

# ***Reliability Report***

<b>Report Title:</b>	<b>Qualification Test Report</b>
<b>Report Type:</b>	<b>See Attached</b>
<b>Date:</b>	<b>See Attached</b>

# QUALIFICATION TEST REPORT

**Package Type:** 20L LS7

**Package Style:** 20L 7x7mm Ceramic LCC Package

**QTR:** 11005P

**Rev:** 03

HMC5445LS6

HMC5622LS7

HMC5805LS6

HMC5840LS6

HMC5846LS6

HMC5879LS7

HMC5927CLS6

HMC5927LS6

HMC5929CLS6

HMC5929LS6

HMC5981LS7

HMC6062LS6

HMC6242LS6

HMC6503LS6

HMC6741LS7

HMC6981LS6

HMC6982LS6

HMC7229LS6

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- *Advance in state-of-the-art technology that supports our products*
- *Enhance our competitive position with superior product standards*

Hittite's employees recognize the responsibility to:

- *Take the initiative to ensure product quality*
- *Create an environment where the highest standards are maintained*
- *Continue to improve quality practices*

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## 1.0 Introduction

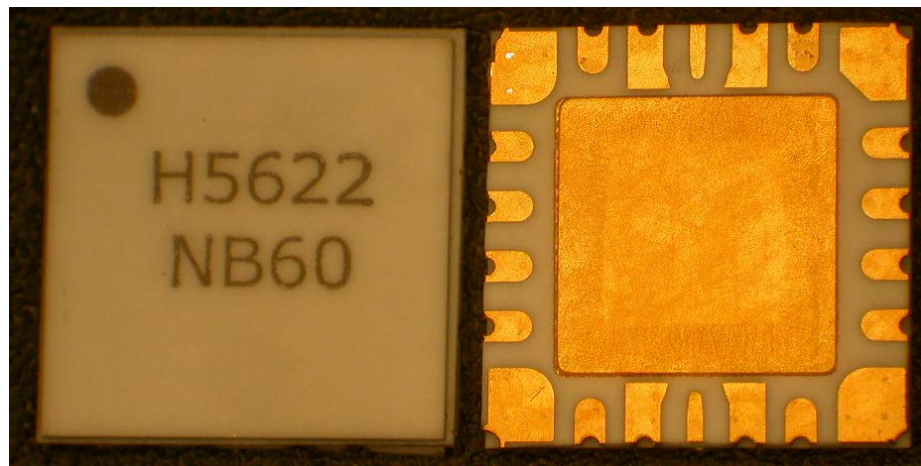
This qualification procedure is designed to satisfy the package reliability requirements for the 20 lead 7x7mm LCC surface mount ceramic package. The testing is designed to simulate the worst-case environments the product may experience during assembly, test and life in the end user application. The device is electrically tested to the appropriate catalog specifications. The HMC5622LS7 was selected to qualify the LS LCC surface mount ceramic package family which includes the LS6, .

## 1.1 General Description

The 20 lead 7x7mm LCC ceramic package uses a high temperature co-fired ceramic body with an epoxy sealed ceramic lid. The leads are finished with Gold over Nickel plating.

The HMC5622LS 7 is a four stage GaAs pHEMT MMIC 2 Watt Power Amplifier which operates between 27.3 and 33.5 GHz. The HMC5622LS7 provides 23 dB of gain, and +34 dBm of saturated output power and 22% PAE from a +6V supply. The RF I/Os are DC blocked and matched to 50 Ohms for ease of integration into Multi-Function-Modules (MFM s). The HMC5622LS7 eliminates the need for wire bonding and allows the use of surface mount manufacturing techniques.

**Figure 1: Typical 20 lead 7x7mm LCC Ceramic Package**



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## 2.0 Summary of Results

PARA	TEST	QTY IN	QTY OUT	PASS/FAIL	NOTES
3.1.1	Initial Electrical Test	154	154	Pass/No Failures	
3.1.2	MSL3 260°C Reflow Preconditioning (3 Passes)	154	154	Complete	
3.1.3	Temperature Cycling	77	77	Complete	
3.1.4	Post Temperature Cycle Electrical Test	77	77	Pass/No Failures	
3.1.5	Autoclave	77	77	Complete	
3.1.6	Post Autoclave Electrical Test	77	77	Pass/No Failures	
3.2.1	Physical Dimensions	15	15	Pass/No Failures	
3.2.2	Solderability	15	15	Pass/No Failures	

*All testing has been completed. There were no failures.*

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## 3.0 Test Procedures

### 3.1 Package Environmental Tests

These tests are designed to demonstrate that the 20L 7x7mm Ceramic LCC surface mount family of packages are capable of maintaining the specified parameters throughout their useful life under rated operating conditions. The HMC5622LS7 was selected as the qualification vehicle to qualify the Ceramic LCC surface mount family of packages. The results of these tests qualify by similarity all other product using the same package.

**3.1.1 Initial Characteristics** - 154 HMC5622LS7 devices were electrically tested for DC and critical RF parameters. These tests are performed at ambient temperature (+25°C). This test was performed at Hittite. There were no failures in this test.

**3.1.2 MSL3 260°C Reflow Preconditioning** – 154 devices from 3.1.1 were subjected to 192 hours at 30°C/ 60% RH then a reflow simulation at a peak temperature of 260°C for 3 passes (see Figure 1 for profile).

**3.1.3 Temperature Cycle** - 77 devices from 3.1.2 were subjected to 500 cycles of non-operating temperature cycling from -65°C to 150°C. This test is performed at Hittite.

**3.1.4 Final Electrical Test** - 77 devices from 3.1.3 were electrically tested at ambient temperature to DC and critical RF parameters. Any out of specification parameter is considered a failure. This test was performed at Hittite. There were no failures in this test.

**3.1.5 Autoclave** – 77 devices from 3.1.2 were subjected to 96 hours of humidity (100%), temperature (121°C) and pressure (15 PSIG). This test is performed at Hittite using an Espec environmental chamber.

**3.1.6 Final Electrical Test** - 77 devices from 3.1.5 were electrically tested at ambient temperature to DC and critical RF parameters. Any out of specification parameter is considered a failure. This test was performed at Hittite. There were no failures in this test.

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## 3.2 Package Mechanical Tests

**3.2.1 Physical Dimensions** - 15 devices were measured to the requirement of the data sheet package outline drawing. These devices need not be electrically functional. Any out of specification parameter is considered a failure. This test is performed at Hittite. There were no failures.

**3.2.2 Solderability** - 15 devices were subjected to steam aging and solderability test in accordance with MIL-STD-883 Method 2003. These devices need not be electrically functional. This test was performed at Hittite. There were no failures.

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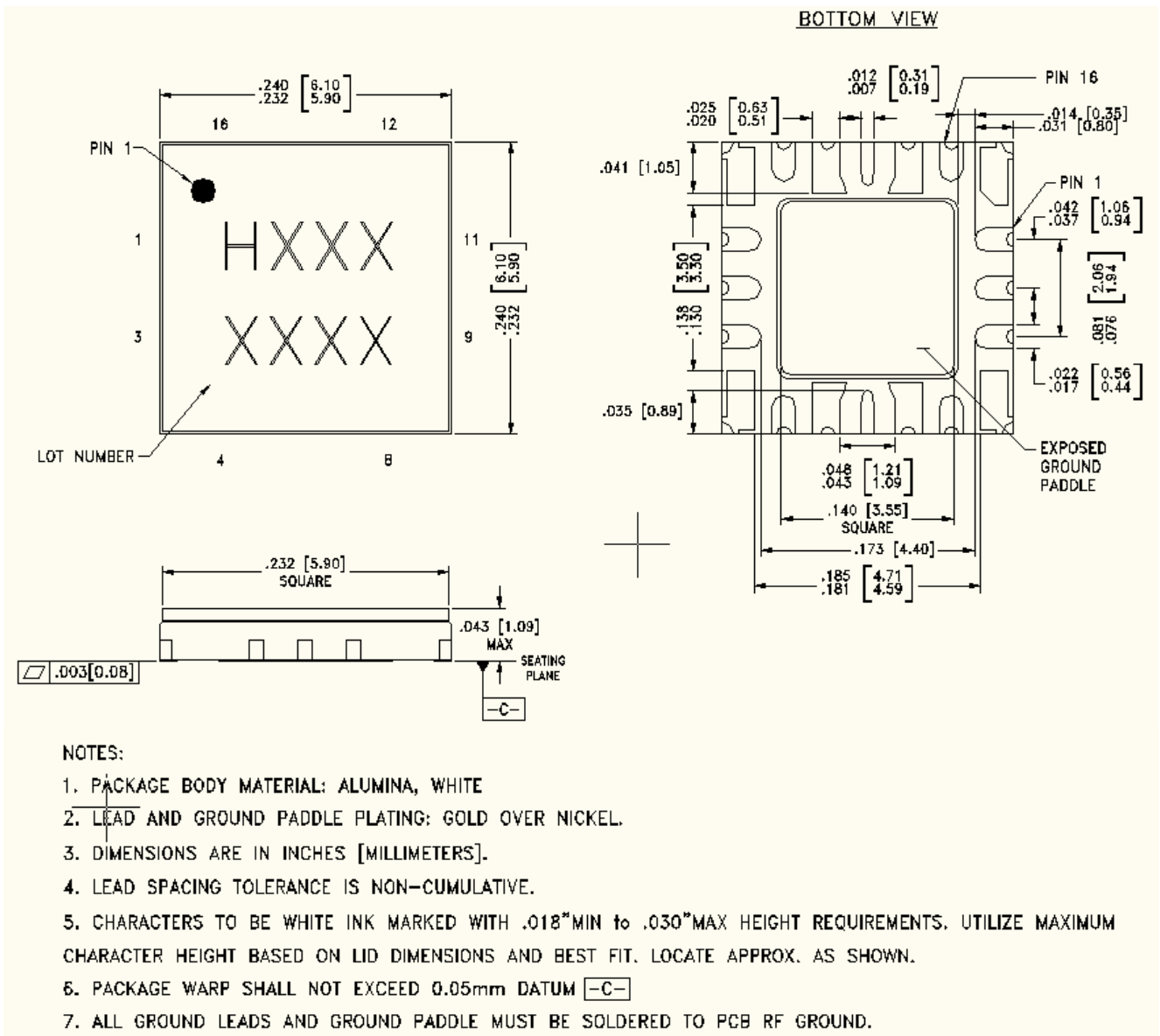
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Figure 2: 20 lead 6x6mm LCC Ceramic Package Outline Drawing



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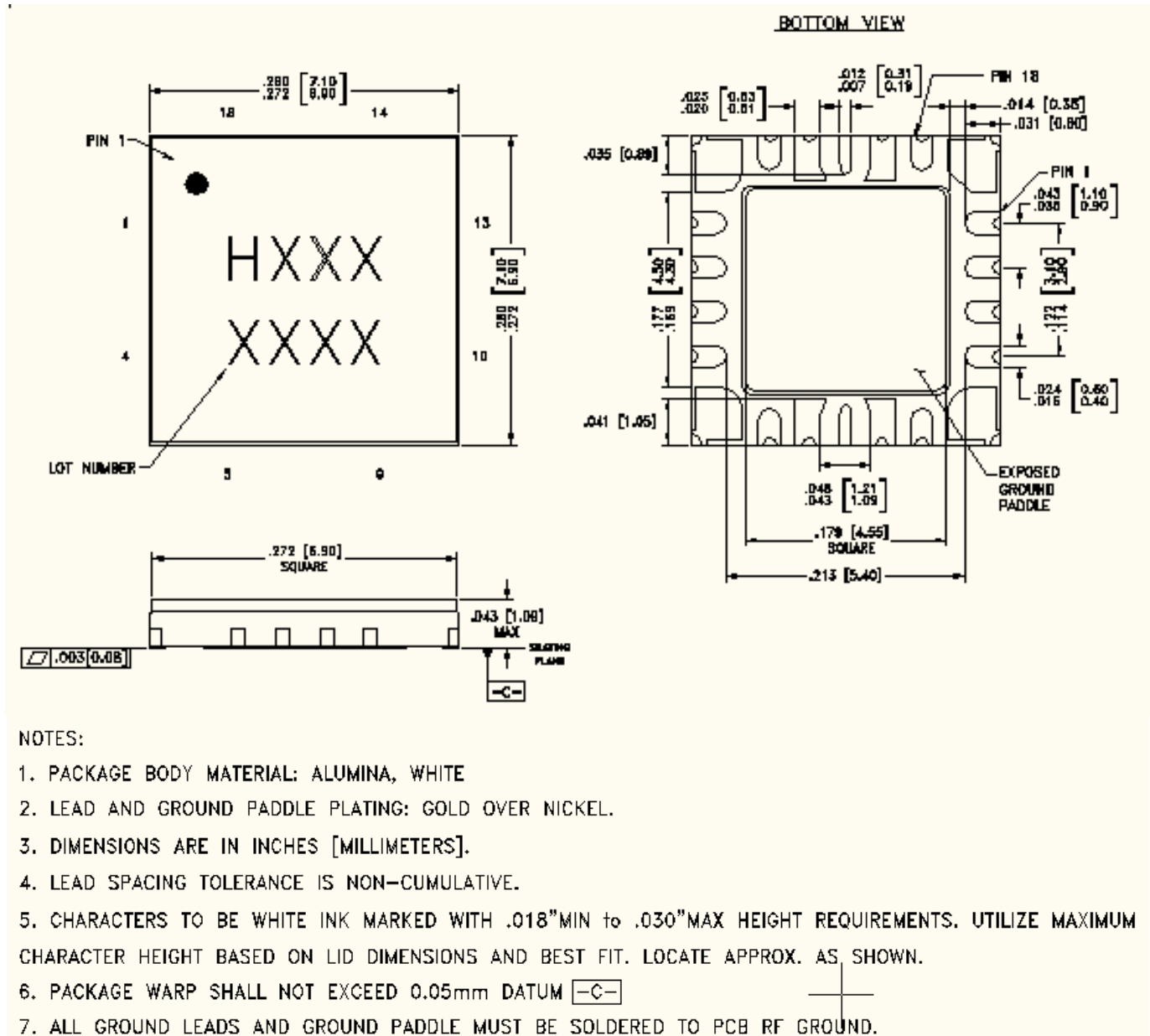
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Figure 3: 20 lead 7x7mm LCC Ceramic Package Outline Drawing



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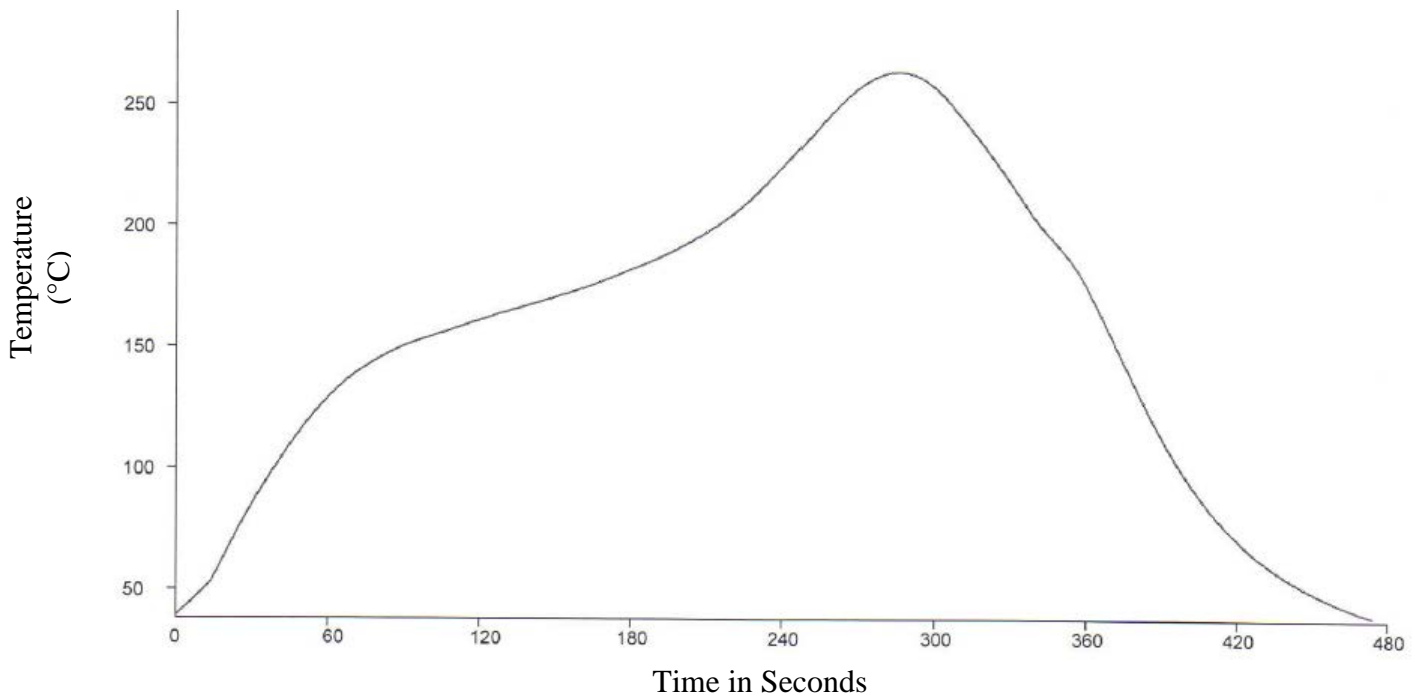
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Figure 4: 260°C Reflow Profile



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