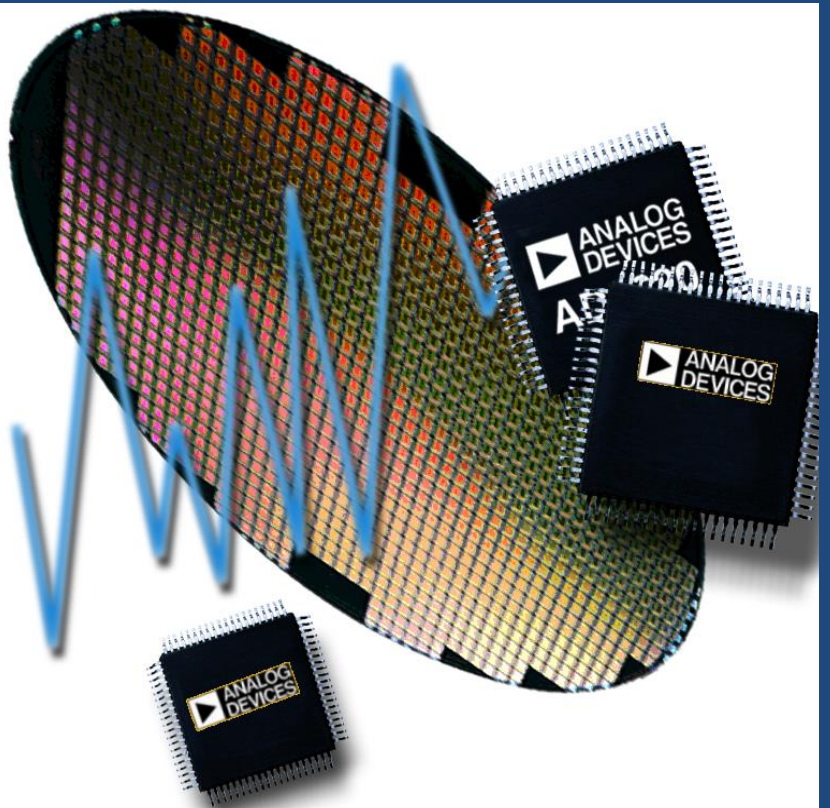


Analog Devices Welcomes Hittite Microwave Corporation

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

Part Type: Plastic Encapsulated
Package Family: SOT26

QTR: 02017
Rev: 01

HMC197AE	Switch, SPDT Reflective
HMC221AE	Switch, SPDT Reflective
HMC285E	Mixer, Single-Balanced
HMC286E	Amplifier, Low Noise
HMC290E	Attenuator, 2-Bit Digital
HMC291E	Attenuator, 2-Bit Digital
HMC308E	Amplifier, Driver
HMC313E	Amplifier, HBT Gain Block
HMC332E	Mixer, Single-Balanced
HMC333E	Mixer, Single-Balanced
HMC432E	Frequency Divider, $\div 2$
HMC433E	Frequency Divider, $\div 4$
HMC434E	Frequency Divider, $\div 8$
HMC446E	Switch, SPDT T/R 10W
HMC544E	Switch, SPDT T/R
HMC545E	Switch, SPDT Reflective
HMC550E	Switch, Failsafe

Obsolete Products

HMC195E	Switch, SPDT T/R
HMC197E	Switch, SPDT Reflective
HMC221E	Switch, SPDT Reflective
HMC226E	Switch, SPDT T/R
HMC314E	Amplifier, Driver
HMC315E	Amplifier, HBT Gain Block
HMC323E	Amplifier, Driver

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



1.0 Introduction

This qualification procedure was designed to satisfy the package reliability requirements for a plastic SOT 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 HMC197 was selected to qualify the SOT package family.

1.1 General Description

The SOT 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 HMC197 is a low-cost SPDT switch in a 6-lead SOT26 plastic package for use in general switching applications which require very low insertion loss and very small size. The device can control signals from DC to 3 GHz and is

especially suited for 900 MHz, 1.8 - 2.2 GHz, and 2.4 GHz ISM applications with less than 1 dB loss. The design provides exceptional insertion loss performance, ideal for filter and receiver switching. RF1 and RF2 are reflective shorts when "Off". The two control voltages require a minimal amount of DC current and offer compatibility with most CMOS & TTL logic families. See HMC221 for same performance in an alternate SOT26 pin-out.

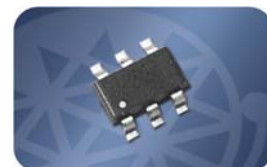


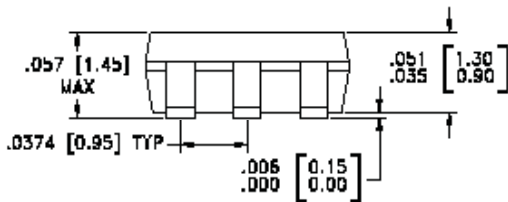
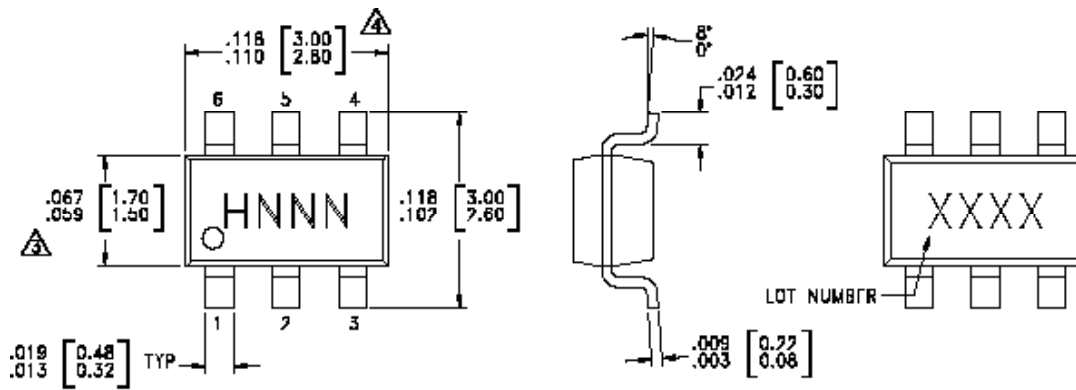
Photo 1
Typical SOT26 Package

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	N/A	N/A	Pass	Laser Marked
3.2.4	Solderability	15	15	Pass	

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

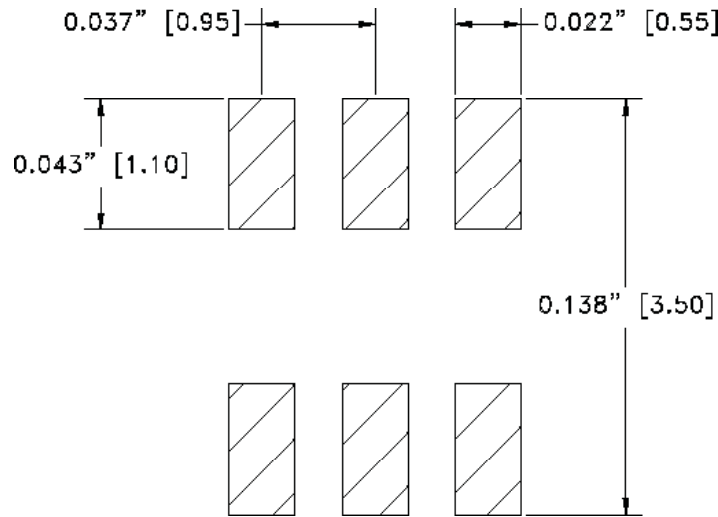
Package Dimensions



NOTES:

1. LEADFRAME MATERIAL: COPPER ALLOY
2. DIMENSIONS ARE IN INCHES [MILLIMETERS]
- ⚠ DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
- ⚠ 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]}
	RoHS Compliant Mold Compound	Sn/Pb Solder	MSL1 ^[1]	HNNN XXXX
E	RoHS Compliant Mold Compound	100% matte Sn	MSL1 ^[2]	NNNE 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 SOT family of packages are capable of maintaining the specified parameters throughout their useful life under rated operating conditions. The HMC197 was chosen to qualify the SOT package family. The results of these tests qualify by similarity all other product using the same package.
- 3.1.1 Initial Characteristics - 196 HMC197 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 Hittite.
- 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.
- 3.2.4 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.