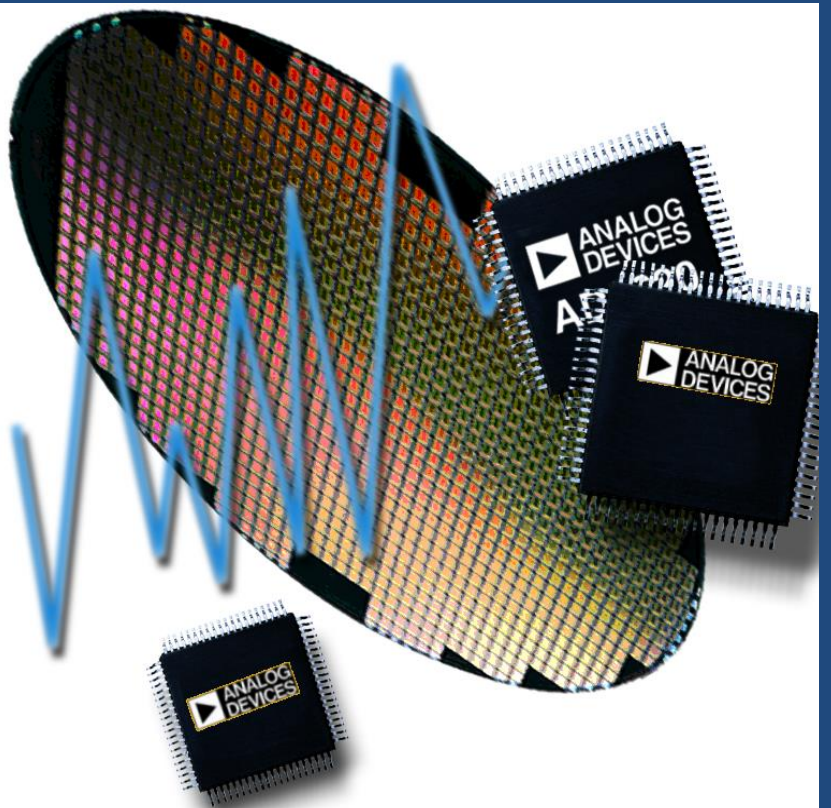


Analog Devices Welcomes Hittite Microwave Corporation

NO CONTENT ON THE ATTACHED DOCUMENT HAS CHANGED





Reliability Report

Report Title:	Qualification Test Report
Report Type:	See Attached
Date:	See Attached

Package Qualification Report

QTR: 2014- 00150

Rev: 02

Package: LP5 & LP5G

HMC340LP5	HMC708LP5
HMC462LP5	HMC742HFLP5
HMC463LP5	HMC742LP5
HMC464LP5	HMC795LP5
HMC465LP5	HMC797LP5
HMC486LP5	HMC881LP5
HMC487LP5	HMC882LP5
HMC489LP5	HMC890LP5
HMC490LP5	HMC892LP5
HMC590LP5	HMC893LP5
HMC591LP5	HMC894LP5
HMC619LP5	HMC900LP5
HMC625ALP5	HMC907LP5
HMC625HFLP5	HMC920LP5
HMC625LP5	HMC926LP5
HMC626LP5	HMC928LP5
HMC627LP5	HMC935LP5
HMC640LP5	HMC972LP5
HMC677LP5	HMC1030LP5
HMC681LP5	
HMC698LP5	
HMC699LP5	
HMC707LP5	

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- *Enhance our competitive position with superior product standards*

Hittite's employees recognize the responsibility to:

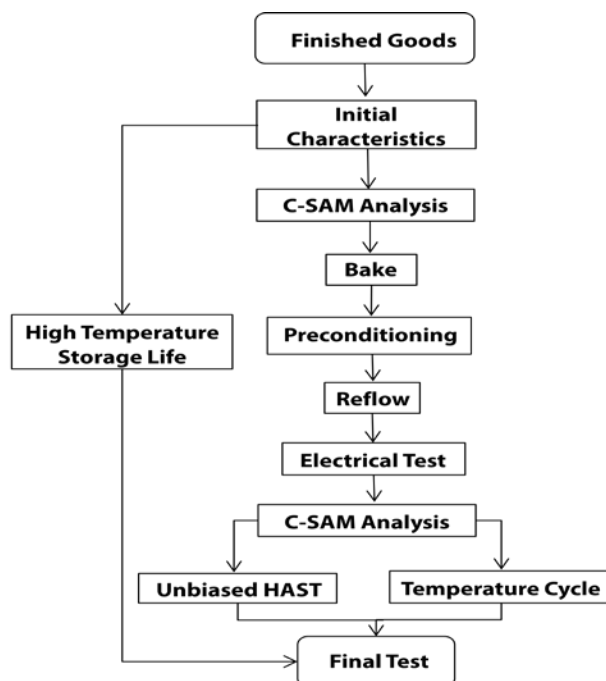
- *Take the initiative to ensure product quality*
- *Create an environment where the highest standards are maintained*
- *Continue to improve quality practices*

Introduction

The Reliability tests summarized in this report are designed to satisfy the reliability requirements designated by Hittite Microwave Corporation. The testing was devised to simulate exposure to environments the product may experience during assembly, test, and life in the end user application. The pass/fail criteria are dependent upon DC and critical RF parameters determined by the appropriate catalog specifications. A complete data sheet for the devices tested can be found at www.hittite.com.

The Package Reliability Plan is as follows:

Package Reliability



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Glossary of Terms & Definitions:

- 1. Autoclave:** Devices are subjected to 96 hours of 100% relative humidity at a temperature of 121°C and pressure (15 PSIG), unbiased. This test is performed in accordance with JESD22-A102.
- 2. HTOL:** High Temperature Operating Life. This test is used to determine the effects of bias conditions and temperature on semiconductor devices over time. It simulates the devices' operating condition in an accelerated way, through high temperature and/or bias voltage, and is primarily for device qualification and reliability monitoring. This test was performed in accordance with JEDEC JESD22-A108.
- 3. HTSL:** High Temperature Storage Life. Devices are subjected to 1000 hours at 150°C. This test is performed in accordance with JEDEC JESD22-A103.
- 4. MSL1 Preconditioning:** Moisture sensitivity level 1 pre-conditioning is performed in accordance with JEDEC JESD22-A113, lead free, 260°C peak temperature (see Appendix 1 for reflow profile).
- 5. Physical Dimensions:** Devices are inspected to the current package outline drawing to ensure all package dimensions are within specification (see Appendix 2 for applicable outline drawings).
- 6. Solderability:** Devices are subjected to 8 hours of steam age and Method 1 Dip and Look testing in accordance with JEDEC JESD22-B102.
- 7. Temperature Cycle:** Devices are subjected to 500 non-operating temperature cycling from -65°C to 150°C in accordance with JEDEC JESD22-A104.
- 8. UHAST:** Unbiased Highly Accelerated Stress Test. Devices are subjected to 96 hours of 85% relative humidity at a temperature of 130°C and pressure (18.6 PSIG). This test was performed in accordance with JEDEC JESD22-A118.

Qualification Sample Selection:

All qualification devices used were manufactured and tested on standard production processes and met pre-stress acceptance test requirements.

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Package Qualification Report

QTR: 2014- 00150

Rev: 02

Package: LP5 & LP5G

Summary of Qualification Tests:

HMC681LP5 (QTR2010-00009)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial electrical Test	160	160	Pass	
MSL 1 Preconditioning	160	160	Complete	
MSL Preconditioning Final Test	160	160	Pass	
Autoclave (preconditioned)	80	80	Complete	
Autoclave Final Test	80	80	Pass	
Temp. Cycle (preconditioned)	80	80	Complete	
Temp. Cycle Final Test	80	80	Pass	
Physical Dimensions	15	15	Pass	
Solderability	15	15	Pass	

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Package Qualification Report

QTR: 2014- 00150

Rev: 02

Package: LP5 & LP5G

HMC4XXXLP5 (QTR2012-00275)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial electrical Test	320	320	Pass	
HTSL	80	80	Complete	
HTSL Final Test	80	80	Pass	
HTOL	80	80	Complete	
HTOL Final test	80	80	Pass	
MSL 1 Preconditioning	160	160	Complete	
MSL 1 Preconditioning Final Test	160	160	Pass	
UHAST (preconditioned)	80	80	Complete	
UHAST Final Test	80	80	Pass	
Temp. Cycle (preconditioned)	80	80	Complete	
Temp. Cycle Final Test	80	80	Pass	
Physical Dimensions	15	15	Pass	
Solderability	6	6	Pass	
X-Ray Analysis	6	6	Pass	

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Package Qualification Report

QTR: 2014- 00150

Rev: 02

Package: LP5 & LP5G

HMC890LP5 (QTR2013-00020)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial electrical Test	320	320	Pass	
HTSL	80	80	Complete	
HTSL Final Test	80	80	Pass	
HTOL	80	80	Complete	
HTOL Final test	80	80	Pass	
MSL 1 Preconditioning	160	160	Complete	
MSL 1 Preconditioning Final Test	160	160	Pass	
UHAST (preconditioned)	80	80	Complete	
UHAST Final Test	80	80	Pass	
Temp. Cycle (preconditioned)	80	80	Complete	
Temp. Cycle Final Test	80	80	Pass	
Physical Dimensions	15	15	Pass	
Solderability	6	6	Pass	
X-Ray Analysis	10	10	Pass	

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Package Qualification Report

QTR: 2014- 00150

Rev: 02

Package: LP5 & LP5G

Cumulative Summary of All MSL1 LP5 & LP5G Package Tests

TEST	Total Units Tested	Total Units Passed	Total Units Failed	Comments
HTSL, 1000 hours	160	160	0	
Autoclave (Preconditioned)	80	80	0	
UHAST (Preconditioned)	160	160	0	
Temperature Cycle (Preconditioned)	240	240	0	
Solderability	27	27	0	
Physical Dimensions	45	45	0	

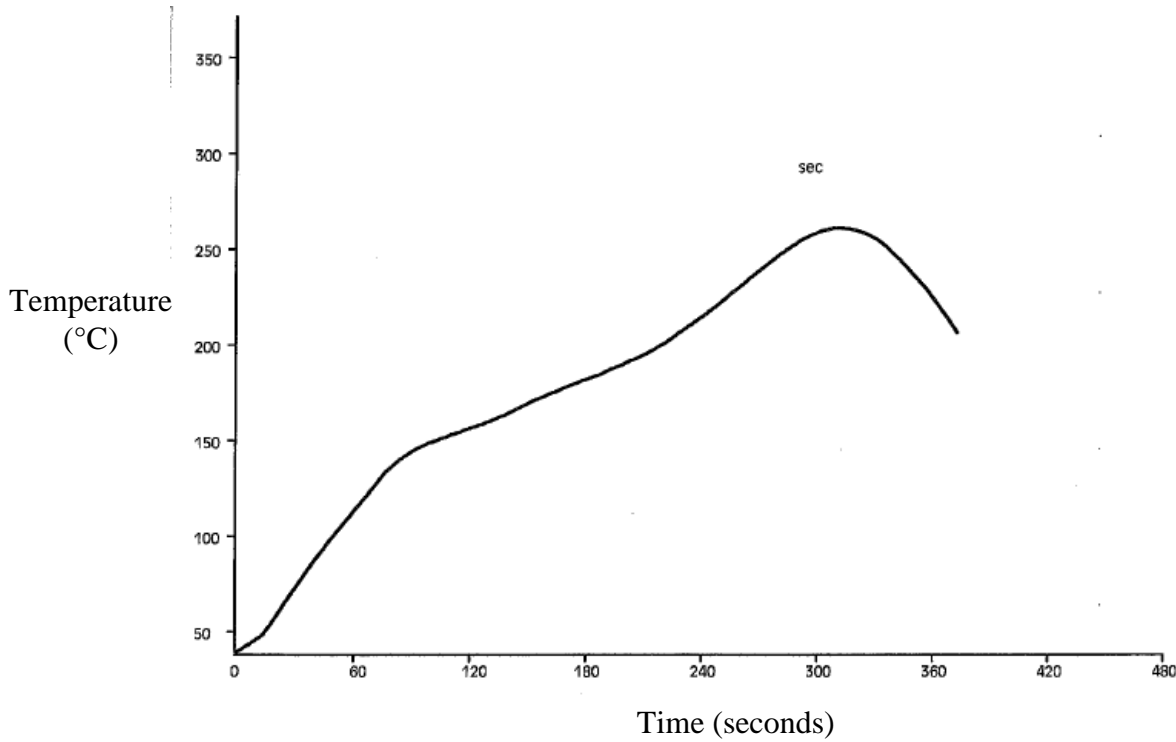
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Appendix 1



Hittite Microwave Corporation is committed to:

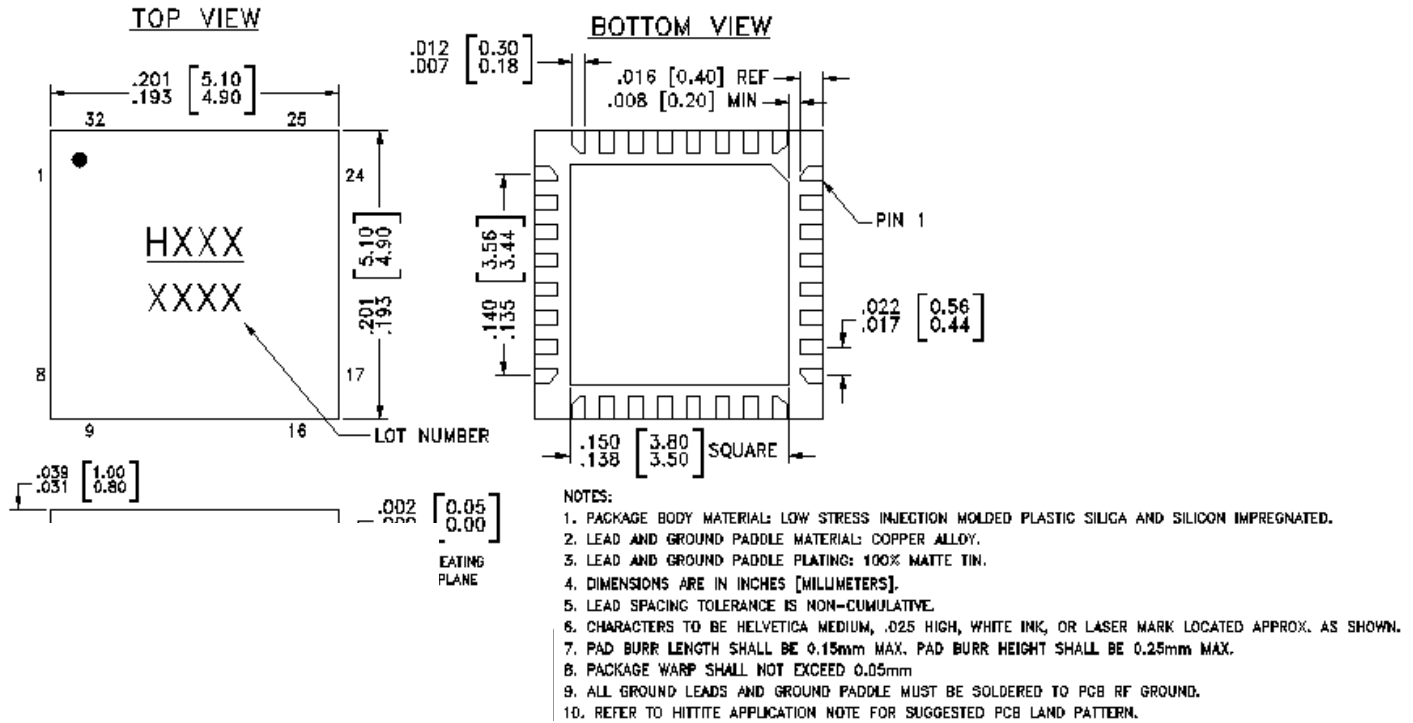
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Appendix 2

LP5 Outline



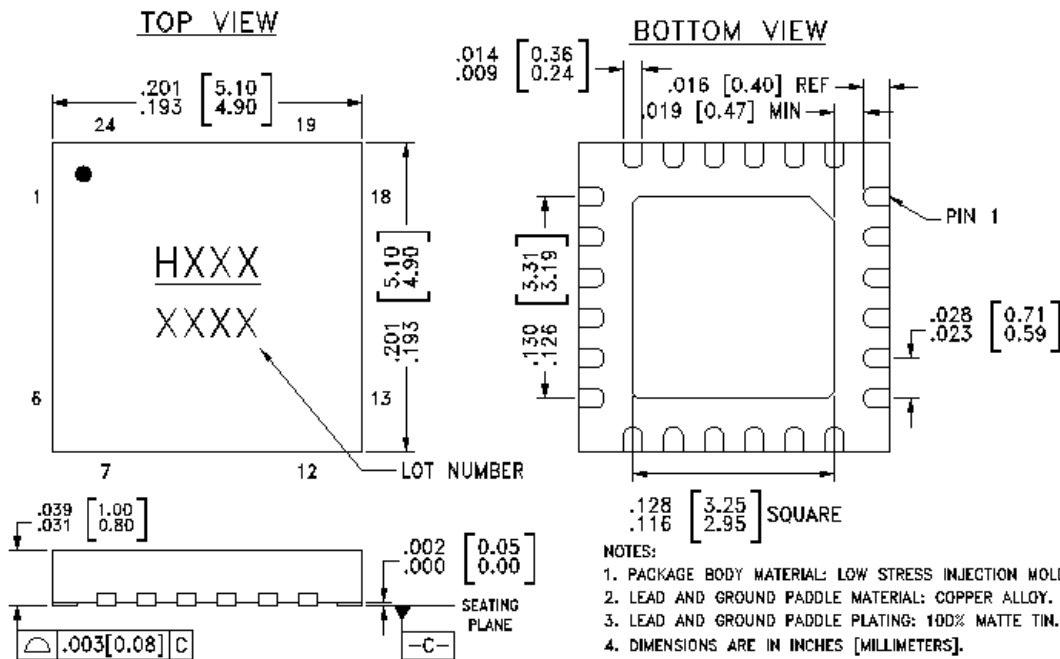
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LP5G Outline



NOTES:

1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEAD AND GROUND PADDLE MATERIAL: COPPER ALLOY.
3. LEAD AND GROUND PADDLE PLATING: 100% MATTE TIN.
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. LEAD SPACING TOLERANCE IS NON-CUMULATIVE.
6. CHARACTERS TO BE HELVETICA MEDIUM, .025 HIGH, WHITE INK, OR LASER MARK LOCATED APPROX. AS SHOWN.
7. PAD BURR LENGTH SHALL BE 0.15mm MAX. PAD BURR HEIGHT SHALL BE 0.25mm MAX.
8. PACKAGE WARP SHALL NOT EXCEED 0.05mm
9. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.
10. REFER TO HITTITE APPLICATION NOTE FOR SUGGESTED PCB LAND PATTERN. PROPRIETARY TO HITTITE MICROWAVE CORPORATION

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