DS14C89A Quad CMOS Receiver

Check for Samples: DS14C89A

FEATURES

- **Meets EIA/TIA-232-E and CCITT V.28 Standards**
- **Failsafe - Output High for Open Input**
- **LOW Power Consumption**
- **On Chip Noise Filter**
- **Available in SOIC Package**

DESCRIPTION

The DS14C89A, pin-for-pin compatible to the DS1489A/MC1489A, ia a quad receiver designed to interface data terminal equipment (DTE) with data circuit-terminating equipment (DCE). These devices translate levels conforming to EIA-232E and CCITT V.28 standards to TTL/CMOS logic levels.

The device is fabricated in low threshold CMOS metal gate technology. The device provides very low power consumption compared to their bipolar equivalents: 900 µA (DS14C89A) versus 26 mA (DS1489A).

The DS14C89A provides on chip noise filtering which eliminates the need for external response control filter capacitors. When replacing the DS1489A with the DS14C89A, the response control filter pins can be tied high, low, or not connected.

Connection Diagram

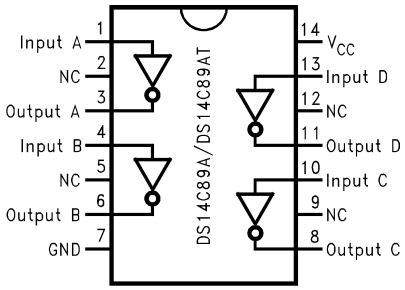


Figure 1. See Package Number D, NFF0014A

These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

Absolute Maximum Ratings(1)(2)

V_{CC}		+6V
Input Voltage		−30V to +30V
Receiver Output Voltage		(V_{CC}) +0.3V to GND−0.3V
Junction Temperature		+150°C
Continuous Power Dissipation @ +25°C(3)	NFF0014A Package	1513 mW
	D Package	1063 mW
Lead Temp.	(Soldering 4 seconds)	+260°C
Storage Temp. Range		−65°C to +150°C
ESD Rating ≥ 1.8 kV, Typically ≥ 2 kV (HMB, 1.5 kΩ, 100 pF)		

(1) Absolute Maximum Ratings are those values beyond which the safety of the device cannot be ensured. They are not meant to imply that the devices should be operated at these limits. The tables of AC Electrical Characteristics specify conditions for device operation.
(2) If Military/Aerospace specified devices are required, please contact the Texas Instruments Sales Office/ Distributors for availability and specifications.
(3) Derate NFF0014A Package 12.1 mW/°C, and D Package 8.5 mW/°C above +25°C.

Recommended Operating Conditions

		Min	Max	Units
V_{CC} (GND = 0V)		+4.5	+5.5	V
Operating Free Air Temp. (T_A)	DS14C89A	0	+75	°C

Electrical Characteristics

Over recommended operating conditions, unless otherwise specified

Symbol	Parameter	Conditions		Min	Typ	Max	Units
V_{TH}	Input High Threshold			1.3		2.7	V
V_{TL}	Input Low Threshold			0.5		1.9	V
V_{HY}	Typical Input Hysteresis				1.0		V
I_{IN}	Input Current	V_{IN} = +25V	V_{CC} = +4.5V to +5.5V	3.6		8.3	mA
		V_{IN} = −25V		−3.6		−8.3	mA
		V_{IN} = +3V		0.43		1.0	mA
		V_{IN} = −3V		−0.43		−1.0	mA
		V_{IN} = +15V	V_{CC} = 0V (Power-Off)(1)	2.14		5.0	mA
		V_{IN} = −15V		−2.14		−5.0	mA
		V_{IN} = +3V		0.43		1.0	mA
		V_{IN} = −3V		−0.43		−1.0	mA
V_{OH}	Output High Voltage	V_{IN} = V_{TL} (min)	I_{OUT} = −3.2 mA	2.8	4.0		V
			I_{OUT} = −20µA	3.5	4.7		V
V_{OL}	Output Low Voltage	V_{IN} = V_{TH} (max) I_{OUT} = +3.2 mA			0.15	0.4	V
I_{CC}	Supply Current	No Load, V_{IN} = 2.7V or 0.5V			0.5	900	µA

(1) Under the power-off supply conditions it is assumed that the power supply potential drops to zero (0V) and is replaced by a low impedance or short circuit to ground.

AC Electrical Characteristics(1)

Over recommended operating conditions, unless otherwise specified, C_l = 50 pF

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{PLH}	Propagation Delay Low to High	Input Pulse Width ≥ 10 µs		3.5	6.5	µs
t_{PHL}	Propagation Delay High to Low	Input Pulse Width ≥ 10 µs		3.2	6.5	µs
t_{SK}	Typical Propagation Delay Skew			400		ns
t_r	Output Rise TIme			40	300	ns
t_f	Output Fall Time			40	300	ns
t_{nw}	Pulse Width assumed to be Noise				1.0	µs

(1) AC input waveforms for test purposes: t_r = t_f = 200 ns, V_{IH} = +3V, V_L = −3V, f = 20 KHz.

Parameter Measurement Information

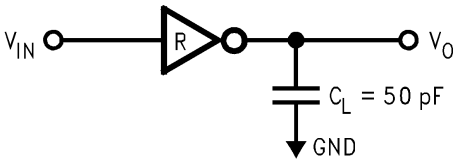


Figure 2. Receiver Load Circuit

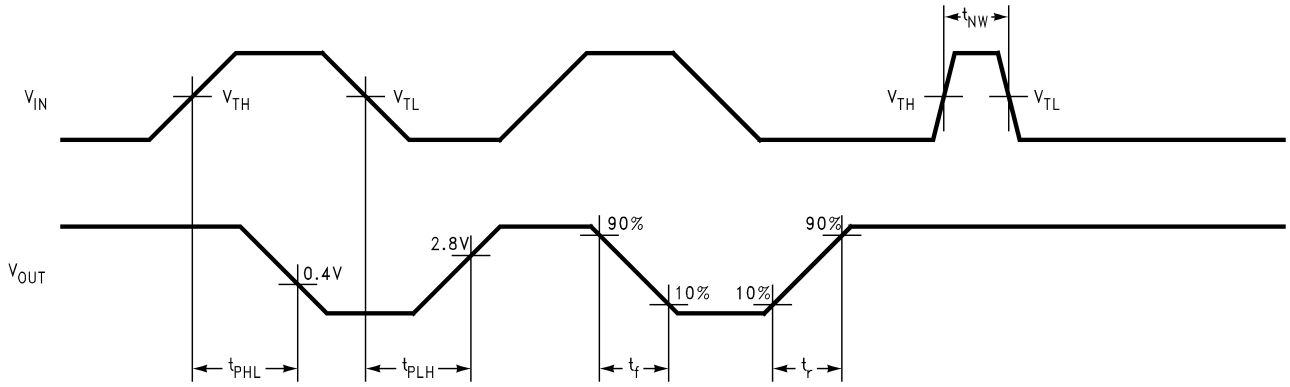


Figure 3. Receiver Switching Waveform (2)

(2) AC input waveforms for test purposes: $t_r = t_f = 200$ ns, $V_{IH} = +3V$, $V_L = -3V$, f = 20 KHz.

TYPICAL APPLICATION INFORMATION

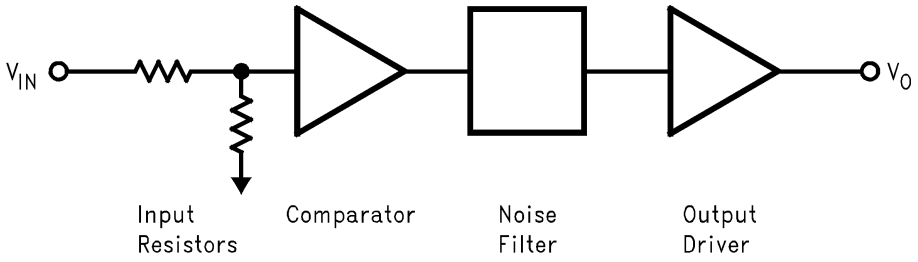


Figure 4. Receiver Block Diagram

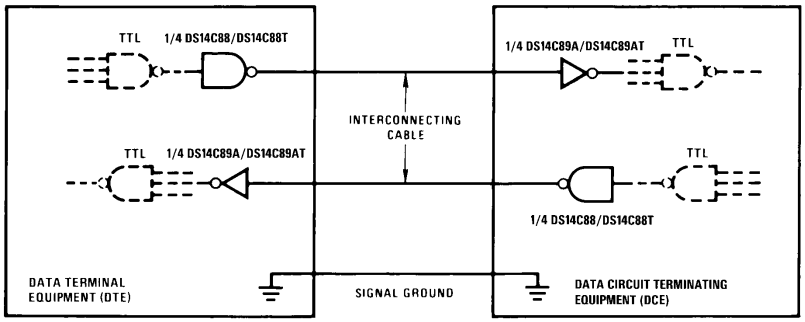


Figure 5. EIA-232D Data Transmission

REVISION HISTORY

Changes from Revision B (April 2013) to Revision C	Page
• Changed layout of National Data Sheet to TI format	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)
DS14C89AM/NOPB	Active	Production	SOIC (D) | 14	55 | TUBE	Yes	SN	Level-1-260C-UNLIM	0 to 70	DS14C89AM
DS14C89AM/NOPB.A	Active	Production	SOIC (D) | 14	55 | TUBE	Yes	SN	Level-1-260C-UNLIM	0 to 70	DS14C89AM
DS14C89AM/NOPB.B	Active	Production	SOIC (D) | 14	55 | TUBE	Yes	SN	Level-1-260C-UNLIM	0 to 70	DS14C89AM
DS14C89AMX/NOPB	Active	Production	SOIC (D) | 14	2500 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-	DS14C89AM
DS14C89AMX/NOPB.A	Active	Production	SOIC (D) | 14	2500 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	0 to 70	DS14C89AM
DS14C89AMX/NOPB.B	Active	Production	SOIC (D) | 14	2500 | LARGE T&R	Yes	SN	Level-1-260C-UNLIM	0 to 70	DS14C89AM

(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.

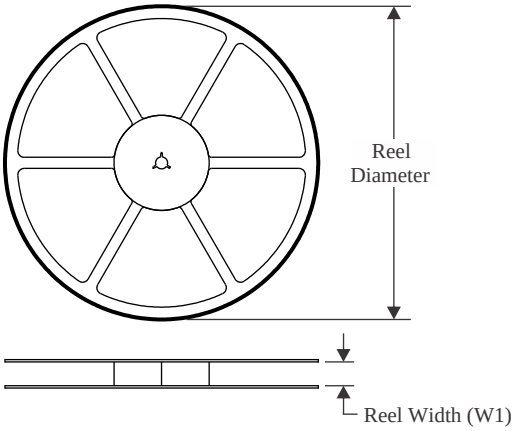
(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will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

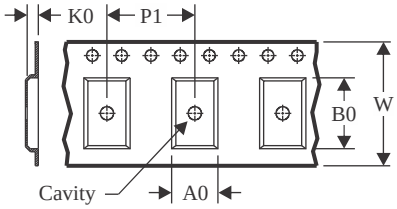
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

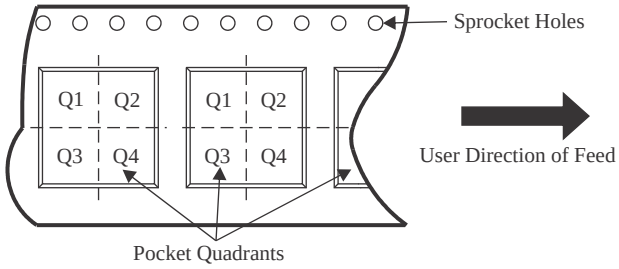


TAPE DIMENSIONS



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

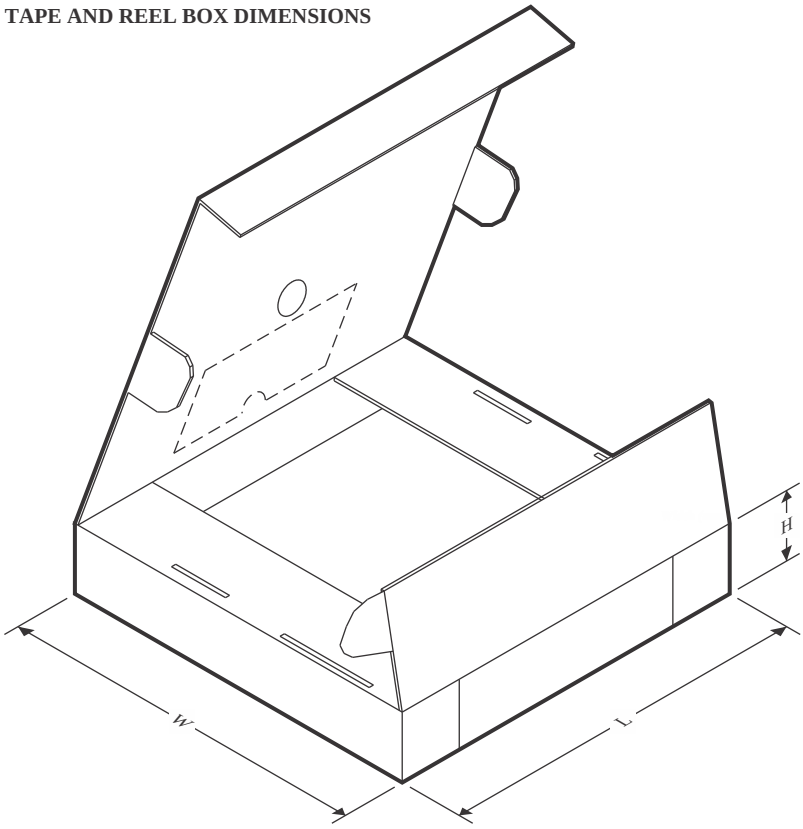
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
DS14C89AMX/NOPB	SOIC	D	14	2500	330.0	16.4	6.5	9.35	2.3	8.0	16.0	Q1

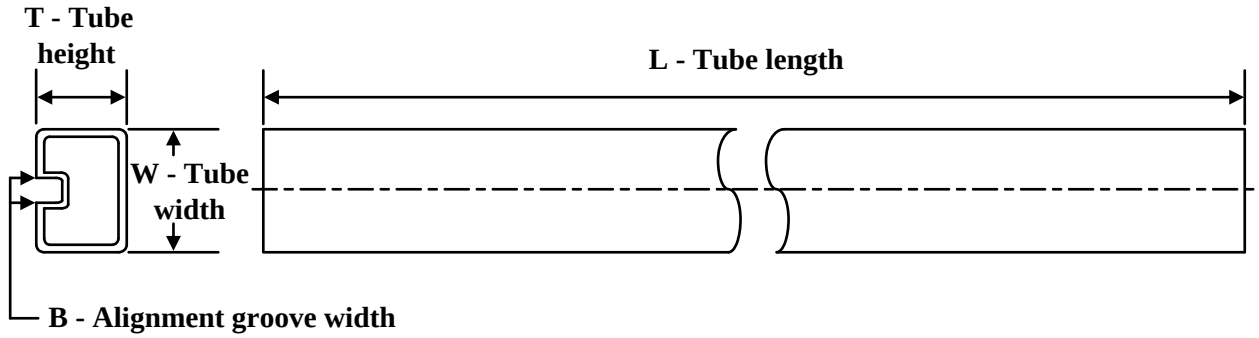
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

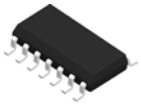
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
DS14C89AMX/NOPB	SOIC	D	14	2500	367.0	367.0	35.0

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
DS14C89AM/NOPB	D	SOIC	14	55	495	8	4064	3.05
DS14C89AM/NOPB.A	D	SOIC	14	55	495	8	4064	3.05
DS14C89AM/NOPB.B	D	SOIC	14	55	495	8	4064	3.05

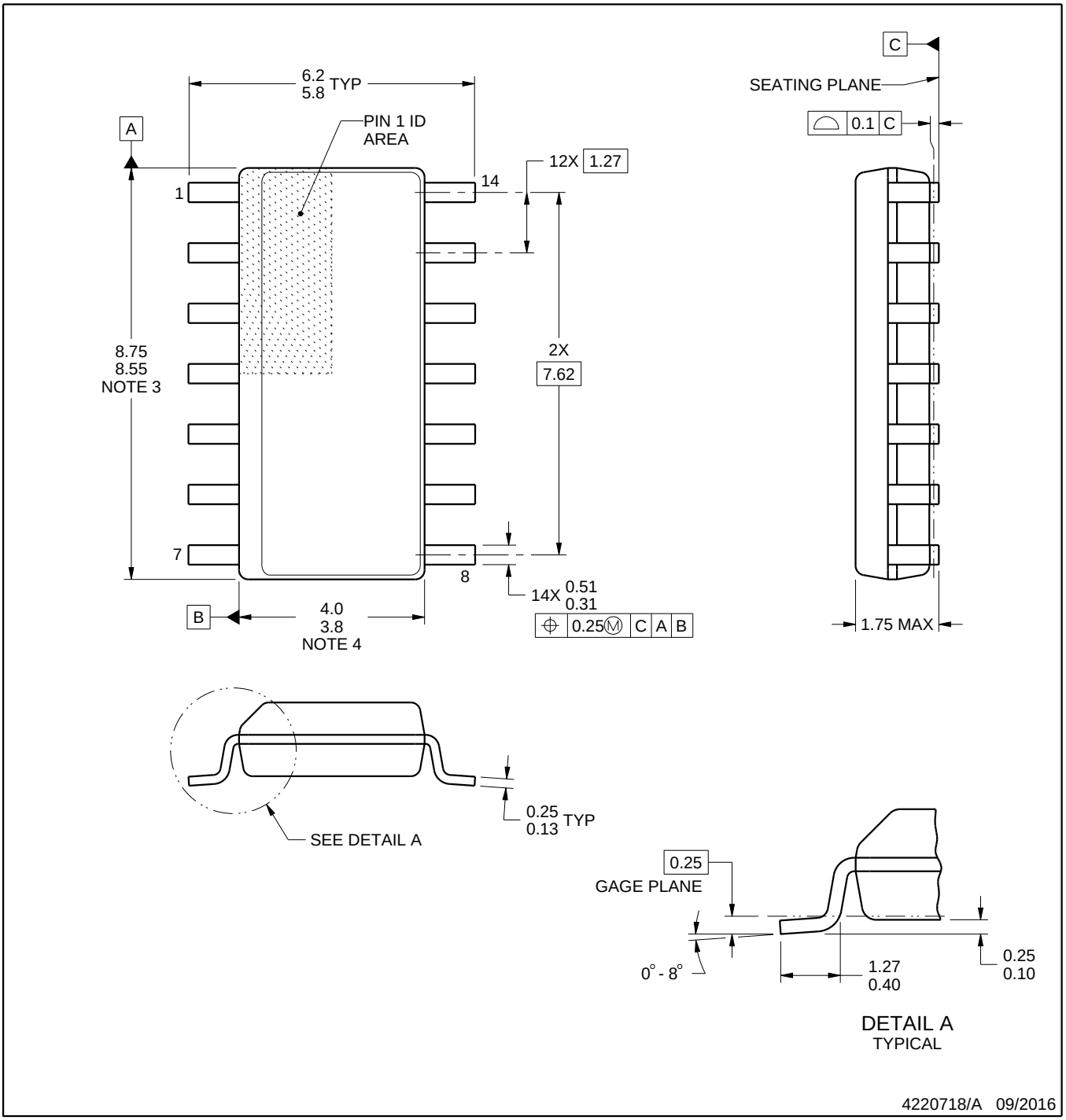


PACKAGE OUTLINE

D0014A

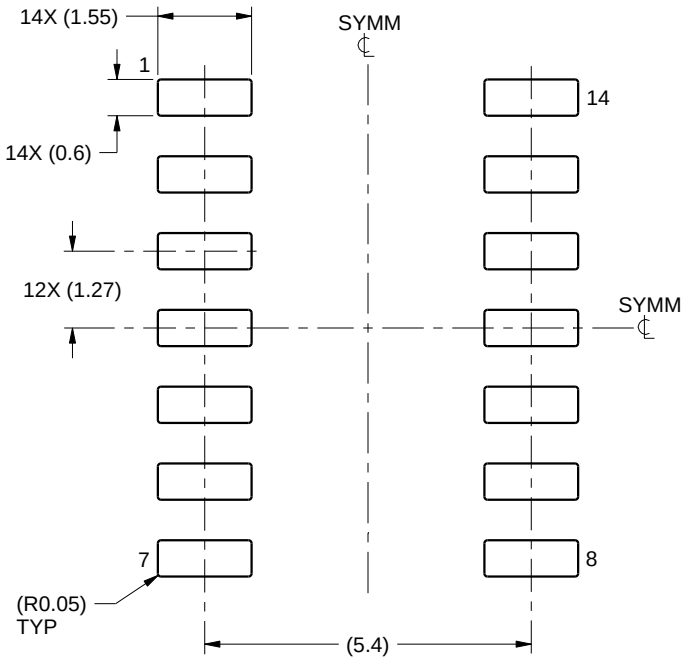
SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT

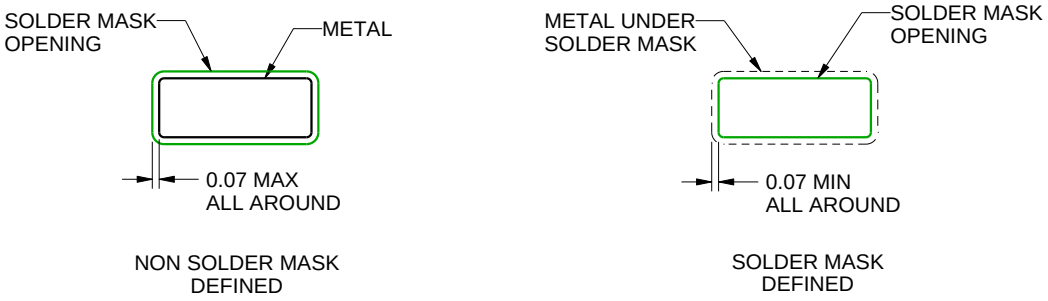


NOTES:

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.



LAND PATTERN EXAMPLE
SCALE:8X



SOLDER MASK DETAILS

4220718/A 09/2016

NOTES: (continued)

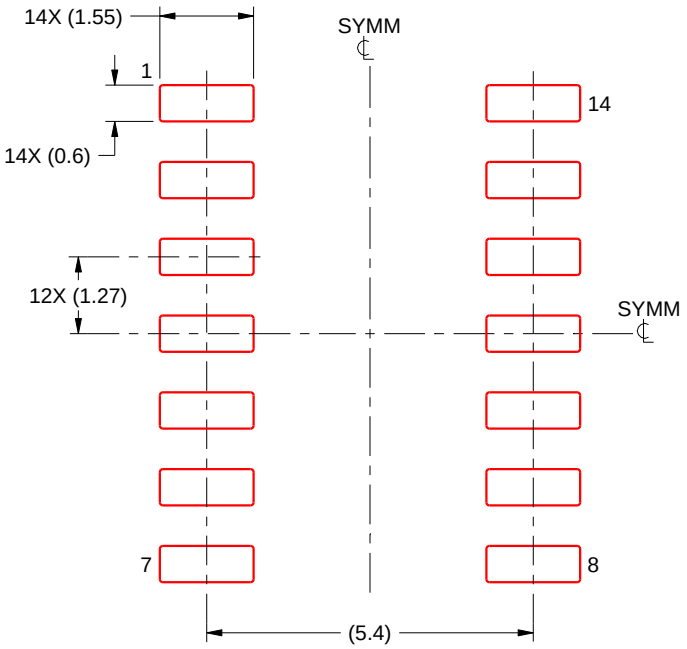
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE:8X

4220718/A 09/2016

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