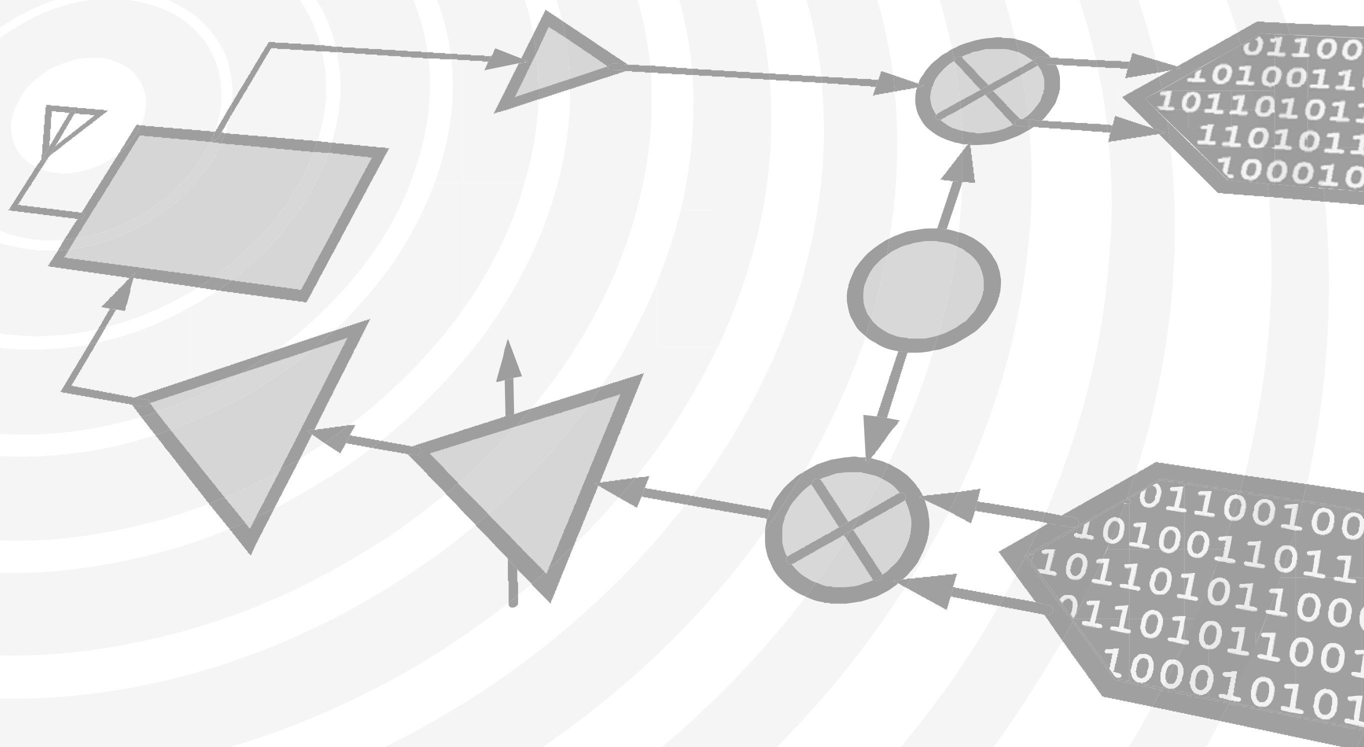
ANALOG DEVICES

Hittite MICROWAVE PRODUCTS FROM ANALOG DEVICES

Analog Devices Welcomes Hittite Microwave Corporation

NO CONTENT ON THE ATTACHED DOCUMENT HAS CHANGED



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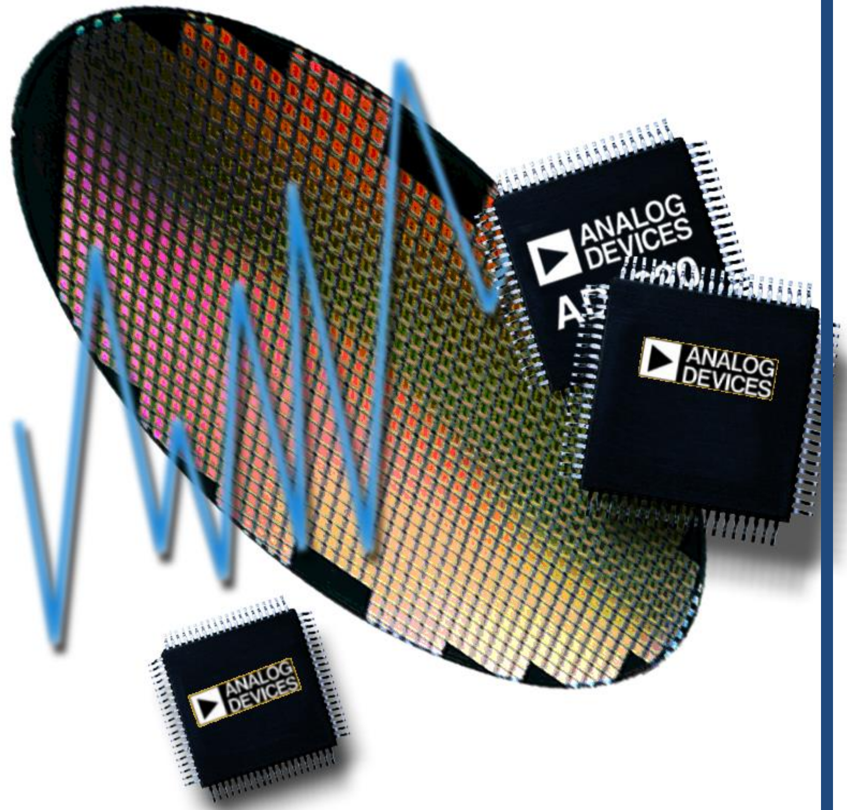

Reliability Report

Report Title: Qualification Test Report

Report Type: See Attached

Date: See Attached

HMC182S14E	Switch, SP4T
HMC207S8E	Mixer, Double-Balanced
HMC351S8E	Mixer, High IP3, Double-Balanced
HMC361S8GE	Frequency Divider, ÷2
HMC362S8GE	Frequency Divider, ÷2
HMC363S8GE	Frequency Divider, ÷2
HMC364S8GE	Frequency Divider, ÷2
HMC365S8GE	Frequency Divider, ÷2
HMC754S8GE	Amplifier, HBT Gain Block

Obsolete Products	
HMC147S8E	Mixer, Double-Balanced
HMC154S8E	Switch, SPDT
HMC165S14E	Switch, SP4T
HMC239S8E	Switch, SPDT Reflective
HMC403S8GE	Frequency Detector

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1.0 Introduction

This qualification procedure was designed to satisfy the package reliability requirements for a plastic SOIC 8-lead surface mount package. 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 HMC182S14 was selected to qualify the SOIC package family.

1.1 General Description

The SOIC 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 or Matte Sn.

The HMC182S14 is a low-cost terminated SP4T switch in a 14-lead SOIC package for use in antenna diversity, switched filter banks, gain/attenuation selection, and general channel multiplexing applications. The switch can control signals up to 2 GHz. A 2:4 decoder is integrated on the switch, requiring only 2 control lines and a negative bias to select each RF path. The 2:4 decoder replaces 4 to 8 control lines normally required by GaAs SP4T switches. The HMC182S14 is a drop-in replacement for the HMC165S14 in applications requiring low “off-state” VSWR. See positive bias/TTL SP4T HMC241QS16.

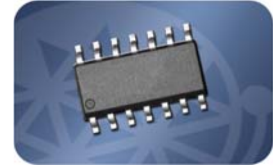


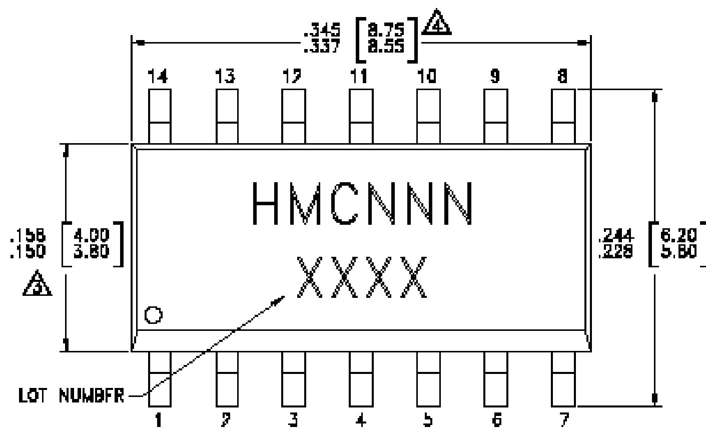
Photo 1
Typical SOIC Package

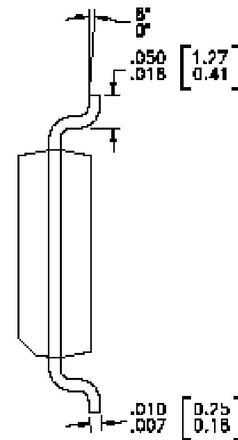
2.0 Summary of Results

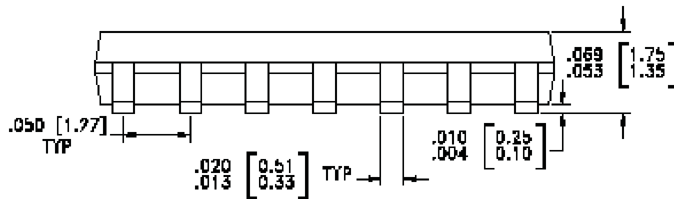
PARA	TEST	QTY IN	QTY OUT	PASS / FAIL	NOTES
3.1.1	Initial Electrical Test	196	196	Pass	
3.1.2	Temperature Cycle	116	116	Complete	
3.1.3	Final Electrical Test	116	116	Pass	
3.1.4	Autoclave	80	80	Complete	
3.1.5	Final Electrical Test	80	80	Pass	
3.2.1	Lead Co-Planarity	80	80	Pass	
3.2.2	Physical Dimensions	15	15	Pass	
3.2.3	Resistance to Solvents	45	45	Pass	
3.2.4	Solderability	15	15	Pass	

All testing has been completed. There were no relevant failures.

Package Dimensions



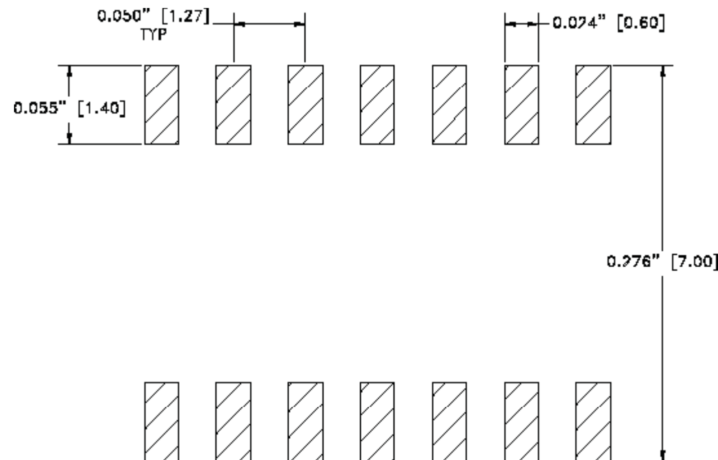




NOTES:

1. LEADFRAME MATERIAL: COPPER ALLOY
2. DIMENSIONS ARE IN INCHES [MILLIMETERS]
3. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
4. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
5. ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND.

Suggested Land Pattern



Package Information

Part Number Suffix	Package Body Material	Lead Finish	MSL Rating	Package Marking [3][4]
S14	RoHS Compliant Mold Compound	Sn/Pb Solder	MSL1 [1]	HMCNNN XXXX
S14E	RoHS Compliant Mold Compound	100% matte Sn	MSL1 [2]	HMCNNN XXXX

[1] Max peak reflow temperature of 235 °C
[2] Max peak reflow temperature of 260 °C
[3] 4-Digit lot number XXXX
[4] 3-Digit part number NNN

3.0 Test Procedures

3.1 Package Environmental Tests - These tests are designed to demonstrate that the SOIC family of packages are capable of maintaining the specified parameters throughout their useful life under rated operating conditions. The HMC182S14 was chosen to qualify the SOIC package family. The results of these tests qualify by similarity all other product using the same package.

3.1.1 Initial Characteristics - 196 HMC182S14 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 was performed at Test Labs in Woburn, MA.

3.1.3 Final Electrical Test - 116 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.

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.