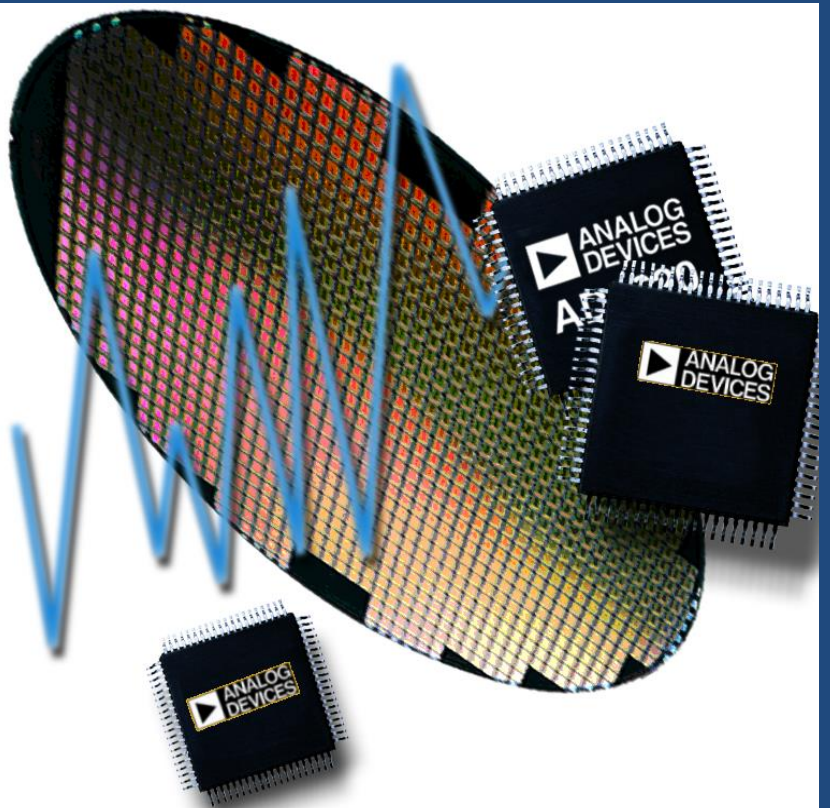


Analog Devices Welcomes Hittite Microwave Corporation

NO CONTENT ON THE ATTACHED DOCUMENT HAS CHANGED





Reliability Report

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

QUALIFICATION TEST REPORT

QTR: 02016 REV: 01

PACKAGE TYPE: PLASTIC ENCAPSULATED
PACKAGE FAMILY: MSOP

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 position 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*

HMC173MS8	Attenuator
HMC174MS8	Switch
HMC175MS8	Mixer
HMC187MS8	Multiplier
HMC188MS8	Multiplier
HMC189MS8	Multiplier
HMC190MS8	Switch
HMC194MS8	Switch
HMC199MS8	Switch
HMC208MS8	Mixer
HMC210MS8	Attenuator
HMC213MS8	Mixer
HMC216MS8	Mixer
HMC218MS8	Mixer
HMC219MS8	Mixer
HMC220MS8	Mixer
HMC223MS8	Switch
HMC224MS8	Switch
HMC230MS8	Attenuator
HMC251MS8	Frequency
HMC272MS8	Mixer
HMC287MS8	Amplifier
HMC288MS8	Attenuator
HMC296MS8	Mixer
HMC304MS8	Mixer
HMC306MS10	Attenuator
HMC309MS8	Amplifier
HMC316MS8	Mixer
HMC350MS8	Mixer
HMC352MS8	Mixer
HMC353MS8	Mixer
HMC422MS8	Mixer
HMC423MS8	Mixer

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 - 3.2.4 Solderability

1.0 Introduction

This qualification procedure was designed to satisfy the package reliability requirements for plastic MSOP 8 and 10 lead surface mount packages. The testing was designed to simulate the worst-case environments the product may experience during assembly, test and life in the end user application. The device was electrically tested to the appropriate catalog specifications. The HMC174MS8 was selected to qualify the 8 and 10 lead MSOP package family.

1.1 General Description

The MSOP package uses a copper lead frame. The lead frame is spot plated with silver to enable gold wire bonding. The MMIC device is 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.

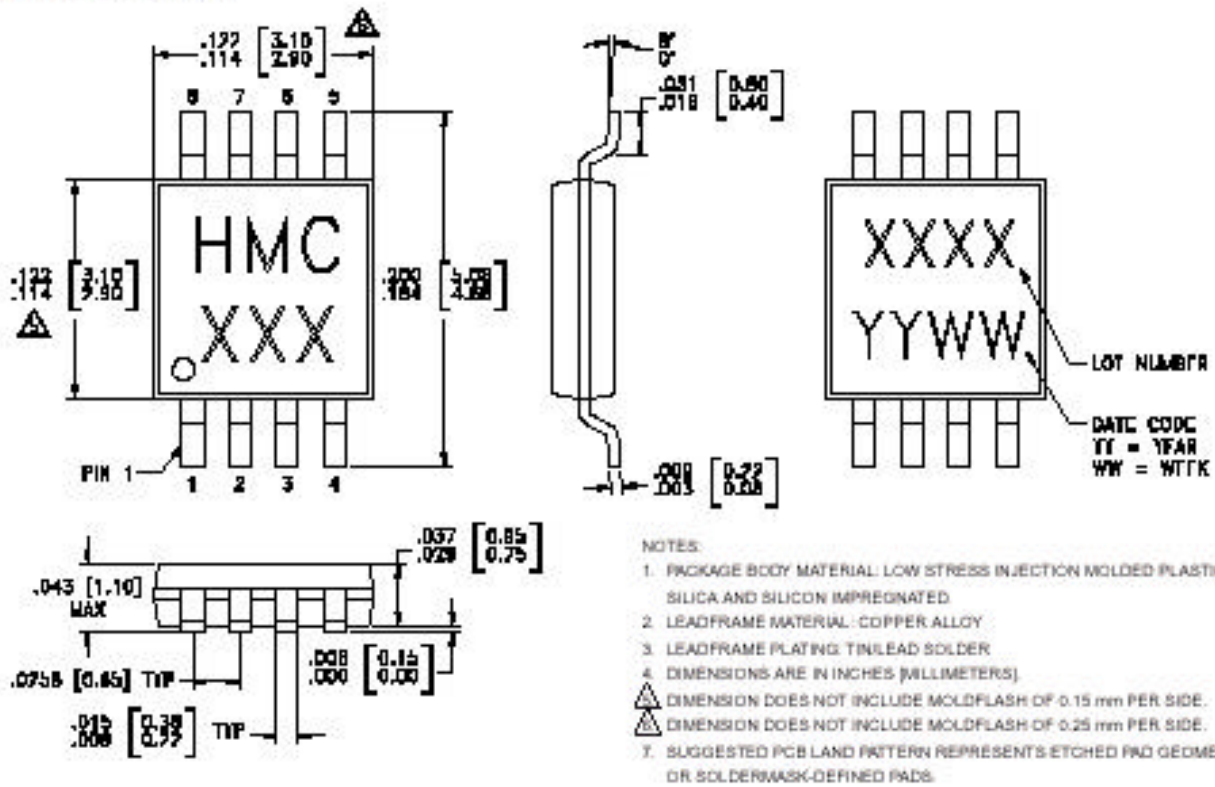
The HMC174MS8 is a low-cost SPDT switch in an 8-lead MSOP package for use in transmit-receive applications which require very low distortion at high signal power levels. The device can control signals from DC to 3.0 GHz and is especially suited for 900 MHz, 1.8 - 2.2 GHz, and 2.4 GHz ISM applications with only 0.5 dB loss. The design provides exceptional intermodulation performance; providing a +60 dBm third order intercept at 8 Volt bias. RF1 and RF2 are reflective shorts when "OFF". On-chip circuitry allows single positive supply operation at very low DC current with control inputs compatible with CMOS and most TTL logic families.

Photo 1: Typical MSOP Package

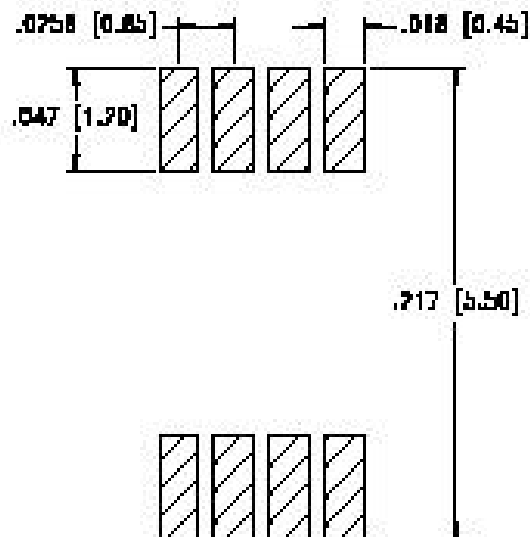


Package Dimensions

MS8 Package



Suggested Land Pattern



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	195	195	Pass	
3.1.2	Temp. Cycle	115	114	Complete	
3.1.3	Final Electrical Test	114	114	Pass	1 pc mech. damaged
3.1.4	Autoclave	80	80	Complete	
3.1.5	Final Electrical Test	80	80	Pass	
3.2.1	Lead Co-planarity	80	80	Pass	
3.2.2	Physical Dimensions	15	15	Pass	
3.2.3	Resistance to Solvents	45	45	Pass	
3.2.4	Solderability	15	15	Pass	

3.0 Test Procedures

3.1 Package Environmental Tests - These tests are designed to demonstrate that the MSOP family of packages are capable of maintaining the specified parameters throughout their useful life under rated operating conditions. The HMC174MS8 was chosen to qualify the MSOP package family. The results of these tests qualify by similarity all other product using the same package.

3.1.1 Initial Characteristics - 195 HMC174MS8 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 - 115 devices from 3.1.1 were subjected to 200 cycles of non-operating temperature cycling from -65 °C to 150 °C. This test was performed at Test Labs in Woburn, MA.

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 was considered a failure. This test was performed at Hittite. There were no failures in this test. Note that test quantity was reduced from 115 to 114 pieces due to operator induced mechanical failure (broken leads) resulting in 1 part being not suitable for testing.

3.1.4 Autoclave - 80 devices from 3.1.1 were subjected to 96 hours of humidity (100%), temperature (121 °C) and pressure (15 PSIG). This test was performed at Qualified Parts Lab in Santa Clara, CA.

3.1.5 Final Electrical Test - 80 devices from 3.1.4 were electrically tested at ambient temperature to DC and critical RF parameters. Any out of specification parameter was 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 were measured for lead coplanarity. Coplanarity in excess of .004” (0.1 mm) was considered a reject. These devices need not be electrically functional. Any out of specification parameter was 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 was considered a failure. This test was 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 were scrubbed for 10 seconds each with a stiff bristle brush. The marking were then inspected using 10X magnification for permanency and legibility. These devices need not be electrically functional. Illegible marking was 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.