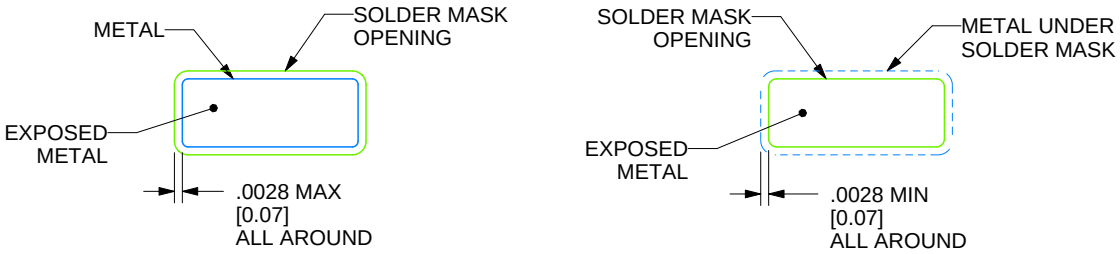


NOTES:

1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 [0.15] per side.
4. This dimension does not include interlead flash.
5. Reference JEDEC registration MS-012, variation AA.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:8X



SOLDER MASK DETAILS

4214825/C 02/2019

NOTES: (continued)

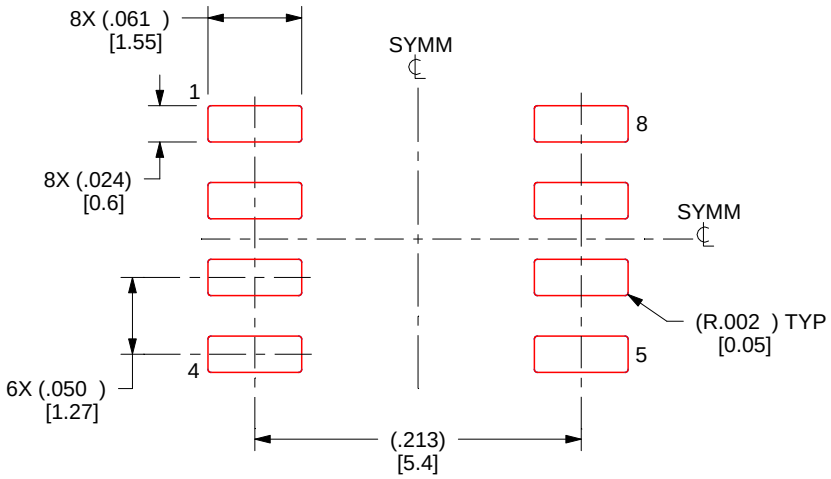
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE
BASED ON .005 INCH [0.125 MM] THICK STENCIL
SCALE:8X

4214825/C 02/2019

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), 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 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, TI’s General Quality Guidelines, 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. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

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

Last updated 10/2025