



EMC Test Log

Client:	Sharewave	Date:	12/20/99	Test Eng:	Jerry Hill
Product:	Cresta II Modular Radio	File:	T35129	Proj. Eng:	Mark Briggs
Objective:	Final Qualification	Site:	SVOATS #2	Contact:	Dale Dorando
Spec:	FCC Part 15	Page:	1 of 4	Approved:	
Revision	1.0				

Ambient Conditions

Temperature:	8.3 °C
Humidity:	68 % RH

Test Objective

The objective of this test session is to perform final qualification testing the EUT defined below relative to the specification(s) defined above.

Test Summary

Run #1 - Maximized Radiated Spurious Emissions From The Transmitter, High Channel 2462MHz.

PASS Results: FCC 15.209 -1.4 dB Avg @ 2484.950 MHz Horizontal

Run #2 - Maximized Radiated Spurious Emissions From The Transmitter, Medium Channel 2437MHz

PASS Results: FCC 15.209 -12.5 dB Avg @ 9745.880 MHz Vertical

Run #3 - Maximized Radiated Spurious Emissions From The Transmitter, Low Channel 2412MHz

PASS Results: FCC 15.209 -6.0 dB Pk @ 7236.150 MHz Horizontal

Run #4 - Conducted Emissions Scan of EUT, 0.45-30.00 MHz, **120V, 60Hz, High Channel 2462MHz**

PASS Results: FCC 15.207 -7.9 dB QP @ 11.830 MHz Line

Run #5 - Conducted Emissions Scan of EUT, 0.45-30.00 MHz, **120V, 60Hz, Medium Channel 2437MHz**

PASS Results: FCC 15.207 -5.7 dB QP @ 11.830 MHz Neutral

Run #6 - Conducted Emissions Scan of EUT, 0.45-30.00 MHz, **120V, 60Hz, Low Channel 2412MHz**

PASS Results: FCC 15.207 -7.6 dB QP @ 11.830 MHz Neutral



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Equipment Under Test (EUT) General Description

The EUT is a modular spread spectrum radio that uses Direct Sequence spreading code. The EUT is designed for use in LAN environment. Normally, the EUT would be placed on a tabletop during operation. The EUT was, therefore, placed in this position during emissions testing to simulate the end user environment. The electrical rating of the EUT is 5 VDC, 600 mA.

Equipment Under Test (EUT)

Manufacturer/Model/Description	Serial Number	FCC ID Number
Shareware/ Crest II Modular Radio/ wireless LAN	FCC1	N9PSW2-2450 (proposed)
Sharewave Antenna/ Powerwave/ Antenna	N/A	N9PSW1-2450

Power Supply and Line Filters

Description	Manufacturer	Model
N/A	-	-

The EUT power is derived from the power supply of the host unit. For testing, a PC interface card was used to provide power to the EUT.

Printed Wiring Boards in EUT

Manufacturer/Description	Assembly #	Rev.	Serial Number	Crystals (MHz)
Shareware/ Modular radio	301-0118-000	D	FCC1	44

Subassemblies in EUT

Manufacturer/Description	Assembly Number	Rev.	Serial Number
None	-	-	-

EUT Enclosure(s)

The EUT does not have an enclosure as it is designed to be installed within the enclosure of a host device. The PCB has sheet metal shields on both sides. It measures approximately 5 cm wide by 9 cm deep by 1 cm high.



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EMI Suppression Devices (filters, gaskets, etc.)

Description	Manufacturer	Part Number
N/A	-	-

EUT Antenna

The EUT connects to the antenna via a reverse connector. This is a non-standard connector that meets the requirements of 15.203. The antenna is identical to the one used with Sharewave modular radio FCC ID: N9PSW1-2450

Modifications

No modifications were made to the EUT in order to comply with the requirements.

Local Support Equipment

Manufacturer/Model/Description	Serial Number	FCC ID Number
Dell/ M2005/ PC	-	-
Dell/ D1025TM/ Monitor	840519	D102STM
Dell/ SK-1000REW/ Keyboard	3862A	GYUR43SK
Microsoft/ Intellimouse/ Mouse	00364949	C3KKMPS

Remote Support Equipment

Manufacturer/Model/Description	Serial Number	FCC ID Number
None	-	-

Interface Cabling

Cable Description	Length (m)	From Unit/Port	To Unit/Port
Radio Cable	1	PC LAN Port	Radio
AC Power Cord	2	AC / Mains	CPU/AC Input
Monitor AC Power Cord	2	AC / Mains	Monitor / AC Input
Monitor cable	2	Monitor / VGA Input	CPU / VGA Out
Mouse cable	2	CPU / Mouse	Mouse
Keyboard	2	Keyboard / Out	CPU / keyboard input

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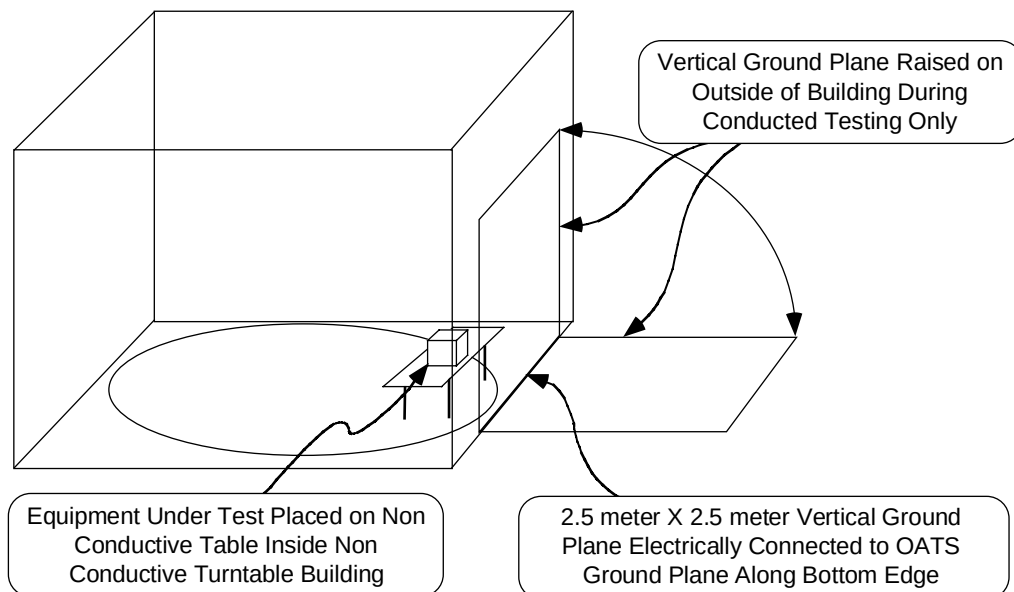
Test Software

The EUT was set to operate transmitting continuously, programmable to 1 of 3 channels. All three channels were tested.

General Test Conditions

During radiated testing, the EUT was connected to a host PC, which was ran at 120 V, 60 Hz power input. The EUT was located on the turntable for radiated testing and conducted testing. All local support equipment was located beneath the table.

During conducted emissions testing, the EUT was connected to either 120 V, 60 Hz power input as noted. A 2.5 x 2.5 meter ground plane was raised to a vertical position 40 cm from the EUT as shown below:



Test Data Tables

See attached data



Emissions Test Data

Client:	Sharewave	Date:	12/20/1999	Test Engr:	Jerry Hill
Product:	Cresta II Modular Radio	File:	D35129	Proj. Engr:	Mark Briggs
Objective:	Final Qual	Site:	SVOATS #2	Contact:	Dale Dorando
Spec:	FCC Part 15	Distance:	3 m	Approved:	

Ambient conditions
 Temperature: 8.3 °C
 Humidity: 68 % RH

Note: all emissions above 7385.90 MHz were Noise floor therefore no Duty Cycle Correction factor applied.

Run #1: Radiated emissions, 30-24000 MHz at 3m, Transmitting on High Channel

Measurements made at 3m per FCC requirements. * = duty cycle correction factor for avg readings of -2.5 applied.

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2484.950	68.5	v	74.0	-5.5	Pk	0	1.0	1Mhz avg bw no pre amp. Band Edge, no filter
2484.950	71.0	h	74.0	-3.0	Pk	0	1.2	1Mhz avg bw no pre amp. Band Edge, no filter
2484.950	46.6	v	54.0	-7.4	Avg	0	1.0	10 hz avg bw no pre amp. Band Edge. * no filter
2484.950	52.6	h	54.0	-1.4	Avg	0	1.2	10 hz avg bw no pre amp. Band Edge. * no filter
4923.900	60.5	v	74.0	-13.5	Pk	140	1.0	1Mhz avg bw w/pre amp.
4923.900	55.2	h	74.0	-18.8	Pk	210	1.3	1Mhz avg bw w/pre amp.
4923.900	43.2	v	54.0	-10.8	Avg	140	1.0	10 hz avg bw w/pre amp and filter. *
4923.900	37.7	h	54.0	-16.3	Avg	210	1.3	10 hz avg bw w/pre amp and filter. *
7385.900	62.3	v	74.0	-11.7	Pk	140	1.0	1Mhz avg bw w/pre amp.
7385.900	51.7	h	74.0	-22.3	Pk	210	1.3	1Mhz avg bw w/pre amp.
7385.900	41.0	v	54.0	-13.0	Avg	140	1.0	10 hz avg bw w/pre amp and filter. *
7385.900	43.2	h	54.0	-10.8	Avg	210	1.3	10 hz avg bw w/pre amp and filter. *
9847.860	55.5	v	74.0	-18.5	Pk	0	1.3	1Mhz avg bw w/pre amp.
9847.860	54.0	h	74.0	-20.0	Pk	0	1.3	1Mhz avg bw w/pre amp.
9847.860	49.7	v	54.0	-4.3	Avg	0	1.3	10 hz avg bw w/pre amp and filter.
9847.860	39.0	h	54.0	-15.0	Avg	0	1.3	10 hz avg bw w/pre amp and filter.
12309.800	52.5	v	74.0	-21.5	Pk	0	1.3	1Mhz avg bw w/pre amp. Noise floor.
12309.800	57.9	h	74.0	-16.1	Pk	0	1.3	1Mhz avg bw w/pre amp. Noise floor.
12309.800	48.0	v	54.0	-6.0	Avg	0	1.3	10 hz avg bw w/pre amp and filter. Noise floor
12309.800	47.0	h	54.0	-7.0	Avg	0	1.3	10 hz avg bw w/pre amp and filter. Noise floor



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Spec:	FCC Part 15	Distance:	3 m	Approved:	

Run #2: Spurious Radiated emissions, Selected Frequencies at 3m, Transmitting on Medium Channel 2437MHz.

Measurements made at 3m per FCC requirements.

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4872.980	57.5	v	74.0	-16.5	Pk	140	1.0	1Mhz avg bw w/pre amp.
4872.980	55.0	h	74.0	-19.0	Pk	210	1.3	1Mhz avg bw w/pre amp.
4872.980	38.7	v	54.0	-15.3	Avg	140	1.0	10 hz avg bw w/pre amp and filter. *
4872.980	35.5	h	54.0	-18.5	Avg	210	1.3	10 hz avg bw w/pre amp and filter. *
7309.410	57.0	v	74.0	-17.0	Pk	140	1.0	1Mhz avg bw w/pre amp.
7309.410	53.0	h	74.0	-21.0	Pk	210	1.3	1Mhz avg bw w/pre amp.
7309.410	41.1	v	54.0	-12.9	Avg	140	1.0	10 hz avg bw w/pre amp and filter. *
7309.400	39.5	h	54.0	-14.5	Avg	210	1.3	10 hz avg bw w/pre amp and filter. *
9745.880	56.5	v	74.0	-17.5	Pk	0	1.3	1Mhz avg bw w/pre amp.
9745.880	52.0	h	74.0	-22.0	Pk	0	1.3	1Mhz avg bw w/pre amp.
9745.880	41.5	v	54.0	-12.5	Avg	0	1.3	10 hz avg bw w/pre amp and filter.
9745.880	41.3	h	54.0	-12.8	Avg	0	1.3	10 hz avg bw w/pre amp and filter.

Run #3: Spurious Radiated emissions, Selected frequencies at 3m, Transmitting on Low Channel 2412MHz.

Measurements made at 3m per FCC requirements.

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4823.930	60.1	v	74.0	-13.9	Pk	140	1.0	1Mhz avg bw w/pre amp.
4823.930	62.0	h	74.0	-12.0	Pk	210	1.3	1Mhz avg bw w/pre amp.
4823.930	38.5	v	54.0	-15.5	Avg	140	1.0	10 hz avg bw w/pre amp and filter. *
4823.930	39.2	h	54.0	-14.9	Avg	210	1.3	10 hz avg bw w/pre amp and filter. *
7236.150	59.6	v	74.0	-14.4	Pk	140	1.0	1Mhz avg bw w/pre amp.
7236.150	68.0	h	74.0	-6.0	Pk	210	1.3	1Mhz avg bw w/pre amp.
7236.150	40.1	v	54.0	-13.9	Avg	140	1.0	10 hz avg bw w/pre amp and filter. *
7236.150	44.5	h	54.0	-9.5	Avg	210	1.3	10 hz avg bw w/pre amp and filter. *
9648.370	46.5	v	74.0	-27.5	Pk	0	1.3	1Mhz avg bw w/pre amp.
9648.370	46.3	h	74.0	-27.7	Pk	0	1.3	1Mhz avg bw w/pre amp.
9648.370	41.0	v	54.0	-13.0	Avg	0	1.3	10 hz avg bw w/pre amp and filter.
9648.370	41.1	h	54.0	-12.9	Avg	0	1.3	10 hz avg bw w/pre amp and filter.



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Spec:	FCC Part 15	Distance:	3 m	Approved:	

Run #4: Conducted Emissions, 120V/60Hz, High Channel 2462MHz. Sorted by Margin.

Frequency	Level	Power	FCC 15.207		Detector	Comments
MHz	dBuV	Lead	Limit	Margin	QP/Ave	
11.830	40.1	Line	48.0	-7.9	QP	
11.900	39.0	Neutral	48.0	-9.0	QP	
8.890	36.9	Neutral	48.0	-11.1	QP	
5.158	33.6	Line	48.0	-14.4	QP	
5.080	32.4	Neutral	48.0	-15.6	QP	
3.276	27.2	Line	48.0	-20.8	QP	

Run #5: Conducted Emissions, 120V/60Hz, Medium Channel 2437MHz. Sorted by Margin.

Frequency	Level	Power	FCC 15.207		Detector	Comments
MHz	dBuV	Lead	Limit	Margin	QP/Ave	
11.830	42.3	Neutral	48.0	-5.7	QP	
11.830	40.2	Line	48.0	-7.8	QP	
8.890	39.9	Neutral	48.0	-8.1	QP	
5.160	38.0	Neutral	48.0	-10.0	QP	
8.890	34.5	Line	48.0	-13.5	QP	
5.160	33.4	Line	48.0	-14.6	QP	

Run #6: Conducted Emissions, 120V/60Hz, Low Channel 2412MHz. Sorted by Margin.

Frequency	Level	Power	FCC 15.207		Detector	Comments
MHz	dBuV	Lead	Limit	Margin	QP/Ave	
11.830	40.4	Neutral	48.0	-7.6	QP	
11.830	39.0	Line	48.0	-9.0	QP	
7.660	33.6	Neutral	48.0	-14.4	QP	
7.660	32.9	Line	48.0	-15.1	QP	
5.160	32.9	Neutral	48.0	-15.1	QP	
5.160	32.6	Line	48.0	-15.4	QP	

ELLIOTT LABORATORIES

20. Dec 99 11:50

FCC B

Operator: Jerry Hill
Comment:

Shareware

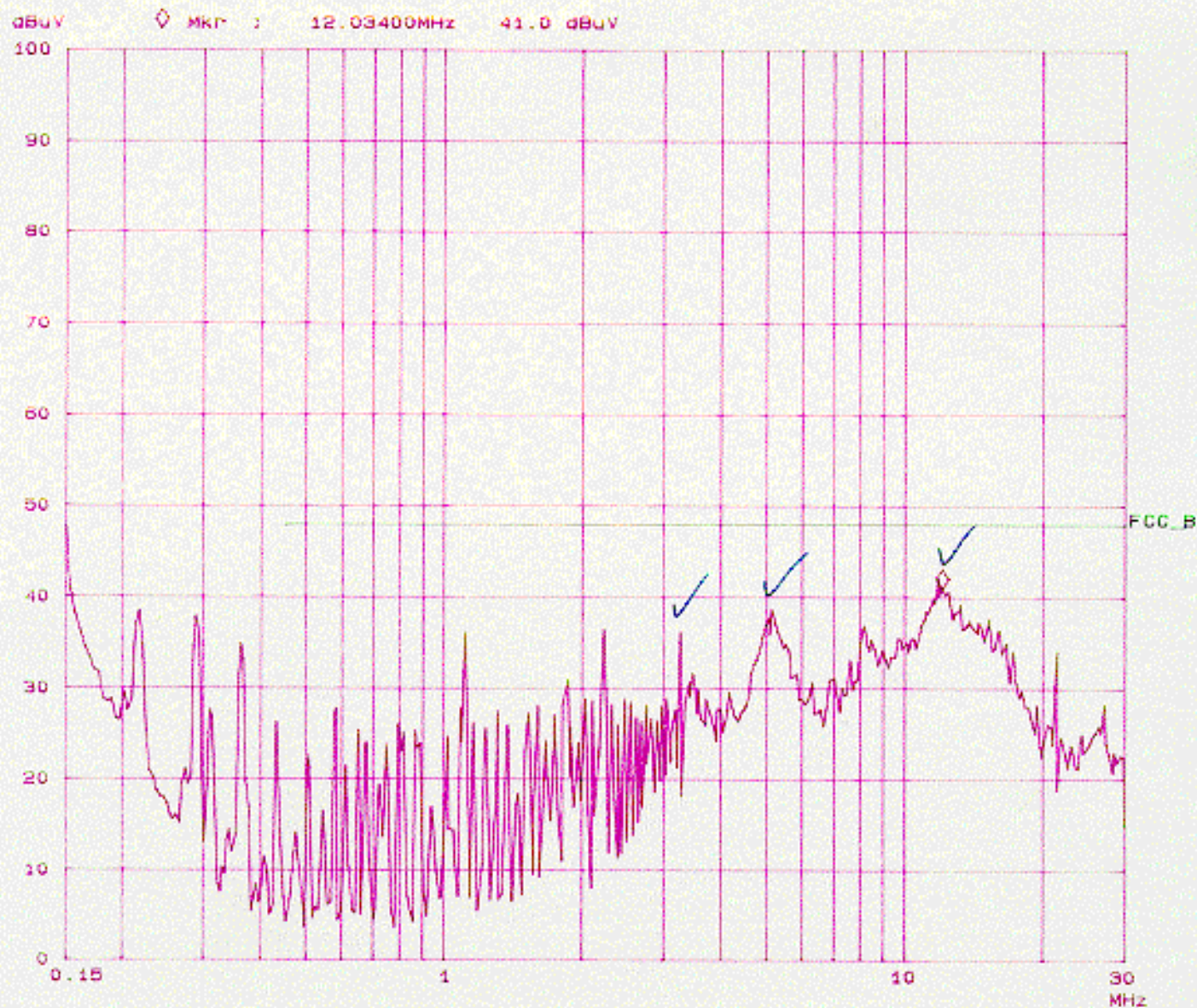
035129

Conducted Emission

120/60Hz line High chan. 2462MHz

A = Ambient ✓ = EUT

JB



ELLIOTT LABORATORIES

20. Dec 99 12:20

FCC B

Operator: Jerry Hill

Comment:

Shareware

035129

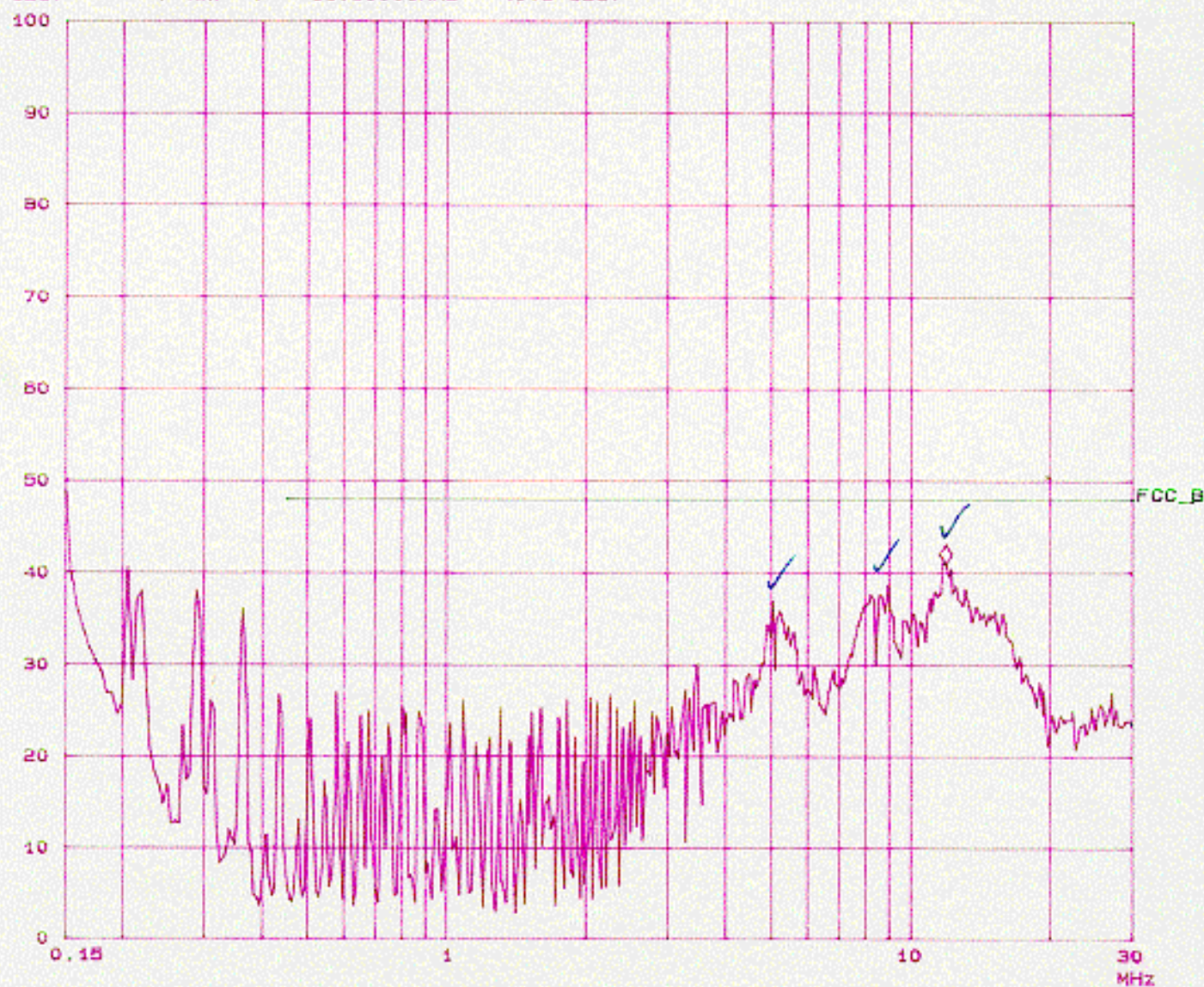
Conducted Emission

120/60Hz neutral High chan. 2462MHz

A = Ambient ✓ = EUT

GA

dBuV ◇ mkr : 11.90000MHz 40.9 dBuV



ELLIOTT LABORATORIES

20. Dec 99 12:27

FCC. B

Operator: Jerry Hill

Comment:

Shareware

035129

Conducted Emission

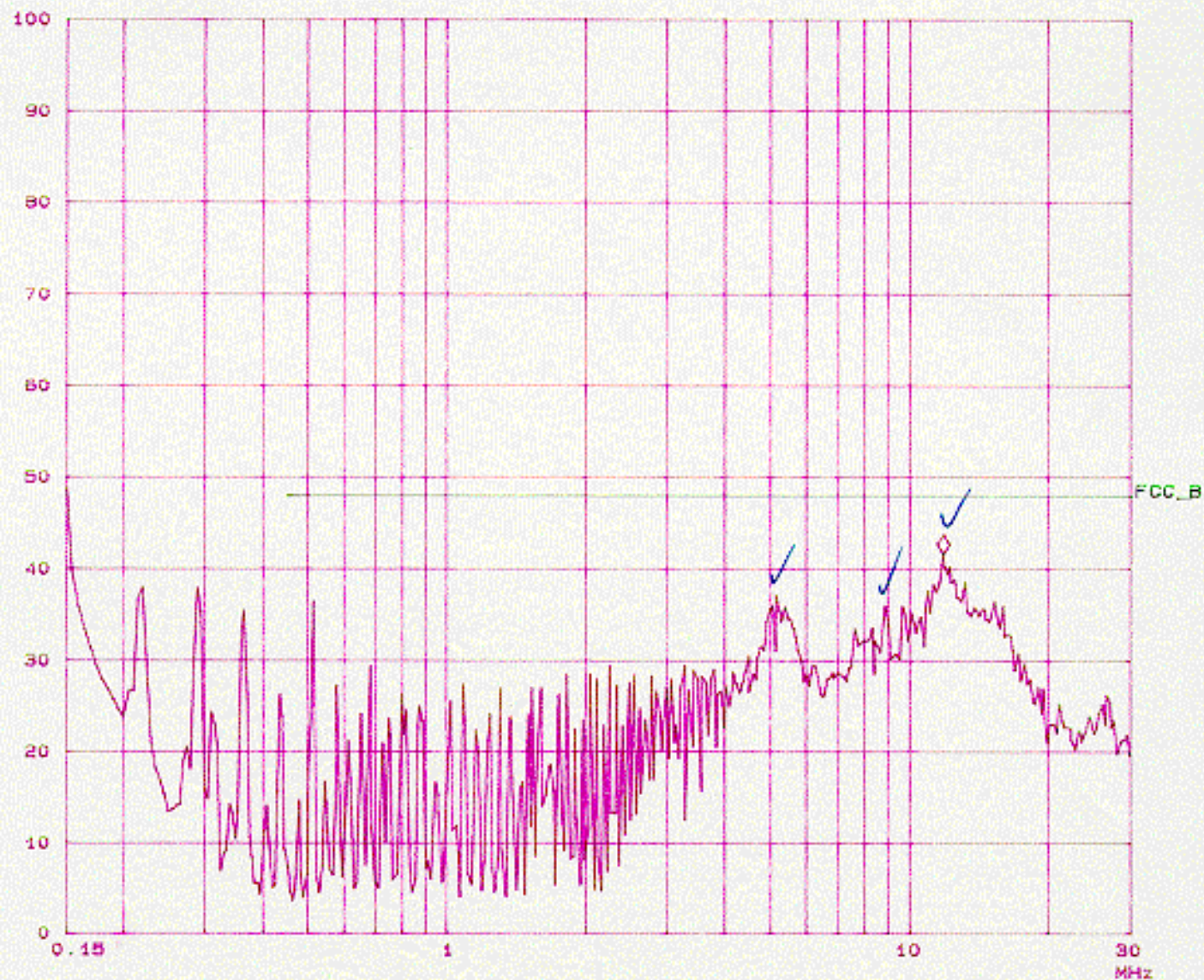
120/60Hz line

Medium chan. 2437MHz

A = Ambient ✓ = EUT

Q

dBuV ◇ Mkn : 11.85000MHz 41.6 dBuV



ELLIOTT LABORATORIES

20. Dec 99 12:38

FCC B

Operator: Jerry Hill

Comment:

Shareware

035129

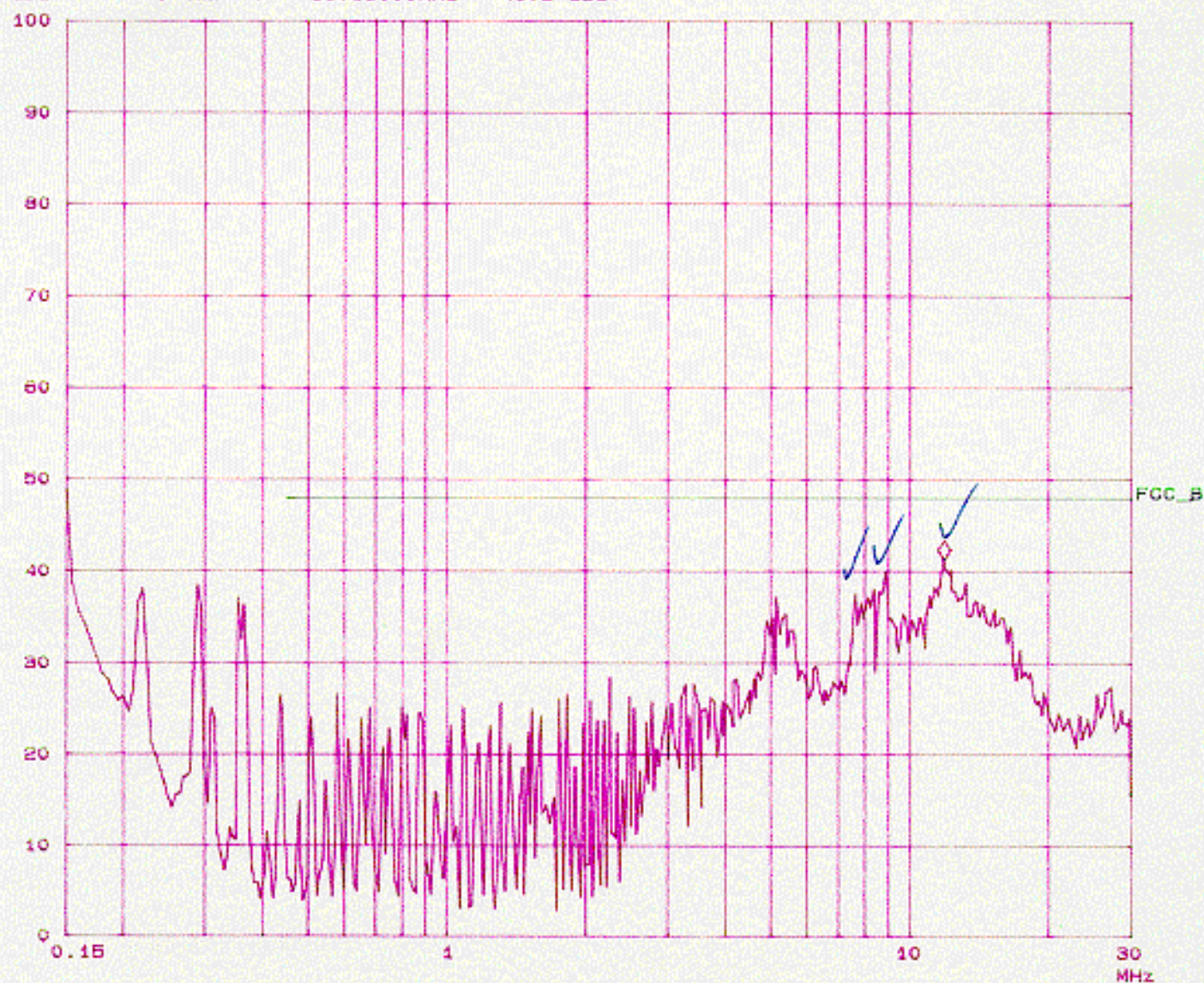
Conducted Emission

120/60Hz neutral Medium chan. 2437MHz

A = Ambient ✓ = EUT

Q/A

dBuV ◇ MKR : 11.83000MHz 41.2 dBuV



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20. Dec 99 13:04

FCC B

Operator: Jerry Hill

Comment:

Shareware

035129

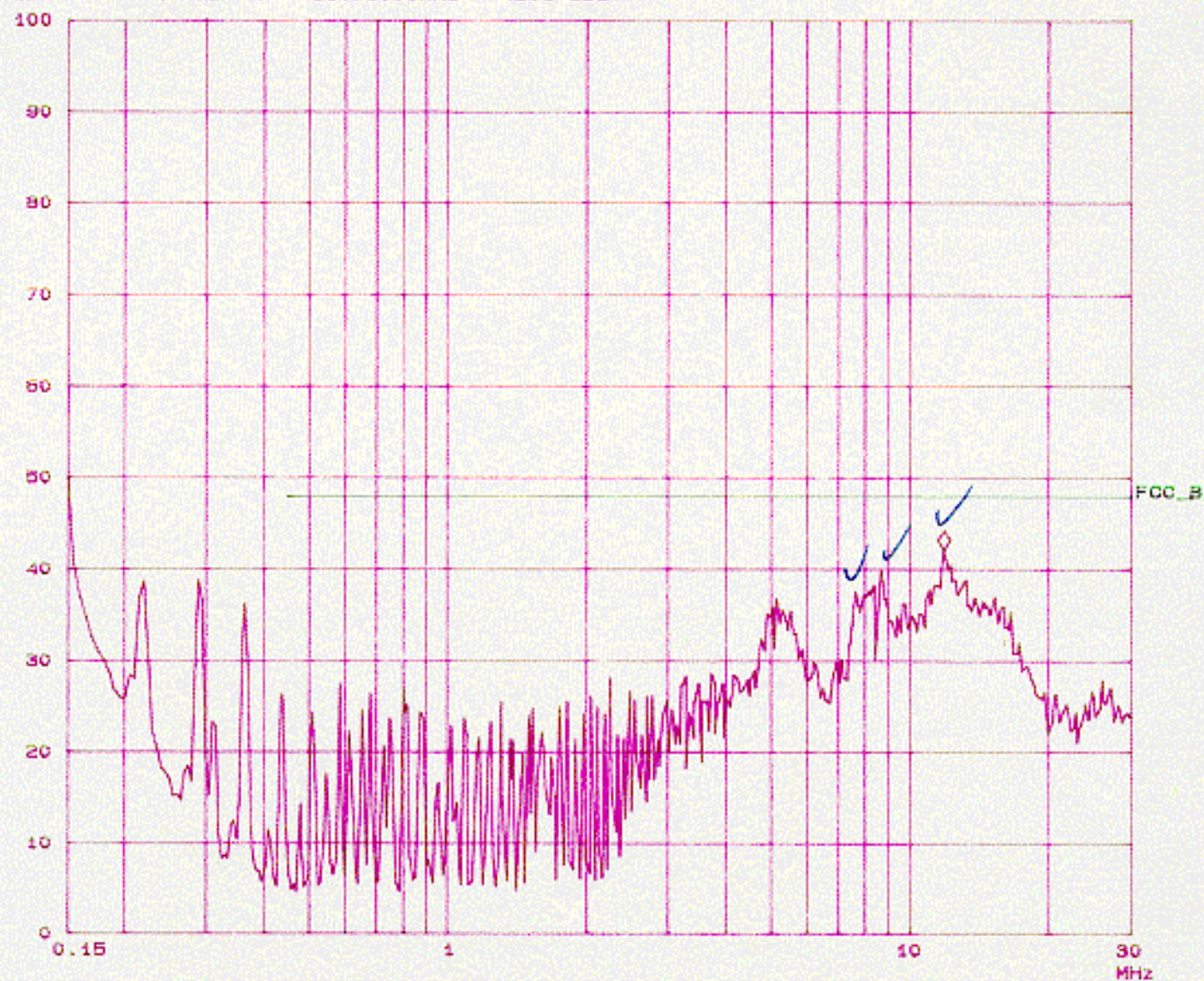
Conducted Emission

120/60Hz neutral Low chan. 2412MHz

A - Ambient ✓ - EUT

JPH

dBuV ◇ Mkr : 11.83000MHz 42.1 dBuV



ELLIOTT LABORATORIES

20. Dec 98 12:50

FCC B

Operator: Jerry Hill

Comment:

Sharware

035129

Conducted Emission

120/60Hz line

Low chan. 2412MHz

A = Ambient ✓ = EUT

gjh

dBuV ⬠ Mkr : 11.83000MHz 42.0 dBuV

