



QUALIFICATION REPORT FOR THE MH1A, MH103A, MH203A AND MH205A PRODUCTS

I. INTRODUCTION

The MH Product family consists of GaAs MESFET products in an unbiased, BiFET configuration. All of the products have the same basic design. Differences in product frequency relate to the on-chip balun, diplexer and matching components. These products include the MH1A, MH103A, MH203A and the MH205A. In the case of the MH203A and MH205A, the diplexer is external to the packaged part. The MH203A and MH205A die are also used in the CVXXX converter product line. The measured parameters consist of Conversion Loss, Input Third Order Intercept Point and Isolation between the LO and RF and LO to IF ports. All of the qualification testing was performed on the MH1A product. The remaining products are qualified by similarity for all tests except for ESD. ESD characterization will be completed for each model.

II. SCOPE

This report summarizes the reliability qualification of the MHXXX Mixers fabricated at an outsourced fabrication facility and assembled in a SOIC-8 plastic package. The reliability data are obtained through the performance of specified accelerated stress tests described in this document.

III. APPLICABLE DOCUMENTS

All the test procedures and test methods are consistent with industry standards. The standards referenced in this document are JEDEC standard 22.



401 River Oaks Parkway
San Jose, CA 95134

SIZE	DWG. NO.		
A	453417		
SCALE	REV.	SHEET	
	-	1	

IV. STRESS AND TEST METHODOLOGY

All components in the qualification testing were tested as loose parts. Prior to each electrical test, a control unit was measured to ensure proper test system calibration. The testing was performed on an in-house mixer test station consisting of three HP8648D signal generators, a Rhode & Schwartz 1066.3010 spectrum analyzer and the frequency appropriate power amplifiers, filters and isolators.

The following table defines the test conditions and pass/fail criteria

Measurement	LO Frequency and Power	RF Frequency and Power	IF Frequency	Pass/Fail
Conversion Loss (1)	1450 MHz; 17 dBm	1700 MHz; 0 dBm	250 MHz	Fail if CL increases by 1 dB or more
Conversion Loss (2)	1950 MHz; 17 dBm	2000 MHz; 0 dBm	50 MHz	
Conversion Loss (3)	1750 MHz; 17 dBm	2000 MHz; 0 dBm	250 MHz	
Input Intercept Point (1)	1450 MHz; 17 dBm	1700 MHz; 0 dBm	250 MHz	Fail if IIP3 drops by more than 2 dBm
Input Intercept Point (2)	1950 MHz; 17 dBm	2000 MHz; 0 dBm	50 MHz	
Input Intercept Point (3)	1750 MHz; 17 dBm	2000 MHz; 0 dBm	250 MHz	
LO-IF Isolation (1)	1450 MHz; 17 dBm	N/A	N/A	Fail if L-I increases by more than 2 dBm
LO-IF Isolation (2)	1950 MHz; 17 dBm	N/A	N/A	
LO-RF Isolation (1)	1450 MHz; 17 dBm	N/A	N/A	Fail if L-R increases by more than 2 dBm
LO-RF Isolation (2)	1950 MHz; 17 dBm	N/A	N/A	



SIZE
A

DWG. NO.

453417

SCALE

REV.

1

SHEET

2

V. QUALIFICATION TEST PLAN/RESULTS

MH1A/SOIC-8 Products

Stress or Test	Procedures/Conditions	Device Hours/ Cycles	Sample Size	Failed Units	Date	Reference Document	Part Tested
Preconditioning Level 3	Temp. & Humidity Test 192 hrs. @ +30°C/ 60%RH High Temp. Storage Life 24 hrs @+125°C Infrared Solder Reflow (IR) test 3 cycles w/flux immersion. Max Temp = 235 °C	N/A	1 lot of 200 & 2 lots of 100 = 400 parts	0	Q3-Q4 2003	JESD22-A113 JESD22-A101 JESD22-B101 JESD22-103 JESD22-A112.4	MH1A
Temperature Cycle	Test Condition C Temp. -65°C (+0°/-10°C) to +150°C (+10°/-0°C) Dwell time = 10 ≥ 15	500 cycles	3 lots of 45 = total 135	0	Q3-Q4 2003	JESD22-A104-B	MH1A
Unbiased Autoclave	Test Condition C Temp. 121°C (+/-1°C) Pressure = 15 +/-1psig Relative Humidity = 100%	96 (-1, +5) hours	3 lots of 45 = total 135	0	Q3-Q4 2003	JESD22-A102-C	MH1A
Unbiased High Temperature Storage	Temp. 150°C (+/- 5°C)	1000 hours	3 lots of 45 = total 135	0	Q3-Q4 2003	JESD22-A108-B	MH1A
RF Life Test	Temp 125°C LO Drive = +20 dBm @ 1750 MHz RF Drive = +20 dBm @ 1850 MHz	1000 hours	1 lot of 11 & 2 lots of 6 = total 23	0	Q3-Q4 2003	N/A	MH1A
ESD Human Body Model Charged Device Model	HBM: 250 V and 500 V CDM: 250 V and 500 V	N/A	3 lots of 10 parts/voltage = total 120	0	Q3-Q4 2003	JESD22-A114 JESD22-C101-A	MH1A



401 River Oaks Parkway
San Jose, CA 95134

SIZE
A

DWG. NO.

453417

SCALE

REV.

1

SHEET

3

VI. DISCUSSION OF RESULTS

1. Pre-Conditioning

Three lots for a total of 400 MH1A devices have completed pre-conditioning with no failures.

2. Temperature Cycle

Three lots of 45 for a total of 135 parts have completed 500 Temperature Cycles with no failures

3. Unbiased Autoclave

Three lots of 45 for a total of 135 parts have completed 96 hours of Autoclave with no failures

4. Unbiased High Temperature Storage

Three lots of 45 for a total of 135 parts have completed 100 High Temperature Storage with no failures

5. RF Life-Test

Three lots for a total of 23 parts have completed 1000 hours of life test under RF Drive with no failures.

6. ESD

The ESD testing for this qualification consisted of 10 parts per voltage instead of the 3 parts per voltage defined in the JEDEC specification. The increased sample set was stressed because the original version of the MH1A product fabricated internally at WJCI is a Class 0 part (Human Body Model). This testing shows that a Class 1B rating is achieved in this process. A Class 1B rating is defined as having parts pass an exposure to an ESD pulse of 500 V. In addition, the Charged Device Model testing indicates that this part is Class III on the CDM rating scale. A Class III rating is defined as having parts pass an exposure to an ESD pulse of 500 V. Because some of the internal passive components are of different values on the various designs, additional ESD testing should be performed on each of the product models in order to insure that a Class 1B rating is maintained.

VII. CONCLUSIONS

The MHXXX mixers in the SOIC-8 package are reliable products that have passed industry standard qualification testing.



SIZE
A

DWG. NO.

453417

SCALE

REV.

1

SHEET

4