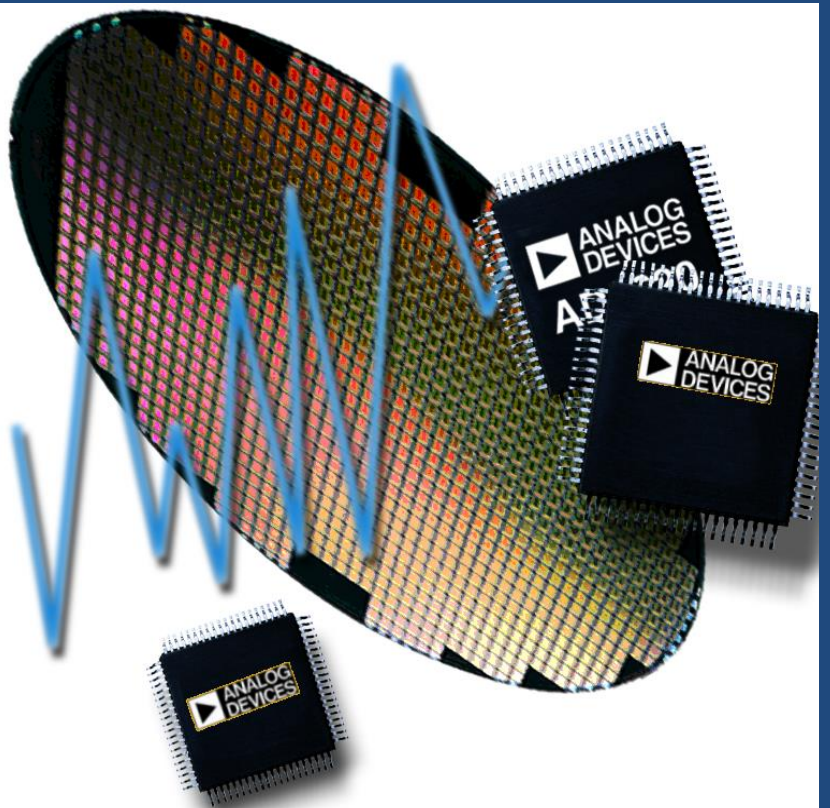


Analog Devices Welcomes Hittite Microwave Corporation

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: 2014-00368

Rev: 02

Package: LP6, LP6C, LP6G

HMC381LP6	HMC829LP6G
HMC581LP6	HMC830LP6G
HMC647LP6	HMC831LP6C
HMC648LP6	HMC832LP6G
HMC649LP6	HMC832ALP6G
HMC682LP6C	HMC833LP6G
HMC701LP6C	HMC835LP6G
HMC702LP6C	HMC836LP6C
HMC743LP6C	HMC837LP6C
HMC764LP6C	HMC838LP6C
HMC765LP6C	HMC839LP6C
HMC767LP6C	HMC840LP6C
HMC783LP6C	HMC936LP6
HMC807LP6C	HMC1032LP6G
HMC820LP6C	HMC1033LP6G
HMC821LP6C	HMC1034LP6G
HMC822LP6C	HMC1035LP6G
HMC824LP6C	HMC1190LP6G
HMC826LP6C	
HMC828LP6C	

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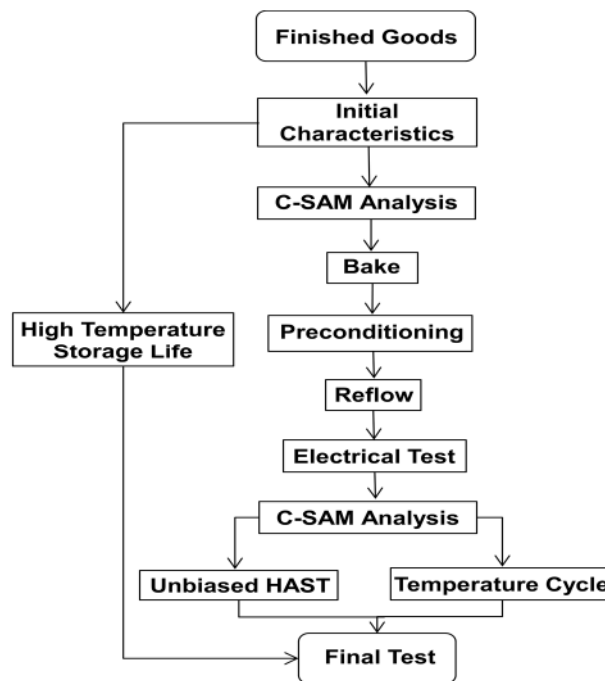
- *Take the initiative to ensure product quality*
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- *Continue to improve quality practices*

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:** A highly accelerated moisture stress test (unbiased). Devices are subjected to 96 hours of 100% relative humidity at a temperature of 121°C and pressure (14.7 PSIG). This test is performed in accordance with JEDEC JESD22-A102.
- 2. HAST:** Highly Accelerated Stress Test (biased). Devices are subjected to 96 hours of 85% relative humidity at a temperature of 130°C and pressure (18.6 PSIG), while DC biased. This test is performed in accordance with JEDEC JESD22-A110.
- 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. MSL Preconditioning:** Moisture sensitivity level 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.
- 9. X-Ray Analysis:** Devices are inspected to the current assembly drawing to ensure devices are assembled correctly and are free of any assembly anomalies.

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: 2014-00368

Rev: 02

Package: LP6, LP6C, LP6G

Summary of Qualification Tests:

HMC701LP6G (QTR2011-00002)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial Electrical	1325	1325	Complete	
HTOL, 1000 hours	240	240	Complete	
Post HTOL Electrical Test	240	240	Pass	
HTSL, 1000 hours	48	48	Complete	
Post HTSL Electrical Test	48	48	Pass	
MSL1 Preconditioning	959	959	Complete	
MSL1 Preconditioning Final Test	959	959	Pass	
UHASt (Preconditioned)	240	240	Complete	
UHASt Final Test	240	240	Pass	
HAST (Preconditioned)	239	239	Complete	
HAST Final Test	239	239	Pass	
Temperature Cycle (Preconditioned)	240	240	Complete	
Temperature Cycle Final Test	240	240	Pass	
ESD	33	33	Complete	HBM Class 1B CDM Class IV MM Pass 100V
Solderability	15	15	Pass	
Physical Dimensions	30	30	Pass	

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Package Qualification Report

QTR: 2014-00368

Rev: 02

Package: LP6, LP6C, LP6G

HMC830LP6G (QTR2011-00008)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial Electrical	190	190	Complete	
MSL1 Preconditioning	160	160	Complete	
MSL1 Preconditioning Final Test	160	160	Pass	
Autoclave (Preconditioned)	80	80	Complete	
Autoclave Final Test	80	80	Pass	
Temperature Cycle (Preconditioned)	80	80	Complete	
Temperature Cycle Final Test	80	80	Pass	
Solderability	15	15	Pass	
Physical Dimensions	15	15	Pass	

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Package Qualification Report

QTR: 2014-00368

Rev: 02

Package: LP6, LP6C, LP6G

HMC822LP6C (QTR2012-00019)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial Electrical	175	175	Complete	
MSL1 Preconditioning	160	160	Complete	
MSL1 Preconditioning Final Test	160	160	Pass	
Autoclave (Preconditioned)	80	80	Complete	
Autoclave Final Test	80	80	Pass	
Temperature Cycle (Preconditioned)	80	80	Complete	
Temperature Cycle Final Test	80	80	Pass	
Physical Dimensions	15	15	Pass	

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Package Qualification Report

QTR: 2014-00368

Rev: 02

Package: LP6, LP6C, LP6G

HMC6803LP6G (QTR2012-00294)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial Electrical	267	267	Complete	
HTSL, 1000 hours	80	80	Complete	
Post HTSL Electrical Test	80	80	Pass	
MSL1 Preconditioning	160	160	Complete	
MSL1 Preconditioning Final Test	160	160	Pass	
UHAST (Preconditioned)	80	80	Complete	
UHAST Final Test	80	80	Pass	
Temperature Cycle (Preconditioned)	80	80	Complete	
Temperature Cycle Final Test	80	80	Pass	
Solderability	6	6	Pass	
Physical Dimensions	15	15	Pass	
X-Ray	6	6	Pass	

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Package Qualification Report

QTR: 2014-00368

Rev: 02

Package: LP6, LP6C, LP6G

HMC830LP6G (QTR2012-00296)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial Electrical	271	271	Complete	
HTSL, 1000 hours	80	80	Complete	
Post HTSL Electrical Test	80	80	Pass	
MSL1 Preconditioning	160	160	Complete	
MSL1 Preconditioning Final Test	160	160	Pass	
UHAST (Preconditioned)	80	80	Complete	
UHAST Final Test	80	80	Pass	
Temperature Cycle (Preconditioned)	80	80	Complete	
Temperature Cycle Final Test	80	80	Pass	
Solderability	6	6	Pass	
Physical Dimensions	15	15	Pass	
X-Ray	10	10	Pass	

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Package Qualification Report

QTR: 2014-00368

Rev: 02

Package: LP6, LP6C, LP6G

HMC648LP6 (QTR2012-00328)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial Electrical	352	352	Complete	
HTOL, 1000 hours	81	81	Complete	
Post HTOL Electrical Test	81	81	Pass	
HTSL, 1000 hours	80	80	Complete	
Post HTSL Electrical Test	80	80	Pass	
MSL1 Preconditioning	160	160	Complete	
MSL1 Preconditioning Final Test	160	160	Pass	
UHAST (Preconditioned)	80	80	Complete	
UHAST Final Test	80	80	Pass	
Temperature Cycle (Preconditioned)	80	80	Complete	
Temperature Cycle Final Test	80	80	Pass	
ESD	36	36	Complete	HBM Class 0 CDM Class IV MM Pass 50V
Solderability	6	6	Pass	
Physical Dimensions	15	15	Pass	
X-Ray	10	10	Pass	

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Package Qualification Report

QTR: 2014-00368

Rev: 02

Package: LP6, LP6C, LP6G

HMC1190LP6G (QTR2012-00515)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial Electrical	333	333	Complete	
HTOL, 1000 hours	80	80	Complete	
Post HTOL Electrical Test	80	80	Pass	
HTSL, 1000 hours	80	80	Complete	
Post HTSL Electrical Test	80	80	Pass	
THB	27	27	Complete	
THB Final Test	27	27	Pass	
MSL1 Preconditioning	80	80	Complete	
MSL1 Preconditioning Final Test	80	80	Pass	
Temperature Cycle (Preconditioned)	80	80	Complete	
Temperature Cycle Final Test	80	80	Pass	
ESD	39	39	Complete	HBM Class 1C CDM Class IV
Solderability	6	6	Pass	
Physical Dimensions	15	15	Pass	
X-Ray	6	6	Pass	

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Package Qualification Report

QTR: 2014-00368

Rev: 02

Package: LP6, LP6C, LP6G

Cumulative Summary of All LP6 Package Tests

TEST	Total Units Tested	Total Units Passed	Total Units Failed	Comments
HTSL, 1000 hours	368	368	0	
HAST (Preconditioned)	239	239	0	
Autoclave (Preconditioned)	160	160	0	
UHAST (Preconditioned)	480	480	0	
Temperature Cycle (Preconditioned)	720	720	0	
THB	27	27	0	
Solderability	54	54	0	
Physical Dimensions	120	120	0	

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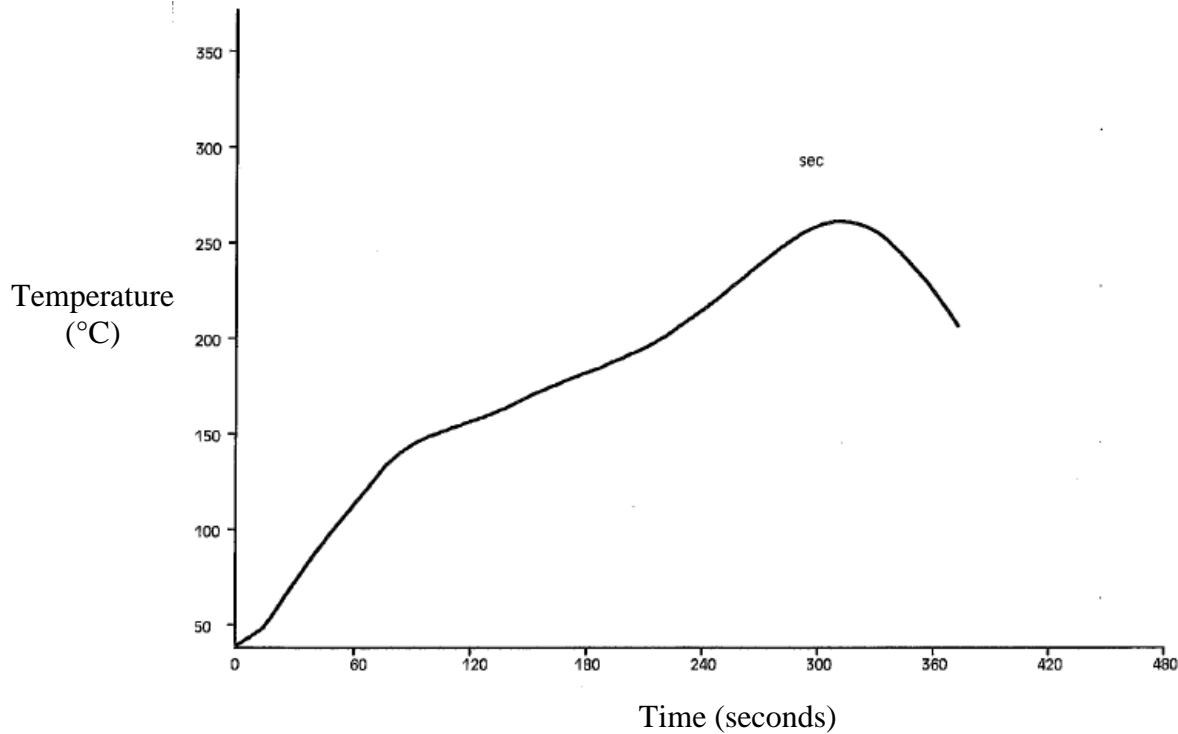
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Appendix 1

Reflow Profile for MSL1 Preconditioning



Hittite Microwave Corporation is committed to:

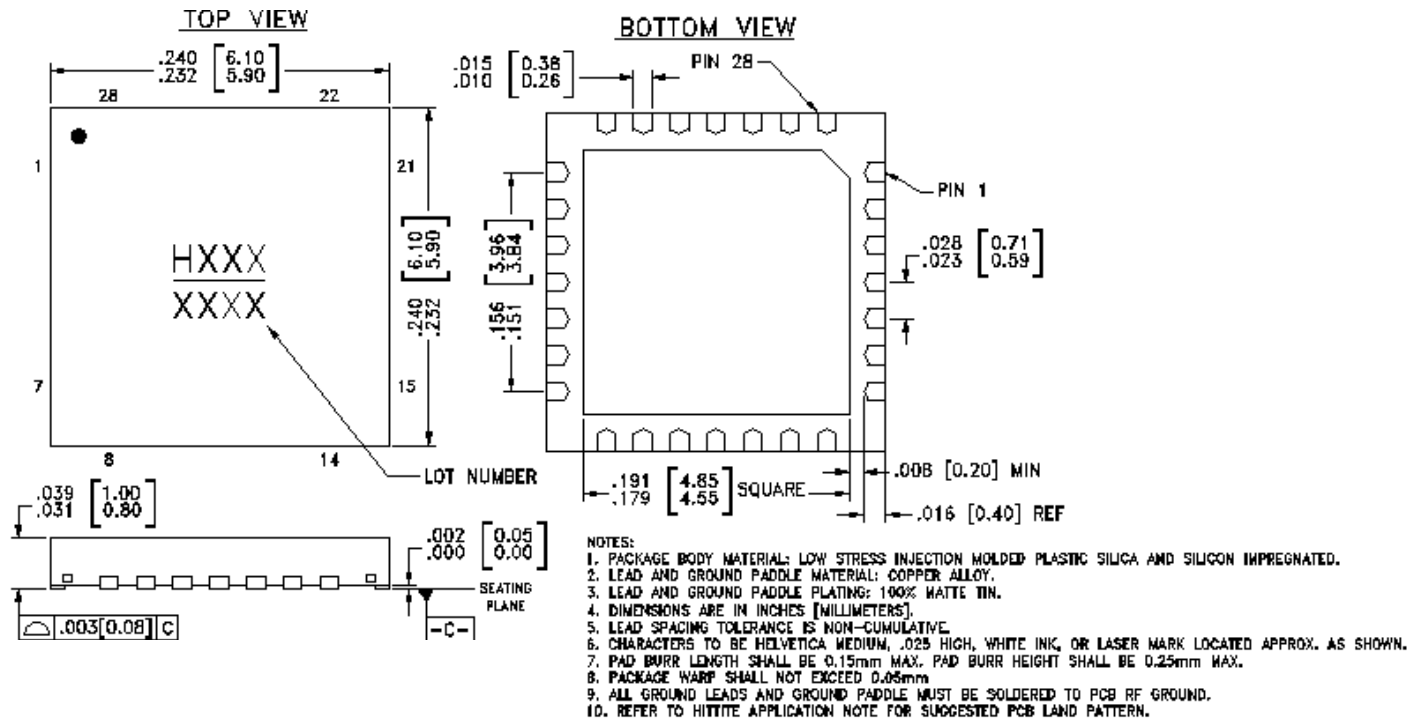
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Appendix 2

LP6 Outline



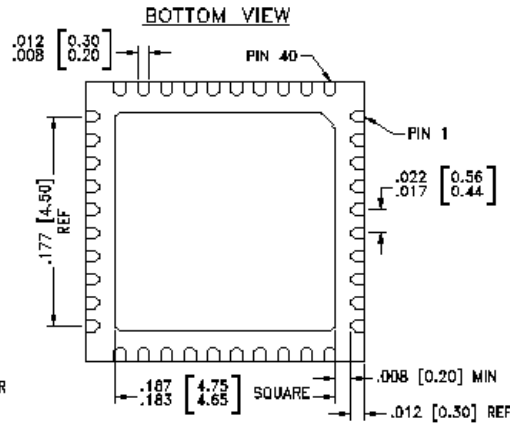
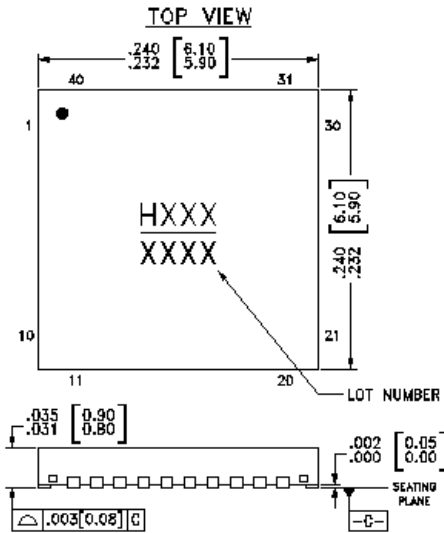
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LP6G Outline



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.

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