CKC LABORATORIES, INC. Testing the Future

ACCREDITED
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803.01 - 803.06
EMC/SAFETY

HONEYWELL INTERNATIONAL INC. TEST REPORT

FOR THE

HIGH FREQUENCY COMMUNICATIONS TRANSCEIVER, KHF 1050 SYSTEM ALSO KNOWN AS THE PRIMUS HF 1050 SYSTEM

FCC PARTS 80, 87, 90 AND PART 15 SUBPART B SECTION 15.109 CLASS B

COMPLIANCE

DATE OF ISSUE: MARCH 6, 2003

PREPARED FOR:

Honeywell International Inc.
23500 West 105th Street, MS 56
Olathe, KS 66061-6615

P.O. No.: A00008581
W.O. No.: 79777

PREPARED BY:

Mary Ellen Clayton
CKC Laboratories, Inc.
5473A Clouds Rest
Mariposa, CA 95338

Date of test: February 3 - March 5, 2003

Report No.: FC03-009

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ADMINISTRATIVE INFORMATION

DATE OF TEST:	February 3 - March 5, 2003
DATE OF RECEIPT:	February 3, 2003
PURPOSE OF TEST:	To demonstrate the compliance of the High Frequency Communications Transceiver, KHF 1050 System with the requirements for FCC Parts 80, 87, 90 and Part 15 Subpart B Section 15.109 Class B devices.
TEST METHOD:	FCC Parts 80, 87, 90 and ANSI C63.4 (1992)
FREQUENCY RANGE TESTED:	9 kHz - 3 GHz
MANUFACTURER:	Honeywell International Inc. 23500 West 105th Street, MS 56 Olathe, KS 66061-6615
REPRESENTATIVE:	Larry Haddix
TEST LOCATION:	CKC Laboratories, Inc. 5473A Clouds Rest Mariposa, CA 95338

SUMMARY OF RESULTS

As received, the Honeywell International Inc. High Frequency Communications Transceiver, KHF 1050 System, also known as the Primus HF 1050 System, was found to be fully compliant with the following standards and specifications:

United States

- FCC Parts 80, 87, 90
- Part 15 Subpart B Section 15.109 Class B using ANSI C63.4 (1992) method

CONDITIONS FOR COMPLIANCE

No modifications to the EUT were necessary to comply.

APPROVALS

QUALITY ASSURANCE:

Steve Behm, Director of Engineering Services and Quality Assurance

Joyce Walker, Quality Assurance Administrative Manager

TEST PERSONNEL:

Randy Clark, EMC Engineer

Mike Wilkinson, Lab Manager

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The High Frequency Communications Transceiver, KHF 1050 System tested by CKC Laboratories was a production unit.

EQUIPMENT UNDER TEST

The KHF 1050 System consists of:
FCC ID: ASYKHF1050 (pending)

Power Amplifier KPA 1052
Manuf: Honeywell
Model: 064-01072-0101
Serial: Y538
FCC ID: ASYKHF1050 (pending)

Antenna Coupler KAC 1052
Manuf: Honeywell
Model: 064-01074-0101
Serial: Y560
FCC ID: ASYKHF1050 (pending)

Receiver/Exciter KRX 1053
Manuf: Honeywell
Model: 064-01073-0101
Serial: Y547
FCC ID: ASYKHF1050 (pending)

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

DC Power Supply
Manuf: Sorensen
Model: 55-90T
Serial: CKC 2297
FCC ID: NA

Audio Oscillator
Manuf: HP
Model: 204D
Serial: CKC 1283
FCC ID: DoC

Audio Oscillator
Manuf: HP
Model: 204D
Serial: CKC 2457
FCC ID: DoC

Attenuator 14 dB
Manuf: JFW
Model: 50FHC-014
Serial: CKC P1631
FCC ID: DoC

Attenuator 10 dB
Manuf: Weinschel
Model: 33-10-33
Serial: CKC P1681
FCC ID: DoC

Attenuator 30 dB
Manuf: Bird
Model: 8322
Serial: 102-0053-00
FCC ID: DoC

Computer
Manuf: Toshiba
Model: PA1249U-T2A
Serial: Y7368523-1
FCC ID: DoC

KHF1050 System Breakout Box
Manuf: Honeywell
Model: NA
Serial: NA
FCC ID: DoC

DC Power Distribution Box
Manuf: Honeywell
Model: NA
Serial: NA
FCC ID: DoC

Microphone
Manuf: Telex
Model: Tel-66C
Serial: NA
FCC ID: DoC

Controller
Manuf: Gables Eng.
Model: G-7511-101-FTD (PS440)
Serial: 12
FCC ID: DoC

DC Power Supply
Manuf: HP
Model: 6205
Serial: CKC 762
FCC ID: NA

MEASUREMENT UNCERTAINTY

TEST	HIGHEST UNCERTAINTY
Radiated Emissions	+/- 2.94 dB

Note: Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Statements of compliance are based on the nominal values only.

TEMPERATURE AND HUMIDITY DURING TESTING
The temperature during testing was within +15°C and + 35°C.
The relative humidity was between 20% and 75%.

2.1033(c)(3) USER'S MANUAL
The necessary information is contained in a separate document.

2.1033 (c)(4) TYPE OF EMISSIONS
2k80J3E, 2k80H3E, 2k80R3E, 2k8J3D, 2k8H3D, 2k8J2D, 2k8H2D
Test procedure requires 400 Hz and 1800 Hz tones for J3E, R3E, J2D and J3D testing and 1500 Hz tones for H3E, H2D and H3D testing, however the device is capable of 2.8 kHz bandwidth.

2.1033(c)(5) FREQUENCY RANGE
2-29.9999 MHz

2.1033(c)(6) OPERATING POWER
J3D/J2D USB: 109.49 EIRP Watts, J3D/J2D LSB: 110.52 EIRP Watts, J3E USB: 215.00 EIRP Watts, J3E LSB: 212.84 EIRP Watts, R3E USB: 225.12 EIRP Watts, H3E USB: 210.00 EIRP Watts, H3D/H2D USB: 92.10 EIRP Watts

2.1033(c)(7) MAXIMUM POWER RATING
Various

2.1033(c)(8) DC VOLTAGES
The necessary information is contained in a separate document.

2.1033(c)(9) TUNE-UP PROCEDURE
The necessary information is contained in a separate document.

2.1033(c)(10) SCHEMATICS AND CIRCUITRY DESCRIPTION
The necessary information is contained in a separate document.

2.1033(c)(11) LABEL AND PLACEMENT
The necessary information is contained in a separate document.

2.1033(c)(12) SUBMITTAL PHOTOS
The necessary information is contained in a separate document.

2.1033(c)(13) MODULATION INFORMATION
The necessary information is contained in a separate document.

2.1033(c)(14)/2.1046/87.131 - RF POWER OUTPUT

Test Conditions: System Interconnect The KHF 1050 System consists of a KRX 1053 Receiver Exciter, a KPA 1052 Power Amplifier, a KAC 1052 Antenna Coupler, and an appropriate ARINC 429 Controller (RM-855 or PS 440). For the purpose of a bench testing, these units are interconnected via a KHF 1050 Breakout Box. The control and DC-power cables that interface each unit to the KHF 1050 Breakout Box are approximately 1 m long. A double-shielded coaxial cable (approximately 0.5 m long) interconnects the KRX 1053 and the KPA 1052. For the purpose of the tests, a Signalcrafter power sensor is mounted to the transmitter output of the KPA 1052. Depending on the nature of the test being conducted, a double shielded coax approximately 1 m long carries the RF power from the power sensor to either a 54 dB power attenuator or to the KAC 1052 antenna coupler. The antenna coupler is terminated with an antenna-load. A DC-power-distribution box is used to supply 27.5VDC power to the KHF 1050 Breakout Box and to the controller.

System Operation
The ARINC-429 controller communicates the pilot-selected operating frequency and other operating parameters to the KRX 1053 via the KHF 1050 Breakout Box. The operating parameters of the KRX 1053 are returned to the controller via ARINC 429 to display to the pilot. Modulation audio from the external audio oscillators is applied to the KHF 1050 Breakout Box, where the tones are summed together and routed to the KRX 1053. At the KHF 1050 Breakout Box, the audio level is monitored with a HP 8903B Audio Analyzer at a point that directly connects to the microphone or data audio inputs of the KRX 1053. The audio levels are set to typical operating values, unless specifically directed otherwise by the requirements of the test being conducted.

The KRX 1053 communicates with the KAC 1052 via an RS-422 bus and discrete parallel lines. Operating parameters such as operating-frequency band, transmitter power setting and mode of operation is communicated along this RS-422 bus. Additionally, operating-status information of the KAC 1052 and KPA 1052 is returned to the KRX 1053 via the RS-422 bus and parallel lines. Another serial bus conveys band information and mode of operation from the KAC 1052 and KPA 1052. In addition to the serial information, discrete parallel lines communicate control and status information between these two units.

In the transmit mode of operation, the exciter signal output by the KRX 1053 is routed to the KPA 1052 where it is amplified. The transmitter output at the KPA 1052 is monitored either directly or routed through the KAC 1052, depending on the nature of the test being performed.

A computer connected to the RS-232 maintenance port of the KAC 1052 is used to effectively disable the average power detector inside the KPA 1052 when testing voice modes of operation. This raises the threshold of the average power detector from approximately 50 W to approximately 100 W to ensure that the average-power detector in the KPA 1052 does not limit the RF output power below that which is representative of normal voice operation. The average power detector is active for data modes of operation.

2.1046(a)/87.139 - EIRP measurements and Calculations

RF Conducted Measurement: (Effective Isotropic Radiated Power)
Customer Name: Honeywell International WO 79777
Test Engineer: Randal Clark
Test Date: 3-3-03

Emission Designator = J3D & J2D									
Mode	Freq (MHz)	Antenna Port (Watts)	Antenna Port (dBm)	Cable Correction (dB)	Antenna Gain (dBi) **[Note 1]**	Corrected Reading EIRP (dBm)	Corrected Reading EIRP (Watts)	Spec Limit (Watts)	Results
USB	2.1	108.00	50.33	0.00	0.00	50.33	108.00	none	PASS
USB	10.1	105.00	50.21	0.10	0.00	50.31	107.45	none	PASS
USB	29.9	107.00	50.29	0.10	0.00	50.39	109.49	none	PASS
LSB	2.1	107.00	50.29	0.00	0.00	50.29	107.00	none	PASS
LSB	10.1	108.00	50.33	0.10	0.00	50.43	110.52	none	PASS
LSB	29.9	105.00	50.21	0.10	0.00	50.31	107.45	none	PASS

Emission Designator = J3E									
Mode	Freq (MHz)	Antenna Port (Watts)	Antenna Port (dBm)	Cable Correction (dB)	Antenna Gain (dBi) **[Note 1]**	Corrected Reading EIRP (dBm)	Corrected Reading EIRP (Watts)	Spec Limit (Watts)	Results
USB	2.1	215.00	53.32	0.00	0.00	53.32	215.00	400.00	PASS
USB	10.1	210.00	53.22	0.10	0.00	53.32	214.89	400.00	PASS
USB	29.9	208.00	53.18	0.10	0.00	53.28	212.84	400.00	PASS
LSB	2.1	205.00	53.12	0.00	0.00	53.12	205.00	400.00	PASS
LSB	10.1	208.00	53.18	0.10	0.00	53.28	212.84	400.00	PASS
LSB	29.9	205.00	53.12	0.10	0.00	53.22	209.78	400.00	PASS

Emission Designator = R3E									
Mode	Freq (MHz)	Antenna Port (Watts)	Antenna Port (dBm)	Cable Correction (dB)	Antenna Gain (dBi) **[Note 1]**	Corrected Reading EIRP (dBm)	Corrected Reading EIRP (Watts)	Spec Limit (Watts)	Results
USB	2.1	220.00	53.42	0.00	0.00	53.42	220.00	400.00	PASS
USB	10.1	220.00	53.42	0.10	0.00	53.52	225.12	400.00	PASS
USB	29.9	220.00	53.42	0.10	0.00	53.52	225.12	400.00	PASS

Emission Designator = H3E									
Mode	Freq (MHz)	Antenna Port (Watts)	Antenna Port (dBm)	Cable Correction (dB)	Antenna Gain (dBi) **[Note 1]**	Corrected Reading EIRP (dBm)	Corrected Reading EIRP (Watts)	Spec Limit (Watts)	Results
USB	2.1	210.00	53.22	0.00	0.00	53.22	210.00	400.00	PASS
USB	10.1	205.00	53.12	0.10	0.00	53.22	209.78	400.00	PASS
USB	29.9	205.00	53.12	0.10	0.00	53.22	209.78	400.00	PASS

Emission Designator = H3D & H2D									
Mode	Freq (MHz)	Antenna Port (Watts)	Antenna Port (dBm)	Cable Correction (dB)	Antenna Gain (dBi) **[Note 1]**	Corrected Reading EIRP (dBm)	Corrected Reading EIRP (Watts)	Spec Limit (Watts)	Results
USB	2.1	90.00	49.54	0.00	0.00	49.54	90.00	none	PASS
USB	10.1	90.00	49.54	0.10	0.00	49.64	92.10	none	PASS
USB	29.9	90.00	49.54	0.10	0.00	49.64	92.10	none	PASS

Note(s):

1. Assuming unity gain, antenna not sold with EUT.
2. USB refers to Upper Side Band operation; LSB refers to Lower Side Band operation.

Test Equipment

Equipment	*Manufacturer*	*Model #*	*Serial #*	*Asset #*	*Cal Date*	*Cal Due*
Wattmeter	Signalcrafter	29B	108-0137-00	Honeywell*	1-21-03	5-21-03
Power Sensor	Signalcrafter	HF233K	108-0160-01	Honeywell*	1-21-03	5-21-03
Audio Analyzer	HP	8903A	3011A09432	2338	11-27-02	11-23-03

***Non-CKC Laboratories equipment

2.1033(c)(14)/2.1047(a)/87.141 - MODULATION CHARACTERISTICS - AUDIO FREQUENCY RESPONSE

Test Conditions: System Interconnect

The KHF 1050 System consists of a KRX 1053 Receiver Exciter, a KPA 1052 Power Amplifier, a KAC 1052 Antenna Coupler, and an appropriate ARINC 429 Controller (PS 440). For the purpose of a bench testing, these units are interconnected via a KHF 1050 Breakout Box. The control and DC-power cables that interface each unit to the KHF 1050 Breakout Box are approximately 1 m long. A double-shielded coaxial cable (approximately 0.5 m long) interconnects the KRX 1053 and the KPA 1052. For the purpose of the tests, a Signalcrafter power sensor is mounted to the transmitter output of the KPA 1052. A double-shielded coax approximately 1 m long carries the RF power from the power sensor to a 54 dB power attenuator, then to the spectrum analyzer. A DC-power-distribution box is used to supply 27.5VDC power to the KHF 1050 Breakout Box and to the controller.

System Operation

The ARINC-429 controller communicates the pilot-selected operating frequency and other operating parameters to the KRX 1053 via the KHF 1050 Breakout Box. The operating parameters of the KRX 1053 are returned to the controller via ARINC 429 to display to the pilot.

The KRX 1053 communicates with the KAC 1052 via an RS-422 bus and discrete parallel lines. Operating parameters such as operating-frequency band, transmitter power setting and mode of operation is communicated along this RS-422 bus. Additionally, operating-status information of the KAC 1052 and KPA 1052 is returned to the KRX 1053 via the RS-422 bus and parallel lines.

Another serial bus conveys band information and mode of operation from the KAC 1052 and KPA 1052. In addition to the serial information, discrete parallel lines communicate control and status information between these two units.

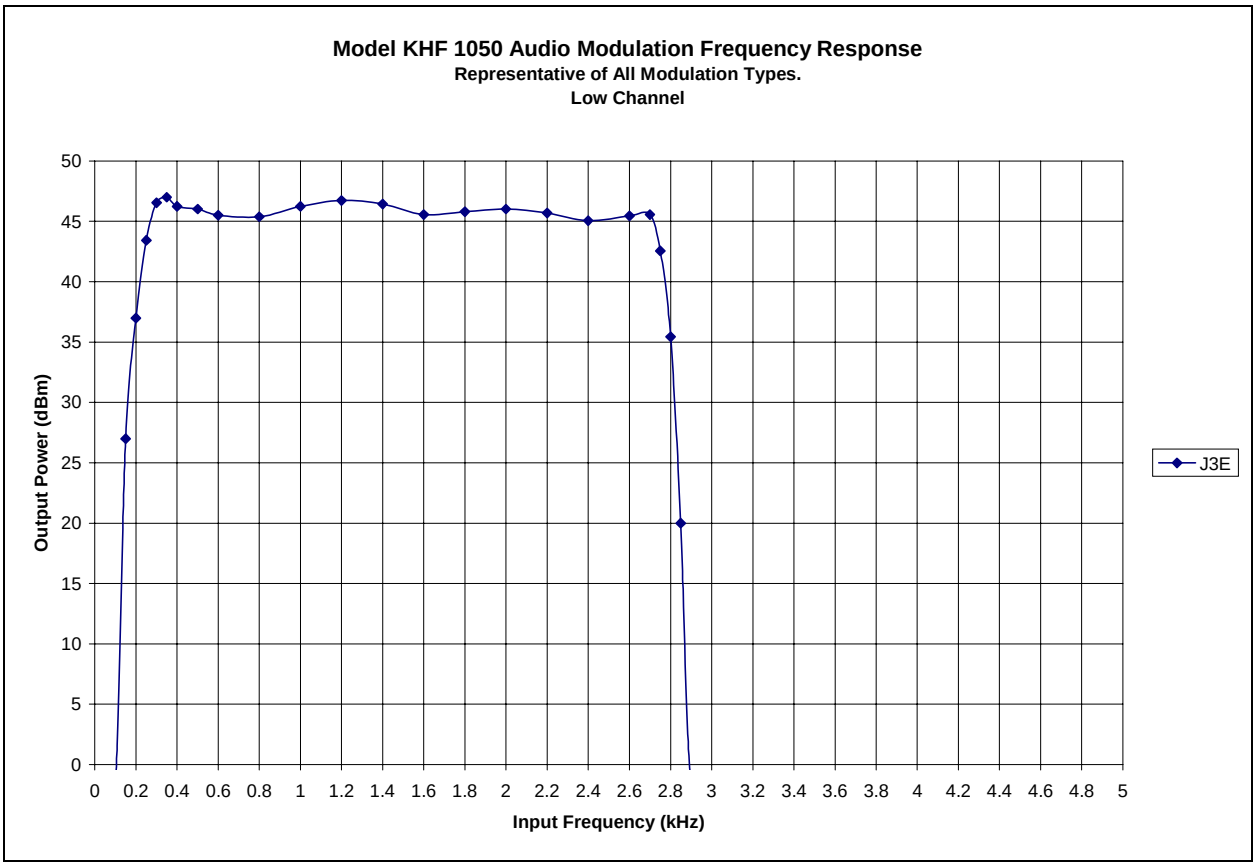
In the transmit mode of operation, the exciter signal output by the KRX 1053 is routed to the KPA 1052 where it is amplified. The transmitter output at the KPA 1052 is monitored either directly or routed through the KAC 1052, depending on the nature of the test being performed.

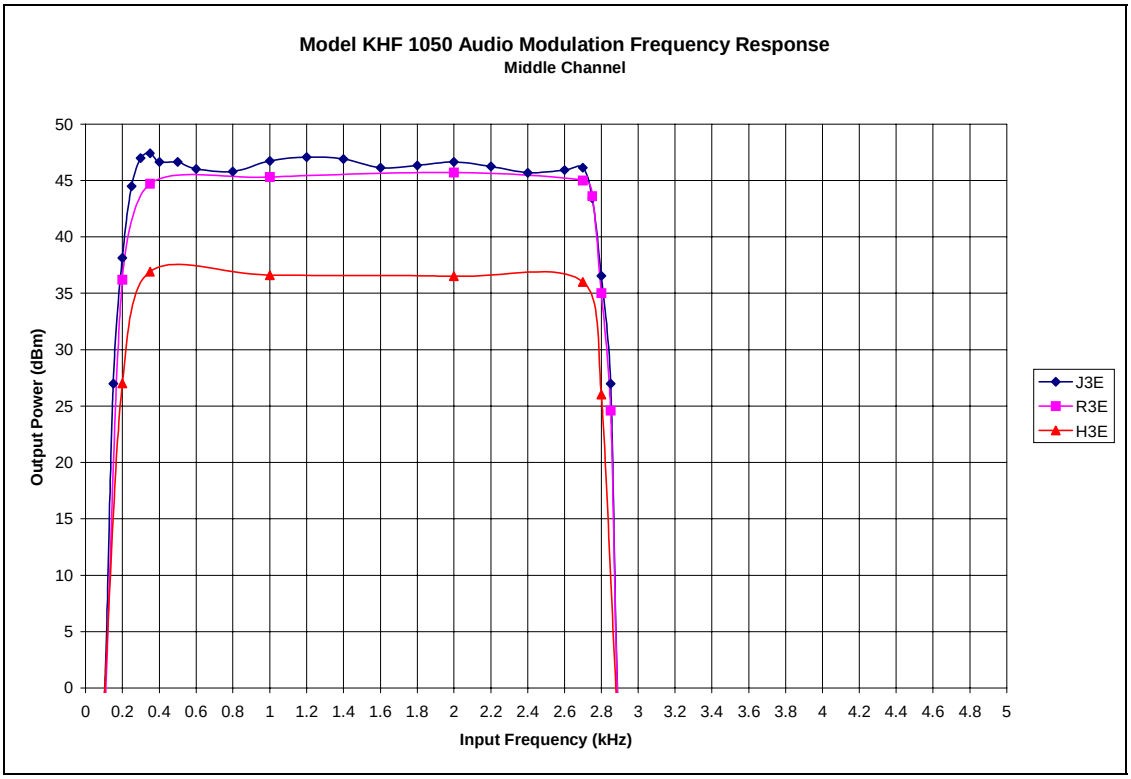
A computer connected to the RS-232 maintenance port of the KAC 1052 is used to effectively disable the average power detector inside the KPA 1052 when testing voice modes of operation. This raises the threshold of the average power detector from approximately 50 W to approximately 100 W to ensure that the average-power detector in the KPA 1052 does not limit the RF output power below that which is representative of normal voice operation. The average power detector is active for data modes of operation.

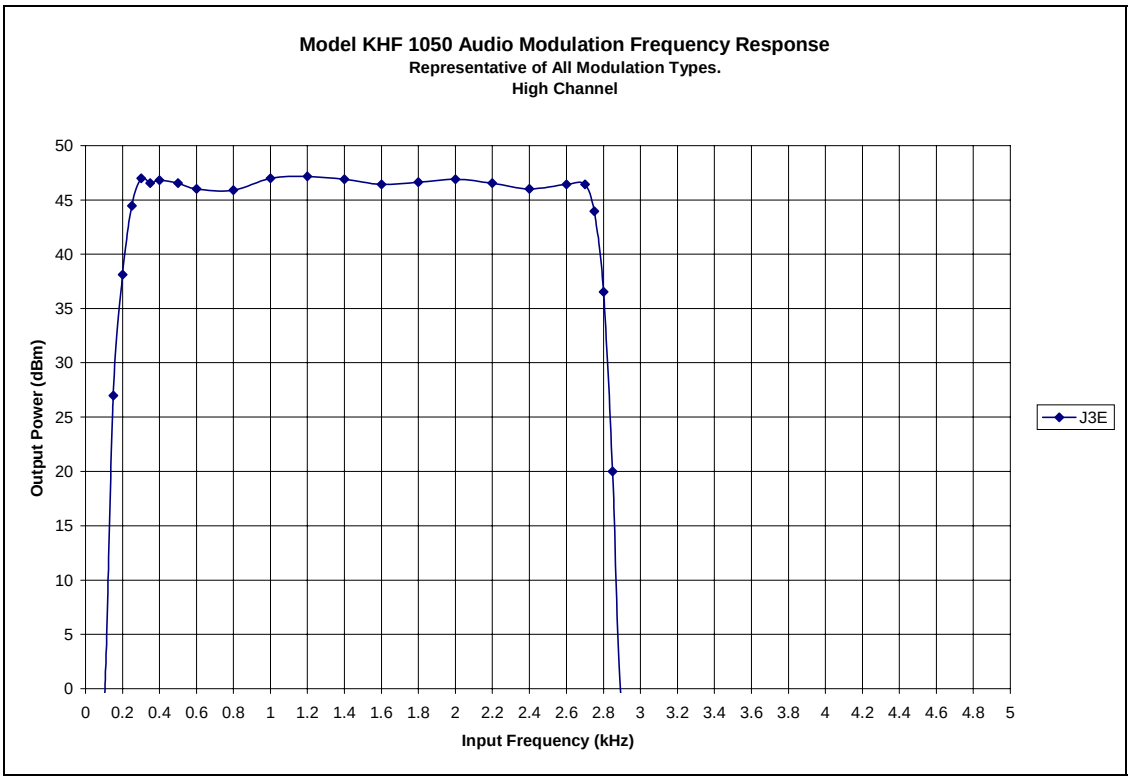
Test Configuration

Modulation audio from the external audio oscillators is applied to the KHF 1050 Breakout Box where the tones are summed together and routed to the KRX 1053 Mic input. At the KHF 1050 Breakout Box, the audio level is monitored with a HP 8903B Audio Analyzer at a point that directly connects to the microphone or data audio inputs of the KRX 1053. The level of the audio modulation is gradually adjusted, from near zero, upward while monitoring the RF output power. Modulation limiting begins at the point where the output power ceases to increase. From this point, the modulation level is reduced by approximately 6 dB and the modulation frequency is swept from 50 Hz to 5000 Hz.

The power output during this test is monitored by a Peak Envelope Power meter. In cases where the RF carrier is present along with the modulation, the power level of the modulation envelope is monitored using a spectrum analyzer to ensure compliance to this part.




Model KHF 1050 Audio Modulation Frequency Response
Middle Channel
Output Power (dBm)
Input Frequency (kHz)
J3E
R3E
H3E


Model KHF 1050 Audio Modulation Frequency Response
Representative of All Modulation Types.
High Channel
Output Power (dBm)
Input Frequency (kHz)
J3E

2.1033(c)(14)/2.1047(b)/87.141 - MODULATION CHARACTERISTICS – Modulation Limiting Response

Test Conditions: System Interconnect

The KHF 1050 System consists of a KRX 1053 Receiver Exciter, a KPA 1052 Power Amplifier, a KAC 1052 Antenna Coupler, and an appropriate ARINC 429 Controller (PS 440). For the purpose of a bench testing, these units are interconnected via a KHF 1050 Breakout Box. The control and DC-power cables that interface each unit to the KHF 1050 Breakout Box are approximately 1 m long. A double-shielded coaxial cable (approximately 0.5 m long) interconnects the KRX 1053 and the KPA 1052. For the purpose of the tests, a Signalcrafter power sensor is mounted to the transmitter output of the KPA 1052. A double-shielded coax approximately 1 m long carries the RF power from the power sensor to a 54 dB power attenuator, then to the spectrum analyzer. A DC-power-distribution box is used to supply 27.5VDC power to the KHF 1050 Breakout Box and to the controller.

System Operation

The ARINC-429 controller communicates the pilot-selected operating frequency and other operating parameters to the KRX 1053 via the KHF 1050 Breakout Box. The operating parameters of the KRX 1053 are returned to the controller via ARINC 429 to display to the pilot.

The KRX 1053 communicates with the KAC 1052 via an RS-422 bus and discrete parallel lines. Operating parameters such as operating-frequency band, transmitter power setting and mode of operation is communicated along this RS-422 bus. Additionally, operating-status information of the KAC 1052 and KPA 1052 is returned to the KRX 1053 via the RS-422 bus and parallel lines.

Another serial bus conveys band information and mode of operation from the KAC 1052 and KPA 1052. In addition to the serial information, discrete parallel lines communicate control and status information between these two units.

In the transmit mode of operation, the exciter signal output by the KRX 1053 is routed to the KPA 1052 where it is amplified. The transmitter output at the KPA 1052 is monitored either directly or routed through the KAC 1052, depending on the nature of the test being performed.

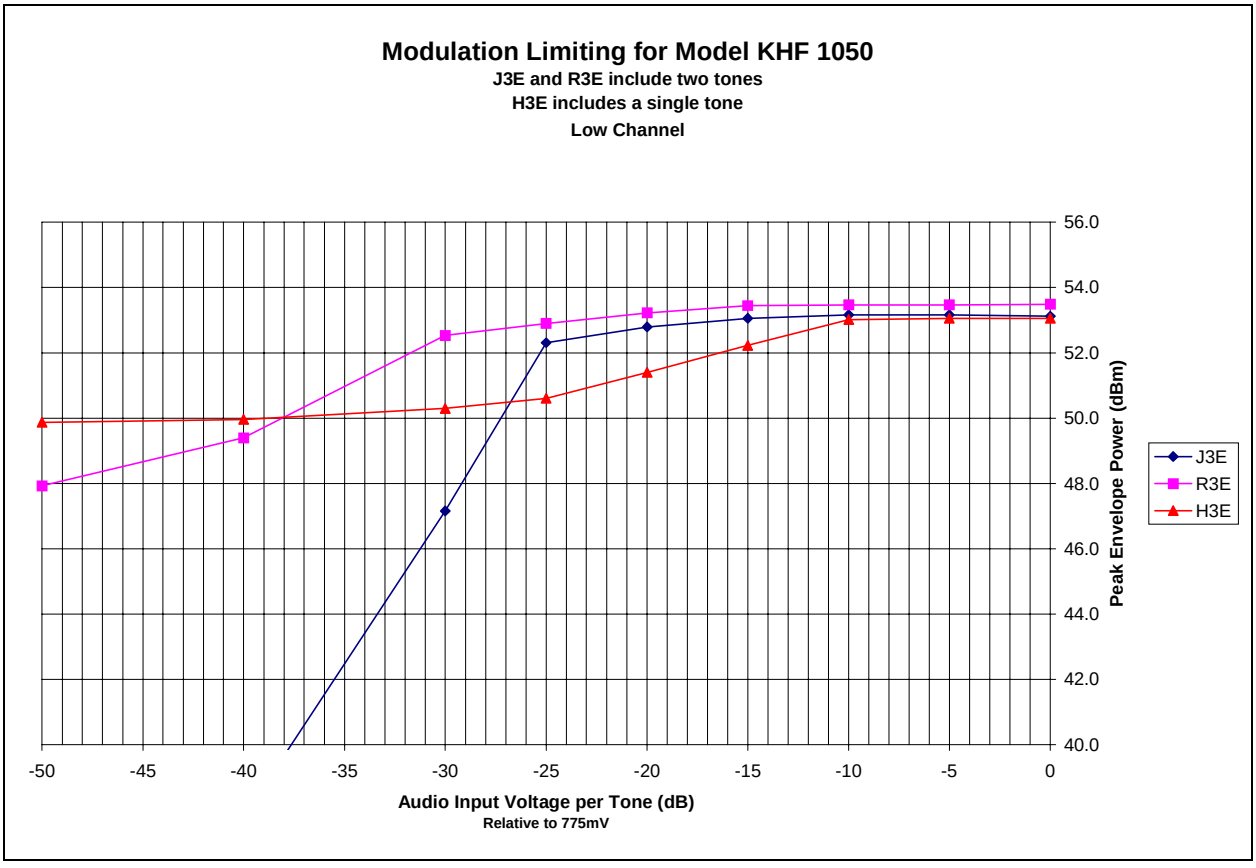
A computer connected to the RS-232 maintenance port of the KAC 1052 is used to effectively disable the average power detector inside the KPA 1052 when testing voice modes of operation. This raises the threshold of the average power detector from approximately 50 W to approximately 100 W to ensure that the average-power detector in the KPA 1052 does not limit the RF output power below that which is representative of normal voice operation. The average power detector is active for data modes of operation.

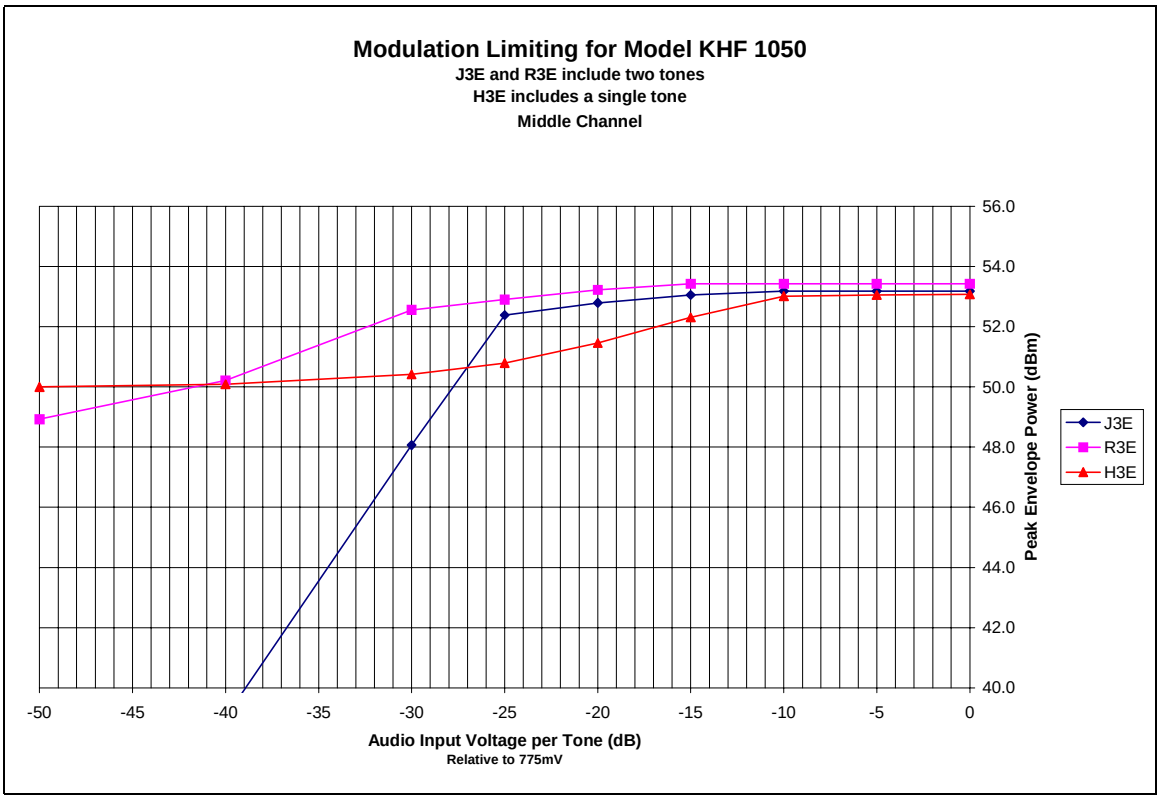
Test Configuration

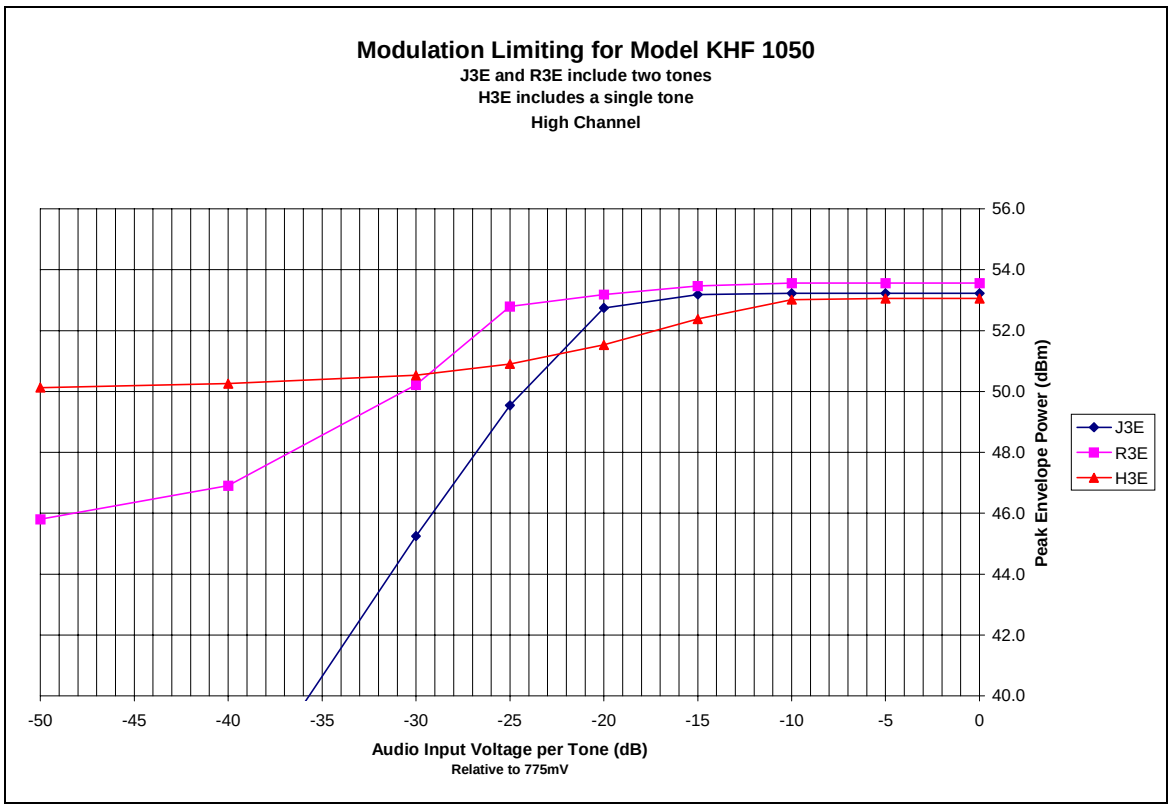
The modulation signal input tones are selected based on modulation type. For J3E, and R3E, there are two input tones at 400Hz and 1800Hz. For H3E, there is one tone at 1500Hz. In each case, the audio input signal level is measured per tone with respect to a 775mV signal.

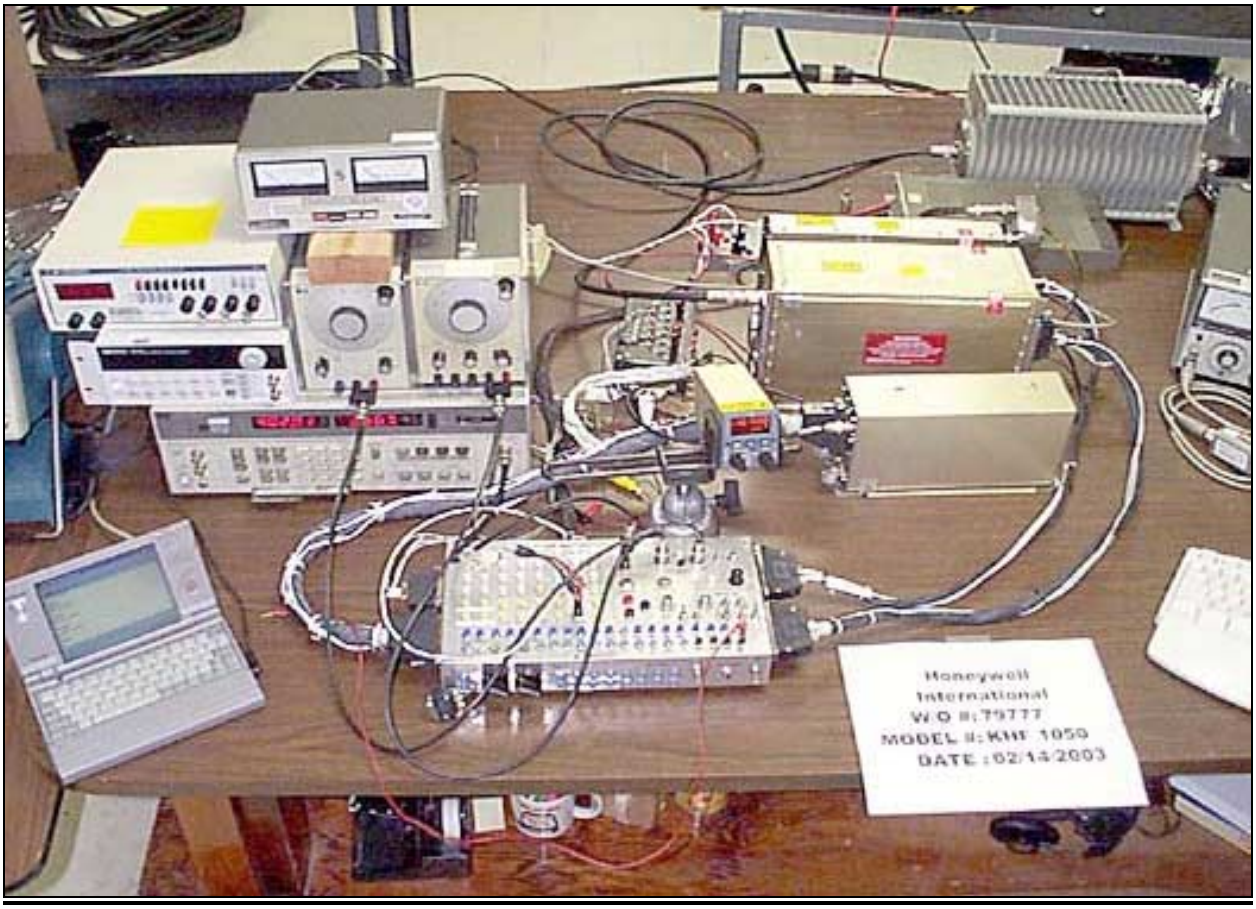
Modulation audio from the external audio oscillators is applied to the KHF 1050 Breakout Box where the tones are summed together and routed to the KRX 1053 audio input. At the KHF 1050 Breakout Box, the audio level is monitored with a HP 8903B Audio Analyzer at a point that directly connects to the microphone or data audio inputs of the KRX 1053. The level of the audio modulation is gradually adjusted, from near zero, upward while monitoring and recording the RF output power. Modulation limiting begins at the point where the output power ceases to increase. For the modulation limiting test, the modulation level is increased by at least 10 dB above the point of modulation limiting.

The power output during this test is monitored by a Peak Envelope Power meter.




Modulation Limiting for Model KHF 1050
J3E and R3E include two tones
H3E includes a single tone
Middle Channel
56.0
54.0
52.0
50.0
48.0
46.0
44.0
42.0
40.0
Peak Envelope Power (dBm)
J3E
R3E
H3E
-50
-45
-40
-35
-30
-25
-20
-15
-10
-5
0
Audio Input Voltage per Tone (dB)
Relative to 775mV


Modulation Limiting for Model KHF 1050
J3E and R3E include two tones
H3E includes a single tone
High Channel
56.0
54.0
52.0
50.0
48.0
46.0
44.0
42.0
40.0
Peak Envelope Power (dBm)
J3E
R3E
H3E
-50
-45
-40
-35
-30
-25
-20
-15
-10
-5
0
Audio Input Voltage per Tone (dB)
Relative to 775mV



Test Equipment

Equipment	*Manufacturer*	*Model #*	*Serial #*	*Asset #*	*Cal Date*	*Cal Due*
Spectrum Analyzer	HP	8568B	2414A00481	00042	7/8/02	7/8/03
RF Preselector	HP	85685A	2510A00167	00484	2/24/03	2/24/04
Audio Analyzer	HP	8903A	3011A09432	2338	11/27/02	11/23/03
Oscillator	HP	204D	1105A02034	02457	2/20/03	2/20/04
Oscillator	HP	204C	0989A06663	01283	2/20/03	2/20/04
Arbitrary Waveform Generator	Agilent	33120A	US36037748	02561	10/1/02	10/1/03
Function Generator	BK Precision	4011	259-05324	P02219	10/10/02	10/10/03
Wattmeter	Signalcrafter	29B	108-0137-00	Honeywell*	1/21/03	5/21/03
Power Sensor	Signalcrafter	HF233K	108-0160-01	Honeywell*	1/21/03	5/21/03
Oscilloscope	Tektronix	2445A	B012153	00098	10/31/02	10/31/03

*****Non-CKC Laboratories equipment

2.1033(c)(14)/2.1049(i)/87.135/87.139- EMISSIONS MASK AND OCCUPIED BANDWIDTH

Test Conditions: System Interconnect

The KHF 1050 System consists of a KRX 1053 Receiver Exciter, a KPA 1052 Power Amplifier, a KAC 1052 Antenna Coupler, and an appropriate ARINC 429 Controller (PS 440). For the purpose of a bench testing, these units are interconnected via a KHF 1050 Breakout Box. The control and DC-power cables that interface each unit to the KHF 1050 Breakout Box are approximately 1 m long. A double-shielded coaxial cable (approximately 0.5 m long) interconnects the KRX 1053 and the KPA 1052. For the purpose of the tests, a Signalcrafter power sensor is mounted to the transmitter output of the KPA 1052.

The RF power from the power sensor is routed to the KAC 1052 antenna coupler. The antenna coupler is then terminated with a 54 dB attenuator. The attenuator output is routed to the spectrum analyzer. A DC-power-distribution box is used to supply 27.5VDC power to the KHF 1050 Breakout Box and to the controller.

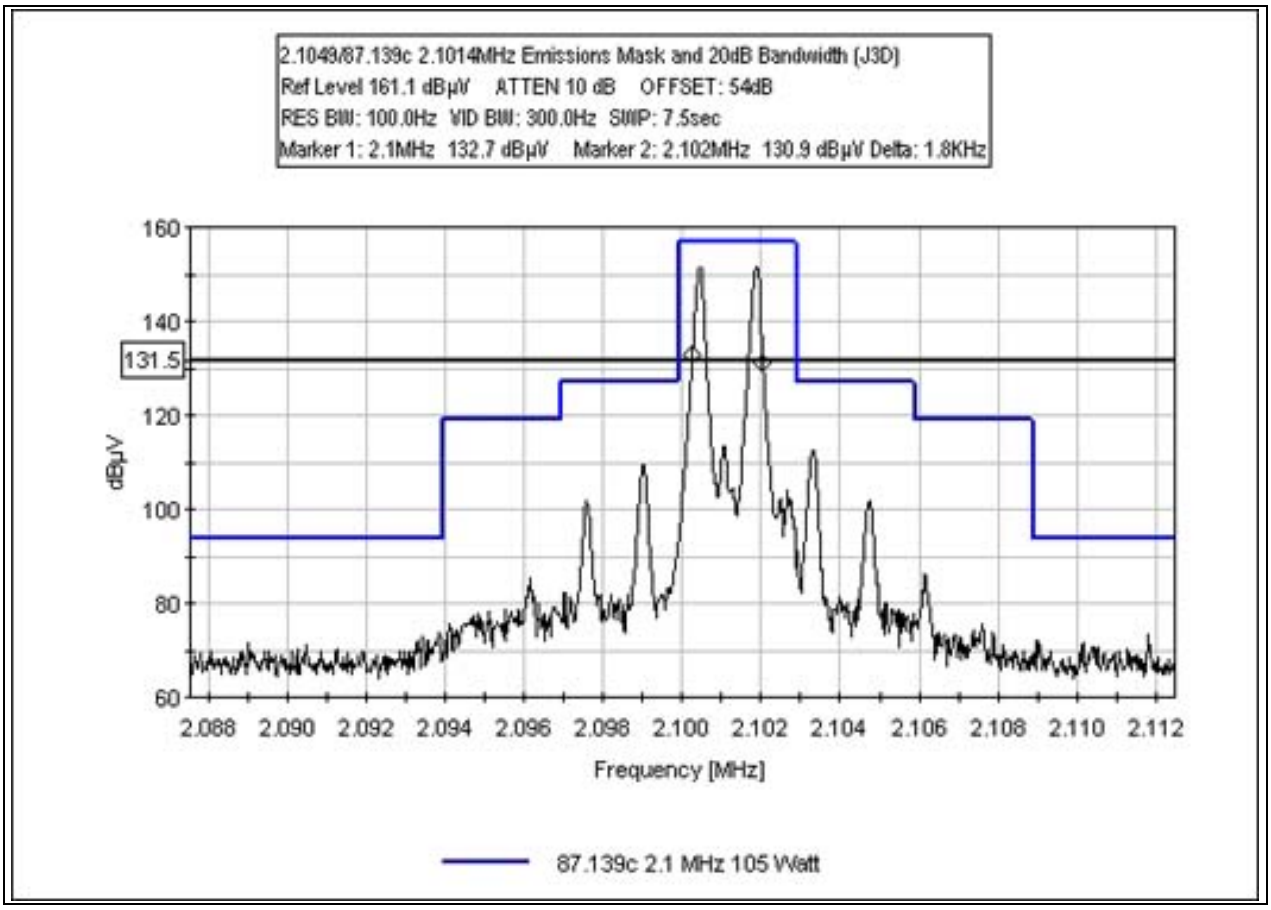
System Operation

The ARINC-429 controller communicates the pilot-selected operating frequency and other operating parameters to the KRX 1053 via the KHF 1050 Breakout Box. The operating parameters of the KRX 1053 are returned to the controller via ARINC 429 to display to the pilot. Modulation audio from the external audio oscillators is applied to the KHF 1050 Breakout Box, where the tones are summed together and routed to the KRX 1053. At the KHF 1050 Breakout Box, the audio level is monitored with a HP 8903B Audio Analyzer at a point that directly connects to the microphone or data audio inputs of the KRX 1053. The audio levels are set to typical operating values, unless specifically directed otherwise by the requirements of the test being conducted.

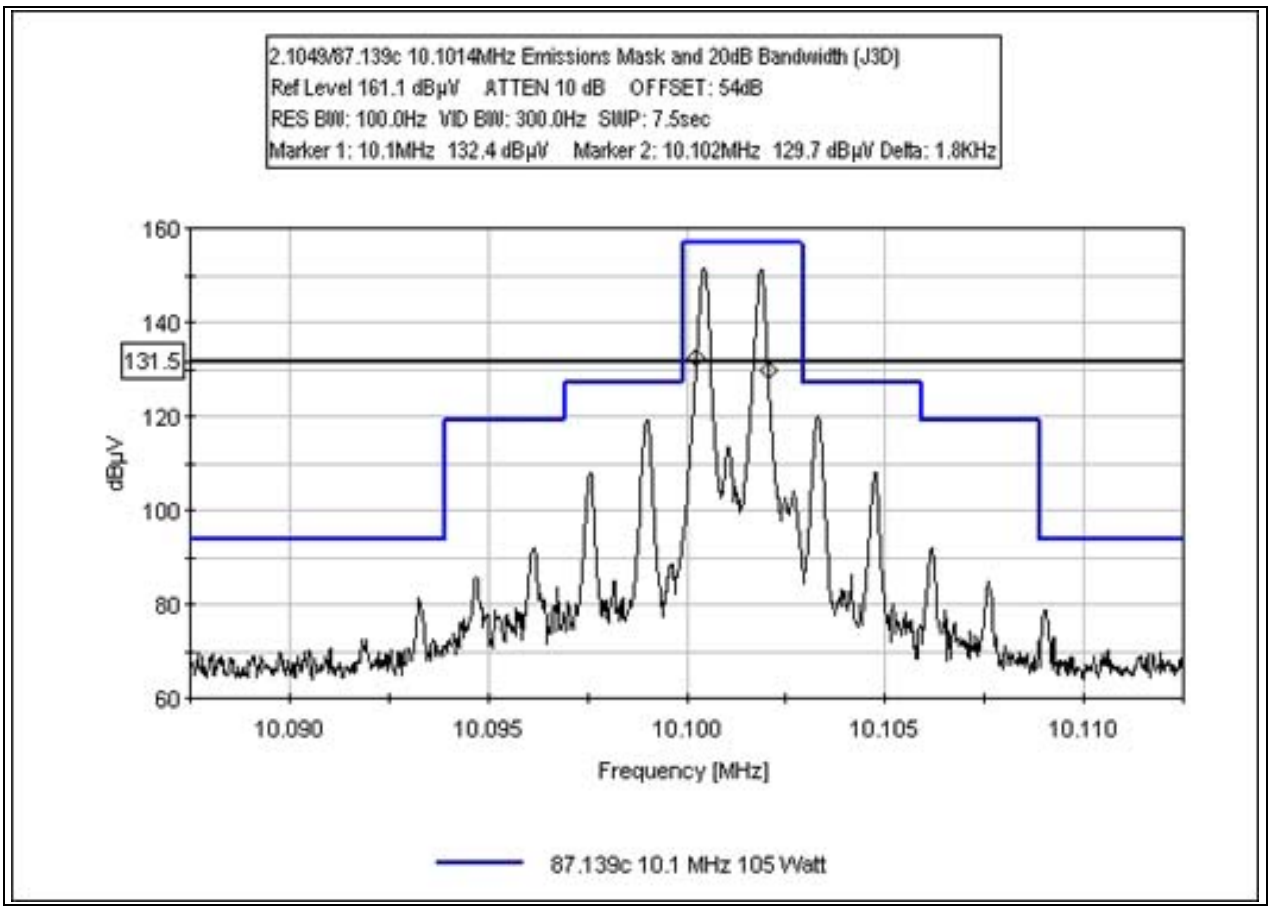
The KRX 1053 communicates with the KAC 1052 via an RS-422 bus and discrete parallel lines. Operating parameters such as operating-frequency band, transmitter power setting and mode of operation is communicated along this RS-422 bus. Additionally, operating-status information of the KAC 1052 and KPA 1052 is returned to the KRX 1053 via the RS-422 bus and parallel lines. Another serial bus conveys band information and mode of operation from the KAC 1052 and KPA 1052. In addition to the serial information, discrete parallel lines communicate control and status information between these two units.

In the transmit mode of operation, the exciter signal output by the KRX 1053 is routed to the KPA 1052 where it is amplified. The transmitter output at the KPA 1052 is monitored either directly or routed through the KAC 1052, depending on the nature of the test being performed.
A computer connected to the RS-232 maintenance port of the KAC 1052 is used to disable the average power detector inside the KPA 1052 when testing voice modes of operation. This ensures that the average-power detector in the KPA 1052 does not limit the RF output power below that which is representative of normal voice operation. The average power detector is active for data modes of operation. Test procedure requires 1.8 kHz tones, however the device is capable of 2.8 kHz bandwidth.

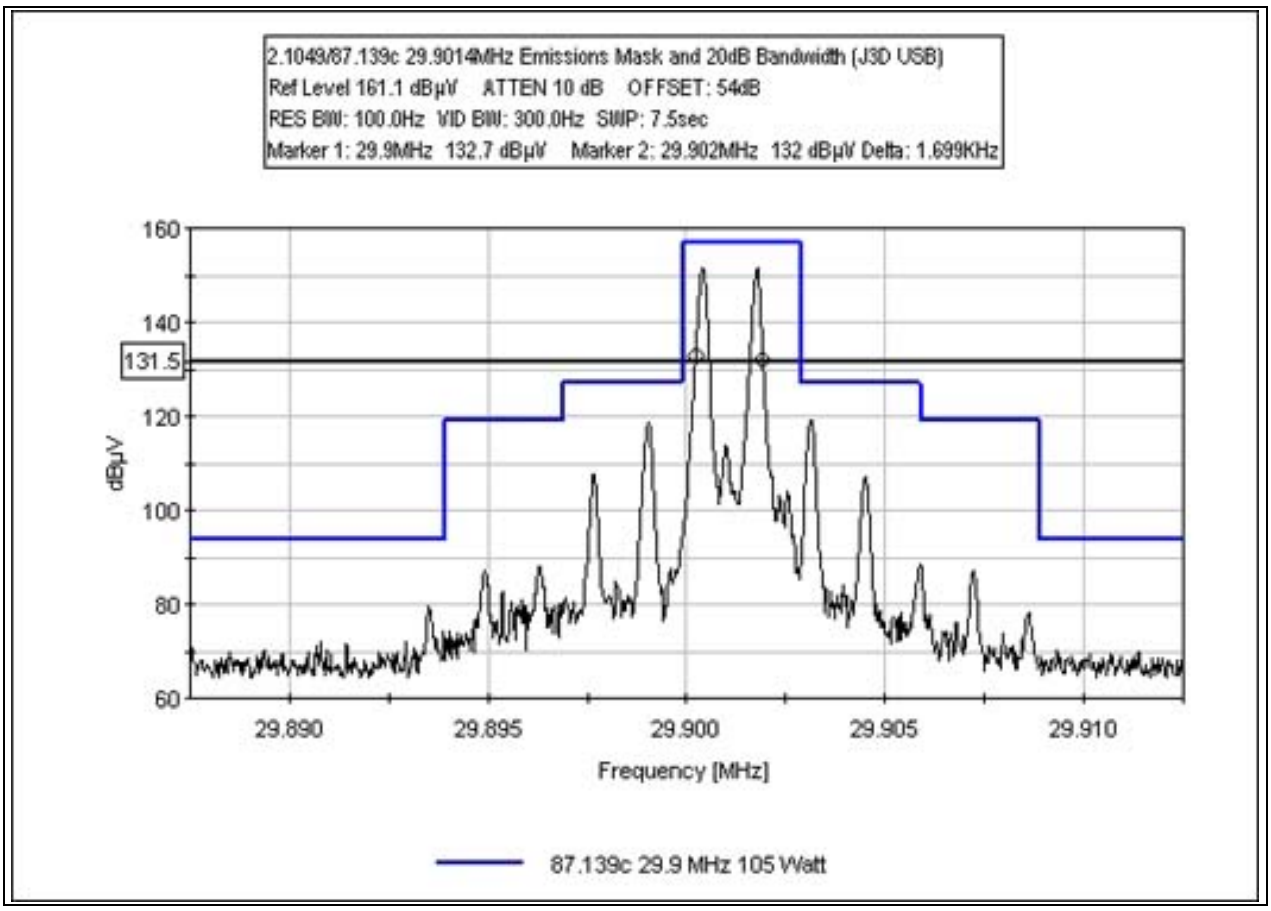
EMISSIONS MASK AND OCCUPIED BANDWIDTH – J2D/J3D USB 2.1 MHz



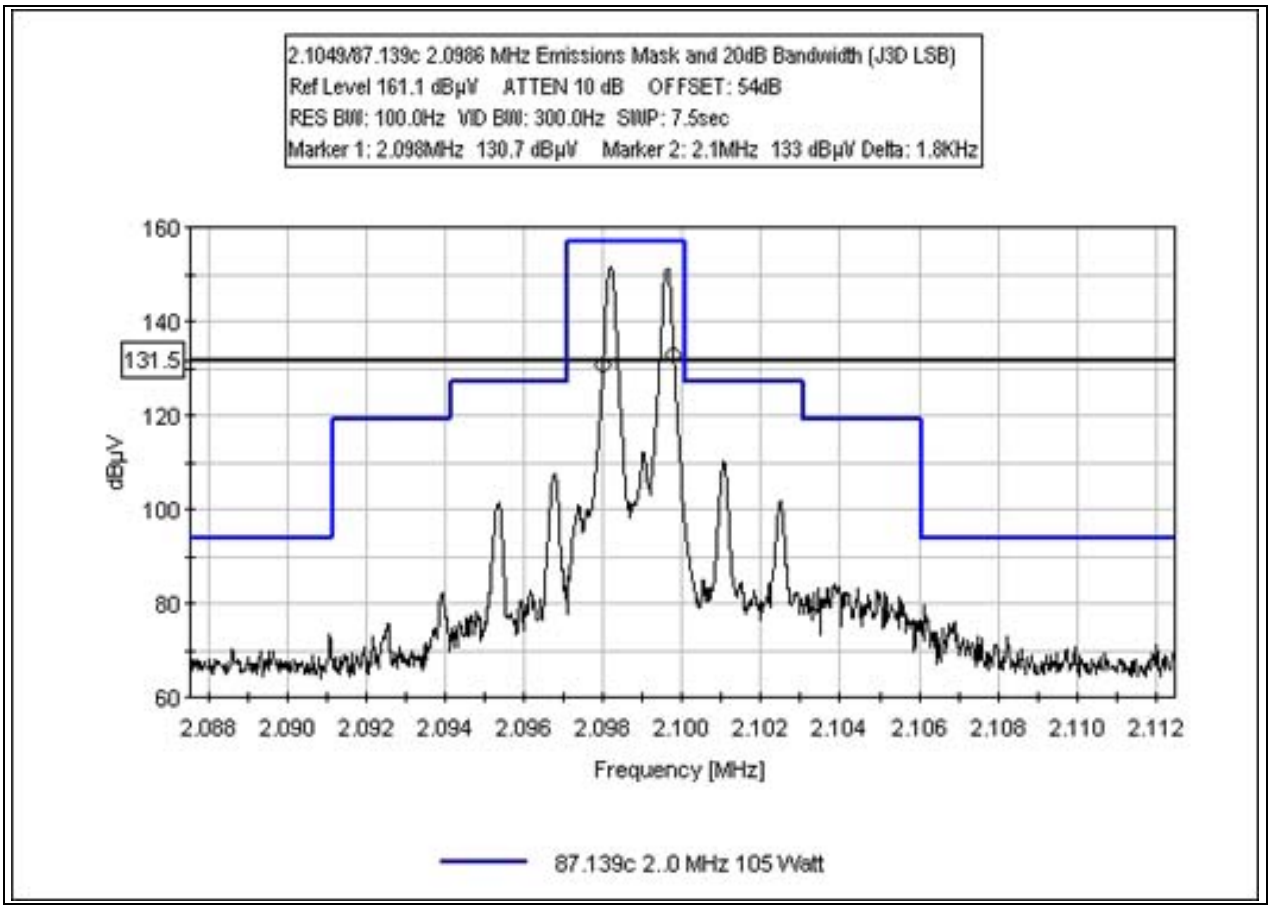
EMISSIONS MASK AND OCCUPIED BANDWIDTH - J2D/J3D USB 10.1 MHz



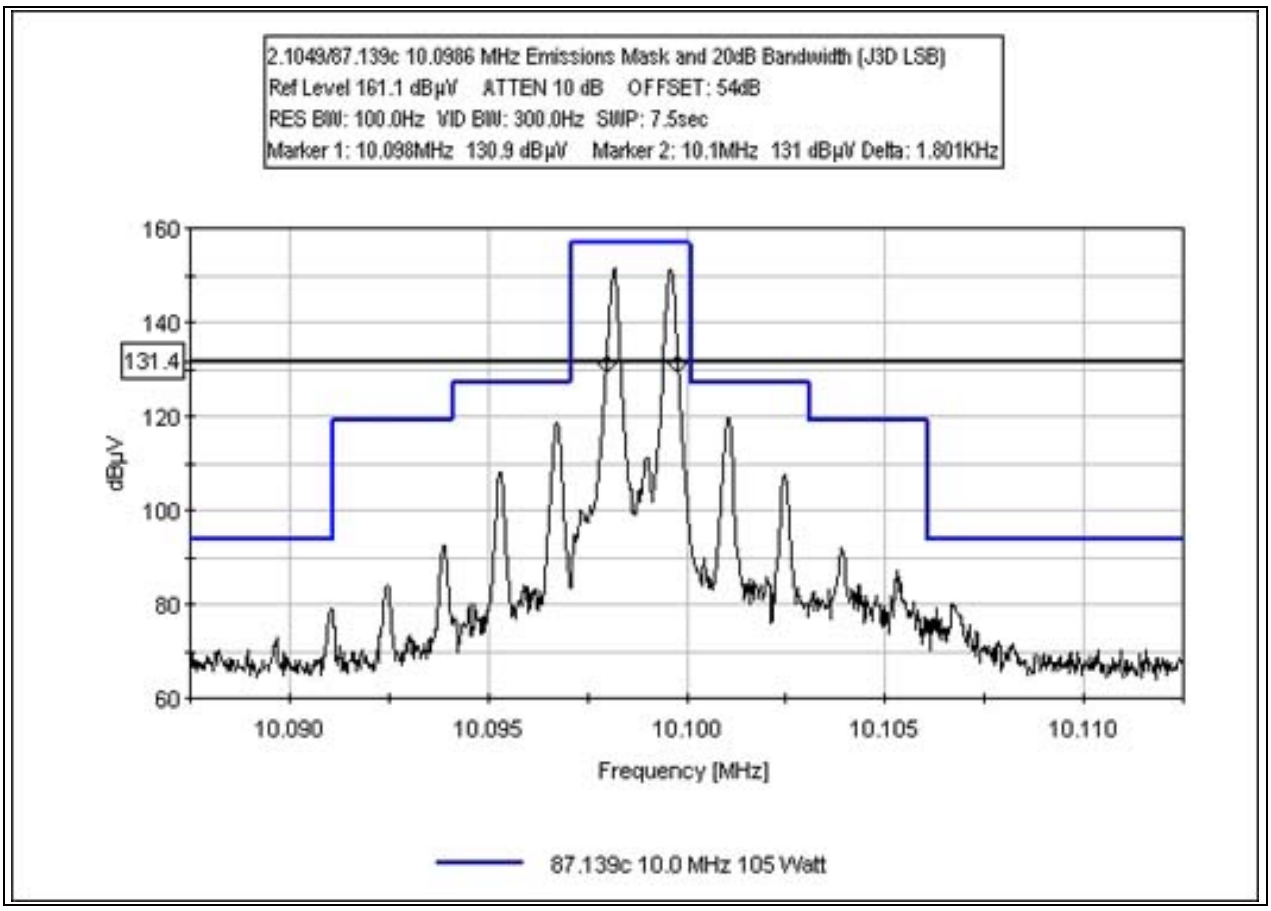
EMISSIONS MASK AND OCCUPIED BANDWIDTH - J2D/J3D USB 29.9 MHz



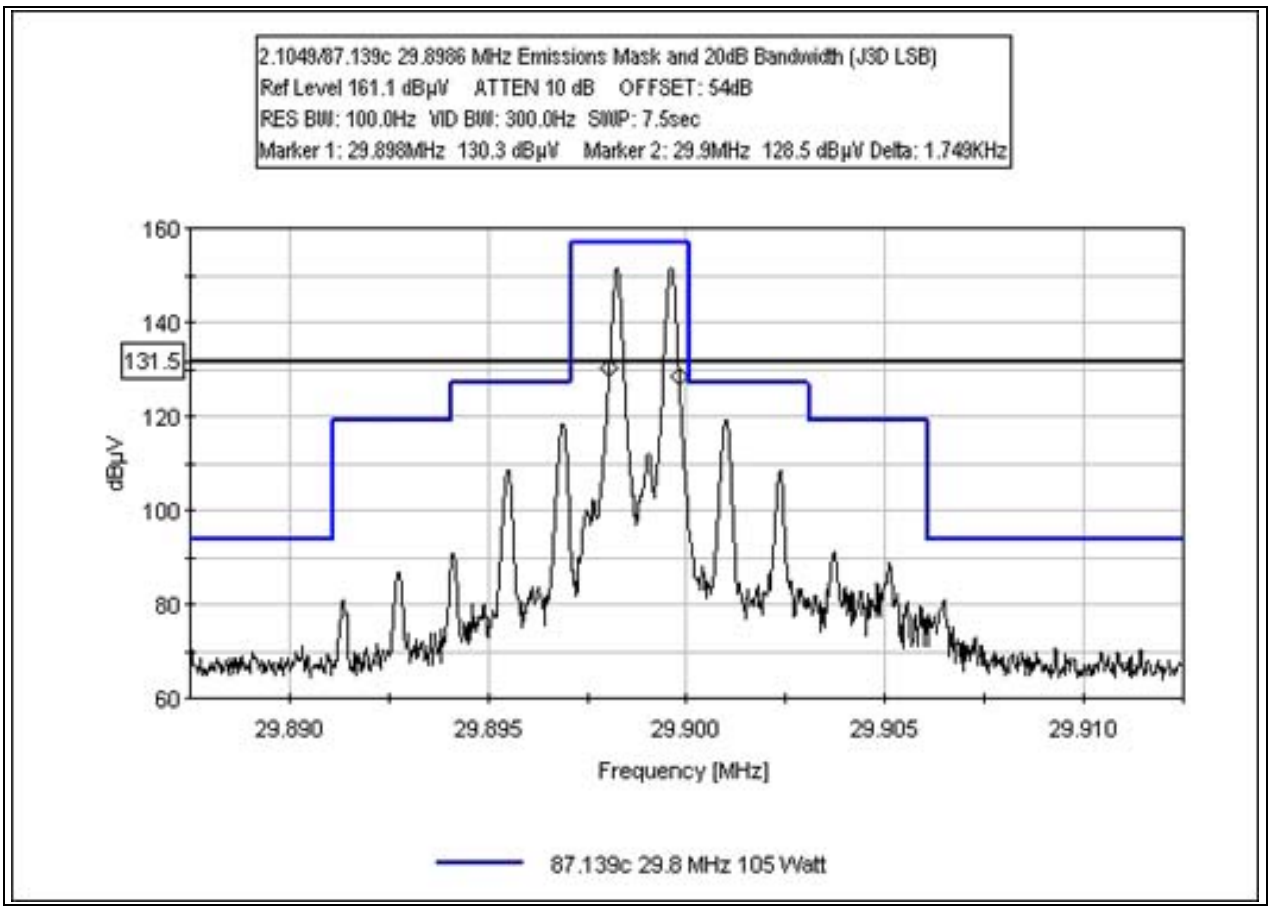
EMISSIONS MASK AND OCCUPIED BANDWIDTH - J2D/J3D LSB 2.1 MHz



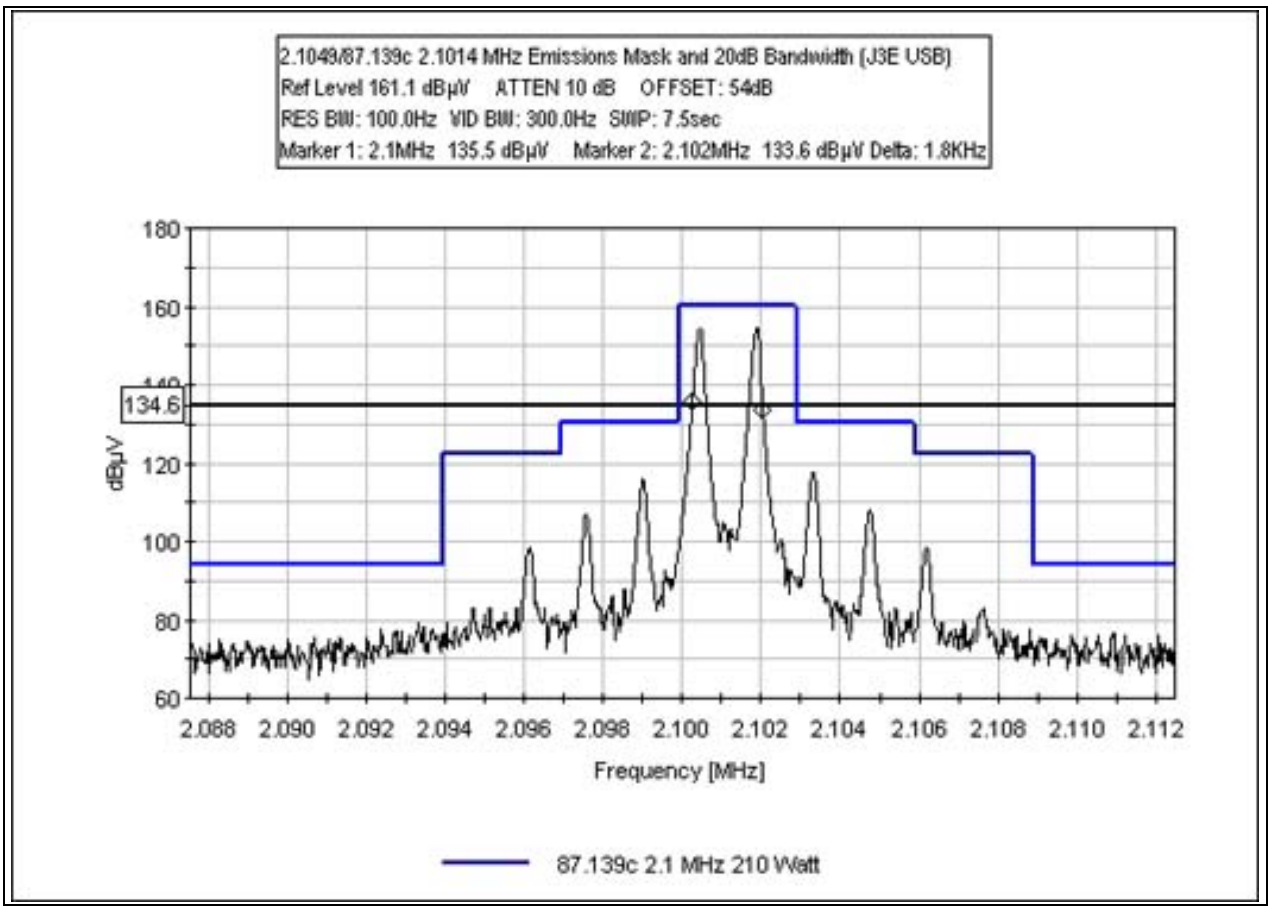
EMISSIONS MASK AND OCCUPIED BANDWIDTH - J2D/J3D LSB 10.1 MHz



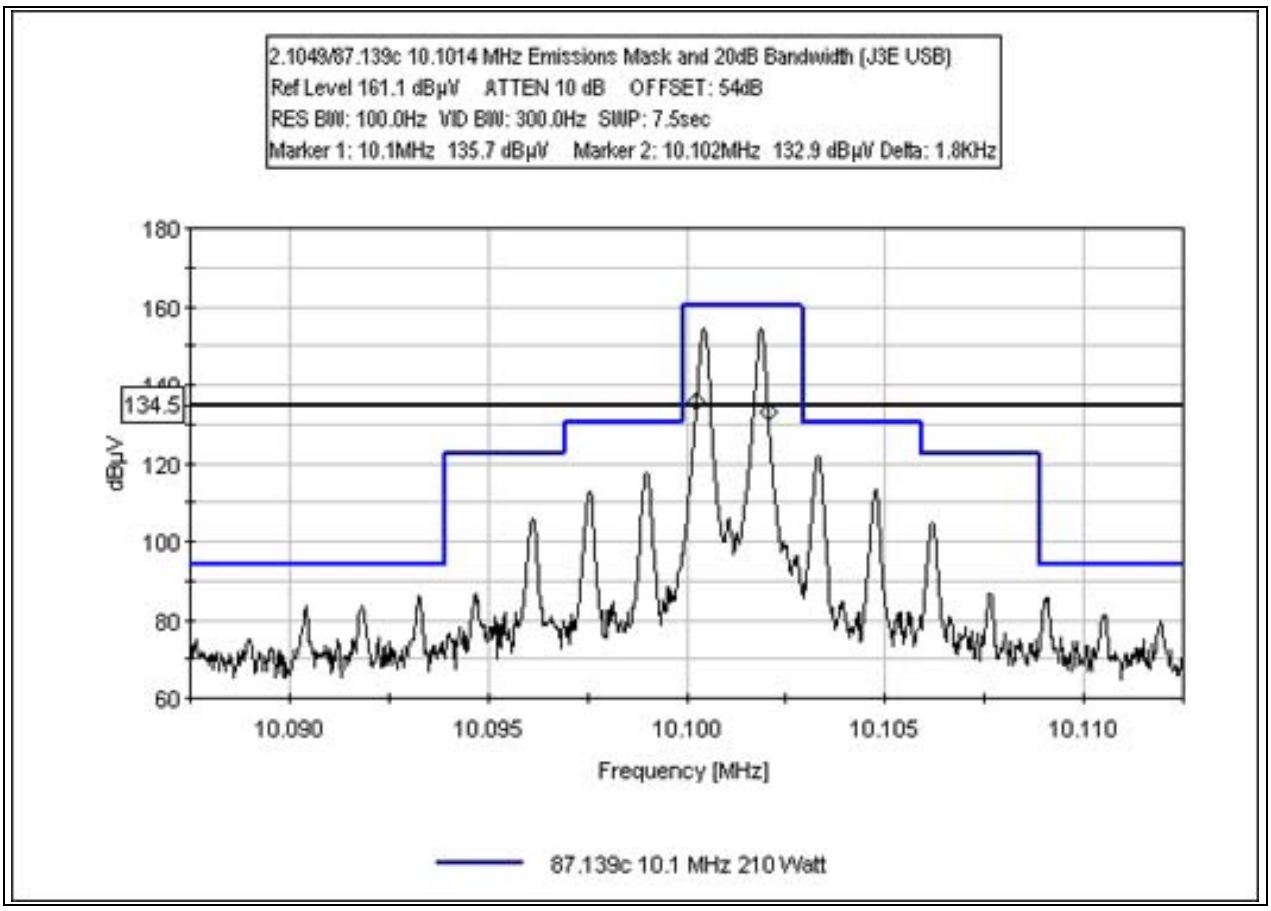
EMISSIONS MASK AND OCCUPIED BANDWIDTH - J2D/J3D LSB 29.9 MHz



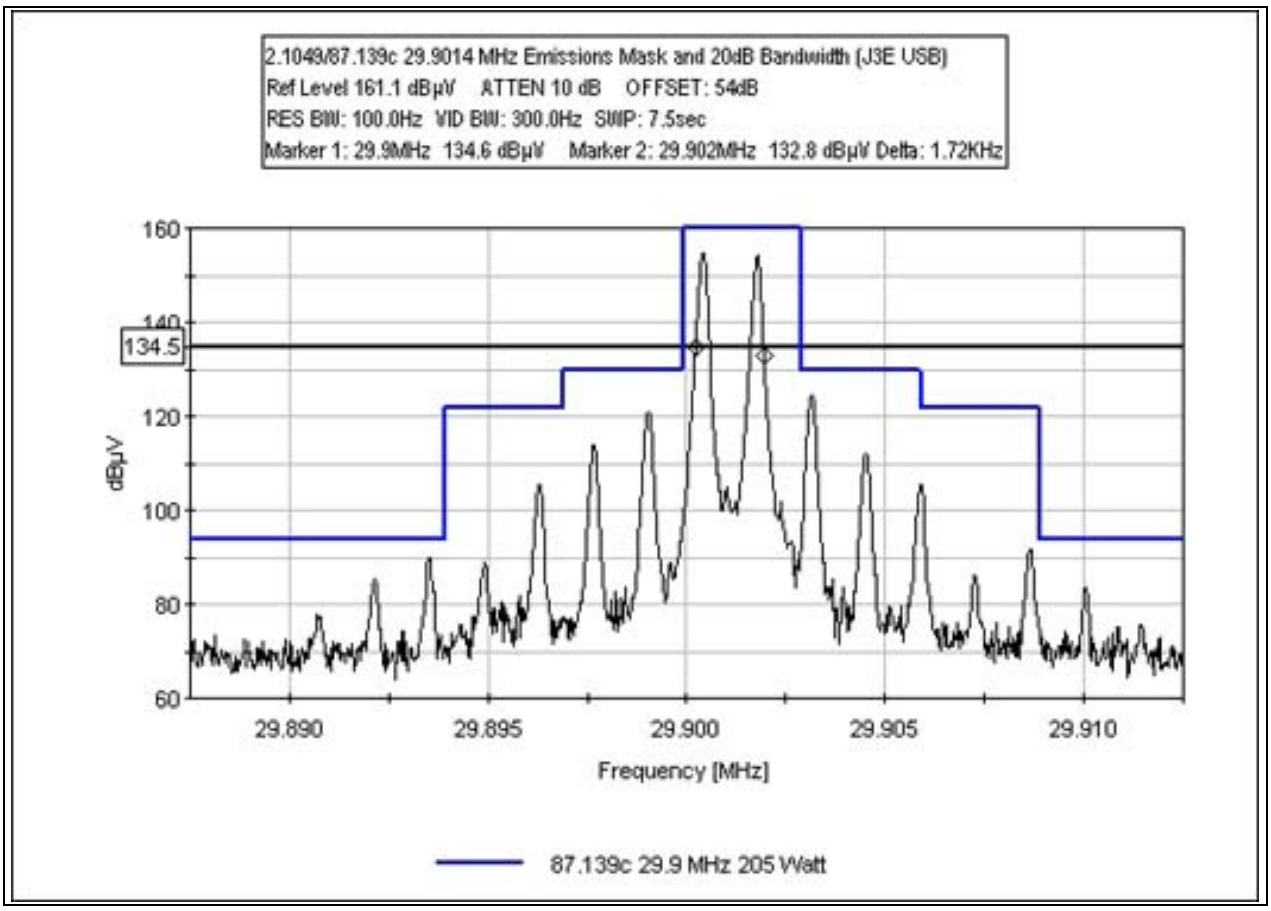
EMISSIONS MASK AND OCCUPIED BANDWIDTH - J3E USB 2.1 MHz



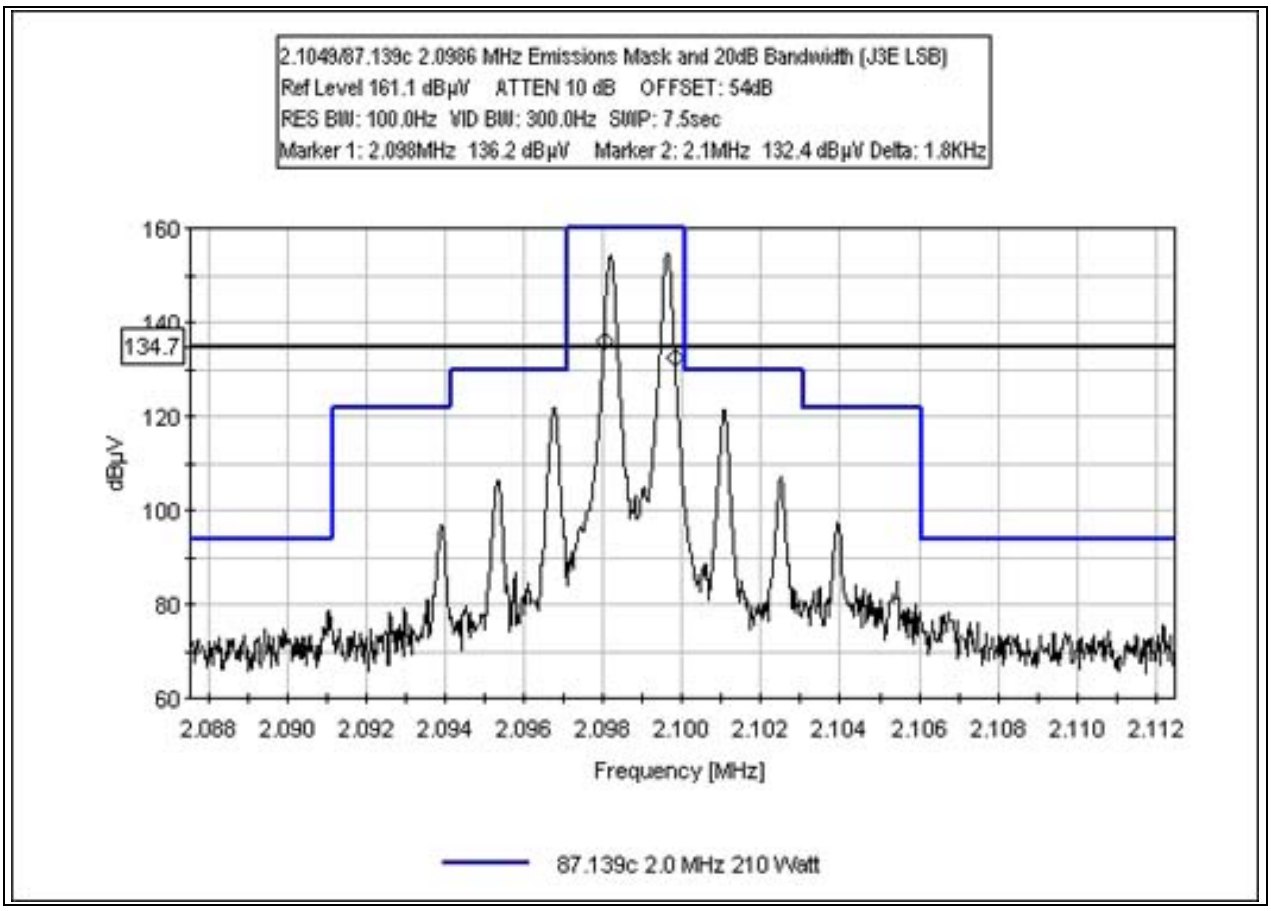
EMISSIONS MASK AND OCCUPIED BANDWIDTH - J3E USB 10.1 MHz



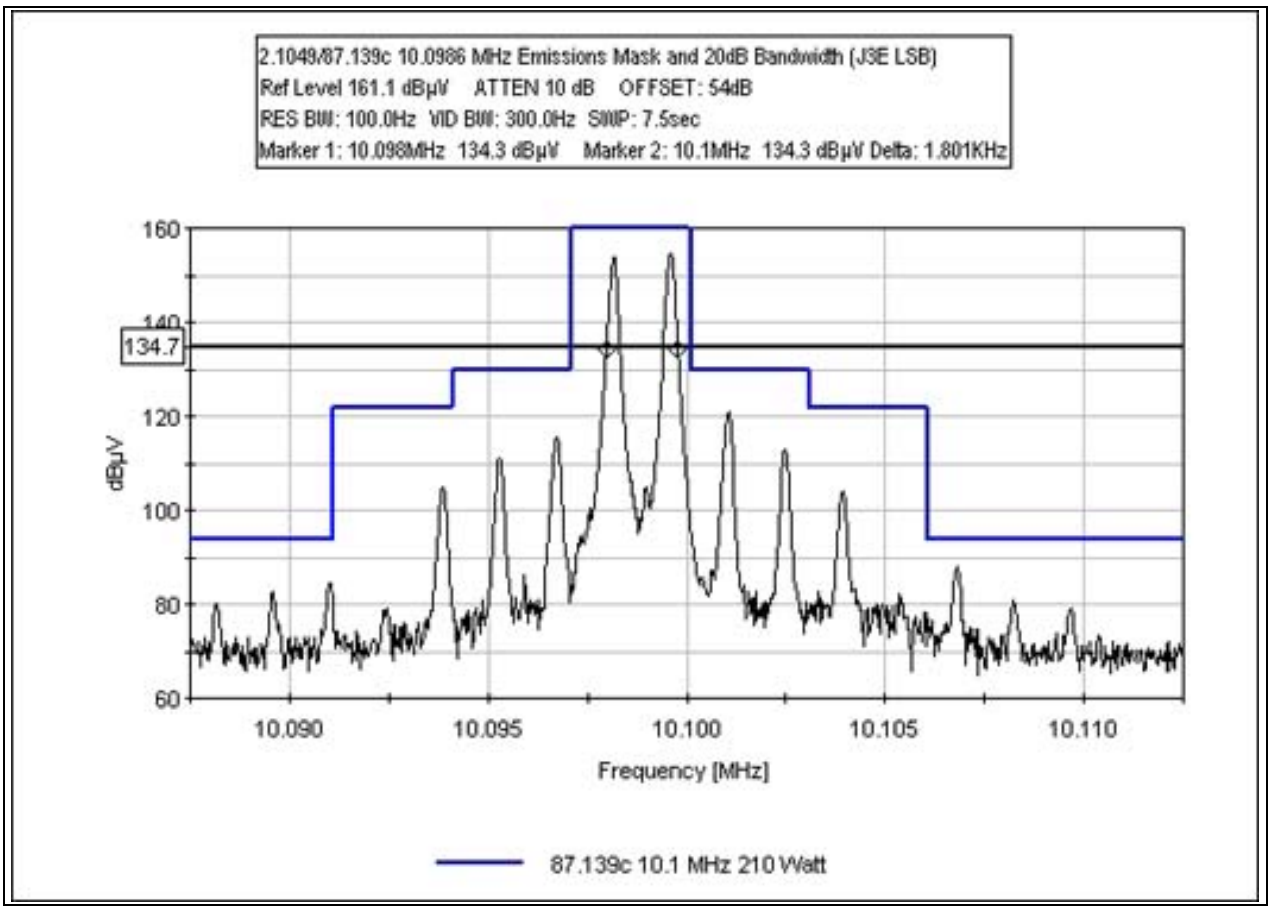
EMISSIONS MASK AND OCCUPIED BANDWIDTH - J3E USB 29.9 MHz



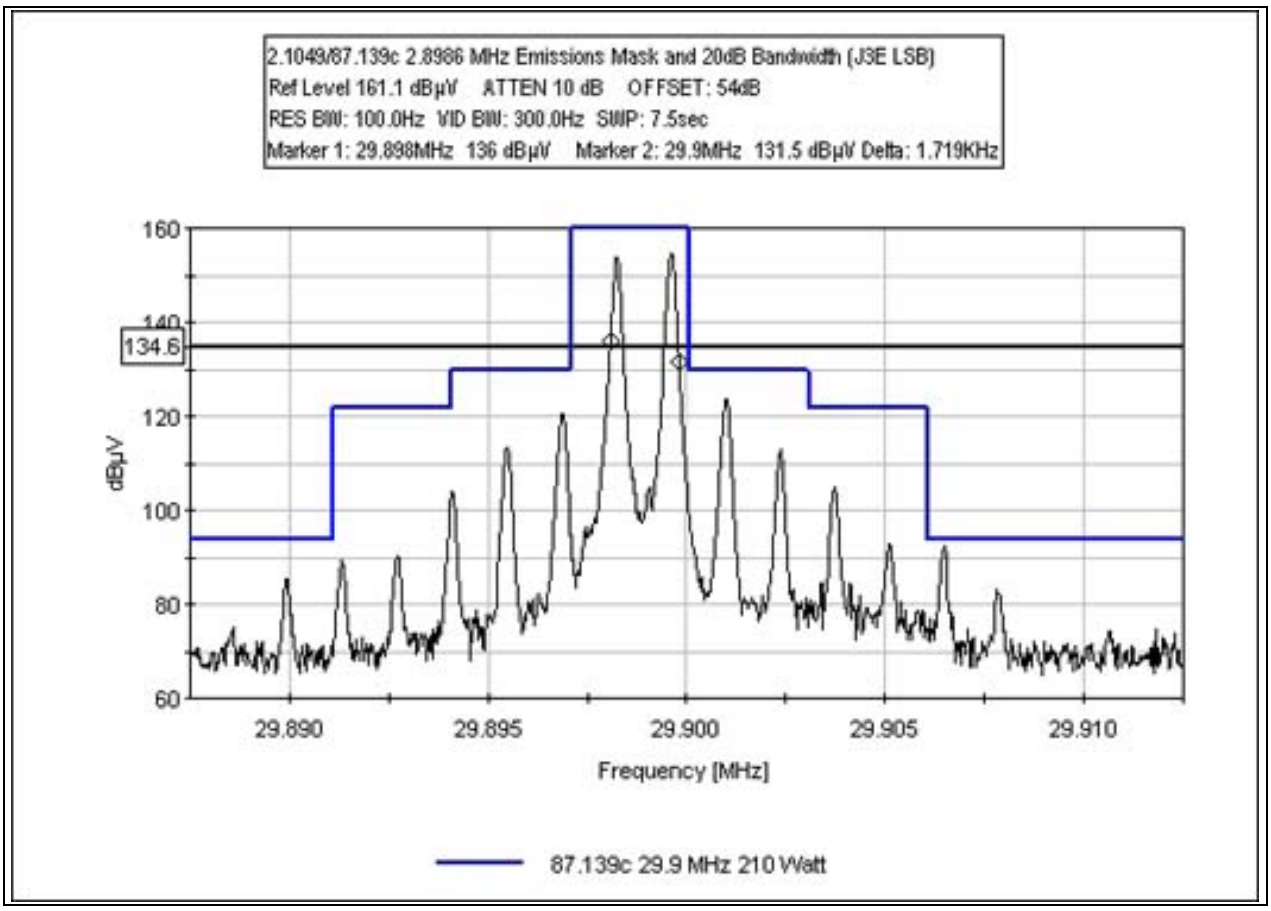
EMISSIONS MASK AND OCCUPIED BANDWIDTH - J3E LSB 2.1 MHz



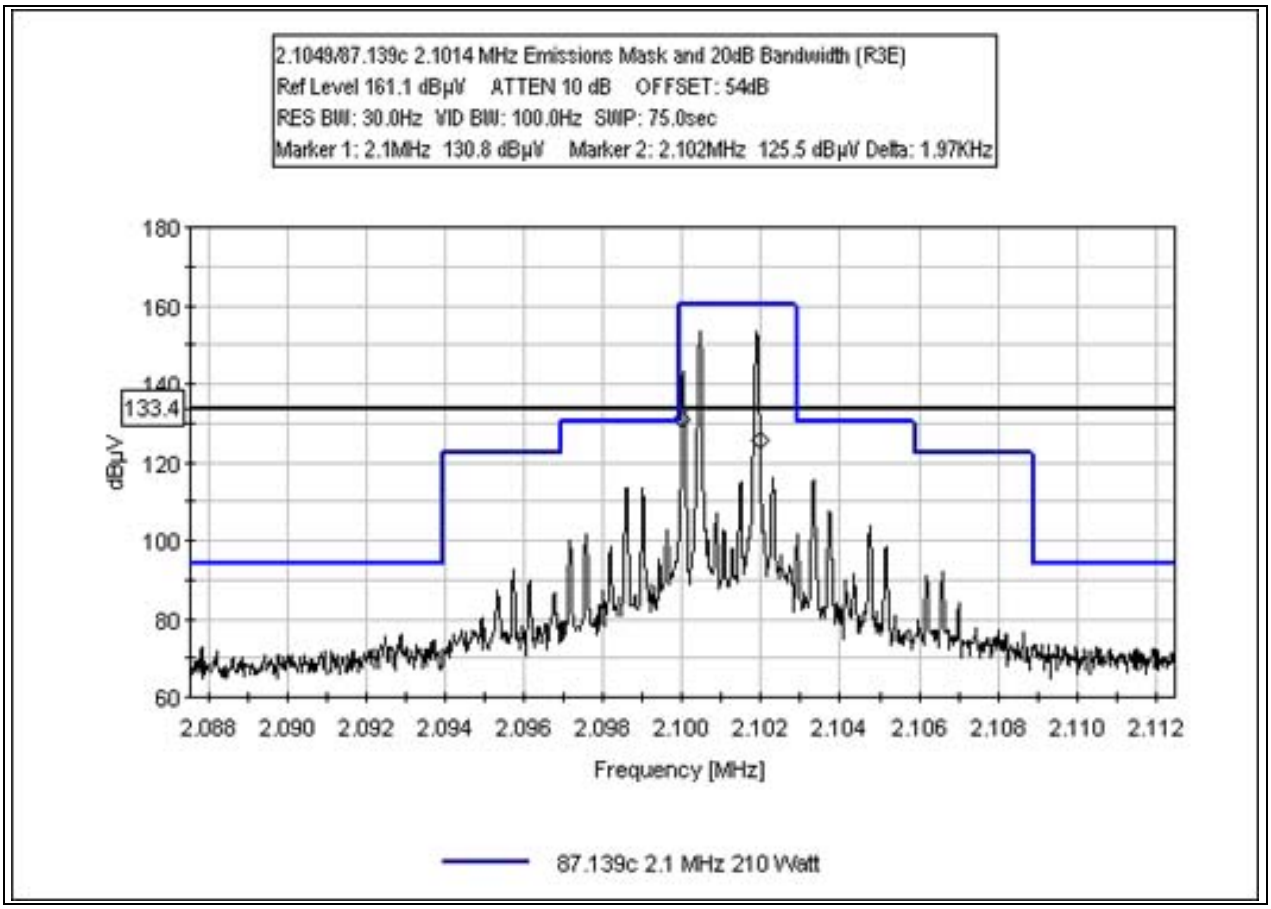
EMISSIONS MASK AND OCCUPIED BANDWIDTH - J3E LSB 10.1 MHz



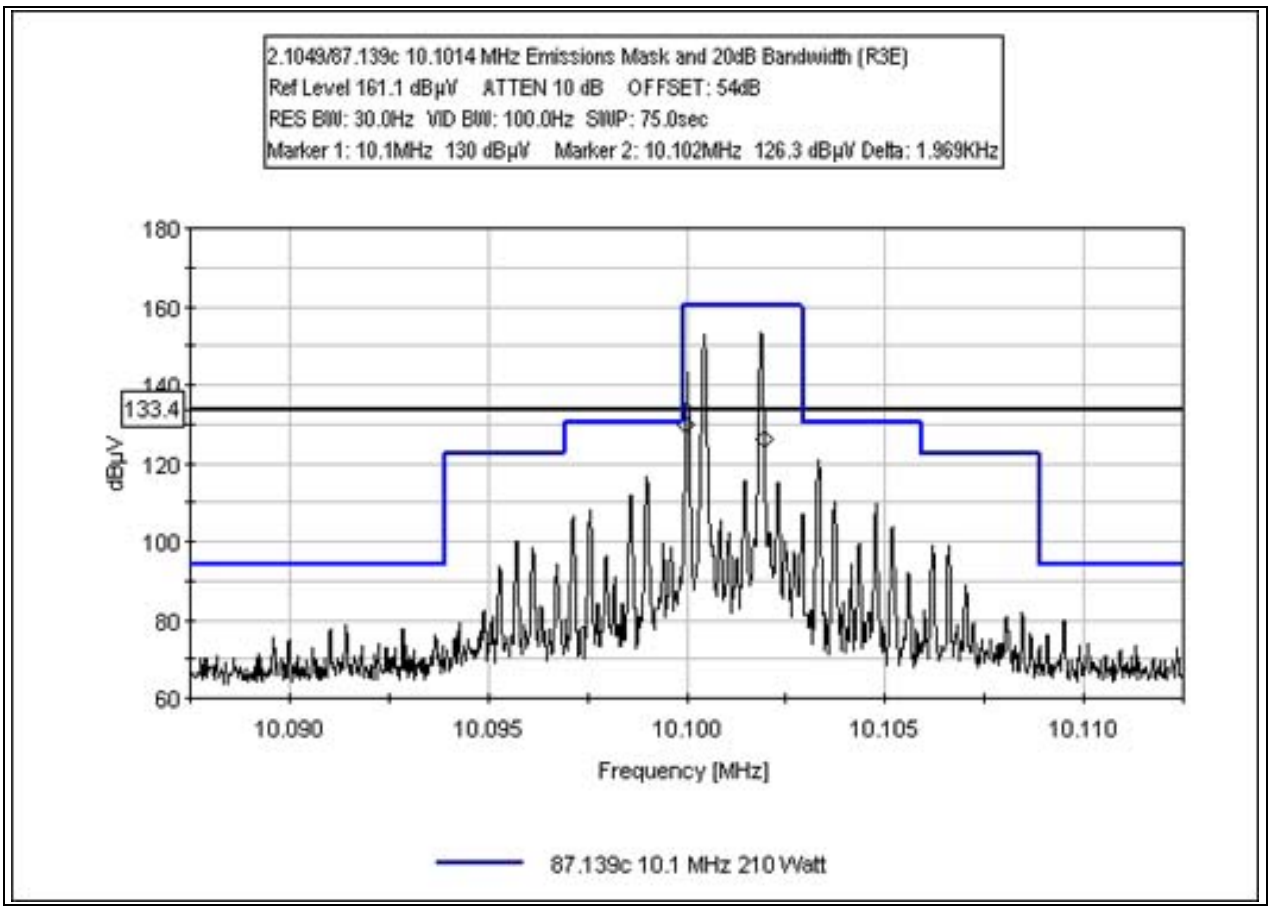
EMISSIONS MASK AND OCCUPIED BANDWIDTH - J3E LSB 29.9 MHz



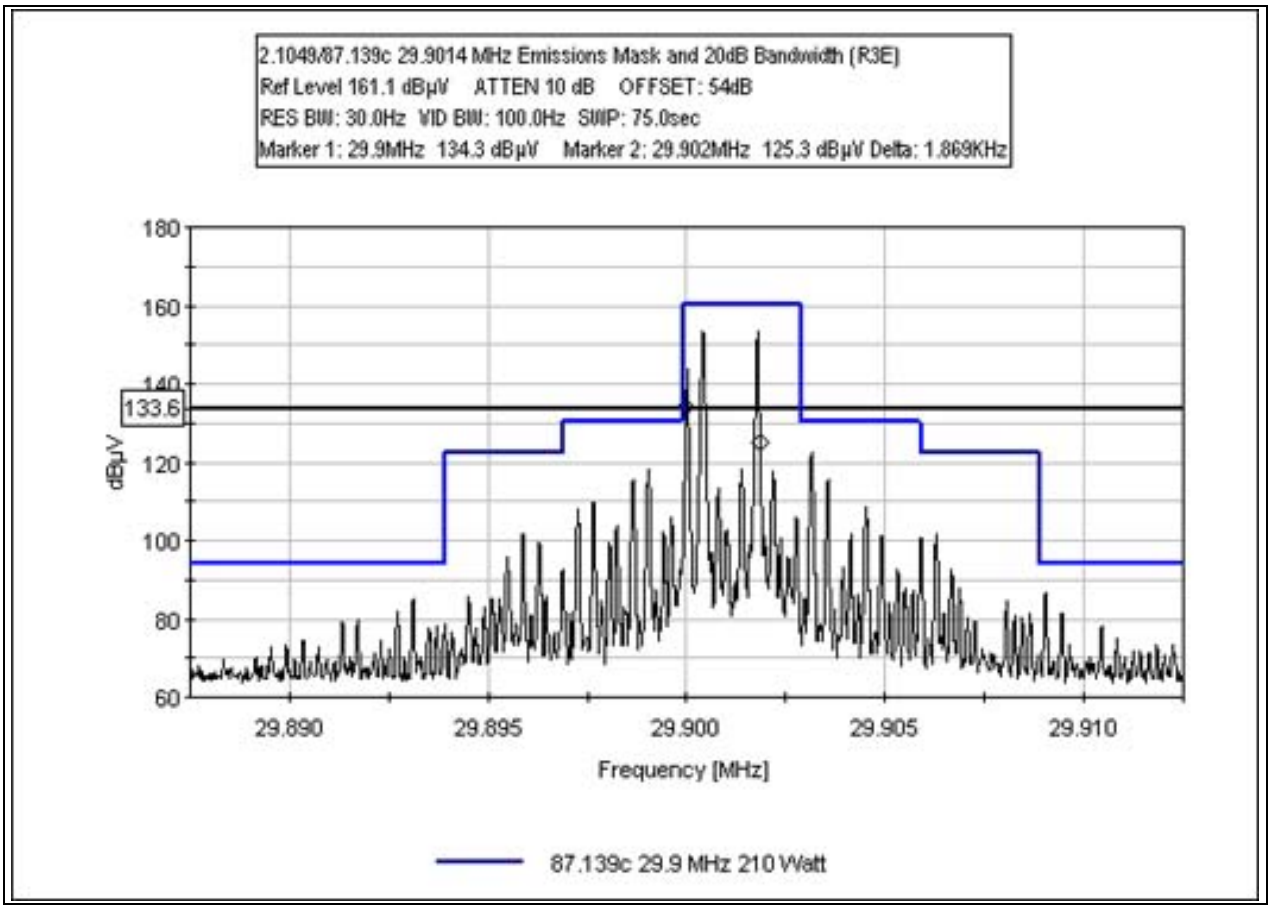
EMISSIONS MASK AND OCCUPIED BANDWIDTH - R3E USB 2.1 MHz



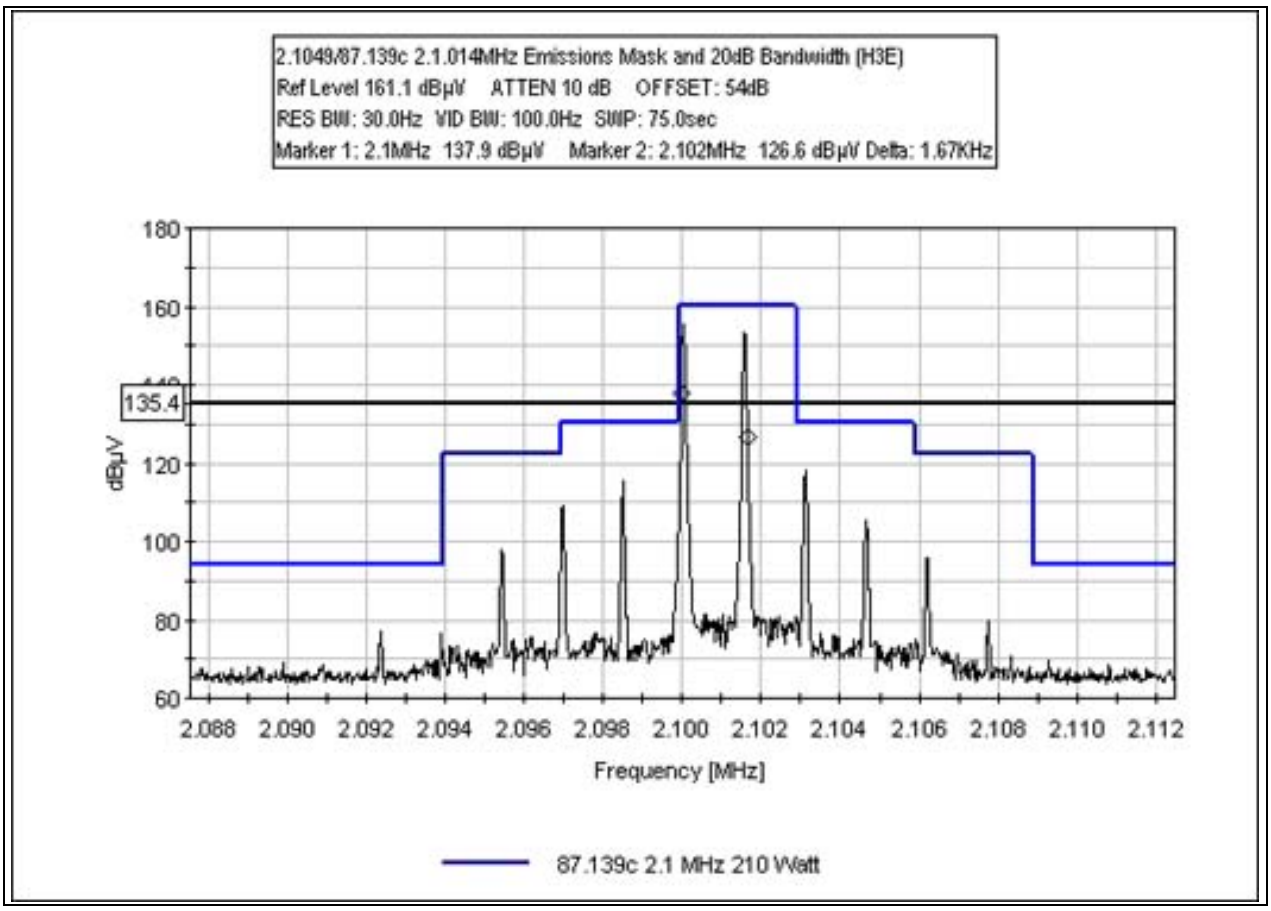
EMISSIONS MASK AND OCCUPIED BANDWIDTH - R3E USB 10.1 MHz



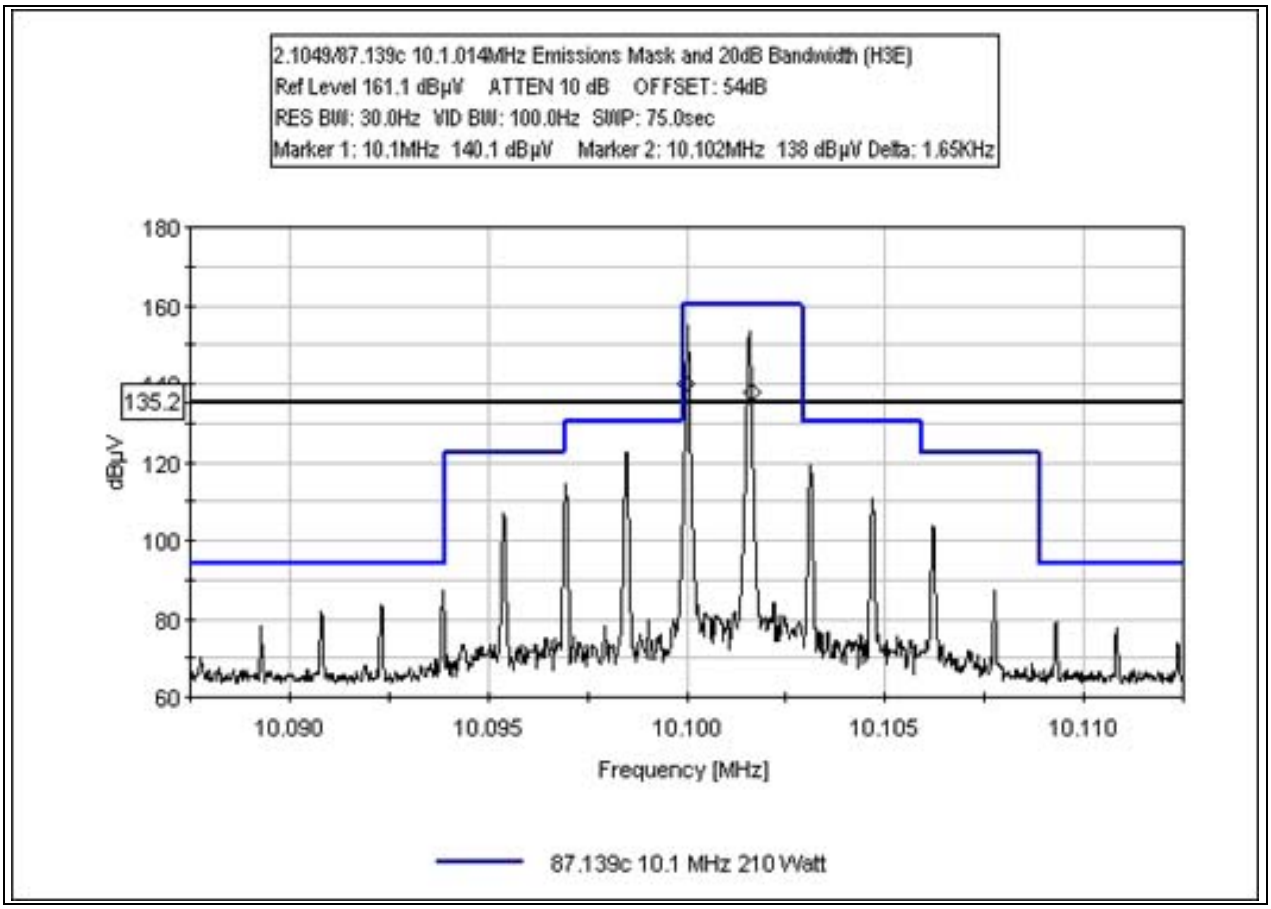
EMISSIONS MASK AND OCCUPIED BANDWIDTH - R3E USB 29.9 MHz



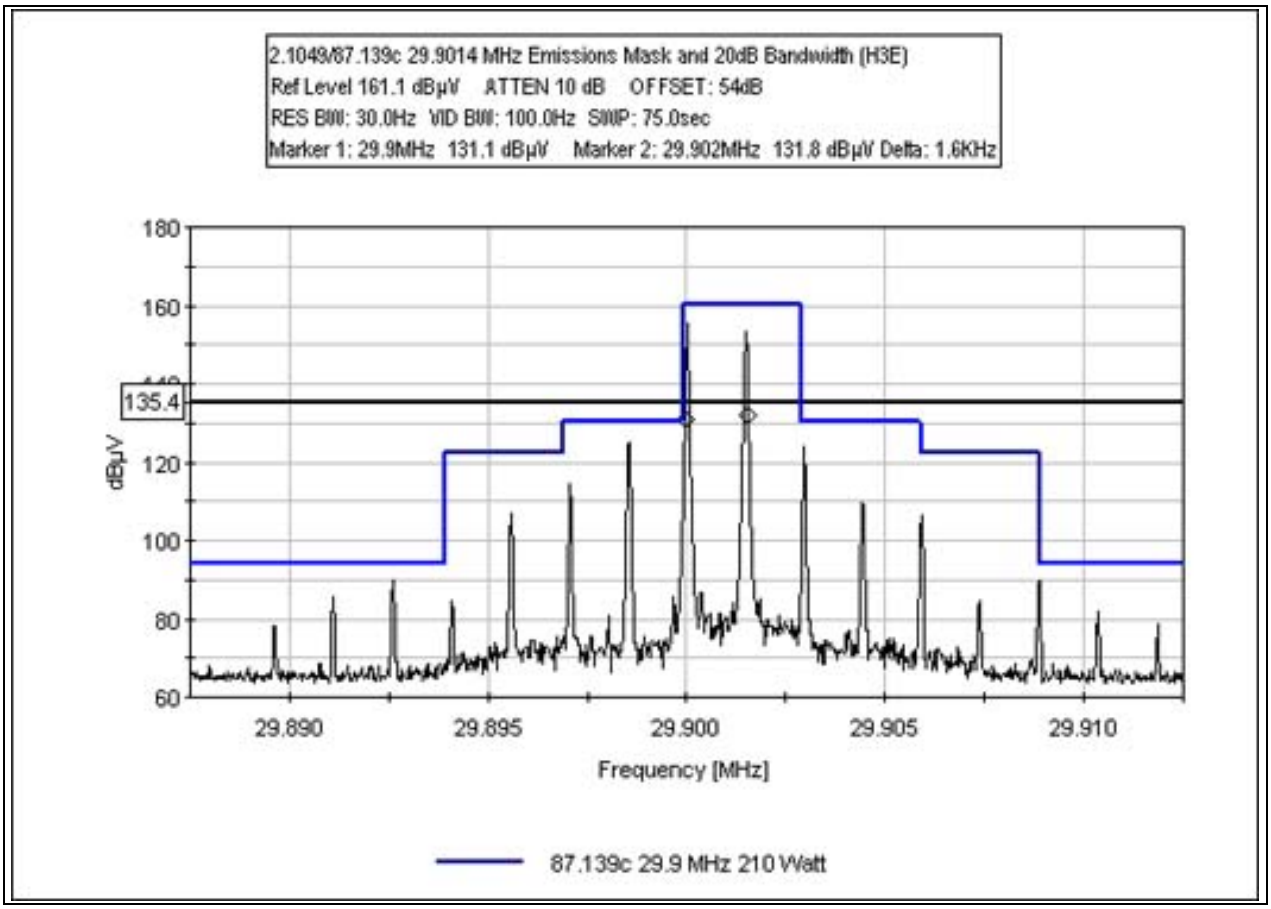
EMISSIONS MASK AND OCCUPIED BANDWIDTH - H3E USB 2.1 MHz



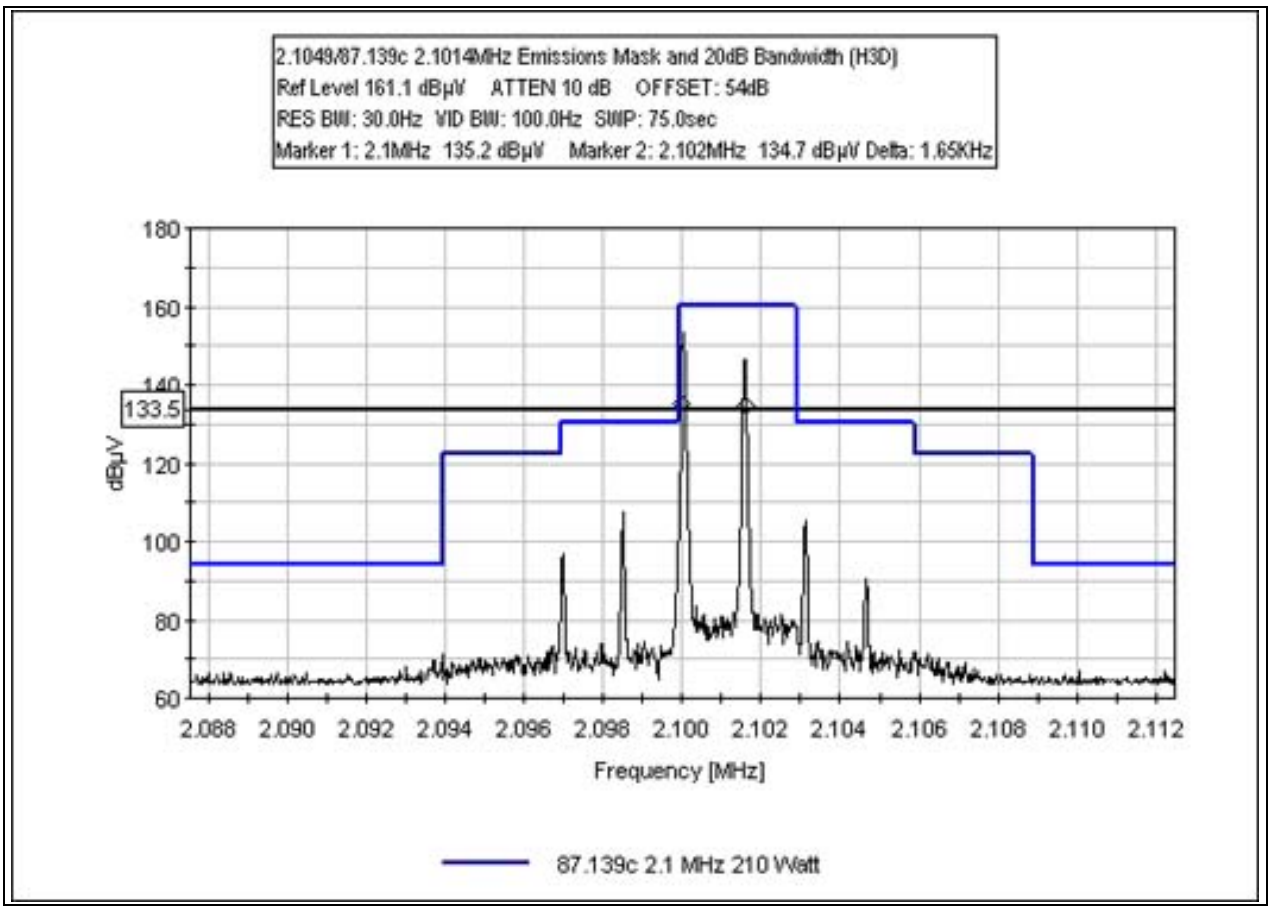
EMISSIONS MASK AND OCCUPIED BANDWIDTH - H3E USB 10.1 MHz



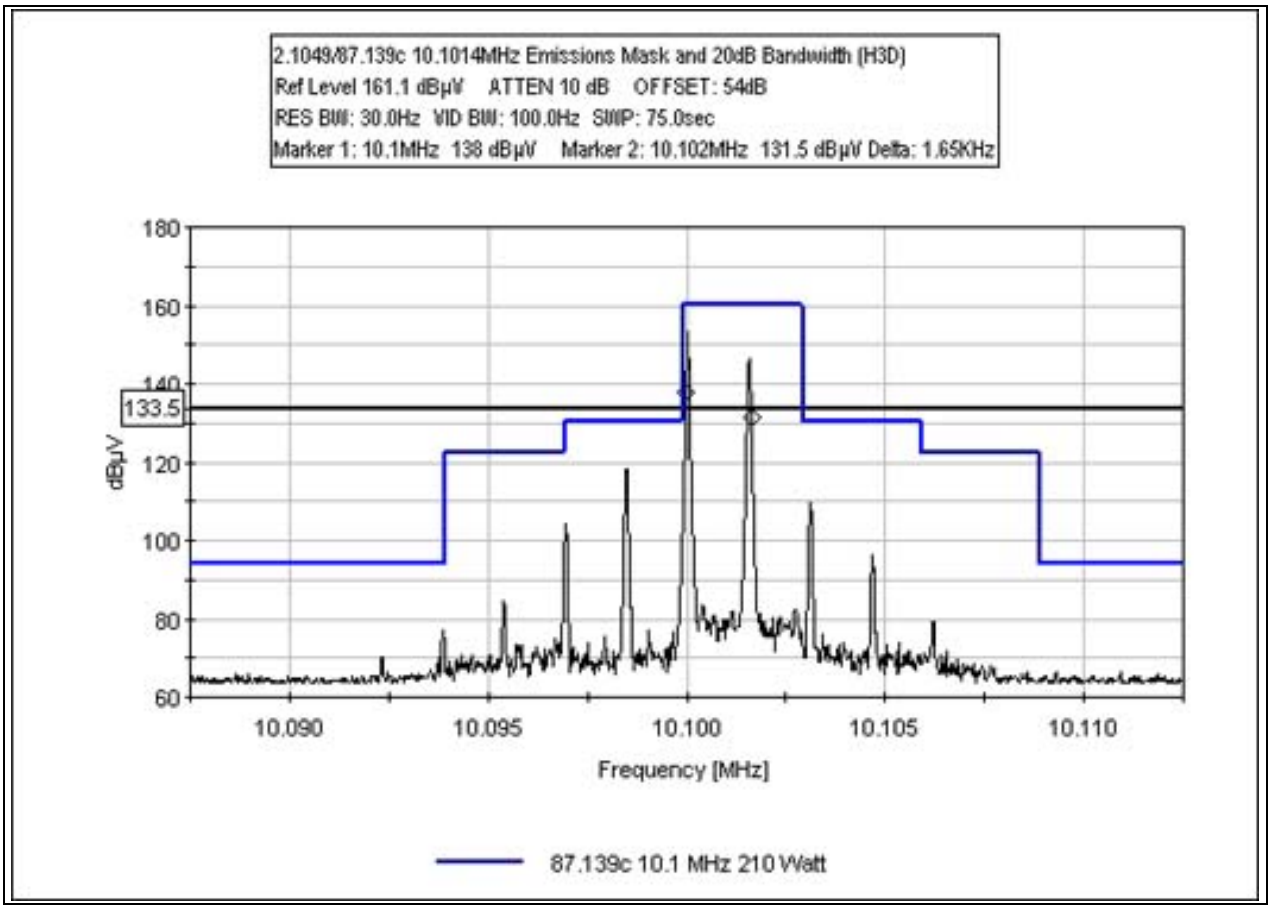
EMISSIONS MASK AND OCCUPIED BANDWIDTH - H3E USB 29.9 MHz



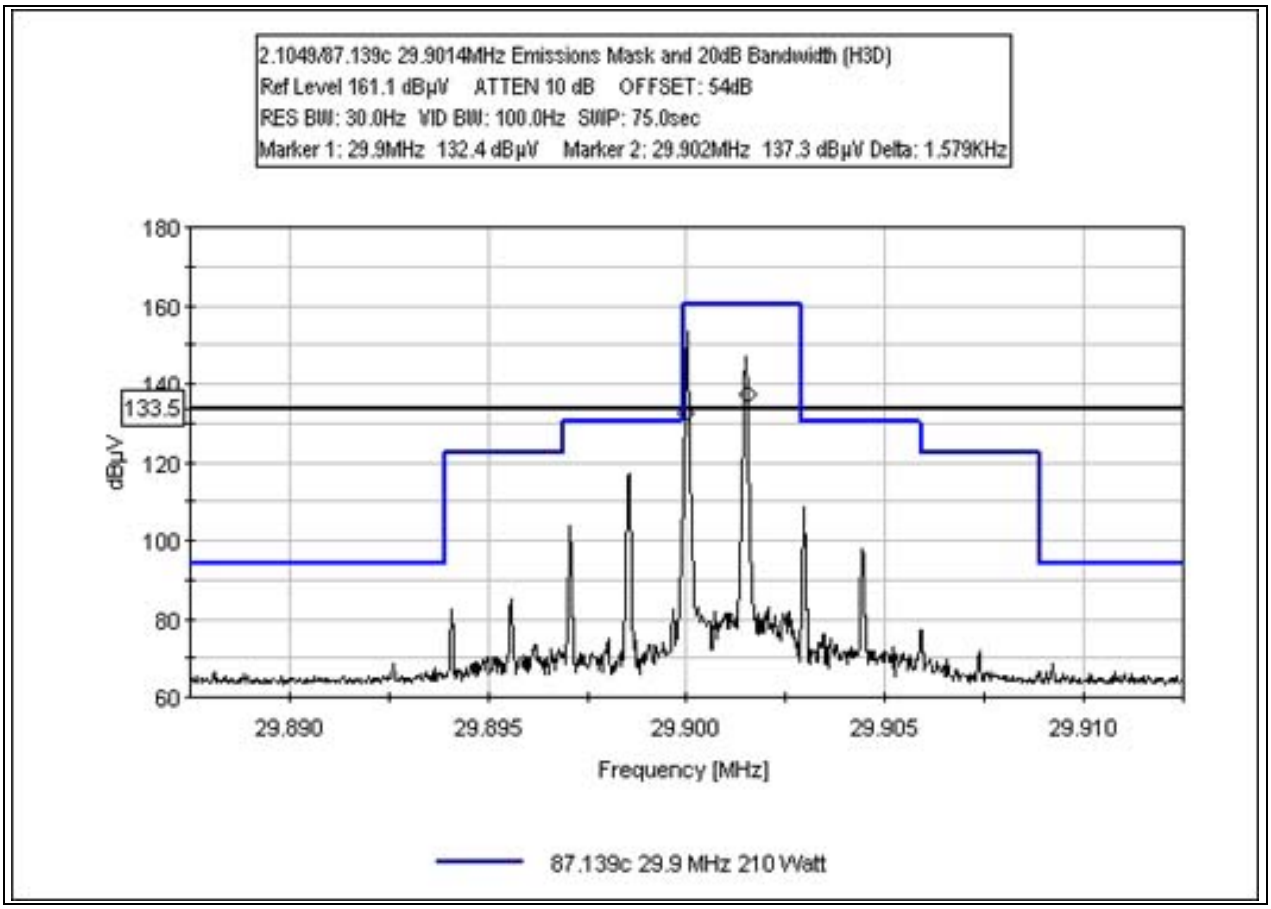
EMISSIONS MASK AND OCCUPIED BANDWIDTH - H2D/H3D USB 2.1 MHz

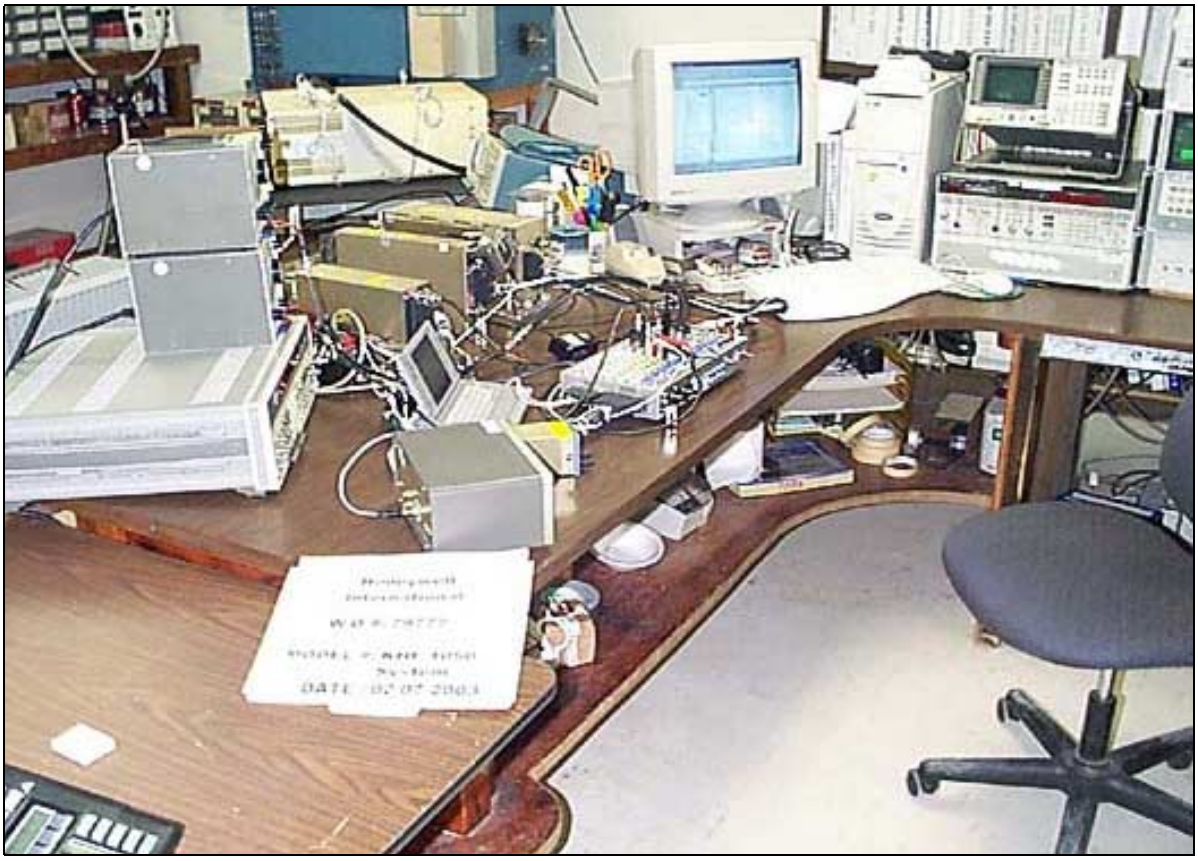


EMISSIONS MASK AND OCCUPIED BANDWIDTH - H2D/H3D USB 10.1 MHz



EMISSIONS MASK AND OCCUPIED BANDWIDTH - H2D/H3D USB 29.9 MHz





Test Equipment

Equipment	*Manufacturer*	*Model #*	*Serial #*	*Asset #*	*Cal Date*	*Cal Due*
Spectrum Analyzer	HP	8596E	3346A00225	00783	6/24/02	6/24/03
QP Adapter	HP	85650A	2521A00904	2495	7/27/02	7/27/03
Spectrum Analyzer	HP	8566B	2235a02425	92	10/23/02	10/23/03
RF Preselector	HP	85685A	2510A00167	484	2/24/03	2/24/04
Audio Analyzer	HP	8903A	3011A09432	2338	11/27/02	11/23/03
Oscillator	HP	204D	1105A02034	02457	2/20/03	2/20/04
Oscillator	HP	204C	0989A06663	01283	2/20/03	2/20/04
Arbitrary Waveform Generator	Agilent	33120A	US36037748	02561	10/1/02	10/1/03
Function Generator	BK Precision	4011	259-05324	P02219	10/10/02	10/10/03
Wattmeter	Signalcrafter	29B	108-0137-00	Honeywell*	1/21/03	5/21/03
Power Sensor	Signalcrafter	HF233K	108-0160-01	Honeywell*	1/21/03	5/21/03
Oscilloscope	Tektronix	2445A	B012153	00098	10/31/02	10/31/03

*****Non-CKC Laboratories equipment

2.1033(c)(14)/2.1051/87.139 - SPURIOUS EMISSIONS AT ANTENNA TERMINAL

Test Conditions: The frequency range investigated was 9 kHz to 3 GHz.

System Interconnect

The KHF 1050 System consists of a KRX 1053 Receiver Exciter, a KPA 1052 Power Amplifier, a KAC 1052 Antenna Coupler, and an appropriate ARINC 429 Controller (PS 440). For the purpose of a bench testing, these units are interconnected via a KHF 1050 Breakout Box. The control and DC-power cables that interface each unit to the KHF 1050 Breakout Box are approximately 1 m long. A double-shielded coaxial cable (approximately 0.5 m long) interconnects the KRX 1053 and the KPA 1052. For the purpose of the tests, a Signalcrafter power sensor is mounted to the transmitter output of the KPA 1052. The RF power from the power sensor is routed to the KAC 1052 antenna coupler. The antenna coupler is then terminated with a 54 dB attenuator. The attenuator output is routed to the spectrum analyzer. A DC-power-distribution box is used to supply 27.5VDC power to the KHF 1050 Breakout Box and to the controller.

System Operation

The ARINC-429 controller communicates the pilot-selected operating frequency and other operating parameters to the KRX 1053 via the KHF 1050 Breakout Box. The operating parameters of the KRX 1053 are returned to the controller via ARINC 429 to display to the pilot. Modulation audio from the external audio oscillators is applied to the KHF 1050 Breakout Box, where the tones are summed together and routed to the KRX 1053. At the KHF 1050 Breakout Box, the audio level is monitored with a HP 8903B Audio Analyzer at a point that directly connects to the microphone or data audio inputs of the KRX 1053. The audio levels are set to typical operating values, unless specifically directed otherwise by the requirements of the test being conducted.

The KRX 1053 communicates with the KAC 1052 via an RS-422 bus and discrete parallel lines. Operating parameters such as operating-frequency band, transmitter power setting and mode of operation is communicated along this RS-422 bus. Additionally, operating-status information of the KAC 1052 and KPA 1052 is returned to the KRX 1053 via the RS-422 bus and parallel lines. Another serial bus conveys band information and mode of operation from the KAC 1052 and KPA 1052. In addition to the serial information, discrete parallel lines communicate control and status information between these two units.

In the transmit mode of operation, the exciter signal output by the KRX 1053 is routed to the KPA 1052 where it is amplified. The transmitter output at the KPA 1052 is monitored either directly or routed through the KAC 1052, depending on the nature of the test being performed.
A computer connected to the RS-232 maintenance port of the KAC 1052 is used to disable the average power detector inside the KPA 1052 when testing voice modes of operation. This ensures that the average-power detector in the KPA 1052 does not limit the RF output power below that which is representative of normal voice operation. The average power detector is active for data modes of operation.

ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE				
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING RBW	BANDWIDTH SETTING VBW
RADIATED EMISSIONS	9 kHz	150 kHz	300 Hz	1 kHz
RADIATED EMISSIONS	150 kHz	30 MHz	10 kHz	10 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	100 kHz	100 kHz

Test Location: CKC Laboratories •5473A Clouds Rest • Mariposa, Ca 95338 • 209 966 5240

Customer: **Honeywell International**
Specification: **2.1051/87.139**
Work Order #: **79777** Date: 02/07/2003
Test Type: **Maximized Emissions** Time: 14:31:42
Equipment: **High Frequency Communications Transceiver** Sequence#: 7
Manufacturer: Honeywell International Tested By: Mike Wilkinson
Model: KHF 1050 System
S/N: See EUT List

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier KPA 1052	Honeywell	064-01072-0101	Y538
Antenna Coupler KAC 1052	Honeywell	064-01074-0101	Y560
Receiver/Exciter KRX 1053	Honeywell	064-01073-0101	Y547

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Sorensen	55-90T	CKC 2297
Audio Oscillator	HP	204D	CKC 1283
Audio Oscillator	HP	204D	CKC 2457
Attenuator 14 dB	JFW	50FHC-014	CKC P1631
Attenuator 10 dB	Weinschel	33-10-33	CKC P1681
Attenuator 30 dB	Bird	8322	102-0053-00
Computer	Toshiba	PA1249U-T2A	Y7368523-1
KHF1050 System Breakout Box	Honeywell	None	None
DC Power Distribution Box	Honeywell	None	None
Microphone	Telex	Tel-66C	None
Controller	Gables Eng.	G-7511-101-FTD (PS440)	12
DC Power Supply	HP	6205	CKC 762

Test Conditions / Notes:

EUT is operating in the J2D/J3D USB modulation mode and tuned to 10.1 MHz. Input signal frequencies are two tones at 400Hz and 1800Hz. The input signal levels are set such that the power output represents worst case. The frequency range investigated was 9 kHz to 3 GHz.

Transducer Legend:

T1=Dummy Antenna Load

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	9.440M	34.3	+51.4				+0.0	85.7	94.0	-8.3	None
2	105.200k	33.6	+51.8				+0.0	85.4	94.0	-8.6	None
3	119.600k	30.0	+51.8				+0.0	81.8	94.0	-12.2	None
4	6.771M	26.8	+51.6				+0.0	78.4	94.0	-15.6	None
5	20.210M	25.4	+50.9				+0.0	76.3	94.0	-17.7	None
6	8.989M	22.2	+51.5				+0.0	73.7	94.0	-20.3	None
7	306.000k	22.0	+51.7				+0.0	73.7	94.0	-20.3	None
8	599.000k	20.5	+51.8				+0.0	72.3	94.0	-21.7	None
9	50.503M	17.6	+47.5				+0.0	65.1	94.0	-28.9	None
10	40.404M	8.9	+48.6				+0.0	57.5	94.0	-36.5	None
11	30.304M	7.1	+50.0				+0.0	57.1	94.0	-36.9	None
12	374.700k	2.9	+51.7				+0.0	54.6	94.0	-39.4	None
13	60.605M	8.0	+46.6				+0.0	54.6	94.0	-39.4	None
14	265.400M	8.2	+45.2				+0.0	53.4	94.0	-40.6	None
15	90.905M	3.8	+44.7				+0.0	48.5	94.0	-45.5	None

Test Location: CKC Laboratories •5473A Clouds Rest • Mariposa, Ca 95338 • 209 966 5240

Customer:	**Honeywell International**		
Specification:	**2.1051/87.139**		
Work Order #:	**79777**	Date:	03/05/2003
Test Type:	**Maximized Emissions**	Time:	09:38:17
Equipment:	**High Frequency Communications Transceiver**	Sequence#:	14
Manufacturer:	Honeywell International	Tested By:	Randal Clark
Model:	KHF 1050 System		
S/N:	See EUT List		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier KPA 1052	Honeywell	064-01072-0101	Y538
Antenna Coupler KAC 1052	Honeywell	064-01074-0101	Y560
Receiver/Exciter KRX 1053	Honeywell	064-01073-0101	Y547

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Sorensen	55-90T	CKC 2297
Audio Oscillator	HP	204D	CKC 1283
Audio Oscillator	HP	204D	CKC 2457
Attenuator 14 dB	JFW	50FHC-014	CKC P1631
Attenuator 10 dB	Weinschel	33-10-33	CKC P1681
Attenuator 30 dB	Bird	8322	102-0053-00
Computer	Toshiba	PA1249U-T2A	Y7368523-1
KHF1050 System Breakout Box	Honeywell	None	None
DC Power Distribution Box	Honeywell	None	None
Microphone	Telex	Tel-66C	None
Controller	Gables Eng.	G-7511-101-FTD (PS440)	12
DC Power Supply	HP	6205	CKC 762

Test Conditions / Notes:

EUT is operating in the J3D LSB modulation mode and tuned to 10.1 MHz. Input signal frequencies are two tones at 400Hz and 1800Hz. The input signal levels are set such that the power output represents worst case. The frequency range investigated was 9 kHz to 3 GHz.

Transducer Legend:

T1=Dummy Antenna Load

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	10.555M	41.5	+51.3				+0.0	92.8	94.0	-1.2	None
2	9.445M	34.5	+51.4				+0.0	85.9	94.0	-8.1	None
3	11.004M	28.6	+51.3				+0.0	79.9	94.0	-14.1	None
4	6.756M	27.0	+51.6				+0.0	78.6	94.0	-15.4	None

5	6.648M	26.7	+51.6	+0.0	78.3	94.0	-15.7	None
6	20.199M	27.0	+50.9	+0.0	77.9	94.0	-16.1	None
7	30.298M	15.7	+50.0	+0.0	65.7	94.0	-28.3	None
8	50.496M	16.6	+47.5	+0.0	64.1	94.0	-29.9	None
9	40.397M	5.9	+48.6	+0.0	54.5	94.0	-39.5	None
10	191.884M	7.1	+44.9	+0.0	52.0	94.0	-42.0	None
11	151.486M	6.5	+44.6	+0.0	51.1	94.0	-42.9	None
12	141.389M	4.6	+44.6	+0.0	49.2	94.0	-44.8	None

Test Location: CKC Laboratories •5473A Clouds Rest • Mariposa, Ca 95338 • 209 966 5240

Customer:	**Honeywell International**		
Specification:	**2.1051/87.139**		
Work Order #:	**79777**	Date:	03/05/2003
Test Type:	**Maximized Emissions**	Time:	09:35:19
Equipment:	**High Frequency Communications Transceiver**	Sequence#:	3
Manufacturer:	Honeywell International	Tested By:	Mike Wilkinson
Model:	KHF 1050 System		
S/N:	See EUT List		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier KPA 1052	Honeywell	064-01072-0101	Y538
Antenna Coupler KAC 1052	Honeywell	064-01074-0101	Y560
Receiver/Exciter KRX 1053	Honeywell	064-01073-0101	Y547

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Sorensen	55-90T	CKC 2297
Audio Oscillator	HP	204D	CKC 1283
Audio Oscillator	HP	204D	CKC 2457
Attenuator 14 dB	JFW	50FHC-014	CKC P1631
Attenuator 10 dB	Weinschel	33-10-33	CKC P1681
Attenuator 30 dB	Bird	8322	102-0053-00
Computer	Toshiba	PA1249U-T2A	Y7368523-1
KHF1050 System Breakout Box	Honeywell	None	None
DC Power Distribution Box	Honeywell	None	None
Microphone	Telex	Tel-66C	None
Controller	Gables Eng.	G-7511-101-FTD (PS440)	12
DC Power Supply	HP	6205	CKC 762

Test Conditions / Notes:

EUT is operating in the J3E USB modulation mode and tuned to 2.1 MHz. Input signal frequencies are two tones at 400Hz and 1800Hz. The input signal levels are set such that the power output represents worst case. The frequency range investigated was 9 kHz to 3 GHz.

Transducer Legend:

T1=Dummy Antenna Load

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	2.555M	37.4	+51.8				+0.0	89.2	94.0	-4.8	None
2	4.204M	37.4	+51.8				+0.0	89.2	94.0	-4.8	None
3	1.324M	34.1	+51.8				+0.0	85.9	94.0	-8.1	None
4	3.004M	33.1	+51.8				+0.0	84.9	94.0	-9.1	None

5	1.141M	32.6	+51.8	+0.0	84.4	94.0	-9.6	None
6	6.315M	29.5	+51.7	+0.0	81.2	94.0	-12.8	None
7	10.507M	19.9	+51.4	+0.0	71.3	94.0	-22.7	None
8	14.710M	16.8	+51.0	+0.0	67.8	94.0	-26.2	None
9	12.603M	10.3	+51.2	+0.0	61.5	94.0	-32.5	None
10	8.390M	10.0	+51.5	+0.0	61.5	94.0	-32.5	None
11	86.800M	14.6	+44.9	+0.0	59.5	94.0	-34.5	None
12	45.730M	10.3	+48.0	+0.0	58.3	94.0	-35.7	None

Test Location: CKC Laboratories •5473A Clouds Rest • Mariposa, Ca 95338 • 209 966 5240

Customer:	**Honeywell International**		
Specification:	**2.1051/87.139**		
Work Order #:	**79777**	Date:	03/04/2003
Test Type:	**Maximized Emissions**	Time:	17:26:45
Equipment:	**High Frequency Communications Transceiver**	Sequence#:	2
Manufacturer:	Honeywell International	Tested By:	Mike Wilkinson
Model:	KHF 1050 System		
S/N:	See EUT List		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier KPA 1052	Honeywell	064-01072-0101	Y538
Antenna Coupler KAC 1052	Honeywell	064-01074-0101	Y560
Receiver/Exciter KRX 1053	Honeywell	064-01073-0101	Y547

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Sorensen	55-90T	CKC 2297
Audio Oscillator	HP	204D	CKC 1283
Audio Oscillator	HP	204D	CKC 2457
Attenuator 14 dB	JFW	50FHC-014	CKC P1631
Attenuator 10 dB	Weinschel	33-10-33	CKC P1681
Attenuator 30 dB	Bird	8322	102-0053-00
Computer	Toshiba	PA1249U-T2A	Y7368523-1
KHF1050 System Breakout Box	Honeywell	None	None
DC Power Distribution Box	Honeywell	None	None
Microphone	Telex	Tel-66C	None
Controller	Gables Eng.	G-7511-101-FTD (PS440)	12
DC Power Supply	HP	6205	CKC 762

Test Conditions / Notes:

EUT is operating in the J3E USB modulation mode and tuned to 10.1 MHz. Input signal frequencies are two tones at 400Hz and 1800Hz. The input signal levels are set such that the power output represents worst case. The frequency range investigated was 9 kHz to 3 GHz.

Transducer Legend:

T1=Dummy Antenna Load

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	10.555M	36.2	+51.3				+0.0	87.5	94.0	-6.5	None
2	20.194M	35.7	+50.9				+0.0	86.6	94.0	-7.4	None
3	6.783M	30.8	+51.6				+0.0	82.4	94.0	-11.6	None
4	9.443M	28.2	+51.4				+0.0	79.6	94.0	-14.4	None

5	10.996M	28.1	+51.3	+0.0	79.4	94.0	-14.6	None
6	8.043M	24.7	+51.5	+0.0	76.2	94.0	-17.8	None
7	50.504M	26.1	+47.5	+0.0	73.6	94.0	-20.4	None
8	13.490M	21.4	+51.1	+0.0	72.5	94.0	-21.5	None
9	30.321M	19.7	+49.9	+0.0	69.6	94.0	-24.4	None
10	1.496M	17.7	+51.8	+0.0	69.5	94.0	-24.5	None
11	191.800M	20.5	+44.9	+0.0	65.4	94.0	-28.6	None
12	171.400M	20.4	+44.8	+0.0	65.2	94.0	-28.8	None
13	70.708M	18.3	+45.9	+0.0	64.2	94.0	-29.8	None
14	60.598M	17.0	+46.6	+0.0	63.6	94.0	-30.4	None
15	90.893M	15.7	+44.7	+0.0	60.4	94.0	-33.6	None
16	111.131M	15.4	+44.3	+0.0	59.7	94.0	-34.3	None

Test Location: CKC Laboratories •5473A Clouds Rest • Mariposa, Ca 95338 • 209 966 5240

Customer:	**Honeywell International**		
Specification:	**2.1051/87.139**		
Work Order #:	**79777**	Date:	03/05/2003
Test Type:	**Maximized Emissions**	Time:	09:19:04
Equipment:	**High Frequency Communications Transceiver**	Sequence#:	4
Manufacturer:	Honeywell International	Tested By:	Mike Wilkinson
Model:	KHF 1050 System		
S/N:	See EUT List		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier KPA 1052	Honeywell	064-01072-0101	Y538
Antenna Coupler KAC 1052	Honeywell	064-01074-0101	Y560
Receiver/Exciter KRX 1053	Honeywell	064-01073-0101	Y547

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Sorensen	55-90T	CKC 2297
Audio Oscillator	HP	204D	CKC 1283
Audio Oscillator	HP	204D	CKC 2457
Attenuator 14 dB	JFW	50FHC-014	CKC P1631
Attenuator 10 dB	Weinschel	33-10-33	CKC P1681
Attenuator 30 dB	Bird	8322	102-0053-00
Computer	Toshiba	PA1249U-T2A	Y7368523-1
KHF1050 System Breakout Box	Honeywell	None	None
DC Power Distribution Box	Honeywell	None	None
Microphone	Telex	Tel-66C	None
Controller	Gables Eng.	G-7511-101-FTD (PS440)	12
DC Power Supply	HP	6205	CKC 762

Test Conditions / Notes:

EUT is operating in the J3E USB modulation mode and tuned to 29.9 MHz. Input signal frequencies are two tones at 400Hz and 1800Hz. The input signal levels are set such that the power output represents worst case. The frequency range investigated was 9 kHz to 3 GHz.

Transducer Legend:

T1=Dummy Antenna Load

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	19.749M	36.6	+50.9				+0.0	87.5	94.0	-6.5	None
2	59.807M	40.0	+46.7				+0.0	86.7	94.0	-7.3	None
3	30.420M	28.8	+49.9				+0.0	78.7	94.0	-15.3	None
4	89.708M	32.5	+44.7				+0.0	77.2	94.0	-16.8	None

5	30.880M	25.2	+49.9	+0.0	75.1	94.0	-18.9	None
6	32.070M	23.5	+49.7	+0.0	73.2	94.0	-20.8	None
7	32.680M	23.4	+49.6	+0.0	73.0	94.0	-21.0	None
8	149.510M	19.2	+44.6	+0.0	63.8	94.0	-30.2	None
9	9.670M	9.4	+51.4	+0.0	60.8	94.0	-33.2	None
10	1.103M	7.8	+51.8	+0.0	59.6	94.0	-34.4	None
11	2.741M	7.6	+51.8	+0.0	59.4	94.0	-34.6	None
12	209.313M	7.2	+45.0	+0.0	52.2	94.0	-41.8	None
13	119.608M	6.3	+44.4	+0.0	50.7	94.0	-43.3	None
14	328.898M	4.4	+45.5	+0.0	49.9	94.0	-44.1	None

Test Location: CKC Laboratories •5473A Clouds Rest • Mariposa, Ca 95338 • 209 966 5240

Customer: **Honeywell International**
Specification: **2.1051/87.139**
Work Order #: **79777** Date: 03/04/2003
Test Type: **Maximized Emissions** Time: 17:14:03
Equipment: **High Frequency Communications Transceiver** Sequence#: 13
Manufacturer: Honeywell International Tested By: Randal Clark
Model: KHF 1050 System
S/N: See EUT List

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier KPA 1052	Honeywell	064-01072-0101	Y538
Antenna Coupler KAC 1052	Honeywell	064-01074-0101	Y560
Receiver/Exciter KRX 1053	Honeywell	064-01073-0101	Y547

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Sorensen	55-90T	CKC 2297
Audio Oscillator	HP	204D	CKC 1283
Audio Oscillator	HP	204D	CKC 2457
Attenuator 14 dB	JFW	50FHC-014	CKC P1631
Attenuator 10 dB	Weinschel	33-10-33	CKC P1681
Attenuator 30 dB	Bird	8322	102-0053-00
Computer	Toshiba	PA1249U-T2A	Y7368523-1
KHF1050 System Breakout Box	Honeywell	None	None
DC Power Distribution Box	Honeywell	None	None
Microphone	Telex	Tel-66C	None
Controller	Gables Eng.	G-7511-101-FTD (PS440)	12
DC Power Supply	HP	6205	CKC 762

Test Conditions / Notes:

EUT is operating in the J3E LSB modulation mode and tuned to 10.1 MHz. Input signal frequencies are two tones at 400Hz and 1800Hz. The input signal levels are set such that the power output represents worst case. The frequency range investigated was 9 kHz to 3 GHz.

Transducer Legend:

T1=Dummy Antenna Load

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	10.550M	36.7	+51.3				+0.0	88.0	94.0	-6.0	None
2	20.200M	32.9	+50.9				+0.0	83.8	94.0	-10.2	None
3	11.006M	31.5	+51.3				+0.0	82.8	94.0	-11.2	None
4	9.435M	28.4	+51.4				+0.0	79.8	94.0	-14.2	None

5	6.768M	26.8	+51.6	+0.0	78.4	94.0	-15.6	None
6	50.496M	25.2	+47.5	+0.0	72.7	94.0	-21.3	None
7	30.298M	20.5	+50.0	+0.0	70.5	94.0	-23.5	None
8	9.176M	18.2	+51.4	+0.0	69.6	94.0	-24.4	None
9	171.686M	16.6	+44.8	+0.0	61.4	94.0	-32.6	None
10	191.882M	15.9	+44.9	+0.0	60.8	94.0	-33.2	None
11	181.783M	15.2	+44.8	+0.0	60.0	94.0	-34.0	None
12	151.488M	12.8	+44.6	+0.0	57.4	94.0	-36.6	None
13	161.586M	11.2	+44.7	+0.0	55.9	94.0	-38.1	None
14	141.389M	11.2	+44.6	+0.0	55.8	94.0	-38.2	None
15	232.281M	8.4	+45.1	+0.0	53.5	94.0	-40.5	None
16	131.287M	9.0	+44.5	+0.0	53.5	94.0	-40.5	None
17	111.088M	4.0	+44.3	+0.0	48.3	94.0	-45.7	None

Test Location: CKC Laboratories •5473A Clouds Rest • Mariposa, Ca 95338 • 209 966 5240

Customer:	**Honeywell International**		
Specification:	**2.1051/87.139**		
Work Order #:	**79777**	Date:	02/06/2003
Test Type:	**Maximized Emissions**	Time:	17:45:00
Equipment:	**High Frequency Communications Transceiver**	Sequence#:	1
Manufacturer:	Honeywell International	Tested By:	Mike Wilkinson
Model:	KHF 1050 System		
S/N:	See EUT List		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier KPA 1052	Honeywell	064-01072-0101	Y538
Antenna Coupler KAC 1052	Honeywell	064-01074-0101	Y560
Receiver/Exciter KRX 1053	Honeywell	064-01073-0101	Y547

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Sorensen	55-90T	CKC 2297
Audio Oscillator	HP	204D	CKC 1283
Audio Oscillator	HP	204D	CKC 2457
Attenuator 14 dB	JFW	50FHC-014	CKC P1631
Attenuator 10 dB	Weinschel	33-10-33	CKC P1681
Attenuator 30 dB	Bird	8322	102-0053-00
Computer	Toshiba	PA1249U-T2A	Y7368523-1
KHF1050 System Breakout Box	Honeywell	None	None
DC Power Distribution Box	Honeywell	None	None
Microphone	Telex	Tel-66C	None
Controller	Gables Eng.	G-7511-101-FTD (PS440)	12
DC Power Supply	HP	6205	CKC 762

Test Conditions / Notes:

EUT is operating in the R3E USB modulation mode and tuned to 10.1 MHz. Input signal frequencies are two tones at 400Hz and 1800Hz. The input signal levels are set such that the power output represents worst case. The frequency range investigated was 9 kHz to 3 GHz.

Transducer Legend:

T1=Dummy Antenna Load

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	6.813M	33.9	+51.6				+0.0	85.5	94.0	-8.5	None
2	10.555M	33.4	+51.3				+0.0	84.7	94.0	-9.3	None
3	4.520M	32.5	+51.8				+0.0	84.3	94.0	-9.7	None
4	8.000M	32.3	+51.5				+0.0	83.8	94.0	-10.2	None

5	20.203M	29.6	+50.9	+0.0	80.5	94.0	-13.5	None
6	50.506M	17.0	+47.5	+0.0	64.5	94.0	-29.5	None
7	70.703M	18.4	+45.9	+0.0	64.3	94.0	-29.7	None
8	90.891M	11.6	+44.7	+0.0	56.3	94.0	-37.7	None
9	40.405M	3.1	+48.6	+0.0	51.7	94.0	-42.3	None
10	111.087M	6.9	+44.3	+0.0	51.2	94.0	-42.8	None
11	80.789M	5.4	+45.2	+0.0	50.6	94.0	-43.4	None
12	60.610M	3.5	+46.6	+0.0	50.1	94.0	-43.9	None

Test Location: CKC Laboratories •5473A Clouds Rest • Mariposa, Ca 95338 • 209 966 5240

Customer:	**Honeywell International**		
Specification:	**2.1051/87.139**		
Work Order #:	**79777**	Date:	03/05/2003
Test Type:	**Maximized Emissions**	Time:	09:52:50
Equipment:	**High Frequency Communications Transceiver**	Sequence#:	5
Manufacturer:	Honeywell International	Tested By:	Mike Wilkinson
Model:	KHF 1050 System		
S/N:	See EUT List		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier KPA 1052	Honeywell	064-01072-0101	Y538
Antenna Coupler KAC 1052	Honeywell	064-01074-0101	Y560
Receiver/Exciter KRX 1053	Honeywell	064-01073-0101	Y547

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Sorensen	55-90T	CKC 2297
Audio Oscillator	HP	204D	CKC 1283
Audio Oscillator	HP	204D	CKC 2457
Attenuator 14 dB	JFW	50FHC-014	CKC P1631
Attenuator 10 dB	Weinschel	33-10-33	CKC P1681
Attenuator 30 dB	Bird	8322	102-0053-00
Computer	Toshiba	PA1249U-T2A	Y7368523-1
KHF1050 System Breakout Box	Honeywell	None	None
DC Power Distribution Box	Honeywell	None	None
Microphone	Telex	Tel-66C	None
Controller	Gables Eng.	G-7511-101-FTD (PS440)	12
DC Power Supply	HP	6205	CKC 762

Test Conditions / Notes:

EUT is operating in the H3E USB modulation mode and tuned to 10.1 MHz. Input signal frequency is one tone at 1500Hz. The input signal level is set such that the power output represents worst case. The frequency range investigated was 9 kHz to 3 GHz.

Transducer Legend:

T1=Dummy Antenna Load

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	10.555M	40.8	+51.3				+0.0	92.1	94.0	-1.9	None
2	20.205M	32.0	+50.9				+0.0	82.9	94.0	-11.1	None
3	9.454M	29.8	+51.4				+0.0	81.2	94.0	-12.8	None
4	11.030M	29.6	+51.3				+0.0	80.9	94.0	-13.1	None

5	6.786M	29.0	+51.6	+0.0	80.6	94.0	-13.4	None
6	11.232M	27.1	+51.3	+0.0	78.4	94.0	-15.6	None
7	8.998M	24.0	+51.5	+0.0	75.5	94.0	-18.5	None
8	50.506M	24.3	+47.5	+0.0	71.8	94.0	-22.2	None
9	13.445M	18.5	+51.1	+0.0	69.6	94.0	-24.4	None
10	171.900M	17.2	+44.8	+0.0	62.0	94.0	-32.0	None
11	70.709M	14.8	+45.9	+0.0	60.7	94.0	-33.3	None
12	1.112M	8.3	+51.8	+0.0	60.1	94.0	-33.9	None
13	40.405M	11.3	+48.6	+0.0	59.9	94.0	-34.1	None
14	60.608M	11.0	+46.6	+0.0	57.6	94.0	-36.4	None
15	30.305M	6.0	+50.0	+0.0	56.0	94.0	-38.0	None
16	90.915M	8.7	+44.7	+0.0	53.4	94.0	-40.6	None
17	101.006M	6.3	+44.2	+0.0	50.5	94.0	-43.5	None

Test Location: CKC Laboratories •5473A Clouds Rest • Mariposa, Ca 95338 • 209 966 5240

Customer:	**Honeywell International**		
Specification:	**2.1051/87.139**		
Work Order #:	**79777**	Date:	02/07/2003
Test Type:	**Maximized Emissions**	Time:	13:28:29
Equipment:	**High Frequency Communications Transceiver**	Sequence#:	6
Manufacturer:	Honeywell International	Tested By:	Mike Wilkinson
Model:	KHF 1050 System		
S/N:	See EUT List		

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier KPA 1052	Honeywell	064-01072-0101	Y538
Antenna Coupler KAC 1052	Honeywell	064-01074-0101	Y560
Receiver/Exciter KRX 1053	Honeywell	064-01073-0101	Y547

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Sorensen	55-90T	CKC 2297
Audio Oscillator	HP	204D	CKC 1283
Audio Oscillator	HP	204D	CKC 2457
Attenuator 14 dB	JFW	50FHC-014	CKC P1631
Attenuator 10 dB	Weinschel	33-10-33	CKC P1681
Attenuator 30 dB	Bird	8322	102-0053-00
Computer	Toshiba	PA1249U-T2A	Y7368523-1
KHF1050 System Breakout Box	Honeywell	None	None
DC Power Distribution Box	Honeywell	None	None
Microphone	Telex	Tel-66C	None
Controller	Gables Eng.	G-7511-101-FTD (PS440)	12
DC Power Supply	HP	6205	CKC 762

Test Conditions / Notes:

EUT is operating in the H2D/H3D USB modulation mode and tuned to 10.1 MHz. Input signal frequency is one tone at 1500Hz. The input signal level is set such that the power output represents worst case. The frequency range investigated was 9 kHz to 3 GHz.

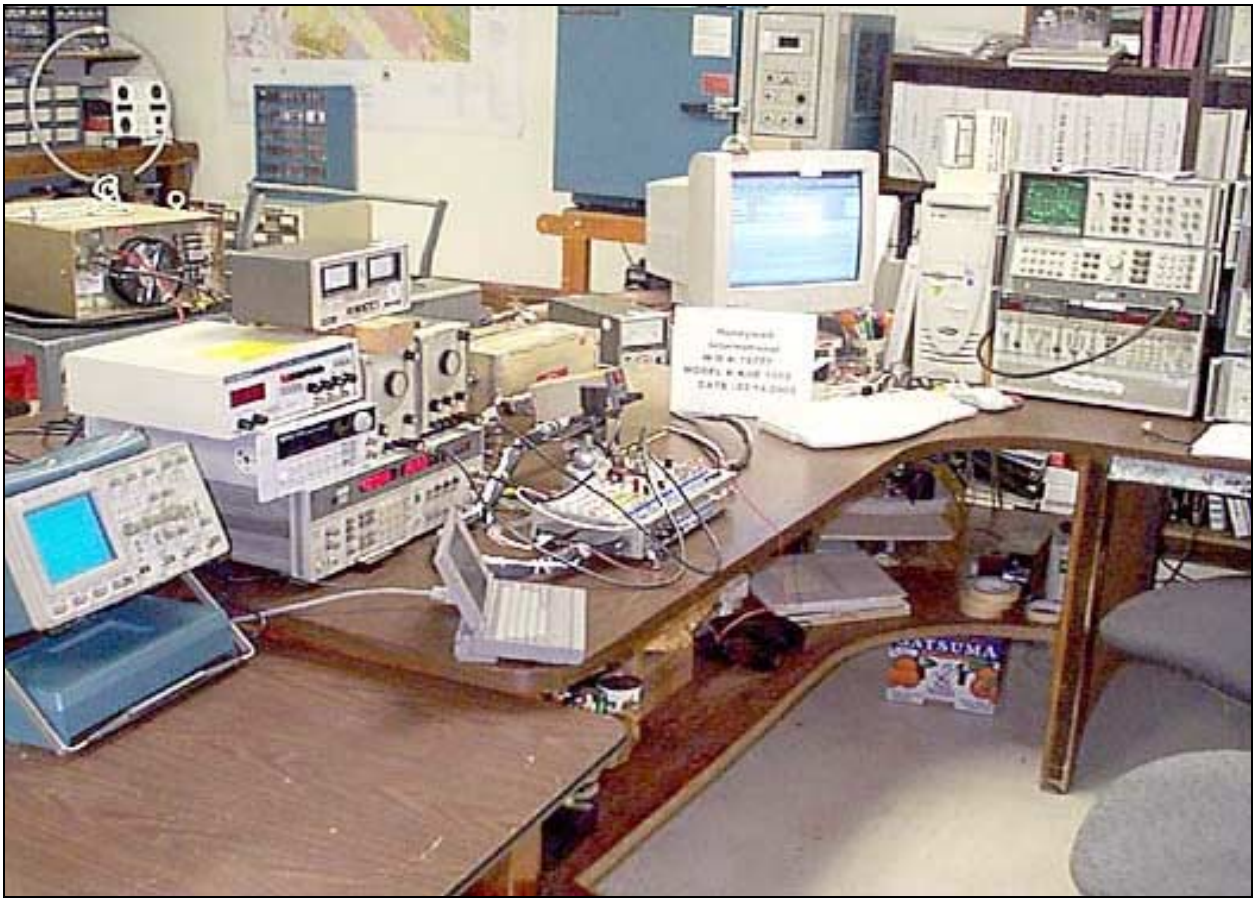
Transducer Legend:

T1=Dummy Antenna Load

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBµV	T1 dB	dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	10.600M	35.7	+51.3				+0.0	87.0	94.0	-7.0	None
2	9.439M	31.7	+51.4				+0.0	83.1	94.0	-10.9	None
3	11.050M	27.5	+51.3				+0.0	78.8	94.0	-15.2	None
4	6.764M	25.8	+51.6				+0.0	77.4	94.0	-16.6	None

5	20.260M	25.0	+50.9	+0.0	75.9	94.0	-18.1	None
6	8.989M	22.9	+51.5	+0.0	74.4	94.0	-19.6	None
7	50.504M	23.8	+47.5	+0.0	71.3	94.0	-22.7	None
8	11.700M	18.0	+51.2	+0.0	69.2	94.0	-24.8	None
9	1.150M	8.9	+51.8	+0.0	60.7	94.0	-33.3	None
10	70.703M	13.8	+45.9	+0.0	59.7	94.0	-34.3	None
11	40.399M	9.6	+48.6	+0.0	58.2	94.0	-35.8	None
12	90.903M	7.6	+44.7	+0.0	52.3	94.0	-41.7	None
13	238.400M	4.9	+45.1	+0.0	50.0	94.0	-44.0	None



Test Equipment

Equipment	*Manufacturer*	*Model #*	*Serial #*	*Asset #*	*Cal Date*	*Cal Due*
Spectrum Analyzer	HP	8596E	3346A00225	00783	6/24/02	6/24/03
QP Adapter	HP	85650A	2521A00904	2495	7/27/02	7/27/03
Spectrum Analyzer	HP	8566B	2235a02425	92	10/23/02	10/23/03
RF Preselector	HP	85685A	2510A00167	484	2/24/03	2/24/04
Audio Analyzer	HP	8903A	3011A09432	2338	11/27/02	11/23/03
Oscillator	HP	204D	1105A02034	02457	2/20/03	2/20/04
Oscillator	HP	204C	0989A06663	01283	2/20/03	2/20/04
Arbitrary Waveform Generator	Agilent	33120A	US36037748	02561	10/1/02	10/1/03
Function Generator	BK Precision	4011	259-05324	P02219	10/10/02	10/10/03
Wattmeter	Signalcrafter	29B	108-0137-00	Honeywell*	1/21/03	5/21/03
Power Sensor	Signalcrafter	HF233K	108-0160-01	Honeywell*	1/21/03	5/21/03
Oscilloscope	Tektronix	2445A	B012153	00098	10/31/02	10/31/03

*****Non-CKC Laboratories equipment

2.1033(c)(14)/2.1053/87.139 - FIELD STRENGTH OF SPURIOUS RADIATION

Test Conditions: This data sheet will include J3E Low, Mid & High channel frequencies plus Mid channel for J3D/J2D, R3E, HE3 & H3D/H2D as noted for each reading. EUT is transmitting with modulation. The modulation input signal levels are set such that the power output represents worst case. The frequency range investigated was 9 kHz to 3.0 GHz. No EUT signals detected above 600 MHz at any transmit frequency or operation mode.

System Interconnect

The KHF 1050 System consists of a KRX 1053 Receiver Exciter, a KPA 1052 Power Amplifier, a KAC 1052 Antenna Coupler, and an appropriate ARINC 429 Controller (PS 440). For the purpose of a bench testing, these units are interconnected via a KHF 1050 Breakout Box. The control and DC-power cables that interface each unit to the KHF 1050 Breakout Box are approximately 1 m long. A double-shielded coaxial cable (approximately 0.5 m long) interconnects the KRX 1053 and the KPA 1052. For the purpose of the tests, a Signalcrafter power sensor is mounted to the transmitter output of the KPA 1052.

The RF power from the power sensor is routed to the KAC 1052 antenna coupler. The antenna coupler is then terminated with a 54 dB attenuator. The attenuator output is routed to the spectrum analyzer. A DC-power-distribution box is used to supply 27.5VDC power to the KHF 1050 Breakout Box and to the controller.

System Operation

The ARINC-429 controller communicates the pilot-selected operating frequency and other operating parameters to the KRX 1053 via the KHF 1050 Breakout Box. The operating parameters of the KRX 1053 are returned to the controller via ARINC 429 to display to the pilot. Modulation audio from the external audio oscillators is applied to the KHF 1050 Breakout Box, where the tones are summed together and routed to the KRX 1053. At the KHF 1050 Breakout Box, the audio level is monitored with a HP 8903B Audio Analyzer at a point that directly connects to the microphone or data audio inputs of the KRX 1053. The audio levels are set to typical operating values, unless specifically directed otherwise by the requirements of the test being conducted.

The KRX 1053 communicates with the KAC 1052 via an RS-422 bus and discrete parallel lines. Operating parameters such as operating-frequency band, transmitter power setting and mode of operation is communicated along this RS-422 bus. Additionally, operating-status information of the KAC 1052 and KPA 1052 is returned to the KRX 1053 via the RS-422 bus and parallel lines. Another serial bus conveys band information and mode of operation from the KAC 1052 and KPA 1052. In addition to the serial information, discrete parallel lines communicate control and status information between these two units.

In the transmit mode of operation, the exciter signal output by the KRX 1053 is routed to the KPA 1052 where it is amplified. The transmitter output at the KPA 1052 is monitored either directly or routed through the KAC 1052, depending on the nature of the test being performed.

A computer connected to the RS-232 maintenance port of the KAC 1052 is used to effectively disable the average power detector inside the KPA 1052 when testing voice modes of operation. This raises the threshold of the average power detector from approximately 50 W to approximately 100 W to ensure that the average-power detector in the KPA 1052 does not limit the RF output power below that which is representative of normal voice operation. The average power detector is active for data modes of operation.

ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	3 GHz	1 MHz

Operating Frequency: 2-29.9 MHz
Channels: J3E Low, Mid & High channel frequencies plus Mid channel for J3D/J2D, R3E, HE3 & H3D/H2D
Highest Measured Output Power: 46.96 EIRP(dBm)= 49.64 EIRP(Watts)
Distance: 3 meters
Limit: 43+10Log(P)= 59.96 dBc

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
1.66	-32.9		79.86

Note: This is the only reading with a margin of less than –20 and it came from the H3D USB modulation.

Test Equipment

Equipment	*Manufacturer*	*Model #*	*Serial #*	*Asset #*	*Cal Date*	*Cal Due*
Antenna, Bicon	A&H	SAS-200/542	156	00225	12/2/02	12/2/03
Antenna, Log	A&H	SAS-200/510	154	01330	6/19/02	6/19/03
Preamp	HP	8447D	1937A02604	00099	3/21/02	3/21/03
Preamp	HP	8449B	3008A00301	02010	10/18/02	10/18/03
Spectrum Analyzer	HP	8596E	3346A00225	783	6/24/02	6/24/03
Audio Analyzer	HP	8903A	3011A09432	2338	11/27/02	11/23/03
Antenna, Horn	EMCO	3115	4085	00656	3/19/02	3/19/03
Antenna, Mag Loop	EMCO	6502	1074	226	6/5/02	6/5/03
Cable #4 (50')	Andrew	FSJ1-50A	N/A	N/A	4/16/02	4/16/03
Cable #1 (30')	Andrew	FSJ1-50A	N/A	N/A	4/16/02	4/16/03
Cable #8 (6')	Andrew	FSJ1-50A	N/A	N/A	4/16/02	4/16/03

2.1033(c)(14)/2.1055/87.133/87.147- FREQUENCY STABILITY

Test Conditions: System Interconnect

The KHF 1050 System consists of a KRX 1053 Receiver Exciter, a KPA 1052 Power Amplifier, a KAC 1052 Antenna Coupler, and an appropriate ARINC 429 Controller (PS 440). For the purpose of a bench testing, these units are interconnected via a KHF 1050 Breakout Box. The control and DC-power cables that interface each unit to the KHF 1050 Breakout Box are approximately 1 m long. A double-shielded coaxial cable (approximately 0.5 m long) interconnects the KRX 1053 and the KPA 1052. For the purpose of the tests, a Signalcrafter power sensor is mounted to the transmitter output of the KPA 1052. The RF power from the power sensor is routed to the KAC 1052 antenna coupler. The antenna coupler is then terminated with a 54 dB attenuator. The attenuator output is routed to the spectrum analyzer. A DC-power-distribution box is used to supply 27.5VDC power to the KHF 1050 Breakout Box and to the controller.

System Operation

The ARINC-429 controller communicates the pilot-selected operating frequency and other operating parameters to the KRX 1053 via the KHF 1050 Breakout Box. The operating parameters of the KRX 1053 are returned to the controller via ARINC 429 to display to the pilot. Modulation audio from the external audio oscillators is applied to the KHF 1050 Breakout Box, where the tones are summed together and routed to the KRX 1053. At the KHF 1050 Breakout Box, the audio level is monitored with a HP 8903B Audio Analyzer at a point that directly connects to the microphone or data audio inputs of the KRX 1053. The audio levels are set to typical operating values, unless specifically directed otherwise by the requirements of the test being conducted

The KRX 1053 communicates with the KAC 1052 via an RS-422 bus and discrete parallel lines. Operating parameters such as operating-frequency band, transmitter power setting and mode of operation is communicated along this RS-422 bus. Additionally, operating-status information of the KAC 1052 and KPA 1052 is returned to the KRX 1053 via the RS-422 bus and parallel lines. Another serial bus conveys band information and mode of operation from the KAC 1052 and KPA 1052. In addition to the serial information, discrete parallel lines communicate control and status information between these two units.

In the transmit mode of operation, the exciter signal output by the KRX 1053 is routed to the KPA 1052 where it is amplified. The transmitter output at the KPA 1052 is monitored either directly or routed through the KAC 1052, depending on the nature of the test being performed.
A computer connected to the RS-232 maintenance port of the KAC 1052 is used to disable the average power detector inside the KPA 1052 when testing voice modes of operation. This ensures that the average-power detector in the KPA 1052 does not limit the RF output power below that which is representative of normal voice operation. The average power detector is active for data modes of operation.

Customer: Honeywell
WO#: 79777
Test Engineer: Mike Wilkinson

Device Model #: KHF 1050
Operating Voltage: 27.5 **VDC**
Frequency Limit: 0.00002 **MHz**

H3E mode with no modulation input		**Low Channel (MHz)**	**Dev. (MHz)**
Channel Frequency:		**2.100000**	
Temp (C)	Voltage		
-20	27.5	2.100001	0.000001
-10	27.5	2.100001	0.000001
0	27.5	2.100001	0.000001
10	27.5	2.100003	0.000003
20	27.5	2.100001	0.000001
30	27.5	2.100001	0.000001
40	27.5	2.100001	0.000001
50	27.5	2.100000	0.000000

Voltage Variations (±15%)

20	23.4	2.100000	0.000000
20	27.5	2.100001	0.000001
20	31.6	2.100000	0.000000

Max Deviation (MHz)	**0.000003**
	Pass

H3E mode with no modulation input		**Mid Channel (MHz)**	**Dev. (MHz)**
Channel Frequency:		**10.100000**	
Temp (C)	Voltage		
-20	27.5	10.100001	0.000001
-10	27.5	10.100001	0.000001
0	27.5	10.100001	0.000001
10	27.5	10.100001	0.000001
20	27.5	10.100003	0.000003
30	27.5	10.100001	0.000001
40	27.5	10.100001	0.000001
50	27.5	10.100000	0.000000

Voltage Variations (±15%)

20	23.4	10.100001	0.000001
20	27.5	10.100003	0.000003
20	31.6	10.100001	0.000001

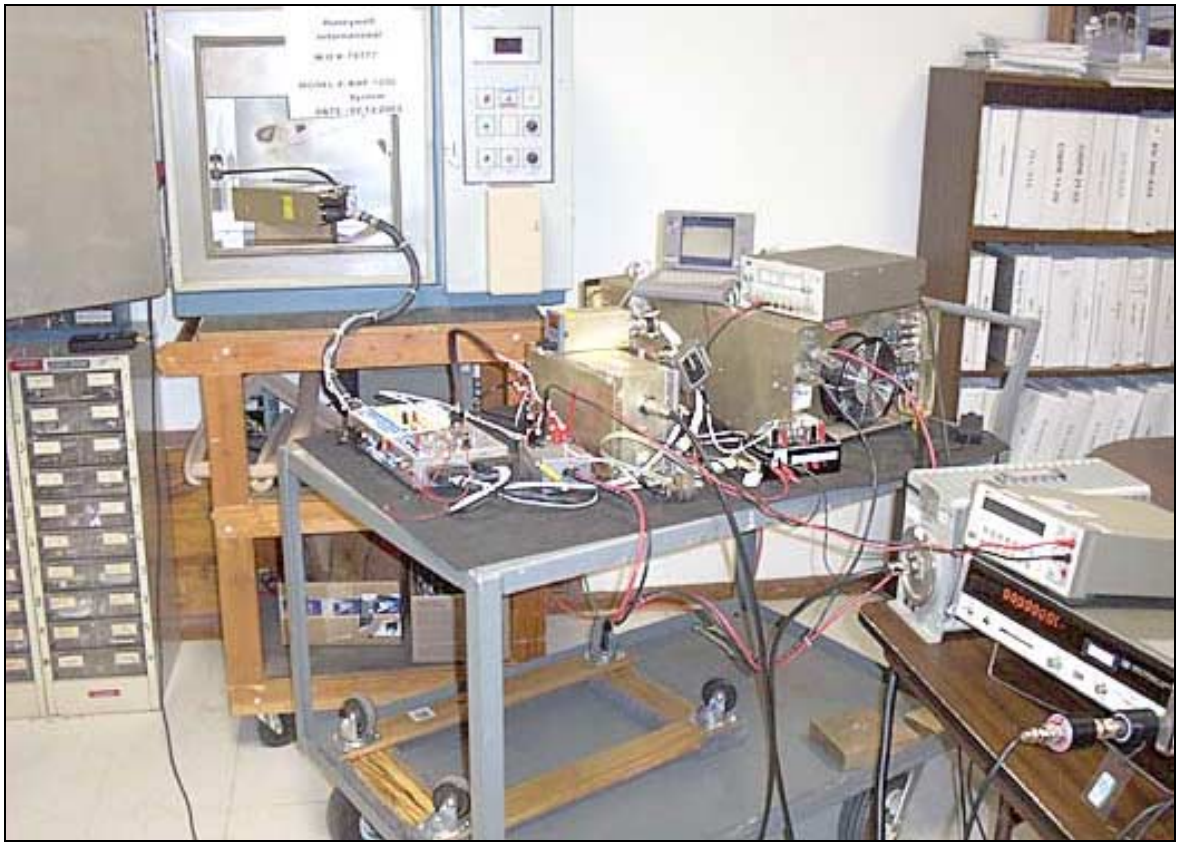
Max Deviation (MHz)	**0.000003**
	Pass

H3E mode with no modulation input		High Channel (MHz)	Dev. (MHz)
Channel Frequency:		**29.900000**	
Temp (C)	Voltage		
-20	27.5	29.900004	0.000004
-10	27.5	29.900002	0.000002
0	27.5	29.900001	0.000001
10	27.5	29.900002	0.000002
20	27.5	29.899999	0.000001
30	27.5	29.900001	0.000001
40	27.5	29.900001	0.000001
50	27.5	29.900000	0.000000

Voltage Variations (±15%)

20	23.4	29.899999	0.000001
20	27.5	29.899999	0.000001
20	31.6	29.899999	0.000001

Max Deviation (MHz)	**0.000004**
	Pass



Test Equipment

Equipment	*Manufacturer*	*Model #*	*Serial #*	*Asset #*	*Cal Date*	*Cal Due*
Frequency Counter	HP	5340A	1532A03198	1257	4/30/02	4/30/03
Thermometer	Omega	HH-26K	T-202884	02242	8/30/02	8/30/03
Temp Chamber	Thermotron	S-1.2 MiniMax	11899	01879	1/31/03	1/31/04

2.1091 – MPE CALCULATIONS

Maximum Permissible Exposure Calculations
Date of Report: February 4, 2003

Model Number: KHF 1050
FCC Identification:

Fundamental Operating Frequency: 2 MHz to 29.999 MHz

Maximum Rated Output Power: 250 Watts
Measured Output Power (Conducted): 220 Watts (R3E)

Due to the nature of this device, 50% would be a theoretical maximum duty cycle. If the EUT operated at this duty cycle for a period exceeding 5 minutes, the device would become too hot and begin reducing the power level to avoid over heating.

MPE Limit in accordance with 1.1310(b): Limits for general population/uncontrolled exposure

MPE Limit = 180/fc(MHz)
2MHz Limit: 180/2.0 = 90mW/cm^2
29.99MHz Limit: 180/29.999 = 6.0mW/cm^2

Frequency	EIRP (mW) PEAK	Power Density Limit (mW/cm^2)	Minimum Separation (cm)
2MHz	220000	90.0	13.95
29.9MHz	220000	6.0	54.03
29.9MHz w/ 50% Duty cycle	110000	6.0	38.21

$$PowerDensity(mW/cm^2) = \frac{EIRP}{4\pi d^2}$$ Given: **EIRP** in *mW* and **d** in *cm*

Under normal operating conditions, the antenna used will be mounted near the leading edge of the vertical stabilizer of an aircraft. As can be seen from the MPE results, at worse case this device requires a separation of 54.03 cm to satisfy the limits specified in 1.1310(b) of the rules at a PEAK power of 220W.

15.109 - RADIATED EMISSIONS

ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz

Test Location: CKC Laboratories •5473A Clouds Rest • Mariposa, Ca 95338 • 209 966 5240

Customer: **Honeywell International**
Specification: **15.109 CLASS B**
Work Order #: **79777** Date: 02/14/2003
Test Type: **Maximized Emissions** Time: 14:30:16
Equipment: **High Frequency Communications Transceiver** Sequence#: 8
Manufacturer: Honeywell International Tested By: Mike Wilkinson
Model: KHF 1050 System
S/N: See EUT List

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
Power Amplifier KPA 1052	Honeywell	064-01072-0101	Y538
Antenna Coupler KAC 1052	Honeywell	064-01074-0101	Y560
Receiver/Exciter KRX 1053	Honeywell	064-01073-0101	Y547

Support Devices:

Function	Manufacturer	Model #	S/N
DC Power Supply	Sorensen	55-90T	CKC 2297
Audio Oscillator	HP	204D	CKC 1283
Audio Oscillator	HP	204D	CKC 2457
Attenuator 14 dB	JFW	50FHC-014	CKC P1631
Attenuator 10 dB	Weinschel	33-10-33	CKC P1681
Attenuator 30 dB	Bird	8322	102-0053-00
Computer	Toshiba	PA1249U-T2A	Y7368523-1
KHF1050 System Breakout Box	Honeywell	None	None
DC Power Distribution Box	Honeywell	None	None
Microphone	Telex	Tel-66C	None
Controller	Gables Eng.	G-7511-101-FTD (PS440)	12
DC Power Supply	HP	6205	CKC 762

Test Conditions / Notes:

EUT is in the Receive mode. and operating in J3E 10.1 MHz. The frequency range investigated was 30 MHz to 1.0 GHz. System Interconnect The KHF 1050 System consists of a KRX 1053 Receiver Exciter, a KPA 1052 Power Amplifier, a KAC 1052 Antenna Coupler, and an appropriate ARINC 429 Controller (PS 440). For the purpose of a bench testing, these units are interconnected via a KHF 1050 Breakout Box. The control and DC-power cables that interface each unit to the KHF 1050 Breakout Box are approximately 1 m long. A double-shielded coaxial cable (approximately 0.5 m long) interconnects the KRX 1053 and the KPA 1052. For the purpose of the tests, a Signalcrafter power sensor is mounted to the transmitter output of the KPA 1052. The RF power from the power sensor is routed to the KAC 1052 antenna coupler. The antenna coupler is then terminated with a 54 dB attenuator. The attenuator output is routed to the spectrum analyzer. A DC-power-distribution box is used to supply 27.5VDC power to the KHF 1050 Breakout Box and to the controller. System Operation The ARINC-429 controller communicates the pilot-selected operating frequency and other operating parameters to the KRX 1053 via the KHF 1050 Breakout Box. The operating parameters of the KRX 1053 are returned to the controller via ARINC 429 to display to the pilot. Modulation audio from the external audio oscillators is applied to the KHF 1050 Breakout

Box, where the tones are summed together and routed to the KRX 1053. At the KHF 1050 Breakout Box, the audio level is monitored with a HP 8903B Audio Analyzer at a point that directly connects to the microphone or data audio inputs of the KRX 1053. The audio levels are set to typical operating values, unless specifically directed otherwise by the requirements of the test being conducted The KRX 1053 communicates with the KAC 1052 via an RS-422 bus and discrete parallel lines. Operating parameters such as operating-frequency band, transmitter power setting and mode of operation is communicated along this RS-422 bus. Additionally, operating-status information of the KAC 1052 and KPA 1052 is returned to the KRX 1053 via the RS-422 bus and parallel lines. Another serial bus conveys band information and mode of operation from the KAC 1052 and KPA 1052. In addition to the serial information, discrete parallel lines communicate control and status information between these two units.

Transducer Legend:

T1=Amp - S/N 604	T2=Bicon 156
T3=Log s/n 154	T4=Cable - 10 Meter

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

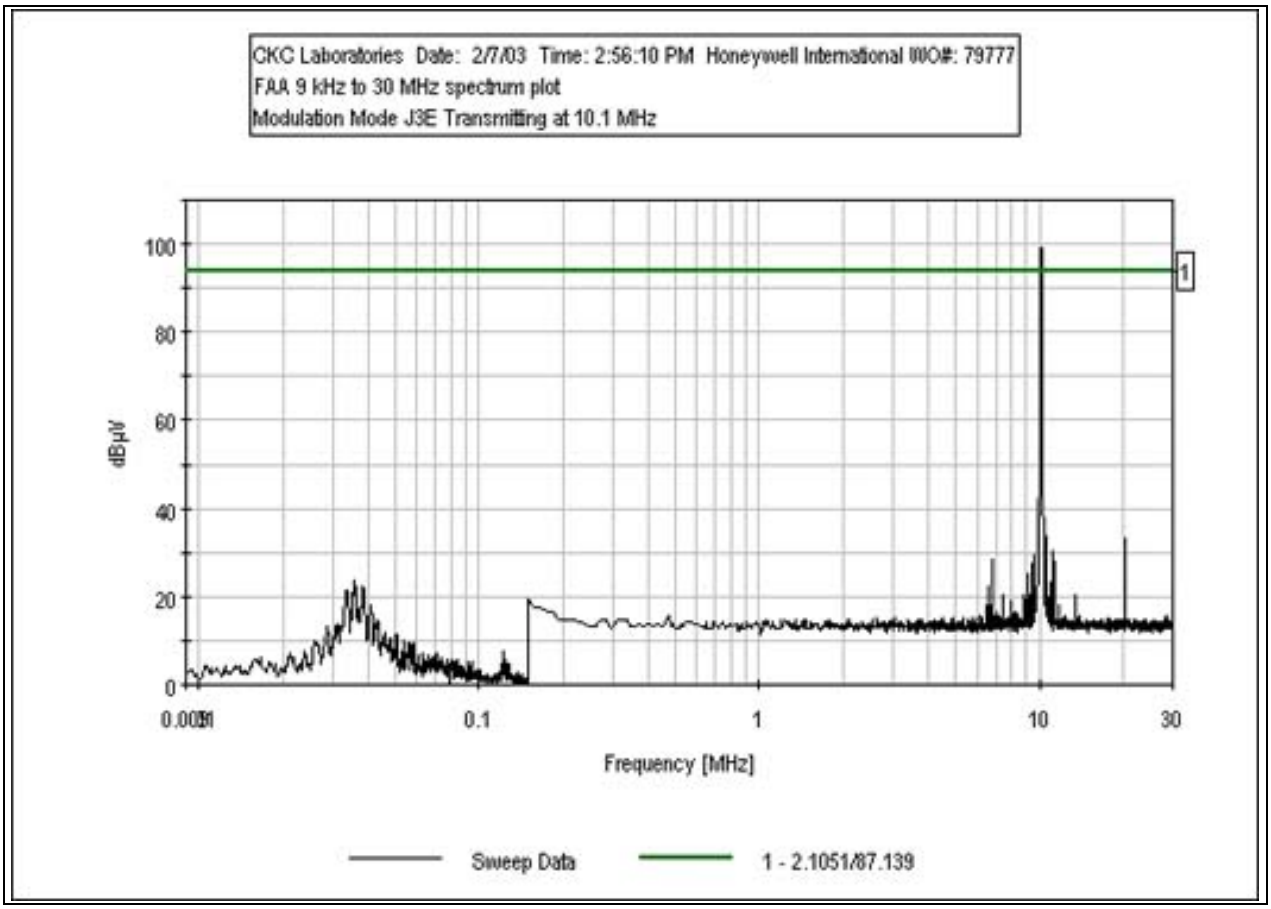
#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	380.018M QP	48.6	-26.6	+0.0	+17.4	+3.6	+0.0	43.0	46.0	-3.0	Horiz
2	128.011M QP	49.2	-26.6	+13.6	+0.0	+1.7	+0.0	37.9	43.5	-5.6	Horiz
3	379.998M	45.7	-26.6	+0.0	+17.4	+3.6	+0.0	40.1	46.0	-5.9	Vert
4	304.014M QP	41.0	-26.2	+0.0	+21.9	+3.0	+0.0	39.7	46.0	-6.3	Vert
5	499.753M	43.2	-27.3	+0.0	+18.1	+4.5	+0.0	38.5	46.0	-7.5	Horiz
6	223.979M	45.5	-26.2	+16.5	+0.0	+2.5	+0.0	38.3	46.0	-7.7	Horiz
7	499.753M	42.2	-27.3	+0.0	+18.1	+4.5	+0.0	37.5	46.0	-8.5	Vert
8	739.753M	37.0	-27.5	+0.0	+21.4	+5.4	+0.0	36.3	46.0	-9.7	Horiz
9	319.998M	37.6	-26.3	+0.0	+20.9	+3.2	+0.0	35.4	46.0	-10.6	Vert
10	159.969M	44.0	-26.5	+13.1	+0.0	+2.0	+0.0	32.6	43.5	-10.9	Horiz
11	739.753M	35.3	-27.5	+0.0	+21.4	+5.4	+0.0	34.6	46.0	-11.4	Vert
12	191.979M	38.8	-26.3	+16.7	+0.0	+2.3	+0.0	31.5	43.5	-12.0	Horiz
13	239.979M	40.8	-26.1	+16.1	+0.0	+2.6	+0.0	33.4	46.0	-12.6	Horiz
14	32.010M	41.1	-26.9	+12.2	+0.0	+0.7	+0.0	27.1	40.0	-12.9	Vert
15	128.010M	41.2	-26.6	+13.6	+0.0	+1.7	+0.0	29.9	43.5	-13.6	Vert
16	196.620M	36.7	-26.3	+16.9	+0.0	+2.4	+0.0	29.7	43.5	-13.8	Vert
17	399.903M	38.6	-26.8	+0.0	+16.3	+3.7	+0.0	31.8	46.0	-14.2	Horiz

18	144.010M	41.3	-26.5	+12.3	+0.0	+1.9	+0.0	29.0	43.5	-14.5	Vert
19	140.005M	40.4	-26.5	+12.7	+0.0	+1.8	+0.0	28.4	43.5	-15.1	Vert
20	223.993M	35.9	-26.2	+16.5	+0.0	+2.5	+0.0	28.7	46.0	-17.3	Vert
21	480.009M	33.4	-27.3	+0.0	+17.8	+4.3	+0.0	28.2	46.0	-17.8	Vert
22	160.010M	36.5	-26.5	+13.1	+0.0	+2.0	+0.0	25.1	43.5	-18.4	Vert
23	240.005M	34.0	-26.1	+16.1	+0.0	+2.6	+0.0	26.6	46.0	-19.4	Vert
24	384.009M	31.9	-26.7	+0.0	+17.1	+3.6	+0.0	25.9	46.0	-20.1	Vert
25	259.938M	31.4	-26.1	+17.2	+0.0	+2.7	+0.0	25.2	46.0	-20.8	Vert

Test Equipment

Equipment	*Manufacturer*	*Model #*	*Serial #*	*Asset #*	*Cal Date*	*Cal Due*
Antenna, Bicon	A&H	SAS-200/542	156	00225	12/2/02	12/2/03
Antenna, Log	A&H	SAS-200/510	154	01330	6/19/02	6/19/03
Preamp	HP	8447D	1937A02604	00099	3/21/02	3/21/03
Preamp	HP	8449B	3008A00301	02010	10/18/02	10/18/03
Spectrum Analyzer	HP	8596E	3346A00225	783	6/24/02	6/24/03
Audio Analyzer	HP	8903A	3011A09432	2338	11/27/02	11/23/03
Antenna, Horn	EMCO	3115	4085	00656	3/19/02	3/19/03
Antenna, Mag Loop	EMCO	6502	1074	226	6/5/02	6/5/03
Cable #4 (50')	Andrew	FSJ1-50A	N/A	N/A	4/16/02	4/16/03
Cable #1 (30')	Andrew	FSJ1-50A	N/A	N/A	4/16/02	4/16/03
Cable #8 (6')	Andrew	FSJ1-50A	N/A	N/A	4/16/02	4/16/03

FAA SPECTRAL PLOT 9 kHz to 30 MHz



FAA SPECTRAL PLOT 30 MHz to 1 GHz