ACCREDITED

Testing Certification # 1367-01

TEST REPORT

Model: CRLU & Power Amp

For	**: Cooper Notification Inc.**
	: 7246 16th Street East - Suite 105
	: Sarasota, FL 34243
Date Tested	**: 09/03-09/05 / 2012**
Test Personnel	**: Steven Hoke**

: Test Specifications

FCC Part 15.247		
FCC Part 15.207		
FCC Part 15.205		
FCC Part 15.203		
FCC Part 1.1307(b)(1)		

Test Report By	**: Steven Hoke**
Approved By	**: Steven Hoke**

Description of non-standard test method or test practice: ***None***
Special limitations of use: ***None***

Traceability: ***reference standards of measurement have been calibrated by a competent body using standards traceable to the NIST.***

According to testing performed at Product Safety Engineering, Inc., the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in regulations listed above under specifications. The test results contained herein relate only to the model(s) identified above. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics.

As the responsible EMC Project Engineer, I hereby declare that the equipment tested as specified above conforms to the requirements indicated above.

Product Description

The product under test is a (2.4) GHz frequency hopping spread spectrum transceiver used in conjunction with a (1) watt power amplifier. The transceiver is identical to the one tested and certified under FCC ID: X2PCRLU-201. The purpose of this testing was to demonstrate continued compliance while using an L-Com model HA2401G power amplifier.

Environmental conditions during testing

The ambient temperature during the testing was within the range of (50° - 104° F).
The humidity levels during the testing was within the range of (10% - 90%) relative humidity
Power supply system : 120 Volts 60 Hz SINGLE phase

Test Results Summary

Test	Requirement	Measured	Pass/Fail	Data Page(s)
Powerline conducted emissions	Table 1	See data	Pass	13-16
Carrier frequency separation	=> 490 kHz	1.02 MHz	Pass	17
Number of Hopping Frequencies	>75 for 1 watt <75 for 0.125 watts	76	Pass	18-19
Time of Occupancy	<400 mS within 30.4 S period	181.56 mS	Pass	20
Peak Output Power	1 watt (w/15 dBi antenna)	1 watt	Pass	21-22
Spurious conducted emissions	=>20 dB down	> 20 down	Pass	23-31
Spurious radiated emissions	< 54 dBuV/m	53.8 dBuV/m	Pass	32-33
20 dB bandwidth	None	490 kHz	Pass	34-35
RF Exposure	1.0 mW / cm^2	0.25 mW / cm^2	Pass	8

Revision History

Revision	Date	Description
---	11/01/2012	Initial Release
Rev C	12/19/2012	revised pages 2,3,9,32,33

Test Procedures

All measurements are made in accordance with ANSI C63.4:2003 and FCC publication FCC Public Notice DA 00-705 Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems, March 2000.

- ## Powerline conducted interference: 15.207

Requirement - the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 mH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Table 1

Freq. (MHz)	Conducted limit Peak	Conducted limit (QP)
0.15 - 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency.

Procedure - Tabletop devices shall be placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the reference groundplane. The vertical conducting plane or wall of a screened room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference groundplane or on insulating material. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs. AC powerline adapters that are used with EUTs such as laptop or notebook computers should be placed as typically used, i.e., on the tabletop if the adapter-to-EUT cord is too short to allow the power adapter to reach the floor.

Each current-carrying conductor of the EUT power cord(s), except the ground (safety) conductor(s), shall be individually connected through a LISN to the input power source. All 50 Ω ports of the LISN shall be resistively terminated in 50 Ω when not connected to the measuring instrument. When the test configuration is comprised of multiple units (EUT and associated/peripheral equipment, or EUT consisting of multiple equipment) that have their own power cords, ac powerline conducted emissions measurements shall be performed with the ac powerline cord of the particular unit under test connected to one LISN that is connected to the measuring instrument. Those power cords for the units in the remainder of the configuration not under measurement shall be connected to a LISN different from the LISN used for the power cord of the portion of the EUT being measured. This connection may be made using a multiple receptacle device.

Emissions from each current-carrying conductor of the EUT shall be individually measured. Where multipleportions of the EUT receive ac power from a common power strip, which is furnished by the manufacturer as part of the EUT, measurements need only be made on the current-carrying conductors of the common power strip. Adapters or extension cords connected between the EUT power cord plug and the LISN power receptacle shall be included in the LISN setup such that the calibration of the combined adapter or extension cord with an adapter and the LISN meets the requirements.

If the EUT is comprised of a number of devices that have their own separate ac power connections, e.g., a floor-standing frame with independent power cords for each shelf, that are able to connect directly to the ac power network, each current-carrying conductor of one device is measured while the other devices are connected to a second (or more) LISN(s). All devices shall be separately measured. If a power strip is provided by the manufacturer, to supply all of the devices making up the EUT, only the conductors in the common power cord to the power strip shall be measured.

If the EUT is normally operated with a ground (safety) connection, the EUT shall be connected to the ground at the LISN through a conductor provided in the lead from the ac power to the LISN. The excess length of the power cord between the EUT and the LISN receptacle (or ac power receptacle where a LISN cannot be used), or an adapter or extension cord connected to and measured with the LISN, shall be folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length. If the EUT does not have a flexible power lead, the EUT shall be placed at a distance of 80 cm from the LISN (or power receptacle where a LISN cannot be used) and connected thereto by a power lead or appropriate connection no more than 1 m long. The measurement shall be made at the LISN end of this power lead or connection.

- **Carrier frequency separation:**.15.247(a)(1)

Requirement - Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Procedure - The EUT hopping function is activated. The spectrum analyzer frequency span is set wide enough to capture (2) adjacent channels. The RBW is set to be greater than (1%) of the span. The VBW is set to be greater than the RBW. The spectrum analyzer is set to maximum hold until stable. A measurement of the frequency separation between the (2) peaks is recorded.

- **Number of Hopping Frequencies:** 15.247(a)(1)(iii)

Requirement - Per section 15.247(a)(1)(iii), frequency hopping systems operating in the 2400-2483.5MHz band that employ at least 15 hopping channels must have a maximum peak conducted output power that does not exceed 0.125W (21dBm).

Per 14.247(b)(1), frequency hopping systems operating in the 2400- 2483.5MHz band that employ at least 75 non-overlapping hopping channels must have a maximum peak conducted output power that does not exceed 1W (30dBm).

Procedure - The output of the test item was connected to the spectrum analyzer through 40dB of attenuation. With the hopping function enabled, the test item was allowed to transmit continuously. The resolution bandwidth (RBW) was set to > to 1% of the span. The peak detector and 'Max-Hold' function were engaged. The span was set wide enough to capture the entire frequency band of operation.

The test item's signal was allowed to stabilize after multiple scans. The number of hopping frequencies was counted. The analyzer's display was plotted using a 'screen dump' utility.

- **Time of Occupancy:** 15.247(a)(1)(iii)

Requirement - The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Procedure - The output of the test item was connected to the spectrum analyzer through 40dB of attenuation. With the hopping function enabled, the test item was allowed to transmit continuously. The resolution bandwidth (RBW) was set to 1MHz. The peak detector and 'Max-Hold' function were engaged. With the span set to 0Hz, the sweep time was adjusted to capture a single event in order to measure the dwell time per hop. The analyzer's display was plotted using a 'screen dump' utility. Then, the sweep time was expanded to 0.4 seconds multiplied by the number of hopping channels employed to capture the number of hops in the appropriate sweep time. A single sweep was made. The analyzer's display was plotted using a 'screen dump' utility. The dwell time in the specified time period was then calculated from dwell time per hop multiplied by the number of hops in the specified time period.

- **Peak Output Power:** 15.247(b)(1), 15.247(b)(4), 15.247(c)(1)(i)

Requirement - For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraph (b)(1) by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Operation using fixed point-to-point operation with directional antenna gains greater than 6 dBi. Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Procedure - The output of the test item was connected to a spectrum analyzer through 40dB of attenuation. The maximum reading was recorded. The peak power output was measured for the low, middle and high hopping frequencies.

- ## **Spurious Conducted Emissions:** 15.247(d)

Requirement - In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Procedure - The output of the test item was connected to the spectrum analyzer through 10dB of attenuation. The frequency hopping function was disabled. The resolution bandwidth (RBW) was set to 100kHz. The peak detector and 'Max-Hold' function were engaged. The emissions in the frequency range from 30MHz to 25GHz were observed and plotted separately with the test item transmitting at low, middle and high hopping frequencies.

- ## **Spurious Radiated Emissions:**15.247(d), 15.205(a)

Requirement - Radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

Procedure - The final open field emission tests were then manually performed over the frequency range of 30MHz to 25GHz.

1) For all emissions in the restricted bands, the following procedure was used:

a) The field strengths of all emissions below 1 GHz were measured using biconical and log periodic antennas. The antennas was positioned at a 3 meter distance from the test item. A peak detector with a resolution bandwidth of 100 kHz was used on the spectrum analyzer.

b) The field strengths of all emissions above 1 GHz were measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3 meter distance from the test item. A peak detector with a resolution bandwidth of 1 MHz was used on the spectrum analyzer. A high pass filter was installed at the input of the preamplifier to prevent overload.

c) To ensure that maximum or worst case emission levels were measured, the following steps were taken when taking all measurements:

i) The test item was rotated so that all of its sides were exposed to the receiving antenna.

ii) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.

iii) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.

iv) In instances were it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer, the measuring antenna was not raised or lowered to ensure maximized readings, instead the test item was rotated through all axis to ensure the maximum readings were recorded for the test item.

d) For all radiated emissions measurements below 1 GHz, if the peak reading is below the limits listed in 15.209(a), no further measurements are required. If however, the peak readings exceed the limits listed in 15.209(a), then the emissions are re-measured using a quasi-peak detector.

e) For all radiated emissions measurements above 1 GHz, the peak readings must comply with the 15.35(b) limits. 15.35(b) states that when average radiated emissions measurements are specified, there also is a limit on the peak level of the radiated emissions. The limit on the peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. Therefore, all peak readings above 1 GHz must be no greater than 20 dB above the limits specified in 15.209(a).

f) Next, for all radiated emissions measurements above 1GHz, the resolution bandwidth was set to 1MHz. The analyzer was set to linear mode with a 10Hz video bandwidth in order to simulate an average detector. An average reading was taken. If the dwell time per channel of the hopping signal is less than 100msec, then the reading obtained with the 10 Hz video bandwidth may be further adjusted by a “duty cycle correction factor”, derived from 20*log(dwell time/100msec). These readings must be no greater than the limits specified in 15.209(a).

• 20 dB Bandwidth:

Requirement - Per section 15.247 (a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, per section 15.247(a)(1), frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate within an output power no greater than 125mW.

Procedure - The output of the test item was connected to the spectrum analyzer through 40 dB of attenuation. With the hopping function disabled, the test item was allowed to transmit continuously. The frequency hopping channel was set separately to low, middle, and high hopping channels. The span was set to 2 to 3 times the 20dB bandwidth and the resolution bandwidth (RBW) was set to > 1% of the 20dB bandwidth. The 'Max-Hold' function was engaged. The analyzer was allowed to scan until the envelope of the transmitter bandwidth was defined. The analyzer's display was plotted using a 'screen dump' utility.

- ## **Maximum Permissible Exposure:** 15.247(I), 1.1307(b)(1)

Requirement - Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

Compliance is based upon section CFR 47 section 1.1310, Table (1) Limits for Maximum Permissible Exposure (MPE), (b) Limits for General Population/Uncontrolled Exposure. The stated limit is (1.0) mW/cm2 and compliance was calculated using the following formula:

$S=(P\ G) / (4\ \pi\ r^2)$

Where:
S = Power density in mW/cm2
P = Power in mW
G = Numerical antenna gain
r = Distance in cm

Procedure - The power is derived from the maximum conducted output measurements and the gain is derived from the manufacturer's specification for the highest gain antenna used with the EUT.

Result -

Maximum output power = (1,000) mW
Antenna gain (numeric) = 31.62
Distance = 100 cm
S = (1,000 *3 1.62) / (12.57 * 400)
S= (31,620) / (125,700)
S= (0.25) mW / cm2
Limit = (1.0) mW / cm2

Test Equipment

Manufacturer	Model	Description	Serial Number	Cal Due
Hewlett Packard	8566B	Spectrum Analyzer	2421A00526	10/13/12
Hewlett Packard	85662A	Display	2403A07352	10/13/12
Hewlett Packard	85650A	Quasi-Peak Adapter	2043A00209	09/06/12
Hewlett Packard	8447D	Preamp 0.1 - 1,000 MHz	2944A06832	03/08/13
Hewlett Packard	8449B	Preamp 1 - 26.5 GHz	3008A00320	05/07/13
EMCO	3104C	Biconical Antenna	00075927	04/05/13
EMCO	3148	Log Periodic Antenna	00075741	01/17/13
EMCO	3115	Double Ridge Guide Ant.	3810	05/25/13
Comm-Power	LI-125	LISN	191180/191181	09/17/13
Electro-Metrics	EMC-30	EMI Receiver	44191	07/24/13
Mini-Circuits	VHF-3100+	High Pass Filter	NA	NA
ATM	42-441-6	Standard Gain Horn	E531612-01	02/12/13

* Cal Due Date Format = MM/DD/YY

Last calibration date is one year prior to the calibration due dates listed unless otherwise noted.

System Configuration

3.1 General Description

The test item is a 2.4 GHz FHSS transceiver with an L-Comm power amplifier and specific antennas.

This test report covers the operation of FCC ID:X2PAMPRF-1 with both the Cooper model CRLU-201 or model TRX-401 transceivers. The basis for testing with the CRLU-201 exclusively was:

CRLU-201 and TRX-401 similarities- These two pieces of equipment are identical except the CRLU includes an additional board that provides analog to digital conversion between our Integrated Base Station (IBS) and the RF transmitter. The RF board, controller board, power supply and housing are the same in both products.

Why ther are (2) FCC IDs- The original submittal for FCC approval was initiated by Cooper incorrectly. These products should have been submitted and approved using only one FCC 10. Since this took place in the past and since the current format works for our customers we see no return on investment to go back and address this issue. Therefore
we still plan to utilize the two separate FCC IDs when the RF amp is not used.

3.1.1 Power Input

The transceiver and computer were powered via 120 VAC and the power amplifier was connected to the output of an AC/DC (9) volt adaptor, model DVE (DSA-15P-12 US).

3.1.2 Peripheral Equipment used in testing

The following peripheral equipment was submitted with the test item:
- personal computer model - Axiometer model AX61221TM-RC-M
- monitor - Acer model AL1716F
- keyboard - Dell model SK8115
- mouse - Microsoft model X8000898
- transceiver - Cooper Notification model CRLU-201 s/n C-1949
- antennas - See page11

3.1.3 Interconnect Cables

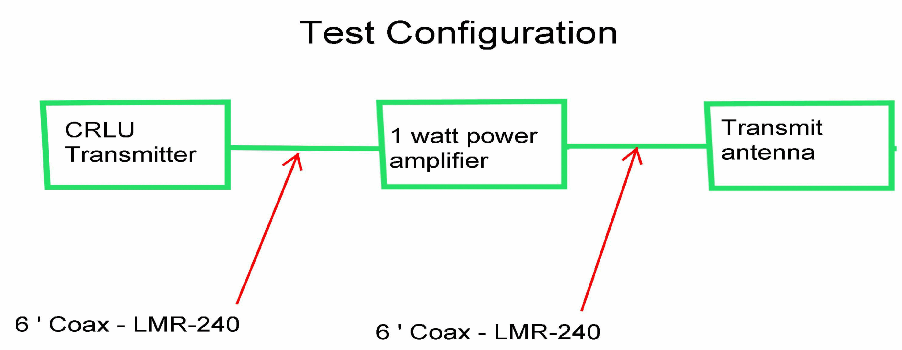
Computer -
(9) pin d-Sub to CRLU (9) pin d-Sub, unshieded (2) meters
(USB) to dedicated cable to mouse, shielded at (2) meters
(USB) to dedicated cable to keyboard, shielded at (2) meters
(15) pin d-Sub to (15) pin d-Sub between computer and monitor, shielded at (2) meters

Power amplifier -
DC input 5.5/2.1 mm connector, unshielded at (2) meters
RF input from transmitter Type N connector, LMR- 240 coaxial cable at (2) meters
RF output to antenna Type N connector, LMR- 240 coaxial cable at (2) meters

Transmitter -
(9) pin d-Sub to computer (9) d-Sub, unshielded at (2) meters

3.1.4 Grounding

The test item was not grounded during the test.



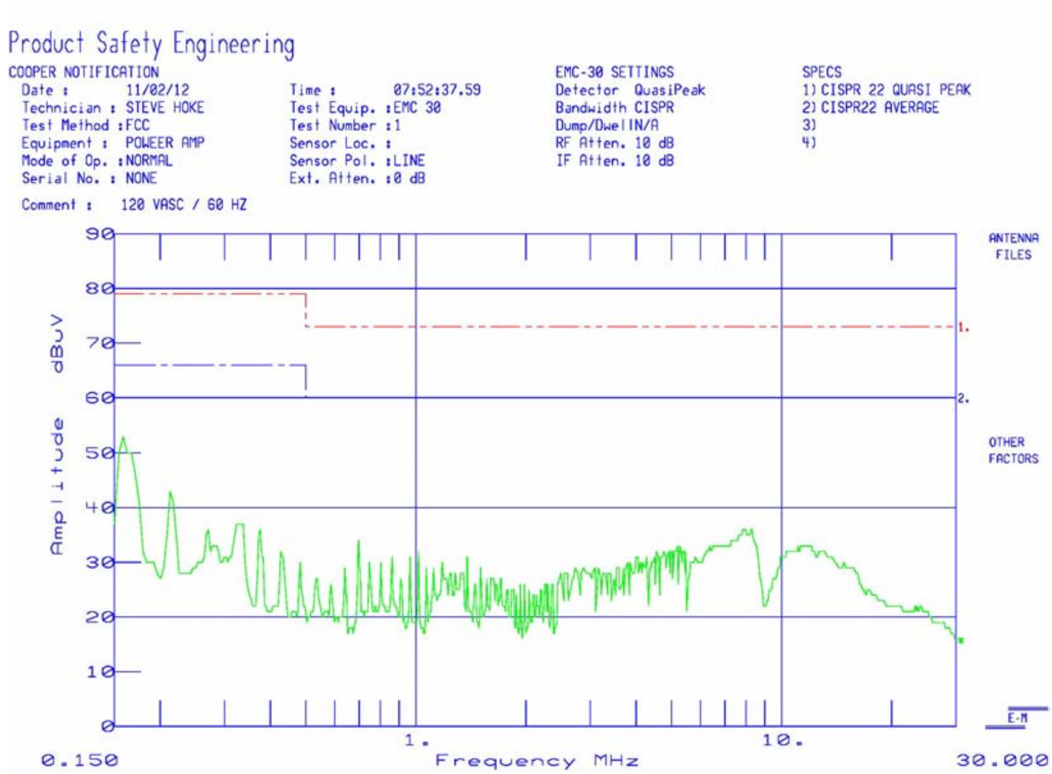
APPROVED ANTENNA LIST

Tested (Y/N)	TYPE	GAIN (dBi)	Directional (Y/N)	Cooper Part #	Manufacturer Part #
Y	Flat Patch	8.0	Y	ANT-109-DR	L-COM HG2409P
Y	Planer Array	15.5	Y	ANT-115-DR	L-COM HG2416P
N	YAGI	13.9	Y	ANT-114-YAGI	LAIRD PC2415N
N	YAGI	13.9	Y	ANT-114-YAGI	TESSCO14571
Y	YAGI	15	Y	ANT-115-YAGI	L-COM HG2415Y-NF
N	OMNI	3	N	ANT-103-OM	L-COM HG2403RD-NM
N	OMNI	6	N	ANT-106-OM	MAXRAD MFB24006
N	OMNI	9	N	ANT-109-OM	MOBIL MARK OD9-2400
N	OMNI	9	N	ANT-109-OM	TESSCO 41525
Y	OMNI	15	N	ANT-115-OM	L-COM HG2415U-PRO

DATA

Powerline conducted emissions

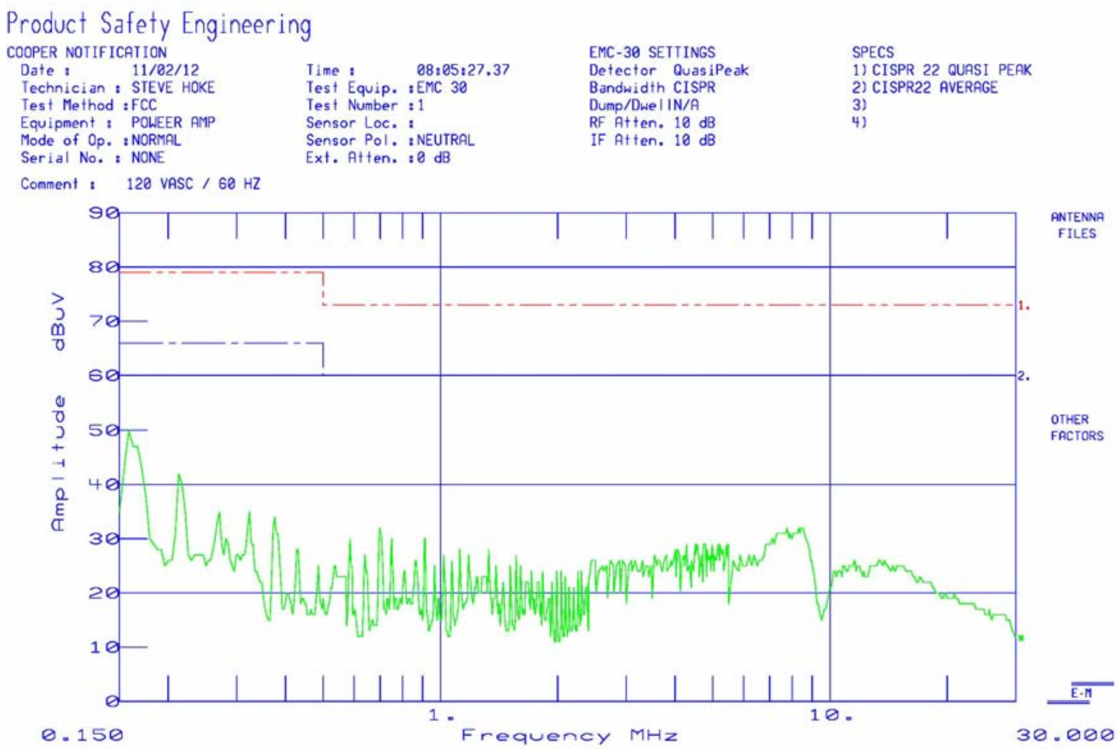
Line Side - Power Amplifier



Freq (MHz)	Amplitude (dBuV)	Avg.Limit (dBuV)	Delta (dB)
0.158	53.0	66.0	-13.0

Powerline conducted emissions

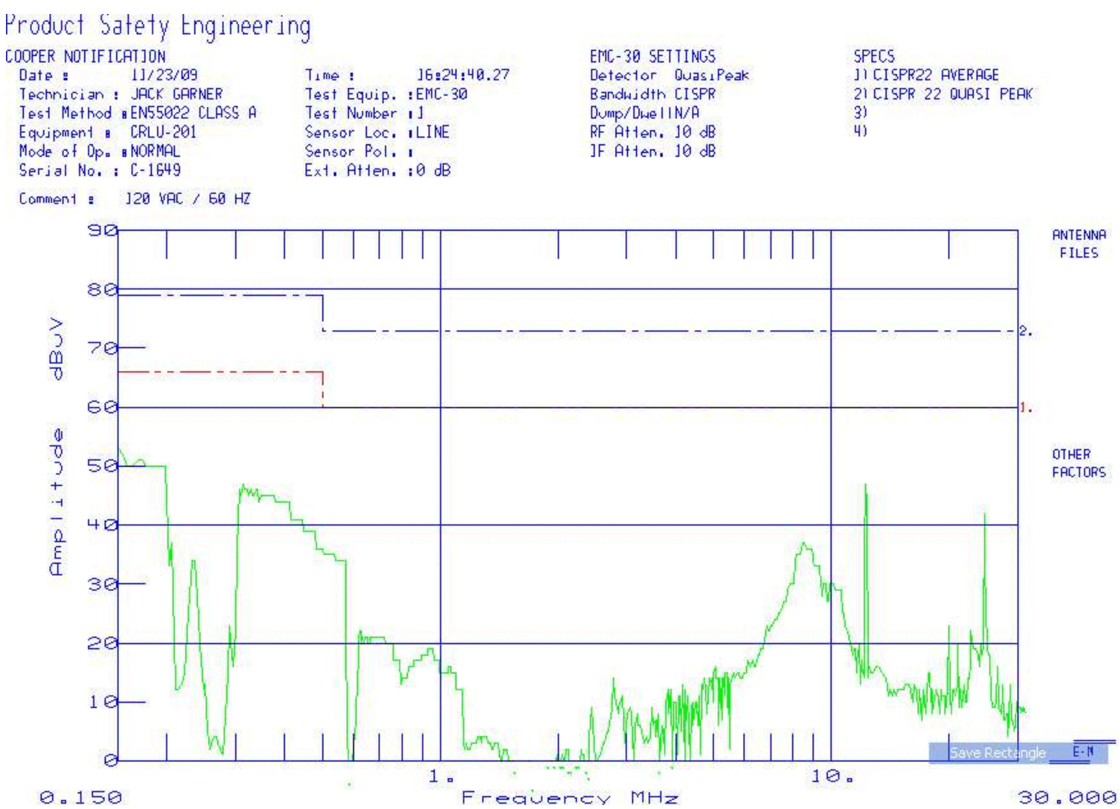
Neutral Side- Power Amplifier



Freq (MHz)	Amplitude (dBuV)	Avg.Limit (dBuV)	Delta (dB)
0.158	50.0	66.0	-16.0

Powerline conducted emissions

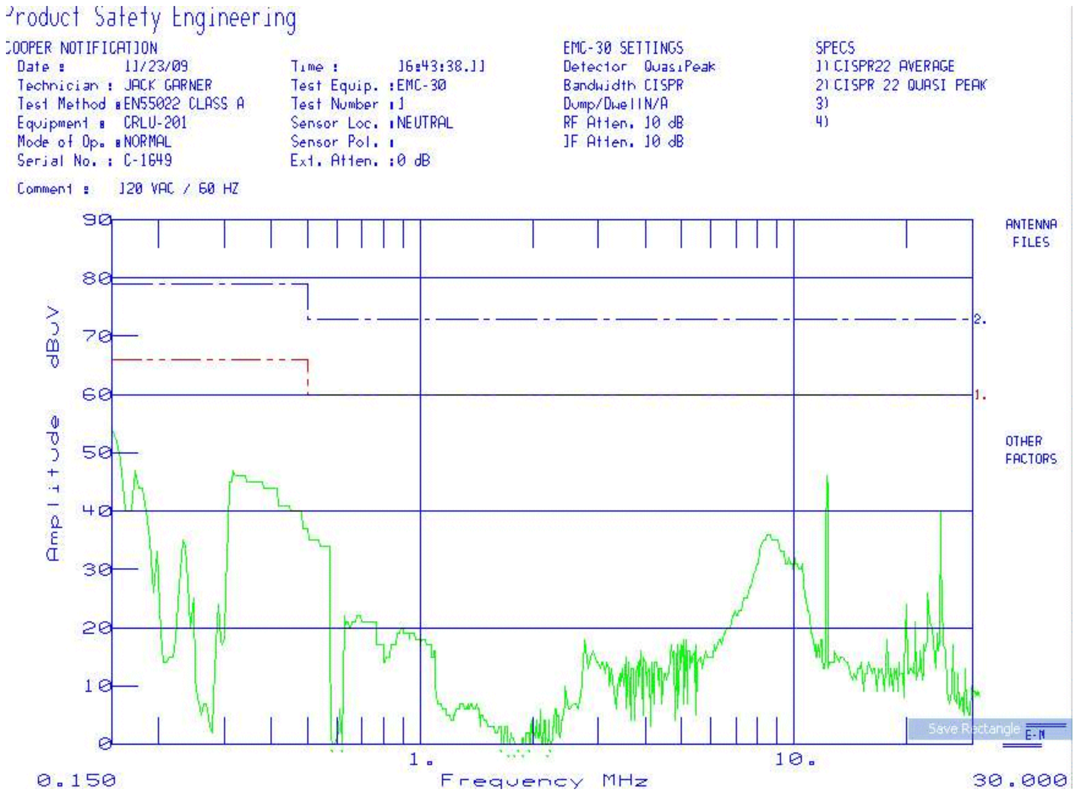
Line Side - Transceiver



Freq (MHz)	Amplitude (dBuV)	Avg.Limit (dBuV)	Delta (dB)
0.150	53.0	66.0	-13.0
0.1542	52.0	66.0	-14.0
0.173	51.0	66.0	-15.0
9.14	47.0	60.0	-13.0

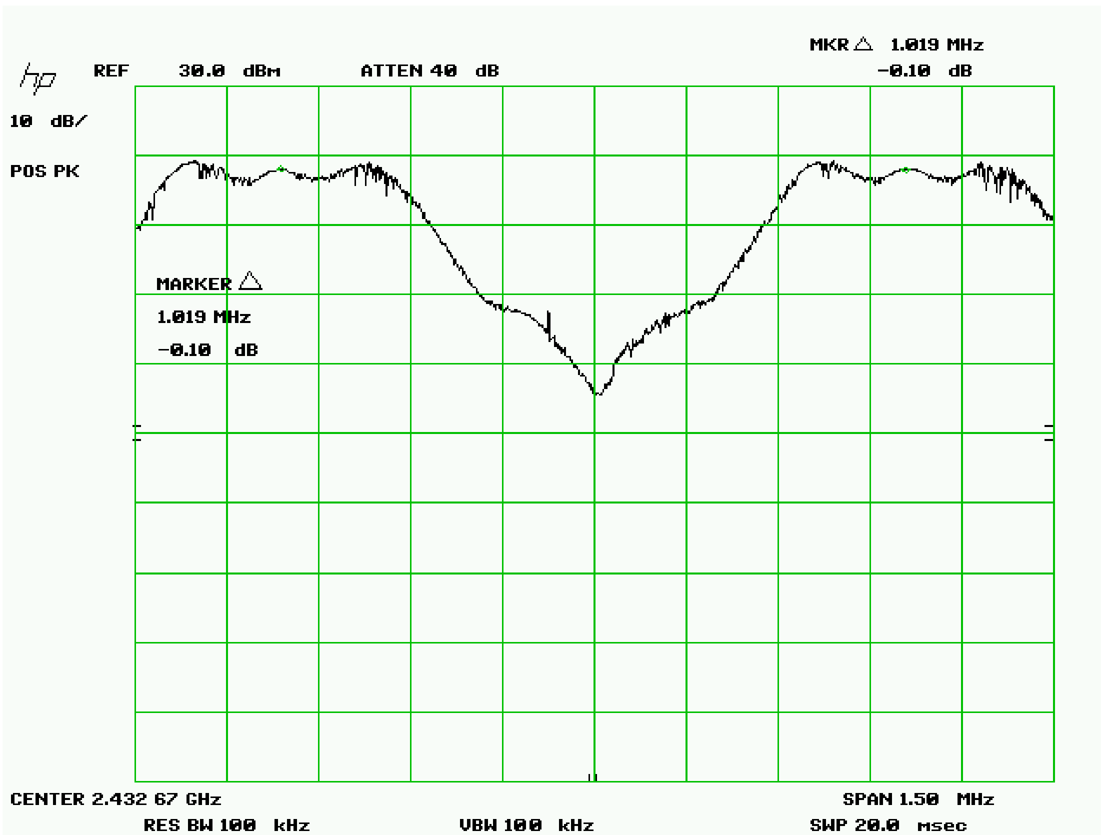
Powerline conducted emissions

Neutral Side - Transceiver

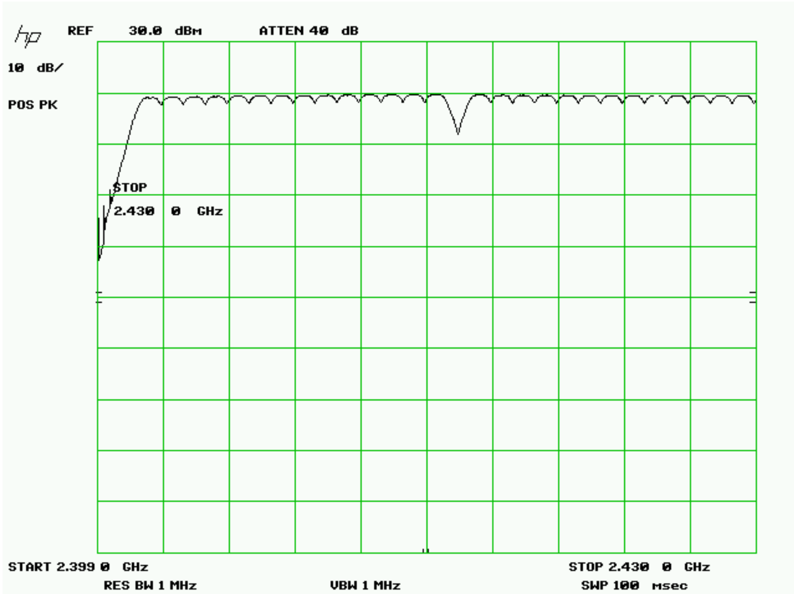


Freq (MHz)	Amplitude (dBuV)	Avg.Limit (dBuV)	Delta (dB)
0.150	54.0	66.0	-12.0
0.154	52.0	66.0	-14.0
12.21	46.0	60.0	-14.0

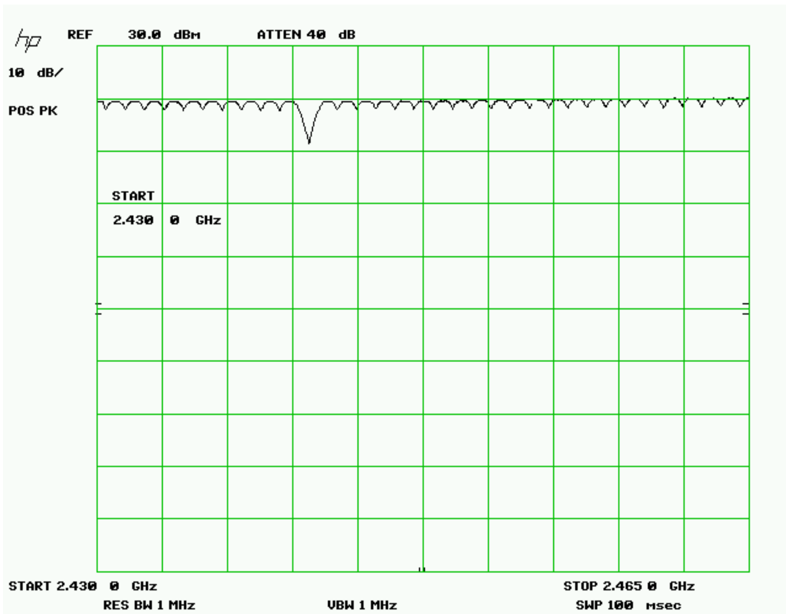
Carrier frequency separation



Number of Hopping Frequencies

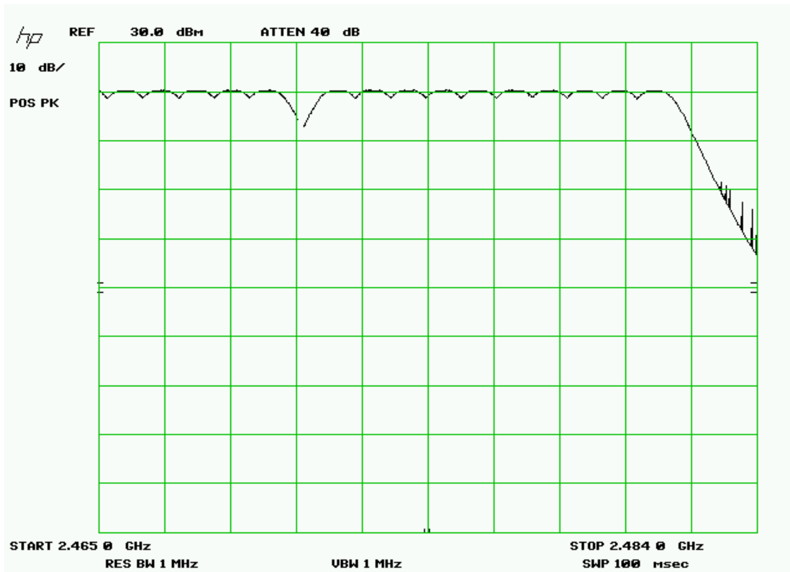


27 Channels



34 Channels

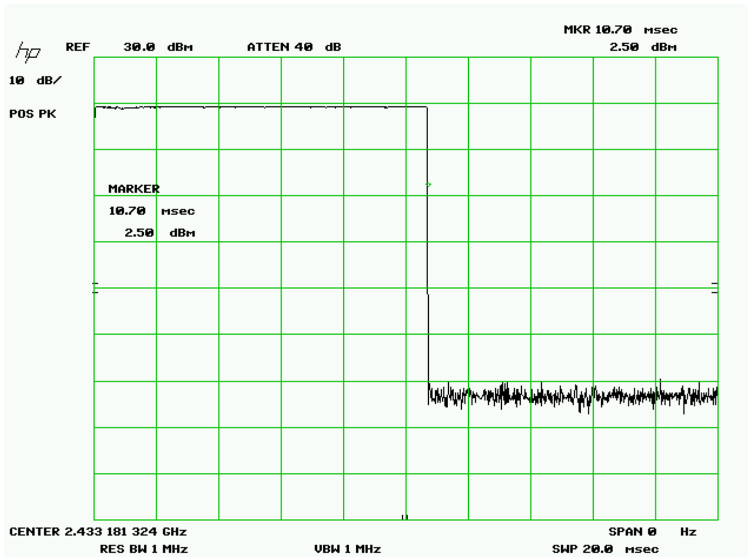
Number of Hopping Frequencies



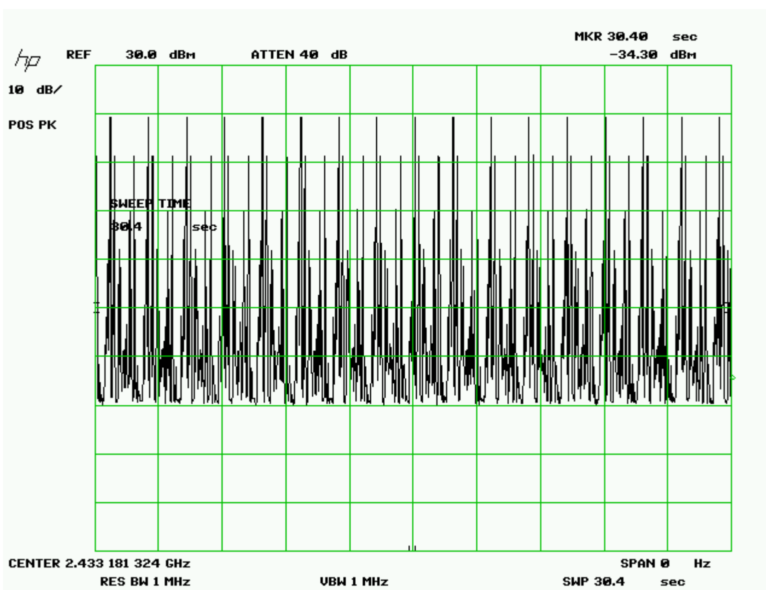
15 Channels

Total number of hopping channels = (34 + 27 + 15) = 76

Time of Occupancy

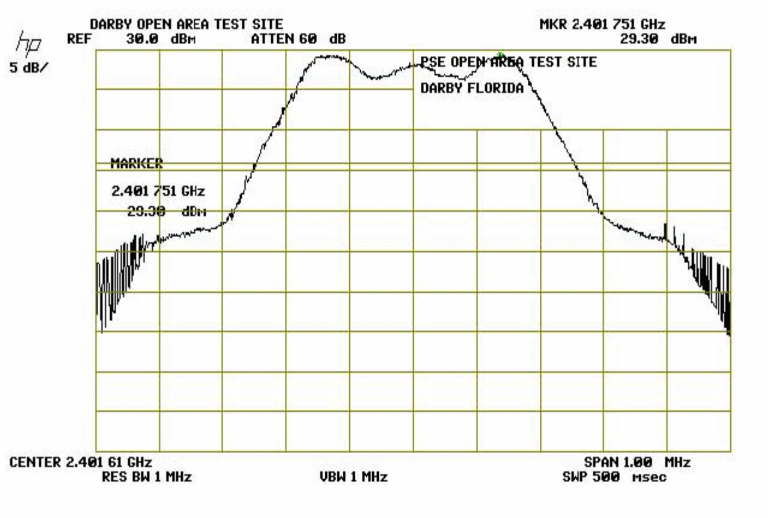


Dwell time per hop (10.68) milliseconds

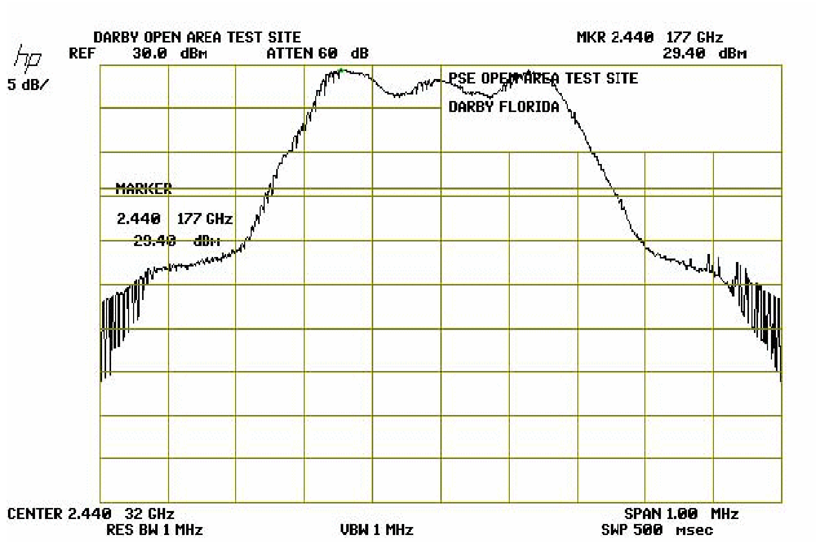


Sweep time was expanded to 0.4 seconds multiplied by 76 channels (30.4 seconds) to capture the number of hops in the appropriate sweep time. Time of occupancy is equal to (17 times 10.68 mS) or (181.56) millseconds.

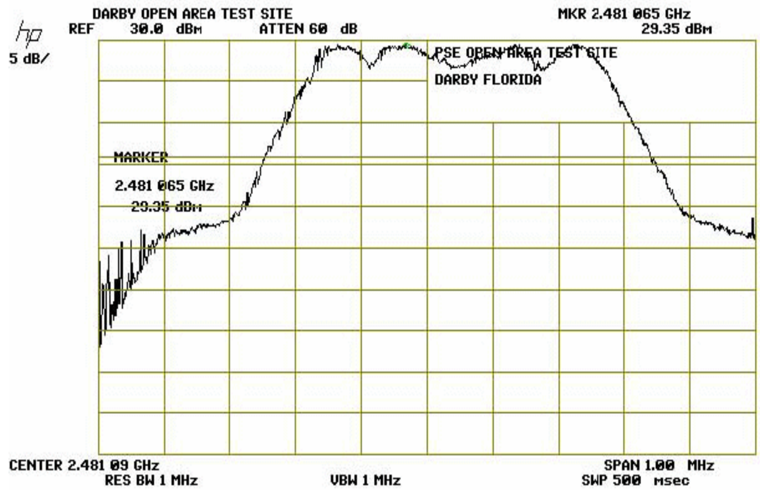
Peak Output Power



Low channel



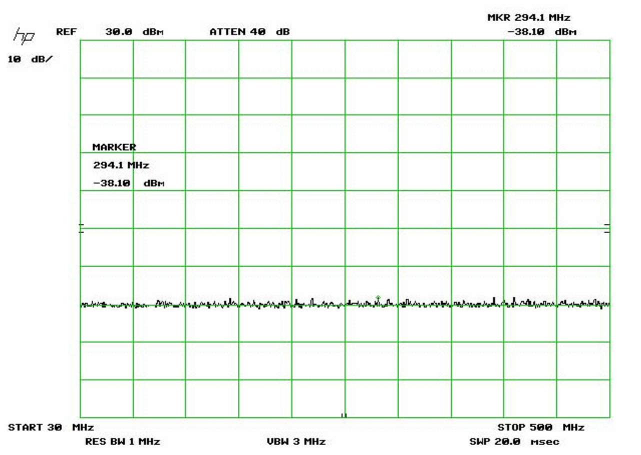
Middle channel



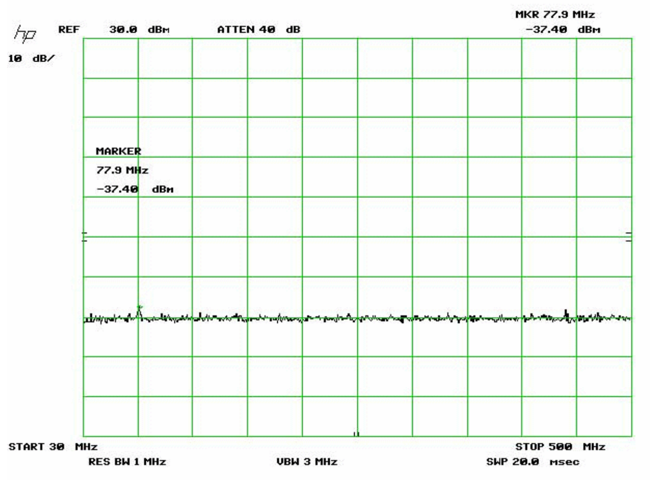
High channel

Channel Freq (GHz)	Measured (dBm)	Cable loss (dB)	Actual Power (dBm)	Actual Power (Watts)
Low (2.401) GHz	29.3	0.6	29.9	0.98
Mid (2.442) GHz	29.4	0.6	29.9	0.98
High (2.481) GHz	29.4	0.6	30.0	1.0

Spurious conducted emissions

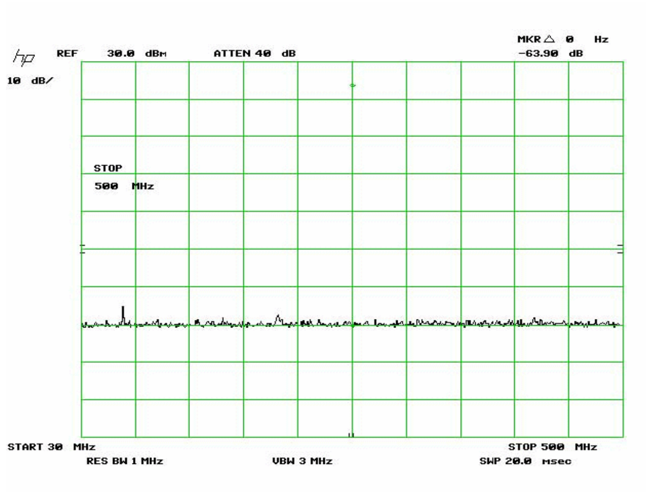


30 MHz to 0.5 GHz - (low ch)

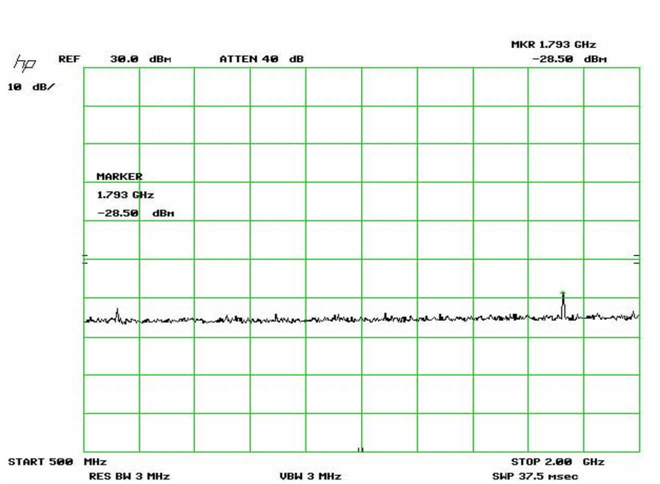


30 MHz to 0.5 GHz - (mid ch)

Spurious conducted emissions

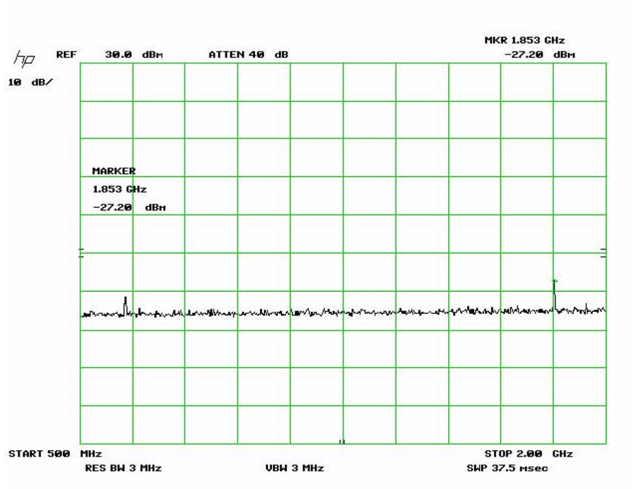


30 MHz to 0.5 GHz - (high ch)

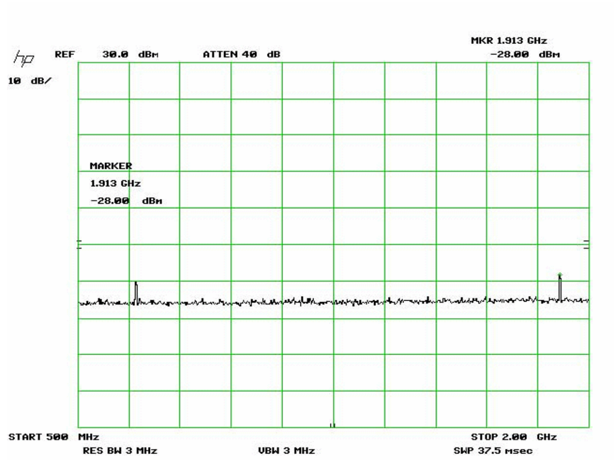


0.5 GHz to 2 GHz - (low ch)

Spurious conducted emissions

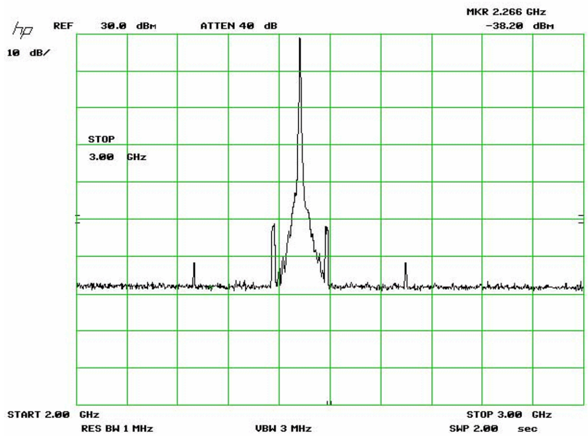


0.5 GHz to 2 GHz - (mid ch)

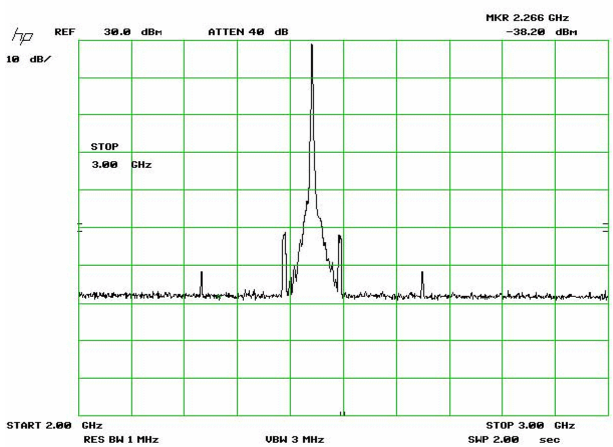


0.5 GHz to 2 GHz - (high ch)

Spurious conducted emissions

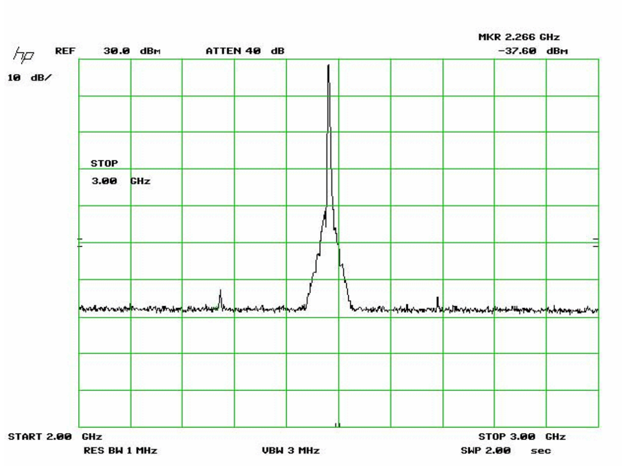


2 GHz to 3 GHz - (low ch)

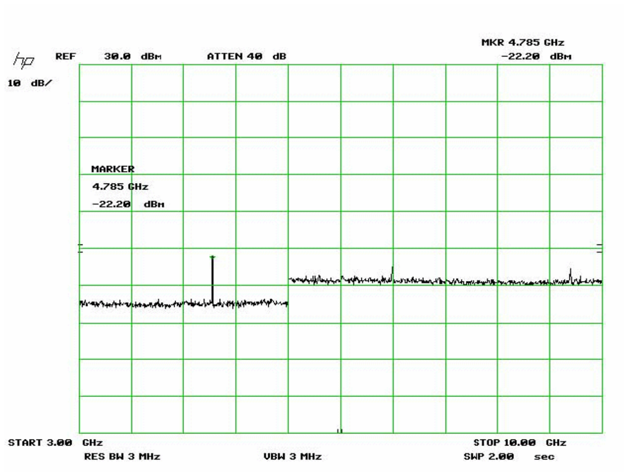


2 GHz to 3 GHz - (mid ch)

Spurious conducted emissions

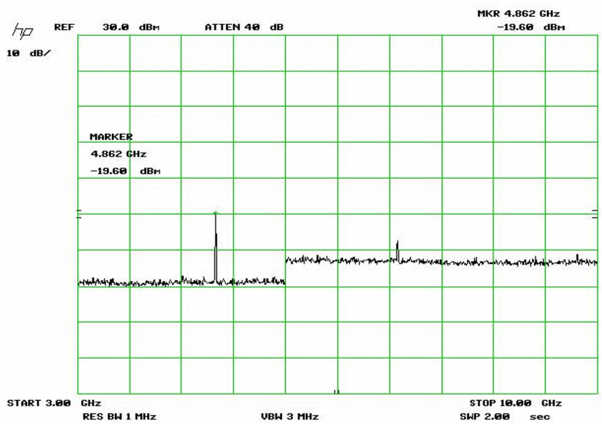


2 GHz to 3 GHz - (high ch)

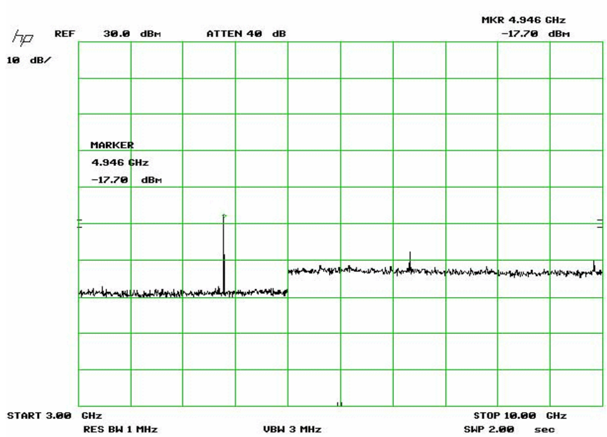


3 GHz to 10 GHz - (low ch)

Spurious conducted emissions

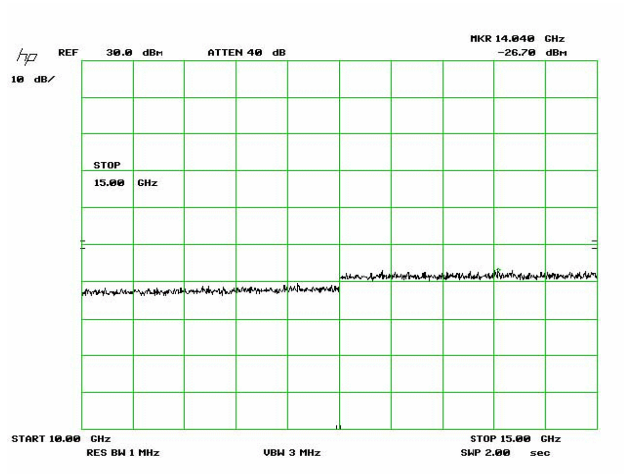


3 GHz to 10 GHz - (mid ch)

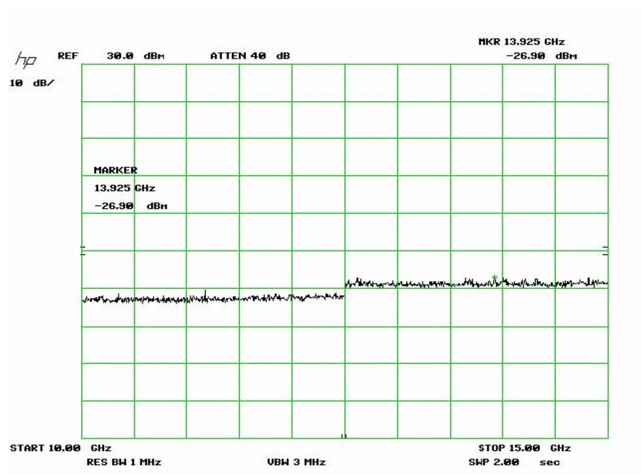


3 GHz to 10 GHz - (high ch)

Spurious conducted emissions

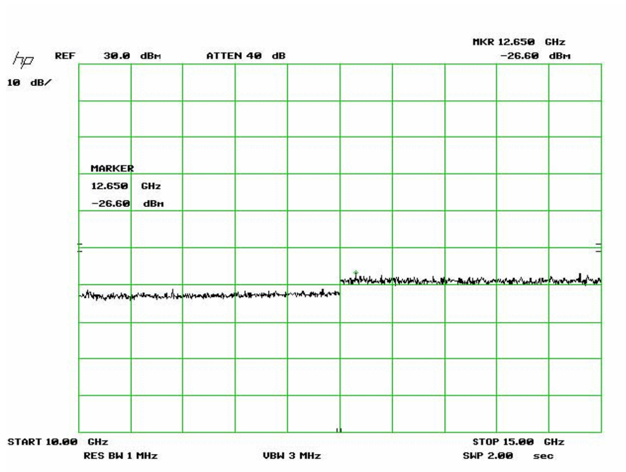


10 GHz to 15 GHz - (low ch)

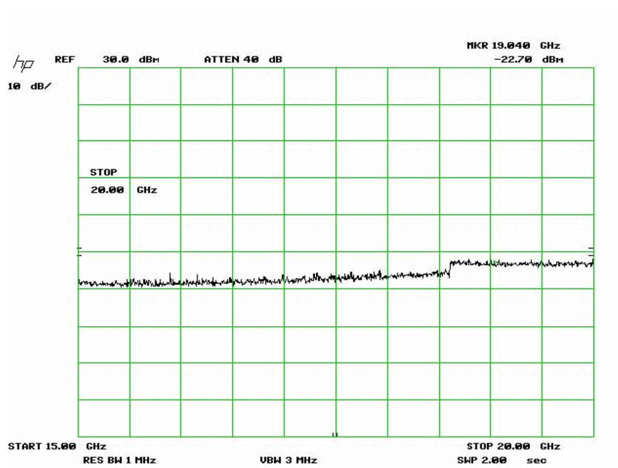


10 GHz to15 GHz - (mid ch)

Spurious conducted emissions

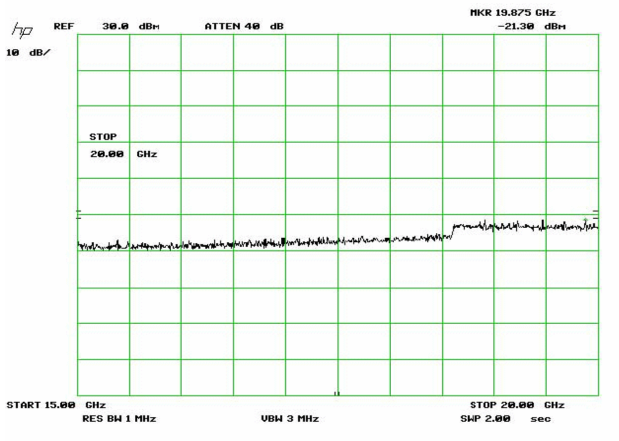


10 GHz to15 GHz - (high ch)

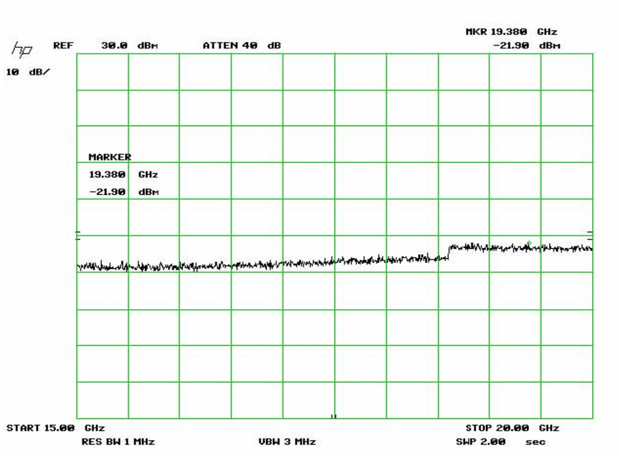


15 GHz to20 GHz - (low ch)

Spurious conducted emissions



15 GHz to 20 GHz - (mid ch)



15 GHz to 20 GHz - (high ch)

Spurious radiated emissions

Spurious Radiated Emissions													
Antenna	**=**		**OMNI**										
Freq.		Fund. Freq.	Measured	Measured	POL	CL & ACF	Post Amp Coax Loss	Adjusted FS	Limit	Delta	Adjusted FS	Limit	Delta
GHz			dBuV Average	dBuV Peak	V/H	dB	dB	dBuV/m Average	dBuV/m Average	dB Average	dBuV/m Peak	dBuV/m Peak	dB Peak
4.896		H	42.7	54.1	H	13.6	13	43.3	54	-10.7	54.7	74	-19.3
4.88		M	41.4	53.2	H	13.6	13	42	54	-12	53.8	74	-20.2
4.804		L	38.7	51.1	H	13.6	13	39.3	54	-14.7	51.7	74	-22.3
7.344		H	38.1	52.3	V	20.6	16	42.7	54	-11.3	56.9	74	-17.1
7.32		M	37.1	48.5	H	20.6	16	41.7	54	-12.3	53.1	74	-20.9
7.206		L	42.1	48.2	V	20.6	16	46.7	54	-7.3	52.8	74	-21.2
Antenna	**=**		**YAGI**										
Freq.		Fund. Freq.	Measured	Measured	POL	CL & ACF	Post Amp Loss	Adjusted FS	Limit	Delta	Adjusted FS	Limit	Delta
GHz			dBuV Average	dBuV Peak	V/H	dB	dB	dBuV/m Average	dBuV/m Average	dB Average	dBuV/m Peak	dBuV/m Peak	dB Peak
4.896		H	45.5	58	V	13.6	7.3	51.8	54	-2.2	64.3	74	-9.7
4.88		M	39.8	53	V	13.6	7.3	46.1	54	-7.9	59.3	74	-14.7
4.804		L	45.9	59.3	V	13.6	7.3	52.2	54	-1.8	65.6	74	-8.4
7.344		H	39.2	50.8	V	20.6	9.2	50.6	54	-3.4	62.2	74	-11.8
7.32		M	39.9	46.8	H	20.6	9.2	51.3	54	-2.7	58.2	74	-15.8
7.206		L	38.2	49.4	V	20.6	9.2	49.6	54	-4.4	60.8	74	-13.2

Spurious radiated emissions

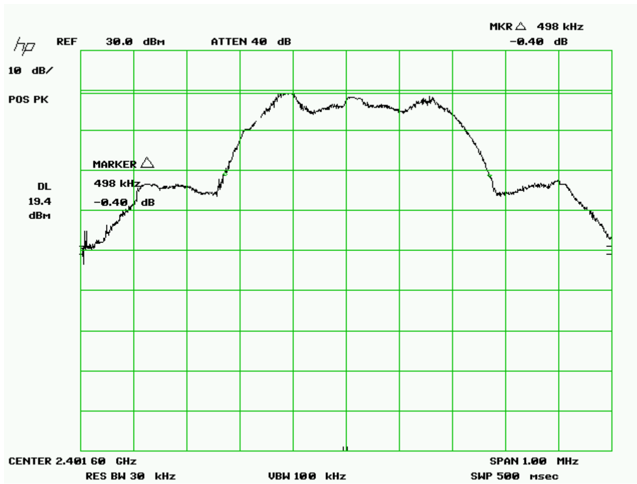
Antenna =		PLANAR ARRAY										
Freq.	Fund. Freq.	Measured	Measured	POL	CL & ACF	Post Amp Loss	Adjusted FS	Limit	Delta	Adjusted FS	Limit	Delta
GHz		dBuV	dBuV	V/H	dB	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
		Average	Peak				Average	Average	Average	Peak	Peak	Peak
4.896	H	45.2	57.4	V	13.6	7.3	51.5	54	-2.5	63.7	74	-10.3
4.88	M	44	55.9	V	13.6	7.3	50.3	54	-3.7	62.2	74	-11.8
4.804	L	43.4	55.3	V	13.6	7.3	49.7	54	-4.3	61.6	74	-12.4
7.344	H	42.1	53.3	V	20.6	9.2	53.5	54	-0.5	64.7	74	-9.3
7.32	M	42.3	56.9	V	20.6	9.2	53.7	54	-0.3	68.3	74	-5.7
7.206	L	42.4	58.8	V	20.6	9.2	53.8	54	-0.2	70.2	74	-3.8
Antenna =		FLAT PATCH										
Freq.	Fund. Freq.	Measured	Measured	POL	CL & ACF	Post Amp Loss	Adjusted FS	Limit	Delta	Adjusted FS	Limit	Delta
GHz		dBuV	dBuV	V/H	dB	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
		Average	Peak				Average	Average	Average	Peak	Peak	Peak
4.896	H	46.6	58.9	V	13.6	7.3	52.9	54	-1.1	65.2	74	-8.8
4.88	M	43.9	57.1	V	13.6	7.3	50.2	54	-3.8	63.4	74	-10.6
4.804	L	42	54	H	13.6	7.3	48.3	54	-5.7	60.3	74	-13.7
7.344	H	39.8	52.2	H	20.6	9.2	51.2	54	-2.8	63.6	74	-10.4
7.32	M	36.7	48	H	20.6	9.2	48.1	54	-5.9	59.4	74	-14.6
7.206	L	40.1	53.6	V	20.6	9.2	51.5	54	-2.5	65	74	-9

All measurements made at a (3) meter distance

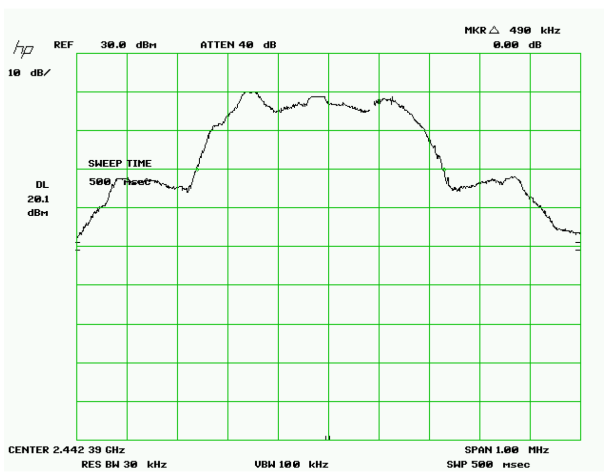
Post amp loss is based upon inserting coaxial cable between the amp and the antenna to achieve the mandatory loss at the fundamental as stated in the user manual

Adjusted field strength (FS) is calculated by (Measured + CL&ACF - Post Amp loss)

20 dB bandwidth

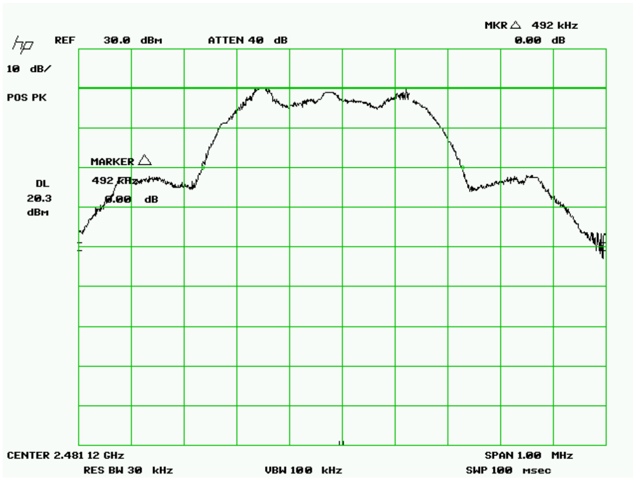


(Low ch)



(Mid ch)

20 dB bandwidth



(High ch)