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MICROWAVE PRODUCTS
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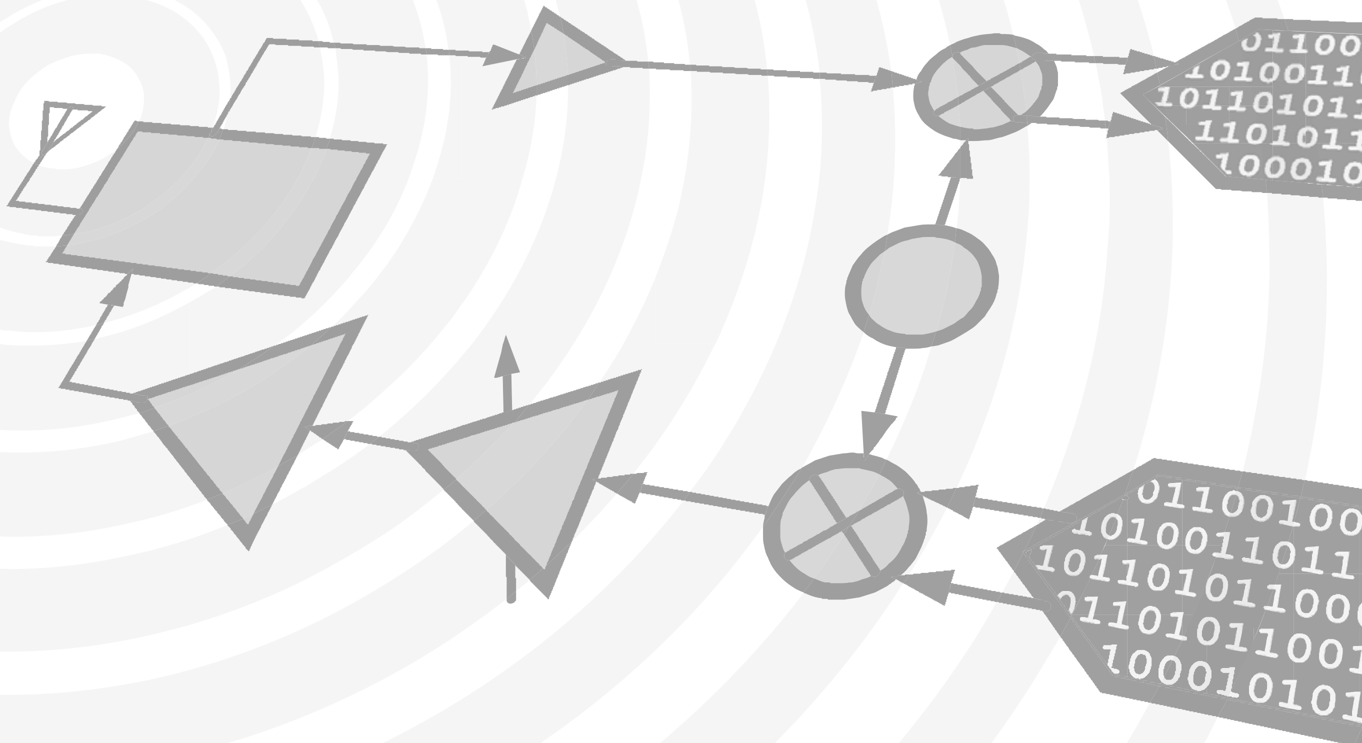

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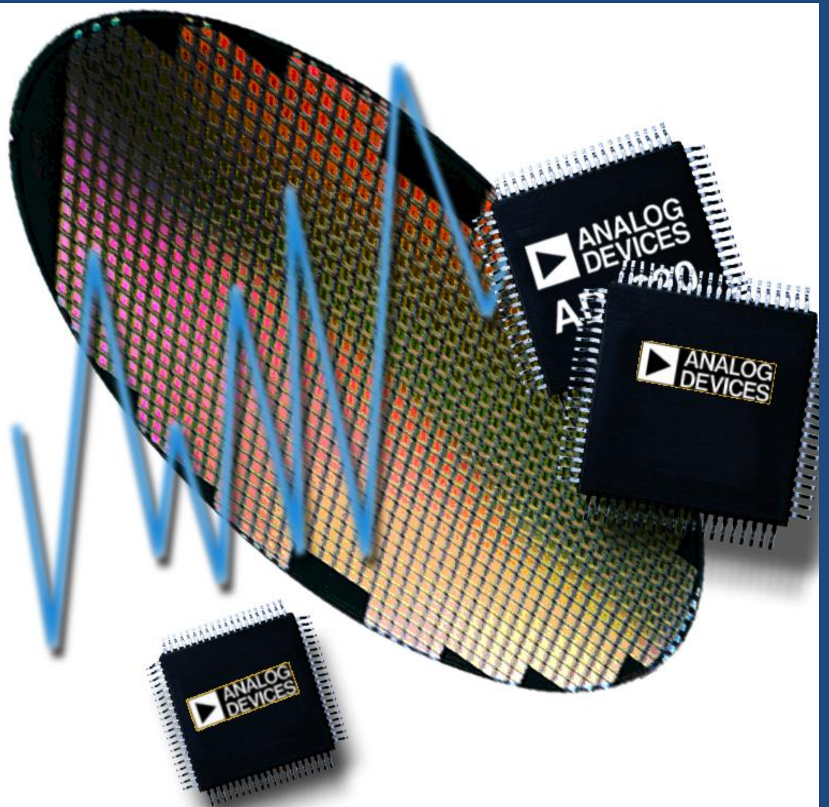

Reliability Report

Report Title: Qualification Test Report

Report Type: See Attached

Date: See Attached

QUALIFICATION TEST REPORT

QUALITY POLICY

Hittite Microwave Corporation is committed to:

- *Be a supplier of products of the highest quality*
- *Advance the state-of-the-art of the technology supporting our products*
- *Enhance our competitive postition with superior products*

Hittite's quality policy recognizes responsibilities of every individual to:

- *Take the initiative to promote quality*
- *Create an environment where highest standards are maintained*
- *Participate in continuous improvement practices*

QTR: 02015 REV: 11

PACKAGE TYPE: PLASTIC ENCAPSULATED

PACKAGE FAMILY: QSOP

HMC235QS16G
HMC241QS16
HMC307QS16G
HMC398QS16G
HMC401QS16G
HMC413QS16G
HMC421QS16
HMC377QS16G
HMC380QS16G
HMC420QS16
HMC439QS16G
HMC440QS16G
HMC450QS16G
HMC452QS16G
HMC453QS16G
HMC457QS16G

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1.0 Introduction

This qualification procedure is designed to satisfy the package reliability requirements for a plastic QSOP surface mount 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 HMC252QS24 was selected to qualify the QSOP family of packages.

1.1 General Description

The QSOP package uses a copper lead frame. The lead frame is spot plated with silver to enable gold wire bonding. The MMIC device is silver-epoxy attached to the paddle. The MMIC contains gold bond pads. The interconnection is performed using 1 mil gold ball bonds. The part is encapsulated using Sumitomo EME 6300 or equivalent encapsulating compound. The leads are finished with 85/15 SnPb.

The HMC252QS24 is a low-cost non-reflective SP6T switch in a 24-lead QSOP package featuring wideband operation from DC to 3.0 GHz. The switch offers a single positive bias and true TTL/CMOS compatibility. A 3:6 decoder is integrated on the switch requiring only 3 control lines and a positive bias to select each path. The HMC252QS24 SP6T replaces multiple configurations of SP4T and SPDT MMIC switches and logic drivers.

Photo 1: Typical QSOP Package

2.0 Summary of Results
All testing has been completed. There were no relevant failures.

PARA	TEST	QTY IN	QTY OUT	PASS/FAIL	NOTES
3.1.1	Initial Electrical Test	192	192	Pass	
3.1.2	Temp. Cycle	116	114	Complete	2 Missing during test.
3.1.3	Final Electrical Test	114	114	Pass	
3.1.4	Autoclave	76	76	Complete	
3.1.5	Final Electrical Test	76	76	Pass	
3.2.1	Lead Co-planarity	80	80	Pass	HMC183QS24
3.2.2	Physical Dimensions	15	15	Pass	
3.2.3	Resistance to Solvents	15	15	Pass	
3.2.4	Solderability	45	45	Pass	

3.0 Test Procedures

3.1 Package Environmental Tests - These tests are designed to demonstrate that the QSOP family of packages are capable of maintaining the specified parameters throughout their useful life under rated operating conditions. The HMC252QS24 was chosen to qualify the QSOP package family. The results of these tests qualify by similarity all other product using the same package.

3.1.1 Initial Characteristics - 192 HMC252QS24 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 Temperature Cycle - 116 devices from 3.1.1 were subjected to 200 cycles of non-operating temperature cycling from -65 °C to 150 °C. This test is performed at Hittite. Note that test quantity was reduced from 116 to 114 pieces due to 2 pieces missing after this test.

3.1.3 Final Electrical Test - 114 devices from 3.1.2 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.

3.1.4 Autoclave - 76 devices from 3.1.1 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.

3.1.5 Final Electrical Test - 76 devices from 3.1.4 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 within 48 hours after removal from the chamber. There were no failures in this test.

3.2 Package Mechanical Tests

3.2.1 Coplanarity - 80 devices of a similar QSOP package were measured for lead coplanarity. Coplanarity in excess of .004” (0.1 mm) is considered a reject. These devices need not be electrically functional. Any out of specification parameter is considered a failure. This test was performed at Source Electronics Corp. in Hollis, NH. There were no failures.

3.2.2 Physical Dimensions - 15 devices were measured to the requirement of the data sheet. 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.

3.2.3 Resistance to Solvents - 15 devices were subjected to the resistance to solvents test as specified herein. The devices shall be immersed in isopropyl alcohol for 30 minutes. After the immersion, the parts will be scrubbed for 10 seconds each with a stiff bristle brush. The marking will then be inspected using 10X magnification for permanency and legibility. These devices need not be electrically functional. Illegible marking is considered a failure. This test was performed at Hittite. There were no failures

3.2.4 Solderability - 45 devices were subjected to the 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.