Report No. 11317
November 1998

PERFORMANCE VERIFICATION TEST REPORT
METSAT AMSU-A2 RECEIVER ASSEMBLY
FOR
INTEGRATED ADVANCED MICROWAVE SOUNDING UNIT-A
(AMSU-A)

CONTRACT NO. NAS5-32314
CDRL 208

NOVEMBER 1998

SUBMITTED TO

NATIONAL AERONAUTICS AND SPACE ADMINISTERATION
GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND 20771

SUBMITTED BY

AEROJET ELECTRONIC SYSTEMS PLANT
1100 WST HOLLYVALE STREET
AZUSA, CALIFORNIA 91702

Report No. 11317
November 1998

AMSU-A RECEIVER VERIFICATION TEST REPORT

LEVEL OF ASSEMBLY:	**SUBASSEMBLY**
TEST ITEM:	**AMSU-A2 RECEIVER ASSEMBLY** **P/N: 1356441-1, S/N: F04**
TYPE OF HARDWARE:	**METSAT FLIGHT MODEL (FM)**
TYPE OF TEST:	**FUNCTIONAL PERFORMANCE**
VERIFICATION TEST PROCEDURE:	**AE-26002/6A**
TEST FACILITY LOCATION:	**AESP** **AZUSA, CALIFORNIA**

SIGNATURE:

TEST ENGINEER: _____ **DATE:** 11/11/1998

TABLE OF CONTENTS

1.0 INTRODUCTION

The AMSU-A receiver subsystem comprises two separated receiver assemblies; AMSU-A1 and AMSU-A2 (P/N 1356441-1). The AMSU-A1 receiver contains 13 channels and the AMSU-A2 receiver 2 channels. The AMSU-A1 receiver assembly is further divided into two parts; AMSU-A1-1 (P/N 1356429-1) and AMSU-A1-2 (P/N 1356409-1), which contain 9 and 4 channels, respectively. Figures 1 and 2 illustrate the functional block diagrams of the AMSU-A1 and AMSU-A2 receivers.

The AMSU-A receiver subsystem stands in between the antenna and signal processing subsystems of the AMSU-A instrument and comprises the RF and IF components from RF isolators to IF attenuators as shown in Figures 1 and 2. It receives the RF signals from the antenna subsystem, down-converts the RF signals to IF signals, amplifies and defines the IF signals to proper power level and frequency bandwidth as specified for each channel, and inputs the IF signals to the signal processing subsystem.

The test reports for the METSAT AMSU-A receiver subsystem are prepared separately for the A1 and A2 receivers so that each receiver stands alone during integration of instruments into the spacecraft. This test report presents the test data of the METSAT AMSU-A2 Flight Model No. 4 (FM-4) receiver. The tests are performed per the Acceptance Test Procedure for the AMSU-A Receiver Subsystem, AE-26002/6A. The functional performance tests are conducted either at the component or subsystem level. While the component-level tests are performed over the entire operating temperature range predicted by thermal analysis, the subsystem-level tests are conducted at ambient temperature only.

2.0 REASON FOR TEST

The Acceptance Test Procedure for the AMSU-A Receiver Subsystem, AE-26002/6A, is prepared to describe in detail the configuration of the test setups and how the tests are to be conducted to verify that the receiver subsystem meets the specifications as required either in the AMSU-A Instrument Performance and Operation Specification, S-480-80, or in AMSU-A Receiver Subsystem Specification, AE-26608, derived by the Aerojet System Engineering. Test results that verify the conformance to the specifications demonstrates the acceptability of that particular receiver.

3.0 ACCEPTANCE TEST

The acceptance tests for the AMSU-A receiver subsystem are performed either at the component or subsystem level. The component-level tests are conducted per the Acceptance Test Procedure of each component at supplier's facilities. The subsystem-level tests are conducted per the Acceptance Test Procedure (ATP), AE-26002/6A at Aerojet Azusa facility.

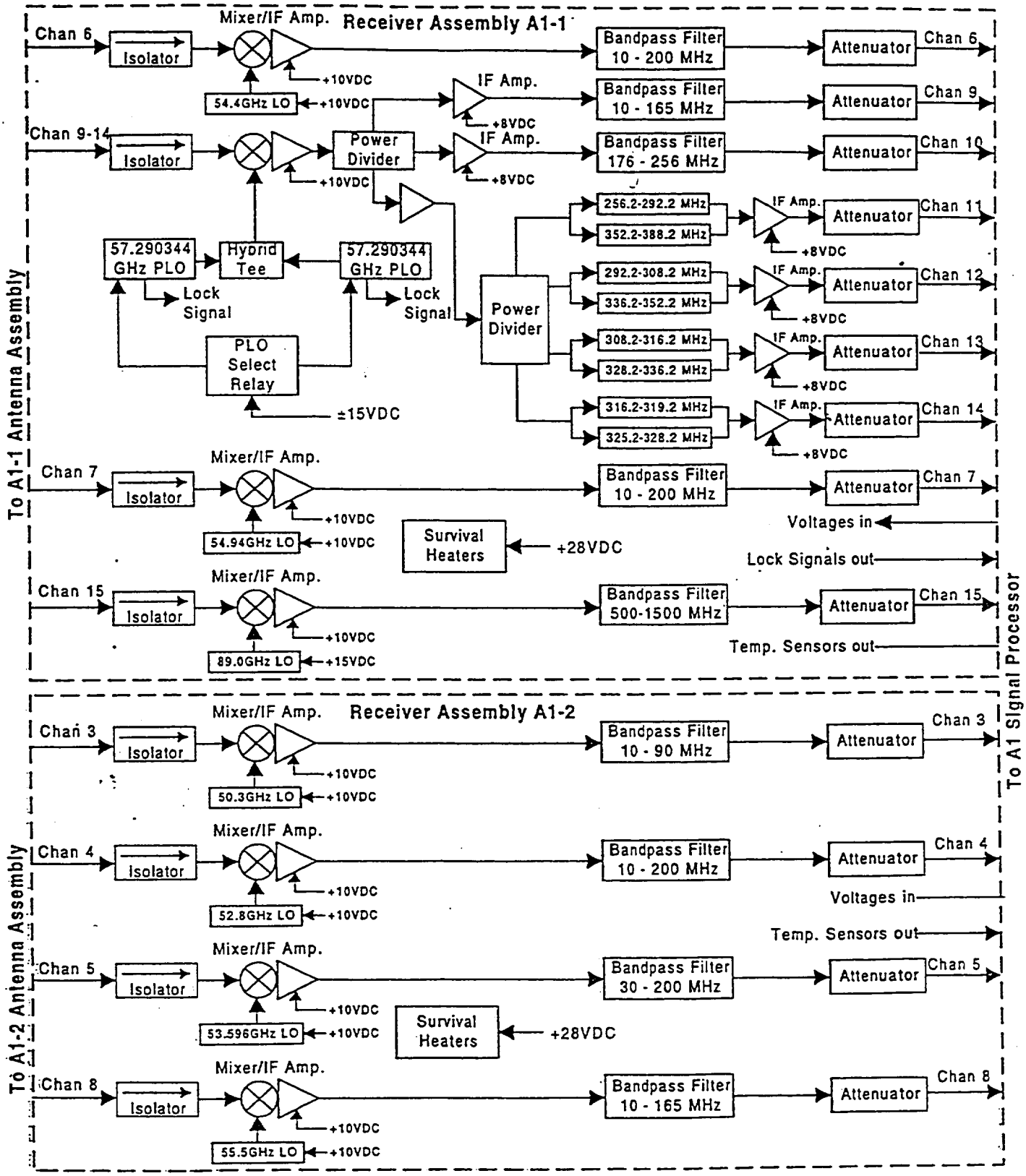

Figure 1. AMSU-A1 Receiver Functional Block Diagram

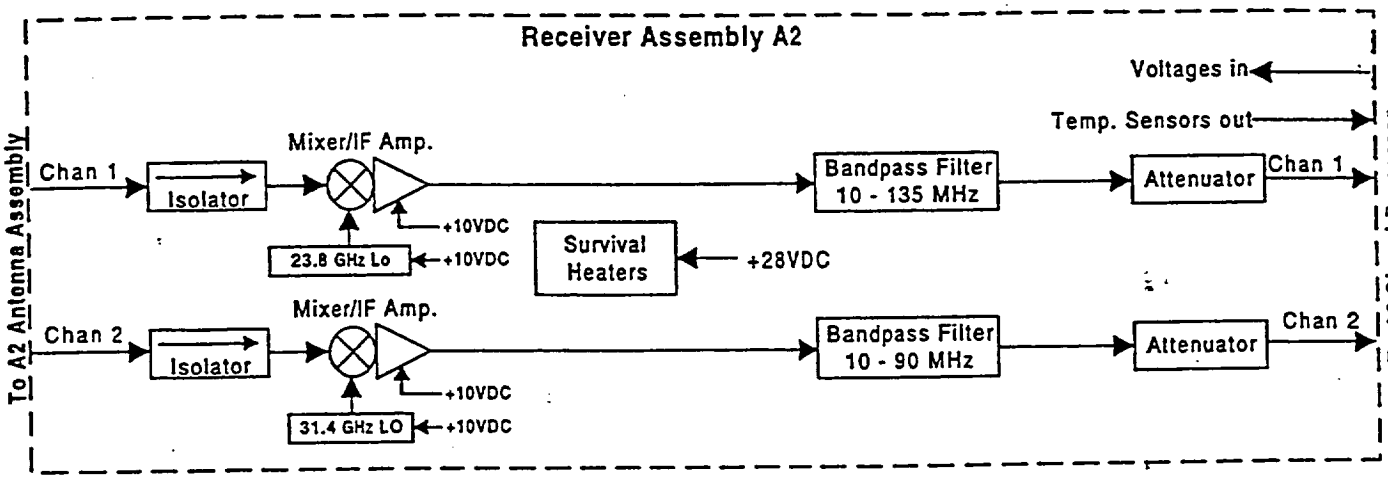

Figure 2. AMSU-A2 Receiver Functional Block Diagram

The component-level tests include the center frequency, center frequency stability, bandpass characteristics, gain stability, and gain compression. Although the bandpass characteristics can change slightly in subsystem level, these performances are mainly dependent on the component characteristics. The subsystem-level tests include the center frequency, IF output power, bandpass characteristics, noise figure, noise power stability, and the tunable short test (for Protoflight Model only).

The subsystem-level tests are performed on the AMSU-A2 receiver. However, since the diplexer of the AMSU-A2 system is inseparably integrated to the receiver, the acceptance tests are conducted with the feedhorn directly connected to the diplexer that precedes the receiver. These tests are performed at room ambient temperature only.

Wire connections between the D-sub connectors and platinum resistance temperature (PRT) sensors and thermistors, and D-sub connector and survival heaters through the thermal switches are verified by measuring either the resistances between the respective two pins or the voltages across the two respective pins. The component bias voltages are verified by measuring the voltages across the two respective banana jacks of the breakout box that are connected to corresponding pins of the D-sub connector.

The subsystem-level tests went smoothly except an error in the LO power adjustment for the channel 1 mixer/IF amplifier (P/N: 1331562-11, S/N: 7A41). While the performance of the unit was optimized at +7dBm at the component level, the LO power level of the mixer was already set at +10.5dBm as nominally applied to the mixers in previous receivers, resulting in higher noise figure of 5.3dB against the specification of 4.5dB. When the LO power of the mixer was reduced to +7dBm, the noise figure of the channel was improved to 4.27dB.

The tunable short tests were not performed as they were performed on previous EOS AMSU-A2 receiver.

4.0 ORGANIZATION OF TEST DATA

The test data are organized in the following formats. The test data obtained at the component level are first summarized for each category for all applicable receiver channels. The bandpass characteristics of the filters are summarized only for the data measured at mid-temperature. Supporting component test data over the operating temperature range then follows the summaries. The subsystem-level test data then follows the component test data. Test data recorded in the test sheet as prepared in the Acceptance Test Procedure and related data plots are included in this test report.

5.0 SUMMARY AND RECOMMENDATIONS

The METSAT AMSU-A2 FM-4 receiver subsystem successfully passed all performance requirements and was delivered to the System Engineering for system integration and test. The test data indicated adequate margins for all performance specifications.

6.0 TEST DATA

In the following, the component and subsystem-level test data are organized as delineated in Paragraph 4.0.

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COMPONENT-LEVEL TEST DATA

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CENTER FREQUENCY AND FREQUENCY STABILITY

FOR

LOCAL OSCILLATORS (LOs)
(DROs)

CENTER FREQUENCY OF LOs

Channel No.	1	2
Specification (GHz)	23.8	31.4
Setting Accuracy (+/-GHz)	0.002	0.002
Measured (GHz)	23.80050	31.40182

FREQUENCY STABILITY OF LOs

Channel No.	1	2
Short-Term Specification (+/-MHz)	8	8
Setting Accuracy (+/-MHz)	2	2
W/ Temp. & Voltage (+/-MHz)	6	6
Measured (MHz) Total	+0.93, -1.92	+4.22, -3.48
Long-Term Specification (+/-MHz)	2	2
By Design or Analysis * (+/-MHz)	0.1	0.1

* Based on accelerated life-test data of DROs.

Channel 1 LO

DRO (P/N: 1336610-1, S/N: 87057)

LITTON
Solid State

TEST DATA SHEET 7.2
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET N/A FINAL DATA SET ✓

LITTON TYPE LS K 9604 CF
SERIAL NUMBER: 87057 QUAL TEST N/A
AESD 1336610-1
ACCEPT TEST ✓

Basic Electrical Test; Ref. Test Para. 5.2.2

SPECIFICATION	MEASUREMENT AT Tnom ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	18	°C	Table IIIB
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	65.1	mA	Table IIIB
Input Power, P_{diss}	0.651	W DC	P_{diss} max
Frequency, f_{Tnom}	23.80050	GHz	Table IIIB
RF Output Power, P_{Tnom}	12.4	dBm	12 to 17 dBm
Frequency Setting Accuracy, Δf_S (= f_{Tnom}-F_o)	0.5	MHz	

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.3

Measurement at 9.5 VDC or at 9.5 VDC			
Temperature	18	°C	Table IIIB
Input Voltage	9.5	VDC	9.5 VDC or Para. 5.2.3.2
Input Current	65.1	mA	Table IIIB
Frequency, f_{meas}	23.80050	GHz	Table IIIB
RF Output Power, P_{meas}	12.4	dBm	12 to 17 dBm
Measurement at 10.5 VDC or at 10.5 VDC			
Temperature	18	°C	Table IIIB
Input Voltage	10.5	VDC	10.5 VDC or Para. 5.2.3.3
Input Current	65.1	mA	Table IIIB
Frequency, f_{meas}	23.80050	GHz	Table IIIB
RF Output Power, P_{meas}	12.4	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{Tnom}$,

Δf_V at 9.5 VDC or at 9.5 VDC = Ø MHz
Δf_V at 10.5 VDC or at 10.5 VDC = Ø MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{Tnom}$,

ΔP_V at 9.5 VDC or at 9.5 VDC = Ø dB
ΔP_V at 10.5 VDC or at 10.5 VDC = Ø dB

Accept ✓ Reject _____

Test Performed by VNE Date 4-17-98
Litton QA _____ Date _____

CODE IDENT NO.	SIZE	NUMBER	REV	SHEET 38 OF 68
56348	A	1300823	B3	

LITTON
Solid State

TEST DATA SHEET 7.3
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET N/A FINAL DATA SET ✓

LITTON TYPE LS K 9604 CF AESD 1336610- 1
SERIAL NUMBER: 87057 QUAL TEST N/A ACCEPT TEST ✓

Temperature Testing at T=10°C, Ref. Test Para. 5.2.5.1

SPECIFICATION	MEASUREMENT AT T=10° ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	10	°C	10° ± 1°C
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	65.0	mA	Table IIIB
Input Power, P_{diss}	0.650	W DC	Pdiss max
Frequency, $f_{10°C}$	23.80057	GHz	Table IIIB
RF Output Power, $P_{10°C}$	12.5	dBm	12 to 17 dBm
Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.5.1			
Measurement at 9.5 VDC or at 9.5 VDC			
Temperature	10	°C	Table IIIB
Input Voltage	9.5	VDC	9.5 VDC or Para. 5.2.3.2
Input Current	64.9	mA	Table IIIB
Frequency, f_{meas}	23.80056	GHz	Table IIIB
RF Output Power, P_{meas}	12.5	dBm	12 to 17 dBm
Measurement at 10.5 VDC or at 10.5 VDC			
Temperature	10	°C	Table IIIB
Input Voltage	10.5	VDC	10.5 VDC or Para. 5.2.3.3
Input Current	65.0	mA	Table IIIB
Frequency, f_{meas}	23.80054	GHz	Table IIIB
RF Output Power, P_{meas}	12.5	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{10°C}$:

Δf_V at 9.5 VDC or at 9.5	VDC =	0.01	MHz
Δf_V at 10.5 VDC or at 10.5	VDC =	-0.03	MHz
Δf_T at 10.0 VDC ($=f_{10°C} - f_{Tnom}$)	=	0.07	MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{10°C}$:

ΔP_V at 9.5 VDC or at 9.5	VDC =	0	dB
ΔP_V at 10.5 VDC or at 10.5	VDC =	0	dB
ΔP_T at 10.0 VDC ($=P_{10°C} - P_{Tnom}$)	=	0.1	dB

Accept ✓ Reject _____

Test Performed by VMD 08 NC LIT Date 4-17-98
Litton Q.A. _____ Date 29 [illegible]

LITTON
Solid State

TEST DATA SHEET 7.4
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET N/A FINAL DATA SET ✓

LITTON TYPE LS K 9604 CF
SERIAL NUMBER: 87057 QUAL TEST N/A AESD 1336610- 1
ACCEPT TEST ✓

Temperature Extreme Testing at Tmin, Ref. Test Para. 5.2.5.2

SPECIFICATION	MEASUREMENT AT Tmin ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	-5	°C	Table IIIB
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	65.1	mA	Table IIIB
Input Power, P_{diss}	0.651	W DC	Pdiss max
Frequency, f_{Tmin}	23.80062	GHz	Table IIIB
RF Output Power, P_{Tmin}	12.5	dBm	12 to 17 dBm

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.5.2

Measurement at 9.5 VDC or at 9.5 VDC			
Temperature	-5	°C	Table IIIB
Input Voltage	9.5	VDC	9.5 VDC or Para 5.2.3.2
Input Current	65.2	mA	Table IIIB
Frequency, f_{meas}	23.80060	GHz	Table IIIB
RF Output Power, P_{meas}	12.5	dBm	12 to 17 dBm

Measurement at 10.5 VDC or at 10.5 VDC			
Temperature	-5	°C	Table IIIB
Input Voltage	10.5	VDC	10.5 VDC or Para 5.2.3.3
Input Current	65.2	mA	Table IIIB
Frequency, f_{meas}	23.80059	GHz	Table IIIB
RF Output Power, P_{meas}	12.5	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{Tmin}$:

Δf_V at 9.5 VDC or at 9.5	VDC =	-0.02	MHz
Δf_V at 10.5 VDC or at 10.5	VDC =	-8.89	MHz
Δf_T at 10.0 VDC (=$f_{Tmin} - f_{Tnom}$)		0.12	MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{Tmin}$:

ΔP_V at 9.5 VDC or at 9.5	VDC =	0.0	dB
ΔP_V at 10.5 VDC or at 10.5	VDC =	0.1	dB
ΔP_T at 10.0 VDC (=$P_{Tmin} - P_{Tnom}$)	=	-0.1	dB

Accept ✓ Reject

Test Performed by VN Date 4-17-98
Litton Q.A. [illegible] Date [illegible]

LITTON
Solid State

TEST DATA SHEET 7.5
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET N/A FINAL DATA SET ✓

LITTON TYPE LS K 9604 CF
SERIAL NUMBER: 87057 QUAL TEST N/A
AESD 1336610- 1
ACCEPT TEST ✓

Temperature Testing at T=30°C, Ref. Test Para. 5.2.5.3

SPECIFICATION	MEASUREMENT AT T=30° ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	30	°C	30° ± 1°C
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	65.4	mA	Table IIIB
Input Power, P_{diss}	0.654	W DC	Pdiss max
Frequency, $f_{30°C}$	23.79972	GHz	Table IIIB
RF Output Power, $P_{30°C}$	12.3	dBm	12 to 17 dBm

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.5.3

Measurement at 9.5 VDC or at 9.5 VDC			
Temperature	30	°C	Table IIIB
Input Voltage	9.5	VDC	9.5 VDC or Para. 5.2.3.2
Input Current	65.4	mA	Table IIIB
Frequency, f_{meas}	23.79972	GHz	Table IIIB
RF Output Power, P_{meas}	12.3	dBm	12 to 17 dBm
Measurement at 10.5 VDC or at 10.5 VDC			
Temperature	30	°C	Table IIIB
Input Voltage	10.5	VDC	10.5 VDC or Para. 5.2.3.3
Input Current	65.4	mA	Table IIIB
Frequency, f_{meas}	23.79971	GHz	Table IIIB
RF Output Power, P_{meas}	12.3	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{30°C}$:

Δf_V at 9.5 VDC or at 9.5	VDC =	0	MHz
Δf_V at 10.5 VDC or at 10.5	VDC =	- 0.01	MHz
Δf_T at 10.0 VDC (=$f_{30°C}$ - f_{Tnom})	=	- 0.78	MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{30°C}$:

ΔP_V at 9.5 VDC or at 9.5	VDC =	0	dB
ΔP_V at 10.5 VDC or at 10.5	VDC =	0	dB
ΔP_T at 10.0 VDC (=$P_{30°C}$ - P_{Tnom})	=	- 0.1	dB

Accept ✓ Reject _____

Test Performed by VSM LITTON
Date 4-17-98
Litton Q.A.
Date

CODE IDENT NO.	SIZE	NUMBER	REV	SHEET 41 OF 68
56348	A	1300823	B3	

LITTON
Solid State

TEST DATA SHEET 7.6
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET N/A FINAL DATA SET ✓

LITTON TYPE LS K 9604 CF
SERIAL NUMBER: 87057 QUAL TEST N/A
AESD 1336610- 1
ACCEPT TEST ✓

Temperature Extreme Testing at Tmax, Ref. Test Para. 5.2.5.4

SPECIFICATION	MEASUREMENT AT Tmax ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	40	°C	Table IIIB
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	65.6	mA	Table IIIB
Input Power, P_{diss}	0.656	W DC	Pdiss max
Frequency, f_{Tmax}	23.79872	GHz	Table IIIB
RF Output Power, P_{Tmax}	12.3	dBm	12 to 17 dBm

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.5.4

Measurement at 9.5 VDC or at 9.5 VDC			
Temperature	40	°C	Table IIIB
Input Voltage	9.5	VDC	9.5 VDC or Para 5.2.3.2
Input Current	65.6	mA	Table IIIB
Frequency, f_{meas}	23.79872	GHz	Table IIIB
RF Output Power, P_{meas}	12.3	dBm	12 to 17 dBm
Measurement at 10.5 VDC or at 10.5 VDC			
Temperature	40	°C	Table IIIB
Input Voltage	10.5	VDC	10.5 VDC or Para 5.2.3.3
Input Current	65.6	mA	Table IIIB
Frequency, f_{meas}	23.79873	GHz	Table IIIB
RF Output Power, P_{meas}	12.3	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{Tmax}$:

Δf_V at 9.5 VDC or at 9.5	VDC =	ϕ	MHz
Δf_V at 10.5 VDC or at 10.5	VDC =	+ 0.01	MHz
Δf_T at 10.0V (=f_{Tmax} -f_{Tnom})	=	− 1.78	MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{Tnom}$: Max VN

ΔP_V at 9.5 VDC or at 9.5	VDC =	− 0.1	dB
ΔP_V at 10.5 VDC or at 10.5	VDC =	− 0.1	dB
ΔP_T at 10.0 VDC (=P_{Tmax}-P_{Tnom})	=	− 0.1	dB

Accept ✓ Reject ____

Test Performed by VINSON NC LIT Date 4-17-98
Litton Q.A. ____ Date ____

TEST DATA SHEET 7.7
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET N/A FINAL DATA SET ✓

LITTON TYPE LS K 9604CF AESD 1336610- 1
SERIAL NUMBER: 87057 QUAL TEST N/A ACCEPT TEST ✓

Power Supply Immunity, Ref. Test Para. 5.2.4

SPECIFICATION	MEASUREMENT AT Tnom ±1°C		LIMIT
Initial Measurement			
Temperature	18	°C	Table IIIB
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	65.0	mA	Table IIIB
Input Power	0.650	W DC	Pdiss max
Frequency (f_{Tnom})	23.80065	GHz	Table IIIB
RF Output Power	12.3	dBm	12 to 17 dBm
Frequency Setting Accuracy, Δf_S (= f_{Tnom}-F_o)	0.65	MHz	

Performance After Short Circuit on Power Supply: Ref Test Para 5.2.4.2

Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	65.0	mA	Table IIIB
Input Power	0.650	W DC	Pdiss max
Frequency	23.80063	GHz	Table IIIB
RF Output Power	12.3	dBm	12 to 17 dBm

Over Voltage: Ref Test Para 5.2.4.3

Overvoltage Input Voltage	28	VDC	+28V

Performance After Input Overvoltage

Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	65.0	mA	Table IIIB
Input Power	0.650	W DC	Pdiss max
Frequency	23.80060	GHz	Table IIIB
RF Output Power	12.3	dBm	12 to 17 dBm

Reverse Polarity: Ref Test Para 5.2.4.4

Reverse Input Voltage	−10	VDC	-10.0 ± 0.2 VDC

Performance After Reverse Input Voltage

Input Voltage	VN 10 ~~65~~	VDC	10.0 ± 0.2 VDC
Input Current	65.0	mA	Table IIIB
Input Power	0.650	W DC	Pdiss max
Frequency, f_{Tnom}	23.80059	GHz	Table IIIB
RF Output Power	12.3	dBm	12 to 17 dBm
Frequency Setting Accuracy, Δf_S (= f_{Tnom}-F_o)	0.65	MHz	

Accept ✓ Reject _____

Test Performed by VN Date APR 17-98
Litton Q.A. _____ Date APR 29 1998

CODE IDENT NO.	SIZE	NUMBER	REV	SHEET 43 OF 68
56348	A	1300823	B3	

TEST DATA SHEET 7.23B
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET N/A FINAL DATA SET ✓

LITTON TYPE LS K 9604 CF
SERIAL NUMBER: 87057 QUAL TEST —
AESD 1336610-1
ACCEPT TEST ✓

Frequency Pulling and Load VSWR 2.5:1 max. all phases. Ref Test Para. 5.9

TEST DESCRIPTION		LIMITS
Output Open and Short. Ref. Test Para. 5.9.5		
Temperature	23 °C	24°C ± 5°C
Frequency:	23.80006 GHz	Table IIIB
RF Output Power:	12.3 dBm	12 to 17 dBm
Input Voltage	10 VDC	10 ± 0.2 VDC
Input Current:	65.2 mA	Table IIIB
Results:	✓ Acceptable	No Damage or Degradation

Calculate maximum Frequency Accuracy (both positive and negative),
$\Delta f_{acc} = \Delta f_S$ (Use worst-case Δf_S from 7.2, 7.7, and 7.22A) + Δf_H (from 7.22A) + Δf_L (from 7.23A):

Maximum Δf_{acc} =	0.98 MHz (Positive)	Table IIIB
	−0.11 MHz (Negative)	Table IIIB

Calculate maximum Short-term Frequency Stability (both positive and negative),
$\Delta f_{V+T} = \Delta f_V + \Delta f_T$ (Use worst-case Δf_V and Δf_T from 7.2 thru 7.6):

Maximum Δf_{V+T} =	0.01 MHz (Positive)	Table IIIB
	−1.98 MHz (Negative)	Table IIIB

Calculate maximum overall RF Output Power Stability (both positive and negative),
$\Delta P_{OV} = \Delta P_V + \Delta P_T$ (Use worst-case ΔP_V and ΔP_T from 7.2 thru 7.6) + ΔP_H (from 7.22A) + ΔP_L (from 7.23A):

Maximum ΔP_{OV} =	0 dB (Positive)	1.0 dB
	−0.1 dB (Negative)	-1.0 dB

Accept ✓ Reject —

Test Performed by VN Date 4-23-98

Litton Q.A. [signature] Date APR 2 0 1998

CODE IDENT NO.	SIZE	NUMBER	REV	SHEET 61 OF 68
56348	A	1300823	B3	

Channel 2 LO

DRO (P/N: 1336610-2, S/N: 87056)

TEST DATA SHEET 7.2
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET N/A FINAL DATA SET ✓

LITTON TYPE LSA 9635 CF AESD 1336610-2
SERIAL NUMBER: 87056 QUAL TEST N/A ACCEPT TEST ✓

Basic Electrical Test; Ref. Test Para. 5.2.2

SPECIFICATION	MEASUREMENT AT Tnom ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	18	°C	Table IIIB
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	135.5	mA	Table IIIB
Input Power, P_{diss}	1.355	W DC	P_{diss} max
Frequency, f_{Tnom}	31.40182	GHz	Table IIIB
RF Output Power, P_{Tnom}	15.6	dBm	12 to 17 dBm
Frequency Setting Accuracy, Δf_S (= f_{Tnom}-F_o)	1.82	MHz	

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.3

Measurement at 9.5 VDC or at 9.5 VDC			
Temperature	18	°C	Table IIIB
Input Voltage	9.5	VDC	9.5 VDC or Para. 5.2.3.2
Input Current	135.5	mA	Table IIIB
Frequency, f_{meas}	31.40179	GHz	Table IIIB
RF Output Power, P_{meas}	15.6	dBm	12 to 17 dBm
Measurement at 10.5 VDC or at 10.5 VDC			
Temperature	18	°C	Table IIIB
Input Voltage	10.5	VDC	10.5 VDC or Para. 5.2.3.3
Input Current	135.6	mA	Table IIIB
Frequency, f_{meas}	31.40179	GHz	Table IIIB
RF Output Power, P_{meas}	15.6	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{Tnom}$,

Δf_V at 9.5 VDC or at 9.5 VDC = −0.03 MHz
Δf_V at 10.5 VDC or at 10.5 VDC = −0.03 MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{Tnom}$,

ΔP_V at 9.5 VDC or at 9.5 VDC = Ø dB
ΔP_V at 10.5 VDC or at 10.5 VDC = Ø dB

Accept ✓ Reject ____

Test Performed by VN Date 5-27-98
Litton QA LITTON 1160 Date MAY 28 1998

LITTON
Solid State

TEST DATA SHEET 7.3
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET N/A FINAL DATA SET ✓

LITTON TYPE LS A 9635 CF — AESD 1336610- 2
SERIAL NUMBER: 87056 QUAL TEST N/A — ACCEPT TEST ✓

Temperature Testing at T=10°C, Ref. Test Para. 5.2.5.1

SPECIFICATION	MEASUREMENT AT T=10° ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	10	°C	10° ± 1°C
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	135.4	mA	Table IIIB
Input Power, P_{diss}	1.354	W DC	Pdiss max
Frequency, $f_{10°C}$	31.40267	GHz	Table IIIB
RF Output Power, $P_{10°C}$	15.6	dBm	12 to 17 dBm
Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.5.1			
Measurement at 9.5 VDC or at 9.5 VDC			
Temperature	10	°C	Table IIIB
Input Voltage	9.5	VDC	9.5 VDC or Para. 5.2.3.2
Input Current	135.3	mA	Table IIIB
Frequency, f_{meas}	31.40263	GHz	Table IIIB
RF Output Power, P_{meas}	15.6	dBm	12 to 17 dBm
Measurement at 10.5 VDC or at 10.5 VDC			
Temperature	10	°C	Table IIIB
Input Voltage	10.5	VDC	10.5 VDC or Para. 5.2.3.3
Input Current	135.4	mA	Table IIIB
Frequency, f_{meas}	31.40263	GHz	Table IIIB
RF Output Power, P_{meas}	15.6	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{10°C}$:

Δf_V at 9.5 VDC or at 9.5	VDC =	-0.04	MHz
Δf_V at 10.5 VDC or at 10.5	VDC =	-0.04	MHz
Δf_T at 10.0 VDC ($=f_{10°C} - f_{Tnom}$)	=	0.85	MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{10°C}$:

ΔP_V at 9.5 VDC or at 9.5	VDC =	∅	dB
ΔP_V at 10.5 VDC or at 10.5	VDC =	∅	dB
ΔP_T at 10.0 VDC ($=P_{10°C} - P_{Tnom}$)	=	∅	dB

Accept ✓ Reject _____

Test Performed by VN — Date 5-27-98
Litton Q.A. LITTON M-60 — Date MAY 28 1998

CODE IDENT NO.	SIZE	NUMBER	REV	SHEET 39 OF 68
56348	A	1300823	B3	

TEST DATA SHEET 7.4
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET N/A FINAL DATA SET ✓

LITTON TYPE LS A 9635 CF
SERIAL NUMBER: 87056 QUAL TEST N/A
AESD 1336610- 2
ACCEPT TEST ✓

Temperature Extreme Testing at Tmin, Ref. Test Para. 5.2.5.2

SPECIFICATION	MEASUREMENT AT Tmin ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	-5	°C	Table IIIB
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	134.8	mA	Table IIIB
Input Power, P_{diss}	1.348	W DC	Pdiss max
Frequency, f_{Tmin}	31.40374	GHz	Table IIIB
RF Output Power, P_{Tmin}	15.5	dBm	12 to 17 dBm

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.5.2

Measurement at 9.5 VDC or at 9.5 VDC			
Temperature	-5	°C	Table IIIB
Input Voltage	9.5	VDC	9.5 VDC or Para 5.2.3.2
Input Current	134.7	mA	Table IIIB
Frequency, f_{meas}	31.40375	GHz	Table IIIB
RF Output Power, P_{meas}	15.5	dBm	12 to 17 dBm

Measurement at 10.5 VDC or at 10.5 VDC			
Temperature	-5	°C	Table IIIB
Input Voltage	10.5	VDC	10.5 VDC or Para 5.2.3.3
Input Current	134.8	mA	Table IIIB
Frequency, f_{meas}	31.40377	GHz	Table IIIB
RF Output Power, P_{meas}	15.5	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{Tmin}$:

Δf_V at 9.5 VDC or at 9.5	VDC =	0.01	MHz
Δf_V at 10.5 VDC or at 10.5	VDC =	0.03	MHz
Δf_T at 10.0 VDC (=$f_{Tmin} - f_{Tnom}$)		1.92	MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{Tmin}$:

ΔP_V at 9.5 VDC or at 9.5	VDC =	-0.1	dB
ΔP_V at 10.5 VDC or at 10.5	VDC =	-0.1	dB
ΔP_T at 10.0 VDC (=$P_{Tmin} - P_{Tnom}$)	=	-0.1	dB

Accept ✓ Reject ____

Test Performed by VN Date 5-27-98
Litton Q.A. LITTON Date MAY 28 1998

LITTON
Solid State

TEST DATA SHEET 7.5
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET N/A FINAL DATA SET ✓

LITTON TYPE LS A 9635 CF
SERIAL NUMBER: 87056 QUAL TEST N/A
AESD 1336610- 2
ACCEPT TEST ✓

Temperature Testing at T=30°C, Ref. Test Para. 5.2.5.3

SPECIFICATION	MEASUREMENT AT T=30° ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	30	°C	30° ± 1°C
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	135.6	mA	Table IIIB
Input Power, P_{diss}	1.356	W DC	Pdiss max
Frequency, $f_{30°C}$	31.40124	GHz	Table IIIB
RF Output Power, $P_{30°C}$	15.6	dBm	12 to 17 dBm

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.5.3

Measurement at 9.5 VDC or at 9.5 VDC			
Temperature	30	°C	Table IIIB
Input Voltage	9.5	VDC	9.5 VDC or Para. 5.2.3.2
Input Current	135.6	mA	Table IIIB
Frequency, f_{meas}	31.40117	GHz	Table IIIB
RF Output Power, P_{meas}	15.6	dBm	12 to 17 dBm
Measurement at 10.5 VDC or at 10.5 VDC			
Temperature	30	°C	Table IIIB
Input Voltage	10.5	VDC	10.5 VDC or Para. 5.2.3.3
Input Current	135.6	mA	Table IIIB
Frequency, f_{meas}	31.4012	GHz	Table IIIB
RF Output Power, P_{meas}	15.6	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{30°C}$:

Δf_V at 9.5 VDC or at 9.5	VDC =	-0.07	MHz
Δf_V at 10.5 VDC or at 10.5	VDC =	-0.12	MHz
Δf_T at 10.0 VDC (=$f_{30°C} - f_{Tnom}$)	=	-0.58	MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{30°C}$:

ΔP_V at 9.5 VDC or at 9.5	VDC =	ø	dB
ΔP_V at 10.5 VDC or at 10.5	VDC =	ø	dB
ΔP_T at 10.0 VDC (=$P_{30°C} - P_{Tnom}$)	=	ø	dB

Accept ✓ Reject _____

Test Performed by VN Date 5-27-98
Litton Q.A. LITTON M 60 Date MAY 28 1998

TEST DATA SHEET 7.6
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET N/A FINAL DATA SET ✓

LITTON TYPE LS A 9635 CF AESD 1336610- 2
SERIAL NUMBER: 87056 QUAL TEST N/A ACCEPT TEST ✓

Temperature Extreme Testing at Tmax, Ref. Test Para. 5.2.5.4

SPECIFICATION	MEASUREMENT AT Tmax ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	40	°C	Table IIIB
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	136.5	mA	Table IIIB
Input Power, P_{diss}	1.365	W DC	Pdiss max
Frequency, f_{Tmax}	31.39888	GHz	Table IIIB
RF Output Power, P_{Tmax}	15.6	dBm	12 to 17 dBm

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.5.4

Measurement at 9.5 VDC or at 9.5 VDC			
Temperature	40	°C	Table IIIB
Input Voltage	9.5	VDC	9.5 VDC or Para 5.2.3.2
Input Current	136.5	mA	Table IIIB
requency, f_{meas}	31.39887	GHz	Table IIIB
RF Output Power, P_{meas}	15.6	dBm	12 to 17 dBm
Measurement at 10.5 VDC or at 10.5 VDC			
Temperature	40	°C	Table IIIB
Input Voltage	10.5	VDC	10.5 VDC or Para 5.2.3.3
Input Current	136.5	mA	Table IIIB
Frequency, f_{meas}	31.39885	GHz	Table IIIB
RF Output Power, P_{meas}	15.6	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{Tmax}$:

Δf_V at 9.5 VDC or at 9.5	VDC =	-0.01	MHz
Δf_V at 10.5 VDC or at 10.5	VDC =	-0.03	MHz
Δf_T at 10.0V ($=f_{Tmax} - f_{Tnom}$)	=	-2.94	MHz

Calculate RF Output Power Variation. $\Delta P_V = P_{meas} - P_{Tnom}$:

ΔP_V at 9.5 VDC or at 9.5	VDC =	∅	dB
ΔP_V at 10.5 VDC or at 10.5	VDC =	∅	dB
ΔP_T at 10.0 VDC ($=P_{Tmax} - P_{Tnom}$)	=	∅	dB

Accept ✓ Reject

Test Performed by VN Date 5-27-98
itton Q.A. LITTON M 60 Date MAY 28 1998

CODE IDENT NO.	SIZE	NUMBER	REV	SHEET 42 OF 68
56348	A	1300823	B3	

TEST DATA SHEET 7.7
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET N/A FINAL DATA SET ✓

LITTON TYPE LS A 9635 CF AESD 1336610- 2
SERIAL NUMBER: 87056 QUAL TEST N/A ACCEPT TEST ✓

Power Supply Immunity, Ref. Test Para. 5.2.4

SPECIFICATION	MEASUREMENT AT Tnom ±1°C		LIMIT
Initial Measurement			
Temperature	18	°C	Table IIIB
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	1359	mA	Table IIIB
Input Power	1.359	W DC	Pdiss max
Frequency (f_{Tnom})	31.40125	GHz	Table IIIB
RF Output Power	15.6	dBm	12 to 17 dBm
Frequency Setting Accuracy, Δf_S (= f_{Tnom}-F_o)	1.25	MHz	

Performance After Short Circuit on Power Supply: Ref Test Para 5.2.4.2

Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	135.8	mA	Table IIIB
Input Power	1.358	W DC	Pdiss max
Frequency	31.40132	GHz	Table IIIB
RF Output Power	15.6	dBm	12 to 17 dBm

ver Voltage: Ref Test Para 5.2.4.3

Overvoltage Input Voltage	28	VDC	+28V

Performance After Input Overvoltage

Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	135.8	mA	Table IIIB
Input Power	1.358	W DC	Pdiss max
Frequency	31.40150	GHz	Table IIIB
RF Output Power	15.6	dBm	12 to 17 dBm

Reverse Polarity: Ref Test Para 5.2.4.4

Reverse Input Voltage	-10	VDC	-10.0 ± 0.2 VDC

Performance After Reverse Input Voltage

Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	135.8	mA	Table IIIB
Input Power	1.358	W DC	Pdiss max
Frequency, f_{Tnom}	31.40160	GHz	Table IIIB
RF Output Power	15.6	dBm	12 to 17 dBm
Frequency Setting Accuracy, Δf_S (= f_{Tnom}-F_o)	1.6	MHz	

Accept ✓ Reject _____

Test Performed by VN Date 5-27-98
Litton Q.A. LITTON M.SO Date MAY 28 1998

TEST DATA SHEET 7.23B
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET N/A FINAL DATA SET ✓

LITTON TYPE LS A 9635CF — AESD 1336610- 2
SERIAL NUMBER: 87056 QUAL TEST N/A — ACCEPT TEST ✓

Frequency Pulling and Load VSWR 2.5:1 max. all phases. Ref Test Para. 5.9

TEST DESCRIPTION		LIMITS
Output Open and Short. Ref. Test Para. 5.9.5		
Temperature	24 °C	24°C ± 5°C
Frequency:	31.40190 GHz	Table IIIB
RF Output Power:	15.6 dBm	12 to 17 dBm
Input Voltage	10 VDC	10 ± 0.2 VDC
Input Current:	135.5 mA	Table IIIB
Results:	✓ Acceptable	No Damage or Degradation

Calculate maximum Frequency Accuracy (both positive and negative),
$f_{acc} = \Delta f_S$ (Use worst-case Δf_S from 7.2, 7.7, and 7.22A) + Δf_H (from 7.22A) + Δf_L (from 7.23A):

Maximum Δf_{acc} =	1.85	MHz (Positive)	Table IIIB
	− 0.12	MHz (Negative)	Table IIIB

Calculate maximum Short-term Frequency Stability (both positive and negative),
$\Delta f_{V+T} = \Delta f_V + \Delta f_T$ (Use worst-case Δf_V and Δf_T from 7.2 thru 7.6):

Maximum Δf_{V+T} =	1.95	MHz (Positive)	Table IIIB
	− 3.06	MHz (Negative)	Table IIIB

Calculate maximum overall RF Output Power Stability (both positive and negative),
$\Delta P_{OV} = \Delta P_V + \Delta P_T$ (Use worst-case ΔP_V and ΔP_T from 7.2 thru 7.6) + ΔP_H (from 7.22A) + ΔP_L (from 7.23A):

Maximum ΔP_{OV} =	0.41	dB (Positive)	1.0 dB
	− 0.30	dB (Negative)	-1.0 dB

Accept ✓ Reject _____

Test Performed by VN Date 5-28-98

Litton Q.A. LITTON M60 Date MAY 28 1998

CODE IDENT NO.	SIZE	NUMBER	REV	SHEET 61 OF 68
56348	A	1300823	B3	

Report No. 11317
November 1998

BANDPASS CHARACTERISTICS

FOR

IF FILTERS

3 dB BANDWIDTH OF IF FILTERS

Channel No.	1	2
Specification (MHz)	135	90
3 dB bandwidth (MHz) *	127	82
f_L - f_H (MHz)	8-135	8-90
Measured (MHz)		
3 dB bandwidth (MHz)	125.51	80.16
f_L - f_H (MHz)	8.60-134.11	9.06-89.22

* Actual specifications for IF filters.

Channel 1 Mixer/Amplifier

Mixer/Amplifier (P/N: 1331562-11, S/N: 7A41)

TEST DATA SHEET NO. 6. AMPLIFIER TESTS

REF: SDAR#29

GAIN FLATNESS TEST: ATP PARAGRAPH 5.1.3

GAIN FLATNESS (dB)ppK	SPEC. GAIN FLATNESS (dB)ppK	ACC	REJ
0.65	0.50	—	QA 1

GAIN VERSUS VOLTAGE SENSITIVITY TEST: ATP PARAGRAPH 5.1.4

ENGINEERING DATA ONLY. SEE AE24869 PARA. 3.2.1.15.2

AMPLIFIER VOLTAGE	GAIN READING (dBm)	ΔG/ΔV	SPEC. ΔG/ΔV	ACC	REJ
9.96	~~70.97~~ 70.50	2.5	1.0	—	QA 1
10.00	~~71.05~~ 70.60				
10.04	~~71.13~~ 70.70				
ΔGv =	0.20 dB				

	DATE	ACC	REJ
SPACEK QA	6-5-98	—	QA 1

PART NO. 1331562-11G

SER NO. 7A41

TESTED BY:

END DATE: 6-5-98

END TIME: 1600

TEST FAILURE: _____

FAILURE ANALYSIS NO. _____

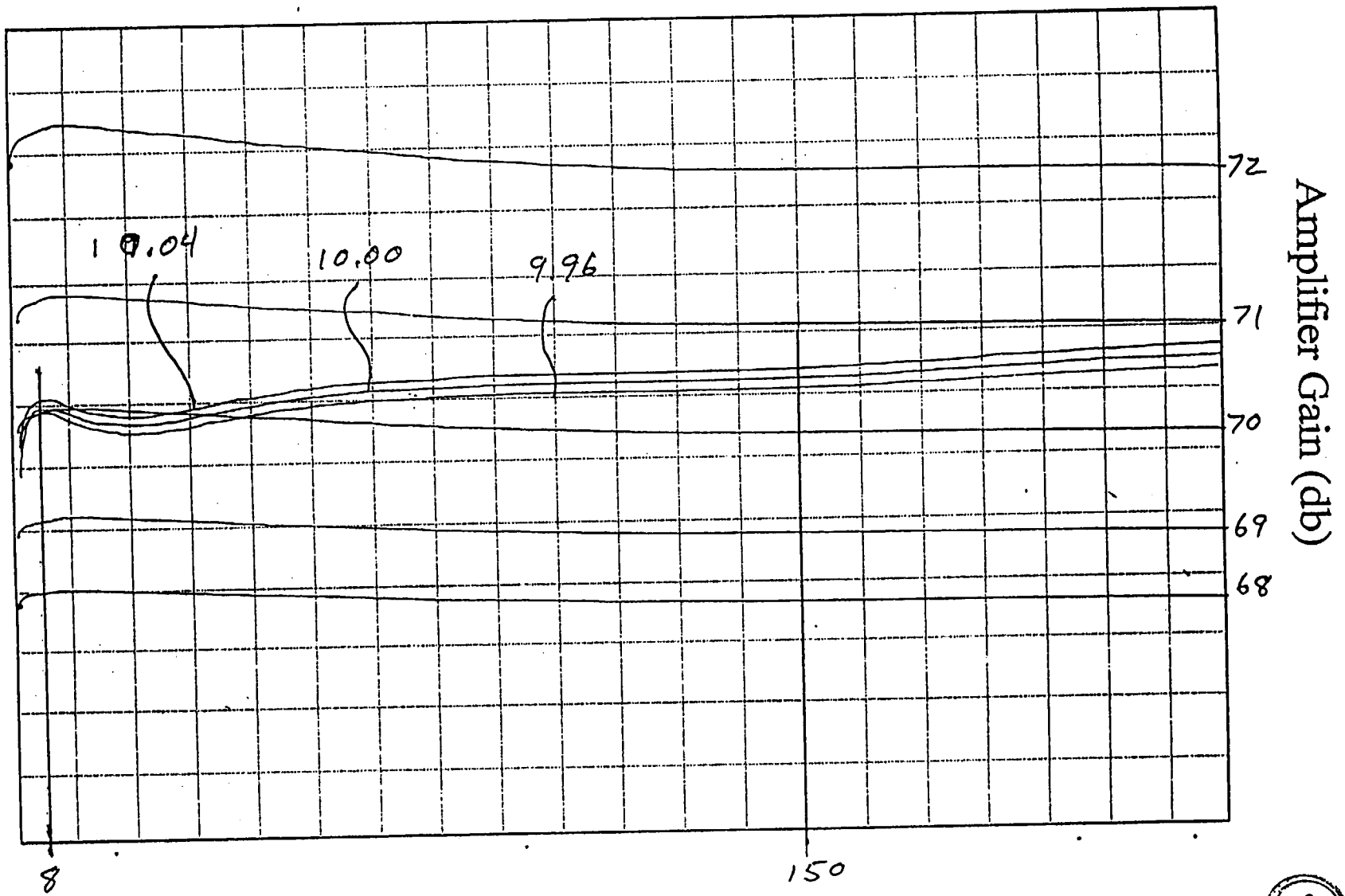
Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara,CA,93101

SPACEK LABS, INC.
MM-WAVE TECHNOLOGY

Amplifier Gain

Model No. 1331562-11
Serial No. 7A 41
Date 6-5-98
Tested By 777

Amb Temp +23



84
1

TEST DATA SHEET NO. 7. AMPLIFIER TESTS

GAIN VERSUS TEMPERATURE SENSITIVITY TEST: ATP PARAGRAPH 5.1.5

Nominal Temperature (°C)	Relative Gain	ΔG/ΔT	SPEC	ACC	REJ
T1 −6	G_{T1} 71.52				
		* 0.009	0.035dB/°C	QA 1	
T2 +8	G_{T2} 71.39				
		* 0.022	0.020dB/°C		QA 1
T3 +28	G_{T3} 70.95				
		* 0.026	0.035dB/°C	QA 1	
T4 +40	G_{T4} 70.64				

* Perform the following calculations and record on the TDS

$$\Delta G/\Delta T = \frac{G_{Ti} - G_{Ti+1}}{T_i - T_{i+1}} \qquad i = 1,2,3,4$$

ΔG_T = 0.88 dB

$\Delta G_{TOTAL} = \Delta G_V + \Delta G_T + 0.4$ = 1.48 dB Spec 1.4dB ACC____ REJ____ QA 1

DATE ACC REJ ENGINEERING DATA ONLY. SEE AE2C PARA. 3.2.1.15.

PART NO. 1331562-11F SPACEK QA 6-8-98 ___ QA 1

SER NO. 7A41 TEST FAILURE: _____

TESTED BY: 7FH FAILURE ANALYSIS NO. _____

END DATE: 6-5-98

END TIME: 1600

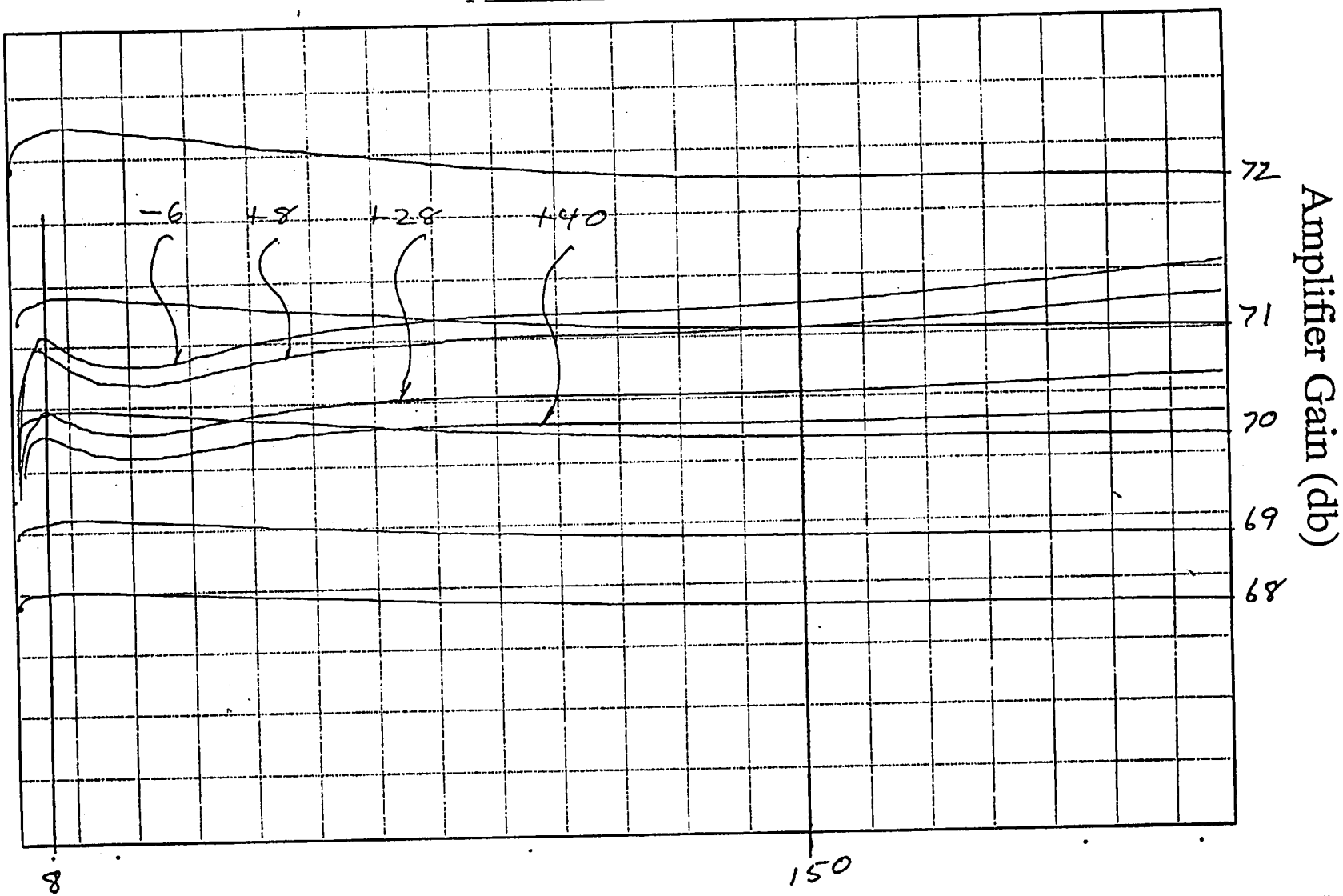
Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara,CA,93101

SPACEK LABS, INC.
MM-WAVE TECHNOLOGY

Amplifier Gain

Model No. 1331562-11
Serial No. 7A41
Date 6-5-98
Tested By TTK

Amb Temp +23°C



TEST DATA SHEET NO. 8. AMPLIFIER TESTS

OUTPUT 1.0 dB COMPRESSION POINT TEST: ATP PARAGRAPH 5.1.6

DASH #

11	12	13	14	15	16	17	18	19	20	FREQ. (MHz)	P2 COMP (dBm)	OUTPUT COMP. at+10(dBm)	SPEC. COMP. PT.(dBm)	ACC	REJ
X	X	X	X		X	X	X	X		10	-2.3	0.7	1.0	SA	
				X						20					
	X	X								50					
X	X	X	X	X	X	X	X			100	-2.4	0.6	1.0	SA	
X										150	-2.5	0.5	1.0	SA	
			X	X	X	X	X	X		200					
								X		400					
									X	500					
									X	1000					
									X	1500					

AMPLIFIER NOISE FIGURE AND TOTAL POWER TEST: ATP PARAGRAPH 5.1.7

DATE: 6-5-98 AMBIENT ROOM TEMPERATURE °C: 23°C

AMPLIFIER OUTPUT POWER AMBIENT (dBm)	AMPLIFIER OUTPUT POWER (-77 K)(dBm)	Y FACTOR (dB)	AMPLIFIER NOISE FIGURE (dB)
-22.9	-26.7	3.8	1.04

Above data taken with Daden filter attached (except -19) .

Intermediate test results for information only

DATE ACC REJ

PART NO. 1331562-11F SPACEK QA 6-8-98 SA

SER NO. 7A41 TEST FAILURE:

TESTED BY: TH FAILURE ANALYSIS NO.

END DATE: 6-5-98

END TIME: 1600

Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara,CA,93101

TEST DATA SHEET NO. 13. MIXER-AMPLIFIER ASSEMBLY TESTS

NOISE FIGURE, TOTAL POWER AND CURRENT VS. TEMPERATURE TEST: ATP PARA 5.4.8.

DATE: 8-20-98 AMBIENT ROOM TEMPERATURE °C: +21

UUT TEMP °C.	UUT CURRENT	MIXER-AMP. OUTPUT POWER (AMBIENT) (dBm)	MIXER-AMP. OUTPUT POWER (77 DEG K) (dBm)	Y FACTOR (dB)	MIXER-AMP. NOISE FIGURE (dB)	SPEC. MIXER-AMP. NOISE FIGURE (dB)	ACC	REJ
-6	43.1	-22.20	-24.10	1.90	3.3	3.5	ACC	
+8	43.1	-22.40	-24.30	1.90	3.3	3.5	ACC	
+28	43.2	-22.70	-24.60	1.90	3.3	3.5	ACC	
+40	43.3	-22.90	-24.75	1.85	3.4	3.5	ACC	

Noise figure change 0.1 dB Spec is .5dB peak to peak on -20 ACC REJ

NOTE: *Above data to be taken with the Daden filter, except on the -19 unit.*

NEΔT-NOISE POWER STABILITY TEST: ATP PARAGRAPH 5.4.9

Date: 8/23/98 Ambient Room Temperature °C: 24

Attach computer generated *NEΔT* spreadsheet to this test data sheet.

Record the calculated Nps(K) from spreadsheet data: 0.060

Record Nps(K) 0.07 for dash number from Aerojet specification AE-24869, Table II.
Accept units if calculated Nps(K) is less than or equal to specified Nps(K), otherwise reject.

ACC REJ

	DATE	ACC	REJ
SPACEK QA	8-25-98	ACC	

PART NO. 1331562-115

SER NO. 7A41

TESTED BY: [illegible]

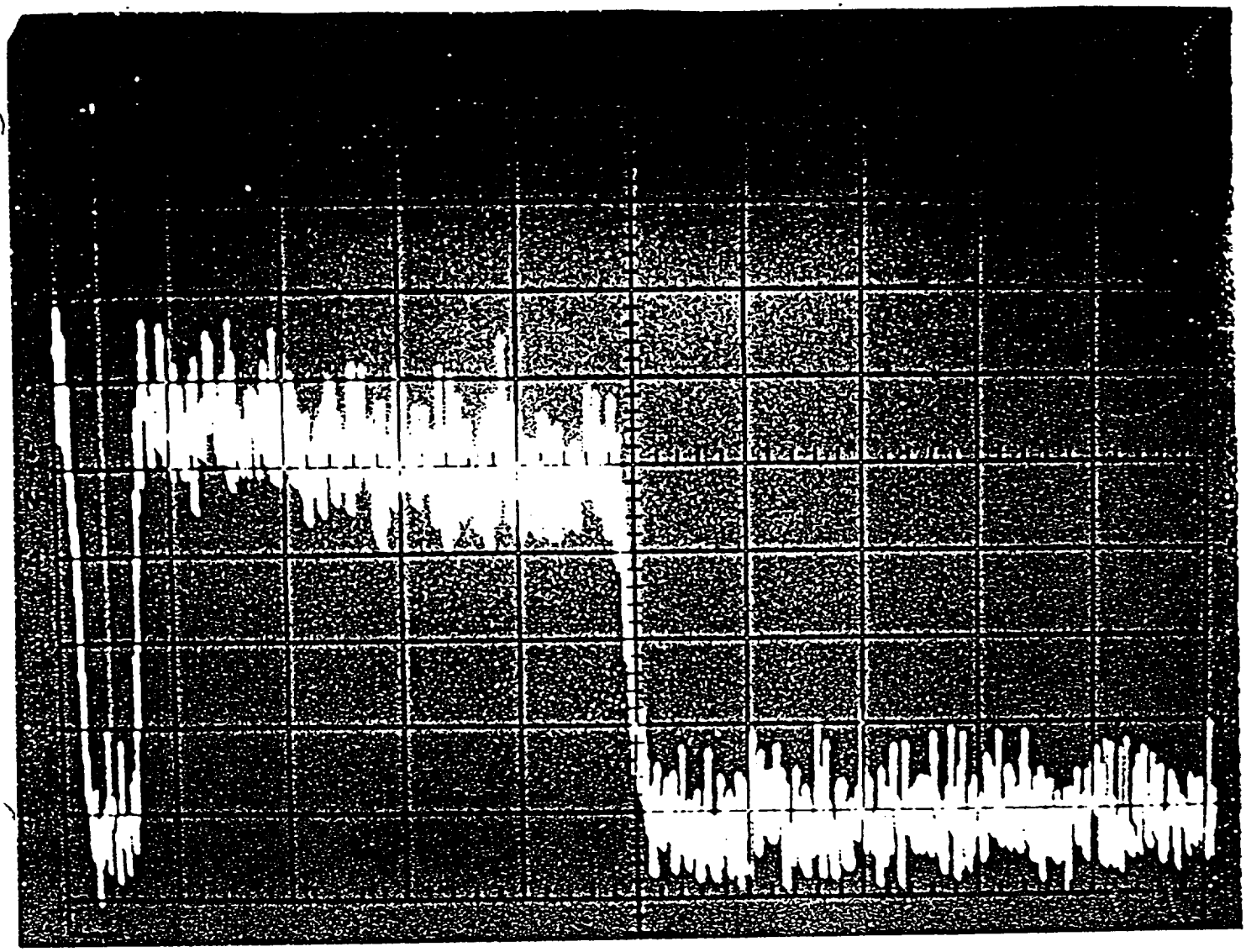
END DATE: 8-20-98

END TIME: 1600

TEST FAILURE:

FAILURE ANALYSIS NO.

Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara,CA,93101



5.4.14 Noise Power Profile

Model No.: 1331562-116
Serial No.: 7A41
Date: 8-25-98
Tested by: DS

Spectrum Analyzer Parameters

Vertical Scale: 2 dB/div.
Scan Width: 30 mhz/Div.
IF Band Width: 10 Khz
Scan Time: 3 sec/Div.
No video filter.

QA 1

Channel 2 Mixer/Amplifier

Mixer/Amplifier (P/N: 1331562-12, S/N: 7A32)

TEST DATA SHEET NO. 6. AMPLIFIER TESTS

GAIN FLATNESS TEST: ATP PARAGRAPH 5.1.3

GAIN FLATNESS (dB)ppK	SPEC. GAIN FLATNESS (dB)ppK	ACC	REJ
0.3	0.5	QA 1	

GAIN VERSUS VOLTAGE SENSITIVITY TEST: ATP PARAGRAPH 5.1.4

AMPLIFIER VOLTAGE	GAIN READING (dBm)	ΔG/ΔV	SPEC. ΔG/ΔV	ACC	REJ
9.96	70.72	2.13	2.0	QA 1	
10.00	70.80				
10.04	70.89				
ΔGv =	0.17 dB				

ECN CAMSV-1352

DATE	ACC	REJ
6-29-98	QA 1	

PART NO. 1331562-12E

SPACEK QA

SER NO. 7A32

TEST FAILURE: _____

TESTED BY: [signature]

FAILURE ANALYSIS NO. _____

END DATE: 6-5-98

END TIME: 1600

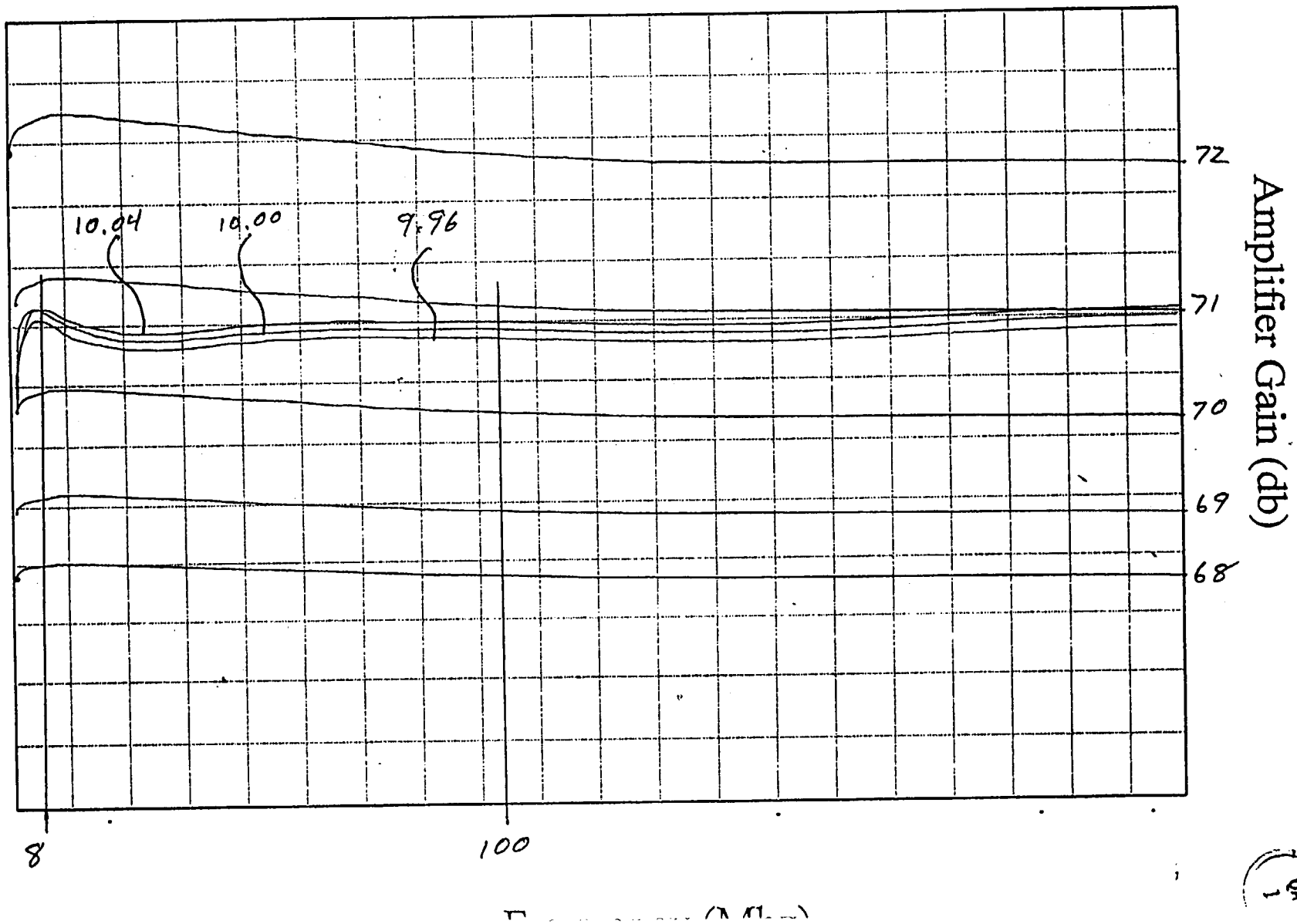
Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara,CA,93101

SPACEK LABS, INC.
MM-WAVE TECHNOLOGY

Amplifier Gain

Model No. 1331562-12
Serial No. 7A32
Date 6-5-98
Tested By 777

Amb Temp +23°C



QA 1

TEST DATA SHEET NO. 7. AMPLIFIER TESTS

GAIN VERSUS TEMPERATURE SENSITIVITY TEST: ATP PARAGRAPH 5.1.5

Nominal Temperature (°C)	Relative Gain	ΔG/ΔT	SPEC	ACC	REJ
T1 −6	G_{T1} 71.38				
		* 0.014	0.035dB/°C	QA 1	
T2 +8	G_{T2} 71.19				
		* 0.022	0.020dB/°C		QA 1
T3 +28	G_{T3} 70.75				
		* 0.025	0.035dB/°C	QA 1	
T4 +40	G_{T4} 70.45				

ECN CAMSU-1352

* Perform the following calculations and record on the TDS

$$\Delta G/\Delta T = \frac{G_{Ti} - G_{Ti+1}}{T_i - T_{i+1}} \quad i = 1,2,3,4$$

ΔG_T = 0.93 dB

QA 1

ECN CAMSU-1352

$\Delta G_{TOTAL} = \Delta G_V + \Delta G_T + 0.4$ = 1.5 dB Spec 1.4dB ACC____ REJ____

	DATE	ACC	REJ
SPACEK QA	6-29-98	QA 1	

PART NO. 1331562-125

SER NO. 7A32

TESTED BY: TT

END DATE: 6-5-98

END TIME: 1600

TEST FAILURE: ____

FAILURE ANALYSIS NO. ____

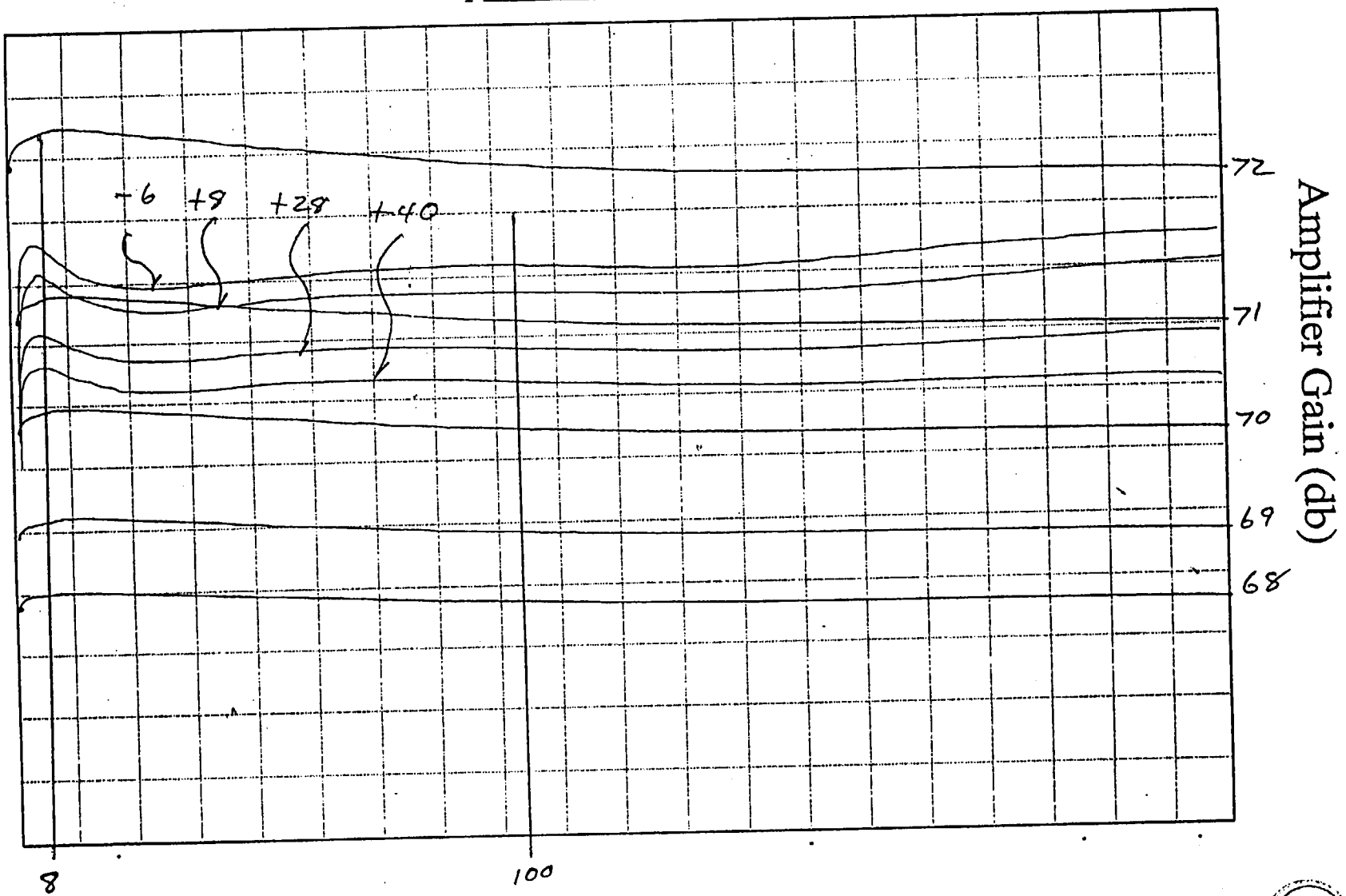
Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara,CA,93101

SPACEK LABS, INC.
MM-WAVE TECHNOLOGY

Amplifier Gain

Model No. 1331562-12
Serial No. 7A32
Date 6-5-98
Tested By 7TH

Amb Temp +23°C



1 of 4

TEST DATA SHEET NO. 8. AMPLIFIER TESTS

OUTPUT 1.0 dB COMPRESSION POINT TEST: ATP PARAGRAPH 5.1.6

DASH #

11	12	13	14	15	16	17	18	19	20	FREQ. (MHz)	P2 COMP (dBm)	OUTPUT COMP. at+10(dBm)	SPEC. COMP. PT.(dBm)	ACC	REJ
X	X	X	X		X	X	X	X		10	-2.6	0.4	1.0		
				X						20	-2				
	X	X								50	-2.7	0.3			
X	X	X	X	X	X	X	X			100	-2.5	0.5			
X										150					
			X	X	X	X	X	X		200					
								X		400					
									X	500					
									X	1000					
									X	1500					

AMPLIFIER NOISE FIGURE AND TOTAL POWER TEST: ATP PARAGRAPH 5.1.7

DATE: 6-5-98 AMBIENT ROOM TEMPERATURE °C: 23°C

AMPLIFIER OUTPUT POWER AMBIENT (dBm)	AMPLIFIER OUTPUT POWER (-77 K)(dBm)	Y FACTOR (dB)	AMPLIFIER NOISE FIGURE (dB)
-24.4	-28.1	3.7	1.11

Above data taken with Daden filter attached (except -19) .

Intermediate test results for information only

		DATE	ACC	REJ
PART NO. 1331562-125	SPACEK QA	6-29-98		
SER NO. 7A32	TEST FAILURE:			
TESTED BY:	FAILURE ANALYSIS NO.			
END DATE: 6-5-98				
END TIME: 1600				

Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara,CA,93101

TEST DATA SHEET NO. 13. MIXER-AMPLIFIER ASSEMBLY TESTS

NOISE FIGURE, TOTAL POWER AND CURRENT VS. TEMPERATURE TEST: ATP PARA 5.4.8.

DATE: 6-24.98 AMBIENT ROOM TEMPERATURE °C: +21

UUT TEMP °C.	UUT CURRENT	MIXER-AMP. OUTPUT POWER (AMBIENT) (dBm)	MIXER-AMP. OUTPUT POWER (77 DEG K) (dBm)	Y FACTOR (dB)	MIXER-AMP. NOISE FIGURE (dB)	SPEC. MIXER-AMP. NOISE FIGURE (dB)	ACC	REJ
-6	43.4	-22.80	-24.80	2.0	3.1	3.2	QA 1	
+8	43.5	-23.00	-24.95	1.95	3.2	3.2	QA 1	
+28	43.7	-23.20	-25.10	1.90	3.2	3.2	QA 1	
+46	43.8	-23.60	-25.50	1.90	3.2	3.2	QA 1	

Noise figure change 0.1 dB Spec is .5dB peak to peak on -20 ACC QA 1 REJ _____

NOTE: *Above data to be taken with the Daden filter, except on the -19 unit.*

NEΔT-NOISE POWER STABILITY TEST: ATP PARAGRAPH 5.4.9

Date: 6-23-98 Ambient Room Temperature °C: 25

Attach computer generated *NEΔT* spreadsheet to this test data sheet.

Record the calculated Nps(K) from spreadsheet data: 0.038

Record Nps(K) 0.07 for dash number from Aerojet specification AE-24869, Table II.
Accept units if calculated Nps(K) is less than or equal to specified Nps(K), otherwise reject.

ACC QA 1 REJ _____

DATE ACC REJ

PART NO. 1331562-12F SPACEK QA 6-24-98 QA 1 _____

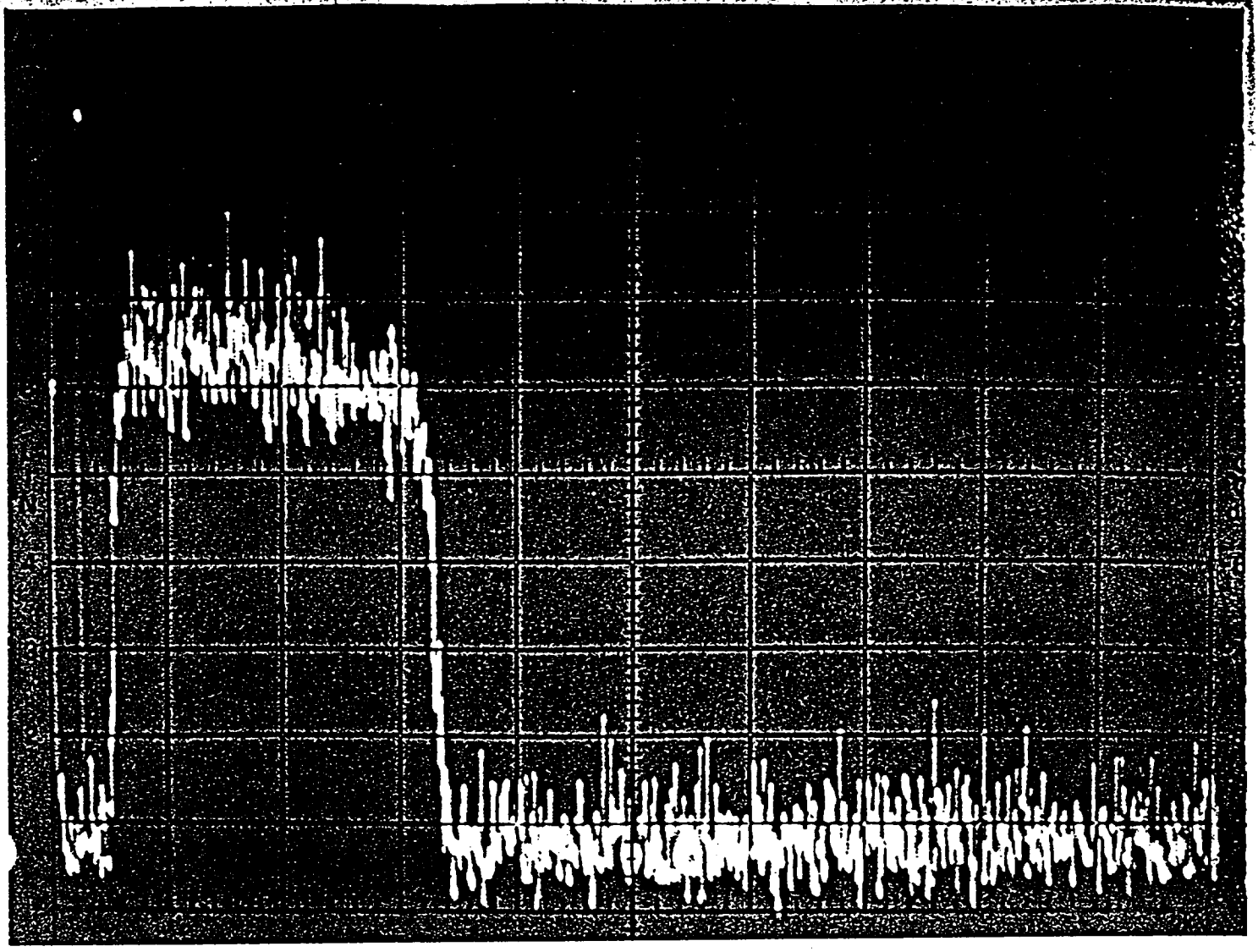
SER NO. 7A32 TEST FAILURE: _____

TESTED BY: _____ FAILURE ANALYSIS NO. _____

END DATE: 6-23-98

END TIME: 1600

Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara,CA,93101



5.4.14 Noise Power Profile

Model No.: 1331562-126

Serial No.: 7A32

Date: 6-29-98

Tested by: DA

Spectrum Analyzer Parameters

Vertical Scale: 2 dB/div.

Scan Width: 30 mhz/Div.

IF Band Width: 10 Khz

Scan Time: 3 sec/Div.

QA 1

Report No. 11317
November 1998

SUBSYSTEM-LEVEL TEST DATA

CENTER FREQUENCY OF LOs

Channel No.	1	2
Specification (GHz) *	23.8	31.4
Setting Accuracy (+/-GHz)	0.008	0.008
Measured (GHz) **	23.8002	31.4004

* Specification in vacuum condition.

** Measured at ambient pressure (standard atmosphere).

Report No. 11317
November 1998

TEST DATA

FOR

AMSU-A2 (P/N: 1356441-1, S/N: F04)

TEST DATA SHEET 3

LO Frequency Test Data (Paragraph 3.5.1) (A2)

Test Setup Verified: _____ Baseplate Temperature (T_B) 23.3 °C
Signature

Component	Channel No.	V_b(V)	I_b(mA)	P_{dc}(mW)			f_o(GHz)		
				Required (Max)	Measured	Pass/ Fail	Required	Measured	Pass/ Fail
LO	1	10.01	65.0	2,000	650.7	P	23.800 ± 0.008	23.800	P
	2	10.02	135.7	2,100	1359.7	P	31.400 ± 0.008	31.401	P
Mixer/ Amps	All	10.01	83.4	900	834.8				
TOTAL				5,000	2845.2				

Pass = P, Fail = F

Part No.: 1356441-1

Serial No.: F04

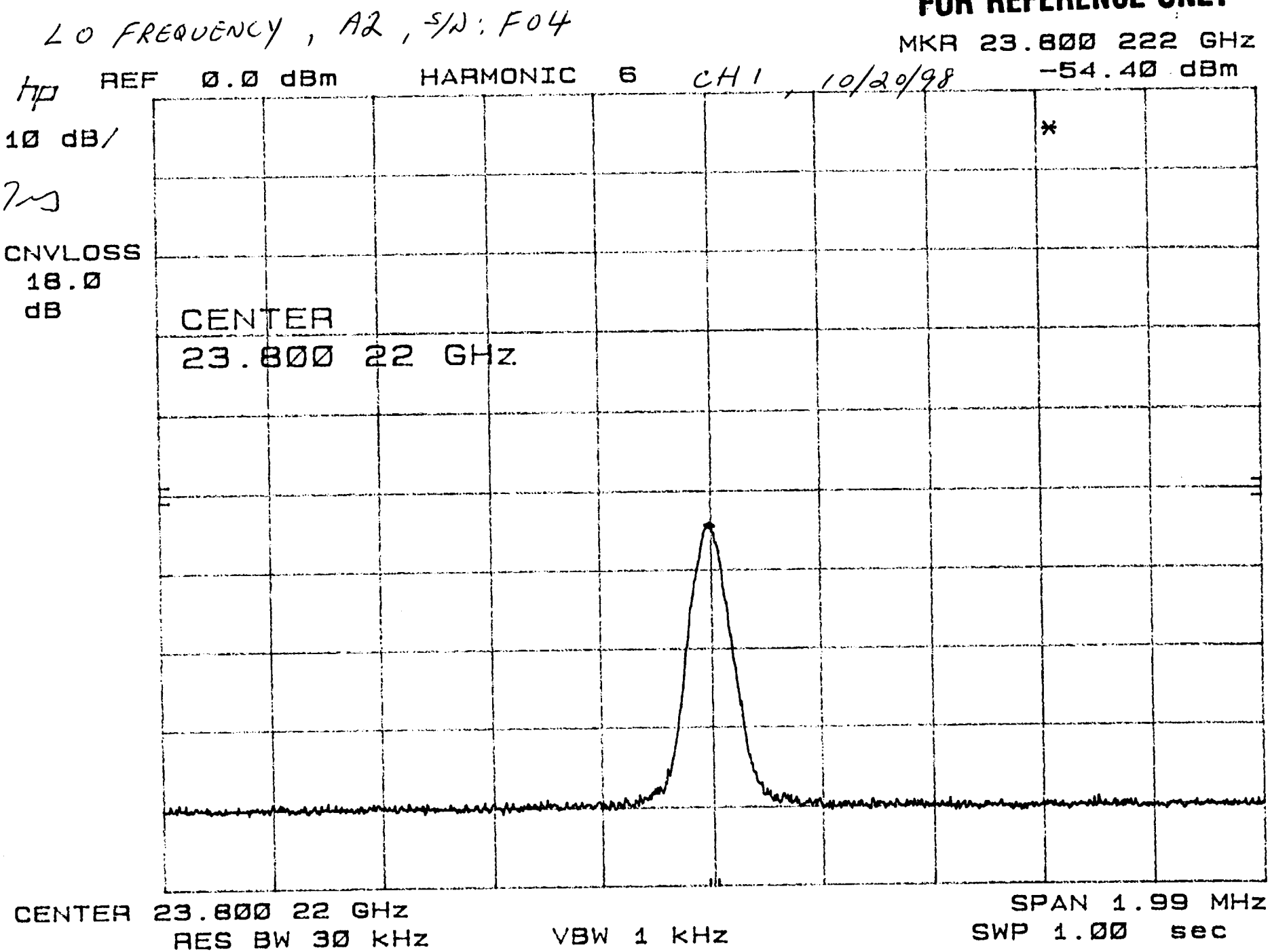
Test Engineer: _____

Quality Assurance: _____ OCT 22 '98

Date: 10/20/98

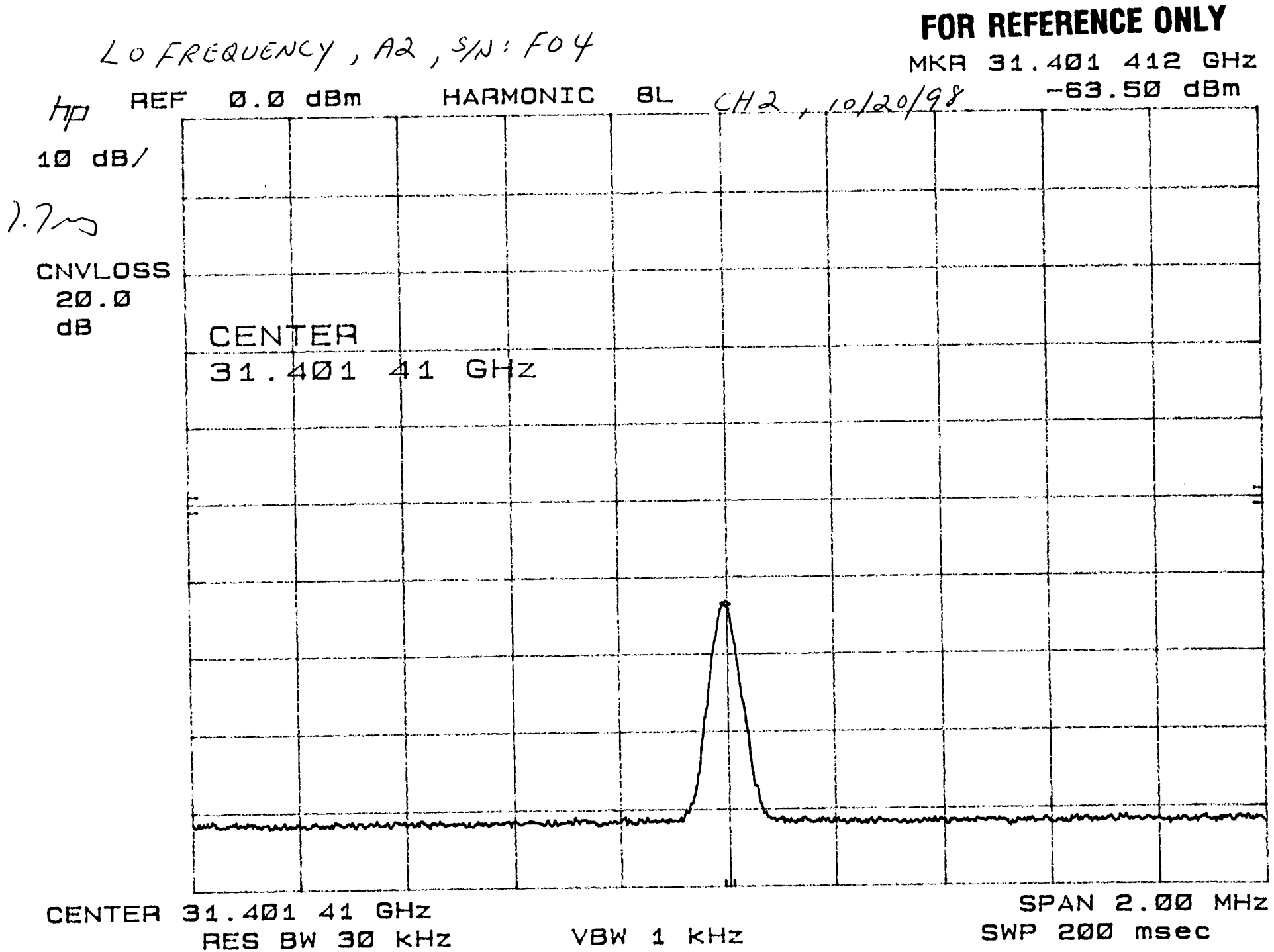
FOR REFERENCE ONLY

LO FREQUENCY, A2, S/N: F04



LO FREQUENCY, A2, S/N: F04

FOR REFERENCE ONLY



TEST DATA SHEET 6

IF Output Test Data (Paragraph 3.5.2) (A2)

Test Setup Verified: J. Tenney (Signature) Baseplate Temperature (T_B) 23.6 °C

Component	Channel No.	V_b(V)	I_b(mA)	P_o(dBm)	Atten (dB)	P_o(dBm) Required	P_o(dBm) Measured	Pass/ Fail
LO	1	10.01	65.0	-22.19	5	-27.0 ± 1.0	-27.21 ~~-27.01~~ 27.2	P
	2	10.02	135.7	-23.19	4	-27.0 ± 1.0	-27.26	P
Mixer/ Amps	All	10.01	83.4					

Pass = P, Fail = F

Part No.: 1356441-1

Serial No.: F04

Test Engineer: [signature]

Quality Assurance: [signature] OCT 22 '98

Date: 10/20/98

TEST DATA SHEET 9

Bandpass Characteristics Test Data (Paragraph 3.5.3) (A2)

Test Setup Verified: T. Jung (Signature) Baseplate Temperature (T_B) 24.7 °C

Component	Channel No.	V_b(V)	I_b(mA)	3 dB BW Frequency (MHz)		3 dB BW Frequency (MHz)		Pass/ Fail
				Lower	Higher	Required MAX.	Measured	
LO	1	10.02	65.1	8.6	133.9	135	125.23	P
	2	10.02	135.8	9.0	88.2	90	79.2	P
Mixer/ Amps	All	10.01	83.4					

Component	Channel No.	V_b(V)	I_b(mA)	40 dB BW Frequency (MHz)		40 dB BW Frequency (MHz) (Ref. Only)		Pass/ Fail
				Lower	Higher	Required MAX.	Measured	
LO	1	10.02	65.1	3.6	146.2	351	142.6	P
	2	10.02	135.8	3.6	99.0	234	95.4	P
Mixer/ Amps	All	10.01	83.4					

Part No.: 1356441-1

Serial No.: F04

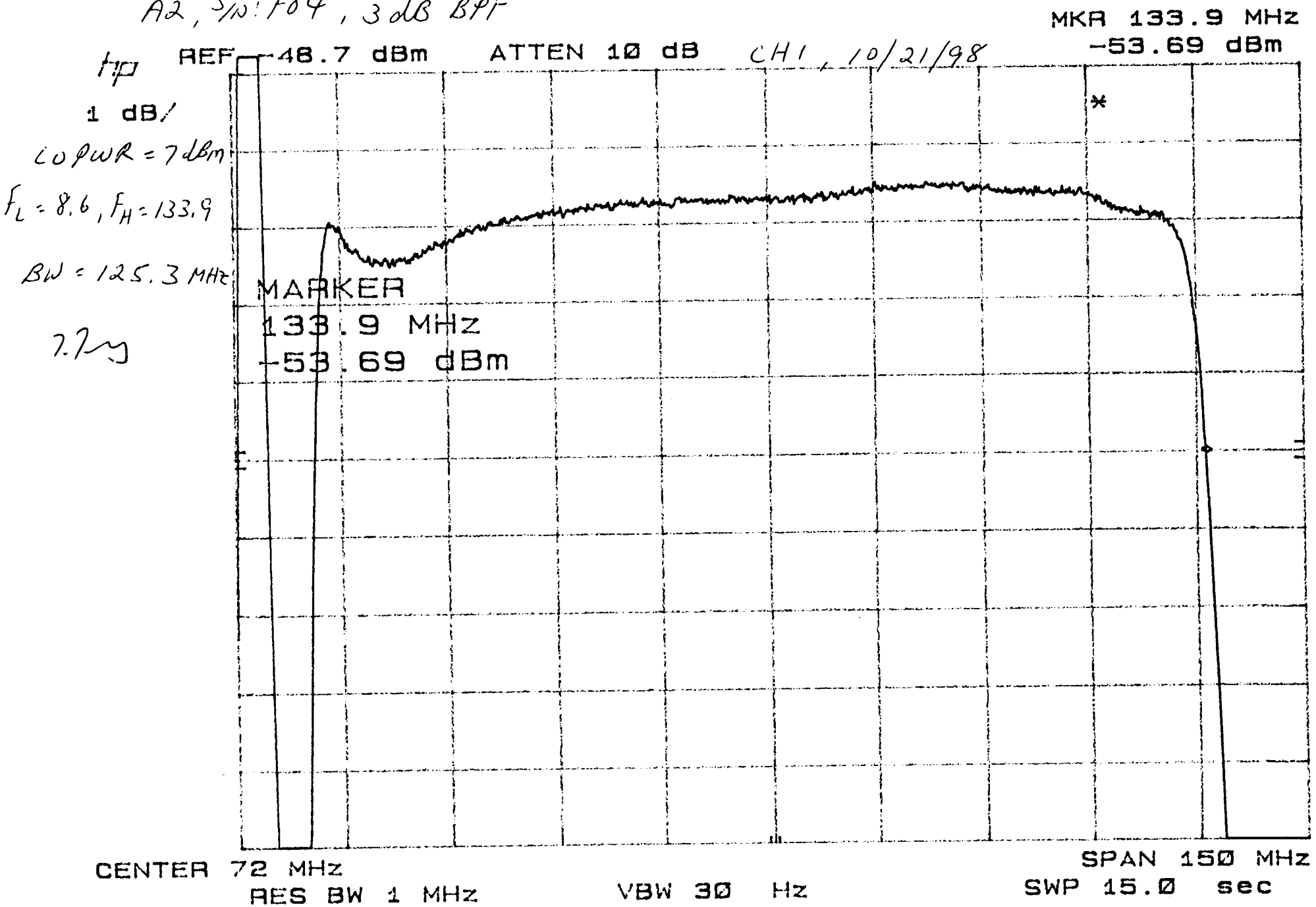
Test Engineer:

Quality Assurance: OCT 22 '98

Date: 10/21/98

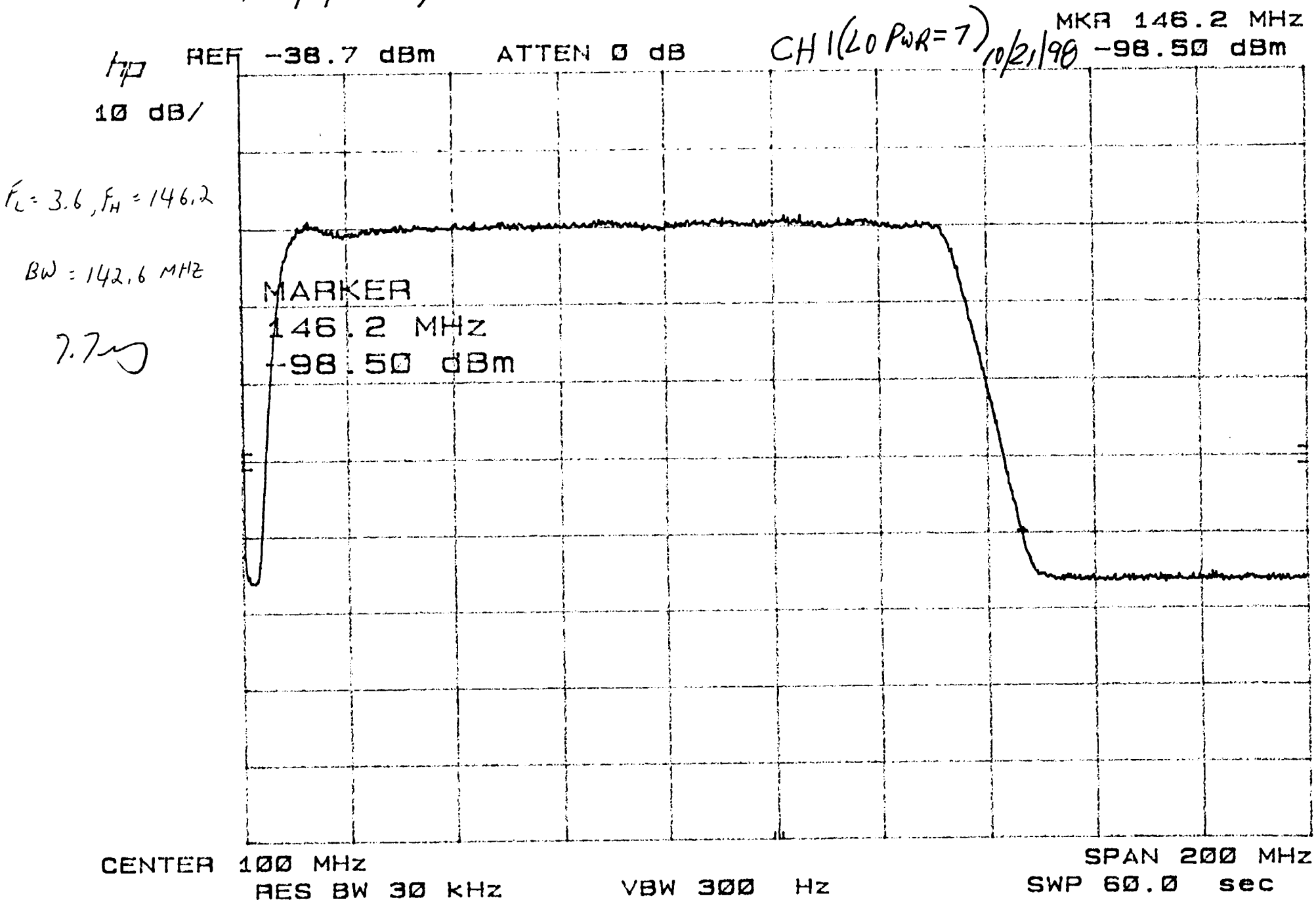
FOR REFERENCE ONLY

A2, S/N: F04, 3 dB BPF



A2, S/N F04, 40dB BPF

FOR REFERENCE ONLY



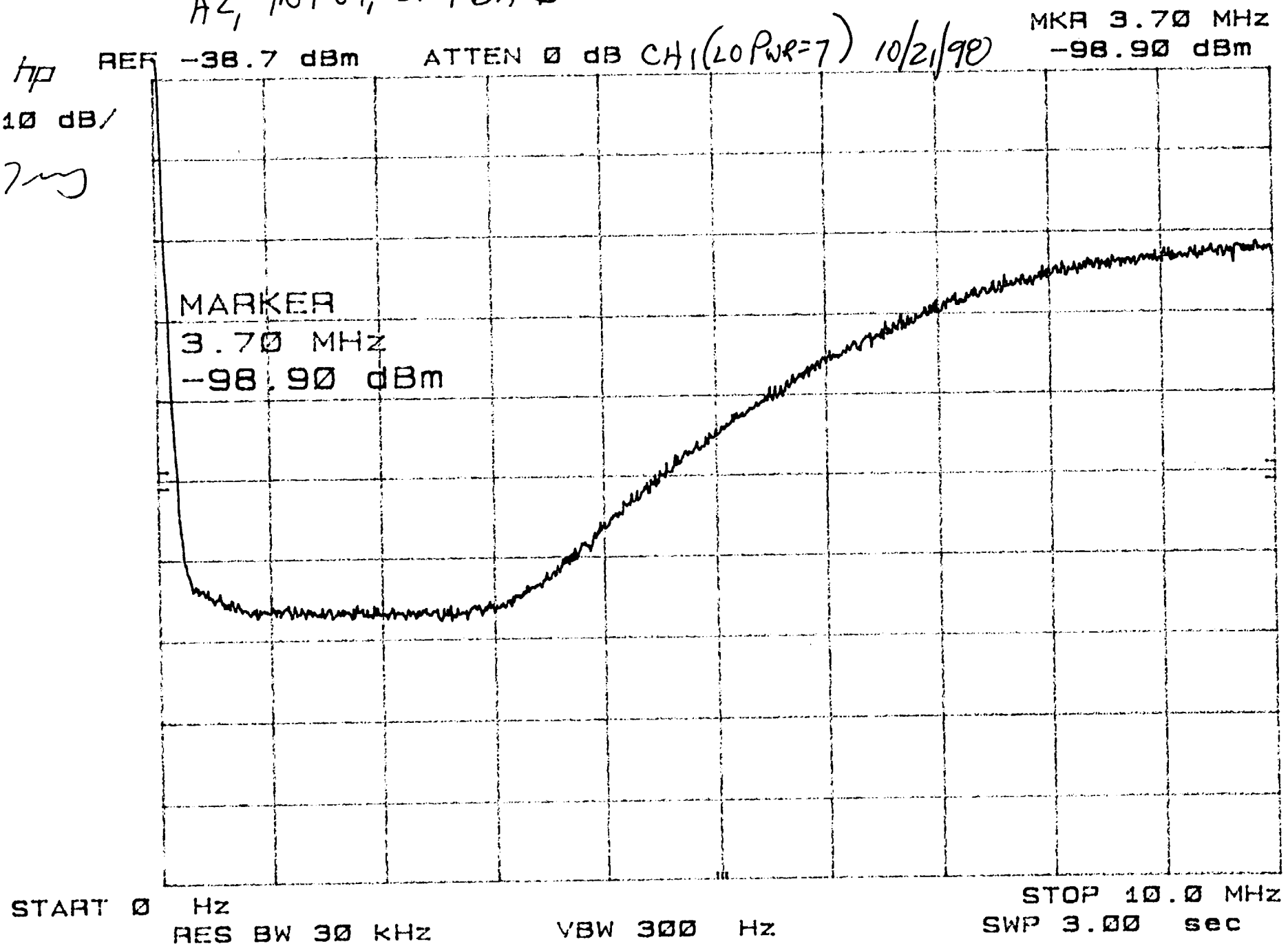
$F_L = 3.6$, $F_H = 146.2$

BW = 142.6 MHz

7.7

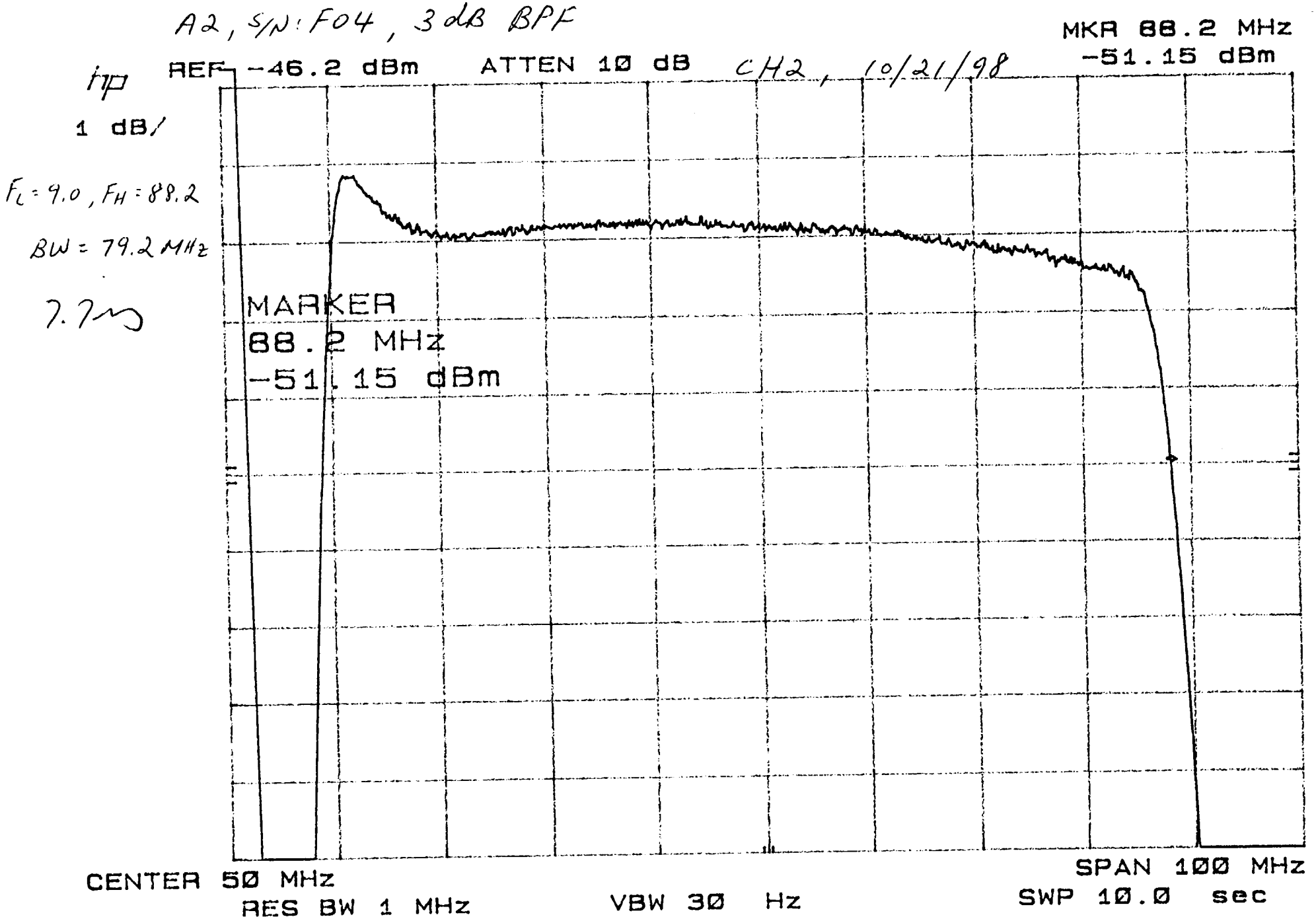
A2, S/N F04, STOPBAND

FOR REFERENCE ONLY



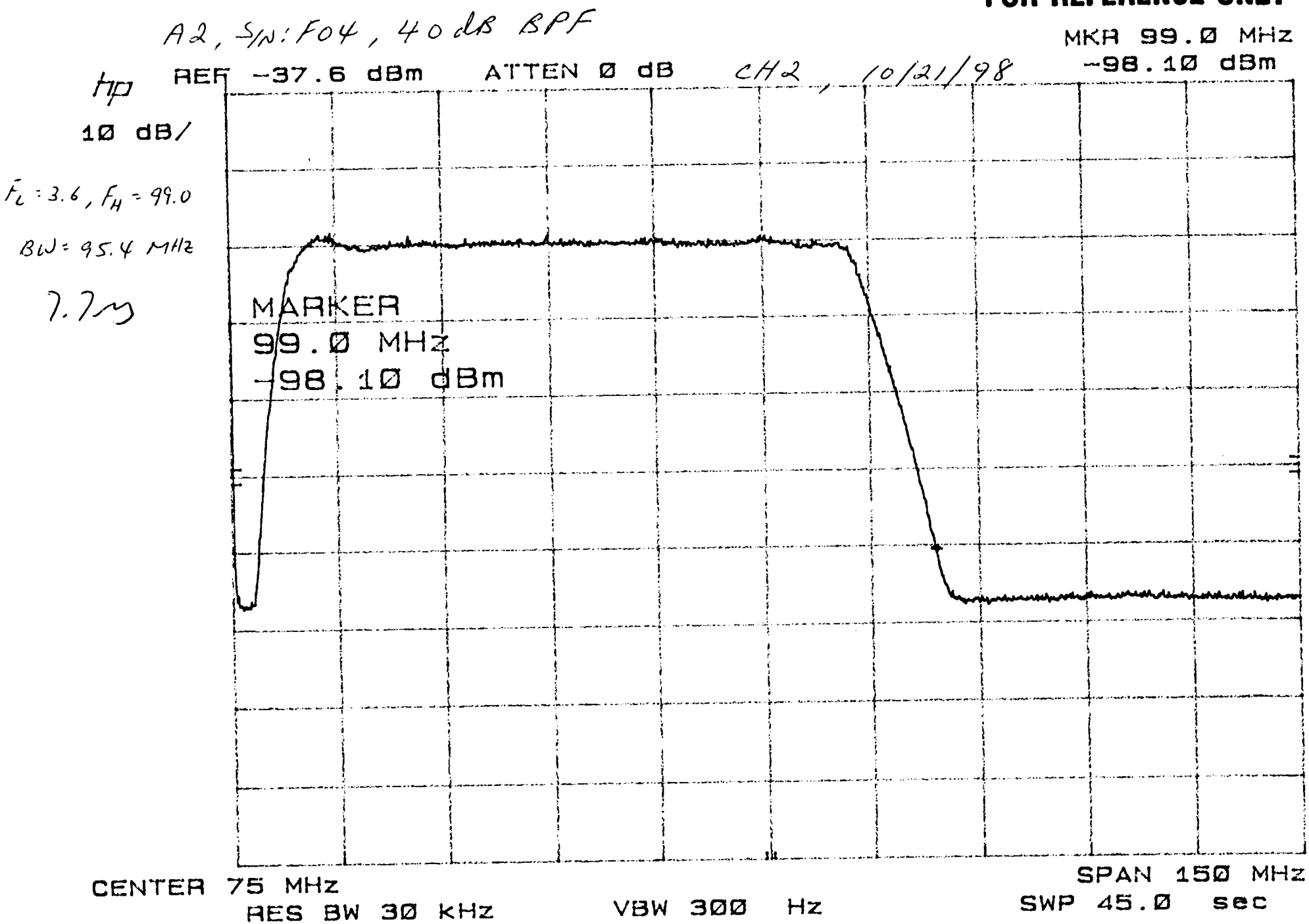
FOR REFERENCE ONLY

A2, S/N: F04, 3 dB BPF

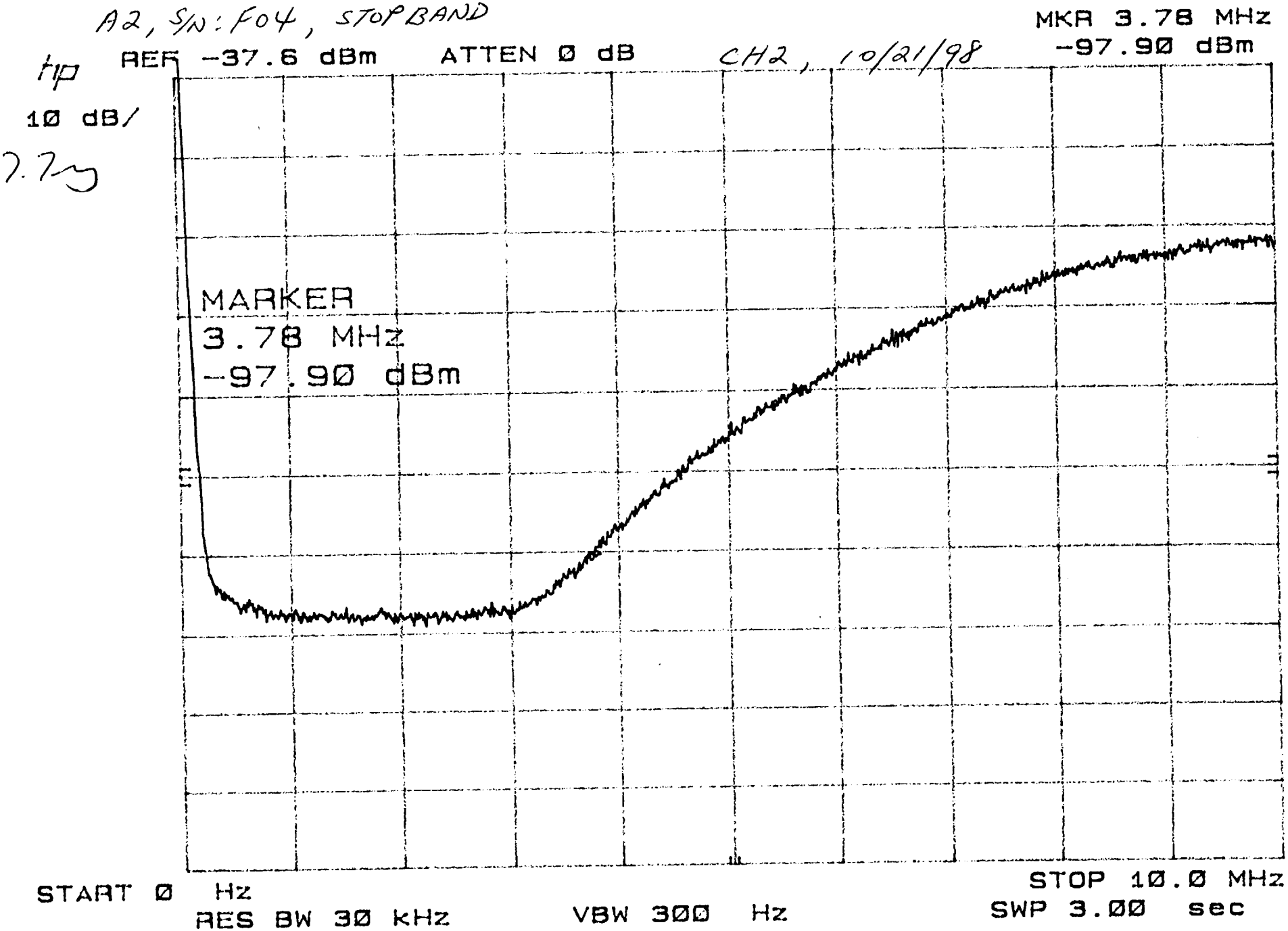


FOR REFERENCE ONLY

A2, S/N: F04, 40 dB BPF



FOR REFERENCE ONLY



TEST DATA SHEET 12 (Sheet 1 of 4)
Noise Figure and Noise Power Stability Test Data (Paragraph 3.5.4) (A2)

Test Setup Verified: T. Jung (Signature) Baseplate Temperature (T_B) 25.7 °C

Component	Channel No.	V_b(V)	I_b(mA)	T_H(°C)	V_H (V) Mean	V_H (V) Standard Deviation	T_C(°C)	V_C (V) Mean	V_C (V) Standard Deviation
LO	1	10.02	65.1	23.0	-.93075	.00021	-194.0	-.67299	.00018
				23.0	-.93058	.00023	-194.0	-.67059	.00016
				23.0	-.93051	.00023	-194.0	-.67267	.00018
				23.0	-.93078	.00024	-194.0	-.67135	.00017
				23.0	-.93054	.00020	-194.0	-.67274	.00017
				23.0	-.93067	.00020	-194.0	-.67186	.00015
				23.0	-.93092	.00021	-194.0	-.67299	.00016
				23.0	-.93094	.00022	-194.0	-.67255	.00013
				23.0	-.93078	.00020	-194.0	-.67195	.00017
				23.0	-.93092	.00021	-194.0	-.67151	.00016
Mixer/ Amps	All	10.01	83.4						
IF Amps	All	N/A	N/A						

Part No.: 1356441-1

Serial No.: F04

Test Engineer: P. Kelly

Quality Assurance: OCT 22 '98

Date: 10/21/98

TEST DATA SHEET 12 (Sheet 3 of 4)

Noise Figure and Noise Power Stability Test Data (Paragraph 3.5.4) (A2)

Test Setup Verified: J. Young (Signature) Baseplate Temperature (T_B) 25.7 °C

Channel No.	NF (dB)				NPS (K)				
	Required (Max)	Measured	Average	Pass/Fail	Required (Max)	Measured	Average	Delta	Pass/Fail
1		4.28				0.03			
		4.24				0.08			
		4.28				0.07			
		4.25				0.09			
		4.28				0.04			
		4.26				0.04			
		4.28				0.02			
		4.27				0.07			
		4.26				0.04			
		4.26				0.02			
	4.5		4.27	P	0.09		0.05	0.077	P

Pass = P, Fail = F

Part No.: 1356441-1

Serial No.: F04

Test Engineer: [signature]

Quality Assurance: [signature] OCT 22 '98

Date: 10/21/98

FOR REFERENCE ONLY

AMSU-A TEST

AMSU-A2, S/N: F04, CH1, LO POWER=7.1 dBm, NF & NPS DATA, TB=25.7C, 10/21/98

SEQ	TEMP_TEST	TEST TEMP	VOLTAGE	STD_DEV	NF (dB)	NPS(K)
1	WARM TEST	296.15	-.93075367	.00020665		
2	COLD TEST	79.15	-.67298859	.00018073	4.28250247	.02730919
3	WARM TEST	296.15	-.93057793	.00023029		
4	COLD TEST	79.15	-.67058927	.00016283	4.24407642	.08045363
5	WARM TEST	296.15	-.93050567	.00022503		
6	COLD TEST	79.15	-.67267258	.00018075	4.28018131	.06991896
7	WARM TEST	296.15	-.93078297	.00023832		
8	COLD TEST	79.15	-.67134821	.00016505	4.25437701	.09550154
9	WARM TEST	296.15	-.93054189	.00020375		
10	COLD TEST	79.15	-.67274166	.00016513	4.28090963	.03970158
11	WARM TEST	296.15	-.93066635	.00020400		
12	COLD TEST	79.15	-.67186366	.00015227	4.26450671	.03871695
13	WARM TEST	296.15	-.93091818	.00020808		
14	COLD TEST	79.15	-.67298522	.00016017	4.28042629	.01838761
15	WARM TEST	296.15	-.93094441	.00022390		
16	COLD TEST	79.15	-.67254876	.00012664	4.27270442	.06693901
17	WARM TEST	296.15	-.93078286	.00020428		
18	COLD TEST	79.15	-.67194706	.00017051	4.26449457	.03779497
19	WARM TEST	296.15	-.93091786	.00020783		
20	COLD TEST	79.15	-.67150655	.00015817	4.25540717	.02013159

CH. 1 ,125.3 MHz MHz.

NOISE FIGURE AVERAGE (dB) = 4.2679775064

NOISE POWER STABILITY (K) = .0494855036981

NOISE POWER STABILITY DELTA (K) = .0771139279986

NPS_MAX (K) = .09550154213 NPS_MIN (K) = .0183876141314

INTEGRATION TIME = .158

TEST DATA SHEET 12 (Sheet 2 of 4)
Noise Figure and Noise Power Stability Test Data (Paragraph 3.5.4) (A2)

Test Setup Verified: _____ Baseplate Temperature (T_B) 25.7 °C
Signature

Component	Channel No.	V_b(V)	I_b(mA)	T_H(°C)	V_H (V) Mean	V_H (V) Standard Deviation	T_C(°C)	V_C (V) Mean	V_C (V) Standard Deviation
LO	2	10.02	135.8	23.0	-.88289	.00027	-194.0	-.59431	.00024
				23.0	-.88220	.00024	-194.0	-.59435	.00024
				23.0	-.88172	.00026	-194.0	-.59412	.00021
				23.0	-.88166	.00028	-194.0	-.59461	.00023
				23.0	-.88147	.00025	-194.0	-.59374	.00025
				23.0	-.88150	.00028	-194.0	-.59527	.00020
				23.0	-.88125	.00027	-194.0	-.59342	.00018
				23.0	-.88153	.00022	-194.0	-.59294	.00020
				23.0	-.88133	.00027	-194.0	-.59392	.00026
				23.0	-.88153	.00024	-194.0	-.59408	.00021
Mixer/ Amps	All	10.01	83.4						
IF Amps	All	N/A	N/A						

Part No.: 1356441-1
Serial No.: F04

Test Engineer: _____
Quality Assurance: _____ OCT 22 '98
Date: 10/21/98

TEST DATA SHEET 12 (Sheet 4 of 4)

Noise Figure and Noise Power Stability Test Data (Paragraph 3.5.4) (A2)

Test Setup Verified: _____ Signature Baseplate Temperature (T_B) 25.7 °C

Channel No.	NF (dB)				NPS (K)				
	Required (Max)	Measured	Average	Pass/Fail	Required (Max)	Measured	Average	Delta	Pass/Fail
2		3.56				0.08			
		3.56				0.06			
		3.57				0.05			
		3.57				0.09			
		3.56				0.03			
		3.59				0.10			
		3.56				0.07			
		3.55				0.08			
		3.57				0.08			
		3.57				0.05			
	3.95		3.57	P	0.09		0.07	0.061	P

Pass = P, Fail = F

Part No.: 1356441-1

Serial No.: F04

Test Engineer: _____

Quality Assurance: _____

Date: 10/21/98

FOR REFERENCE ONLY

AMSU-A TEST

AMSU-A2, S/N: F04, CH2, NF & NPS DATA, TB = 25.7 C, 10/21/98

SEQ	TEMP_TEST	TEST TEMP	VOLTAGE	STD_DEV	NF (dB)	NPS(K)
1	WARM TEST	296.15	-.88288601	.00027115	----------	---------
2	COLD TEST	79.15	-.59431112	.00024391	3.55666048	.07969987
3	WARM TEST	296.15	-.88219801	.00023707	----------	---------
4	COLD TEST	79.15	-.59439313	.00023584	3.56495555	.05836065
5	WARM TEST	296.15	-.88171541	.00025949	----------	---------
6	COLD TEST	79.15	-.59411625	.00020567	3.56569121	.05445363
7	WARM TEST	296.15	-.88166028	.00027655	----------	---------
8	COLD TEST	79.15	-.59461455	.00023262	3.57386049	.09058862
9	WARM TEST	296.15	-.88148899	.00025259	----------	---------
10	COLD TEST	79.15	-.59373968	.00025359	3.56227756	.03117418
11	WARM TEST	296.15	-.88149773	.00028110	----------	---------
12	COLD TEST	79.15	-.59527214	.00019978	3.58559413	.09861723
13	WARM TEST	296.15	-.88124573	.00026667	----------	---------
14	COLD TEST	79.15	-.59341662	.00018449	3.55985227	.07173872
15	WARM TEST	296.15	-.88152986	.00022482	----------	---------
16	COLD TEST	79.15	-.59293577	.00020273	3.54963036	.08082976
17	WARM TEST	296.15	-.88133487	.00026823	----------	---------
18	COLD TEST	79.15	-.59391763	.00026212	3.56657270	.07503417
19	WARM TEST	296.15	-.88153157	.00024048	----------	---------
20	COLD TEST	79.15	-.59408297	.00021343	3.56707262	.04934157

CH. 2 ,79.2 MHz MHz

NOISE FIGURE AVERAGE (dB) = 3.56522651574

NOISE POWER STABILITY (K) = .0689838378223

NOISE POWER STABILITY DELTA (K) = .0674430491914

NPS_MAX (K) = .0986172251355 NPS_MIN (K) = .0311741759441

INTEGRATION TIME = .158

TEST DATA SHEET 18

Temperature Sensor and Thermistor Test Data (Paragraph 3.6.1) (A2)

Test Setup Verified: T. Tsung (Signature) Baseplate Temperature (T_B) 22.3 °C

Reference Designation	Specification	Measured Value	Pass/Fail
RT 12	2200 ± 100 Ω	2166 Ω	P
RT 19	2200 ± 100 Ω	2168 Ω	P
RT 20	2200 ± 100 Ω	2170 Ω	P
RT 13	2200 ± 100 Ω	2169 Ω	P
RT 14	2200 ± 100 Ω	2172 Ω	P
RT 17	2200 ± 100 Ω	2168 Ω	P
TB 58	3000 ± 100 Ω	3013 Ω	P
TB 59	3000 ± 100 Ω	3002 Ω	P
TB 53	4.1 – 4.6 V	4.34 V	P

Pass = P, Fail = F

Part No.: 1356441-1

Serial No.: F04

Test Engineer:

Quality Assurance: OCT 22 '98

Date: 10/20/98

TEST DATA SHEET 22

Survival Heater and Thermal Switch Test Data (Paragraph 3.6.3) (A2)

Test Setup Verified: _____ Baseplate Temperature (T_B) 22.4 °C
Signature

Reference Designation	Open Switch		Closed Switch		
	>10 MΩ	Pass/Fail	Specification	Measured Value	Pass/Fail
HR1/TS1	50MΩ	P	50 - 65 Ω	58.3	P
	50MΩ	P		58.1	P
HR2/TS2	50MΩ	P		55.1	P
	50MΩ	P		55.4	P

Pass = P, Fail = F

Part No.: 1356441-1

Serial No.: F04

Test Engineer: _____

Quality Assurance: _____ OCT 22 '98

Date: 10/20/98

TEST DATA SHEET 23 (Sheet 3 of 3)
Bias Voltage Verification Test Data (Paragraph 3.6.4) (A2)

Test Setup Verified: T. Truong
Signature

Baseplate Temperature (T_B) 22.5 °C

Reference Designation	Specification	Measured Value (V)	Pass/Fail
Mixer/IF AMP Ch 1, 2	+10 ±0.1	10.00	P
DRO Ch 1	+10 ±0.1	10.01	P
DRO Ch 2	+10 ±0.1	10.01	P

Part No.: 1356441-1

Serial No.: F04

Test Engineer: [signature]

Quality Assurance: [signature] OCT 22

Date: 10/20/98

GENCORP AEROJET	MANUFACTURING ASSEMBLY INSTRUCTIONS (M.A.L)			PAGE	OF
	PART DESCRIPTION: RECEIVER ASSEMBLY (A2) FOR		PART NUMBER: 1356441-1	1	4
PLANNED BY: B. MULLIGAN	DATE: 6/4/98	REVISION: 01	NEXT ASSEMBLY: 1356006-1/1331200-2	OPER: 0004	

ASSEMBLY INSTALLATION AND REPLACEMENT LOG

INITIAL INSTALLATION							REPLACEMENT			
ITEM NO.	PART NUMBER	REV	DESCRIPTION	S/N	MFG	INSP	REV	S/N	MFG	IN.
5	1331084-1	F	DIPLEXER, 3 PORT	05	MFG 155 7/16/98					
7	1331100-1	D	WAVEGUIDE ATTENUATOR	~~103~~ 101	MFG 155 7/16/98 MFG 161 7/6/98					
8	1331100-2	E	WAVEGUIDE ATTENUATOR	104	MFG 155 7/16/98					
9	1331111-2	G	ISOLATOR	006	7/16/98 MFG 155					
10	1331112-2	G	ISOLATOR	007	7/16/98 MFG 155					
16	1336610-1	E	STABLE OSCILLATOR	~~87060~~ 9827 87057	MFG 161 7/6/98					
17	1336610-2	E	STABLE OSCILLATOR	87056 9821	MFG 161 7/6/98					
19	1331559-3	E	IF BAND PASS FILTER	P229-008	MFG 155 7-11-98					
20	1331559-6	E	IF BAND PASS FILTER	P232-006	MFG 155 7/25/98					
21	1331562-11		MIXER/AMP, CHAN 1	7A41	MFG 145 9-29-98					
22	1331562-12	G	MIXER/AMP, CHAN 2	7A32	MFG 155 7/16/98					
29	1337640-4	N/A	THERMOFOIL HEATER	HR1 S/N 0034 HR2 S/N 0029	MFG 155 7/25/98					

NOTES:

1. THIS LOG SHALL BE COMPLETED AT THE TIME THAT THE COMPONENT(S) OR PART(S) ARE BEING INSTALLED INTO THE ASSEMBLY. EACH LINE SHALL BE ENTERED AND STAMPED BY THE OPERATOR THAT INSTALLED THE COMPONENT(S) OR PART(S)
2. IF A COMPONENT(S) OR PART(S) ARE REMOVED AND REPLACED, RECORD THE REPLACEMENT PART ON IT'S RESPECTIVE LINE.
3. IF A COMPONENT(S) OR PART(S) HAVE BEEN REMOVED AND REPLACED MORE THAN ONCE, RECORD THE REPLACEMENT P. NUMBER AT THE END OF THE ASSEMBLY LOG.

NASA
National Aeronautics and Space Administration

Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
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4. Title and Subtitle	5. Report Date
Integrated Advanced Microwave Sounding Unit-A (AMSU-A), Performance Verification Report	November1998
	6. Performing Organization Code: ---
7. Author(s): R. Kapper	8. Performing Organization Report No.: 11317
	10. Work Unit No.: ---
9. Performing Organization Name and Address: Aerojet, 1100 W. Hollyvale, Azusa, CA 91702	11. Contract or Grant No.: NAS 5-32314
	13. Type of Report and Period Covered: Final
12. Sponsoring Agency Name and Address: NASA, Goddard Space Flight Center, Greenbelt, Maryland 20771	14. Sponsoring Agency Code: ---

15. Supplementary Notes: ---

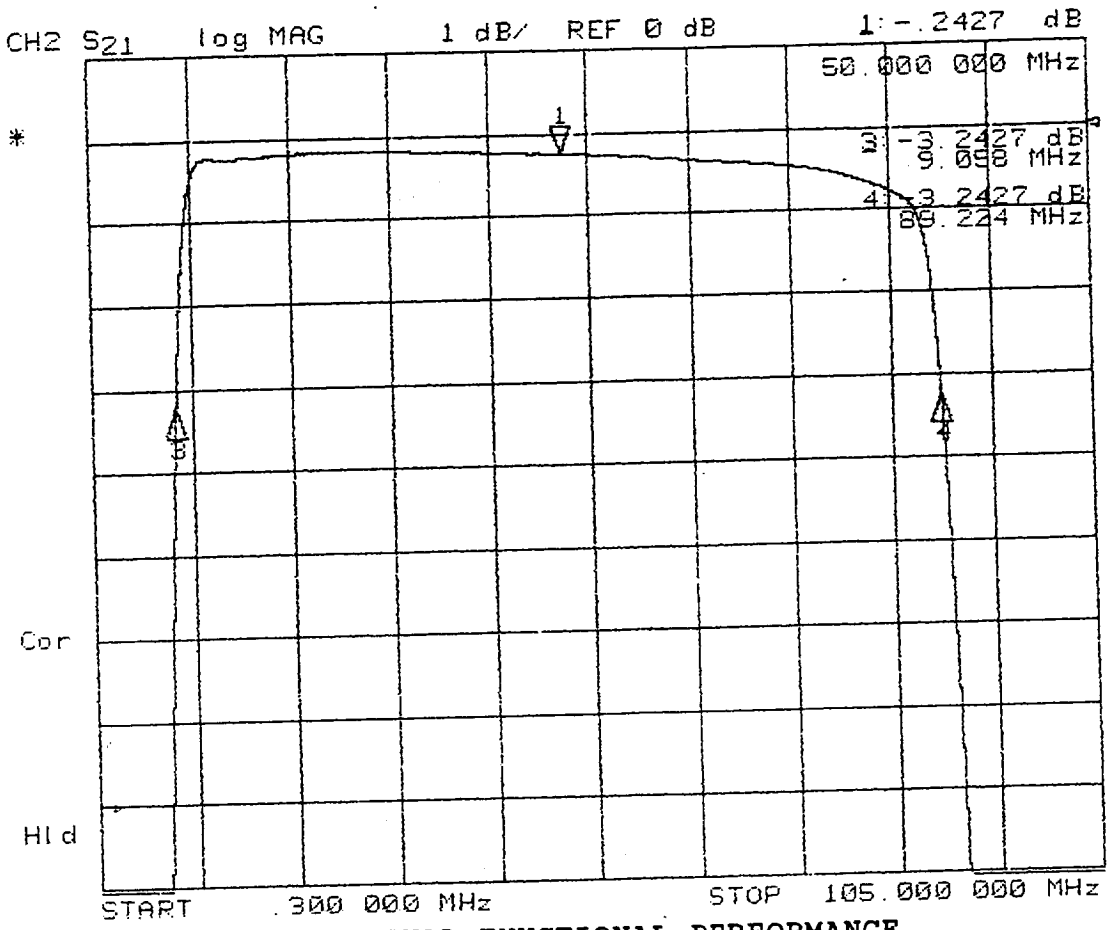
16. ABSTRACT (*Maximum 200 words*)

This is the Performance Verification Report, METSAT AMSU-A2 Receiver Assembly (P/N 1356441-1, S/N F04) S/N 107, for the Integrated Advanced Microwave Sounding Unit-A (AMSU-A).

17. Key Words (Suggested by Author(s))	18. Distribution Statement
EOS Microwave System	Unclassified — Unlimited

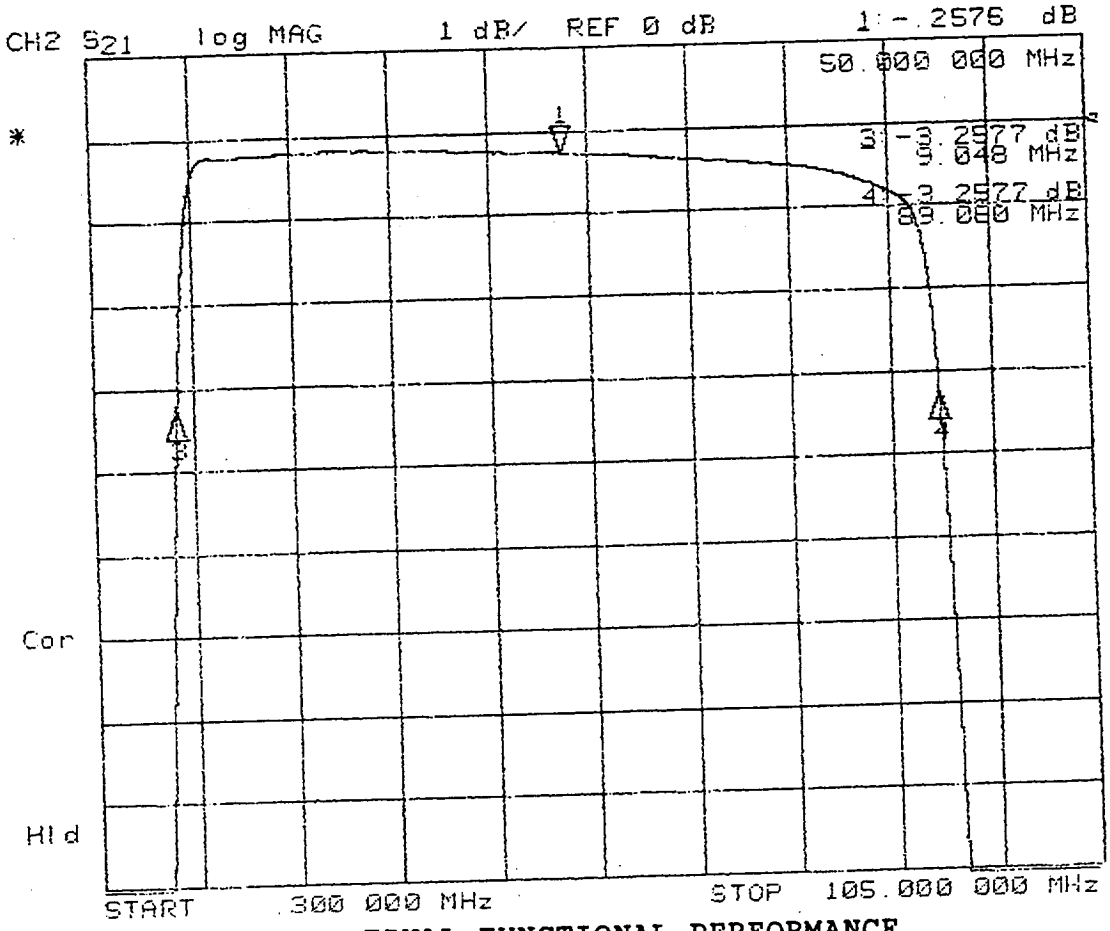
19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of pages	22. Price
Unclassified	Unclassified		---

NASA FORM 1626 OCT 86



FINAL FUNCTIONAL PERFORMANCE
TRANSMISSION LOSS
SERIAL NO. P229-008
+15C DATA
OPR: R. HOGGATT DATE DEC 18 1996

MARKER PARAMETERS	Channel 1	Channel 2
MARKER 1	14.000000 MHz OFF	50.000000 MHz -.2427 dB
MARKER 2	86.000000 MHz OFF	49.141672 MHz OFF
MARKER 3	20.000000 MHz OFF	9.058860 MHz -3.2427 dB
MARKER 4	80.000000 MHz OFF	89.224484 MHz -3.2427 dB
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	89.425802 MHz -3.2342 dB
REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-14 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
MARKER TRACKING	OFF OFF	OFF OFF



FINAL FUNCTIONAL PERFORMANCE
TRANSMISSION LOSS
SERIAL NO. P229-008
+40C DATA
OPR: R. HOGGATT DATE DEC 18 1996

MARKER PARAMETERS	Channel 1	Channel 2
MARKER 1	14.000000 MHz OFF	50.000000 MHz -.2576 dB
MARKER 2	86.000000 MHz OFF	49.054793 MHz OFF
MARKER 3	20.000000 MHz OFF	9.048819 MHz -3.2577 dB
MARKER 4	80.000000 MHz OFF	89.060767 MHz -3.2577 dB
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	89.425802 MHz -3.2342 dB
REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-14 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF

APPENDIX C **ACCEPTANCE TEST REPORT**

BANDPASS FILTER MODEL HL50-80-10SS1 S/N P229-008
AEROJET 1331559-3 REV. E

PASSBAND RIPPLE (CON'T)

{11f} RECORD PASS/FAIL (0.5 dB MAX)	(PASS)/FAIL	(PASS)/FAIL	(PASS)/FAIL
{11g} ATTACH PASSBAND RIPPLE PERFORMANCE X-Y PLOT(S)	✓ (√)	✓ (√)	✓ (√)

OUT-OF-BAND REJECTION

ACCEPTANCE TEST PROCEDURE 63-0005-02 PARA 4.5.5 Fc=50.0 MHz. REF {5A} FOR INSERTION LOSS @ Fc	-10°C	+15°C	+40°C
{12} WORST CASE REJECTION FROM 0.300 MHz TO 1.0 MHz	>100 dB (40.0 dB MIN)	>100 dB (40.0 dB MIN)	>100 dB (40.0 dB MIN)
{13a} WORST CASE REJECTION FROM 102.0 MHz TO 1000.0 MHz	-57.6 dB (40.0 dB MIN)	-57.8 dB (40.0 dB MIN)	-57.8 dB (40.0 dB MIN)
{13c} RECORD MEASURED TEMPERATURE	-12.9 °C (-15.0 TO -10.0)	+14.3 °C (12.5 TO 17.5)	+42.8 °C (40.0 TO 45.0)
{14} ATTACH REJECTION PERFORMANCE X-Y PLOT(S)	✓ (√) ✓ (√)	✓ (√) ✓ (√)	✓ (√) ✓ (√)

TEST PERFORMED BY R. Hoggatt DA DATE 12/18/91.

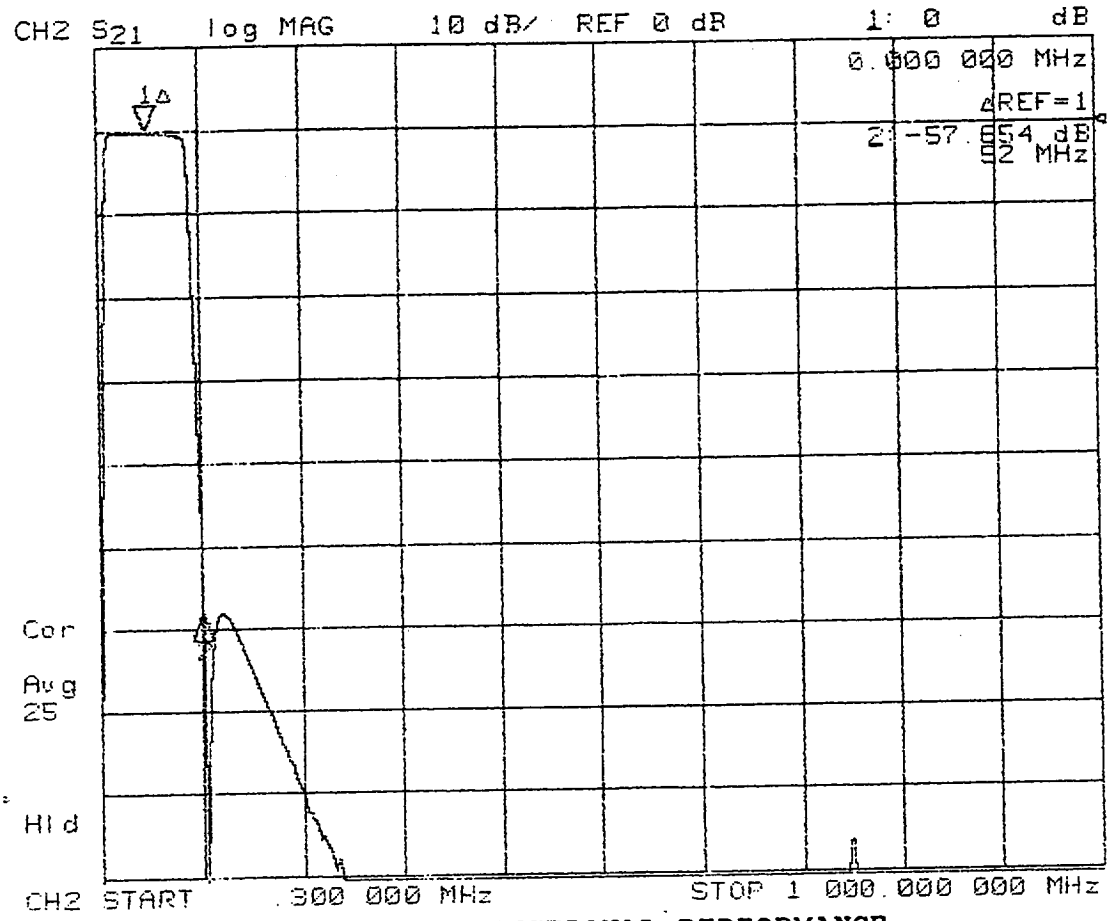
NOTE IF TEST WITNESSED BY AESD: Not witnessed this time. DLD

***** END OF FUNCTIONAL PERFORMANCE TEST ****

OUTLINE AND MOUNTING DIMENSIONS VERIFICATION

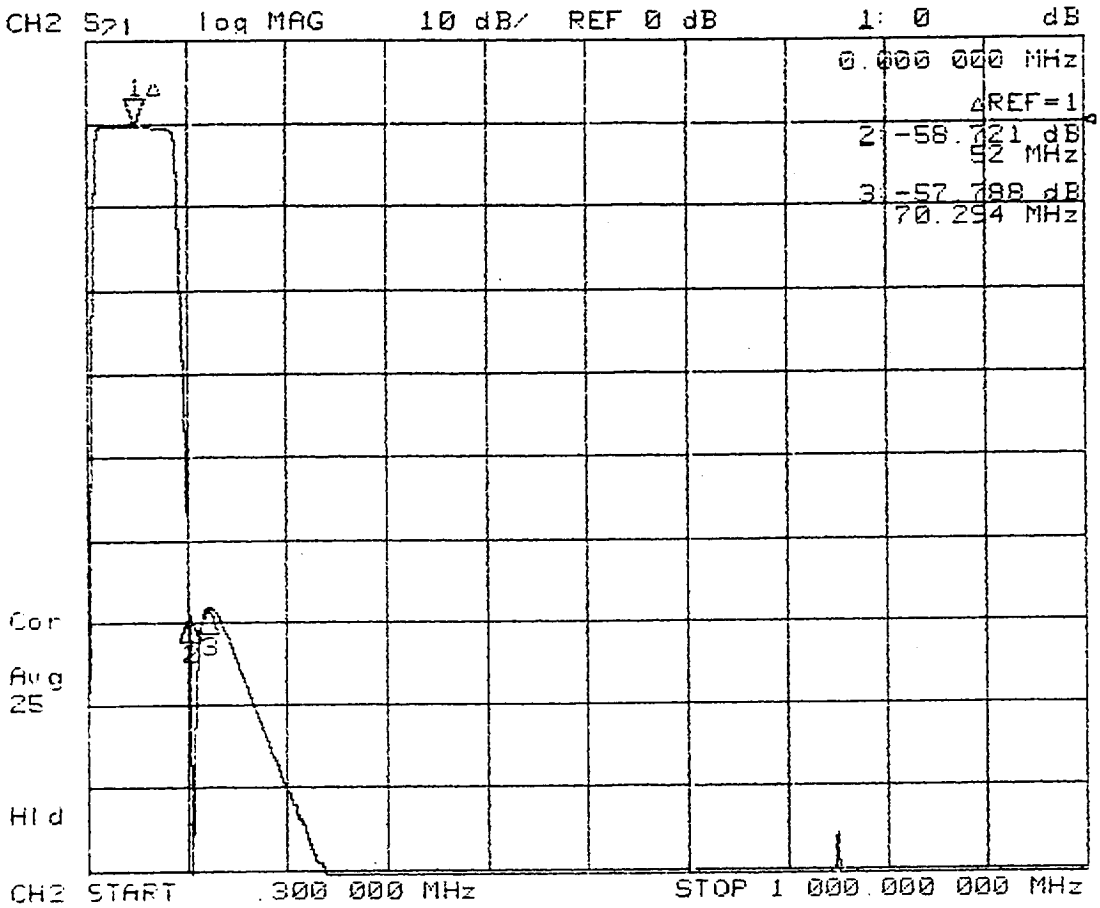
{16} REFERENCE CUSTOMER DRAWING 1331559

DESCRIPTION OF MEASUREMENT	DIMENSION AND TOLERANCE	ACTUAL MEASUREMENT
OVER ALL LENGTH	3.50 ± .03	3.501
MOUNTING HOLE CENTER	0.125 ± .010	0.127
BETWEEN UPPER MOUNTING HOLES	3.250	3.250
BETWEEN LOWER MOUNTING HOLES	3.250	3.250



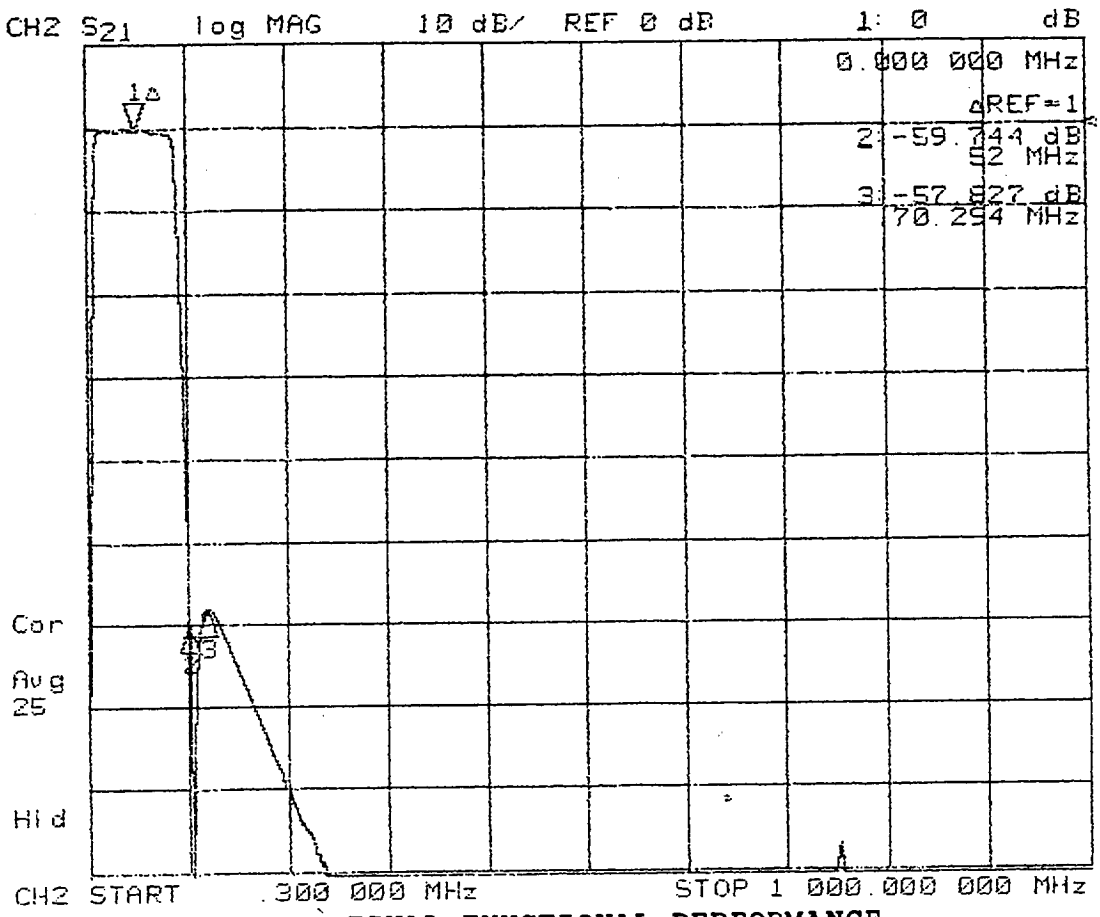
FINAL FUNCTIONAL PERFORMANCE
REJECTION PERFORMANCE
SERIAL NO. P229-008
-10C DATA
OPR: R. HOGGATT DATE DEC 18 1996

MARKER PARAME...	...annel 1	Channel 2
MARKER 1	1.000000 MHz OFF	50.000000 MHz 0 dB
MARKER 2	5.000000 MHz OFF	102.000000 MHz -57.654 dB
MARKER 3	5.000000 MHz OFF	120.494452 MHz OFF
MARKER 4	5.000000 MHz OFF	1000.000000 MHz OFF
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	0.000000 MHz 0 dB
REFERENCE MARKER	OFF	MARKER 1
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-3 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF



FINAL FUNCTIONAL PERFORMANCE
REJECTION PERFORMANCE
SERIAL NO. P229-008
+15C DATA
OPR: R. HOGGATT DATE DEC 18 1996

MARKER PARAMETERS	Channel 1	Channel 2
MARKER 1	1.000000 MHz OFF	50.000000 MHz 0 dB
MARKER 2	5.000000 MHz OFF	102.000000 MHz -58.721 dB
MARKER 3	5.000000 MHz OFF	120.294510 MHz -57.788 dB
MARKER 4	5.000000 MHz OFF	1000.000000 MHz OFF
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	0.000000 MHz 0 dB
REFERENCE MARKER	OFF	MARKER 1
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-3 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF



FINAL FUNCTIONAL PERFORMANCE
REJECTION PERFORMANCE
SERIAL NO. P229-008
+40C DATA
OPR: R. HOGGATT DATE DEC 18 1998

MARKER PARAMETERS	Channel 1	Channel 2
MARKER 1	1.000000 MHz OFF	50.000000 MHz 0 dB
MARKER 2	5.000000 MHz OFF	102.000000 MHz -59.744 dB
MARKER 3	5.000000 MHz OFF	120.294511 MHz -57.827 dB
MARKER 4	5.000000 MHz OFF	1000.000000 MHz OFF
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	0.000000 MHz 0 dB
REFERENCE MARKER	OFF	MARKER 1
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-3 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF

ACCEPTANCE TEST REPORT

BANDPASS FILTER MODEL HL50-80-10SS1 S/N P229-008
AEROJET 1331559-3 REV. E

BANDPASS CHARACTERISTICS MEASUREMENT

PER ATP PARA 4.6
(REF: AE-24687, PARA 4.8.2)

RECORD THE AMBIENT ROOM TEMPERATURE. +22.5 °C (+19°C TO +29.0°C)

{15} ATTACH PASSBAND PERFORMANCE X-Y PLOT ✓ (√)

{24} TEST POINT MATRIX

REF	FREQ	UNIT	VALUE	REF	FREQ	UNIT	VALUE
F1	0.5	MHz	-103.3 dB	F11	(*) 60.0	MHz	-0.32 dB
F2	1.0	MHz	-96.3 dB	F12	(*) 70.0	MHz	-0.41 dB
F3	5.0	MHz	-31.9 dB	F13	80.0	MHz	-0.63 dB
F4	7.5	MHz	-11.1 dB	F14	85.0	MHz	-0.85 dB
F5	10.0	MHz	-1.54 dB	F15	90.0	MHz	-5.56 dB
F6	15.0	MHz	-0.26 dB	F16	100.0	MHz	-46.5 dB
F7	20.0	MHz	-0.21 dB	F17	200.0	MHz	-80.2 dB
F8	(*) 30.0	MHz	-0.18 dB	F18	300.0	MHz	-103.8 dB
F9	(*) 40.0	MHz	-0.21 dB	F19	500.0	MHz	-104.2 dB
F10	50.0	MHz	-0.24 dB	F20	1000.0	MHz	-100.2 dB

TEST PERFORMED BY: R. Hoggatt DA 5 DATE 12/18/96

NOTE IF TEST WITNESSED BY AESD_ Not witnessed this time. DLD ____

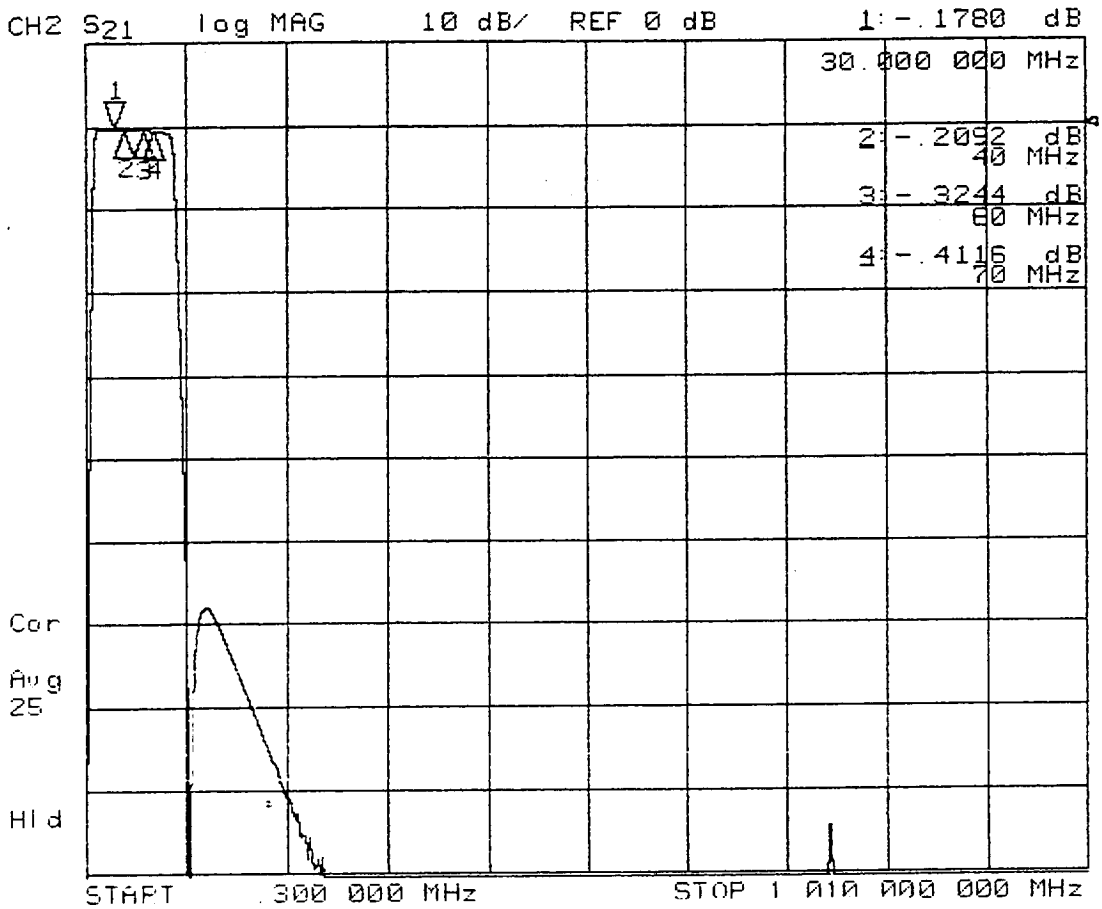
***** END OF BANDPASS CHARACTERISTICS TEST *****

FUNCTIONAL PERFORMANCE TEST

ACCEPTANCE TEST PROCEDURE
63-0005-02 PARA 4.1

BRIEF TEST DESCRIPTION: THE TESTS DESCRIBED IN APPENDIX C PAGE 10 THRU PAGE 13 ARE PERFORMED TO DOCUMENT THE FUNCTIONAL PERFORMANCE OF THE UNIT AT THE CONCLUSION OF ALL ENVIRONMENTAL TESTING. THE TESTS ARE AS FOLLOWS AND IN ANY SEQUENCE:

a.) VSWR PER ATP PARA 4.5.1.
b.) INSERTION LOSS PER ATP PARA 4.5.2
c.) INSERTION LOSS VS TEMPERATURE PER ATP PARA 4.5.6.
d.) 3.0 dB BANDWIDTH PER ATP PARA 4.5.3.
e.) CENTER FREQUENCY (fc) PER ATP PARA 4.5.7 (PART OF 3.0 dB B/W TEST)
f.) PASSBAND RIPPLE PER ATP PARA 4.5.4 (PART OF INSERTION LOSS TEST).
g.) OUT-OF-BAND REJECTION PER ATP PARA 4.5.5.



POST THERMAL CYCLE
PASSBAND CHARACTERISTICS
SERIAL NO. P229-008
AMBIENT
OPR: R. HOGGATT DATE DEC 18 1996

MARKER PARAME...	...nnel 1	Channel 2
MARKER 1	30.000000 MHz OFF	30.000000 MHz -.1780 dB
MARKER 2	40.000000 MHz OFF	40.000000 MHz -.2092 dB
MARKER 3	60.000000 MHz OFF	60.000000 MHz -.3244 dB
MARKER 4	70.000000 MHz OFF	70.000000 MHz -.4116 dB
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	0.000000 MHz 0 dB
REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-3 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF

Report No. 11317
November 1998

GAIN STABILITY AND GAIN COMPRESSION

FOR

MIXER/IF AMPLIFIERS

GAIN-TEMPERATURE SENSITIVITY FOR MIXER/AMPLIFIERS

Channel No.	1	2
Specification (+/-dB/°C)	0.02	0.02
Measured (dB/°C)	-0.015	-0.017

Channel 1 Bandpass Filter

IF Filter (S/N: 1331559-6, S/N: P232-006)

APPENDIX F

ACCEPTANCE TEST REPORT

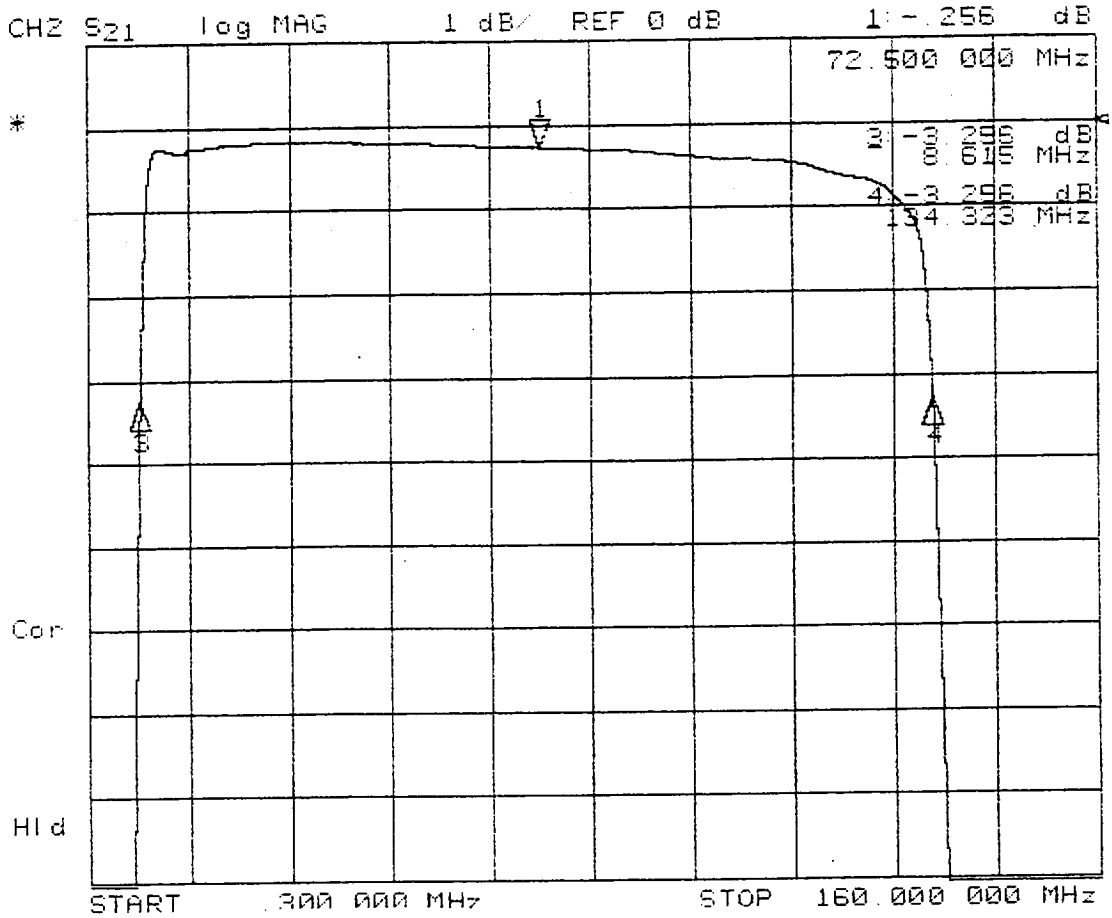
BANDPASS FILTER MODEL HL72.5-125-10SS1 S/N P232-006
AEROJET 1331559-6 REV. E

3.0 dB BANDWIDTH

ACCEPTANCE TEST PROCEDURE 63-0005-02 PARA 4.5.3	-10°C	+15°C	+40°C
{7} UPPER 3.0 dB BANDEDGE	134.32 MHz (133.0-135.0)	134.11 Mhz (133.0-135.0)	133.87 MHz (133.0-135.0)
{8} LOWER 3.0 dB BANDEDGE	8.62 MHz (8.0-10.0)	8.60 Mhz (8.0-10.0)	8.59 MHz (8.0-10.0)
{9} 3.0 dB RELATIVE BANDWIDTH	125.76 MHz (123.0-127.0)	125.51 Mhz (123.0-127.0)	125.28 MHz (123.0-127.0)
{10} ADD {7} AND {8} ÷ 2 =	71.47 MHz (72.5 NOM)	71.36 MHz (72.5 NOM)	71.23 Mhz (72.5 NOM)
{10a} RECORD MEASURED TEMPERATURE	-13.0 °C (-15.0 TO -10.0)	+14.1 °C (12.5 TO 17.5)	+42.5 °C (40.0 TO 45.0)
{6} ATTACH TRANSMISSION LOSS PERFORMANCE X-Y PLOT	✓ (√)	✓ (√)	✓ (√)

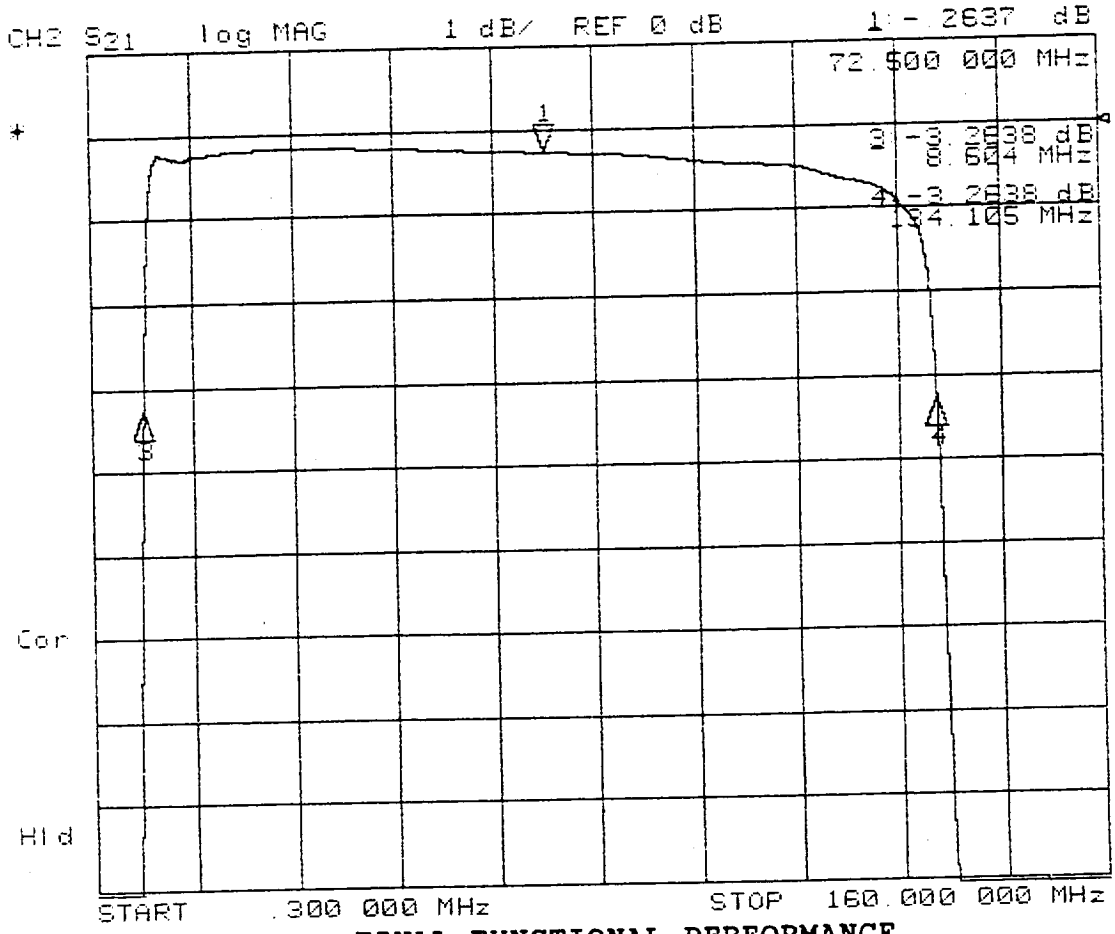
PASSBAND RIPPLE

ACCEPTANCE TEST PROCEDURE 63-0005-02 PARA 4.5.4	-10°C	+15°C	+40°C
{11a} MIN INSERTION LOSS FREQ	32.63 MHz	31.84 Mhz	31.84 MHz
MIN INSERTION LOSS PERFORMANCE	-0.17 dB	-0.17 dB	-0.17 dB
{11b} 75% BW LOWER BANDEDGE FREQ	10.24 MHz	10.17 Mhz	10.13 MHz
75% BW LOWER BANDEDGE I.L. PERF	-0.41 dB	-0.43 dB	-0.46 dB
{11c} 75% BW UPPER BANDEDGE FREQ	103.99 MHz	103.92 Mhz	103.88 MHz
75% BW UPPER BANDEDGE I.L. PERF	-0.42 dB	-0.43 dB	-0.45 dB
{11d} PERFORMANCE DELTA (I.L. @ {11b} - I.L. @ {11a})	0.24 dB	0.26 dB	0.29 dB
{11e} PERFORMANCE DELTA (I.L. @ {11c} - I.L. @ {11a})	0.25 dB	0.26 dB	0.28 dB



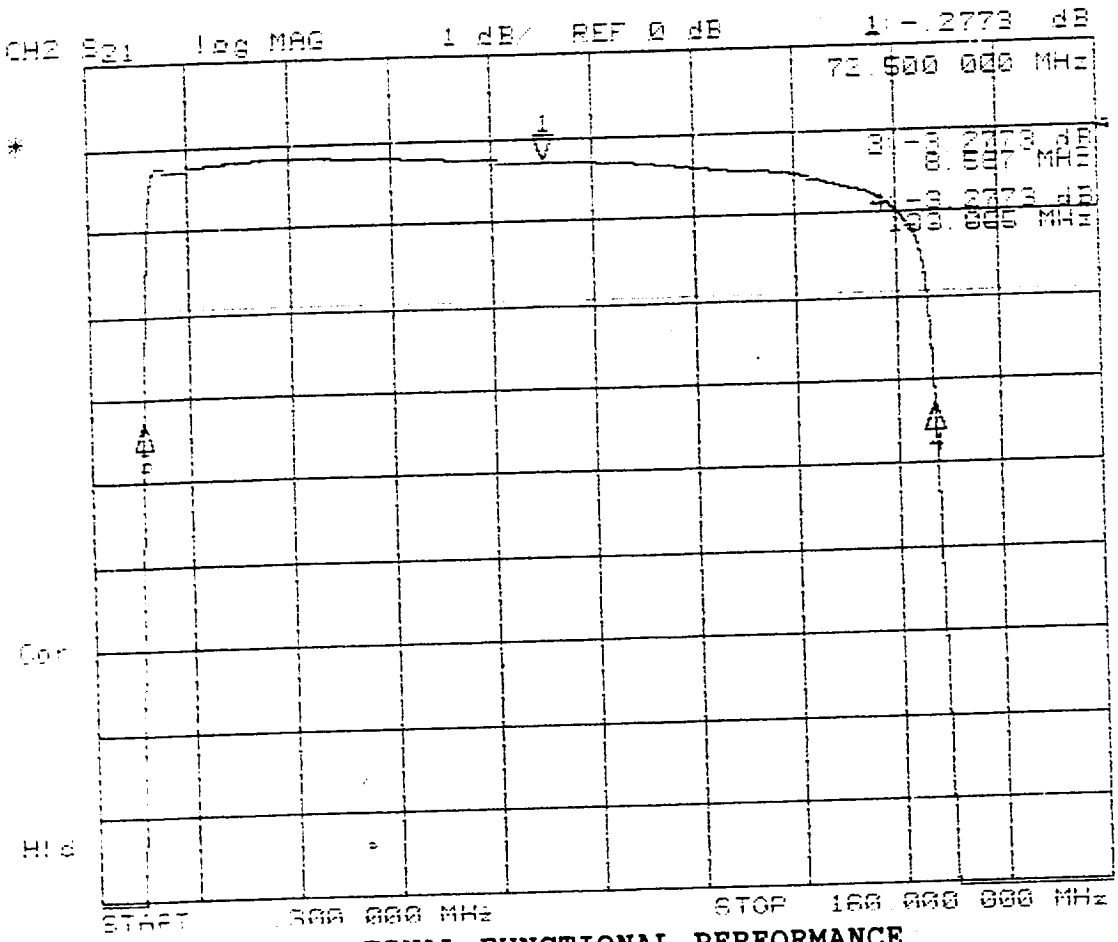
FINAL FUNCTIONAL PERFORMANCE
TRANSMISSION LOSS
SERIAL NO. P232-006
-10C DATA
OPR: R. HOGGATT DATE 12/11/96

MARKER PARAME...	...nnel 1	...nnel 2
MARKER 1	16.250000 MHz OFF	72.500000 MHz -.256 dB
MARKER 2	129.750000 MHz OFF	71.469838 MHz OFF
MARKER 3	39.625000 MHz OFF	8.615992 MHz -3.256 dB
MARKER 4	119.375000 MHz OFF	134.323684 MHz -3.256 dB
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	89.425802 MHz -3.2342 dB
REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-14 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF



FINAL FUNCTIONAL PERFORMANCE
TRANSMISSION LOSS
SERIAL NO. P232-006
+15C DATA
OPR: R. HOGGATT DATE 12/11/96

MARKER PARAME...		...annel 2
MARKER 1	16.250000 MHz OFF	72.500000 MHz -.2637 dB
MARKER 2	128.750000 MHz OFF	71.354527 MHz OFF
MARKER 3	25.625000 MHz OFF	8.604033 MHz -3.2638 dB
MARKER 4	119.375000 MHz OFF	134.105022 MHz -3.2638 dB
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	89.425802 MHz -3.2342 dB
REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-14 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF



FINAL FUNCTIONAL PERFORMANCE
TRANSMISSION LOSS
SERIAL NO. P232-006
+40C DATA
OPR: R. HOGGATT DATE 12/11/96

MARKER PARAMETERS	Channel 1	Channel 2
MARKER 1	18.250000 MHz OFF	72.500000 MHz -.2773 dB
MARKER 2	128.750000 MHz OFF	71.226904 MHz OFF
MARKER 3	25.625000 MHz OFF	8.587920 MHz -3.2773 dB
MARKER 4	119.375000 MHz OFF	133.865888 MHz -3.2773 dB
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	89.425802 MHz -3.2342 dB
REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-14 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF

APPENDIX F ACCEPTANCE TEST REPORT

BANDPASS FILTER MODEL HL72.5-125-10SS1 S/N P232-006
AEROJET 1331559-6 REV. E

PASSBAND RIPPLE (CON'T)

{11f} RECORD PASS/FAIL (0.5 dB MAX)	(PASS)/FAIL	(PASS)/FAIL	(PASS)/FAIL
{11g) ATTACH PASSBAND RIPPLE PERFORMANCE X-Y PLOT(S)	✓ (√)	✓ (√)	✓ (√)

OUT-OF-BAND REJECTION

ACCEPTANCE TEST PROCEDURE 63-0005-02 PARA 4.5.5
Fc=72.5 MHz.
REF {5A} FOR INSERTION LOSS @ Fc

	-10°C	+15°C	+40°C
{12} WORST CASE REJECTION FROM 0.300 MHz TO 1.0 MHz	>100 dB (40.0 dB MIN)	>100 dB (40.0 dB MIN)	>100 dB (40.0 dB MIN)
{13a} WORST CASE REJECTION FROM 153.75 MHz TO 1000.0 MHz	-66.0 dB (40.0 dB MIN)	-67.0 dB (40.0 dB MIN)	-68.1 dB (40.0 dB MIN)
{13c} RECORD MEASURED TEMPERATURE	-13.3 °C (-15.0 TO -10.0)	+13.9°C (12.5 TO 17.5)	+42.3 °C (40.0 TO 45.0)
{14} ATTACH REJECTION PERFORMANCE X-Y PLOT(S)	✓ (√) ✓ (√)	✓ (√) ✓ (√)	✓ (√) ✓ (√)

TEST PERFORMED BY R. Hoggatt (DA) DATE 12/11/96

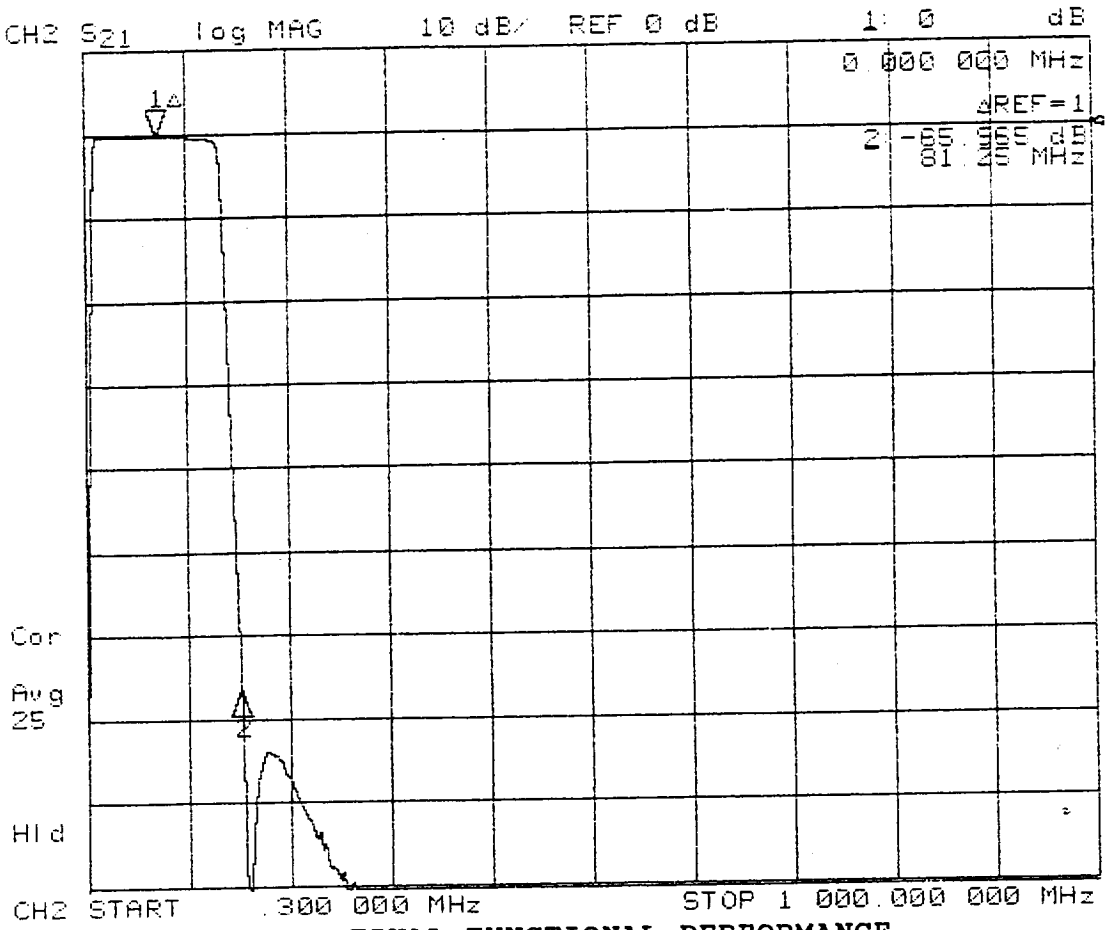
NOTE IF TEST WITNESSED BY AESD: _____ GSI: Not witnessed this time. DLD

***** END OF FUNCTIONAL PERFORMANCE TEST ****

OUTLINE AND MOUNTING DIMENSIONS VERIFICATION

{16} REFERENCE CUSTOMER DRAWING 1331559

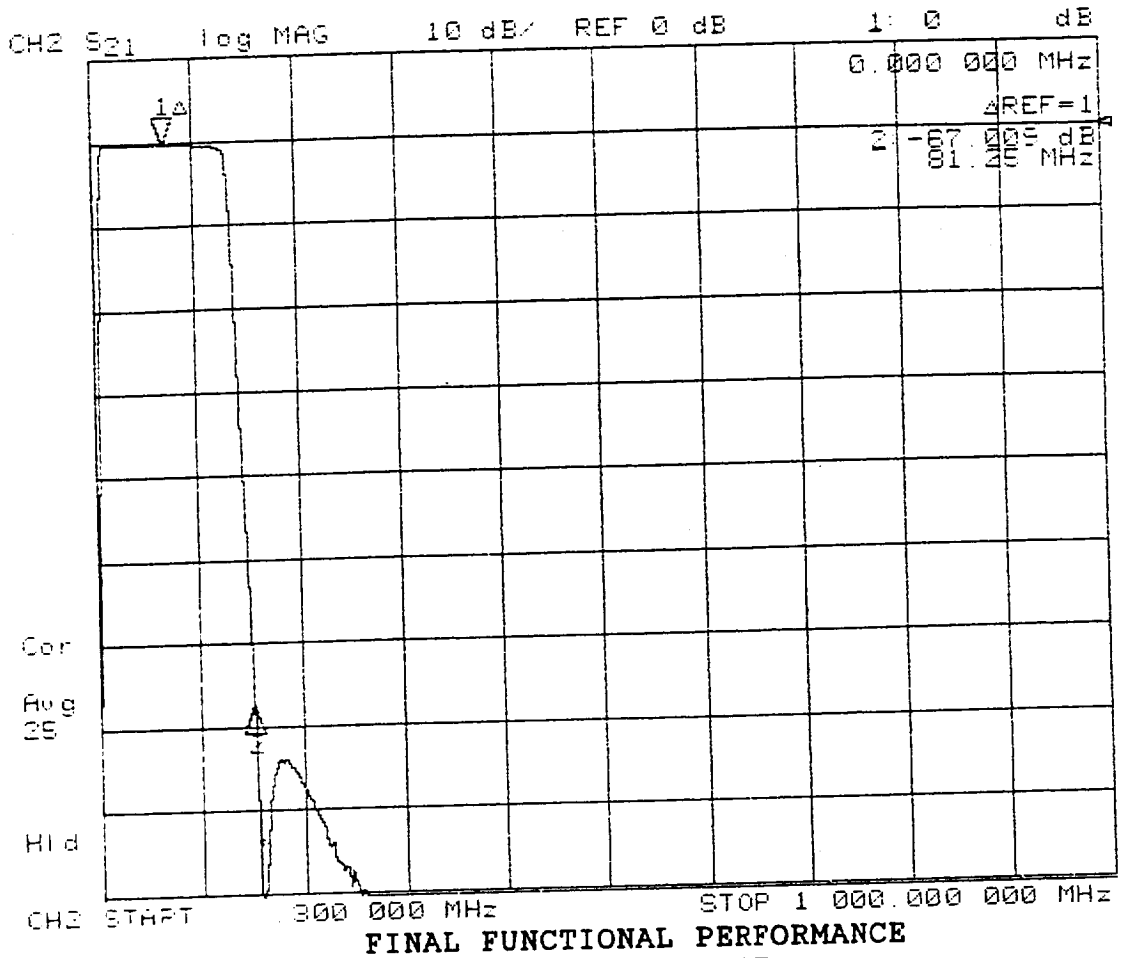
DESCRIPTION OF MEASUREMENT	DIMENSION AND TOLERANCE	ACTUAL MEASUREMENT
OVER ALL LENGTH	3.50 ± .03	3.500
MOUNTING HOLE CENTER	0.125 ± .010	0.126
BETWEEN UPPER MOUNTING HOLES	3.250	3.249
BETWEEN LOWER MOUNTING HOLES	3.250	3.251



FINAL FUNCTIONAL PERFORMANCE
REJECTION PERFORMANCE
SERIAL NO. P232-006
-10C DATA
OPR: R. HOGGATT DATE 12/11/96

MARKER PARAME... ...annel 2

MARKER 1	1.000000 MHz OFF	72.500000 MHz 0 dB
MARKER 2	5.000000 MHz OFF	153.750000 MHz -65.965 dB
MARKER 3	5.000000 MHz OFF	153.750000 MHz OFF
MARKER 4	5.000000 MHz OFF	1000.000000 MHz OFF
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	0.000000 MHz 0 dB
REFERENCE MARKER	OFF	MARKER 1
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-3 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF

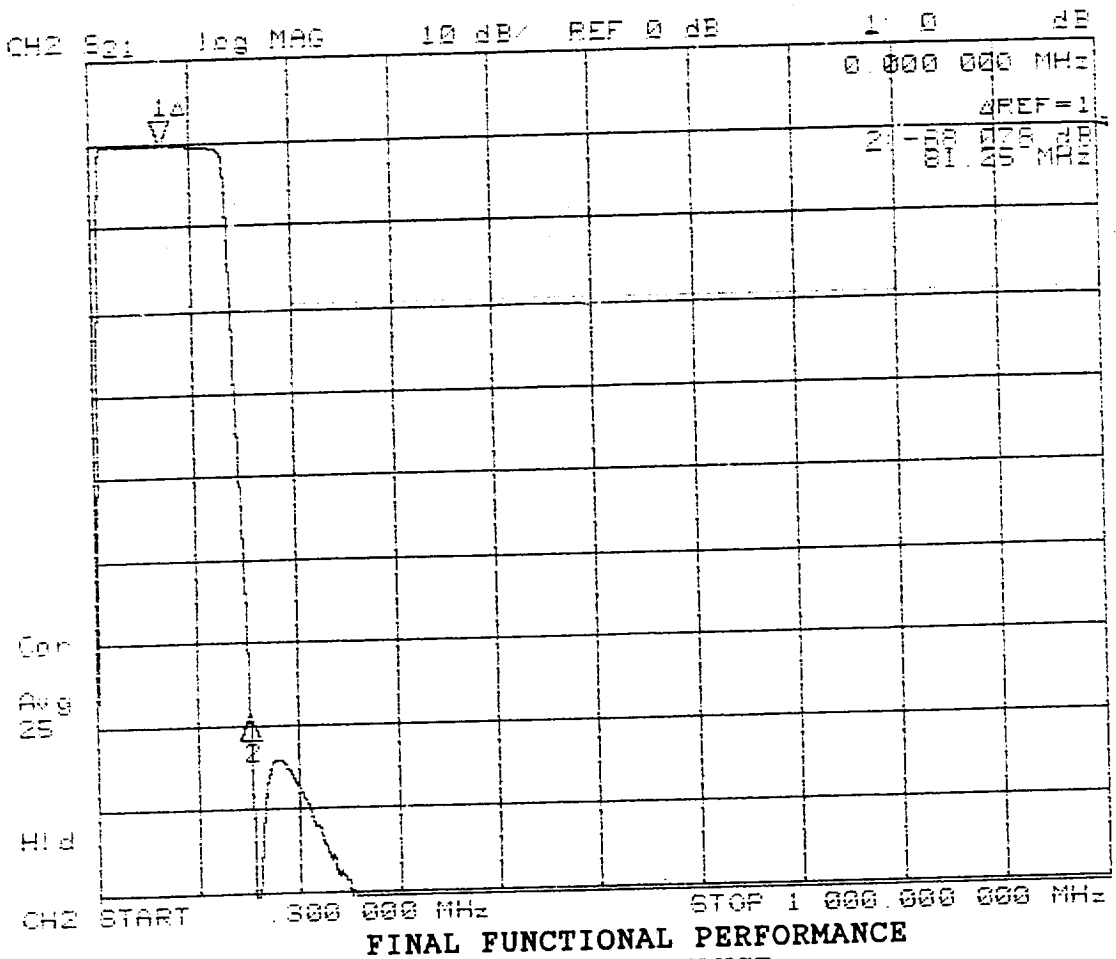


FINAL FUNCTIONAL PERFORMANCE
REJECTION PERFORMANCE
SERIAL NO. P232-006
+15C DATA
OPR: R. HOGGATT DATE 12/11/96

MARKER PARAME... ...nnel 2

MARKER 1	1.000000 MHz OFF	72.500000 MHz 0 dB
MARKER 2	5.000000 MHz OFF	153.750000 MHz -67.009 dB
MARKER 3	5.000000 MHz OFF	153.750000 MHz OFF
MARKER 4	5.000000 MHz OFF	1000.000000 MHz OFF
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	0.000000 MHz 0 dB

REFERENCE MARKER	OFF	MARKER 1
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-3 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF



FINAL FUNCTIONAL PERFORMANCE
REJECTION PERFORMANCE
SERIAL NO. P232-006
+40C DATA
OPR: R. HOGGATT DATE 12/11/90

MARKER PARAMETERS	Channel 1	Channel 2
MARKER 1	1.000000 MHz OFF	72.500000 MHz 0 dB
MARKER 2	5.000000 MHz OFF	153.750000 MHz -88.078 dB
MARKER 3	5.000000 MHz OFF	153.750000 MHz OFF
MARKER 4	5.000000 MHz OFF	1000.000000 MHz OFF
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	0.000000 MHz 0 dB
REFERENCE MARKER	OFF	MARKER 1
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-3 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF

ACCEPTANCE TEST REPORT

BANDPASS FILTER MODEL HL72.5-125-10SS1 S/N P232-006
AEROJET 1331559-6 REV. E

BANDPASS CHARACTERISTICS MEASUREMENT
PER ATP PARA 4.6
(REF: AE-24687, PARA 4.8.2)

RECORD THE AMBIENT ROOM TEMPERATURE. +24.0 °C (+19°C TO +29.0°C)

{15} ATTACH PASSBAND PERFORMANCE X-Y PLOT ✓ (√)

{24} TEST POINT MATRIX

REF	FREQ	UNIT	VALUE	REF	FREQ	UNIT	VALUE
F1	0.5	MHz	-98.1 dB	F11	(*) 80.0	MHz	-0.32 dB
F2	1.0	MHz	-91.4 dB	F12	(*) 100.0	MHz	-0.41 dB
F3	5.0	MHz	-30.2 dB	F13	120.0	MHz	-0.63 dB
F4	7.5	MHz	-9.15 dB	F14	130.0	MHz	-1.06 dB
F5	10.0	MHz	-0.84 dB	F15	135.0	MHz	-5.34 dB
F6	15.0	MHz	-0.30 dB	F16	140.0	MHz	-21.9 dB
F7	25.0	MHz	-0.22 dB	F17	150.0	MHz	-53.6 dB
F8	(*) 45.0	MHz	-0.18 dB	F18	200.0	MHz	-77.2 dB
F9	(*) 65.0	MHz	-0.25 dB	F19	500.0	MHz	-100.1 dB
F10	72.5	MHz	-0.30 dB	F20	1000.0	MHz	-103.2 dB

TEST PERFORMED BY: R. HOGGATT DA E DATE 12/18/96

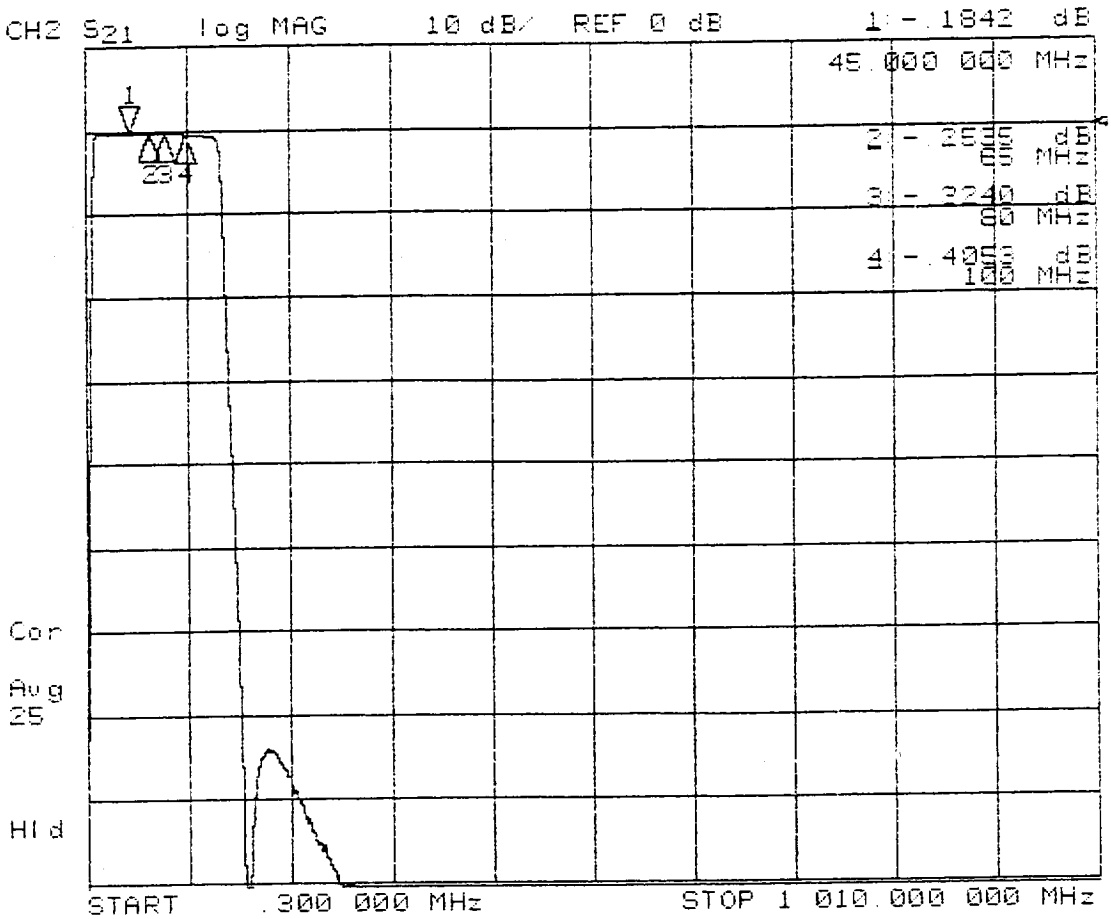
NOTE IF TEST WITNESSED BY AESD _____ GSI Not witnessed this time. DLD

***** END OF BANDPASS CHARACTERISTICS TEST *****

FUNCTIONAL PERFORMANCE TEST
ACCEPTANCE TEST PROCEDURE
63-0005-02 PARA 4.1

BRIEF TEST DESCRIPTION: THE TESTS DESCRIBED IN APPENDIX F PAGE 10 THRU PAGE 13 ARE PERFORMED TO DOCUMENT THE FUNCTIONAL PERFORMANCE OF THE UNIT AT THE CONCLUSION OF ALL ENVIRONMENTAL TESTING. THE TESTS ARE AS FOLLOWS AND IN ANY SEQUENCE:

a.) VSWR PER ATP PARA 4.5.1.
b.) INSERTION LOSS PER ATP PARA 4.5.2
c.) INSERTION LOSS VS TEMPERATURE PER ATP PARA 4.5.6.
d.) 3.0 dB BANDWIDTH PER ATP PARA 4.5.3.
e.) CENTER FREQUENCY (fc) PER ATP PARA 4.5.7 (PART OF 3.0 dB B/W TEST)
f.) PASSBAND RIPPLE PER ATP PARA 4.5.4 (PART OF INSERTION LOSS TEST).
g.) OUT-OF-BAND REJECTION PER ATP PARA 4.5.5.



POST THERMAL CYCLE
PASSBAND CHARACTERISTICS
SERIAL NO. P232-006
AMBIENT
OPR: R. HOGGATT DATE DEC 18 1996

MARKER PARAME...	...nel 2	
MARKER 1	45.000000 MHz OFF	45.000000 MHz -.1842 dB
MARKER 2	65.000000 MHz OFF	65.000000 MHz -.2535 dB
MARKER 3	80.000000 MHz OFF	80.000000 MHz -.3240 dB
MARKER 4	100.000000 MHz OFF	100.000000 MHz -.4053 dB
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	0.000000 MHz 0 dB
REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-3 dB	-3 dB
MARKER WIDTH VALUE	-3 dB OFF	-3 dB OFF
MARKER TRACKING	OFF	OFF

Report No. 11317
November 1998

Channel 2 Bandpass Filter

IF Filter (S/N: 1331559-3, S/N: P229-008)

APPENDIX C **ACCEPTANCE TEST REPORT**

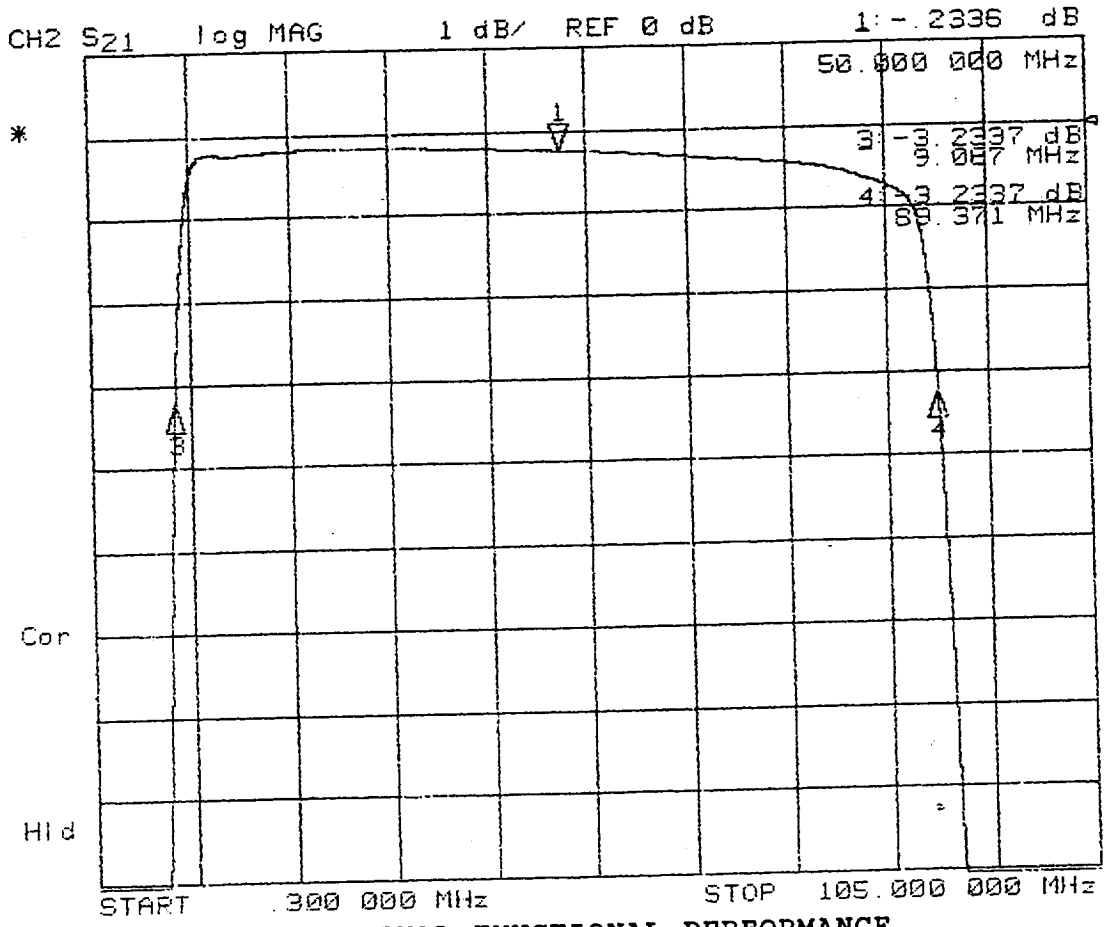
BANDPASS FILTER MODEL HL50-80-10SS1 S/N P229-008
AEROJET 1331559-3 REV. E

3.0 dB BANDWIDTH

ACCEPTANCE TEST PROCEDURE 63-0005-02 PARA 4.5.3	-10°C	+15°C	+40°C
{7} UPPER 3.0 dB BANDEDGE	89.37 MHz (88.0-90.0)	89.22 Mhz (88.0-90.0)	89.06 MHz (88.0-90.0)
{8} LOWER 3.0 dB BANDEDGE	9.07 MHz (8.0-10.0)	9.06 Mhz (8.0-10.0)	9.05 MHz (8.0-10.0)
{9} 3.0 dB RELATIVE BANDWIDTH	80.30 MHz (78.0-82.0)	80.16 Mhz (78.0-82.0)	80.01 MHz (78.0-82.0)
{10} ADD {7} AND {8} ÷ 2 =	49.22 MHz (50.0 NOM)	49.14 MHz (50.0 NOM)	49.06 Mhz (50.0 NOM)
{10a} RECORD MEASURED TEMPERATURE	-12.7 °C (-15.0 TO -10.0)	+14.1 °C (12.5 TO 17.5)	+42.9 °C (40.0 TO 45.0)
{6} ATTACH TRANSMISSION LOSS PERFORMANCE X-Y PLOT	✓ (√)	✓ (√)	✓ (√)

PASSBAND RIPPLE

ACCEPTANCE TEST PROCEDURE 63-0005-02 PARA 4.5.4	-10°C	+15°C	+40°C
{11a} MIN INSERTION LOSS FREQ	27.00 MHz	27.26 Mhz	27.00 MHz
MIN INSERTION LOSS PERFORMANCE	-0.17 dB	-0.17 dB	-0.18 dB
{11b} 75% BW LOWER BANDEDGE FREQ	11.05 MHz	11.00 Mhz	10.94 MHz
75% BW LOWER BANDEDGE I.L. PERF	-0.39 dB	-0.41 dB	-0.44 dB
{11c} 75% BW UPPER BANDEDGE FREQ	71.05 MHz	71.00 Mhz	70.94 MHz
75% BW UPPER BANDEDGE I.L. PERF	-0.39 dB	-0.41 dB	-0.43 dB
{11d} PERFORMANCE DELTA (I.L. @ {11b} - I.L. @ {11a})	0.22 dB	0.24 dB	0.27 dB
{11e} PERFORMANCE DELTA (I.L. @ {11c} - I.L. @ {11a})	0.22 dB	0.24 dB	0.27 dB



FINAL FUNCTIONAL PERFORMANCE
TRANSMISSION LOSS
SERIAL NO. P229-008
-10C DATA
OPR: R. HOGGATT DATE DEC 18 1996

MARKER PARAMETERS	Channel 1	Channel 2
MARKER 1	14.000000 MHz OFF	50.000000 MHz -.2336 dB
MARKER 2	86.000000 MHz OFF	49.219192 MHz OFF
MARKER 3	20.000000 MHz OFF	9.067004 MHz -3.2337 dB
MARKER 4	80.000000 MHz OFF	89.371381 MHz -3.2337 dB
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	89.425802 MHz -3.2342 dB
REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-14 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF

DOCUMENT APPROVAL SHEET

GENCORP
AEROJET

TITLE	DOCUMENT NO.
Performance Verification Report METSAT AMSU-A2 Receiver Assembly, (P/N 1356441-1, S/N F04) S/N 107	Report 11317 November 1998

INPUT FROM: DATE	CDRL:	SPECIFICATION ENGINEER: DATE
R. Kapper	208	N/A

CHECKED BY: DATE	JOB NUMBER: DATE
N/A	N/A

APPROVED SIGNATURES	DEPT. NO.	DATE
Product Team Leader (R. Kapper) R. Kapper	8661	11/10/98
Systems Engineer (R. Platt) R 9t Platt	8311	11/16/98
Design Assurance (E. Lorenz) E. Lorenz	8331	11/12/98
Quality Assurance (R. Taylor) for	7831	11/16/98
Technical Director/PMO (R. Hauerwaas) P V Hauerwaas	4001	11/11/98
Released: Configuration Management (J. Cavanaugh) J. Cavanaugh	8361	11/16/98

By my signature, I certify the above document has been reviewed by me and concurs with the technical requirements related to my area of responsibility.

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Block 9. Performing Organization Name and Address. Provide affiliation (NASA program office, NASA installation, or contractor name) of authors.

Block 10. Work Unit No. Provide Research and Technology Objectives and Plants (RTOP) number.

Block 11. Contract or Grant No. Provide when applicable.

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1. AGENCY USE ONLY (*Leave blank*)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED

4. TITLE AND SUBTITLE
Integrated Advanced Microwave Sounding Unit-A (AMSU-A), Performance Verification Report

5. FUNDING NUMBERS
NAS 5-32314

6. AUTHOR(S)
R. Kapper

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Aerojet
1100 W. Hollyvale
Azusa, CA 91702

8. PERFORMING ORGANIZATION REPORT NUMBER
11317
November 1998

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
NASA
Goddard Space Flight Center
Greenbelt, Maryland 20771

10. SPONSORING/MONITORING AGENCY REPORT NUMBER
---

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT

12b. DISTRIBUTION CODE
---

13. ABSTRACT (*Maximum 200 words*)

This is the Performance Verification Report, METSAT AMSU-A2 Receiver Assembly (P/N 1356441-1, S/N F04), S/N 107 for the Integrated Advanced Microwave Sounding Unit-A (AMSU-A).

14. SUBJECT TERMS
EOS
Microwave System

15. NUMBER OF PAGES

16. PRICE CODE
---

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	SAR

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std 239-18
298-102

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REPORT DOCUMENTATION PAGE

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1. AGENCY USE ONLY *(Leave blank)*

2. REPORT DATE
November 1998

3. REPORT TYPE AND DATES COVERED
Contractor Report

4. TITLE AND SUBTITLE
Integrated Advanced Microwave Sounding Unit-A (AMSU-A)
Performance Verification Report
METSAT AMSU-A2 Receiver Assembly (P/N 1356441-1, S/N F04) S/N 107

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R. Kapper

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1100 West Hollyvale St.
Greenbelt, MS 20771

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9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS (ES)
National Aeronautics and Space Administration
Washington, DC 20546-0001

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11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION / AVAILABILITY STATEMENT
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12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*
This is the Performance Verification Report, METSAT AMSU-A2 Receiver Assembly (P/N 1356441-1, S/N F04), S/N 107 for the Integrated Advanced Microwave Sounding Unit-A (AMSU-A)

14. SUBJECT TERMS
EOS; microwave system.

15. NUMBER OF PAGES
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16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	UL