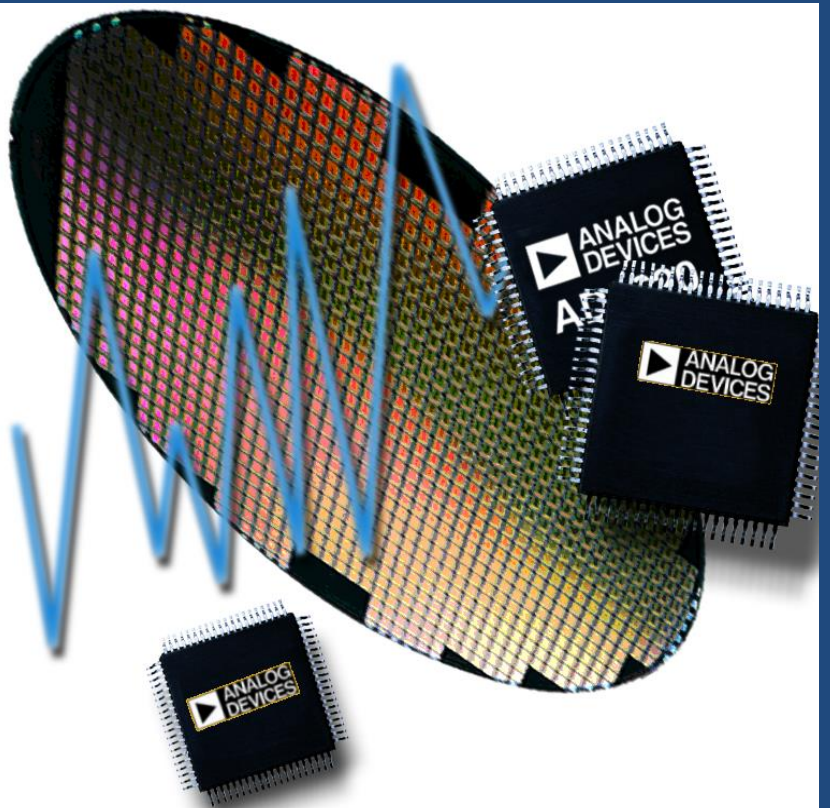


Analog Devices Welcomes Hittite Microwave Corporation

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: 2014-00394

Package: MS10

Rev: 01

HMC306MS10

HMC603MS10

Hittite Microwave Corporation is committed to:

- *Supplying products of the highest quality*
- *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:

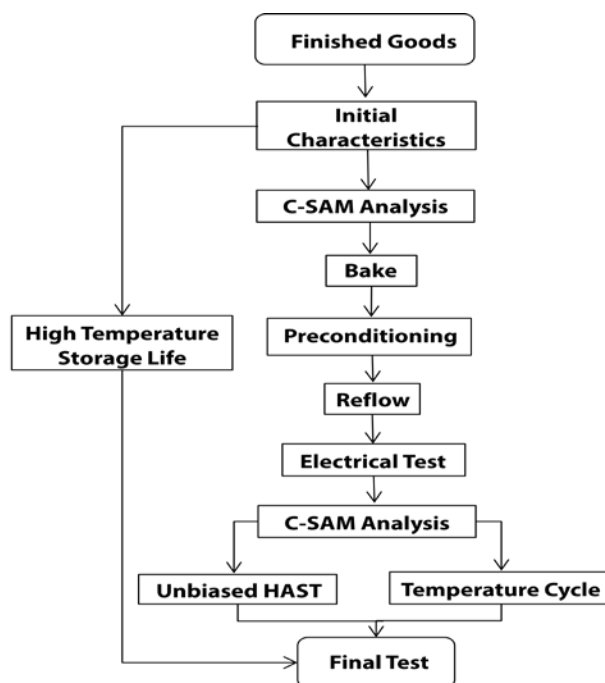
- *Take the initiative to ensure product quality*
- *Create an environment where the highest standards are maintained*
- *Continue to improve quality practices*

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. 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. 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. THB:** Temperature Humidity Bias. Devices are subjected to 1000 hours of 85% relative humidity at a temperature of 85°C, while DC biased. This test is performed in accordance with JESD22-A101.
- 9. 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.
- 10. 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: 2014-00394

Rev: 01

Package: MS10

Summary of Qualification Tests:

HMC603MS10 (QTR2007-00002)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial Electrical	231	231	Complete	
HTOL, 1000 hours	77	77	Complete	
HTOL Final Test	77	77	Pass	
MSL1 Preconditioning	154	154	Complete	
MSL1 Preconditioning Final Test	154	154	Pass	
Autoclave (Preconditioned)	77	77	Complete	
Autoclave Final Test	77	77	Pass	
THB (Preconditioned)	77	77	Complete	
THB Final Test	77	77	Pass	

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Package Qualification Report

QTR: 2014-00394

Package: MS10

Rev: 01

HMC306MS10 (QTR2013-00039)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial Electrical	247	247	Complete	
HTSL, 1000 hours	80	80	Complete	
HTSL Final Test	80	80	Pass	
MSL1 Preconditioning	131	131	Complete	
MSL1 Preconditioning Final Test	131	131	Pass	
Temperature Cycle (Preconditioned)	65	65	Complete	
Temperature Cycle Final Test	65	65	Pass	
UHAST (Preconditioned)	66	66	Complete	
UHAST Final Test	66	66	Pass	
Physical Dimensions	15	15	Pass	
Solderability	6	6	Pass	
X-Ray	15	15	Pass	

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Package Qualification Report

QTR: 2014-00394

Rev: 01

Package: MS10

HMC306MS10 (QTR2013-00057)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial Electrical	247	247	Complete	
HTSL, 1000 hours	80	80	Complete	
HTSL Final Test	80	80	Pass	
MSL1 Preconditioning	131	131	Complete	
MSL1 Preconditioning Final Test	131	131	Pass	
Temperature Cycle (Preconditioned)	65	65	Complete	
Temperature Cycle Final Test	65	65	Pass	
UHAST (Preconditioned)	66	66	Complete	
UHAST Final Test	66	66	Pass	
Physical Dimensions	15	15	Pass	
Solderability	6	6	Pass	
X-Ray	15	15	Pass	

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Package Qualification Report

QTR: 2014-00394

Rev: 01

Package: MS10

HMC306MS10 (QTR2013-00058)

TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
Initial Electrical	268	268	Complete	
HTSL, 1000 hours	80	80	Complete	
HTSL Final Test	80	80	Pass	
MSL1 Preconditioning	152	152	Complete	
MSL1 Preconditioning Final Test	152	152	Pass	
Temperature Cycle (Preconditioned)	75	75	Complete	
Temperature Cycle Final Test	75	75	Pass	
UHAST (Preconditioned)	77	77	Complete	
UHAST Final Test	77	77	Pass	
Physical Dimensions	15	15	Pass	
Solderability	6	6	Pass	
X-Ray	15	15	Pass	

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Package Qualification Report

QTR: 2014-00394

Package: MS10

Rev: 01

Cumulative Summary of All MS10 Package Tests

TEST	Total Units Tested	Total Units Passed	Total Units Failed	Comments
HTOL, 1000 hours	77	77	0	
HTSL, 1000 hours	240	240	0	
UHAST (Preconditioned)	209	209	0	
Temperature Cycle (Preconditioned)	205	205	0	
Autoclave (Preconditioned)	77	77	0	
THB (Preconditioned)	77	77	0	
Solderability	18	18	0	
Physical Dimensions	45	45	0	
X-Ray	45	45	0	

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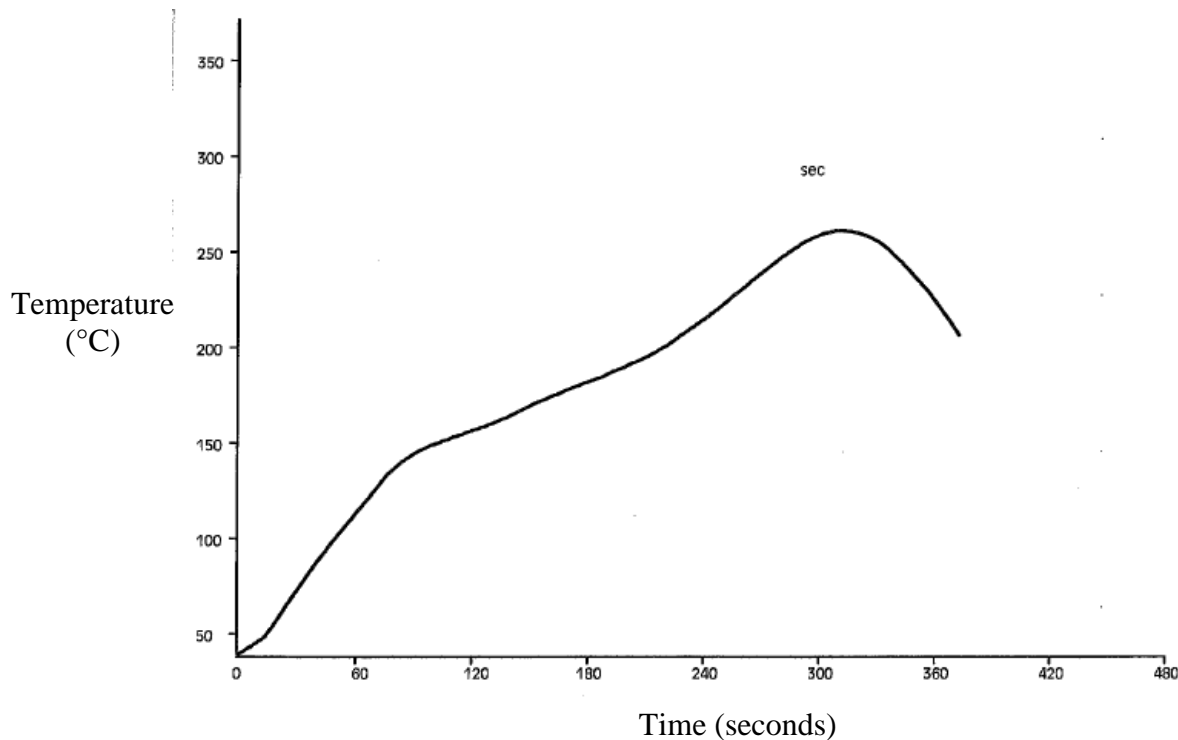
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Appendix 1

Reflow Profile for MSL Preconditioning



Hittite Microwave Corporation is committed to:

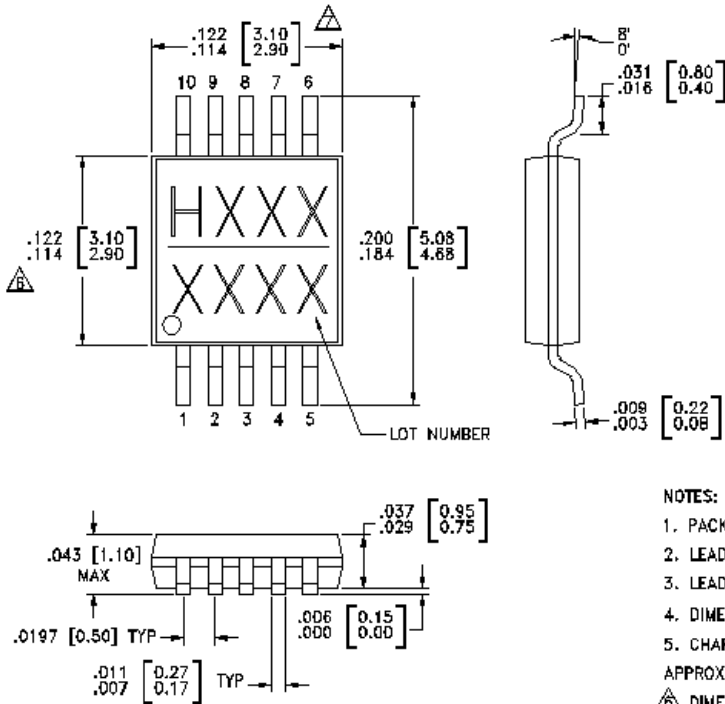
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Appendix 2

MS10 Outline



NOTES:

1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED
2. LEAD MATERIAL: COPPER ALLOY.
3. LEAD PLATING: 100% MATTE TIN.
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. CHARACTERS TO BE HELVETICA MEDIUM, .030 HIGH, LASER OR WHITE INK, LOCATED APPROXIMATELY AS SHOWN.

\triangle DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.

\triangle DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.

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