FCC CFR47 PART 15 SUBPART C CERTIFICATION

TEST REPORT

FOR

BLUETOOTH MODULE

MODEL: PA3232U-1BTM

FCC ID: CJ6UPA3232BT

REPORT NUMBER: 02U1501-1

ISSUE DATE: SEPTEMBER 30, 2002

Prepared for

TOSHIBA CORPORATION DIGITAL MEDIA NETWORK COMPANY
2-9, SUEHIRO-CHO, OME,
TOKYO, 198-8710
JAPAN

Prepared by

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1. TEST RESULT CERTIFICATION

COMPANY NAME: TOSHIBA CORPORATION DIGITAL MEDIA NETWORK COMPANY
2-9, SUEHIRO-CHO, OME
TOKYO, 198-8710 JAPAN

EUT DESCRIPTION: BLUETOOTH MODULE

MODEL NAME: PA3232U-1BTM

DATE TESTED: AUGUST 30 - SEPTEMBER 5, 2002

TYPE OF EQUIPMENT	INTENTIONAL RADIATOR
EQUIPMENT TYPE	2.4 - 2.4835 GHz TRANSCEIVER
MEASUREMENT PROCEDURE	ANSI 63.4 / 1992, TIA/EIA 603
PROCEDURE	CERTIFICATION
FCC RULE	CFR 47 PART 15.C

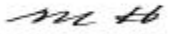
Compliance Certification Services, Inc. tested the above equipment for compliance with the requirements set forth in CFR 47, PART 15, Subpart C. The equipment in the configuration described in this report, shows the measured emission levels emanating from the equipment do not exceed the specified limit. This report only documents the RF conducted and RF radiated performance of the radio module. AC mains conducted emissions and digital device radiated emissions performance is documented by Toshiba Document Number OFA-H3355 dated September 20, 2002, FCC ID: CJ6UPP350SY, Certification Pending..

Note: This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

Approved & Released For CCS By:

THU CHAN
SENIOR EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Tested By:



MIKE HECKROTTE
CHIEF ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

The Toshiba Bluetooth module is a wireless Frequency Hopping Spread Spectrum that operates on the 2400 – 2483.5 MHz band. It is designed to be installed in a host system. This unit provides a power output of +1.4 dBm (1.38 mW) and includes an external film antenna with a 1.22 dBi gain.

3. TEST METHODOLOGY

Conducted and radiated testing were performed according to the procedures documented on chapter 13 of ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, and 15.407.

4. FACILITIES AND ACCREDITATION

4.1. FACILITIES AND EQUIPMENT

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

Receiving equipment (i.e., receiver, analyzer, quasi-peak adapter, pre-selector) and LISNs conform to CISPR specifications for "Radio Interference Measuring Apparatus and Measurement Methods," Publication 16.

4.2. LABORATORY ACCREDITATIONS AND LISTINGS

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (reference no: 31040/SIT (1300B3) and 31040/SIT (1300F2)).

4.3. TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	NVLAP*	FCC Part 15, CISPR 22, AS/NZS 3548,IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11, CNS 13438	200065-0
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	1300
Japan	VCCI	CISPR 22 Two OATS and one conducted Site	R-1014, R-619, C-640
Norway	NEMKO	EN50081-1, EN50081-2, EN50082-1, EN50082-2, IEC61000-6-1, IEC61000-6-2, EN50083-2, EN50091-2, EN50130-4, EN55011, EN55013, EN55014-1, EN55104, EN55015, EN61547, EN55022, EN55024, EN61000-3-2, EN61000-3-3, EN60945, EN61326-1	ELA 117
Norway	NEMKO	EN60601-1-2 and IEC 60601-1-2, the Collateral Standards for Electro-Medical Products. MDD, 93/42/EEC, AIMD 90/385/EEC	ELA-171
Taiwan	BSMI	CNS 13438	SL2-IN-E-1012
Canada	Industry Canada	RSS210 Low Power Transmitter and Receiver	IC2324 A,B,C, and F

* No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government.

5. CALIBRATION AND UNCERTAINTY

5.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

5.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Radiated Emission	
30MHz – 200 MHz	+/- 3.3dB
200MHz – 1000MHz	+4.5/-2.9dB
1000MHz – 2000MHz	+4.6/-2.2dB
Power Line Conducted Emission	
150kHz – 30MHz	+/-2.9

Any results falling within the above values are deemed to be marginal.

5.3. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST AND MEASUREMENT EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due Date
Spectrum Analyzer	HP	8566B	3014A06685	6/1/03
Spectrum Display	HP	85662A	2152A03066	6/1/03
Quasi-Peak Detector	HP	85650A	3145A01654	6/1/03
Preamplifier	HP	8447D	2944A06833	8/22/03
Log Periodic Antenna	EMCO	3146	9107-3163	3/30/03
Biconical Antenna	Eaton	94455-1	1197	3/30/03
Spectrum Analyzer	HP	8593EM	3710A00205	6/11/03
Preamplifier (1 - 26.5GHz)	HP	11	646456	4/26/03
Horn Antenna (1 - 18GHz)	EMCO	3115	6717	1/31/03
Horn Antenna (18 – 26.5GHz)	ARA	MWH 1826/B	6717	1/31/03
High Pass Filter (4.57GHz)	FSY Microwave	FM-4570-9SS	003	N.C.R.

6. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Device Type	Manufacturer	Model	Serial Number	FCC ID
Laptop	Toshiba	PP350U	82010051	Prototype / EUT
AC Adapter	Toshiba	PA3083U-1ACA	1336963G	DoC
Test Fixture	Toshiba	N/A	N/A	N/A

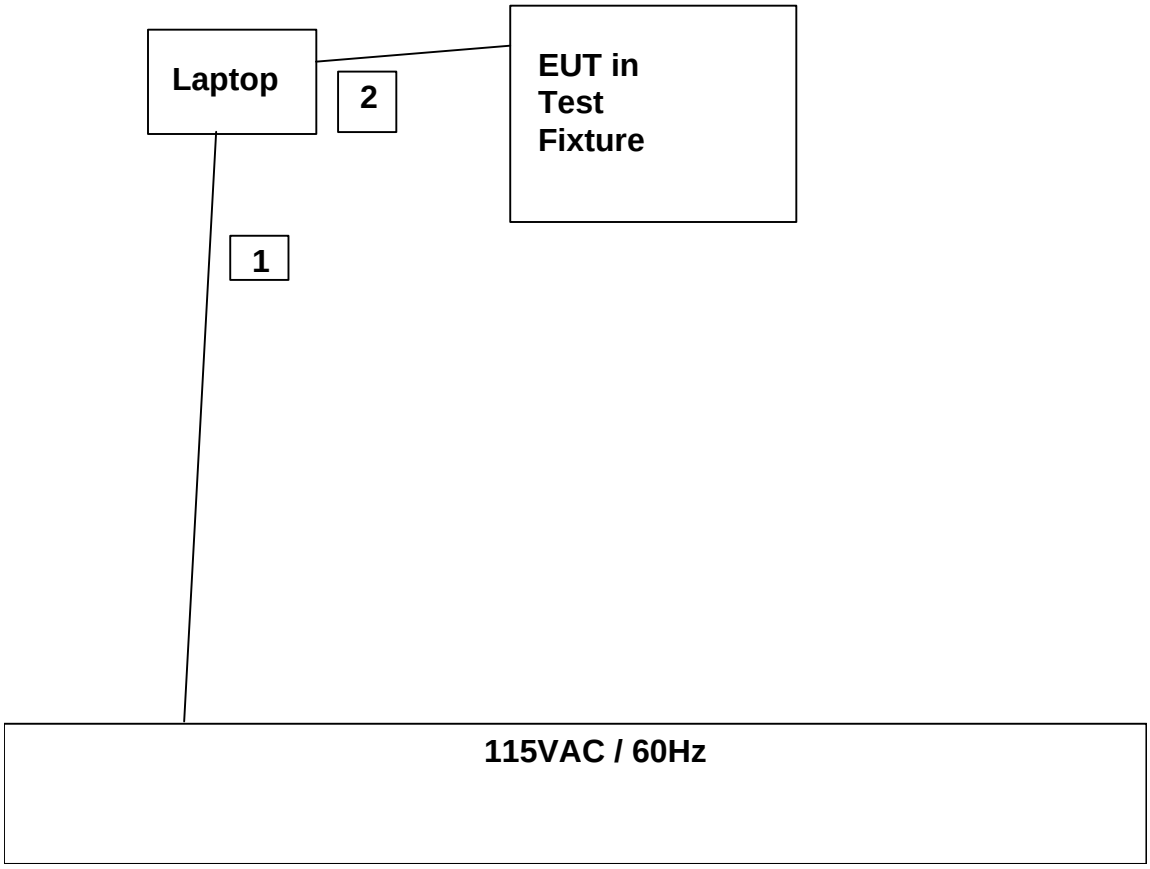
I/O CABLES

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US115	Unshielded	2 m	Integrated with AC Adapter
2	USB	2	USB	Shielded	0.3 m	

TEST SETUP

The EUT is installed into a test fixture that is controlled by a laptop computer during the test.

SETUP DIAGRAM FOR TRANSMITTER TESTS



7. APPLICABLE RULES

§15.247 (a)- BANDWIDTH

(1) (ii) The maximum 20 dB bandwidth of the hopping channel is 1 MHz.

§15.247 (a)- HOPPING FREQUENCY SEPERATION

(1) 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.

Specification limit: >740 kHz (20 dB bandwidth)

§15.247 (a)- NUMBER OF HOPPING CHANNELS

(1) (ii) Frequency hopping systems operating in the 2400 – 2483.5 MHz and the 5725 – 5850 MHz band shall use at least 75 hopping frequencies.

§15.247 (a)- TIME OF OCCUPANCY

(a) (1) (ii) The average time of occupancy on any frequency shall not be greater than 0.4 seconds within 30 second period.

§15.247 (b)- POWER OUTPUT

The maximum peak output power of the intentional radiator shall not exceed the following:

(1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels: 1 watt.

(4) Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Specification Limit: Antenna Gain = 1.22 dBi, therefore the limit is 30 dBm

§15.247 (b)- RADIO FREQUENCY EXPOSURE

(5) 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. See §1.1307(b)(1) of this chapter.

§15.247 (c)- SPURIOUS EMISSIONS

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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) (see §15.205(c)).

§15.247 (d)- PEAK POWER SPECTRAL DENSITY

(d) For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

(f) The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

§15.205- RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2] Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.207- CONDUCTED LIMITS

Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, 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 µH/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.

NEW LIMITS

Frequency Range (MHz)	Quasi-Peak Limit (dBuV)	Average Limit (dBuV)
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.

ALTERNATE LIMITS UNTIL 31 DECEMBER 2002

Frequency Range (MHz)	Quasi-Peak Limit (uV)	Quasi-Peak Limit (dBuV)
0.45 - 30	250	48

* Decreases with the logarithm of the frequency.

§15.209- RADIATED EMISSION LIMITS

(a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

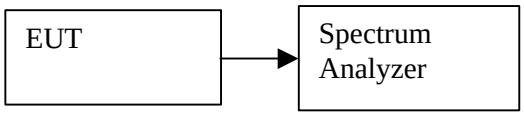
(b) In the emission table above, the tighter limit applies at the band edges.

Frequency Range (MHz)	Field Strength (uV/m at 3 m)	Field Strength (dBuV/m at 3 m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

8. TEST SETUP, PROCEDURE AND RESULT

8.1. 20 dB BANDWIDTH

TEST SETUP



TEST PROCEDURE

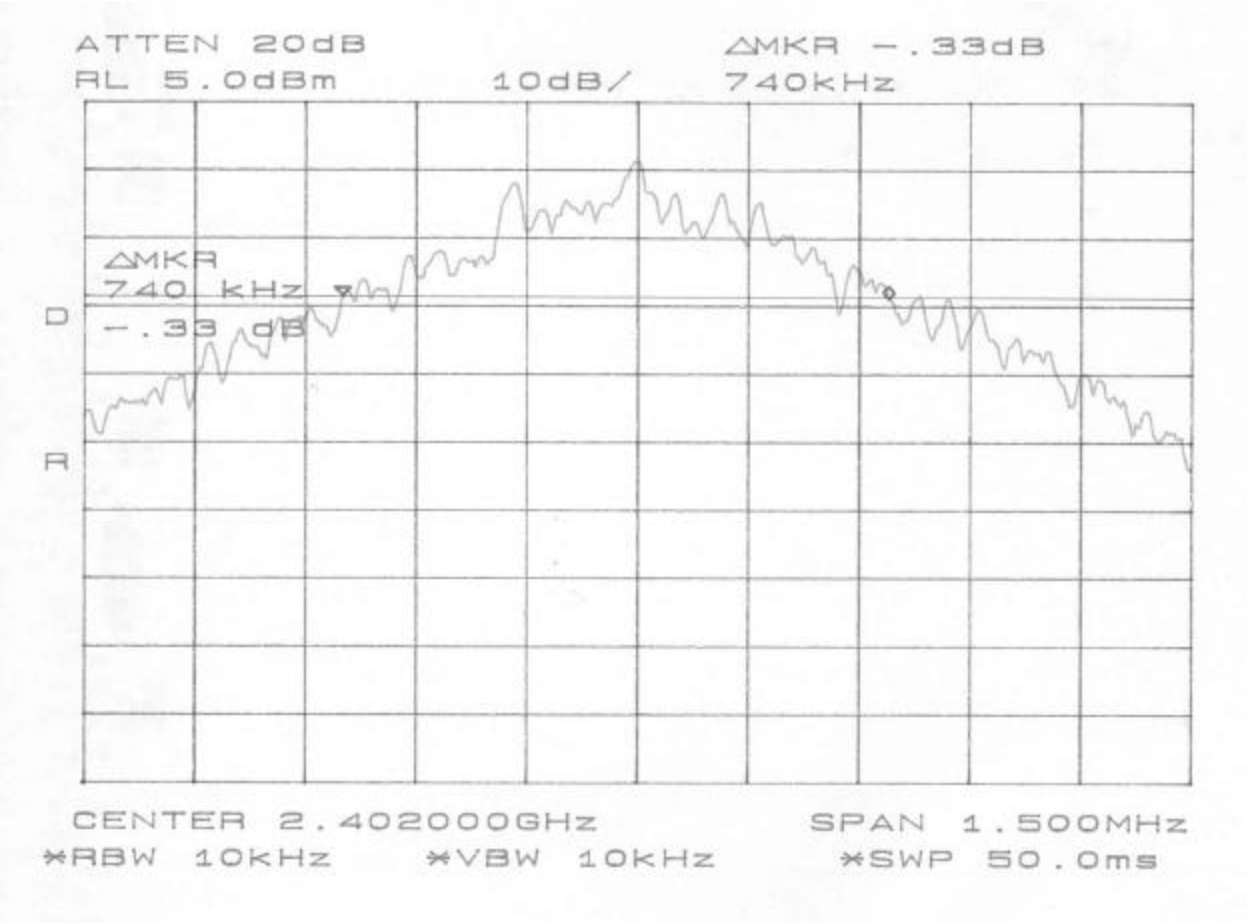
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to at least 1 % of the measured BW, and peak detection is used. The 20 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 20 dB.

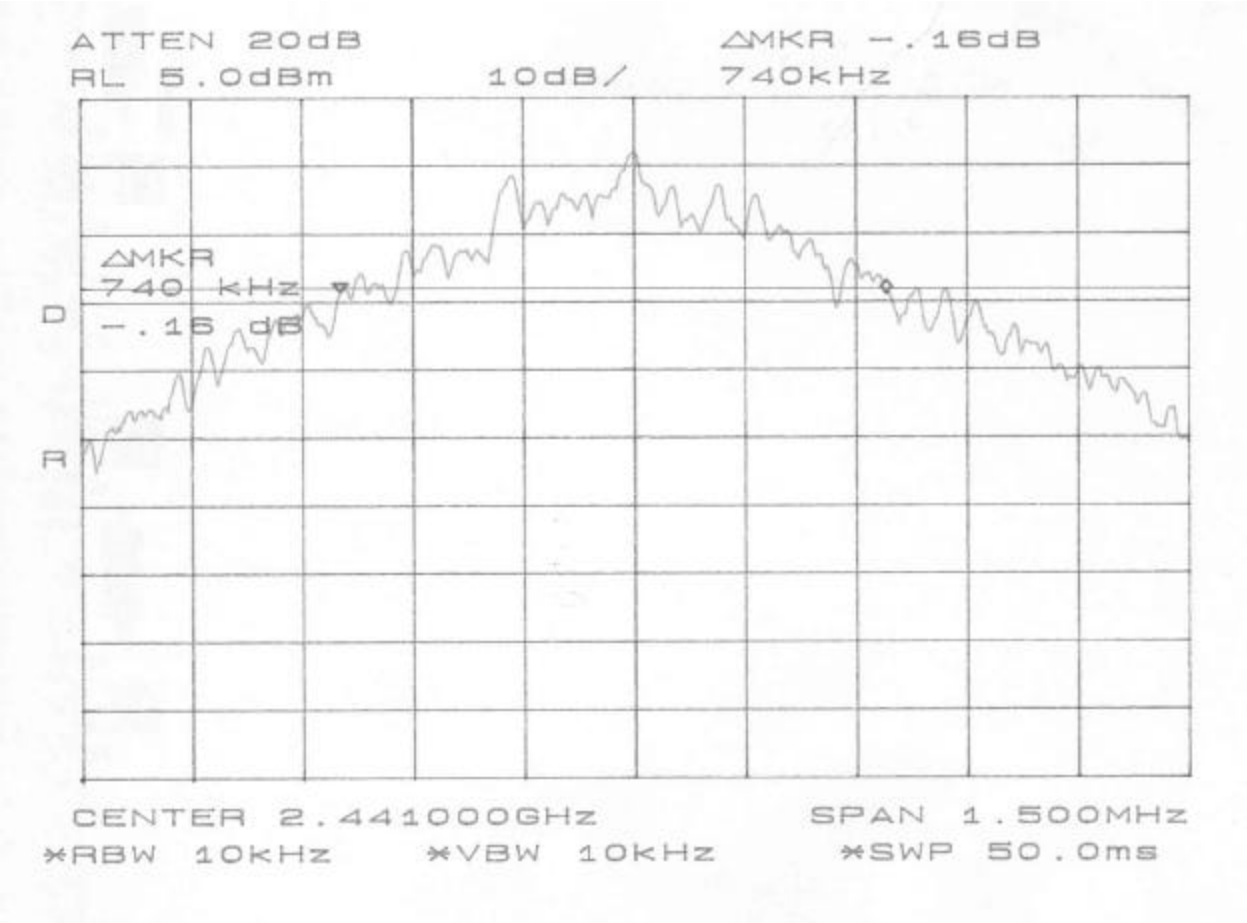
RESULTS

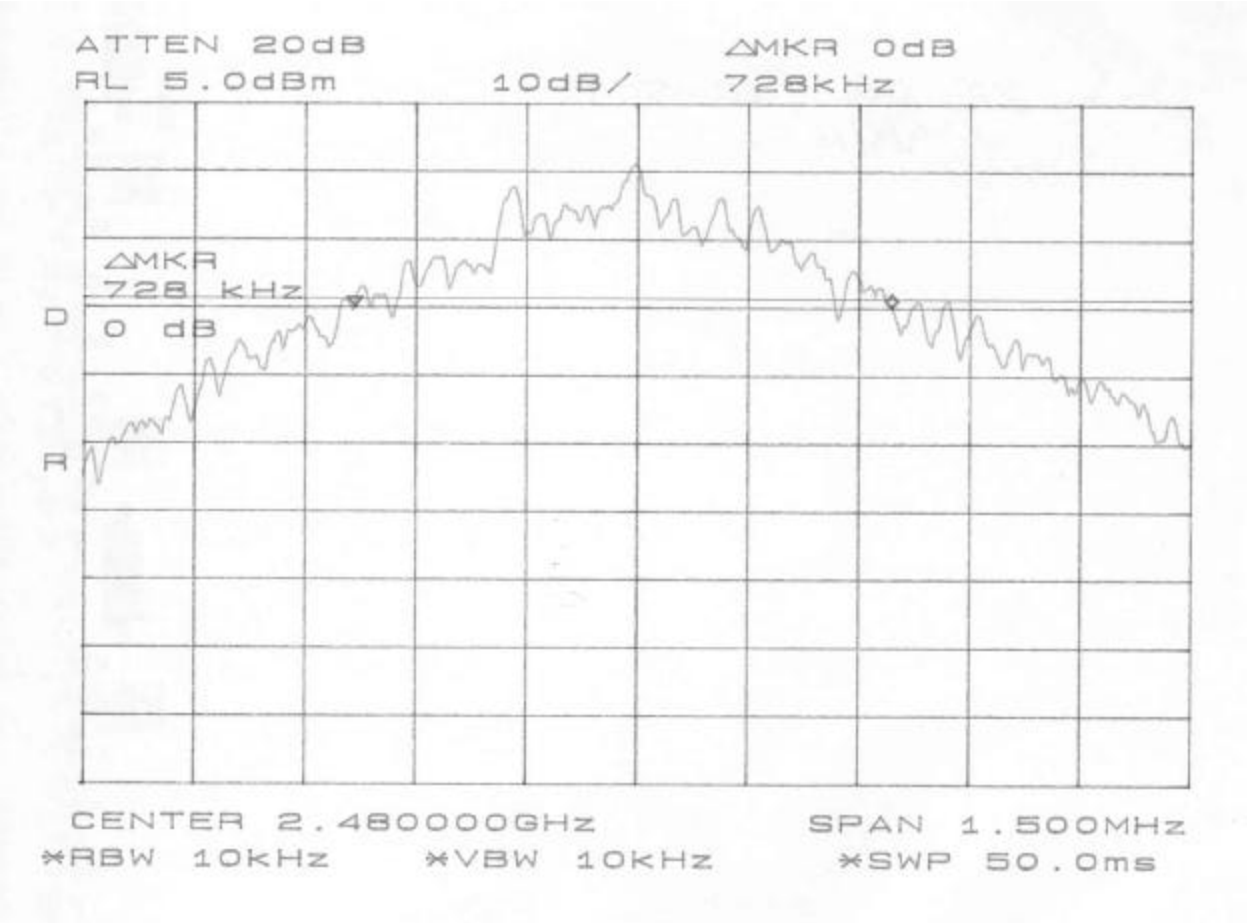
No non-compliance noted:

Channel	Frequency (MHz)	B (kHz)	Limit (kHz)	Margin (kHz)
Low	2402	740	1000	-260
Middle	2441	740	1000	-260
High	2480	728	1000	-272

Refer to plots below.

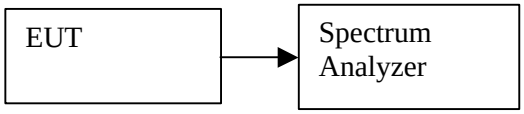






8.2. HOPPING FREQUENCY SEPARATION

TEST SETUP



TEST PROCEDURE

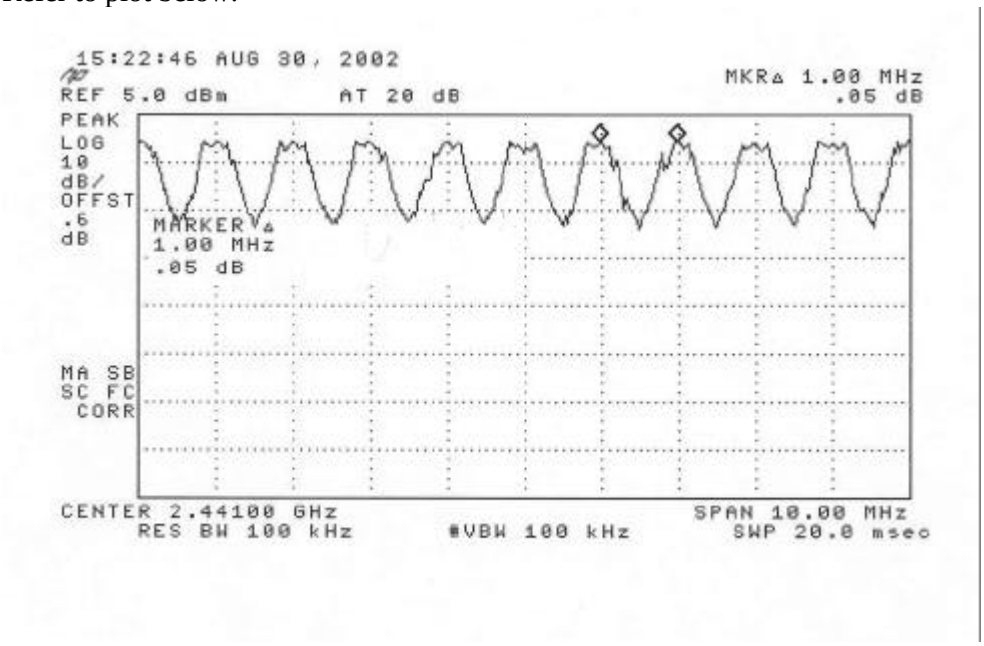
The transmitter output is connected to the spectrum analyzer. The frequency span is set to 10 MHz. The analyzer is set to peak hold, then a pseudo-random hopping sequence of the transmitter is captured. The marker delta function is used to measure the separation between two adjacent hopping channels.

RESULTS

No non-compliance noted:

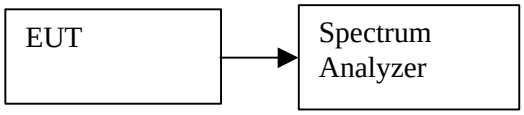
Hopping Frequency Separation (kHz)	Limit (kHz)	Margin (kHz)
1000	740	-260

Refer to plot below.



8.3. NUMBER OF HOPPING CHANNELS

TEST SETUP



TEST PROCEDURE

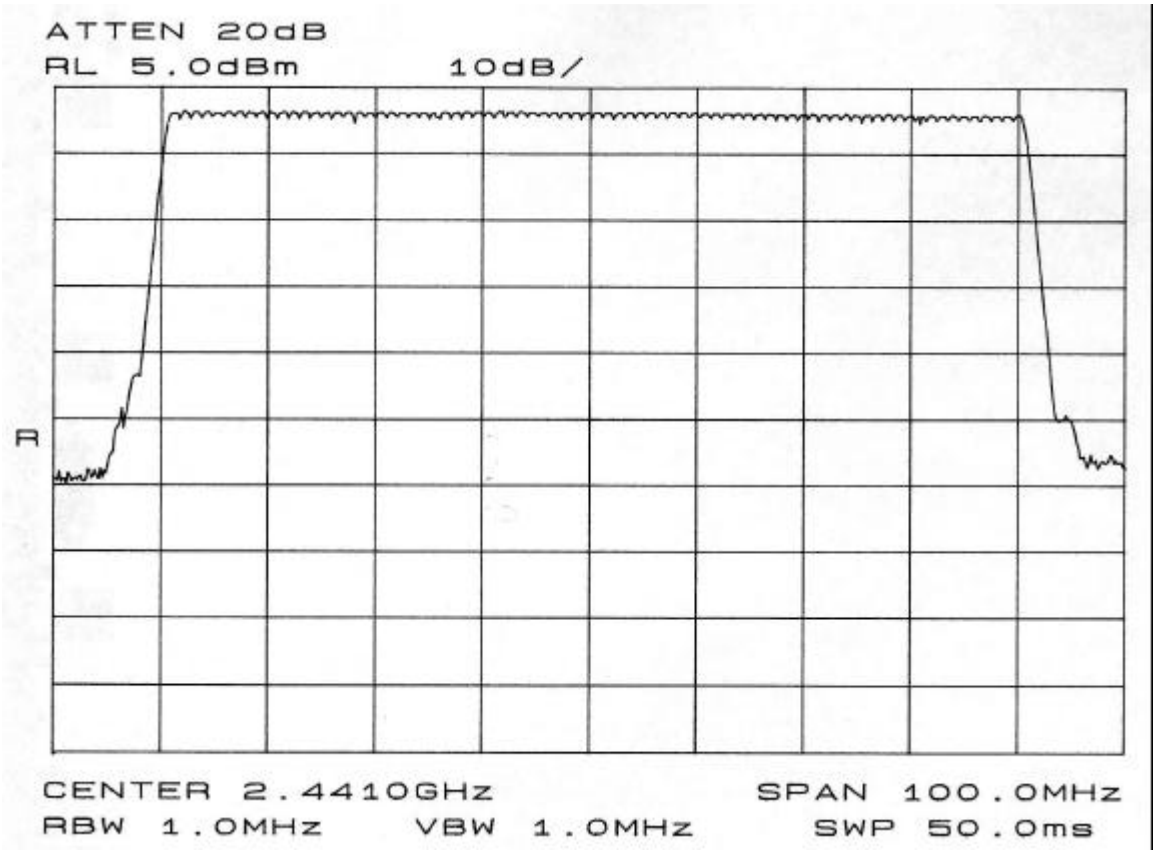
The transmitter output is connected to the spectrum analyzer. The span is set to 100 MHz and the resolution bandwidth is set to 100 kHz. The analyzer is set to peak hold, then the complete pseudo-random hopping sequence of the transmitter is captured.

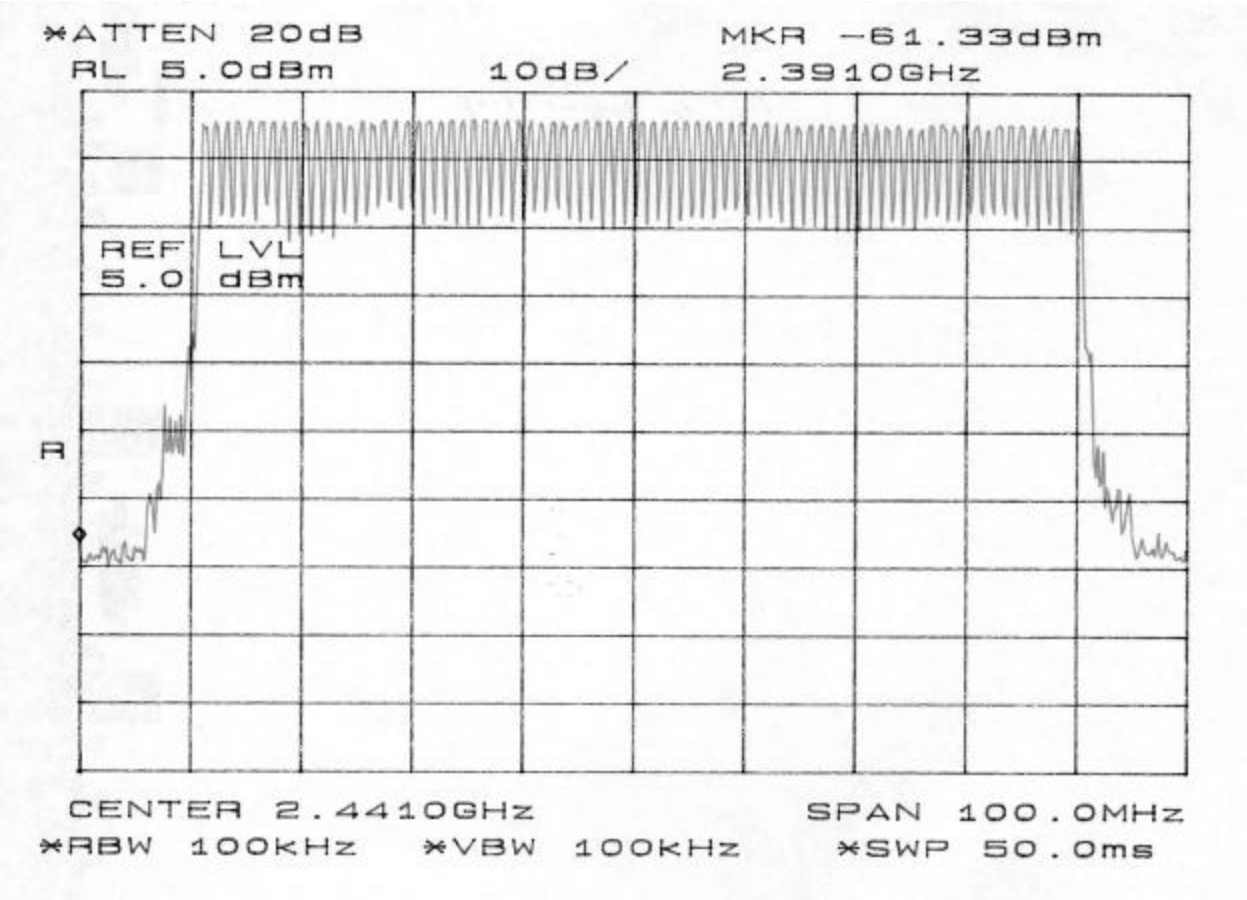
RESULTS

No non-compliance noted:

Mode	Number of Hopping Channels	Limit
Data	79	Minimum of 75

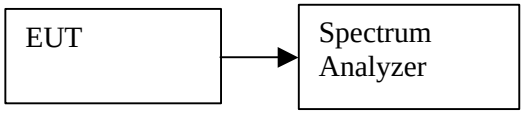
Refer to plots below.





8.4. TIME OF OCCUPANCY

TEST SETUP



TEST PROCEDURE

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The transmitter is set to operate in its normal frequency hopping mode. The spectrum analyzer center frequency is set to one of the hopping channels near the center of the operating band and the span is set to zero Hz. The sweep time is set to display one complete pusle. The marker delta function is used to measure the duration of a the pulse.

The sweep time is then set to 1 second and the number of pulses in a 1 second period is measured.

The time of occupancy is calculated by the following formula:

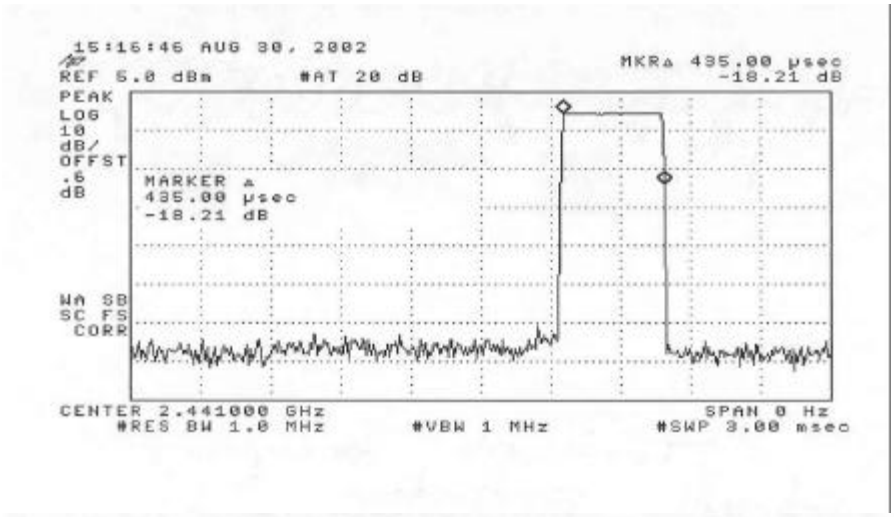
Time of Occupancy = 30 * (duration of a single pulse) * (number of pulses in 1 sec)

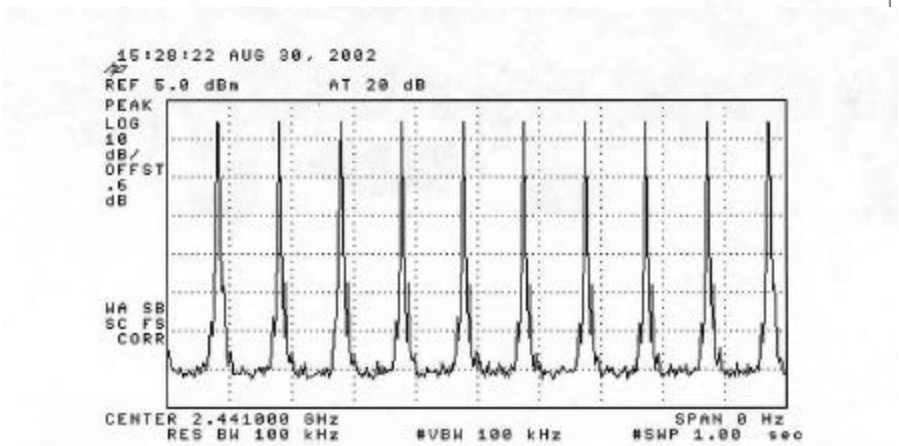
RESULTS

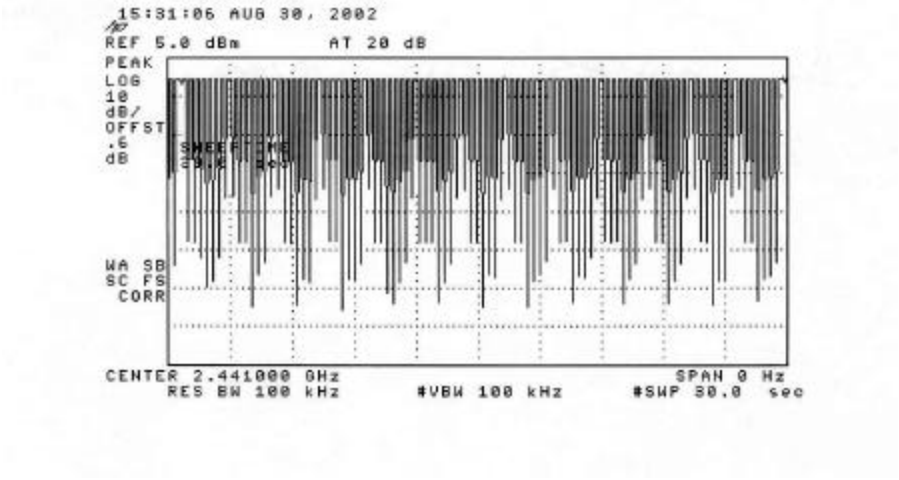
No non-compliance noted:

Duration of a single pulse (msec)	Number of Pulses in 1 sec	Time of occupancy (sec)	Limit (sec)
0.435	10	0.13	0.4

Refer to plots below.

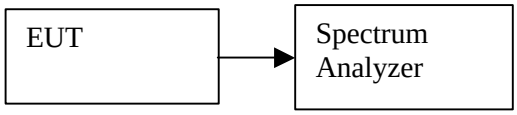






8.5. PEAK POWER

TEST SETUP



TEST PROCEDURE

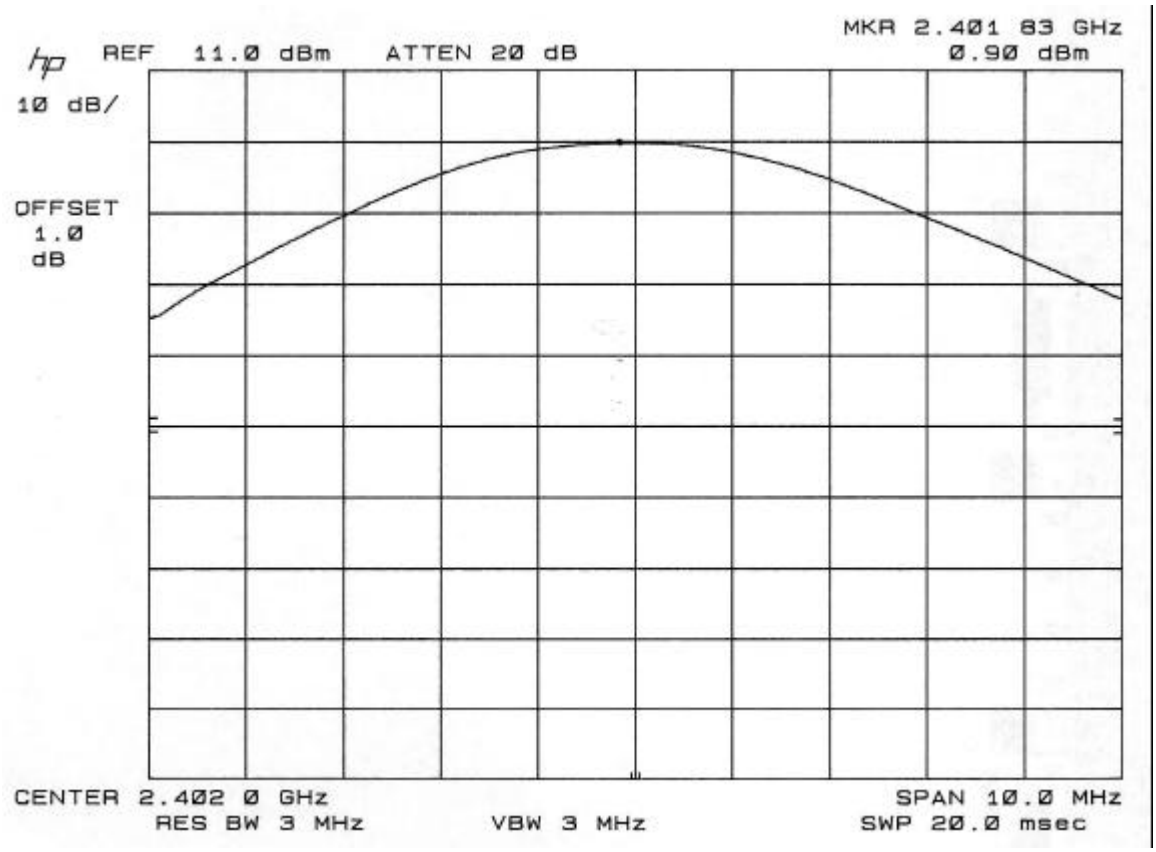
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth and the video bandwidth are set to greater than 1 MHz.

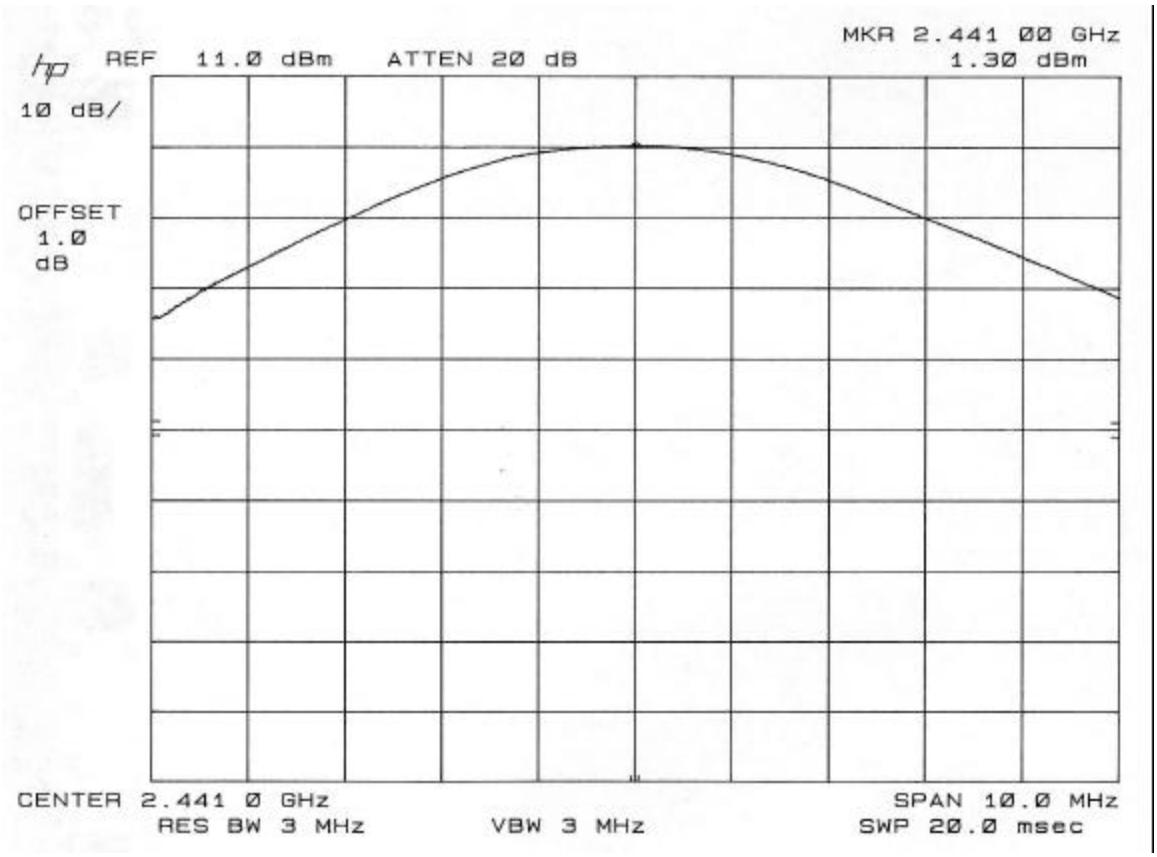
RESULTS

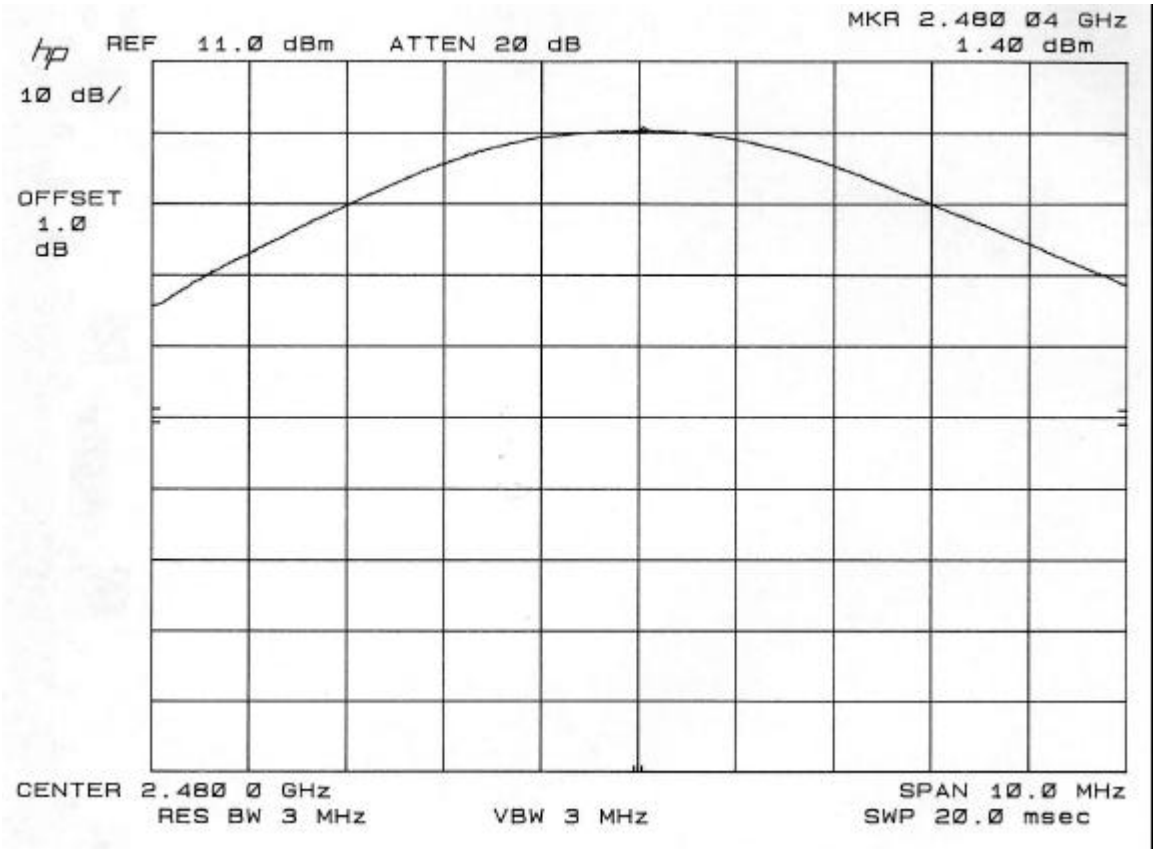
No non-compliance noted:

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin dB
Low	2402	0.9	30	-29.1
Middle	2441	1.3	30	-28.7
High	2480	1.4	30	-28.6

Refer to plots below.

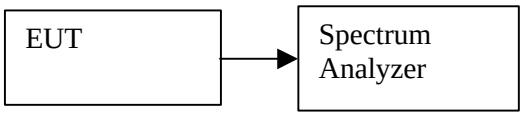






8.6. PEAK POWER SPECTRAL DENSITY

TEST SETUP



TEST PROCEDURE

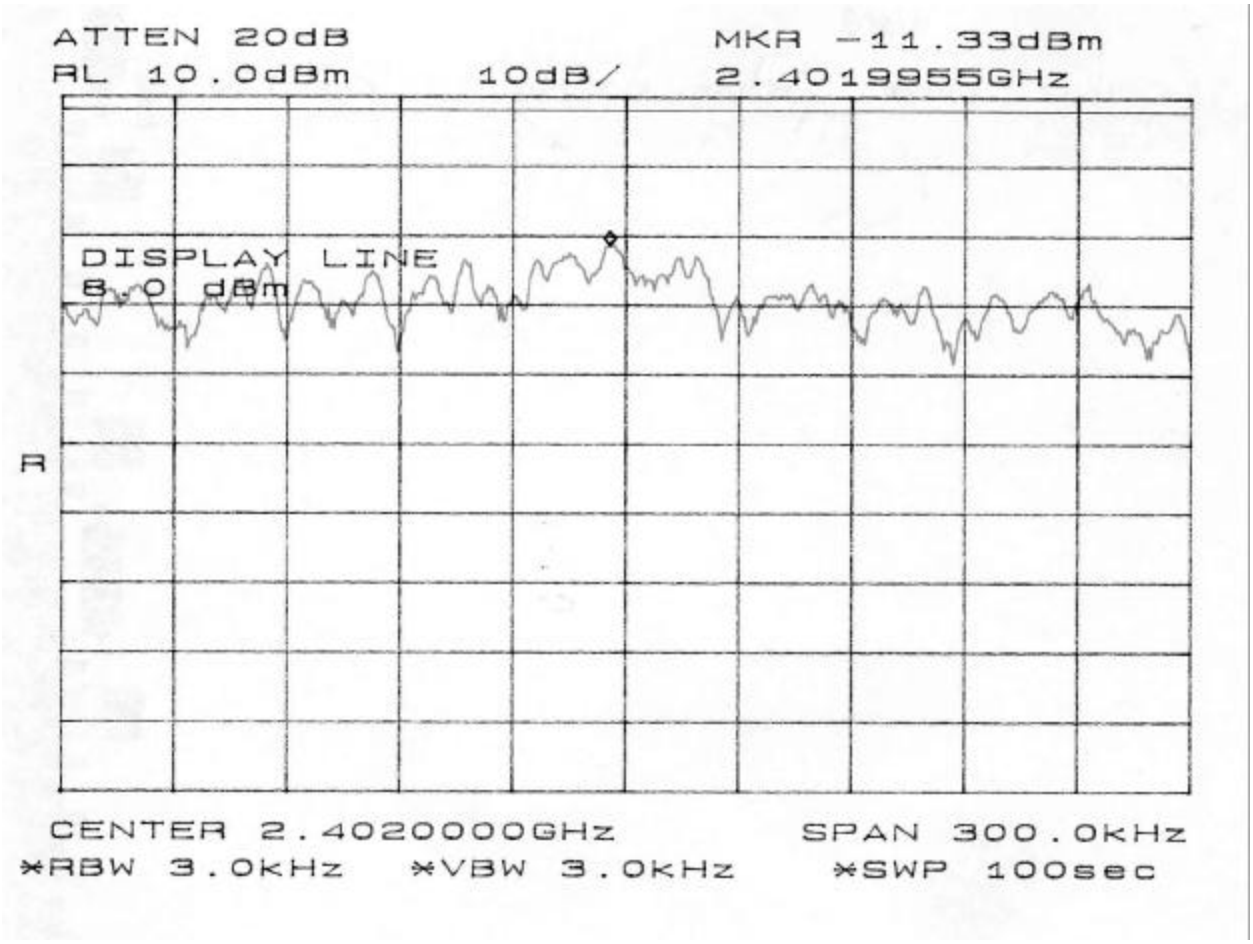
The transmitter output is connected to the spectrum analyzer, the maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer using RBW = VBW = 3KHz, sweep time = span / 3 kHz, and video averaging is turned off. The PPSD is the highest level found across the emission in any 3 kHz band.

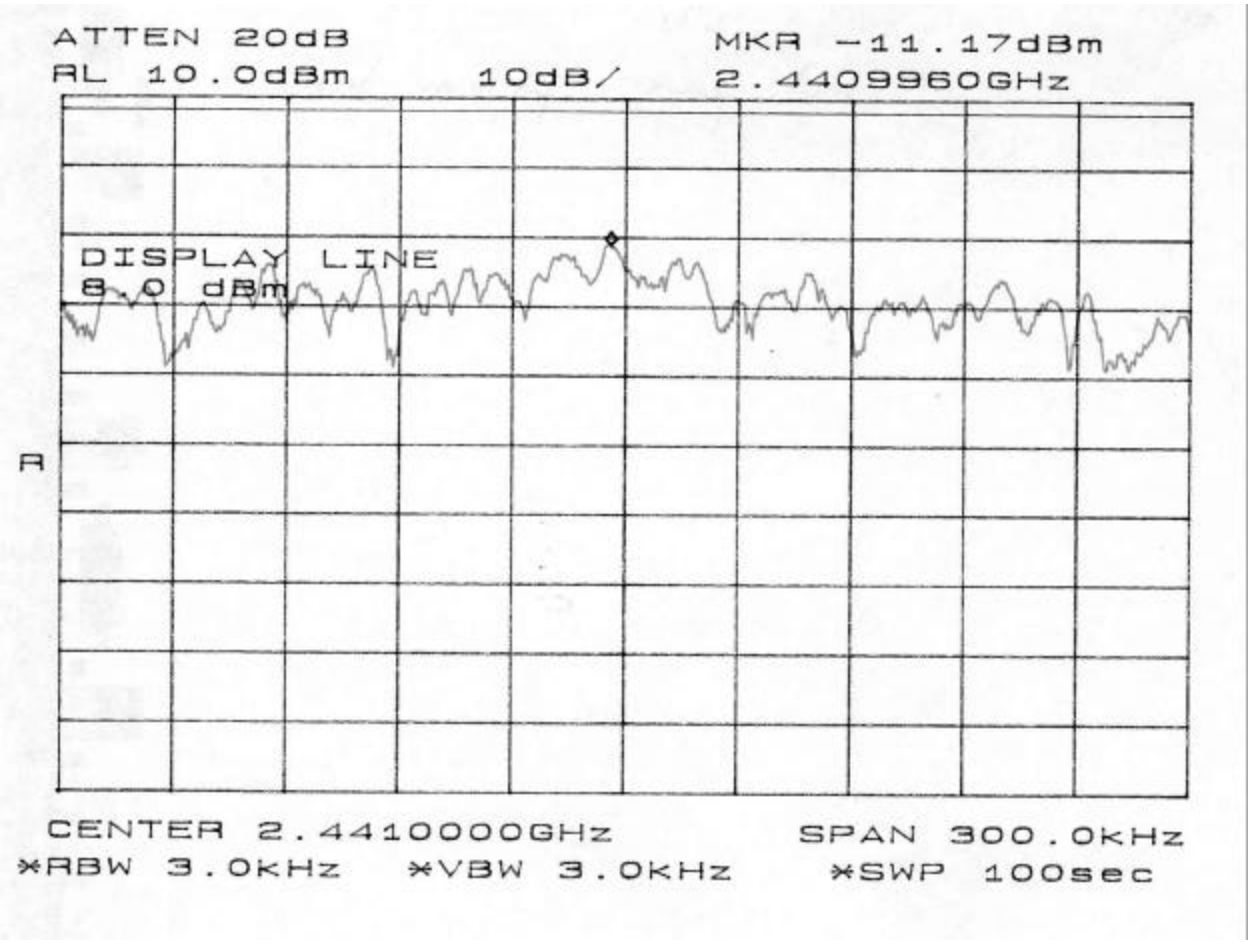
RESULTS

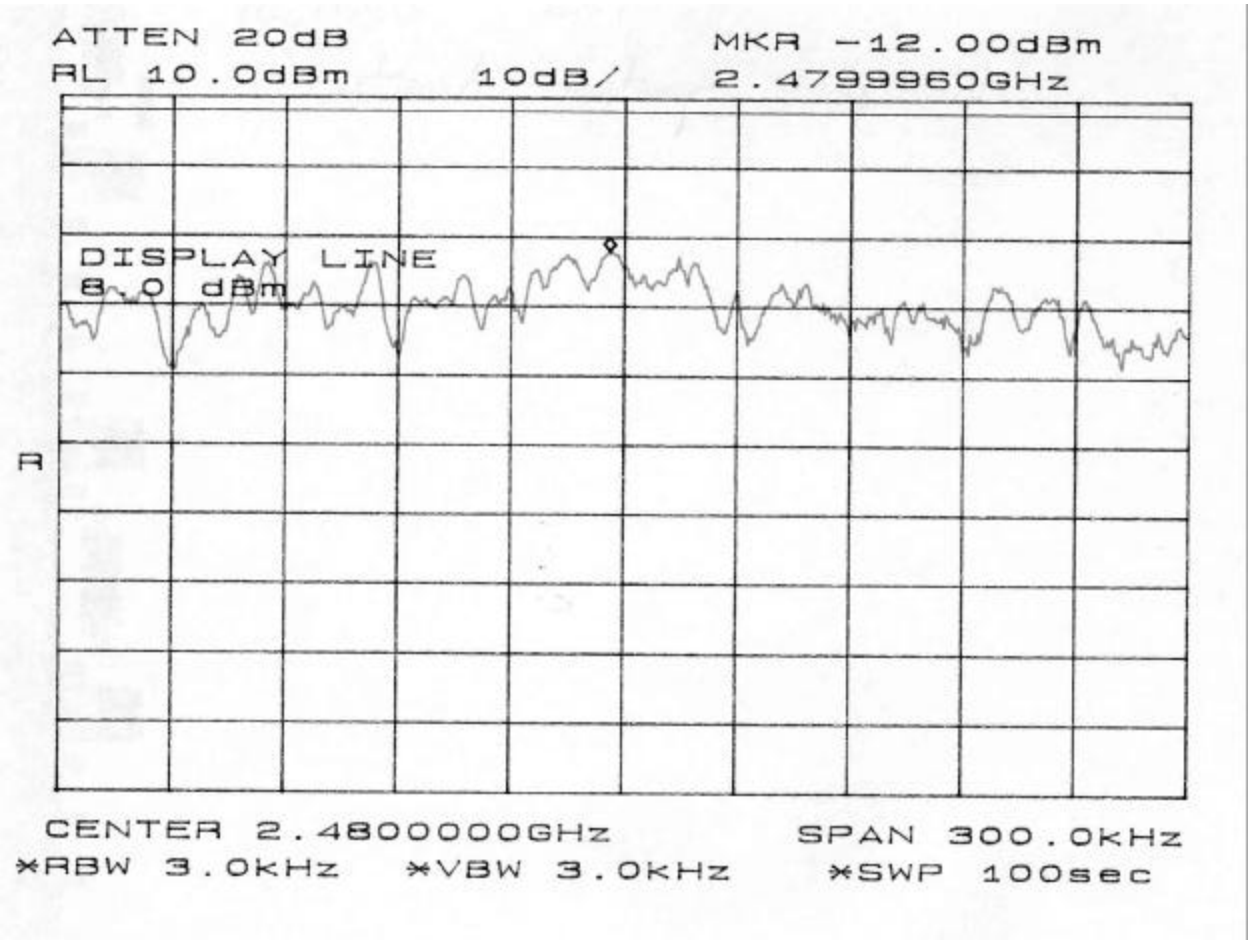
No non-compliance noted:

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin dB
Low	2402	-11.33	8	-19.33
Middle	2441	-11.17	8	-19.17
High	2480	-12.00	8	-20.00

Refer to plots below.







8.7. MAXIMUM PERMISSIBLE EXPOSURE

CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E \wedge 2 / 3770$

where

E = Field Strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = distance in meters
S = Power Density in milliwatts / square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$

$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW / cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and

G (numeric) = 10 ^ (G (dBi) / 10)

yields

$$d = 0.282 * 10 ^ ((P + G) / 20) / \sqrt{S}$$ Equation (1)

where

d = MPE safe distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW / cm^2

RESULTS

No non-compliance noted:

EUT output power = 1.4 dBm
Antenna Gain = 1.22 dBi
S = 1.0 mW / cm^2 from 1.1310 Table 1

Substituting these parameters into Equation (1) above:

MPE Safe Distance = 0.38 cm

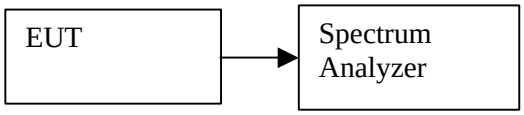
NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

8.8. SPURIOUS EMISSIONS – CONDUCTED MEASUREMENTS

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit.

Also, conducted RF measurements of the transmitter output over the 30 MHz to 26.5 GHz band were made in order to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

TEST SETUP



TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

Measurements are made at the lower band edge with the transmitter set to the lowest channel.

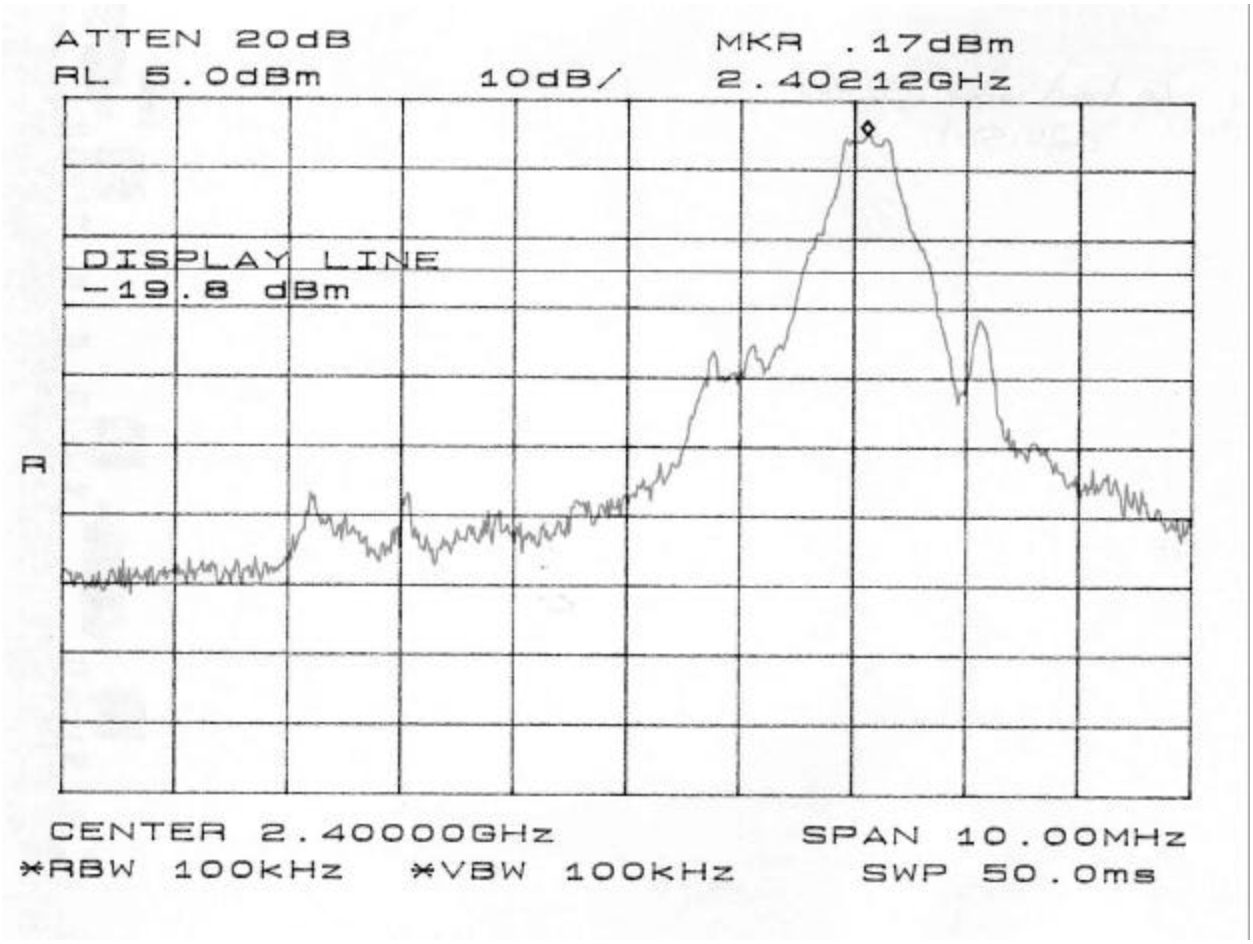
Measurements are made at the upper band edge with the transmitter set to the highest channel.

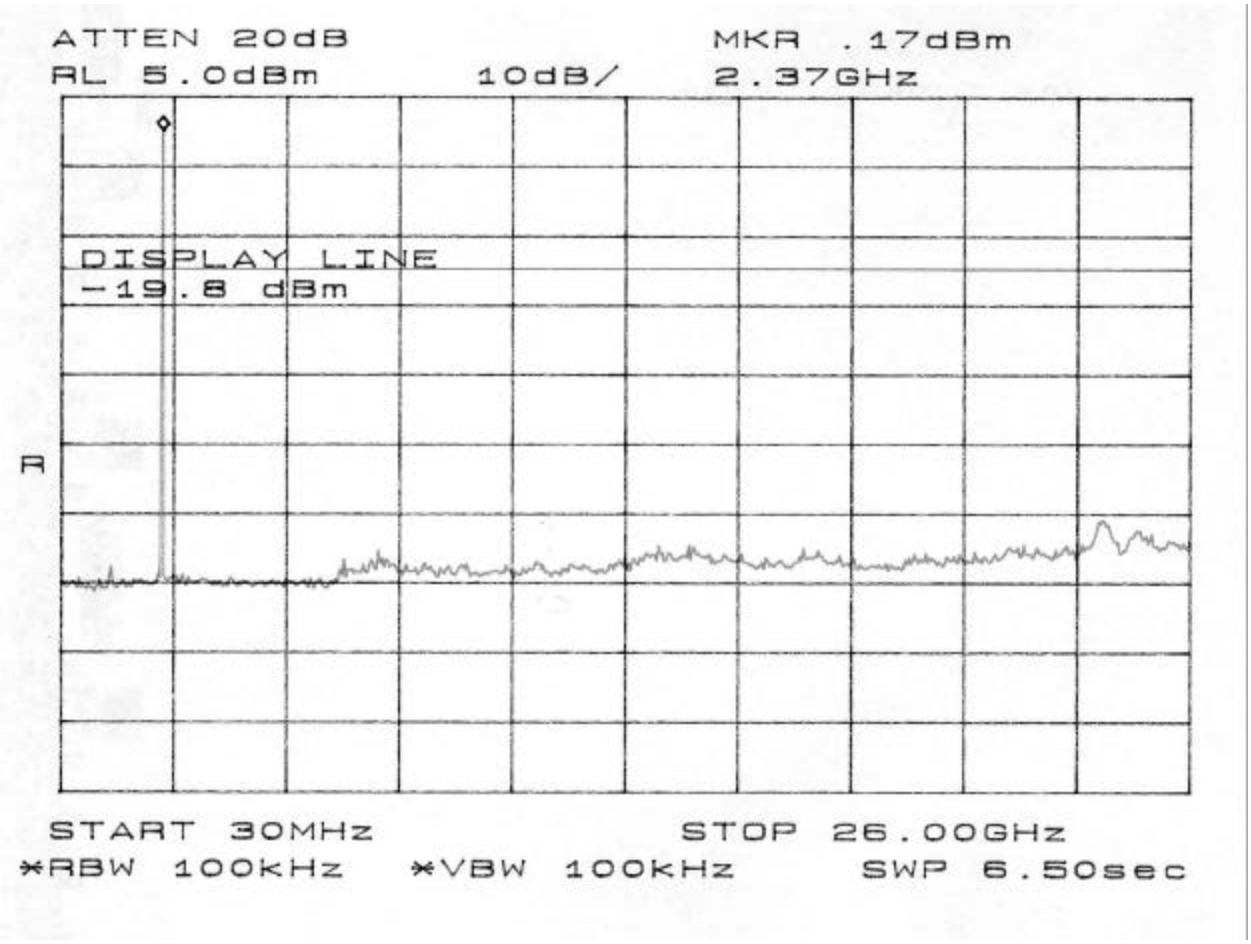
Measurements are made over the 30 MHz to 26.5 GHz range with the transmitter set to the lowest, middle, and highest channels.

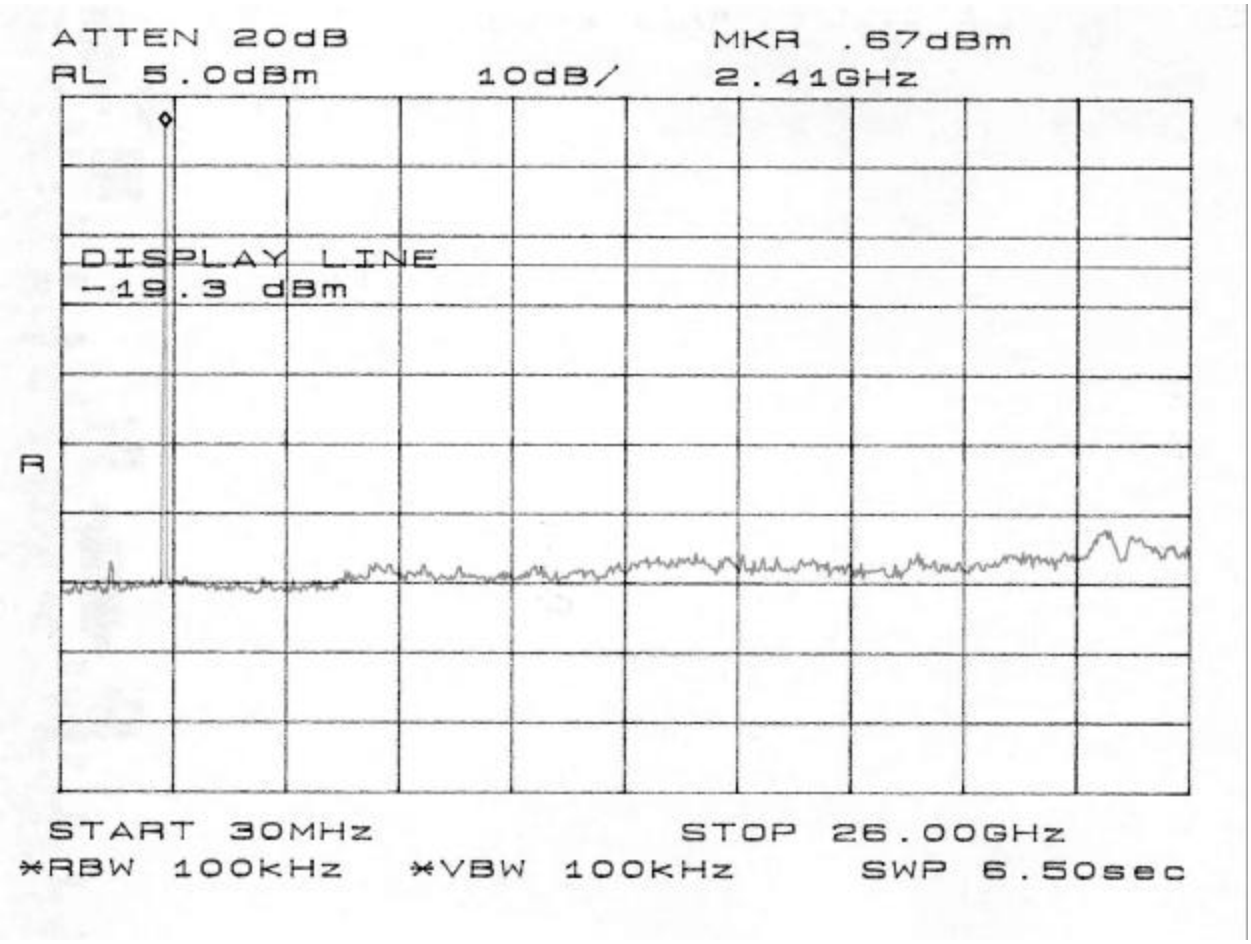
RESULTS

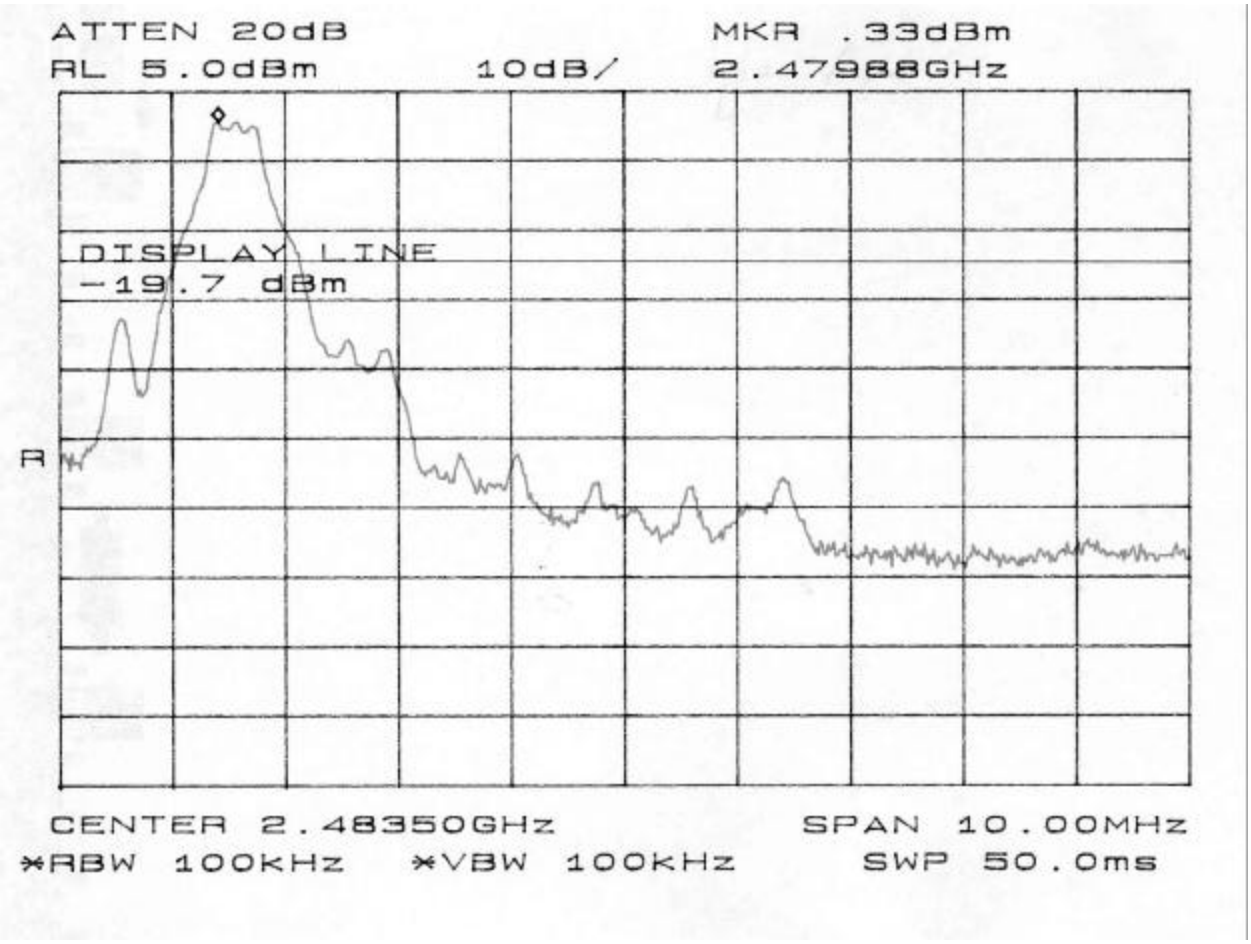
No non-compliance noted:

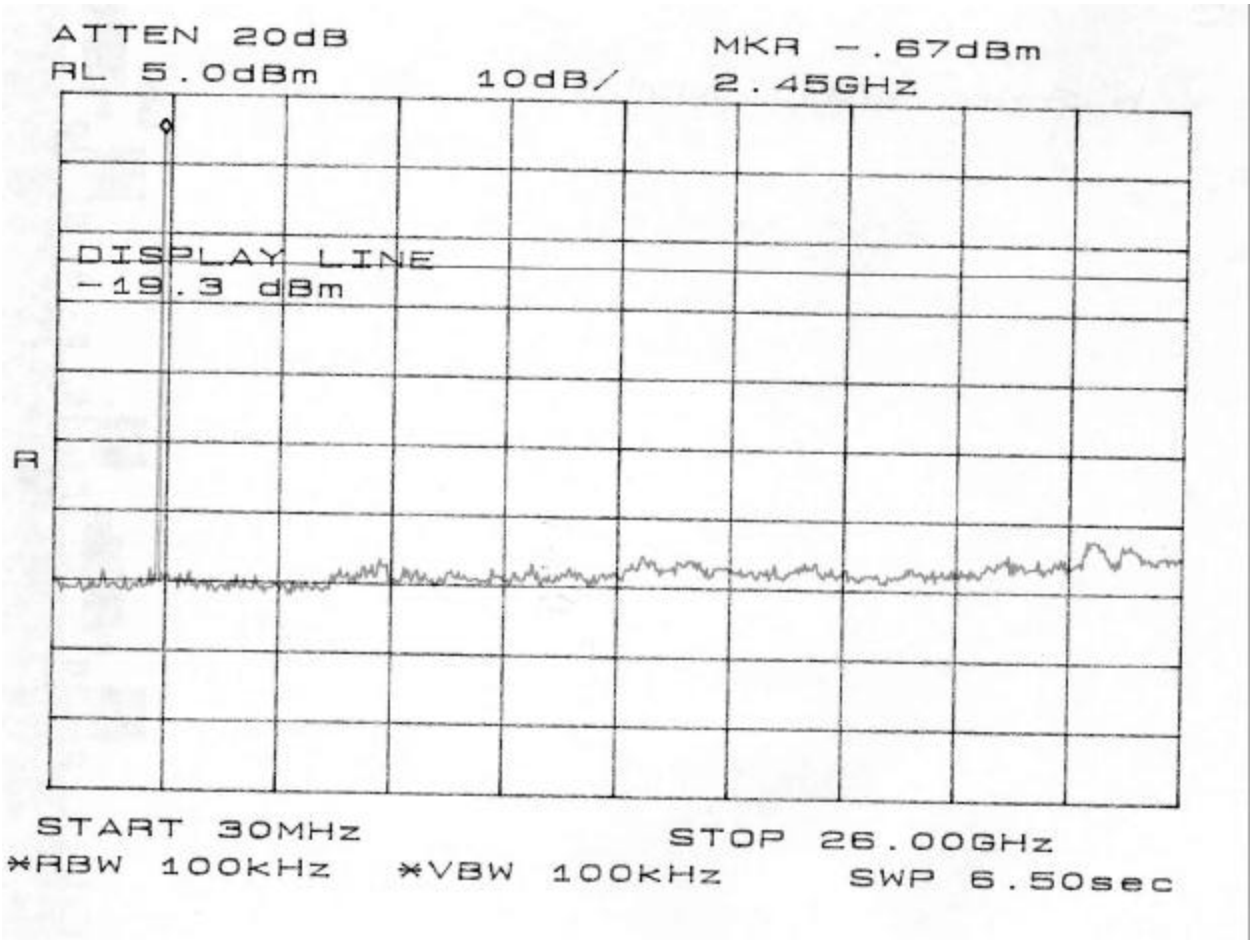
Refer to plots below.











8.9. UNDESIRABLE EMISSIONS – RADIATED MEASUREMENTS

TEST SETUP

For measurements of the EUT as a digital device, the EUT and all other support equipment are placed on a wooden table 80 cm above the ground plane. For measurements of the EUT as a transmitter , the EUT is placed on the wooden table. The antenna to EUT distance is 3 meters for measurements below 1 GHz and 1 meter for measurements above 1 GHz. The EUT is configured in accordance with Section 8 of ANSI C63.4/1992.

The EUT is set to transmit in a continuous mode.

TEST PROCEDURE

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz within restricted bands, the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 26 GHz is investigated.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The frequency span is set small enough to easily differentiate between broadcast stations, intermittent ambient signals and EUT emissions. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the suspected signal. Measurements were made with the antenna polarized in both the vertical and the horizontal positions.

SYSTEM NOISE FLOOR FOR HARMONIC AND SPURIOUS MEASUREMENTS

Compliance Certification Services

Worst Case Radiated Emissions System Noise Floor

Each band below corresponds to each horn antenna band
Uses the lowest gain preamplifier; actual preamp used may have higher gain
Uses the longest typical cable configuration; actual cables used may have less loss
Noise floor field strength results are compared to the FCC 15.205 Restricted Band limit

Specification Distance: 3 meters

Freq GHz	SA dBuV	AF dB/m	Distance m	Distance dB	Preamp dB	Cable dB	Field dBuV/m	Limit dBuV/m	Margin dB
1 to 18 GHz band									
RBW = 1 MHz, peak detection									
18	41.9	47.8	1	-9.5	32.6	13.5	61.06	74	-12.94
RBW = 1 MHz, average detection									
18	28.7	47.8	1	-9.5	32.6	13.5	47.86	54	-6.14
18 to 26.5 GHz band									
RBW = 1 MHz, peak detection									
26.5	44.6	33.4	1	-9.5	35.0	19.5	52.96	74	-21.04
RBW = 1 MHz, average detection									
26.5	32.4	33.4	1	-9.5	35.0	19.5	40.76	54	-13.24

TEST RESULTS

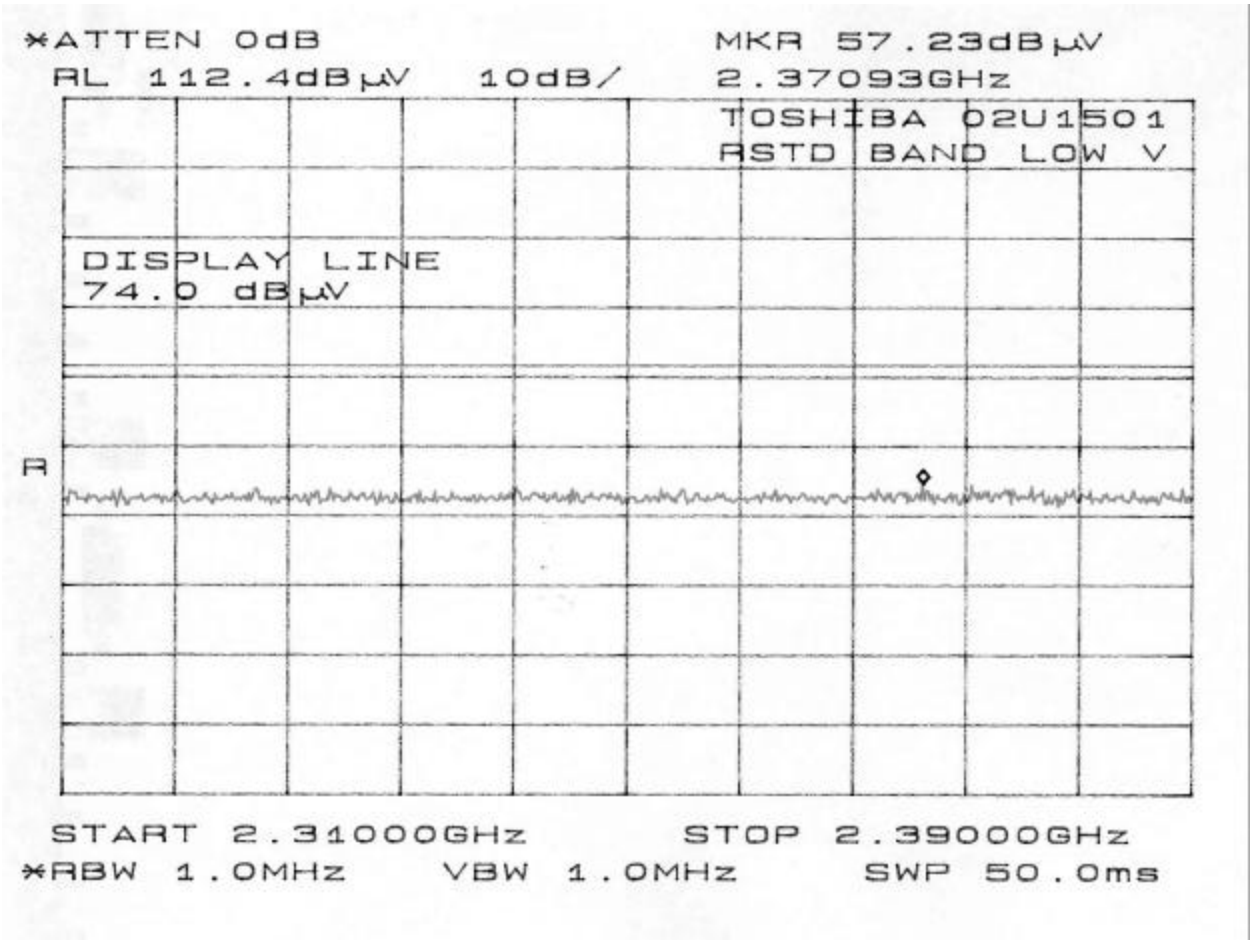
No non-compliance noted:

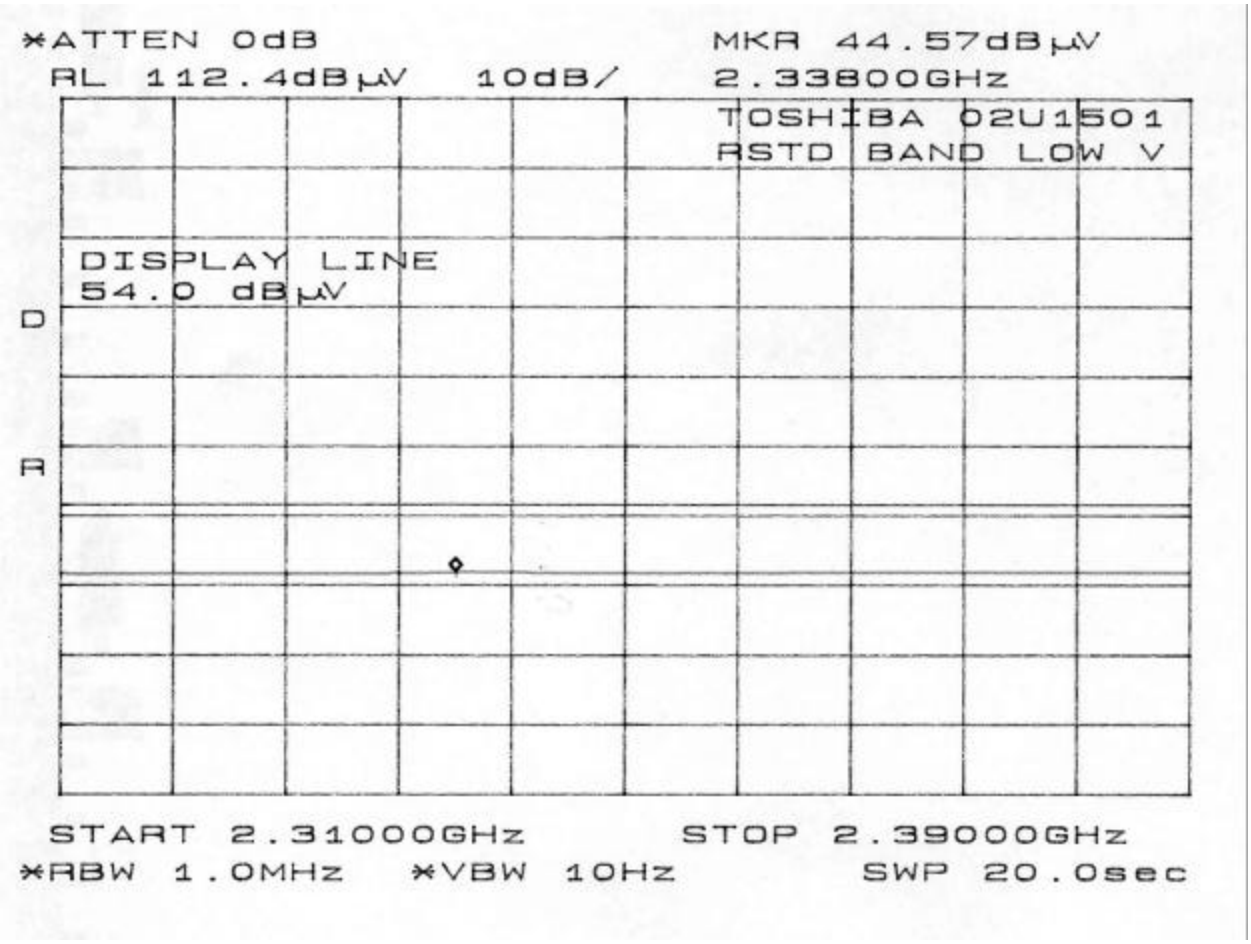
HARMONIC AND SPURIOUS RADIATED EMISSIONS

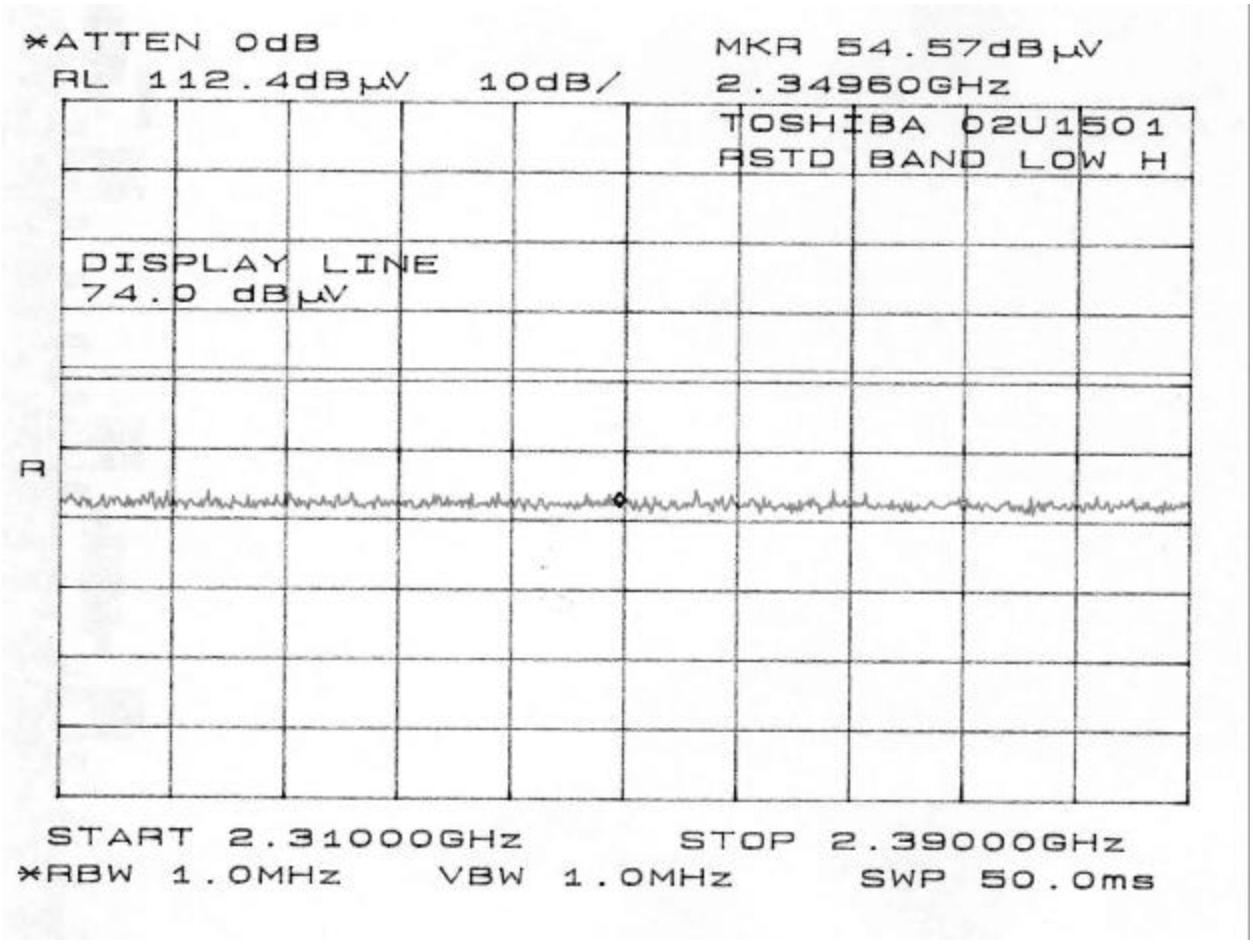
Description of Test:			Spurious Radiated Emissions							
Project Number:			02U1501							
Date:			09/05/02							
Test Engineer:			Warren Wilson							
Site:			B							
Company:			Toshiba							
EUT Description:			Bluetooth Module with Single Film antenna							
Test Configuration:			EUT / Antenna USB Test Fixture / Laptop / AC Adapter							
Mode of Operation:			Constant Tx at maximum power, Low Channel 2.402 GHz							
Specification Distance:			3.0	meters						
Actual Distance:			1.0	meters	Cable Length:		15.0	feet		
Freq	**Det**	**SA**	**Dist**	**AF**	**Preamp**	**Filter**	**Cable**	**Field**	**Limit**	**Margin**
GHz		**dBuV**	**dB**	**dB/m**	**dB**	**dB**	**dB**	**dBuV/m**	**dBm**	**dB**
4.804	Peak	51.3	-9.5	33.8	34.5	1.0	5.7	47.7	74.0	-26.3
4.804	Peak*	51.3	-9.5	33.8	34.5	1.0	5.7	47.7	54.0	-6.3
7.206	Peak	48.2	-9.5	37.0	34.5	1.0	7.2	49.3	74.0	-24.7
7.206	Peak*	48.2	-9.5	37.0	34.5	1.0	7.2	49.3	54.0	-4.7
Note 1: The data above is the worst case of all the following configurations, at each frequency:										
EUT antenna in X / Y / Z orientations and measuring antenna in Vertical / Horizontal polarization.										
Note 2: * The peak level is less than the average limit.										
Note 3: No other spurious emissions were detected above the system noise floor.										

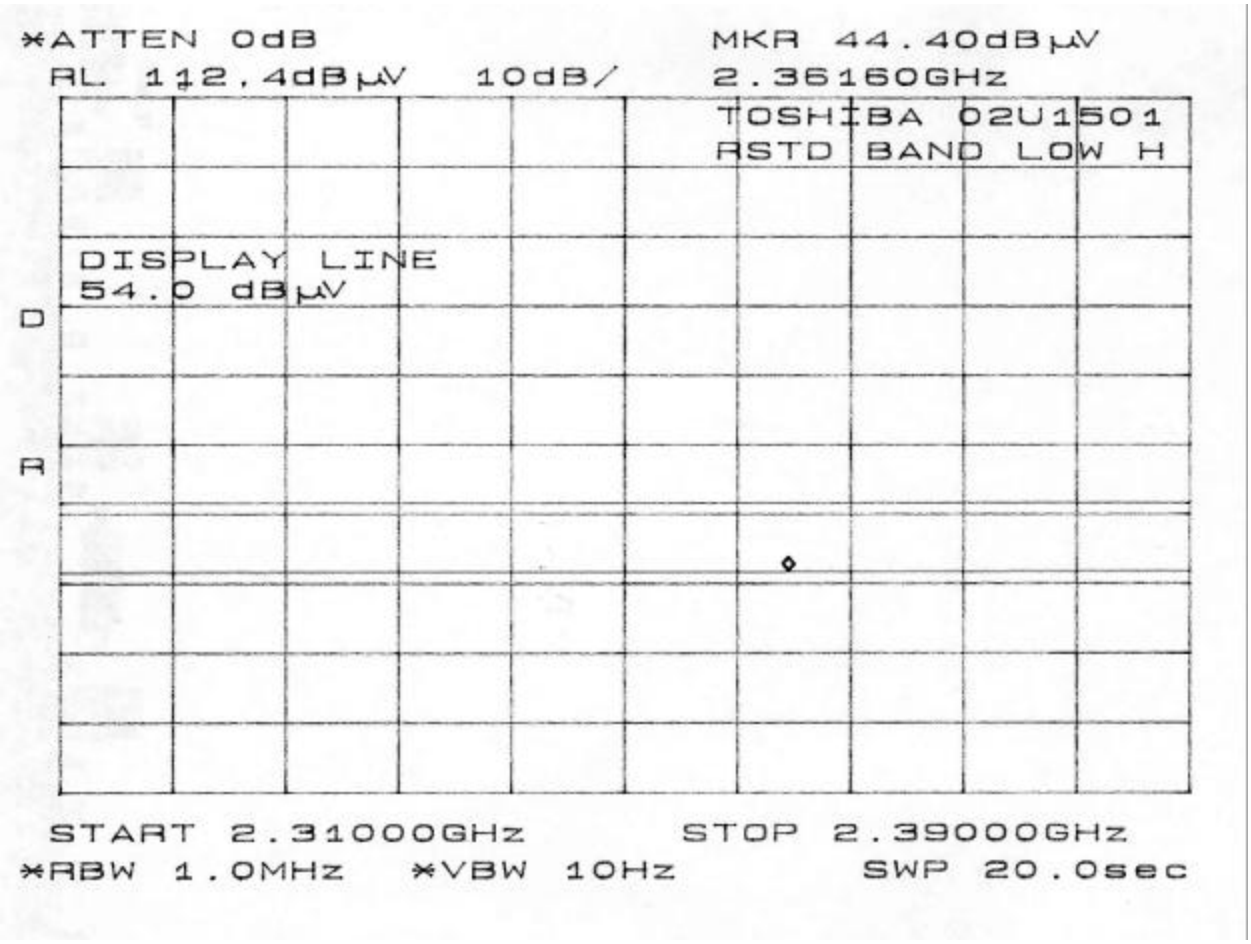
Description of Test:			Spurious Radiated Emissions							
	Project Number:		02U1501							
		Date:	09/05/02							
	Test Engineer:		Warren Wilson							
		Site:	B							
	Company:		Toshiba							
	EUT Description:		Bluetooth Module with Single Film antenna							
Test Configuration:			EUT / Antenna USB Test Fixture / Laptop / AC Adapter							
Mode of Operation:			Constant Tx at maximum power, Mid Channel 2.441 GHz							
Specification Distance:			3.0	meters						
	Actual Distance:		1.0	meters	Cable Length:		15.0	feet		
Freq	**Det**	**SA**	**Dist**	**AF**	**Preamp**	**Filter**	**Cable**	**Field**	**Limit**	**Margin**
GHz		**dBuV**	**dB**	**dB/m**	**dB**	**dB**	**dB**	**dBuV/m**	**dBm**	**dB**
4.882	Peak	52.7	-9.5	34.0	34.5	1.0	5.8	49.4	74.0	-24.6
4.882	Peak*	52.7	-9.5	34.0	34.5	1.0	5.8	49.4	54.0	-4.6
7.323	Peak	48.7	-9.5	37.2	34.6	1.0	7.3	50.1	74.0	-23.9
7.323	Peak*	48.7	-9.5	37.2	34.6	1.0	7.3	50.1	54.0	-3.9
Note 1: The data above is the worst case of all the following configurations, at each frequency:										
EUT antenna in X / Y / Z orientations and measuring antenna in Vertical / Horizontal polarization.										
Note 2: * The peak level is less than the average limit.										
Note 3: No other spurious emissions were detected above the system noise floor.										

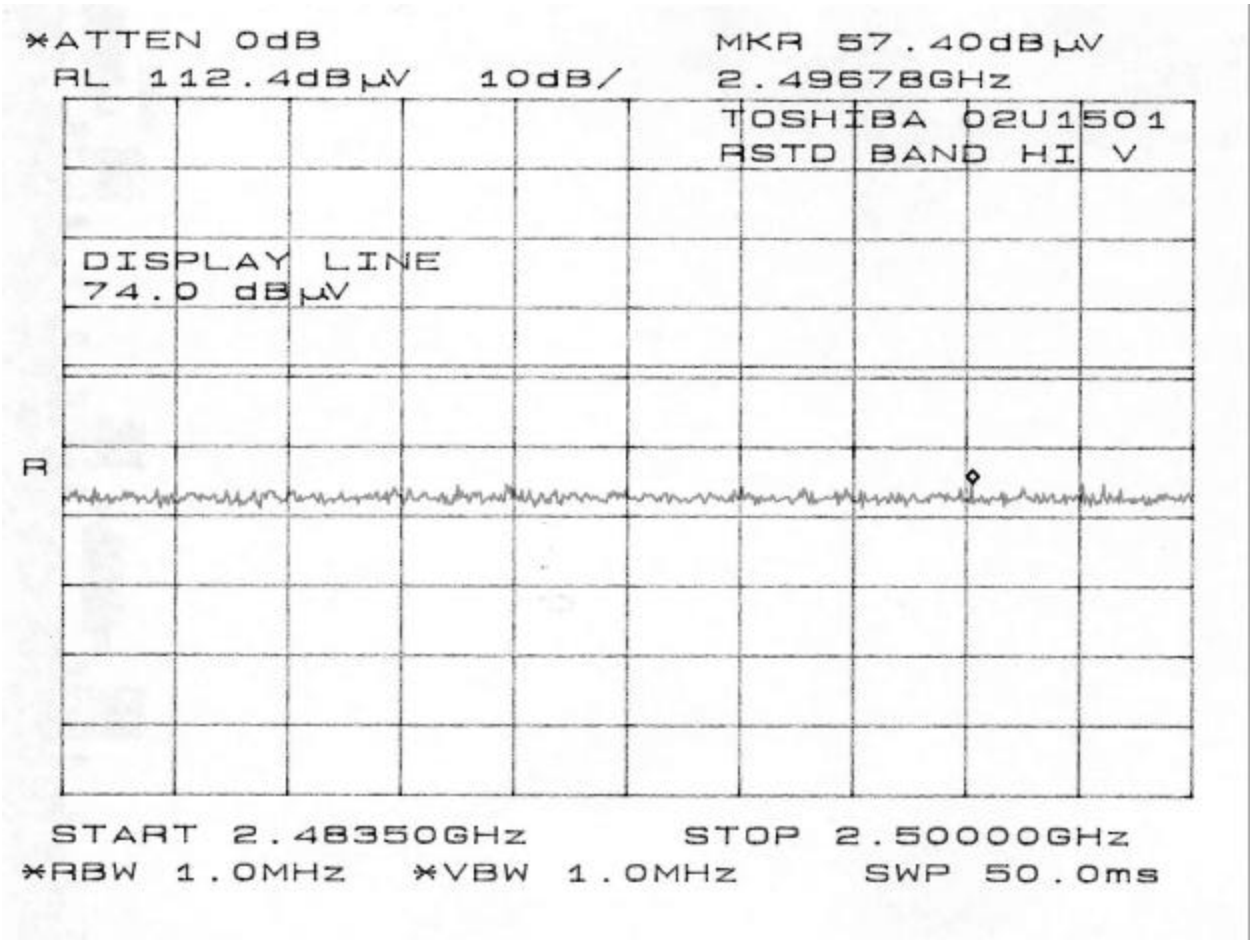
Description of Test:			Spurious Radiated Emissions							
	Project Number:		02U1501							
		Date:	09/05/02							
	Test Engineer:		Warren Wilson							
		Site:	B							
	Company:		Toshiba							
	EUT Description:		Bluetooth Module with Single Film antenna							
Test Configuration:			EUT / Antenna USB Test Fixture / Laptop / AC Adapter							
Mode of Operation:			Constant Tx at maximum power, High Channel 2.480 GHz							
Specification Distance:			3.0	meters						
	Actual Distance:		1.0	meters		Cable Length:		15.0	feet	
Freq	**Det**	**SA**	**Dist**	**AF**	**Preamp**	**Filter**	**Cable**	**Field**	**Limit**	**Margin**
GHz		**dBuV**	**dB**	**dB/m**	**dB**	**dB**	**dB**	**dBuV/m**	**dBm**	**dB**
4.960	Peak	51.5	-9.5	34.2	34.5	1.0	5.8	48.5	74.0	-25.5
4.960	Peak*	51.5	-9.5	34.2	34.5	1.0	5.8	48.5	54.0	-5.5
7.440	Peak	48.0	-9.5	37.5	34.6	1.0	7.4	49.7	74.0	-24.3
7.440	Peak*	48.0	-9.5	37.5	34.6	1.0	7.4	49.7	54.0	-4.3
Note 1: The data above is the worst case of all the following configurations, at each frequency:										
EUT antenna in X / Y / Z orientations and measuring antenna in Vertical / Horizontal polarization.										
Note 2: * The peak level is less than the average limit.										
Note 3: No other spurious emissions were detected above the system noise floor.										

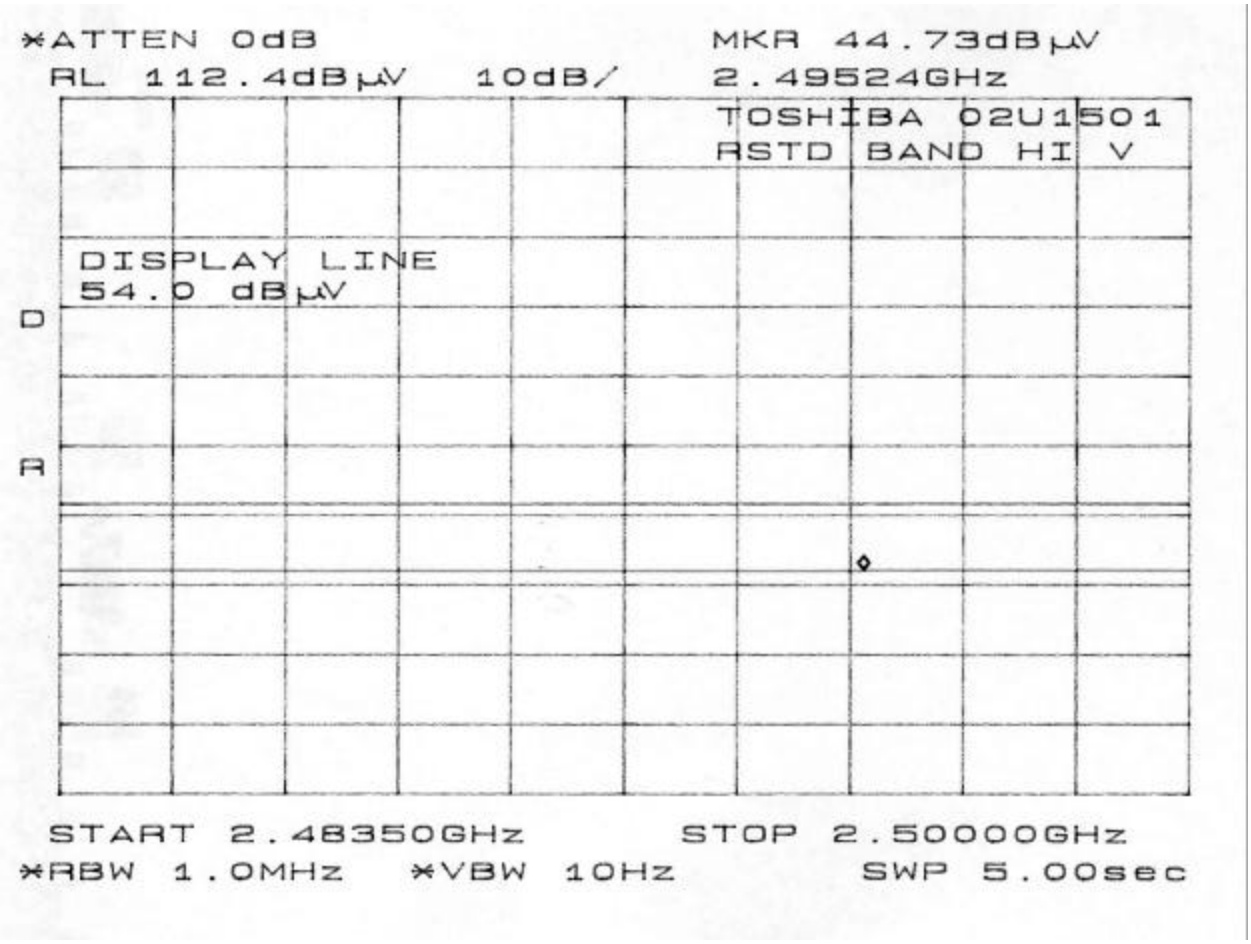


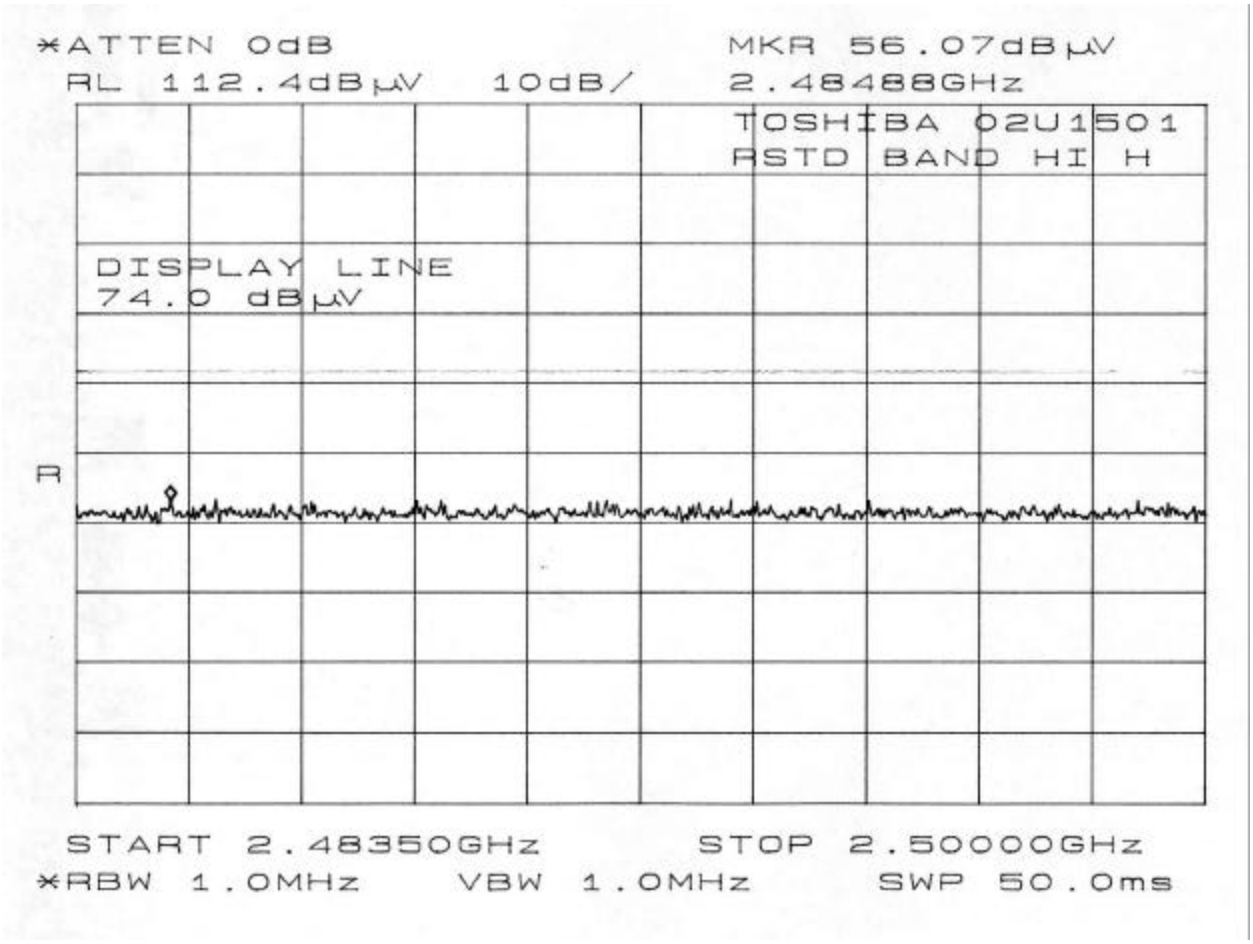


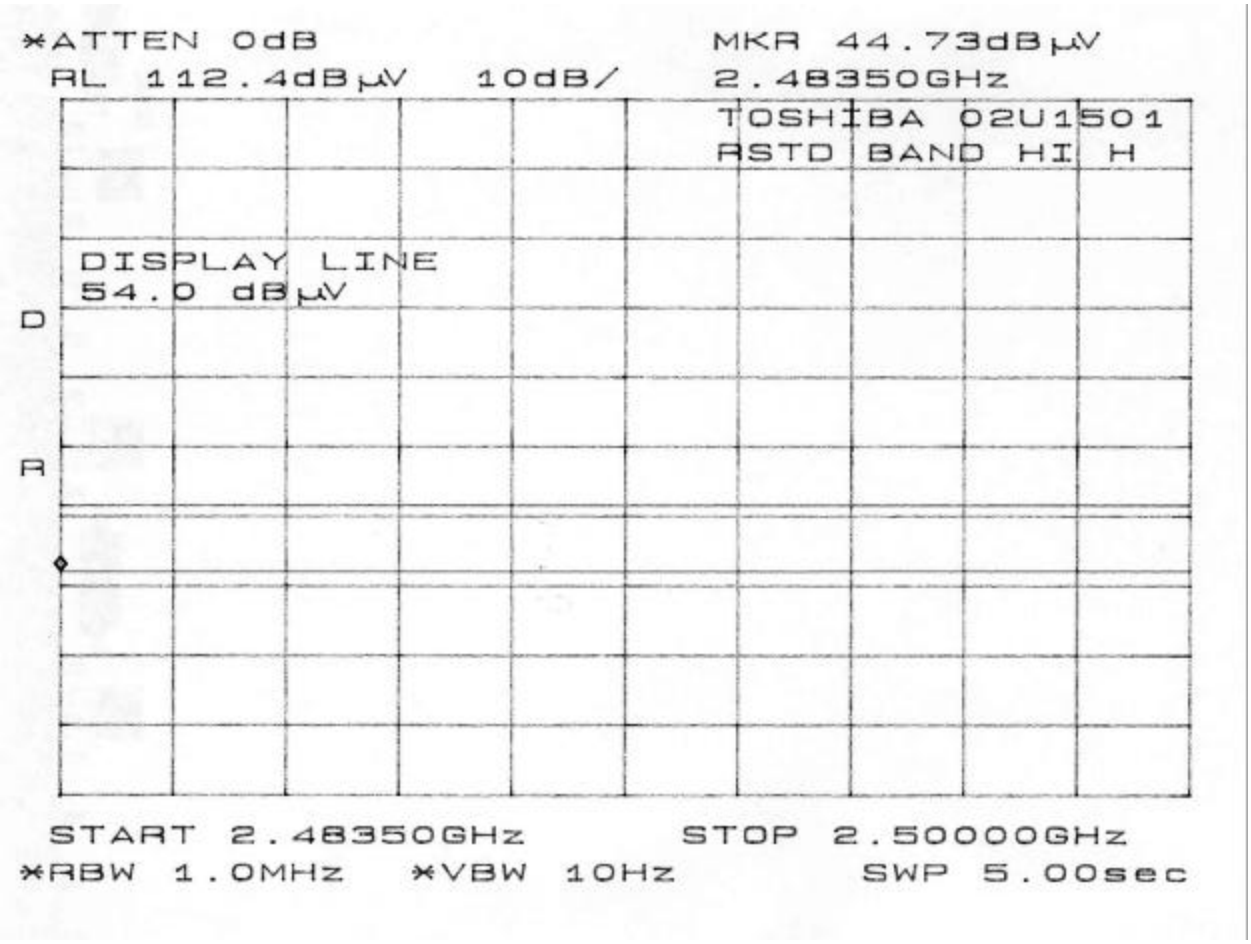












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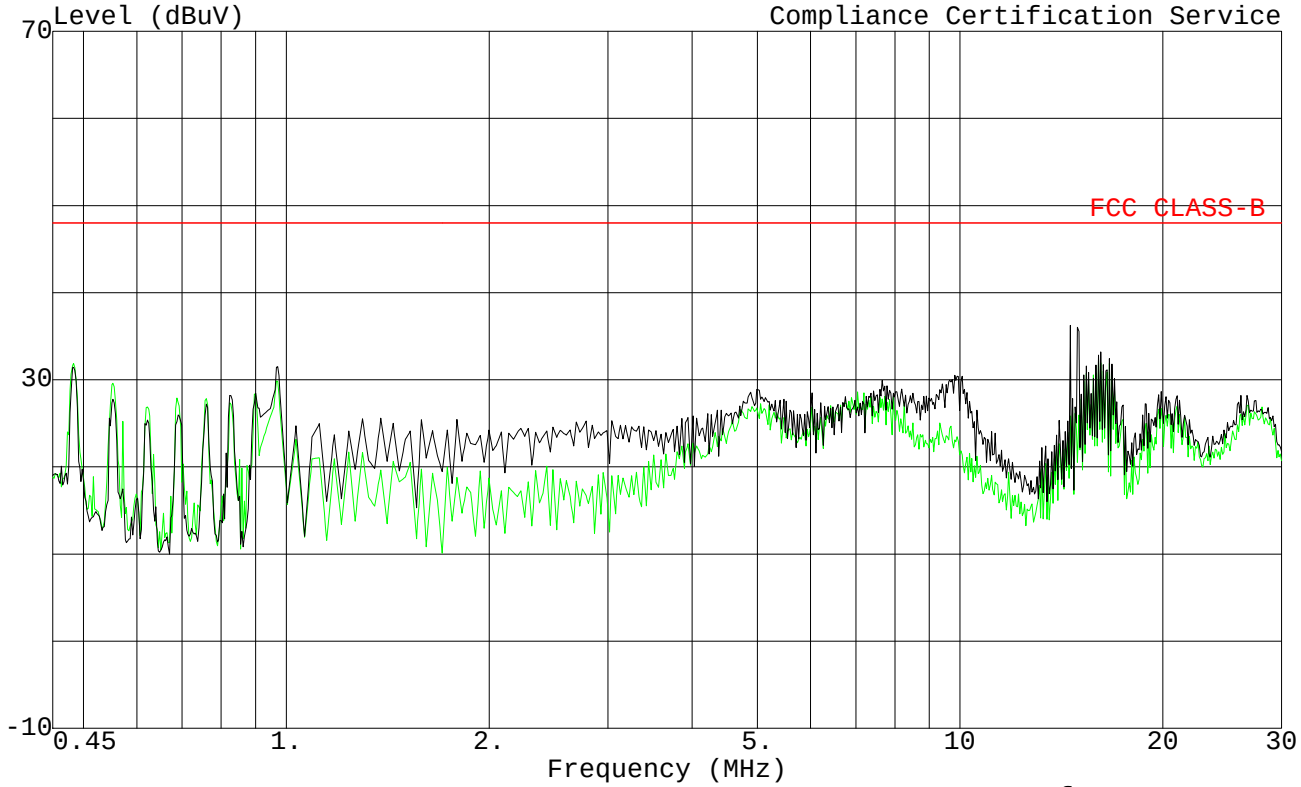
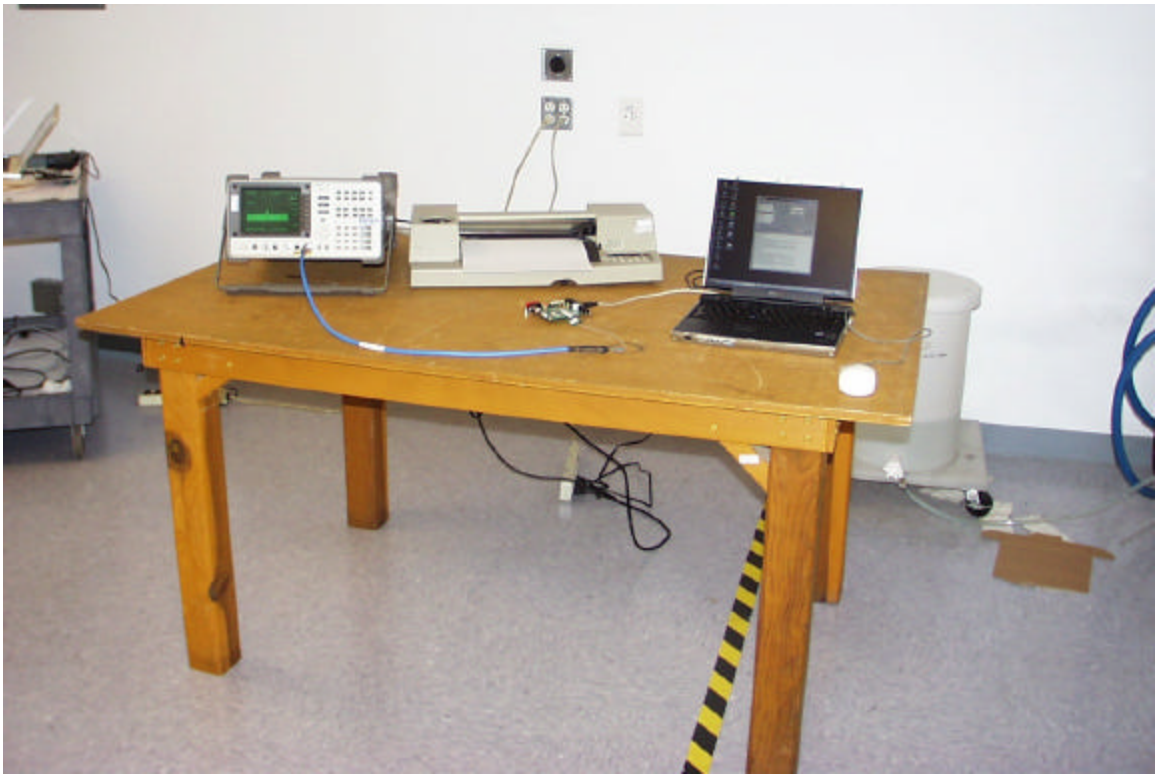


Trace: 3 Ref Trace:

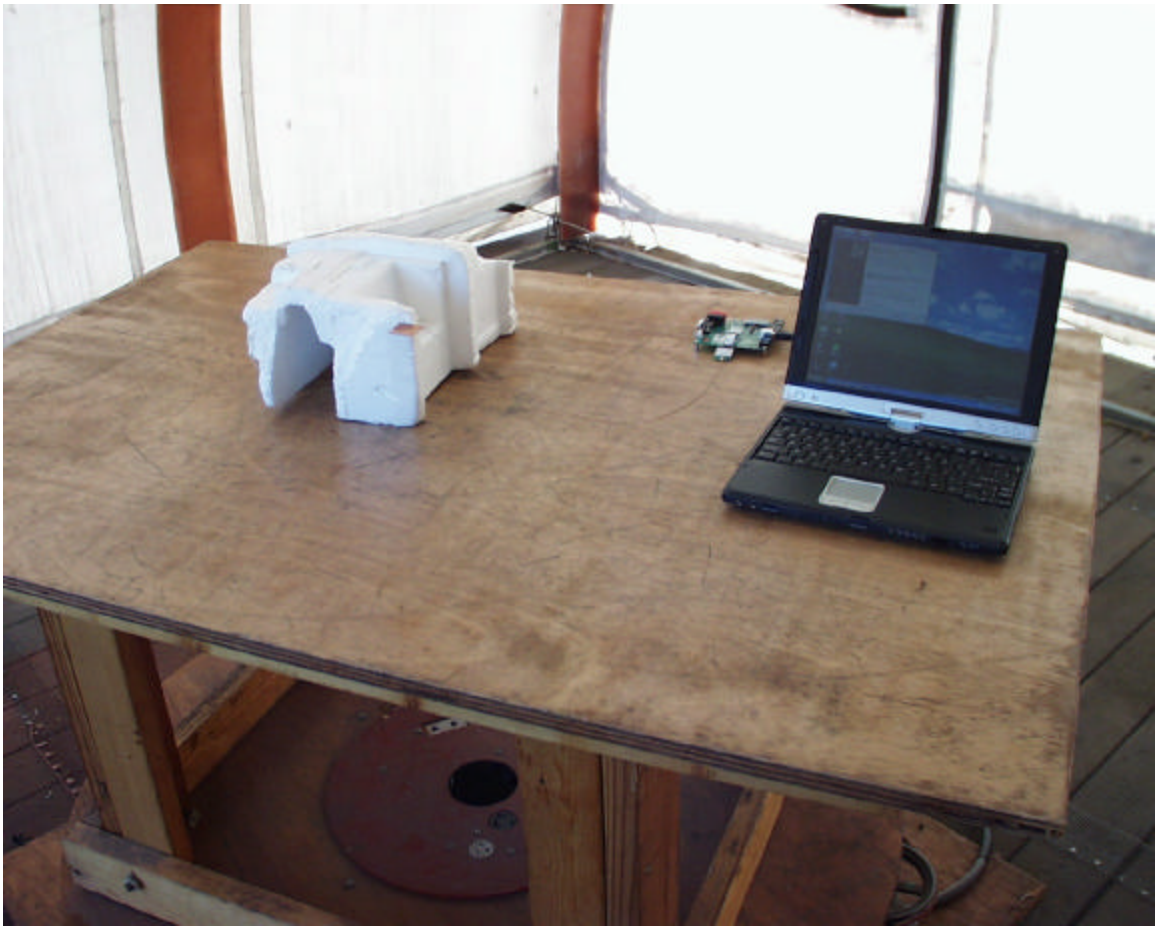
Project # : 02U1501
Test Engineer: WILLIAM ZHUANG
Company : TOSHIBA AMERICA INFORMATION SYSTEMS, INC
EUT : CSR BLUETOOTH CARD WITH FILM ANTENNA
Test Config. : EUT and DC Power Supply KRM AEEC-350
: (CCS Equipment)
Mode of Op. : Standard, Normal Operation
: 115 VAC, 60 Hz
: Peak , Line 1 GREEN, Line 2 BLACK

8.10. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



RADIATED RF MEASUREMENT SETUP: ANTENNA IN X-AXIS ORIENTATION



RADIATED RF MEASUREMENT SETUP: ANTENNA IN Y-AXIS ORIENTATION

RADIATED RF MEASUREMENT SETUP: ANTENNA IN Z-AXIS ORIENTATION

END OF REPORT