TEXAS INSTRUMENTS
AMC7924
SLASF16 – NOVEMBER 2021

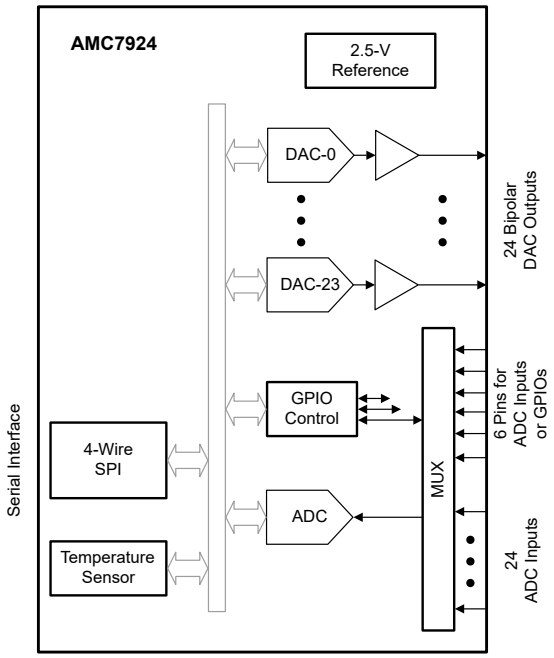
AMC7924 24-Channel, 12-Bit Analog Monitor and Controller With Multichannel ADC, Bipolar DACs, Temperature Sensor, and GPIO Ports

1 Features

- 24 monotonic 12-bit DACs
  - Programmable ranges: –10 V to 0 V, –5 V to 0 V, 0 V to 5 V, and 0 V to 10 V
  - High current drive capability
  - Autorange detector
- 24 inputs, 12-bit SAR ADC
  - High sample rate: 250 kSPS
  - Input ranges: 0 V to 5 V and 0 V to 2.5 V
  - Programmable out-of-range alarms
- 6 FlexIO pins; ADC and GPIO configurable
- Built-in sequencing features
- Internal 2.5-V reference
- Internal temperature sensor
  - Accuracy: ±2.5°C, maximum
  - Resolution: 0.0625°C
- 4-wire, SPI-compatible interface
  - 1.65-V to 5.5-V operation
- Specified temperature range: –40°C to +125°C
- Operating temperature range: –40°C to +150°C

2 Applications

- Active antenna system mMIMO (AAS)
- Macro remote radio unit (RRU)
- Radar
- Data acquisition (DAQ)



Simplified Schematic

3 Description

The AMC7924 is a highly integrated analog monitor and control device designed for high-density, general-purpose monitor and control systems. The AMC7924 includes 24 12-bit digital-to-analog converters (DACs) with programmable output ranges. The device also incorporates a multiplexed, 12-bit analog-to-digital converter (ADC) with programmable threshold detectors, a temperature sensor, and an internal reference. The AMC7924 high level of integration significantly reduces component count and simplifies closed-loop system designs, thus making the device a great choice for high-density applications where board space is critical.

The device includes 24 dedicated ADC inputs and six flexible input/output (FlexIO) pins that can be configured as either additional analog inputs to the ADC or as GPIOs. Communication to the device is performed through a 4-wire, SPI-compatible interface.

The AMC7924 high-integration and wide operating temperature range make the device an excellent choice as an all-in-one bias-control circuit for the power amplifiers (PA) found in multichannel RF communication systems. The flexible DAC output ranges and built-in sequencing features allow the device to be used as a biasing controller for a large variety of transistor technologies, such as LDMOS, GaAs, and GaN. The AMC7924 feature set is similarly beneficial in general-purpose monitor and control systems.

Device Information

PART NUMBER	PACKAGE(1)	BODY SIZE (NOM)
AMC7924	HTQFP (64)	10.00 mm × 10.00 mm

(1) For all available packages, see the package option addendum at the end of the data sheet.

An IMPORTANT NOTICE at the end of this data sheet addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers. PRODUCTION DATA.

4 Device and Documentation Support

4.1 Documentation Support

4.1.1 Related Documentation

For related documentation see the following:

- Texas Instruments, *AMC7924EVM* user's guide
- Texas Instruments, *Temperature Compensation of Power Amplifier FET Bias Voltages* application note

4.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Subscribe to updates* 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.

4.3 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.

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4.4 Trademarks

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4.5 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.

4.6 Glossary

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

5 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
AMC7924PAPR	ACTIVE	HTQFP	PAP	64	1000	RoHS & Green	NIPDAU	Level-3-260C-168 HR	-40 to 125	AMC7924	Samples
AMC7924PAPT	ACTIVE	HTQFP	PAP	64	250	RoHS & Green	NIPDAU	Level-3-260C-168 HR	-40 to 125	AMC7924	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".
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 (Cl) 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.

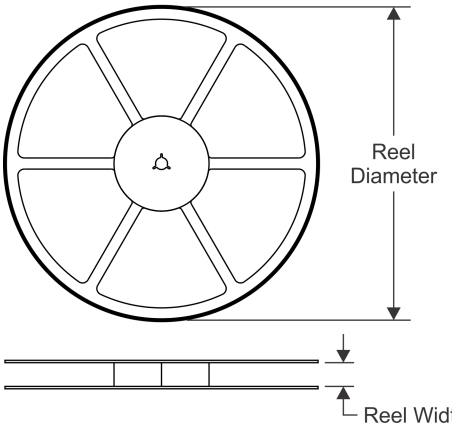
(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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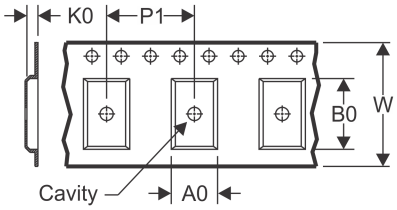
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TAPE AND REEL INFORMATION

REEL DIMENSIONS

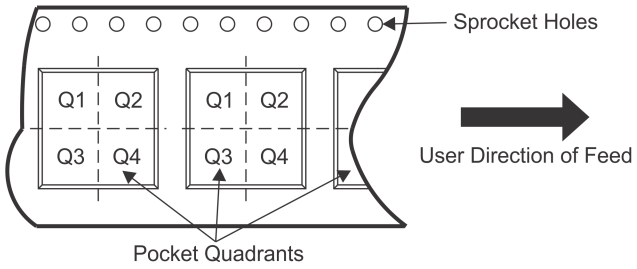


TAPE DIMENSIONS



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

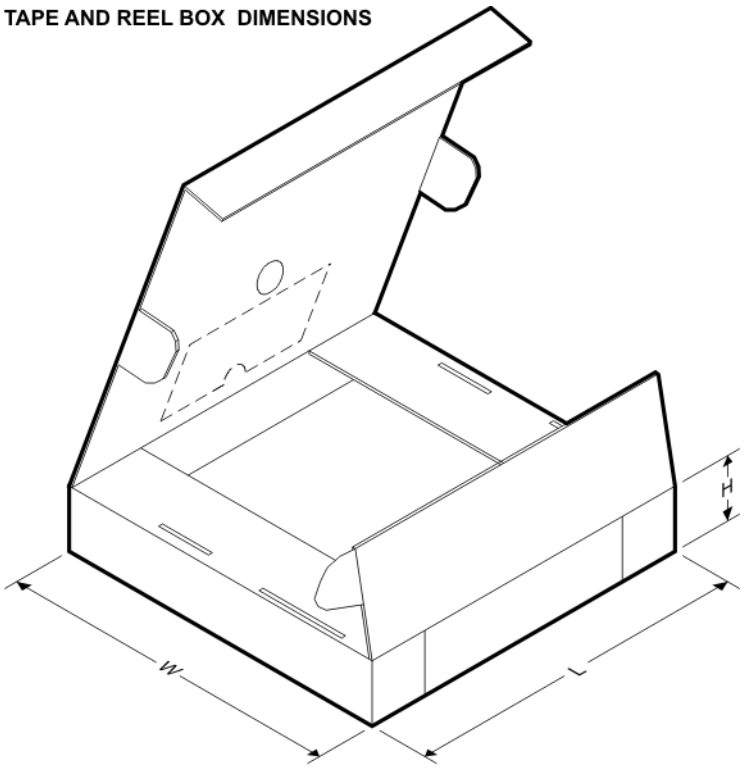
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
AMC7924PAPR	HTQFP	PAP	64	1000	330.0	24.4	13.0	13.0	1.5	16.0	24.0	Q2
AMC7924PAPT	HTQFP	PAP	64	250	330.0	24.4	13.0	13.0	1.5	16.0	24.0	Q2

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
AMC7924PAPR	HTQFP	PAP	64	1000	367.0	367.0	55.0
AMC7924PAPT	HTQFP	PAP	64	250	367.0	367.0	55.0

GENERIC PACKAGE VIEW

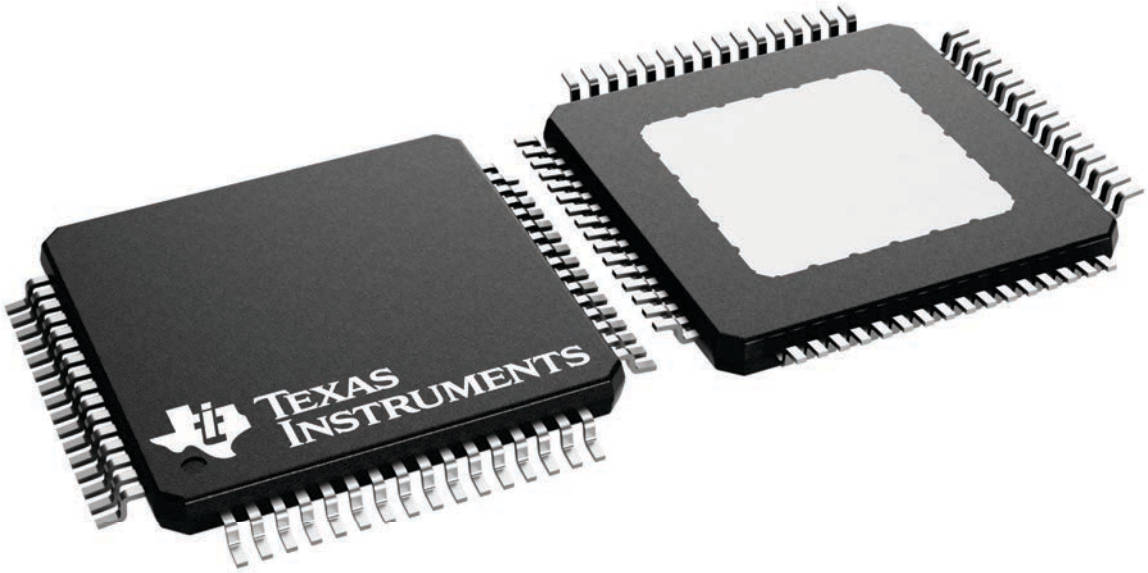
PAP 64

HTQFP - 1.2 mm max height

10 x 10, 0.5 mm pitch

QUAD FLATPACK

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



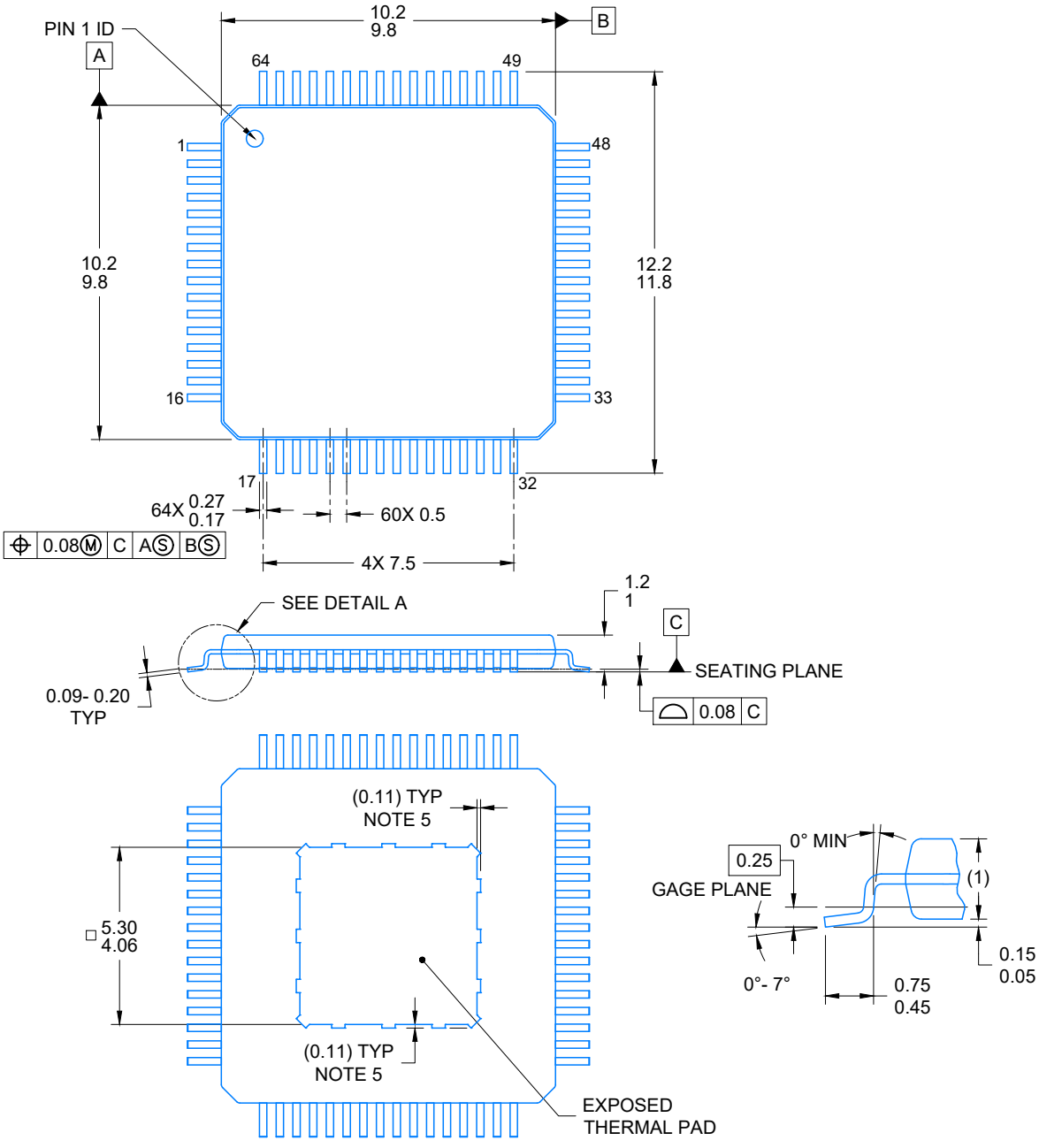
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PACKAGE OUTLINE

PAP0064N

HTQFP - 1.2 mm max height

PLASTIC QUAD FLATPACK

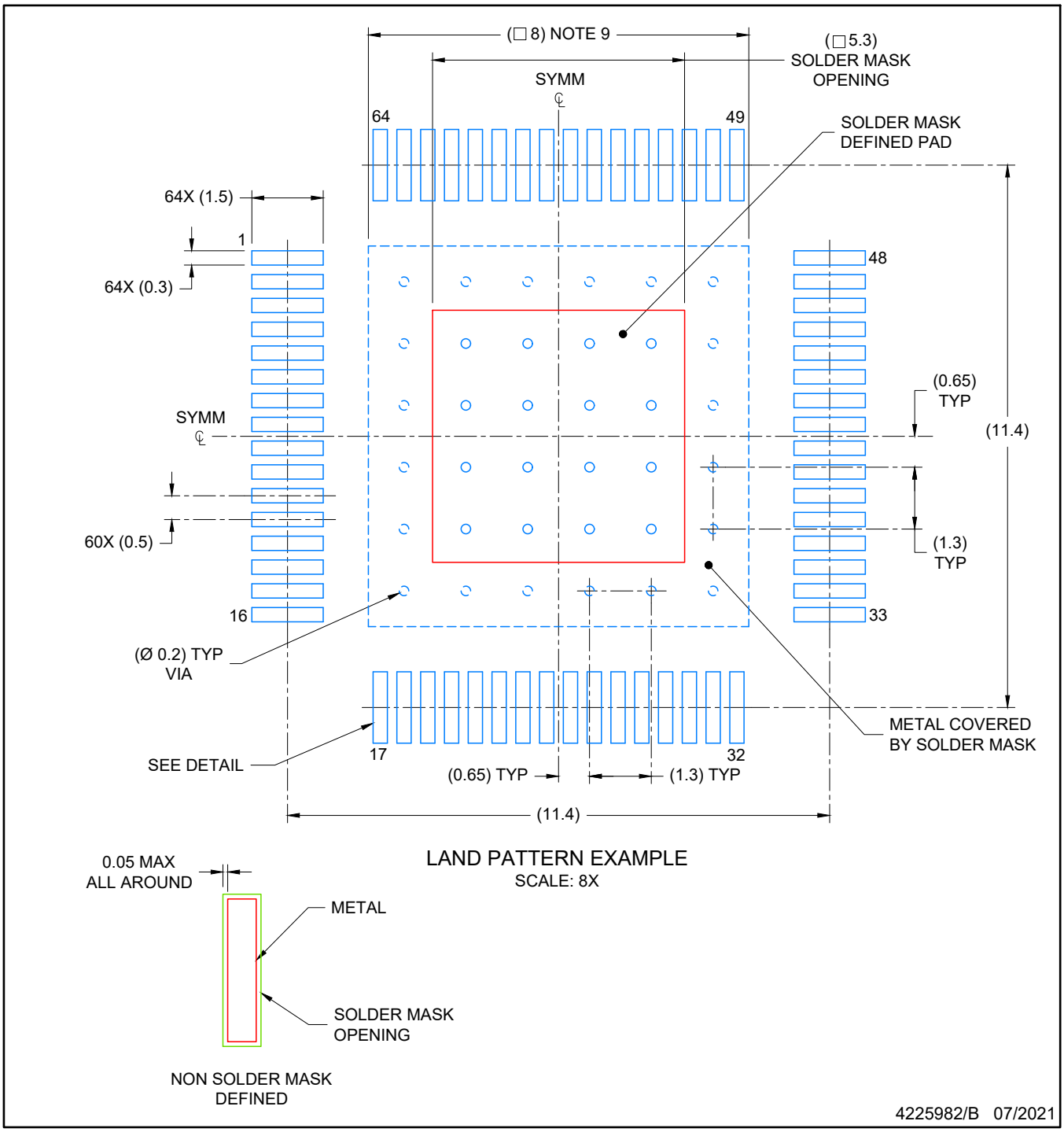


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NOTES:

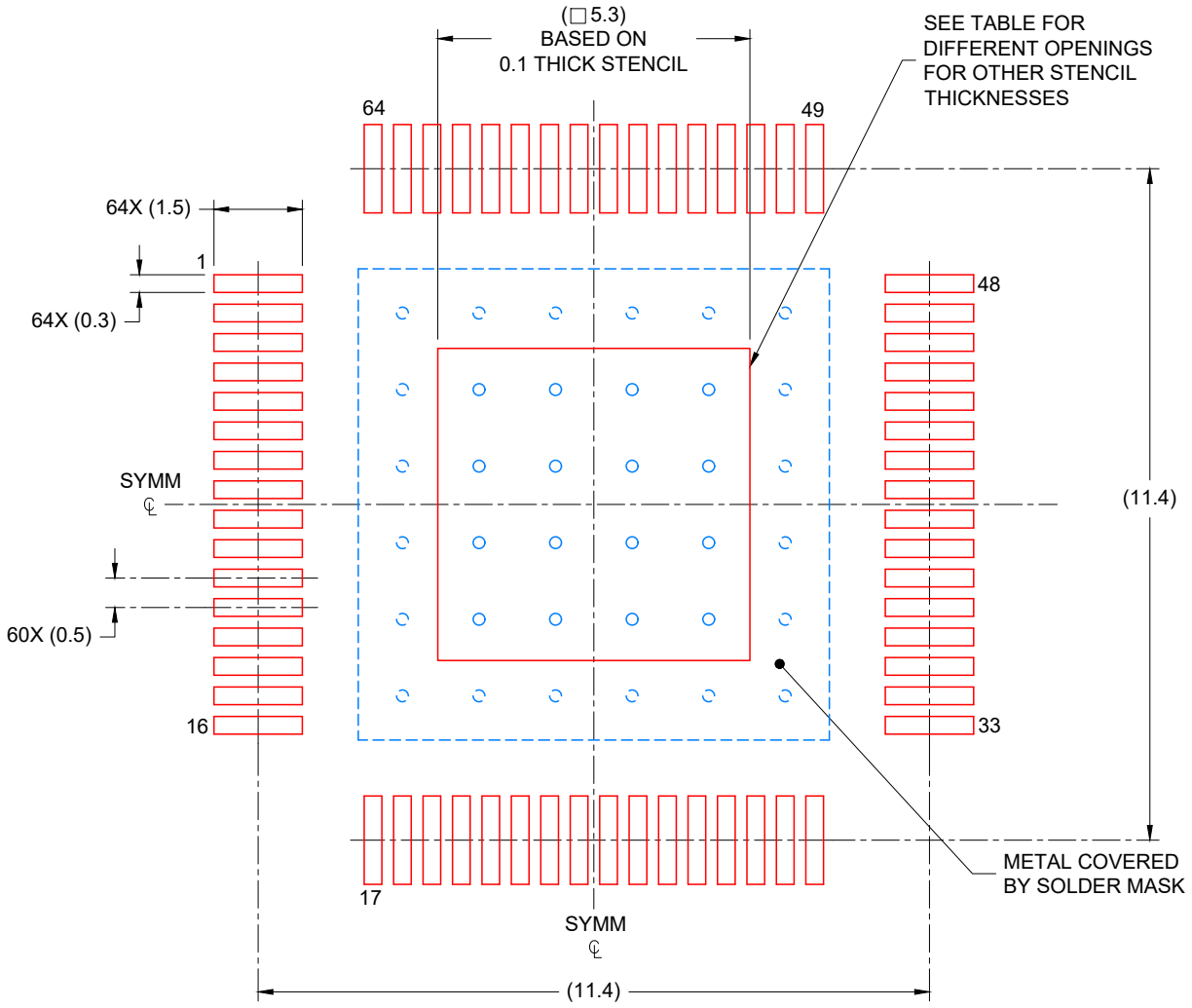
PowerPAD is a trademark of Texas Instruments

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. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 per side.
4. Body width does not include interlead flash. Interlead flash shall not exceed 0.50 per side.
5. Strap features may not be present.
6. The package thermal pad must be soldered to the printed circuit board for thermal and mechanical performance.



NOTES: (continued)

7. Publication IPC-7351 may have alternate designs.
8. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
9. This package is designed to be soldered to a thermal pad on the board. Refer to technical brief, PowerPAD Thermally Enhanced Package, Texas Instruments Literature No. SLMA002 (www.ti.com/lit/slma002) and SLMA004 (www.ti.com/lit/slma004).



SOLDER PASTE EXAMPLE
EXPOSED PAD
100% PRINTED COVERAGE BY AREA
SCALE: 8X

STENCIL THICKNESS	SOLDER STENCIL OPENING
0.1	5.3X5.3 (SHOWN)
0.127	4.44 X 4.44
0.152	4.06 X 4.06
0.178	3.75 X 3.75

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NOTES: (continued)

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

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