

SELECTED ITEM DRAWING



Unless otherwise  
specified  
DIMENSIONS  
ARE IN INCHES  
(MM)

TOLERANCES:  
.XX     +/- 0.010  
.XXX   +/- 0.005  
.XXXX +/- 0.002  
ANGLES +/- .5 DEG

Drawing  
practices  
per **ASME**  
**Y14.100**

17 GHz to 24 GHz,  
Medium Power Amplifier

SIZE  
**A**

DRAWING NUMBER  
**SID000008**

**SID000008** **Rev. A**  
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## 1. SCOPE

### 1.1. Scope

This drawing establishes the requirements for the non-hermetic, 17 GHz to 24 GHz, GaAs, PHEMT, MMIC, Medium Power Amplifier, to be screened with guidelines to MIL-PRF-38535, Class Level S, to the requirements specified in 4.1, 4.2, and 4.3 herein.

### 1.2. Analog Devices Part Number

Generic Part Number

ADH498S

Screened Part Number

HMC5957LC4

## 2. APPLICABLE DOCUMENTS

### 2.1. Government Documents

Unless otherwise specified, the following drawings and standards, of the issue in effect on the date of the accepted purchase order, in the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, shall form a part of this drawing to the extent specified herein.

#### DEPARTMENT OF DEFENSE TEST METHOD STANDARD

MIL-STD-883

Microcircuits

MIL-STD-1580C

Destructive Physical Analysis for Electronic, Electromagnetic, and Electromechanical Parts

#### DEPARTMENT OF DEFENSE PERFORMANCE SPECIFICATIONS

MIL-PRF-38535

Integrated Circuits (Microcircuits) Manufacturing, General Specification For

### 2.2. Non-Government Documents

The following documents, of the issue in effect on the date of the purchase order, form a part of this drawing to the extent specified herein:

#### Analog Devices Inc.

[ADI Standard Space Products Program](#) – ASD-lite.

HMC498LC4 Data Sheet

Commercial Product Datasheet

v05.0418 (Reference Only)

### **3. REQUIREMENTS**

#### **3.1. General Requirements**

The devices delivered shall comply to this specification.

#### **3.2. Design Construction and Physical Dimensions**

The design construction and physical dimensions shall be as defined in Figure 1 herein.

#### **3.3. Traceability**

Each delivered device shall be traceable to a production lot. Inspection lot records shall be maintained to provide traceability of its origin.

#### **3.4. DPA**

If specified on Purchase Order, DPA testing shall be done in accordance with MIL-STD-1580C, Sections 16.1.

#### **3.5. Burn-In and Life Test Circuit**

The burn-in and life test circuit and conditions shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test methods 1005 and 1015 per MIL-STD-883.

### **4. QUALITY ASSURANCE PROVISIONS**

#### **4.1. Wafer Lot Acceptance Testing**

Not applicable.

#### **4.2. Flight Screening Requirements**

Flight screening requirements shall be per MIL-STD-883 TM 5004 for Class level S microcircuits modified for non-hermetic packaged MMIC devices.

##### **4.2.1. Electrical Test Requirements**

Electrical test requirements are defined in Table I herein.

##### **4.2.2. Electrical Performance Characteristics**

Electrical performance characteristics are specified on Table II herein.

##### **4.2.3. Burn-In Delta Requirements**

Pre and Post Burn-In Electrical test and delta parameters shall consist of the tests specified in Table III herein.

#### **4.3. Quality Conformance Inspection (QCI)**

Group B and Group D tests shall be performed per MIL-STD-883 TM 5005 for Class level S microcircuits modified for non-hermetic packaged MMIC devices.

##### **4.3.1 Post Steady State Life Electrical Test**

Post steady state life electrical tests shall consist of the tests specified per Table II tested at room temperature only. Devices must meet delta parameter requirements in accordance with Table III herein.

## 5. MIL-PRF-38535 ASD-LITE EXCEPTIONS

The manufacturing flow described in the ADI STANDARD SPACE PRODUCTS PROGRAM is to be considered a part of this specification.

### 5.1. Wafer Fabrication

Foundry information is available upon request.

### 5.2. Flight Screening Flow

Wafer lot Acceptance: Not applicable for non-hermetic air cavity packages.

Non-destruct Bond Pull: Not applicable for non-hermetic air cavity packages.

Internal visual inspection: DPA performed in lieu of visual – commercial criteria is applicable.

Seal, Fine Leak: Not applicable for non-hermetic air cavity packages.

Seal, Gross Leak: Not applicable for non-hermetic air cavity packages.

### 5.3. Group B

Subgroup 2: Resistance to solvents is not applicable.

Subgroup 3: Steam aging shall not be required for pre-conditioning.

Subgroup 4: Not applicable for non-hermetic air cavity packages.

### 5.4. Group D

Subgroup 2: Not applicable for non-hermetic air cavity packages.

Subgroup 5: Not Applicable for non-hermetic air cavity packages.

Subgroup 6: Not applicable for non-hermetic air cavity packages.

Subgroup 7: Not applicable for non-hermetic air cavity packages.

Subgroup 8: Not applicable for non-hermetic air cavity packages.

Subgroup 9: Not applicable for non-hermetic air cavity packages.

## 6. PREPARATION FOR DELIVERY

The preparation for delivery, packaging, preservation, ESD protection and handling shall be in accordance with MIL-PRF-38535.

### 6.1. Part Marking

Devices shall be marked as specified on Figure 1 herein.

### 6.2. Inspection Data Requirements

The following data shall accompany each shipment.

- a. A Certificate of Conformance (C of C) certifies that the lot(s) meets all requirements of this specification.
- b. DPA Report (if applicable)
- c. Summary of electrical test requirements defined in 4.2 herein.
- d. Summary of QCI results defined in 4.3 herein.
- e. Failure Analysis with photos (If applicable)
- f. A cover sheet indicating the following purchasing information:
  1. Customer purchase order number.
  2. Analog Devices part number.
  3. Part lot identification codes.
  4. Date & quantity shipped.

**TABLE I: ELECTRICAL TEST REQUIREMENTS**

Test Requirement	Subgroups (in accordance with MIL-PRF-38535, Table III)
Interim Electrical Parameters	1, 4, 7
Final Electrical Parameters	1, 4, 7 <u>1/2/</u>
Group A Electrical Parameters	1, 2, 3, 4, 5, 6, 7, 8A, 8B
Group B End-Point Electrical Parameters	1, 4, 7 <u>2/</u>
Group D End-Point Electrical Parameters	1, 4, 7

TABLE I Notes:

1/ PDA applies to Table I subgroup 1 and Table III delta parameters.

2/ See Table III for delta parameters

**TABLE II: ELECTRICAL PERFORMANCE CHARACTERISTICS (-40 °C, +25 °C AND +85 °C)**

Parameter	Test Conditions <u>1/2/</u> Unless otherwise specified	Group A Subgroups	Limits			Units
			Min	Typ	Max	
Gain		4, 5, 6	17			dB
Output Power for 1 dB Compression (OP1dB) <u>3/</u>		7, 8A, 8B	21.5			dBm
Supply Current (Idd1 + Idd2 + Idd3) <u>4/</u>	No Signal at RFIN	1, 2, 3		250	275	mA

TABLE II Notes:

1/ Test limits apply between -40 °C and +85 °C with Vdd1 = Vdd2 = Vdd3 = +5 V.

2/ Electrical tests measurements made at 24 GHz only.

3/ OP1dB test is a go-no-go confirming minimum requirements is met.

4/ Adjust Vgg between -2 V and 0 V to achieve Idd = 250 mA typical at -40 °C, +25 °C, and +85 °C

**TABLE III: BURN-IN/LIFE TEST DELTA LIMITS 1/2/3/4/**

Parameter	Test Conditions	Delta Limits	Units
Gain	Per Table II	± 1	dB
Supply Current (Idd1 + Idd2 + Idd3)		± 10	%

TABLE III Notes:

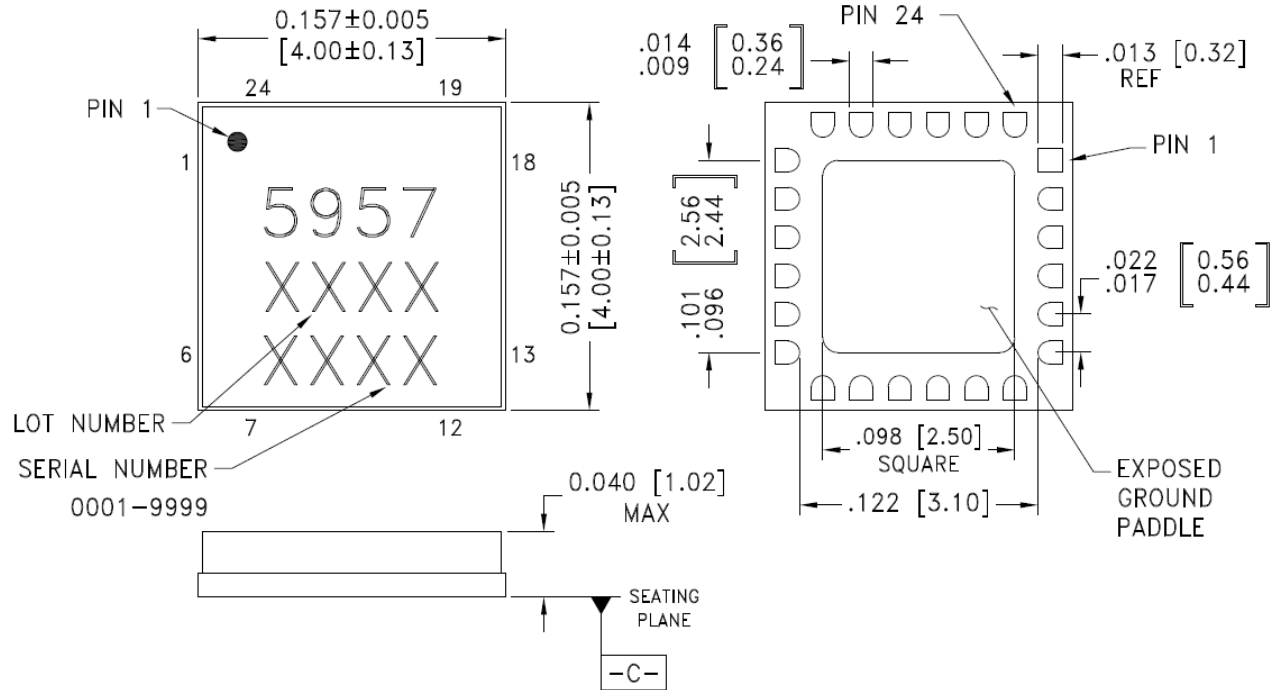
1/ Delta test is performed at T<sub>A</sub> = +25 °C only.

2/ Table II limits will not be exceeded.

3/ Deltas calculated at pre/post 240 hours and post 240 hours / post 1000 hours.

4/ Vgg voltage set to pre burn-in value for each device.

## BOTTOM VIEW



### NOTES:

1. PACKAGE BODY MATERIAL: ALUMINA
2. LEAD AND GROUND PADDLE PLATING: 30-80 MICROINCHES GOLD OVER 50 MICROINCHES MINIMUM NICKEL.
3. DIMENSIONS ARE IN INCHES [MILLIMETERS].
4. LEAD SPACING TOLERANCE IS NON-CUMULATIVE.
5. CHARACTERS TO BE INK OR LASER MARKED WITH  $.018"$  MIN TO  $.030"$  MAX HEIGHT REQUIREMENTS. UTILIZE MAXIMUM CHARACTER HEIGHT BASED ON LID DIMENSIONS AND BEST FIT. LOCATE APPROX. AS SHOWN.
6. PACKAGE WARP SHALL NOT EXCEED  $0.05\text{mm}$  DATUM **-C-**
7. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.
8. SERIALIZATION SHALL BE CONTINUOUS FROM 0001 TO 9999 PER LOT.
9. TEMPLATE HAS BEEN MODIFIED TO ADD SERIALIZATION FOR THIS CUSTOM PART.

PIN #	FUNCTION	PIN #	FUNCTION	PIN #	FUNCTION
1	N/C	9	V <sub>gg</sub>	17	GND
2	GND	10	N/C	18	N/C
3	RFIN	11	N/C	19	V <sub>dd3</sub>
4	GND	12	N/C	20	N/C
5	N/C	13	N/C	21	V <sub>dd2</sub>
6	N/C	14	N/C	22	N/C
7	N/C	15	GND	23	V <sub>dd1</sub>
8	N/C	16	RFOUT	24	N/C

The HMC5957LC4 has a MSL rating of MSL3.

Figure 1 – Device Outline for the HMC5957LC4

# ORDERING GUIDE

Model	Temperature Range	Package Description	Package Option
HMC5957LC4	−40 °C to +85 °C	24-Lead Ceramic Leadless Chip Carrier	LCC (E-24-1)

## Revision History

Revision History		
Rev	Description of Change	Date
A	Initial release.	10/04/2024