



Company: Motorola Inc
Model Tested: SUG3171AA
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

FCC Rules and Regulations / Intentional Radiators

Operational in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz, Bands

Part 15, Subpart C, Section 15.247 and
Sections 15.31(m), 15.203, 15.204, 15.205, 15.207, & 15.209

USING

FCC Public Notice DA 00-705

Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

THE FOLLOWING **"MEETS"** THE ABOVE TEST SPECIFICATION

Formal Name: V710

Kind of Equipment: Mobile Phone

Test Configuration: Connection Mode with other products - Conducted (via a RF cable) & Radiated (via Antenna)

Model Number(s): SUG3171AA

Model(s) Tested: SUG3171AA

Serial Number(s): 77047CB2 & 77047CC2

Date of Tests: November 20, 21 & 26, 2003

Test Conducted For: Motorola Inc
600 N US Highway 45
Libertyville, Illinois 60048

NOTICE: "This report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government". Please see the "Additional Description of Equipment Under Test" page listed inside of this report. This report must not be reproduced (except in full), without the approval of D.L.S. Electronic Systems.



Company: Motorola Inc
Model Tested: SUG3171AA
Report Number: 10440

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SIGNATURE PAGE

Report By:

Arnom C. Rowe
Test Engineer
EMC-001375-NE

Reviewed By:

William Stumpf
OATS Manager

Approved By:

Brian Mattson
General Manager

Company Official:

Motorola Inc



Company: Motorola Inc
Model Tested: SUG3171AA
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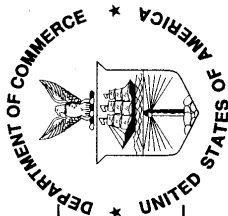
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United States Department of Commerce
National Institute of Standards and Technology



ISO/IEC 17025:1999
ISO 9002:1994

Certificate of Accreditation



D.L.S. ELECTRONIC SYSTEMS, INC.
WHEELING, IL

is recognized by the National Voluntary Laboratory Accreditation Program
for satisfactory compliance with criteria set forth in NIST Handbook 150:2001,
all requirements of ISO/IEC 17025:1999, and relevant requirements of ISO 9002:1994.
Accreditation is awarded for specific services, listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

September 30, 2004

Effective through

For the National Institute of Standards and Technology
NVLAP Lab Code: 100276-0

NVLAP-01C (06-01)



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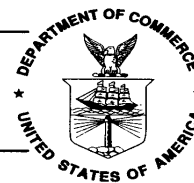
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D.L.S. ELECTRONIC SYSTEMS, INC.

1250 Peterson Drive
Wheeling, IL 60090-6454
Mr. Brian J. Mattson

Phone: 847-537-6400 Fax: 847-537-6488

E-Mail: bmattson@dlsemc.com

URL: <http://www.dlsemc.com>

NVLAP Code Designation / Description

Emissions Test Methods:

12/160D21	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 21 - Emission of Radio Frequency Energy
12/300220a	EN 300 220-1 V1.3.1 (2000-09): Electromagnetic compatibility and Radio spectrum Matters; Short Range Devices; Radio equipment to be used in the 25 MHz to 1000 MHz frequency range with power levels ranging up to 500 mW; Part 1: Technical characteristics and test methods
12/300386a	EN 300 386 V.1.2.1: Electromagnetic compatibility and radio spectrum matter (ERM); Telecommunication network equipment; Electromagnetic compatibility (EMC) requirements
12/C63.17	ANSI C63.17-1998: American National Standard for Methods of Measurement of the Electromagnetic and Operational Compatibility of Unlicensed Personal Communications Services (UPCS) Devices

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<i>NVLAP Code</i>	<i>Designation / Description</i>
12/C6317a	ANSI C63.17-1998: American National Standard for Methods of Measurement of the Electromagnetic and Operational Compatibility of Unlicensed Personal Communications Services (UPCS) Devices
12/CIS11	IEC/CISPR 11 + A1 (1997), EN 55011 (1998), AS/NZS 2064 (1997), and CNS 137803 (1997): Limits and Methods of Measurement of Electromagnetic Disturbance Characteristics of Industrial, Scientific, and Medical Radio-Frequency Equipment
12/CIS13	IEC/CISPR 13 (2001-04), EN 55013 (2001), AS/NZS 1053 (2001), and CNS 13439 (2001): Sound and television broadcast receivers and associated equipment - Radio disturbance characteristics - Limits and methods of measurement
12/CIS14	CISPR 14-1 (March 30, 2000): Limits and methods of measurement of radio interference characteristics of household electrical appliances, portable tools and similar electrical apparatus - Part 1: Emissions
12/CIS14a	EN 55014-1 (1993) with Amendments A1 (1997) & A2 (1999)
12/CIS14d	IEC/CISPR 14-1 (2001) and A1 (2001): Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emissions
12/CIS14e	EN 55014-1 (2001) and A1 (2001): Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission

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12/CIS14f	AS/NZS 1044 (2001) and A1 (2001): Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission
12/CIS14g	CNS 13783-1 (2001) and A1 (2001): Electromagnetic Compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission
12/CIS15	IEC/CISPR 15 (2000) + A1 (2001): Limits and methods of measurements of radio disturbance characteristics of electrical lighting and similar equipment
12/CIS15a	AS/NZS CISPR (2002): Limits and methods of measurements of radio disturbance characteristics of electrical lighting and similar equipment
12/CIS15b	CNS 13439 (2000) + A1 (2001): Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
12/CIS15c	EN 55015 (2000) + A1 (2001): Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
12/CIS22	IEC/CISPR 22 (1997) and EN 55022 (1998): Limits and methods of measurement of radio disturbance characteristics of information technology equipment
12/CIS22a	IEC/CISPR 22 (1993): Limits and methods of measurement of radio disturbance characteristics of information technology equipment, Amendment 1:1995, and Amendment 2:1996.

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12/CIS22b	CNS 13438 (1997): Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment
12/EM02a	IEC 61000-3-2, Edition 2.1 (2001-10), EN 61000-3-2 (2000), and AS/NZS 2279.1 (2000): Electromagnetic compatibility (EMC) Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A)
12/EM03	EN 61000-3-3 (1995), IEC 61000-3-3 (1995), and AS/NZS 2279.3 (1995): EMC - Part 3: Limits - Section 3. Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current up to 16A
12/F18	FCC OST/MP-5 (1986): FCC Methods of Measurement of Radio Noise Emissions for ISM Equipment (cited in FCC Method 47 CFR Part 18 - Industrial, Scientific, and Medical Equipment)
12/FCC15b	ANSI C63.4 (2001) with FCC Method - 47 CFR Part 15, Subpart B: Unintentional Radiators
12/FCC15c	ANSI C63.4 (2001) with FCC Method - 47 CFR Part 15, Subpart C: Intentional Radiators
12/FCC15d	ANSI C63.4 (2001) with FCC Method - 47 CFR Part 15, Subpart D: Unlicensed Personal Communications Service Devices

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<i>NVLAP Code</i>	<i>Designation / Description</i>
12/FCC15e	ANSI C63.4 (2001) with FCC Method - CFR Part 15, Subpart E: Unlicensed National Information Infrastructure Service Devices
12/T51	AS/NZS CISPR 22 (2002) and AS/NZS 3548 (1997): Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment
12/VCCIa	Agreement of Voluntary Control Council for Interference by Information Technology Equipment - Technical Requirements: V-3/02.04

Immunity Test Methods:

12/1089a	GR-1089-CORE, Issue 3, October 2002: Electromagnetic Compatibility and Electrical Safety - Generic Criteria for Network Telecommunications Equipment (sections 2, 3.3, and 3.5)
12/160D16	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 16 - Power Input
12/160D17	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 17 - Voltage Spike
12/160D18	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 18 - Audio Frequency Conducted Susceptibility - Power Inputs

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12/160D19	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 19 - Induced Signal Susceptibility
12/160D20	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 20 - Radio Frequency Susceptibility (Radiated and Conducted)
12/160D22	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 22 - Lightning Induced Transient Susceptibility
12/160D25	RTCA/DO-160D (1997): Environmental Conditions and Test Procedures for Airborne Equipment - Section 25 - Electrostatic Discharge (ESD)
12/I01	IEC 61000-4-2 (1995) and Amendment 1 (1998) and EN 61000-4-2: Electrostatic Discharge Immunity Test
12/I02	IEC 61000-4-3 (1995) and Amendment 1 (1998) and EN 61000-4-3: Radiated, Radio-Frequency Electromagnetic Field Immunity Test
12/I03	IEC 61000-4-4 (1995) and EN 61000-4-4: Electrical Fast Transient/Burst Immunity Test
12/I04	IEC 61000-4-5 (1995) and EN 61000-4-5: Surge Immunity Test

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12/I05	IEC 61000-4-6 (1996) and EN 61000-4-6: Immunity to Conducted Disturbances, Induced Radio-Frequency Fields
12/I06	IEC 61000-4-8 (1993): Power Frequency Magnetic Field Immunity Test
12/I07	IEC 61000-4-11 (1994): Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests
12/J111324	SAE J1113/24: Immunity to radiated electromagnetic fields; 10 kHz to 200 MHz - Crawford TEM cell and 10 kHz to 5 GHz - Wideband TEM cell
12/J111341	SAE J1113/41 (1995-07): Limits and methods of measurement of radio disturbance characteristics of components and modules for the protection of receivers used on board vehicles

Radio Test Methods

12/RSS119	RSS-119, Issue 6 (March 25, 2000): Land Mobile and Fixed Radio Transmitters and Receivers, 27.41 to 960 MHz
12/RSS123	RSS-123, Issue 1, Rev. 2 (November 6, 1999): Low Power Licensed Radiocommunication Devices
12/RSS137	RSS-137, Issue 1, Rev. 1 (September 25, 1999): Location and Monitoring Service (902 - 928 MHz)

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12/RSS139 RSS-139, Issue 1 (February 5, 2000): Licensed Radiocommunications Devices in the Band 2400 - 2483.5 MHz

12/CIS15c EN 55015 (2000) + A1 (2001): Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment

MIL-STD-462 : Conducted Emissions:

12/A18 MIL-STD-461 Version E Method CE106

MIL-STD-462 : Conducted Susceptibility:

12/B12 MIL-STD-462 Version D Method CS101

12/B13 MIL-STD-462 Version D Method CS103

12/B25 MIL-STD-461 Version E Method CS114

12/B26 MIL-STD-461 Version E Method CS115

12/B27 MIL-STD-461 Version E Method CS116

MIL-STD-462 : Radiated Emissions:

12/D04 MIL-STD-462 Version D Method RE101

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NVLAP Code Designation / Description

12/D05 MIL-STD-462 Version D Method RE102

12/D06 MIL-STD-462 Version D Method RE103

MIL-STD-462 : Radiated Susceptibility:

12/E08 MIL-STD-462 Version D Method RS101

12/E09 MIL-STD-462 Version D Method RS103

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1.0 SUMMARY OF TEST REPORT

It was found that the V710, Model Number(s) SUG3171AA, "meets" the radio interference radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.247 for operational in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz, Bands.

This test report relates only to the items tested and contains the following number of pages.

Text and Charts: 72

2.0 INTRODUCTION

On November 20, 21 & 26, 2003, a series of radio frequency interference measurements was performed on V710, Model Number(s) SUG3171AA, Serial Number: 77047CB2, 77047CB2 & 77047CC2. The tests were performed according to the procedures of the FCC as stated in the "Methods of Measurement of Radio-Noise Emissions for Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" found in the American National Standards Institute, ANSI C63.4-2001. Tests were performed by personnel of D.L.S. Electronic Systems, Inc. who are responsible to Donald L. Sweeney, Senior EMC Engineer.

3.0 OBJECT

The purpose of this series of tests was to determine if the test sample could meet the radio frequency interference emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Sections 15.31(m), 15.203, 15.204, 15.205, 15.207, 15.209 & 15.247 for Intentional Radiators operating in the Bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.



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4.0 TEST SET-UP

All emission tests were performed at D.L.S. Electronic Systems, Inc. and set up according to the American National Standards Institute, ANSI C63.4-2001, Section 8, (Figures 11a and 11b).

All radiated emissions tests were performed with the test item placed on a 80 cm high rotating non-conductive table, located in the test room. Equipment normally operated on the floor was placed on a metal covered turntable which is flush with the surrounding conducting ground plane. The ground plane has an electrical isolation layer over its surface approximately 7 mm thick. The EUT is separated from the turntable ground plane by a non-conductive layer. The equipment under test was set up according to ANSI C63.4-2001, Sections 6 and 8.



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5.0 TEST EQUIPMENT (Bandwidths and Detector Function)

All preliminary data below 1000 MHz was automatically plotted using the HP Spectrum Analyzer or ESI 26/40 Fixed Tuned Receiver. The data was taken using Peak, Quasi-Peak or the Average Detector Functions as required. This information was then used to determine the frequencies of maximum emissions. Above 1000 MHz, final data was taken using the Average Detector.

Below 1000 MHz, final data was taken using the HP Spectrum Analyzer and/or ESI 26/40 Fixed Tuned Receiver. These plots were made using the Peak or Quasi-Peak Detector functions, with manual measurements performed on the questionable frequencies using the Quasi-Peak or the Average Detector Function of the Analyzer or ESI 26/40 Fixed Tuned Receiver as required. Above 1000 MHz, final data was taken using the Average Detector on the Spectrum Analyzer.

The bandwidths shown below are specified by ANSI C63.4-2001, Section 4.2.

Frequency Range	Bandwidth (-6 dB)
10 to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
30 MHz to 1 GHz	120 kHz
Above 1 GHz	1 MHz

A list of the equipment used can be found in Table 1. All primary equipment was calibrated against known reference standards with a verified traceable path to NIST.



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6.0 AMBIENT MEASUREMENTS

For emissions measurements, broadband antennas and an EMI Test Receiver with a panoramic spectrum display are used. First the frequency range is scanned and displayed on the test receiver display. Next the scanned frequency range is divided into smaller ranges, and then it is manually tuned through to determine the emissions from the EUT. A headset or loudspeaker is connected to the test receiver's AM/FM demodulated output as an aid in detecting ambient signals and finding frequencies of significant emission from the EUT. If there is any doubt as to the source of the emission, it is further investigated by rotating the EUT, or by disconnecting the power from the EUT.

The EUT is set up in its typical configuration and operated in its various modes. For tabletop systems, cables are manipulated within the range of likely configurations. For floor-standing equipment, the cables or are located in the same manner as the user would install them and no further manipulation is made. If the manner of cable installation is not known, or if it changes with each installation, cables or wires for floor-standing equipment shall be manipulated to the extent possible to produce the maximum level of emissions. For each mode of operation, the frequency spectrum is monitored. Variations in antenna height, antenna polarization, EUT azimuth, and cable or wire placement (each variable within bounds specified elsewhere) are explored to produce the emission that has the highest amplitude relative to the limit. These methods are performed to the specifications in ANSI C63.4: 2001.



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7.0 DESCRIPTION OF TEST SAMPLE: (See also Paragraph 8.0)

7.1 Description:

The sample tested is a mobile phone. It is capable of making wireless connection with a base station for the purpose of voice or data connectivity. The phone is a dual mode, triband (AMPS, CDMA 800 & PCS 1900) system with capability for GPS and Bluetooth.



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7.0 DESCRIPTION OF TEST SAMPLE: (CON'T)

7.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

.93 long x .5 wide x .23 high

7.3 LINE FILTER USED:

NA

7.4 INTERNAL CLOCK FREQUENCIES:

Switching Power Supply Frequencies:

NA

Clock Frequencies:

19.2 MHz



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7.0 DESCRIPTION OF TEST SAMPLE: (CON'T)

7.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

1. Main PCB

PN: 8489474N02 P2



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8.0 ADDITIONAL DESCRIPTION OF TEST SAMPLE:
(See also Paragraph 7.0)

1: There were no changes made at D.L.S. Electronic Systems, Inc.

I certify that the above, as described in paragraph 7.0, describes the equipment tested and will be manufactured as stated.

By: _____
Signature Title

For: _____
Company Date



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9.0 PHOTO INFORMATION AND TEST SET-UP

Item 0 V710

Model Number: SUG3171AA Serial Number: 77047CB2
77047CB2 & 77047CC2

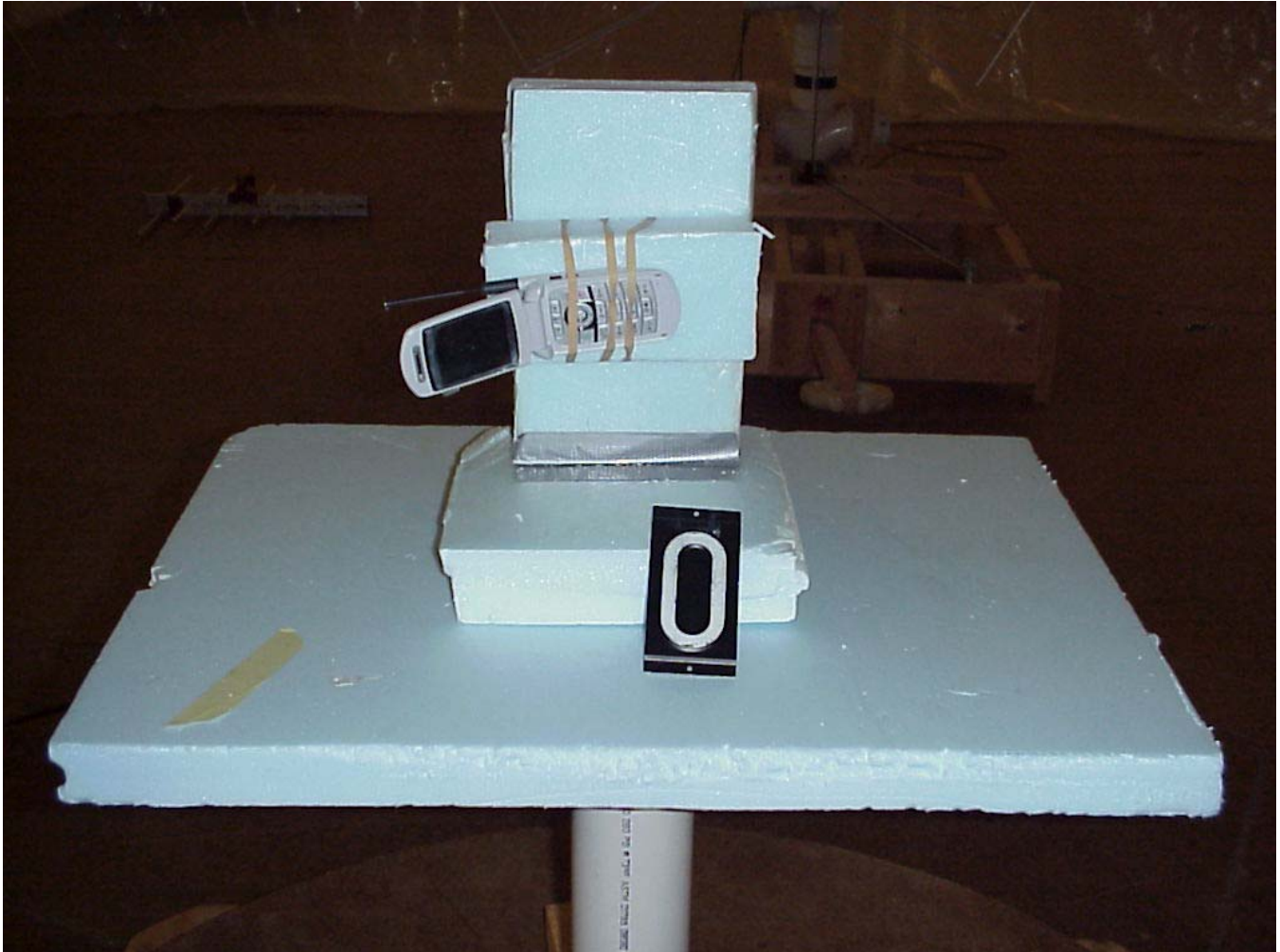
1250 Peterson Dr., Wheeling, IL 60090

10.0 RADIATED PHOTOS TAKEN DURING TESTING



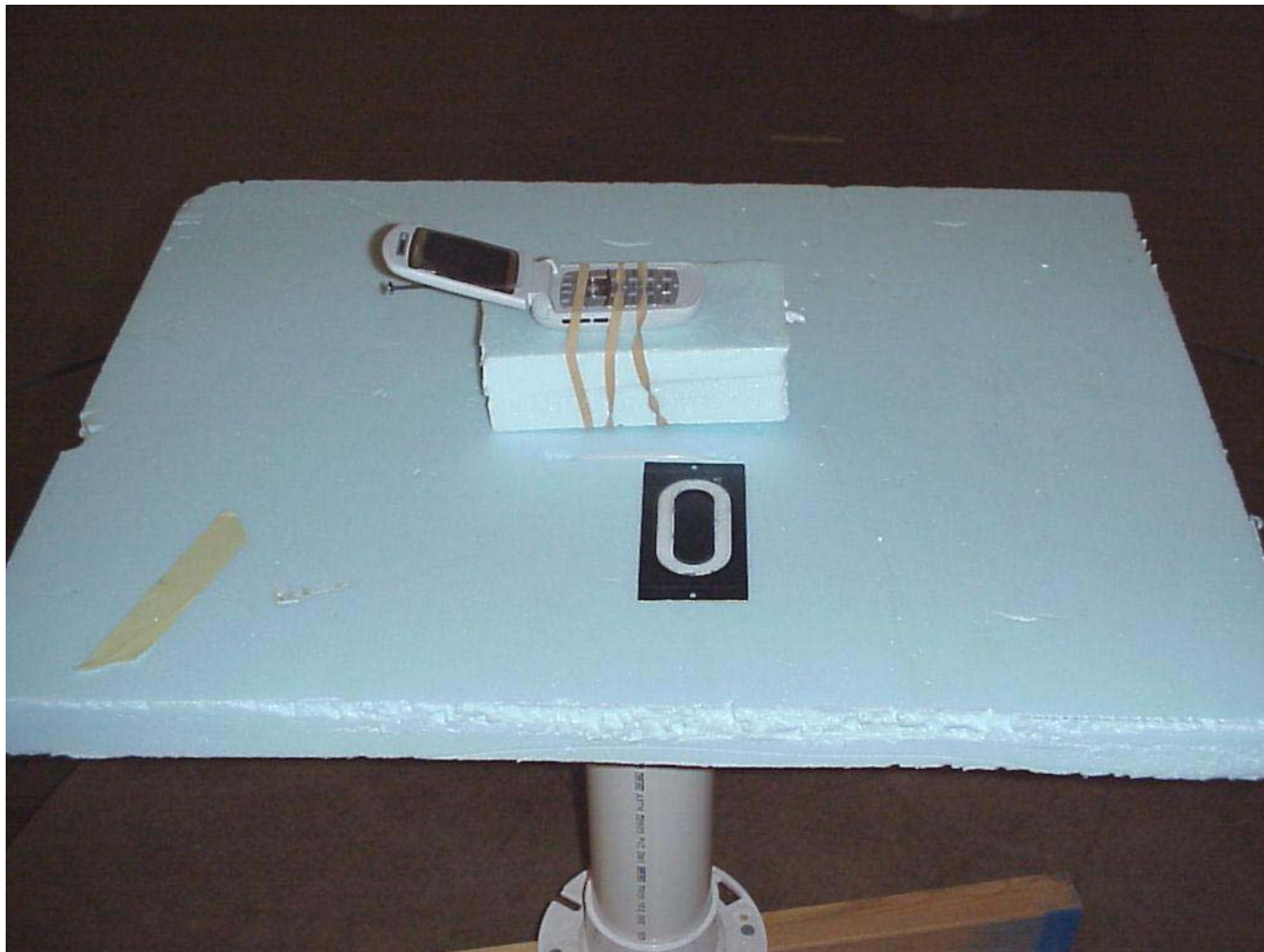
1250 Peterson Dr., Wheeling, IL 60090

10.0 RADIATED PHOTOS TAKEN DURING TESTING



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10.0 RADIATED PHOTOS TAKEN DURING TESTING





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Model Tested: V710
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11.0 RESULTS OF TESTS

The radio interference emission charts results can be seen on the pages at the end of this report. Data sheets indicating the test measurements taken during testing can also be found at the end of this report.

12.0 CONCLUSION

It was found that the V710, Model Number(s) SUG3171AA "meets" the radio interference radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.247 for operational in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz, Bands.



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TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
Spectrum Analyzer	Hewlett/ Packard	8566B	2240A002041	100 Hz – 22 GHz	10/04
Quasi-Peak Adapter	Hewlett/ Packard	85650A	2043A00121	10 kHz – 1 GHz	10/04
Spectrum Analyzer	Hewlett/ Packard	8566B	2421A00452	100 Hz – 22 GHz	2/04
Quasi-Peak Adapter	Hewlett/ Packard	85650A	2043A00450	10 kHz – 1 GHz	2/04
Spectrum Analyzer	Hewlett/ Packard	8591A	3009A00700	9 kHz – 1.8 GHz	3/04
Receiver	Electrometrics	EMC-30	44168	10 kHz – 1 GHz	9/04
Receiver	Rohde & Schwarz	ESI 26	837491/010	20 Hz – 26 GHz	11/04
Receiver	Rohde & Schwarz	ESI 40	837808/006	20 Hz – 40 GHz	12/03
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	12/03
Antenna	EMCO	3104C	00054891	20 MHz – 200 MHz	2/04
Antenna	Electrometrics	LPA-25	1114	200 MHz – 1 GHz	3/04
Antenna	EMCO	3104C	00054892	20 MHz – 200 MHz	3/04

All primary equipment is calibrated against known reference standards with a verified traceable path to NIST.



Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
Antenna	Electrometrics	3146	1205	200 MHz – 1 GHz	3/04
Antenna	EMCO	3104C	97014785	20 MHz – 200 MHz	2/04
Antenna	EMCO	3146	97024895	200 MHz – 1 GHz	3/04
Antenna	EMCO	3115	2479	1 GHz – 18 GHz	8/04
Antenna	EMCO	3115	99035731	1 GHz – 18 GHz	4/04
Antenna	Rohde & Schwarz	HUF-Z1	829381001	20 MHz – 1 GHz	2/04
Antenna	Rohde & Schwarz	HUF-Z1	829381005	20 MHz – 1 GHz	8/04
Bluetooth Tester	Anritsu	MT8850A	6K00000157	NA	12/03

All primary equipment is calibrated against known reference standards with a verified traceable path to NIST.



Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

TEST PROCEDURE

Part 15, Subpart C, Section 15.247 (a-h)

OPERATION WITHIN THE BAND 902-928 MHz, 2400-2483.5 MHz
AND 5725-5857 MHz



Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

1.0 CONDUCTED EMISSION MEASUREMENTS

If applicable, the conducted emissions were measured over the frequency range from 0.45 MHz to 30 MHz in accordance with the power line measurements as specified in the American National Standards Institute, ANSI C63.4-2001, Section 12. Since the device is operated from the public utility lines, the 115 Vac 60 Hz power leads, high and low sides, were to be measured by connecting the measuring equipment to the appropriate meter terminal of the LISN. All signals were then recorded. The allowed levels for Intentional Radiators cannot exceed 250 uV (47.96 dBuV) at any frequency between 450 kHz and 30MHz, as stated in Section 15.207a.

NOTE:

This device is battery operated, therefore the conducted emissions tests are not required.



Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

DATA AND GRAPH(S) TAKEN DURING TESTING

PART 15.207

NOTE:

This device is battery operated, therefore the conducted emissions tests are not required.



Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

2.0 SPURIOUS EMISSIONS AT ANTENNA TERMINALS – PART 15.247(c)

Spurious conducted emissions were measured at the antenna terminals. Plots were made showing the amplitude of each harmonic emission with the equipment operated. As shown by the radiated charts there was no reason to believe that there were any spurious emissions other than the harmonics that were than individually investigated when doing the conducted test at the antenna terminals. Measurements were made up to the 10th harmonic of the fundamental.

The allowed emissions for transmitters operating in the bands for V710 equipment are found under Part 15, Section 15.247(c). This paragraph states that in any 100 kHz bandwidth outside the frequency band which the spread spectrum intentional radiator is operating, the radio frequency power 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.

NOTE: See the following pages for the data and graphs of the actual measurements made:



Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

CONDUCTED EMISSION DATA AND GRAPH(S) TAKEN FOR

SPURIOUS EMISSION MEASUREMENTS MADE

AT THE ANTENNA TERMINALS

PART 15.247(c)

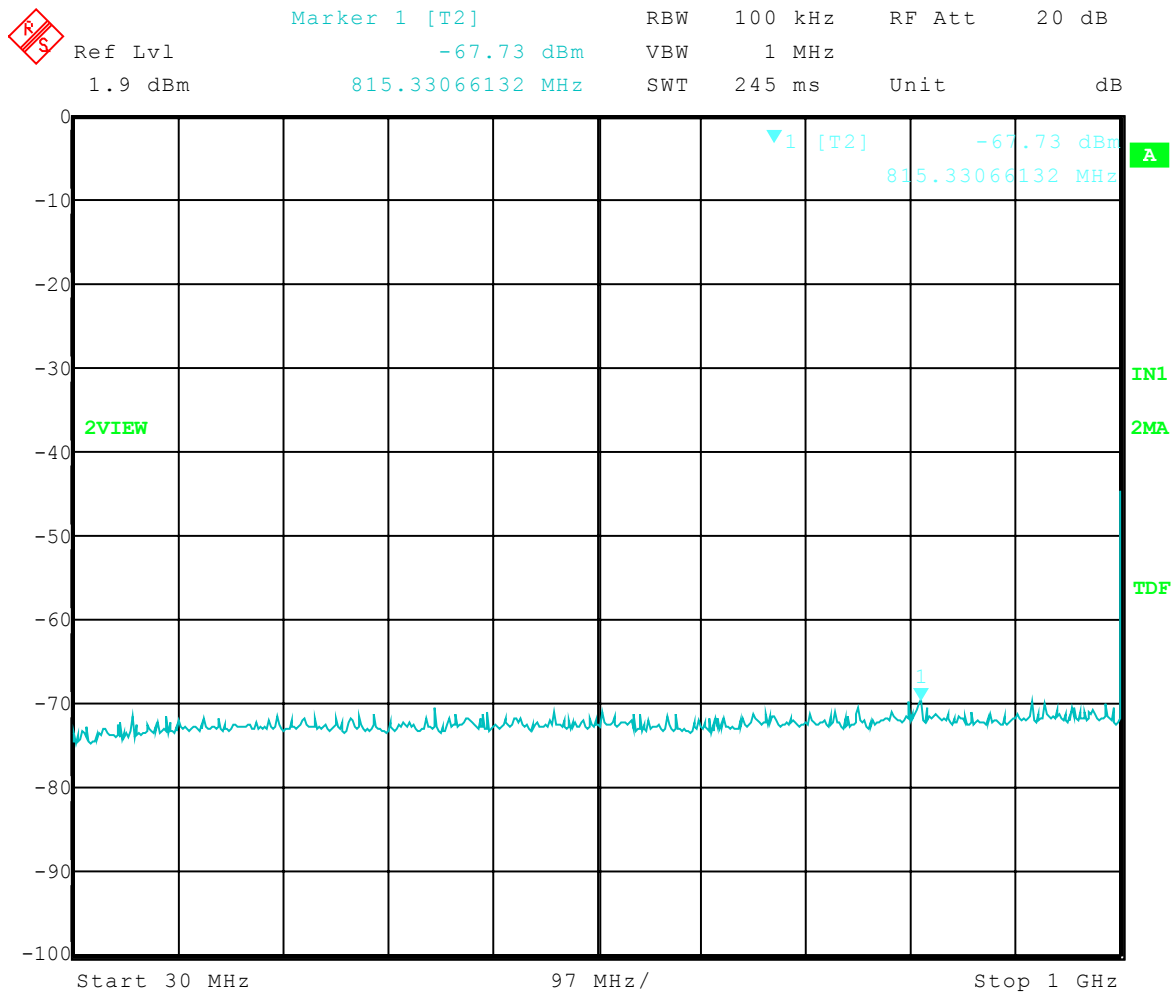


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-26-03
EUT: V710
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: Frequency Range: 30 to 1000 MHz
Chart is Relative to Peak Level of In Band Frequency
Limit = -20 dBi

All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



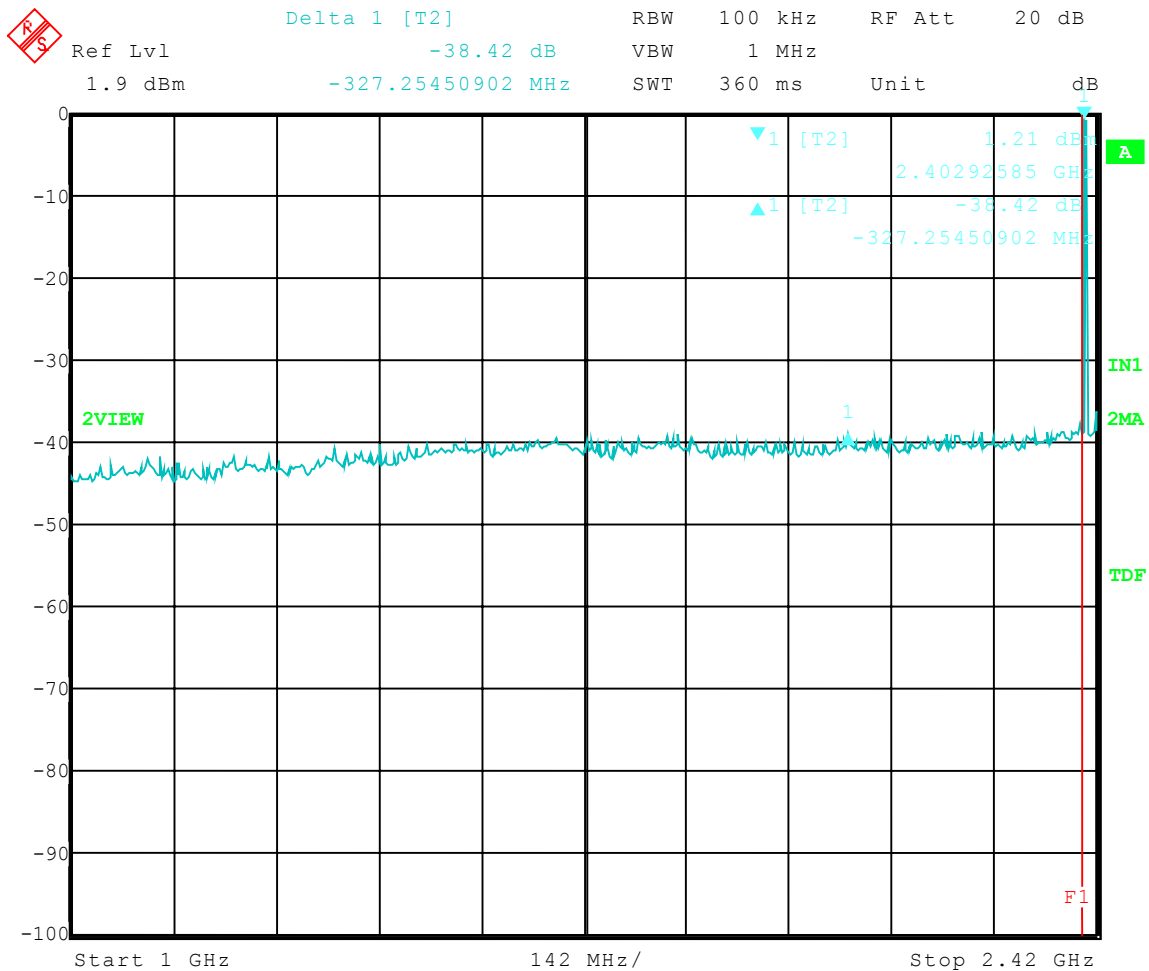
Date: 26.NOV.2003 09:30:29



Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-26-03
EUT: V710
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: Frequency Range: 1 to 2.42 GHz
Chart is Relative to Peak Level of In Band Frequency
Limit = -20 dB
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



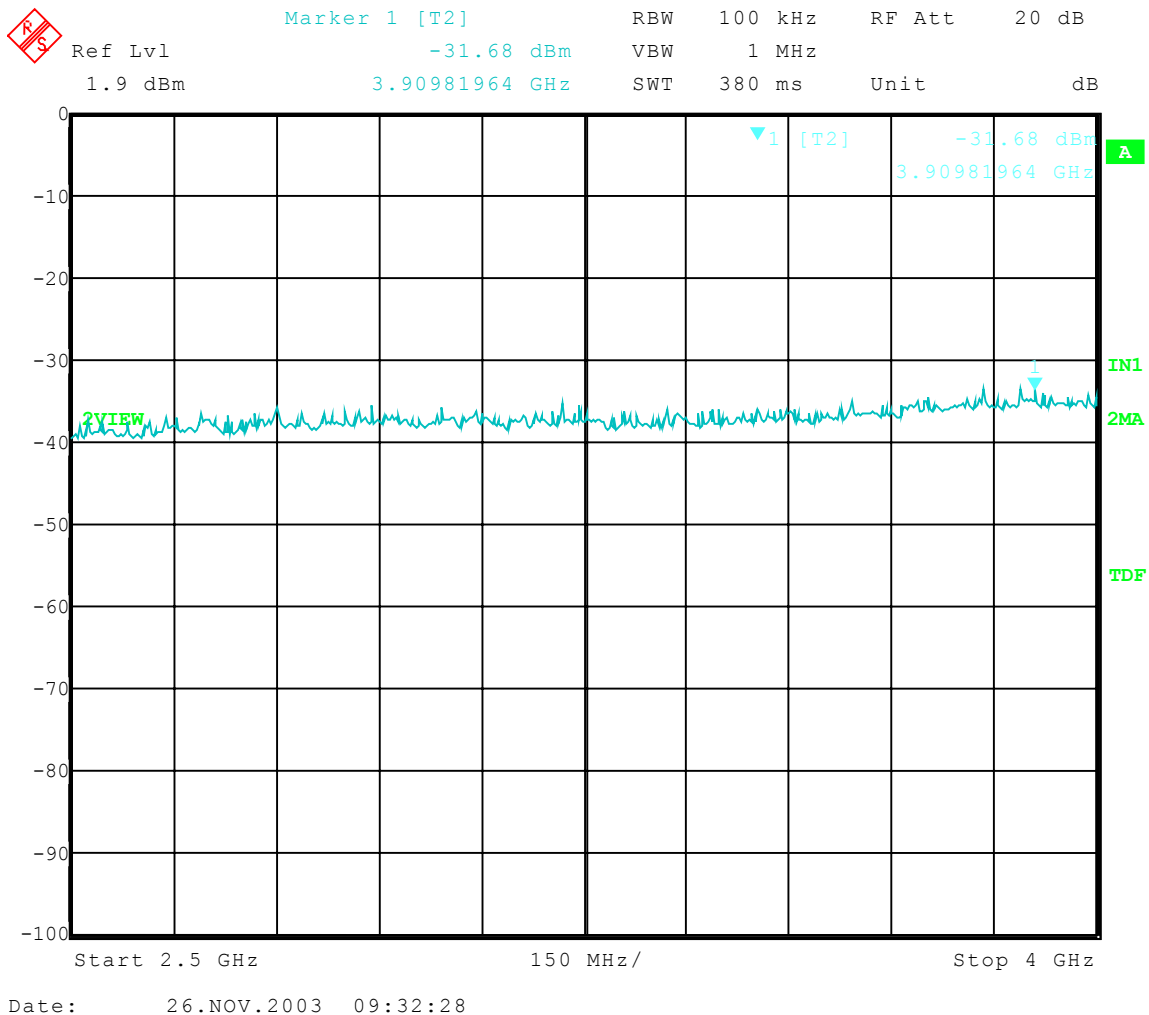
Date: 26.NOV.2003 09:29:15



Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-26-03
EUT: V710
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: Frequency Range: 2.5 to 4.0 GHz
Chart is Relative to Peak Level of In Band Frequency
Limit = -20 dBi
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency

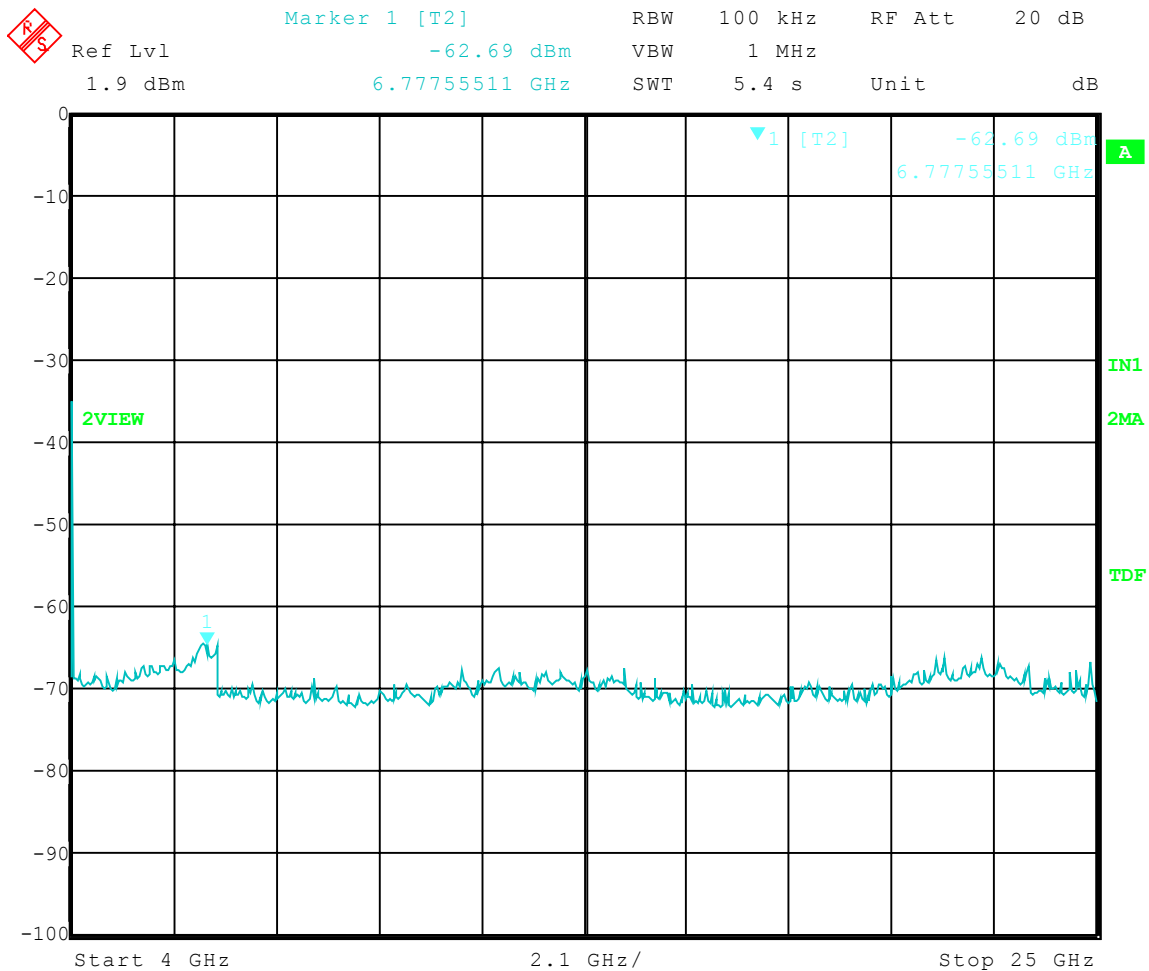




Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-26-03
EUT: V710
Test: Spurious Emissions - Conducted
Operator: Jason L.
Comment: Frequency Range: 4 to 25 GHz
Chart is Relative to Peak Level of In Band Frequency
Limit = -20 dBi
All Spurious Emissions at Least 20 dB below Peak Level of In Band Frequency



Date: 26.NOV.2003 09:33:17

1250 Peterson Dr., Wheeling, IL 60090

3.0 CONDUCTED EMISSIONS (ANTENNA TERMINAL) PHOTOS TAKEN DURING TESTING





Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

4.0 RESTRICTED BANDS

As stated in Section 15.205a, the fundamental emission from the V710 shall not fall within any of the bands listed below:

Frequency in MHz	Frequency in MHz	Frequency in MHz	Frequency in GHz
.0900 to .1100	162.0125 to 167.17	2310.0 to 2390	9.30 to 9.50
.4900 to .5100	167.7200 to 173.20	2483.5 to 2500	10.60 to 12.70
2.1735 to 2.1905	240.000 to 285.00	2655.0 to 2900	13.25 to 13.40
8.362 to 8.3660	322.200 to 335.40	3260.0 to 3267	14.47 to 14.50
13.36 to 13.410	399.900 to 410.00	3332.0 to 3339	15.35 to 16.20
25.50 to 25.670	608.000 to 614.00	3345.8 to 3358	17.70 to 21.40
37.50 to 38.250	960.000 to 1240.00	3600.0 to 4400	22.01 to 23.13
73.00 to 75.500	1300.000 to 1427.00	4500.0 to 5250	23.60 to 24.00
108.00 to 121.94	1435.000 to 1626.50	5350.0 to 5450	31.20 to 31.80
123.00 to 138.00	1660.000 to 1710.00	7250.0 to 7750	36.43 to 36.50
149.90 to 150.00	1718.800 to 1722.20	8025.0 to 8500	ABOVE 38.60
156.70 to 156.90	2200.000 to 2300.00	9000.0 to 9200	

NOTE:

The noise floor within the Restricted Bands for the EMC Receiver and HP Spectrum Analyzer will typically lay 20 dB below the limit.

5.0 BAND EDGE AND RESTRICT BAND COMPLIANCE

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the attenuation below the general limits specified in 15.209 is not required.

The field strength of any **radiated emissions** which fall within the restricted bands shall not exceed the general radiated emissions limits as stated Section 15.209.

NOTE: See the following page(s) for the graph(s) made showing compliance for Band Edge and Restrict Band:



Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

**DATA AND GRAPH(S) TAKEN SHOWING
THE BAND EDGE AND RESTRICT BAND COMPLIANCE**

PART 15.247(c)

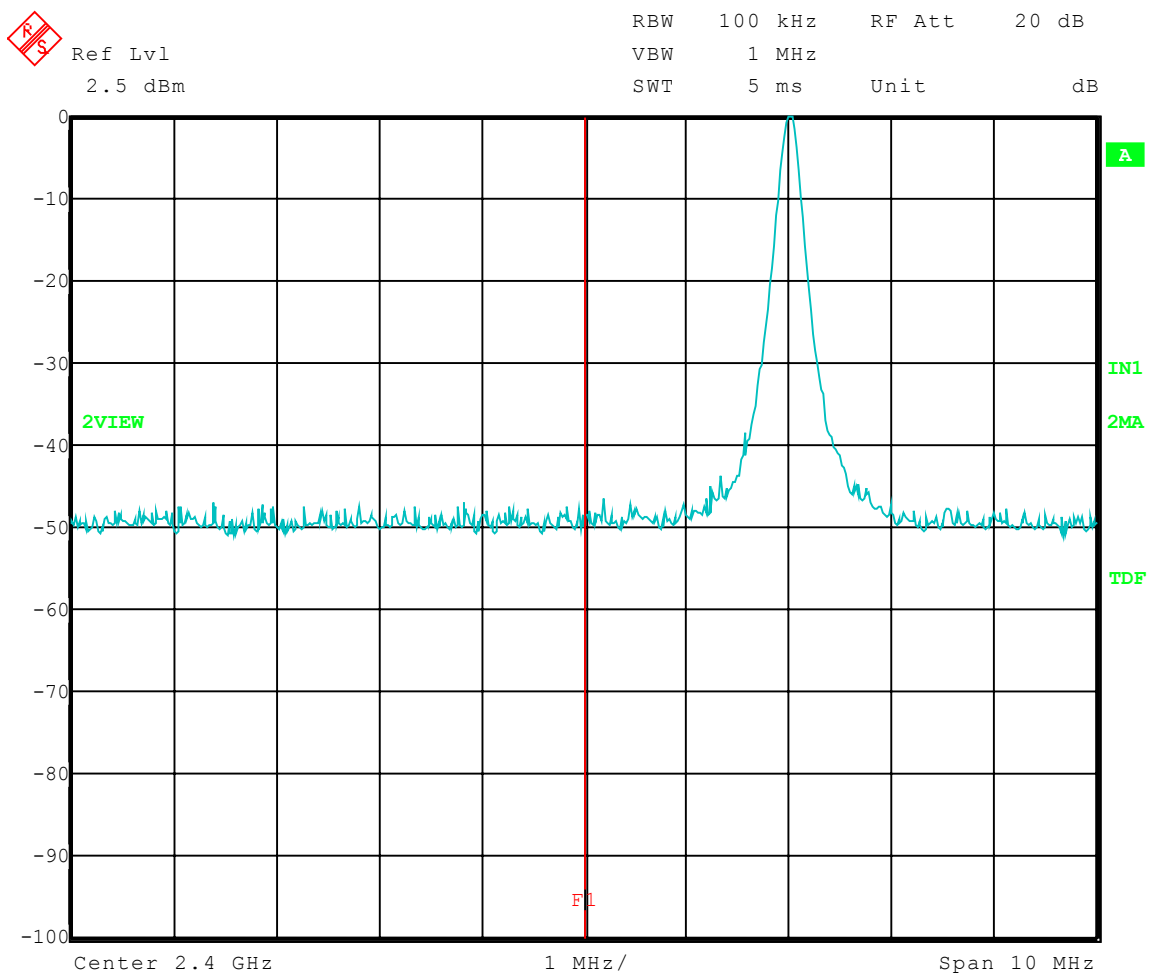


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-20-03
EUT: V710
Test: Low Band-Edge Compliance - Conducted
Operator: Jason L.
Comment: Bluetooth Channel 0: Frequency – 2.402 GHz

Band-Edge Frequency = 2.400 GHz
Band-Edge > 40 dB Below Peak In-Band Emission



Date: 20.NOV.2003 13:24:33

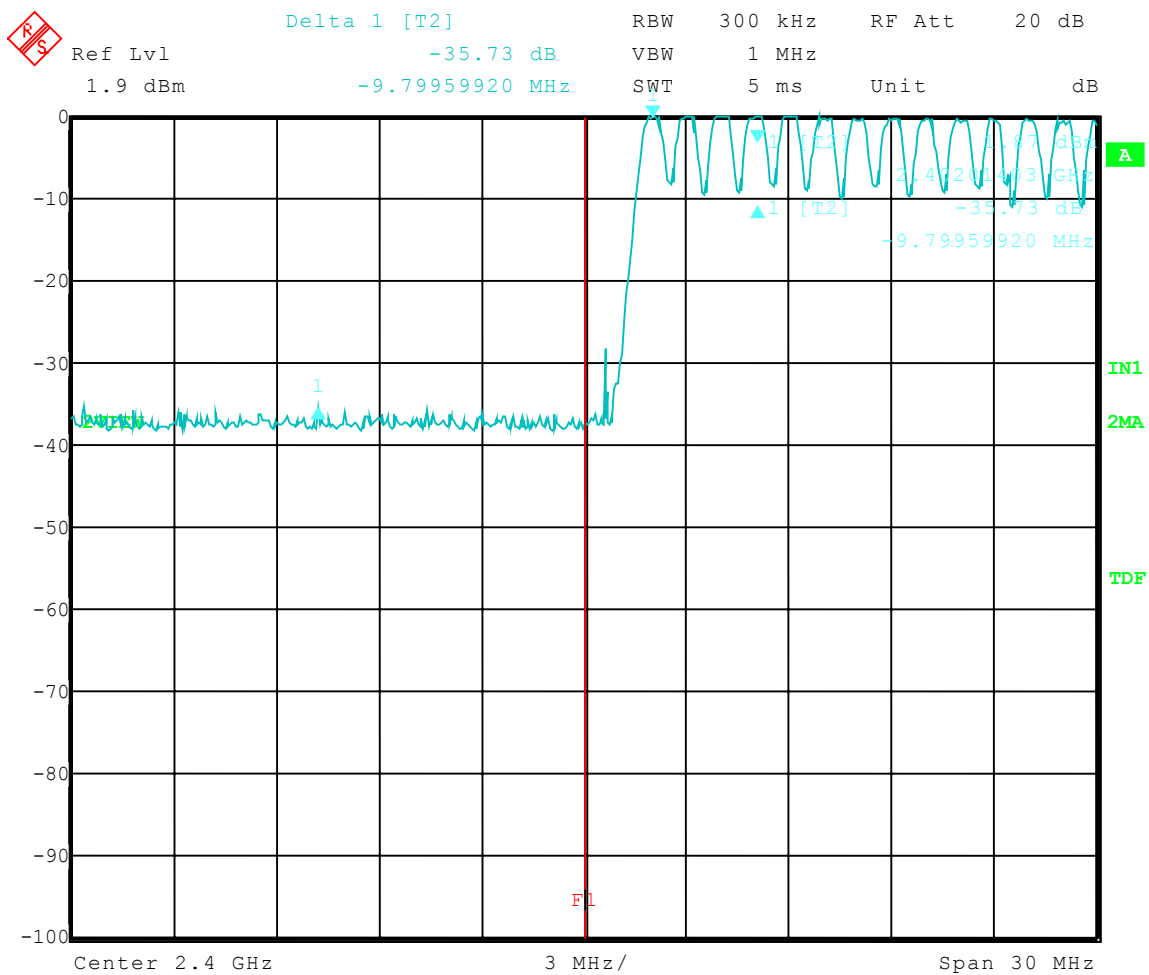


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-26-03
EUT: V710
Test: Low Band-Edge Compliance - Conducted
Operator: Jason L.
Comment: Bluetooth DH5 Mode: Frequency Hopping Turned On

Band-Edge Frequency = 2.400 GHz
Band-Edge > 35 dB Below Peak In-Band Emission



Date: 26.NOV.2003 09:27:13

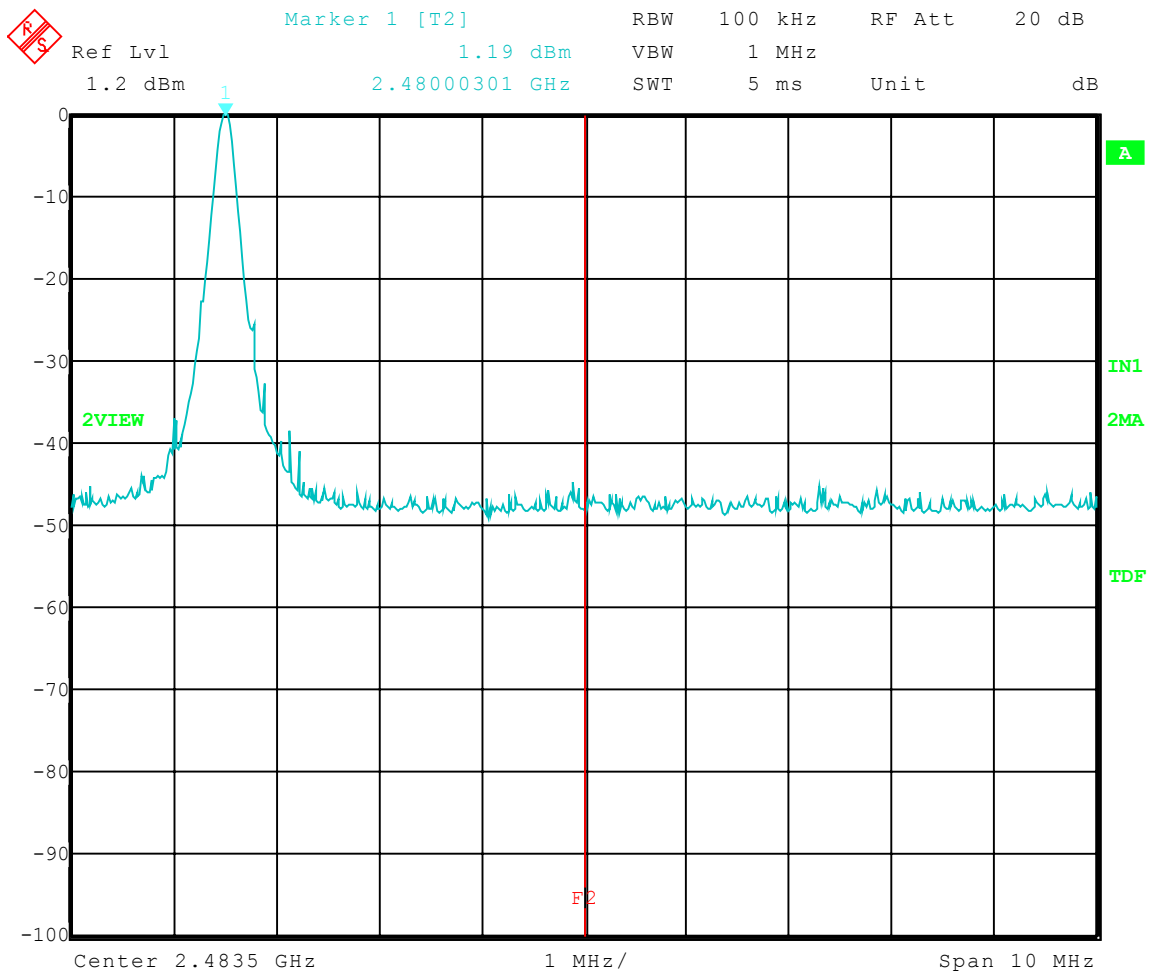


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-20-03
EUT: V710
Test: High Band-Edge Compliance - Conducted
Operator: Jason L.
Comment: Bluetooth Channel 78: Frequency – 2.480 GHz

Band-Edge Frequency = 2.4835 GHz
Band-Edge > 40 dB Below Peak In-Band Emission



Date: 20.NOV.2003 13:42:08

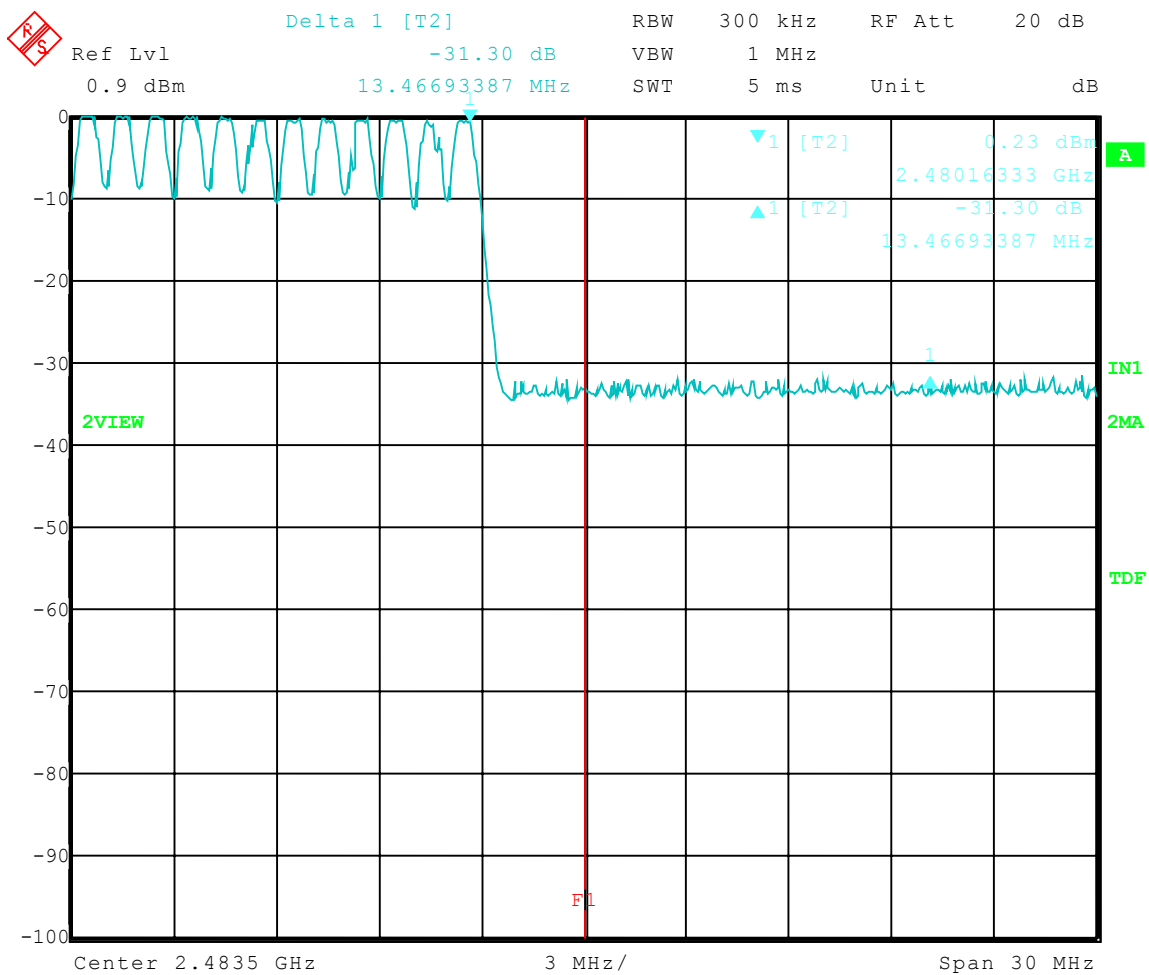


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-26-03
EUT: V710
Test: High Band-Edge Compliance - Conducted
Operator: Jason L.
Comment: Bluetooth DH5 Mode: Frequency Hopping Turned On

Band-Edge Frequency = 2.4835 GHz
Band-Edge > 30 dB Below Peak In-Band Emission



Date: 26.NOV.2003 09:22:27



Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

6.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS

The radiated measurements made at D.L.S. Electronic Systems, Inc., for the V710, Model Number: SUG3171AA, are shown in tabulated and graph form. Preliminary radiation measurements were performed at a three meter test distance with the limits adjusted linearly when required. The frequency range from 30 MHz to over 960 MHz, depending upon the fundamental frequency as stated in Part 15.33a, was automatically scanned and plotted at various angles.

Measurements for the V710 were made up to 25000 MHz, in accordance with Section 15.33a for Intentional Radiators with a fundamental frequency of 2402, 2441, & 2480 MHz. For intentional radiators, the frequency range to be investigated is determined by the lowest radio frequency generated by the device without going below 30 MHz, up to at least the tenth harmonic of the highest fundamental frequency or 10 GHz, whichever is lower. At those frequencies where significant signals were detected, measurements were made over the entire frequency range specified in FCC Part 15, Subpart C, Section 15.247 at the open field test site, located at Genoa City, Wisconsin, FCC file number **31040/SIT**. When required, levels were extrapolated from 10 meters to 3 meters using a linear extrapolation.

All signals in the frequency range of 30 MHz to 2000 MHz were measured with a Biconical Antenna or tuned dipoles and from 200 MHz to 1000 MHz, a Log Periodic or Tuned Dipoles were used. From 1000 MHz to 25 GHz Horn Antennas were used. During the test the equipment was rotated and the antenna was raised and lowered from 1 meter to 4 meters to find the maximum level of emissions. In order to find maximum emissions, the cables were moved through all the positions the equipment would be expected to experience in the field. The EUT, peripheral equipment and cables were configured to meet the conditions in ANSI C63.4-2001, Clauses 6 & 8. Tests were made with the receive antenna(s) in both the horizontal and vertical planes of polarization. In each case, the table was rotated to find the maximum emissions.



Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

6.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS (CON'T)

As stated in Section 15.247(b) the allowed maximum peak output power of the transmitter shall not exceed 1 Watt. In any 100 kHz bandwidth outside these frequency bands (the power that is produced by the modulation products of the spreading sequence), the information sequence and the carrier frequency shall be either at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Attenuation below the general limits specified in 15.209 is not required.

Field strength limits are at a distance of 3 meters. The emission limits shown are based on measurement instrumentation employing an average detector.

Emissions radiated outside of the specified frequency bands, except for harmonics are attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Preliminary radiated emission measurements were performed at a three meter test distance. The frequency range from 30 MHz to 1000 MHz was automatically scanned and plotted at various angles.

NOTE:

All radiated emissions measurements were made at a test room temperature of **70°F** at **35%** relative humidity. The test room temperature and humidity are regulated to be within the specifications required for this test.



Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

RADIATED DATA TAKEN FOR

FIELD STRENGTH

SPURIOUS EMISSION MEASUREMENTS

PART 15.209



Company: Motorola
 Model Tested: V710
 Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

*FCC Part 15.209 Class B
 Electric Field Strength*

EUT: V710
 Manufacturer: Motorola Inc
 Operating Condition: 70 deg F; 35% R.H.
 Test Site: DLS OF Site 3
 Operator: Jason L
 Test Specification: Nominal Battery: 3.6Vdc
 Comment: Tx Low Channel 0: Freq. 2402 MHz
 Date: 11/21/03

NOTE:

- 1) The Spectrum was investigated from 30 MHz to the 10th Harmonic of the fundamental.
- 2) Spurious emissions noise floor is at least 20 dB below the limit.

Vertical Antenna Polarization

Frequency MHz	Level dBμV	Antenna Factor dBμV/m	System Loss dB	Total Level dBμV/m	Limit dBμV/m	Margin dB	Height Ant. m	EuT Ang. deg	Final Detector	Comment
4804	60.37	33.81	-36.9	57.3	73.9	16.6	1.3	180	MAX PEAK	2nd Harmonic
4804	48.24	33.81	-36.9	45.2	53.9	8.7	1.3	180	AVERAGE	2nd Harmonic

Horizontal Antenna Polarization

Frequency MHz	Level dBμV	Antenna Factor dBμV/m	System Loss dB	Total Level dBμV/m	Limit dBμV/m	Margin dB	Height Ant. m	EuT Ang. deg	Final Detector	Comment
4803.9	62.48	33.81	-36.9	59.4	73.9	14.5	1.3	170	MAX PEAK	2nd Harmonic
4803.9	50.41	33.81	-36.9	47.4	53.9	6.5	1.3	170	AVERAGE	2nd Harmonic



Company: Motorola
 Model Tested: V710
 Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

*FCC Part 15.209 Class B
 Electric Field Strength*

EUT: V710
 Manufacturer: Motorola Inc
 Operating Condition: 70 deg F; 35% R.H.
 Test Site: DLS OF Site 3
 Operator: Jason L
 Test Specification: Nominal Battery: 3.6Vdc
 Comment: Tx Mid Channel 39: Freq. 2441 MHz
 Date: 11/21/03

NOTE:

- 3) The Spectrum was investigated from 30 MHz to the 10th Harmonic of the fundamental.
- 4) Spurious emissions noise floor is at least 20 dB below the limit.

Vertical Antenna Polarization

Frequency MHz	Level dBμV	Antenna Factor dBμV/m	System Loss dB	Total Level dBμV/m	Limit dBμV/m	Margin dB	Height Ant. m	EuT Ang. deg	Final Detector	Comment
4882	62.21	34.05	-36.9	59.3	73.9	14.6	1.4	160	MAX PEAK	2nd Harmonic
4882	50.34	34.05	-36.9	47.4	53.9	6.5	1.4	160	AVERAGE	2nd Harmonic

Horizontal Antenna Polarization

Frequency MHz	Level dBμV	Antenna Factor dBμV/m	System Loss dB	Total Level dBμV/m	Limit dBμV/m	Margin dB	Height Ant. m	EuT Ang. deg	Final Detector	Comment
4882	63.7	34.05	-36.9	60.8	73.9	13.1	1.3	200	MAX PEAK	2nd Harmonic
4882	51.82	34.05	-36.9	48.9	53.9	5	1.3	200	AVERAGE	2nd Harmonic



Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

FCC Part 15.209 Class B
Electric Field Strength

EUT: V710
Manufacturer: Motorola Inc
Operating Condition: 70 deg F; 35% R.H.
Test Site: DLS OF Site 3
Operator: Jason L
Test Specification: Nominal Battery: 3.6Vdc
Comment: Tx High Channel 78: Freq. 2480 MHz
Date: 11/21/03

NOTE:

- 5) The Spectrum was investigated from 30 MHz to the 10th Harmonic of the fundamental.
- 6) Spurious emissions noise floor is at least 20 dB below the limit.

Vertical Antenna Polarization

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Ang.	Final Detector	Comment
MHz	dB μ V	dB μ V/m	dB	dB μ V/m	dB μ V/m	dB	m	deg		
4960	59	34.28	-37.1	56.2	73.9	17.7	1.3	180	MAX PEAK	2nd Harmonic
4960	46.85	34.28	-37.1	44	53.9	9.9	1.3	180	AVERAGE	2nd Harmonic

Horizontal Antenna Polarization

Frequency	Level	Antenna Factor	System Loss	Total Level	Limit	Margin	Height Ant.	EuT Ang.	Final Detector	Comment
MHz	dB μ V	dB μ V/m	dB	dB μ V/m	dB μ V/m	dB	m	deg		
4882	62.21	34.05	-36.9	59.3	73.9	14.6	1.4	160	MAX PEAK	2nd Harmonic
4882	50.34	34.05	-36.9	47.4	53.9	6.5	1.4	160	AVERAGE	2nd Harmonic

1250 Peterson Dr., Wheeling, IL 60090

7.0 RADIATED EMISSIONS PHOTOS TAKEN DURING TESTING





Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

CONDUCTED PEAK OUTPUT POWER GRAPHS

PART 15.247

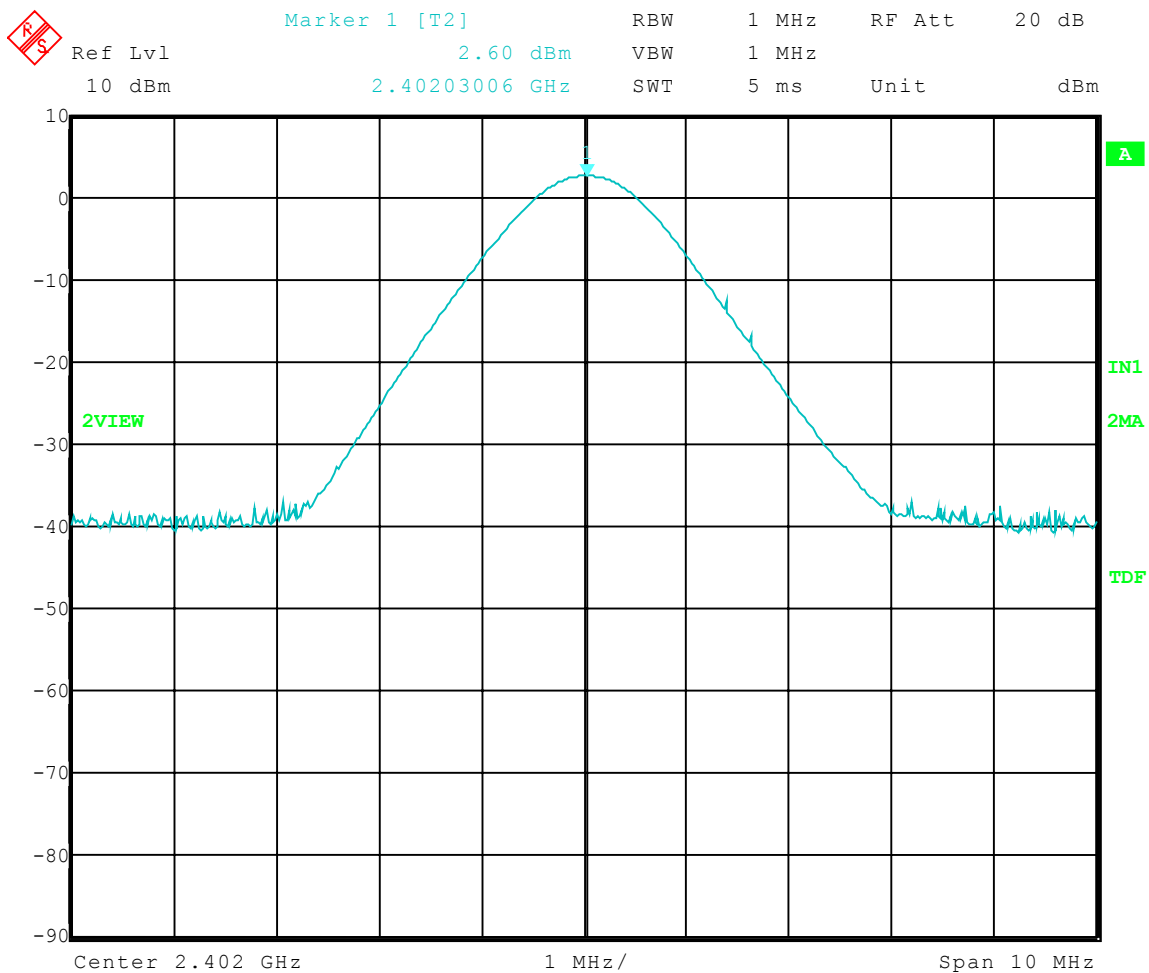


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-20-03
EUT: V710
Test: Peak Output Power - Conducted
Operator: Jason L.
Comment: Bluetooth Channel 0: Frequency – 2.402 GHz

Peak Output Power = 2.60 dBm = 1.82 mW



Date: 20.NOV.2003 13:14:36

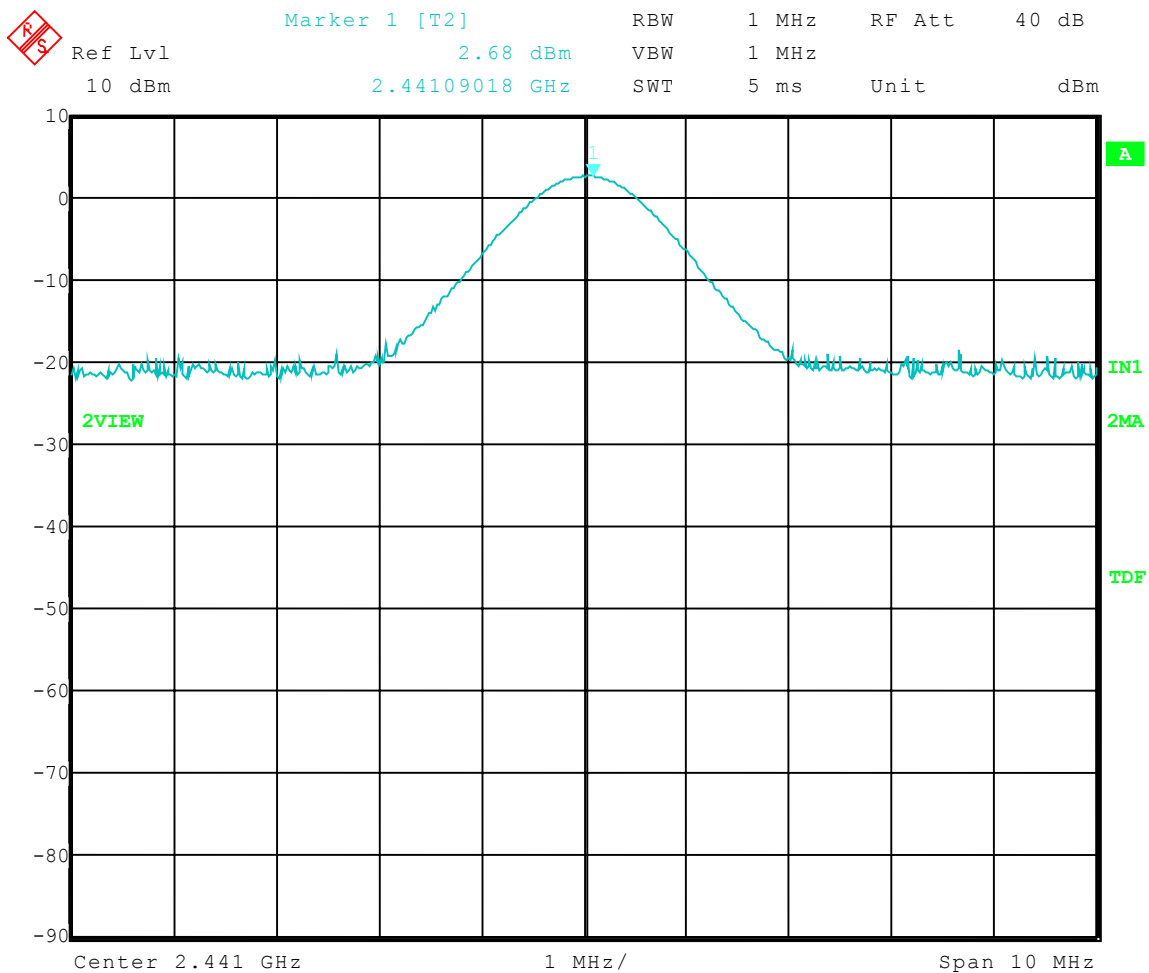


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-20-03
EUT: V710
Test: Peak Output Power - Conducted
Operator: Jason L.
Comment: Bluetooth Channel 39: Frequency – 2.441 GHz

Peak Output Power = 2.68 dBm = 1.85 mW



Date: 20.NOV.2003 10:14:06

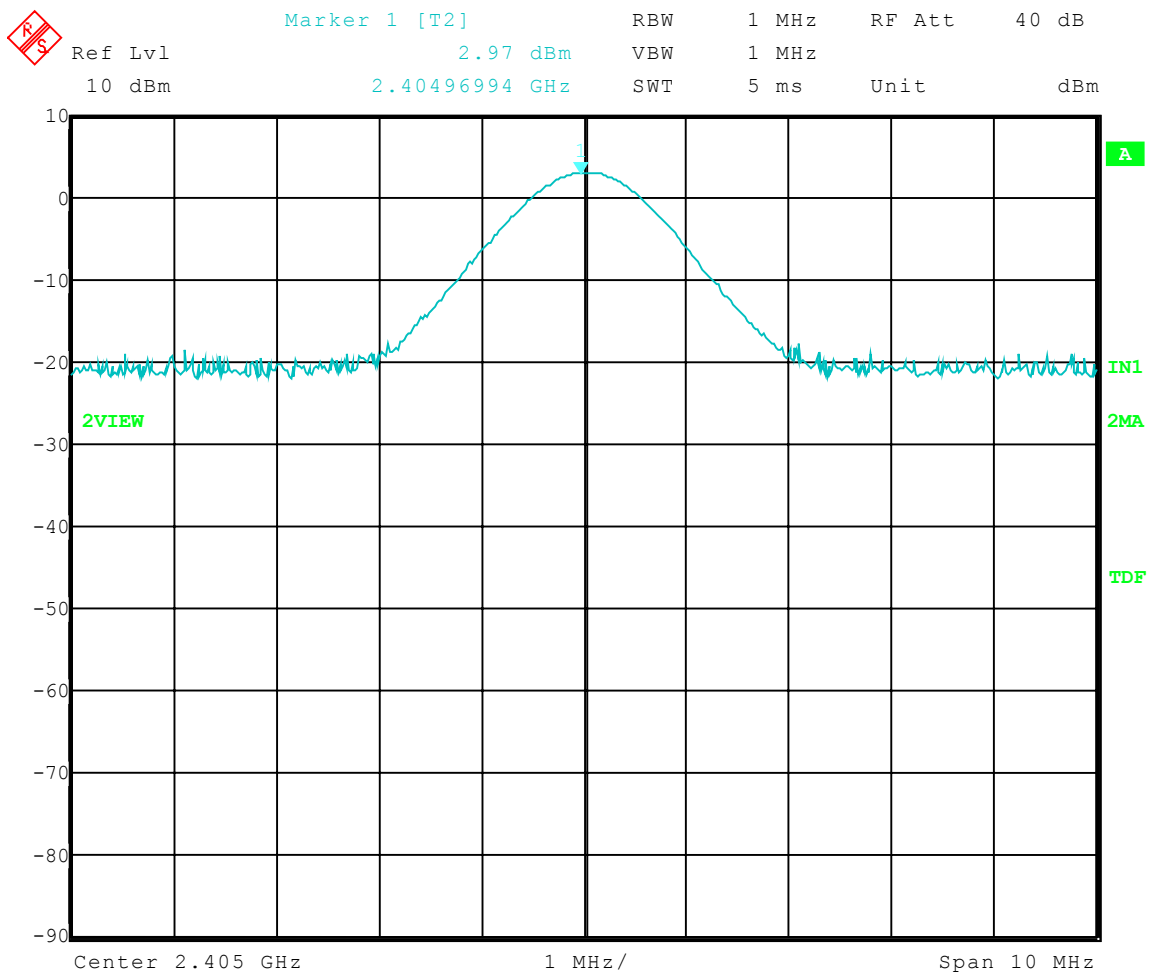


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-20-03
EUT: V710
Test: Peak Output Power - Conducted
Operator: Jason L.
Comment: Bluetooth Channel 78: Frequency – 2.480 GHz

Peak Output Power = 2.97 dBm = 1.98 mW



Date: 20.NOV.2003 10:12:38



Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

20 dB BANDWIDTH GRAPHS

PART 15.247

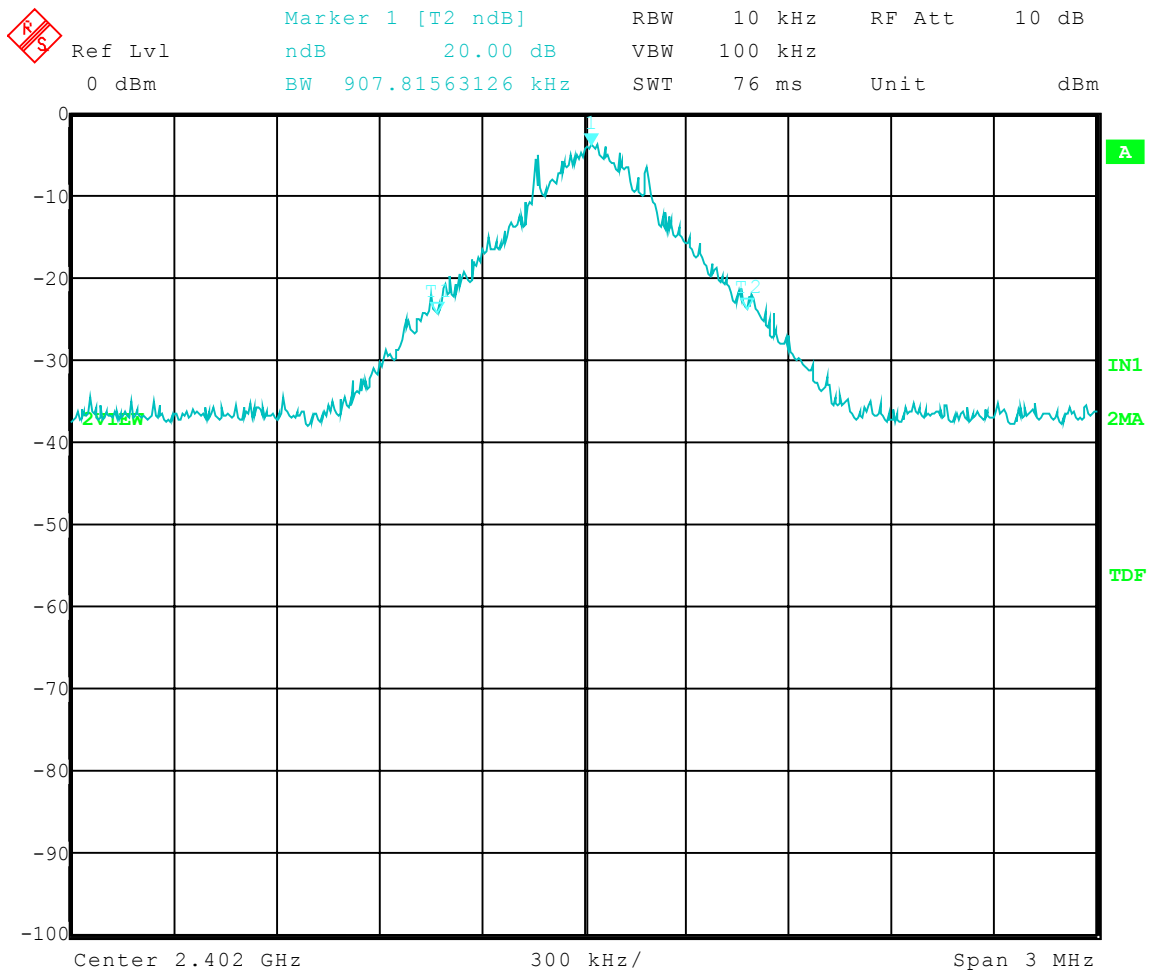


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-26-03
EUT: V710
Test: 20 dB Bandwidth - Conducted
Operator: Jason L.
Comment: Bluetooth Channel 0: Frequency – 2.402 GHz

20 dB Bandwidth = 907.8 kHz



Date: 26.NOV.2003 08:23:23

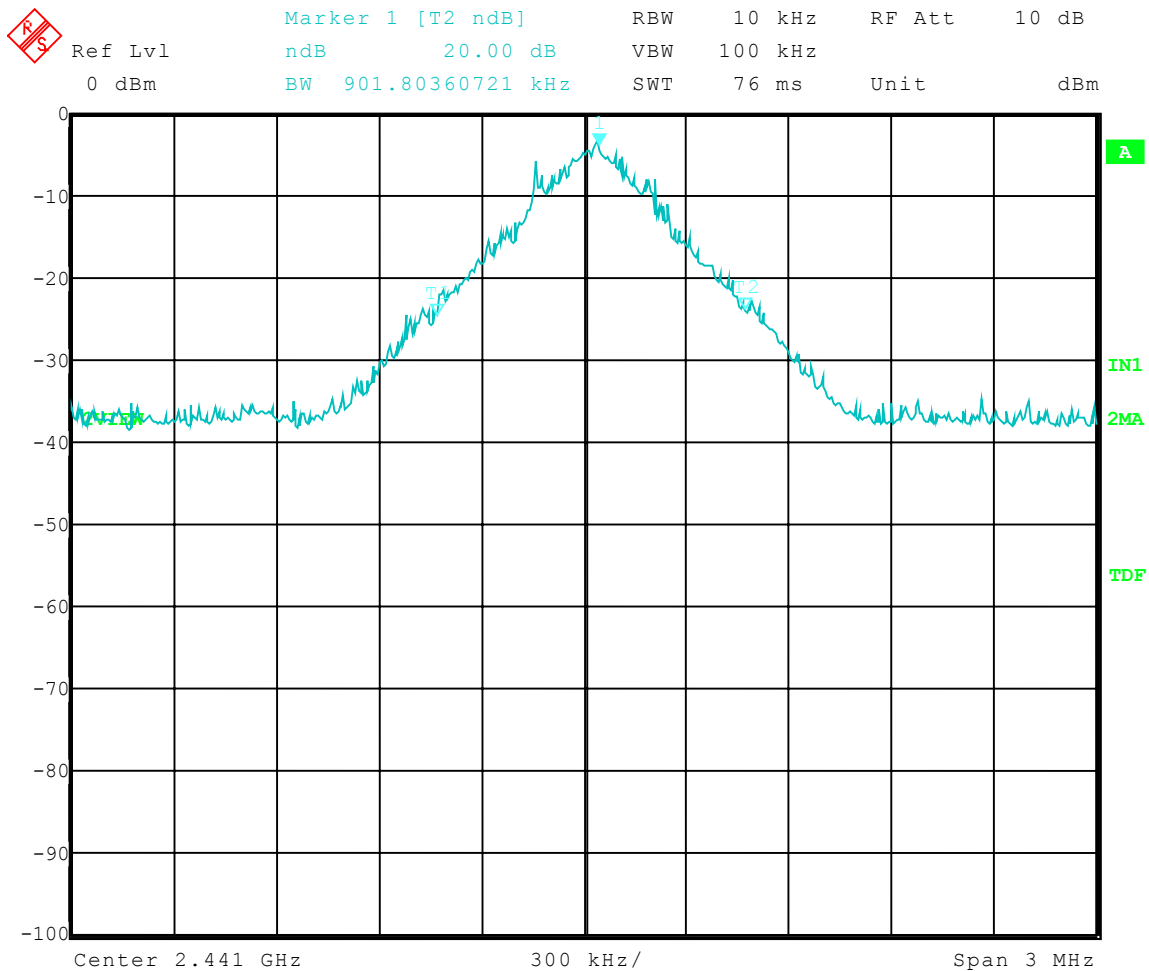


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-26-03
EUT: V710
Test: 20 dB Bandwidth - Conducted
Operator: Jason L.
Comment: Bluetooth Channel 39: Frequency – 2.441 GHz

20 dB Bandwidth = 901.8 kHz



Date: 26.NOV.2003 08:29:08

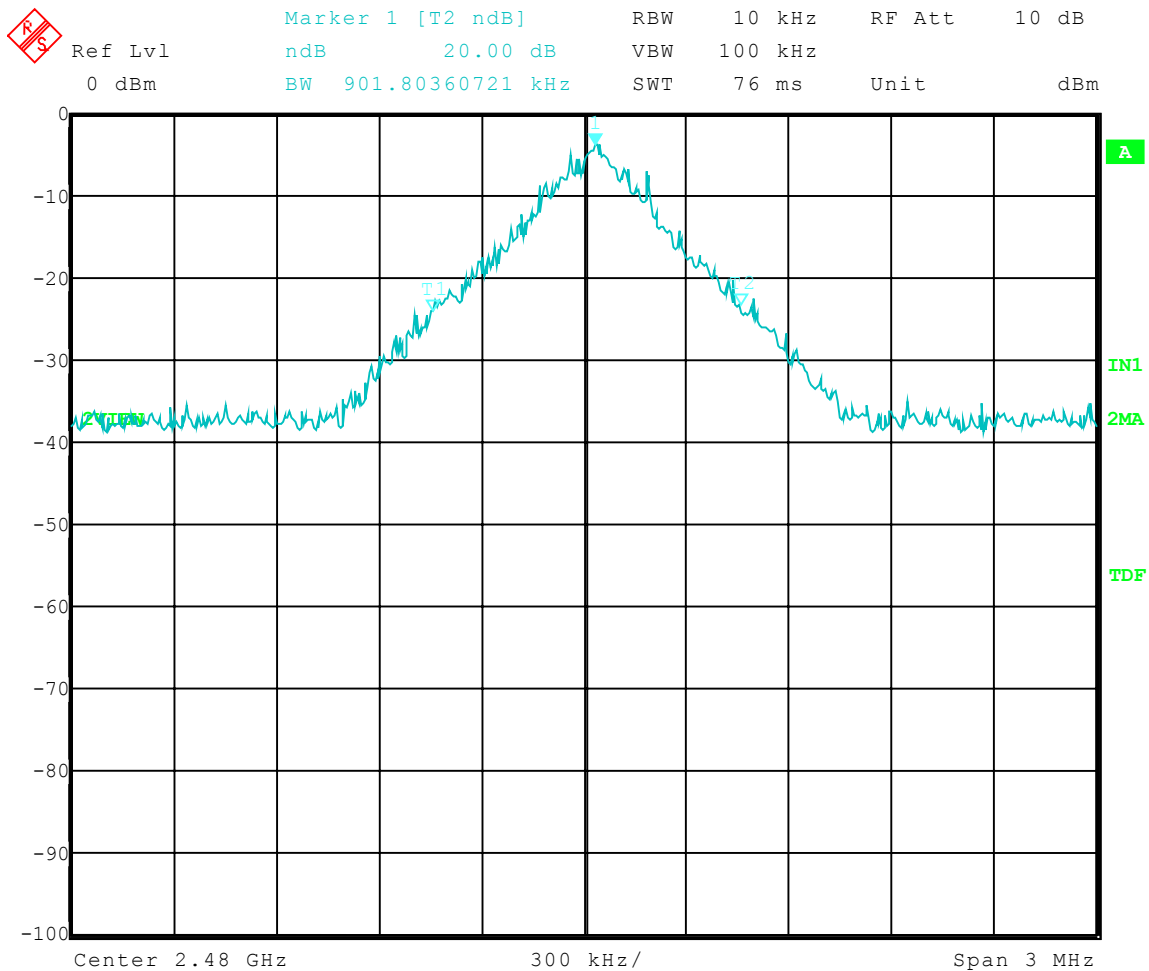


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-26-03
EUT: V710
Test: 20 dB Bandwidth - Conducted
Operator: Jason L.
Comment: Bluetooth Channel 78: Frequency – 2.480 GHz

20 dB Bandwidth = 901.8 kHz



Date: 26.NOV.2003 08:27:31



Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

CARRIER FREQUENCY SEPARATION GRAPHS

PART 15.247

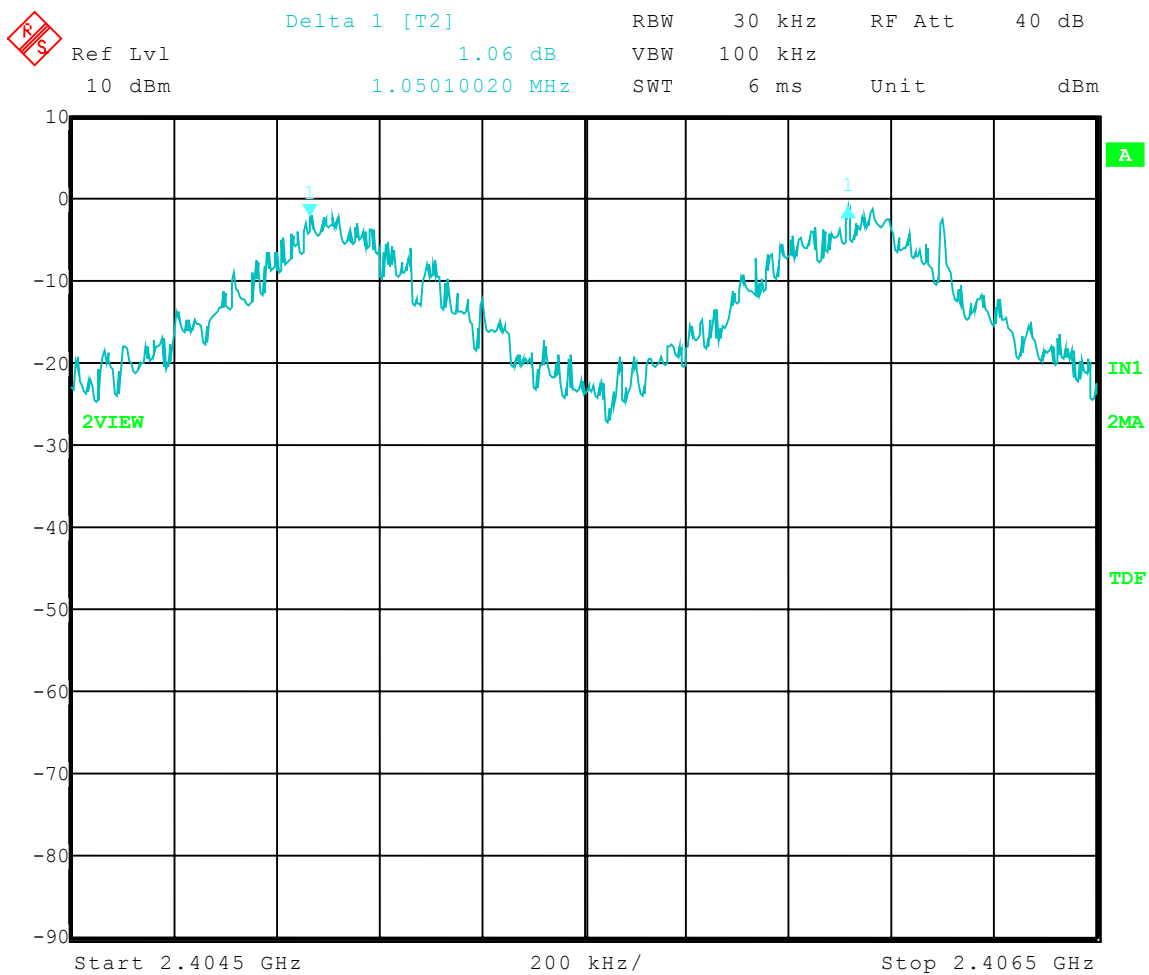


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-20-03
EUT: V710
Test: Carrier Frequency Separation - Conducted
Operator: Jason L.
Comment: Bluetooth DH5 Mode: Frequency Hopping On

Carrier Freq Separation = 1050.1 kHz



Date: 20.NOV.2003 10:52:21



Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

NUMBER OF HOPPING FREQUENCIES GRAPHS

PART 15.247

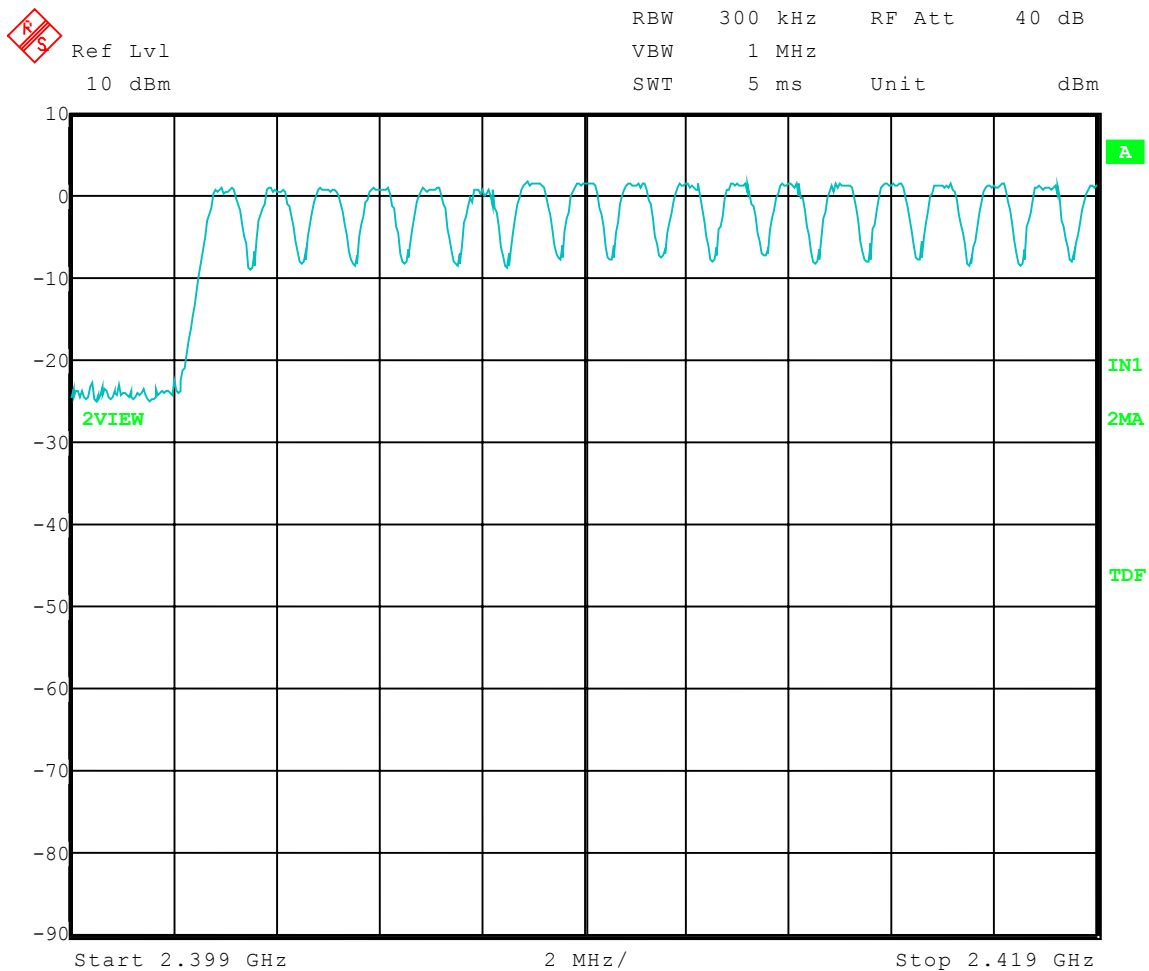


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-20-03
EUT: V710
Test: Number of Hopping Frequencies - Conducted
Operator: Jason L.
Comment: Bluetooth in Hopping Mode

Frequency Range = 2.399 GHz to 2.419 GHz
Number of Frequencies in Range = 18



Date: 20.NOV.2003 11:06:35

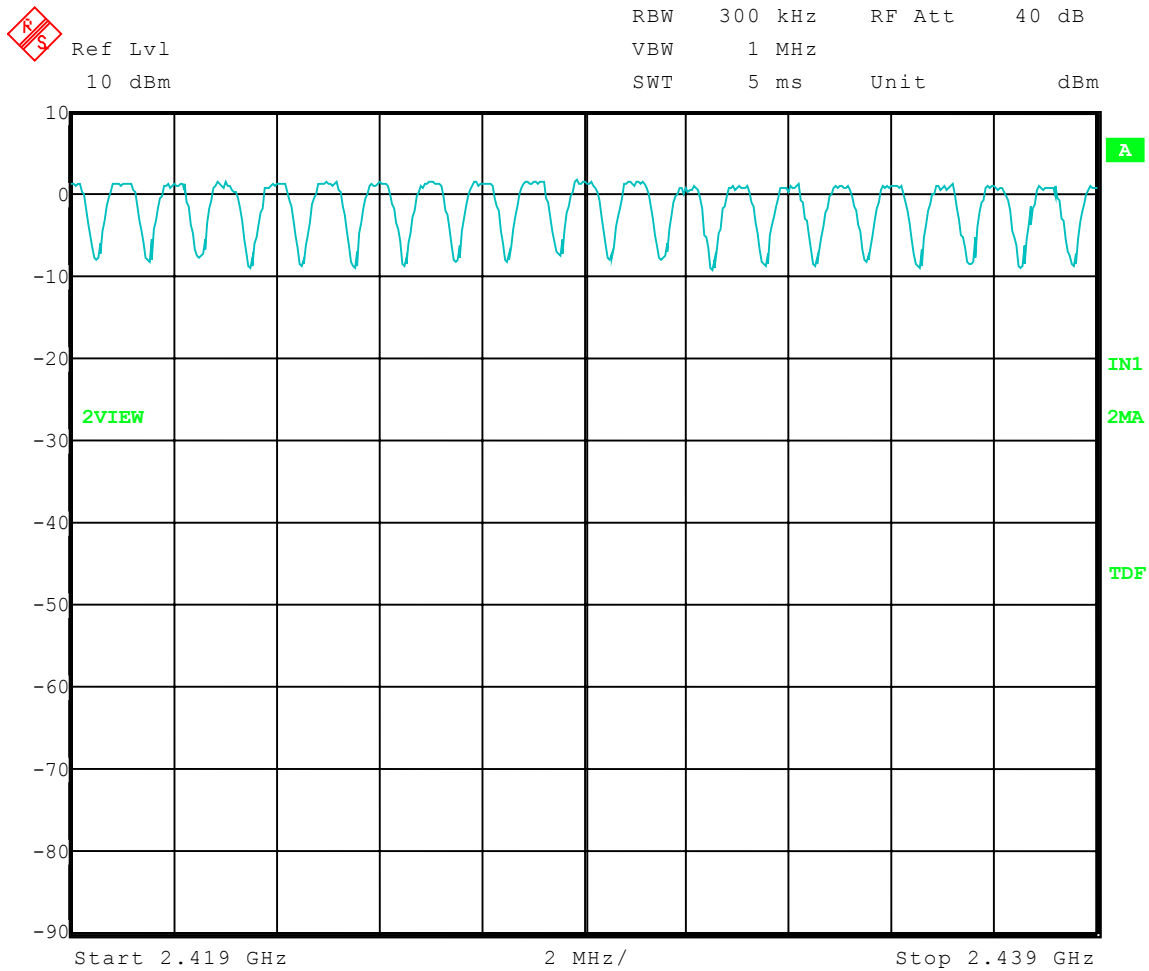


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-20-03
EUT: V710
Test: Number of Hopping Frequencies - Conducted
Operator: Jason L.
Comment: Bluetooth in Hopping Mode

Frequency Range = 2.419 GHz to 2.439 GHz
Number of Frequencies in Range = 20



Date: 20.NOV.2003 11:07:41

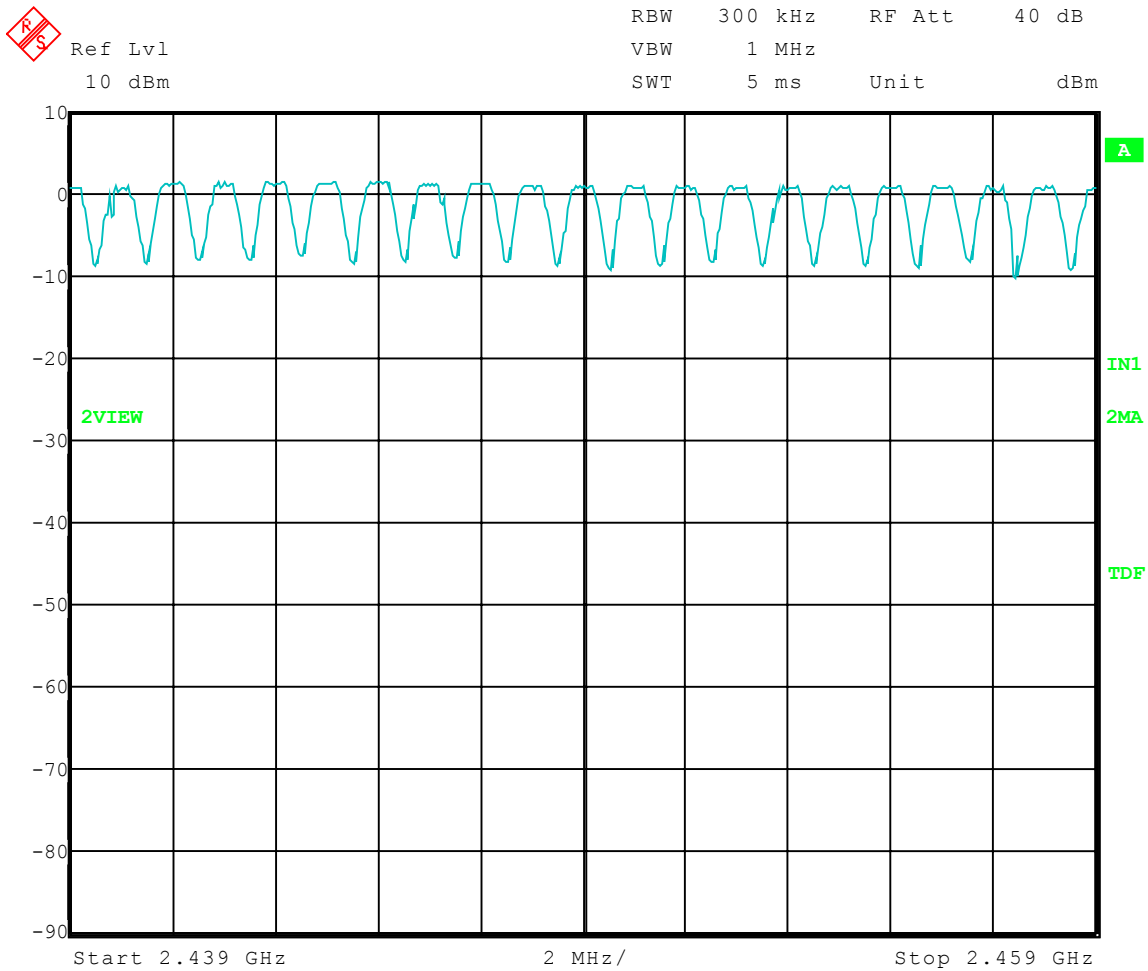


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-20-03
EUT: V710
Test: Number of Hopping Frequencies - Conducted
Operator: Jason L.
Comment: Bluetooth in Hopping Mode

Frequency Range = 2.439 GHz to 2.459 GHz
Number of Frequencies in Range = 20



Date: 20.NOV.2003 11:08:37

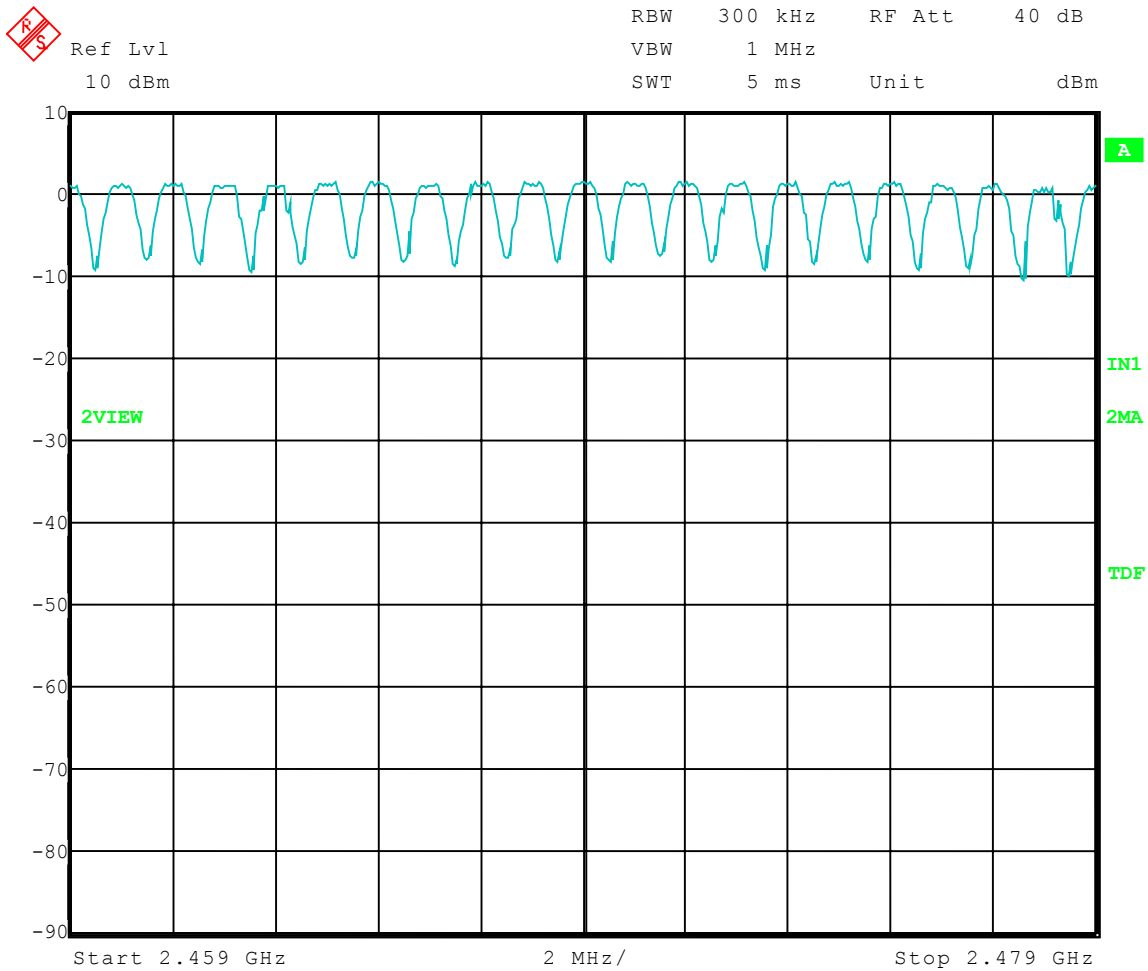


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-20-03
EUT: V710
Test: Number of Hopping Frequencies - Conducted
Operator: Jason L.
Comment: Bluetooth in Hopping Mode

Frequency Range = 2.459 GHz to 2.479 GHz
Number of Frequencies in Range = 20



Date: 20.NOV.2003 11:09:42

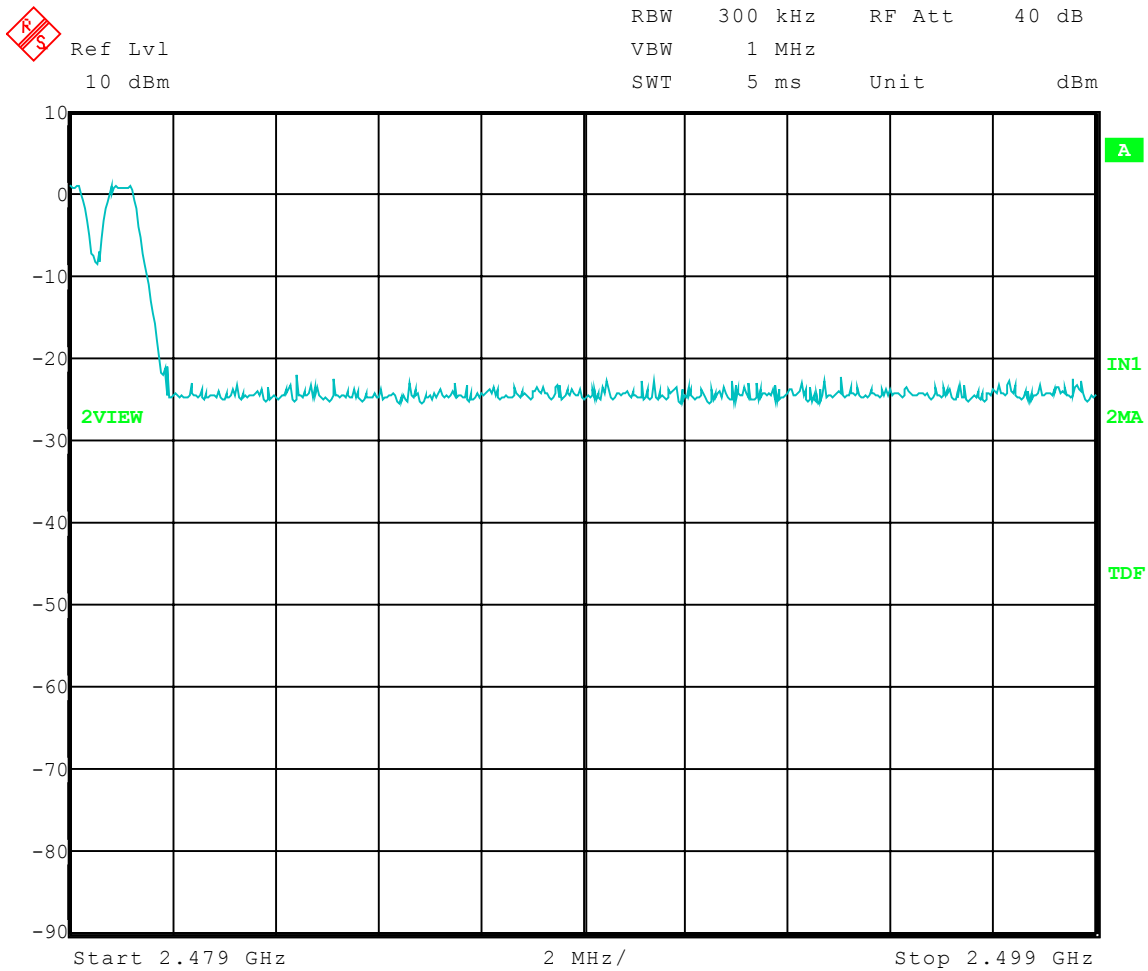


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-20-03
EUT: V710
Test: Number of Hopping Frequencies - Conducted
Operator: Jason L.
Comment: Bluetooth in Hopping Mode

Frequency Range = 2.479 GHz to 2.499 GHz
Number of Frequencies in Range = 1



Date: 20.NOV.2003 11:10:44

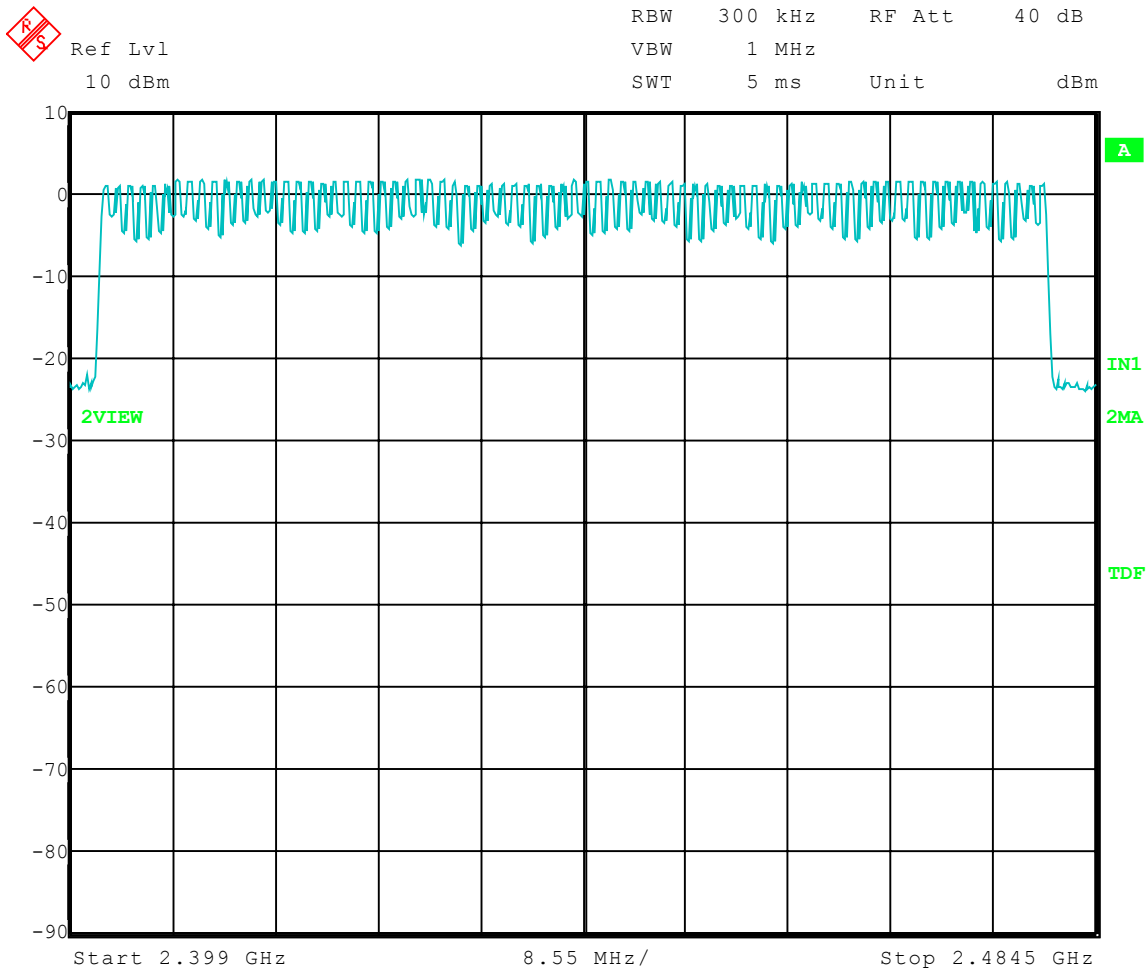


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-20-03
EUT: V710
Test: Number of Hopping Frequencies - Conducted
Operator: Jason L.
Comment: Bluetooth in Hopping Mode

Frequency Range = 2.399 GHz to 2.4845 GHz
Number of Frequencies in Range = 79



Date: 20.NOV.2003 11:05:03



Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

TIME OF OCCUPANCY GRAPHS

PART 15.247

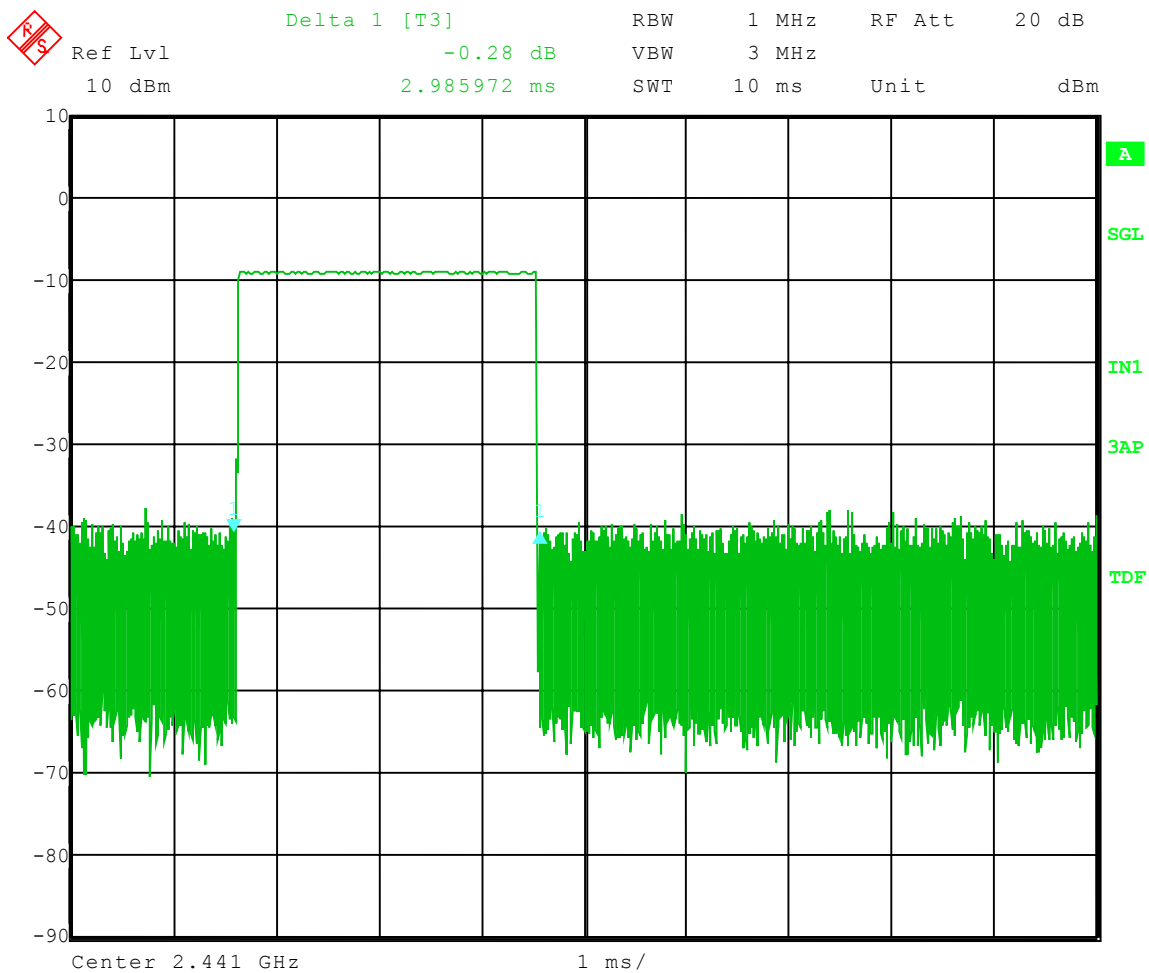


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-20-03
EUT: V710
Test: Dwell Time - Conducted
Operator: Jason L.
Comment: Bluetooth DH5 Protocol – Hopping Mode On

Dwell Time = 2.986 mS



Date: 20.NOV.2003 12:17:40

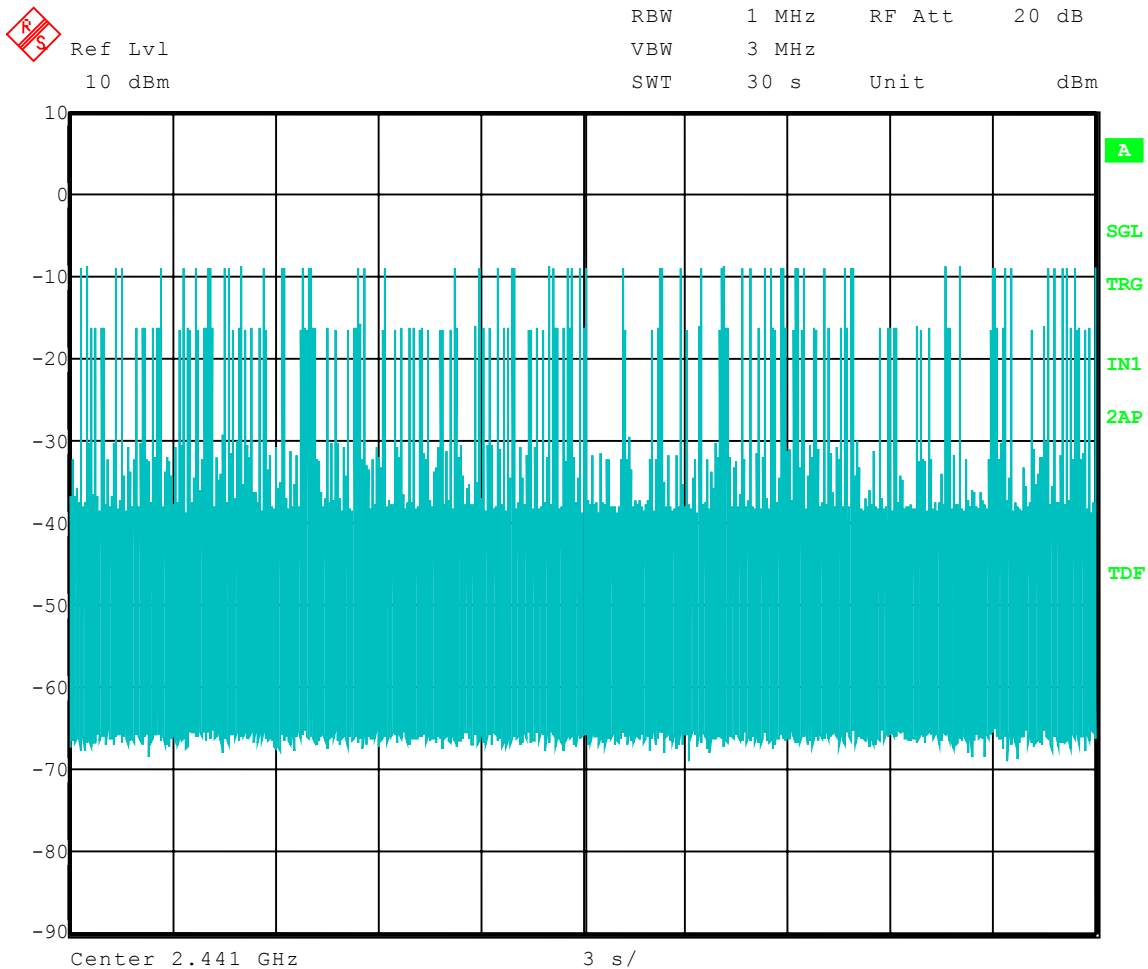


Company: Motorola
Model Tested: V710
Report Number: 10440

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 11-20-03
EUT: V710
Test: Dwell Time in 30 Seconds - Conducted
Operator: Jason L.
Comment: Bluetooth DH5 Protocol – Hopping Mode On
Dwell Time Limit = 0.4 Seconds
Times ON = 315

Dwell Time in 30 Sec = Time Slot Length X Times On / Hopping Channels X 30 Sec
0.358 Seconds = 2.99 ms X 315 / 79 X 30 Sec



Date: 20.NOV.2003 12:30:02