



Support & training



SN54ACT11, SN74ACT11 SCAS531D - AUGUST 1995 - REVISED JULY 2024

SNx4ACT11 Triple 3-Input Positive-and Gates

1 Features

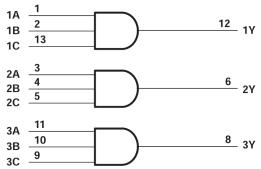
- 4.5V to 5.5V V_{CC} operation
- Inputs accept voltages to 5.5V •
- Max t_{pd} of 10.5ns at 5V
- Inputs are TTL-voltage compatible

2 Description

The 'ACT11 devices contain three independent 3input AND gates. These devices perform the Boolean function $Y = A \cdot B \cdot C$ or $Y = \overline{A} + \overline{B} + C$ in positive logic.

Device Information							
PART NUMBER	NUMBER PACKAGE ⁽¹⁾ PACKAGE SIZE ⁽²⁾ BODY SIZE ⁽³⁾						
	DB (SSOP, 14)	6.2mm x 7.8mm	6.2mm x 5.3mm				
	D (SOIC, 14)	8.65mm x 6mm	8.65 mm x 3.9mm				
SNx4ACT11	N (PDIP, 14)	19.3mm x 9.4mm	19.3mm x 6.3 mm				
	PW (TSSOP, 14)	5mm x 6.4mm	5mm x 4.4mm				
	W (CFP , 14)	9.21mm x 9mm	9.21mm x 6.28mm				
	FK, (LCCC , 14)	8.9mm x 8.9mm	8.9mm x 8.9mm				

- For more information, see Section 10. (1)
- (2) The package size (length × width) is a nominal value and includes pins, where applicable.
- (3) The body size (length × width) is a nominal value and does not include pins.



Logic Diagram, Each Gate (Positive Logic)





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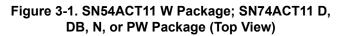
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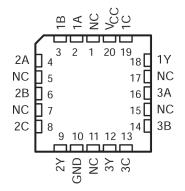
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3 Pin Configuration and Functions

1A 1B 2A 2B 2C 2Y	1 2 3 4 5 6	14 13 12 17 10		V _{CC} 1C 1Y 3A 3B 3C
2Y	6	ę	Ð	3C
GND	7	8	3	3Y





NC – No internal connection Figure 3-2. SN54ACT11 FK Package (Top View)

PIN		- I/O	DESCRIPTION			
NAME	NO.	- 1/0	DESCRIPTION			
1A	1	Input	Channel 1, Input A			
1B	2	Input	Channel 1, Input B			
2A	3	Input	Channel 2, Input A			
2B	4	Input	Channel 2, Input B			
2C	5	Input	Channel 2, Input C			
2Y	6	Output	Channel 2, Output Y			
GND	7	_	Ground			
3Y	8	Output	Channel 3, Output Y			
3C	9	Input	Channel 3, Input A			
3B	10	Input	Channel 3, Input B			
3A	11	Input	Channel 3, Input C			
1Y	12	Output	Channel 1, Output Y			
1C	13	Input	Channel 1, Input C			
V _{CC}	14	_	Positive Supply			



4 Specifications

4.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

			MIN	MAX	UNIT
V _{CC}	Supply voltage range		-0.5	7	V
V _I ⁽²⁾	Input voltage range		-0.5	V _{CC} + 0.5	V
V ₀ ⁽²⁾	Output voltage range		-0.5	V _{CC} + 0.5	V
I _{IK}	Input clamp current	$(V_{I} < 0 \text{ or } V_{I} > V_{CC})$		±20	mA
I _{OK}	Output clamp current	$(V_O < 0 \text{ or } V_O > V_{CC})$		±20	mA
I _O	Continuous output current	$(V_0 = 0 \text{ or } V_{CC})$		±50	mA
	Continuous current through V_{CC} c GND	pr		±200	mA
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) The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

4.2 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

		SN54AC	SN54ACT11		SN74ACT11		
		MIN	MAX	MIN MAX		UNIT	
V _{CC}	Supply voltage	4.5	5.5	4.5	5.5	V	
V _{IH}	High-level input voltage	2		2		V	
V _{IL}	Low-level input voltage		0.8		0.8	V	
VI	Input voltage	0	V _{CC}	0	V _{CC}	V	
Vo	Output voltage	0	V _{CC}	0	V _{CC}	V	
I _{OH}	High-level output current		-24		-24	mA	
I _{OL}	Low-level output current		24		24	mA	
Δt/Δv	Input transition rise or fall rate		8		8	ns/V	
T _A	Operating free-air temperature	-55	125	-40	85	°C	

 All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, Implications of Slow or Floating CMOS Inputs, literature number SCBA004.

4.3 Thermal Information

				SNx4ACT11			
	THERMAL METRIC ⁽¹⁾	D (SOIC)	DB (SSOP)	N (PDIP)	NS (SOP)	PW (TSSOP)	UNIT
		14 PINS	14 PINS	14 PINS	14 PINS	14 PINS	
R _{θJA}	Junction-to-ambient thermal resistance	119.9	96	80	76	145.7	°C/W

(1) For more information about traditional and new thermal metrics, see the Semiconductor and IC Package Thermal Metrics application report.



4.4 Electrical Characteristics

DADAMETED	TEST CONDITIONS	V	T	_A = 25°C		SN54A	CT11	SN74A0	CT11	
PARAMETER	TEST CONDITIONS	V _{cc}	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
	1 - 50	4.5V	4.4	4.49		4.4		4.4		
	I _{OH} = –50 μA	5.5V	5.4	5.49		5.4		5.4		
	I = 24 mA	4.5V	3.86			3.7		3.76		V
V _{OH}	I _{OH} = -24 mA	5.5V	4.86			4.7		4.76		v
	I _{OH} = -50 mA ⁽¹⁾	5.5V				3.85				
	I _{OH} = -75 mA ⁽¹⁾	5.5V						3.85		
	L = 50 uA	4.5V		0.001	0.1		0.1		0.1	
	I _{OL} = 50 μA	5.5V		0.001	0.1		0.1		0.1	
	L = 24 mA	4.5V			0.36		0.5		0.44	V
V _{OL}	I _{OL} = 24 mA	5.5V			0.36		0.5		0.44	v
	I _{OL} = 50 mA ⁽¹⁾	5.5V					1.65			
	I _{OL} = 75 mA ⁽¹⁾	5.5V							1.65	
lı –	V _I = V _{CC} or GND	5.5V			±0.1		±1		±1	μA
I _{CC}	$V_{I} = V_{CC} \text{ or } \qquad I_{O} = 0$	5.5V			2		40		20	μA
ΔI _{CC} ⁽²⁾	One input at 3.4 V, Other inputs at GND or V_{CC}	5.5 V		0.6			1.6		1.5	mA
Ci	V _I = V _{CC} or GND	5V		2.6						pF

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

(1) Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.

(2) This is the increase in supply current for each input that is at one of the specified TTL voltage levels, rather than 0 V or V_{CC}.

4.5 Switching Characteristics

over recommended operating free-air temperature range, $V_{CC} = 5V \pm 0.5V$ (unless otherwise noted) (see Load Circuit and Voltage Waveforms)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	Т	_A = 25°C		SN54A	CT11	SN74A	CT11	UNIT
FARAMETER		10 (001701)	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
t _{PLH}	A, B, or C	v	1.5	6	9.5	1	10.5	1	10.5	ns
t _{PHL}	A, B, 01 C	I	1.5	6	9.5	1	10.5	1	10.5	115

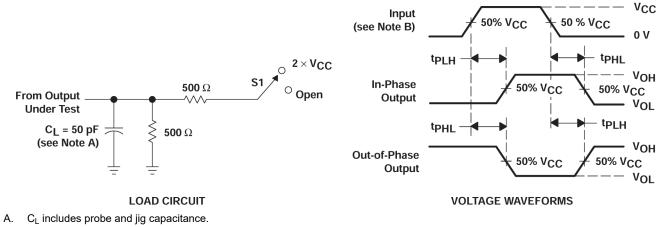
4.6 Operating Characteristics

 V_{CC} = 5 V, T_A = 25°C

	PARAMETER	TEST CONDITIONS	ТҮР	UNIT	
C _{pd}	Power dissipation capacitance	C _L = 50 pF, f = 1 MHz	20	pF	Ĺ



5 Parameter Measurement Information



- B. All input pulses are supplied by generators having the following characteristics: PRR \leq 1 MHz, Z₀ = 50 Ω , t_r \leq 2.5 ns, t_f \leq 2.5 ns.
- C. The outputs are measured one at a time with one input transition per measurement.

Figure 5-1. Load Circuit and Voltage Waveforms

TEST	S1
t _{PLH} /t _{PHL}	Open



6 Detailed Description

6.1 Functional Block Diagram

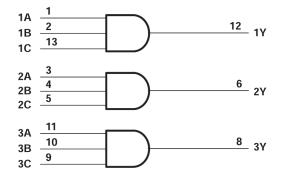


Figure 6-1. Logic Diagram, Each Gate (Positive Logic)

Pin numbers shown are for the D, DB, J, N, NS, PW, and W packages.

6.2 Device Functional Modes

	Table 6-1. Function Table (Each Gate)									
	INPUTS	OUTPUT								
Α	В	С	Y							
Н	Н	Н	Н							
L	Х	Х	L							
Х	L	Х	L							
Х	Х	L	L							

Function Table (Each Gate)



7 Application and Implementation

Note

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes, as well as validating and testing their design implementation to confirm system functionality.

7.1 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in the *Recommended Operating Conditions*. Each V_{CC} terminal should have a bypass capacitor to prevent power disturbance. A 0.1-µF capacitor is recommended for this device. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. The 0.1-µF and 1-µF capacitors are commonly used in parallel. The bypass capacitor should be installed as close to the power terminal as possible for best results.

7.2 Layout

7.2.1 Layout Guidelines

When using multiple-input and multiple-channel logic devices inputs must not ever be left floating. In many cases, functions or parts of functions of digital logic devices are unused; for example, when only two inputs of a triple-input AND gate are used. Such unused input pins must not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. All unused inputs of digital logic devices must be connected to a logic high or logic low voltage, as defined by the input voltage specifications, to prevent them from floating. The logic level that must be applied to any particular unused input depends on the function of the device. Generally, the inputs are tied to GND or V_{CC} , whichever makes more sense for the logic function or is more convenient.



8 Device and Documentation Support

8.1 Documentation Support (Analog)

8.1.1 Related Links

The table below lists quick access links. Categories include technical documents, support and community resources, tools and software, and quick access to sample or buy.

PARTS	PRODUCT FOLDER	SAMPLE & BUY	IPLE & BUY DOCUMENTS		SUPPORT & COMMUNITY	
SN54ACT11	Click here	Click here	Click here	Click here	Click here	
SN74ACT11	Click here	Click here	Click here	Click here	Click here	

8.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

8.3 Support Resources

TI E2E[™] support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

8.4 Trademarks

TI E2E[™] is a trademark of Texas Instruments.

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8.5 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

8.6 Glossary

TI Glossary This glossary lists and explains terms, acronyms, and definitions.

9 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision C (October 2003) to Revision D (July 2024)

Page

10 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

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PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
5962-9077201Q2A	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962- 9077201Q2A SNJ54ACT 11FK	Samples
5962-9077201QDA	ACTIVE	CFP	W	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9077201QD A SNJ54ACT11W	Samples
SN74ACT11D	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI	-40 to 85	ACT11	
SN74ACT11DBR	ACTIVE	SSOP	DB	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AD11	Samples
SN74ACT11DR	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ACT11	Samples
SN74ACT11DRG4	ACTIVE	SOIC	D	14	2500	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	ACT11	Samples
SN74ACT11N	ACTIVE	PDIP	Ν	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-40 to 85	SN74ACT11N	Samples
SN74ACT11PW	OBSOLETE	TSSOP	PW	14		TBD	Call TI	Call TI	-40 to 85	AD11	
SN74ACT11PWR	ACTIVE	TSSOP	PW	14	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-40 to 85	AD11	Samples
SNJ54ACT11FK	ACTIVE	LCCC	FK	20	55	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962- 9077201Q2A SNJ54ACT 11FK	Samples
SNJ54ACT11W	ACTIVE	CFP	W	14	25	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-9077201QD A SNJ54ACT11W	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.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ RoHS: TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".



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PACKAGE OPTION ADDENDUM

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption. **Green:** TI defines "Green" to mean the content of Chlorine (CI) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

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

⁽⁴⁾ There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

⁽⁵⁾ Multiple Device Markings will be inside parentheses. Only one Device 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 Device Marking for that device.

⁽⁶⁾ Lead finish/Ball material - Orderable Devices 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.

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OTHER QUALIFIED VERSIONS OF SN54ACT11, SN74ACT11 :

Catalog : SN74ACT11

• Military : SN54ACT11

NOTE: Qualified Version Definitions:

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



Texas

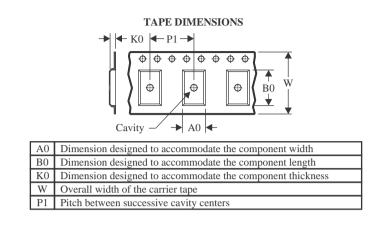
*All dimensions are nominal

STRUMENTS

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TAPE AND REEL INFORMATION





QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74ACT11DBR	SSOP	DB	14	2000	330.0	16.4	8.35	6.6	2.4	12.0	16.0	Q1
SN74ACT11DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74ACT11PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74ACT11PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1



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PACKAGE MATERIALS INFORMATION

23-Oct-2024



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ACT11DBR	SSOP	DB	14	2000	356.0	356.0	35.0
SN74ACT11DR	SOIC	D	14	2500	356.0	356.0	35.0
SN74ACT11PWR	TSSOP	PW	14	2000	356.0	356.0	35.0
SN74ACT11PWR	TSSOP	PW	14	2000	353.0	353.0	32.0

TEXAS INSTRUMENTS

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23-Oct-2024

TUBE



- B - Alignment groove width

*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	Τ (μm)	B (mm)
5962-9077201Q2A	FK	LCCC	20	55	506.98	12.06	2030	NA
5962-9077201QDA	W	CFP	14	25	506.98	26.16	6220	NA
SN74ACT11N	N	PDIP	14	25	506	13.97	11230	4.32
SN74ACT11N	N	PDIP	14	25	506	13.97	11230	4.32
SNJ54ACT11FK	FK	LCCC	20	55	506.98	12.06	2030	NA
SNJ54ACT11W	W	CFP	14	25	506.98	26.16	6220	NA

W (R-GDFP-F14)

CERAMIC DUAL FLATPACK



- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. This package can be hermetically sealed with a ceramic lid using glass frit.
 - D. Index point is provided on cap for terminal identification only.
 - E. Falls within MIL STD 1835 GDFP1-F14



DB0014A



PACKAGE OUTLINE

SSOP - 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. Reference JEDEC registration MO-150.



DB0014A

EXAMPLE BOARD LAYOUT

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.

6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



DB0014A

EXAMPLE STENCIL DESIGN

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.

8. Board assembly site may have different recommendations for stencil design.



FK 20

8.89 x 8.89, 1.27 mm pitch

GENERIC PACKAGE VIEW

LCCC - 2.03 mm max height

LEADLESS CERAMIC CHIP CARRIER

This image is a representation of the package family, actual package may vary. Refer to the product data sheet for package details.





N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



NOTES:

- A. All linear dimensions are in inches (millimeters).B. This drawing is subject to change without notice.
- Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
- \triangle The 20 pin end lead shoulder width is a vendor option, either half or full width.



PW0014A



PACKAGE OUTLINE

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.



PW0014A

EXAMPLE BOARD LAYOUT

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



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.



PW0014A

EXAMPLE STENCIL DESIGN

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



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.



D0014A



PACKAGE OUTLINE

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



NOTES:

- 1. All linear dimensions are in millimeters. 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 0.43 mm, per side.
- 5. Reference JEDEC registration MS-012, variation AB.



D0014A

EXAMPLE BOARD LAYOUT

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



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.



D0014A

EXAMPLE STENCIL DESIGN

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



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.



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