FCC CFR47 PART 15 SUBPART C
CLASS II PERMISSIVE CHANGE

TEST REPORT

FOR

WIRELESS LAN MODULE CO-LOCATED WITH BLUETOOTH

MODEL: PA3233U-1MPC

FCC ID: CJ6UPA3233WL

REPORT NUMBER: 02U1644-1

ISSUE DATE: DECEMBER 13, 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: WIRELESS LAN MODULE CO-LOCATED WITH BLUETOOTH

MODEL: PA3233U-1MPC

DATE TESTED: DECEMBER 12, 2002

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC 15.247	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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:

MIKE HECKROTTE
CHIEF ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Tested By:

CHIN PANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. DESCRIPTION OF EUT AND CLASS II PERMISSIVE CHANGE

2.1.1. EUT DESCRIPTION

The Toshiba WLAN module is an 802.11 a/b wireless Spread Spectrum transceiver. It is constructed on a printed circuit card with a Mini PCI interface and is designed to be installed in a host system. This unit provides a power output of +18.2 dBm (66 mW) in the 2400 – 2483.5 MHz band and +23.1 dBm (204 mW) in the 5725 –5850 MHz band . It is designed to use two dual band inverted F film antennas. A single antenna is used for transmit. Both antennas are used for receive diversity. The highest intended antenna gain is 4.8 dBi.

According to the original FCC Grant of Equipment Authorization, this module may only be used in Toshiba laptops.

2.1.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The proposed change is to add co-location with the CSR Bluetooth transceiver module.

The CSR Bluetooth module is a wireless Frequency Hopping Spread Spectrum transceiver that operates from 2402 – 2480 MHz. This unit provides a maximum power output of +1.4 dBm (1.38 mW) and is connected to an internal film antenna with a 1.22 dBi gain (Single Film).

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
Spectrum Analyzer	HP	8593EM	3710A00205	6/11/03
Preamplifier (1 - 26.5GHz)	Miteq	NSP10023988	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
Touch Screen Platform	Toshiba	Portege 3500	92027903	Prototype / EUT
AC Adapter	Toshiba	PA3083U-1ACA	1230257G	DoC

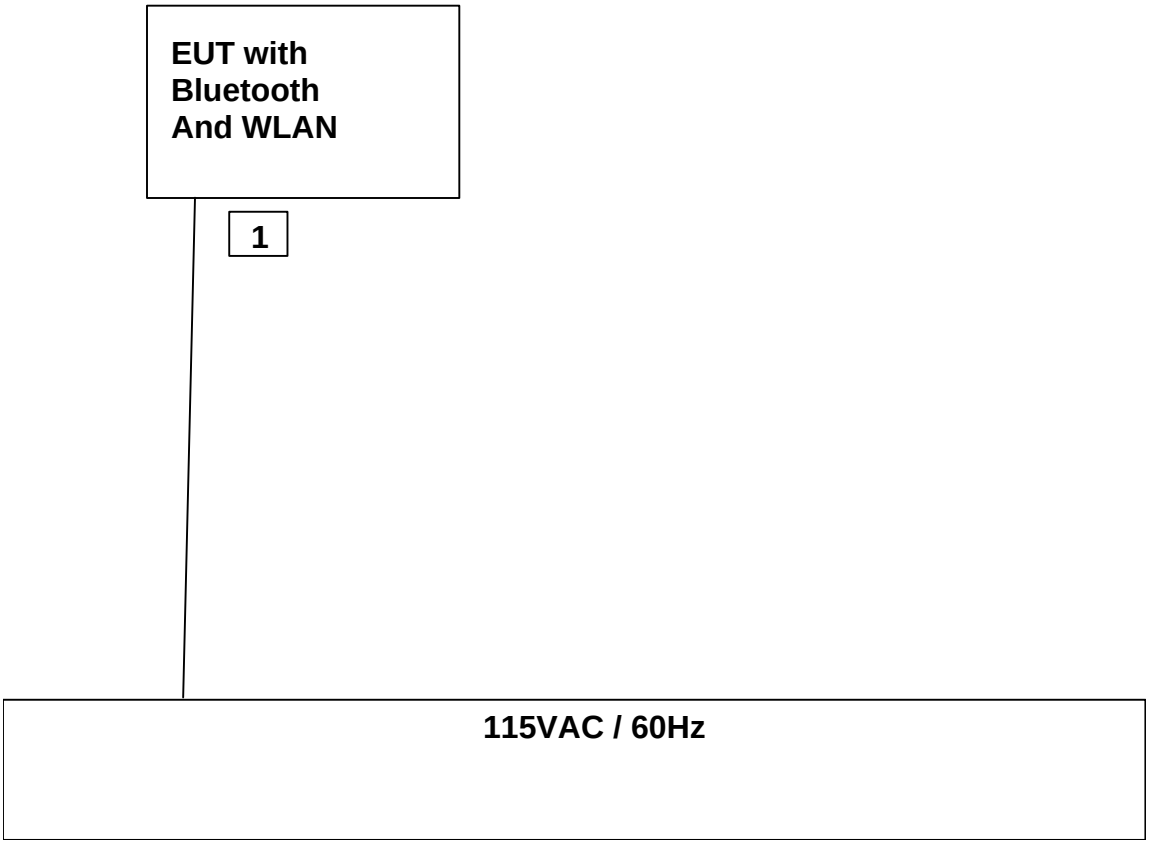
I/O CABLES

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

TEST SETUP

The Bluetooth transceiver in the EUT is operated in a standalone mode by a utility program. The WLAN transceiver in the EUT is also operated in a standalone mode by a utility program.

SETUP DIAGRAM FOR TRANSMITTER TESTS



6.1. APPLICABLE RULES

§15.247 (c)- SPURIOUS EMISSIONS

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)).

§15.205- 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.

§15.209- 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

7. TEST SETUP, PROCEDURE AND RESULT

7.1. UNDESIRABLE EMISSIONS – RADIATED MEASUREMENTS

TEST SETUP

The EUT is placed on the wooden table. The antenna to EUT distance is 3 meters for measurements. The EUT is configured in accordance with ANSI C63.4/1992.

Both transmitters in the EUT are set to transmit simultaneously 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.

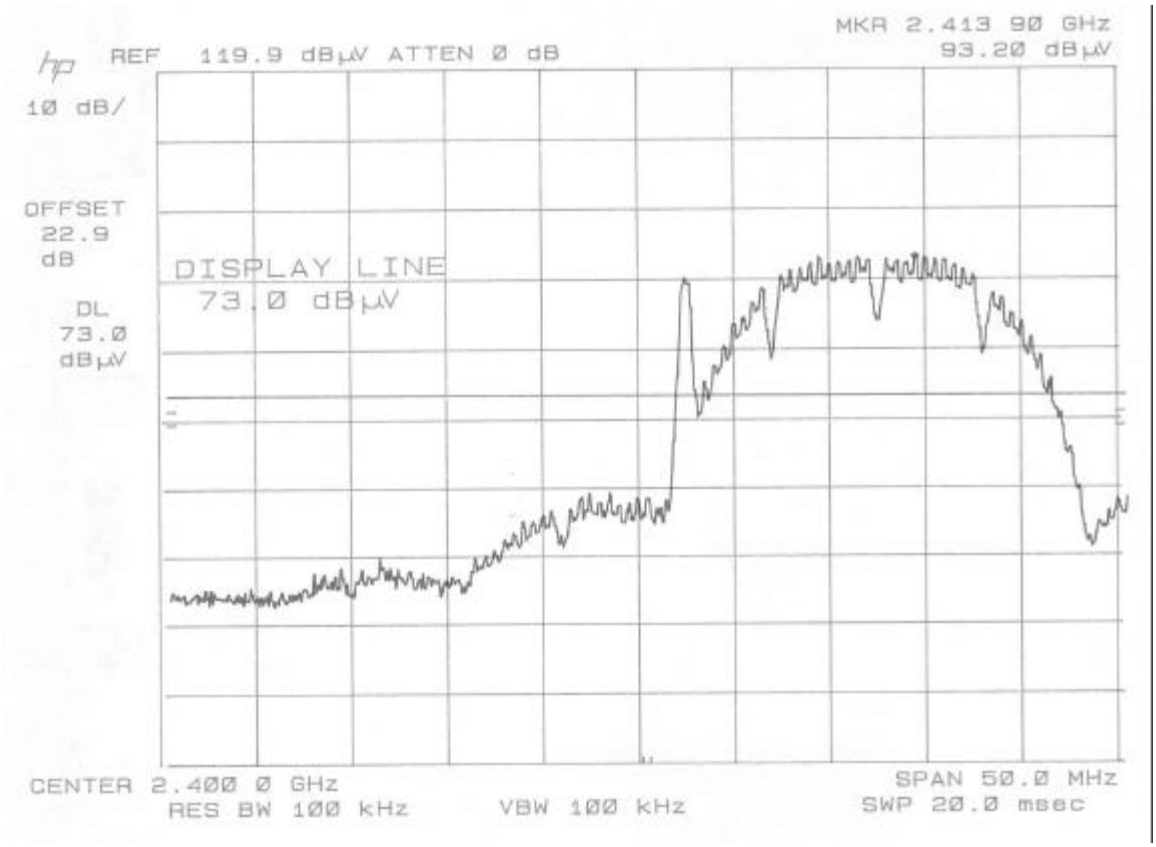
The spectrum from 30 MHz to 26 GHz is investigated.

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.

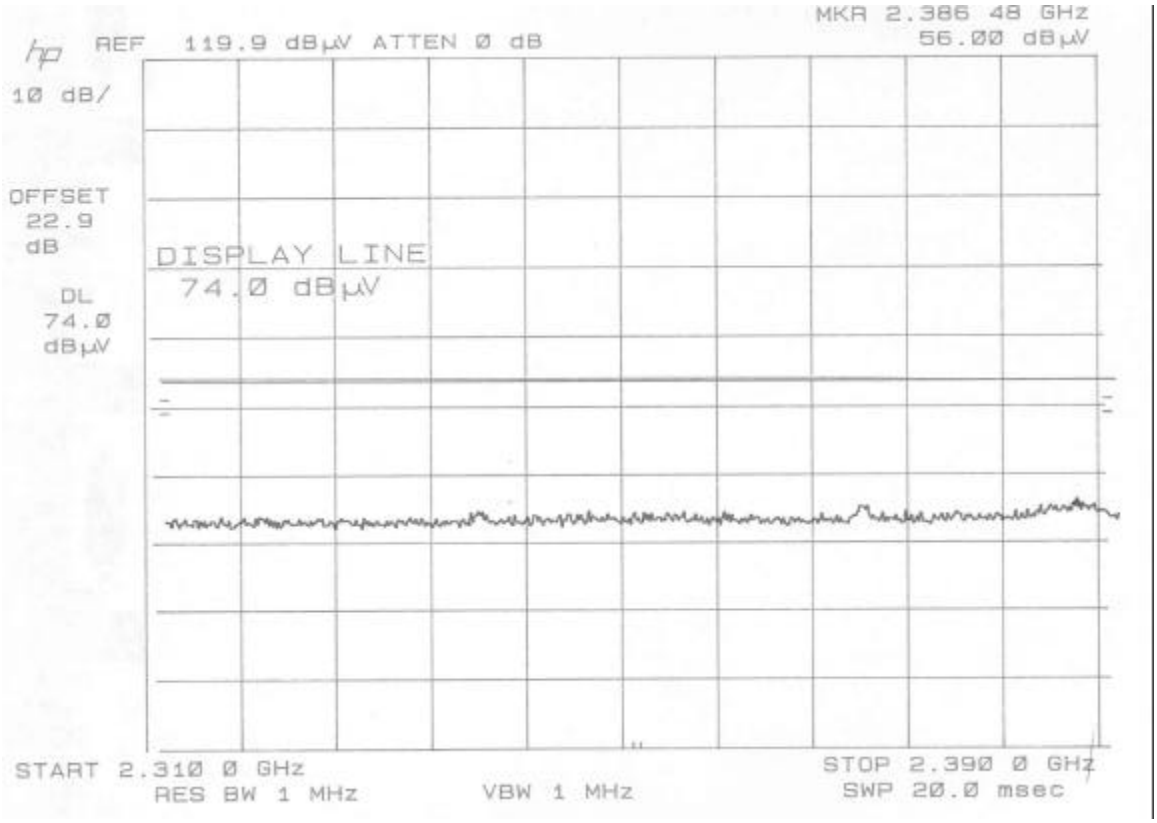
TEST RESULTS

No non-compliance noted:

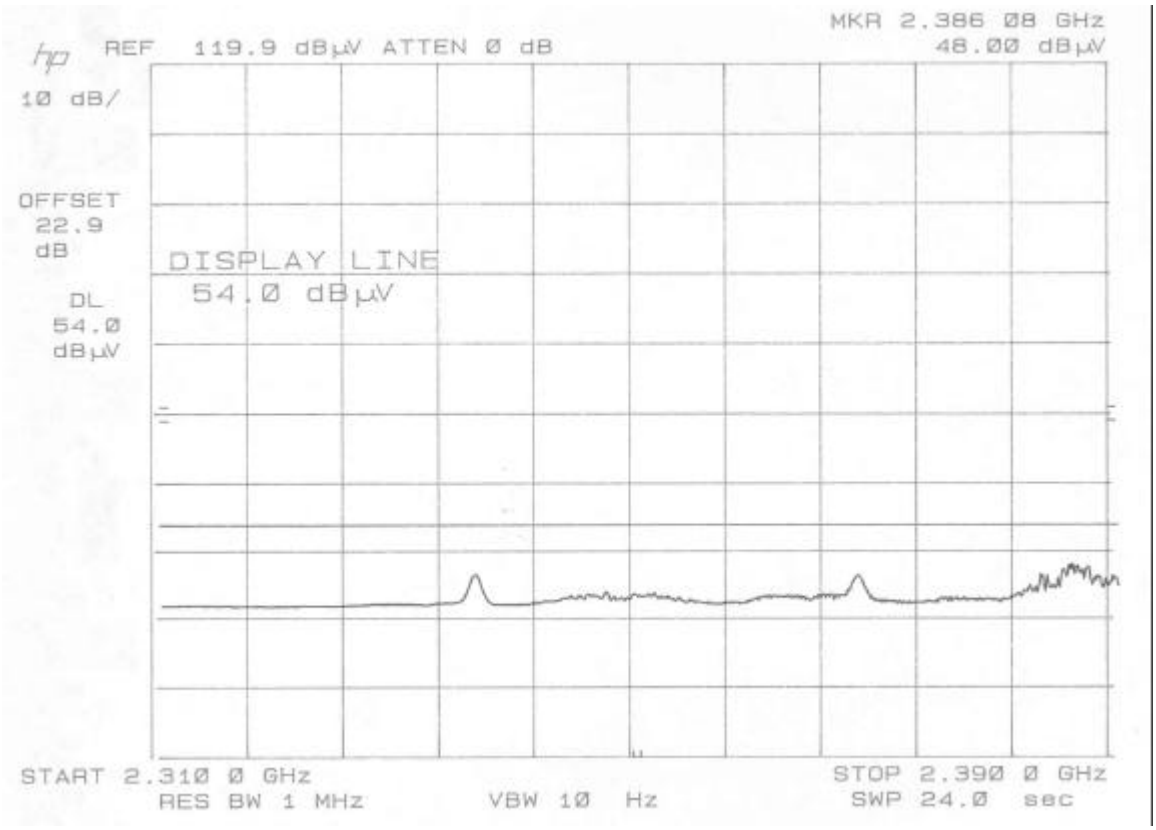
LOWER BAND EDGE WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR LOW FREQUENCY CHANNELS



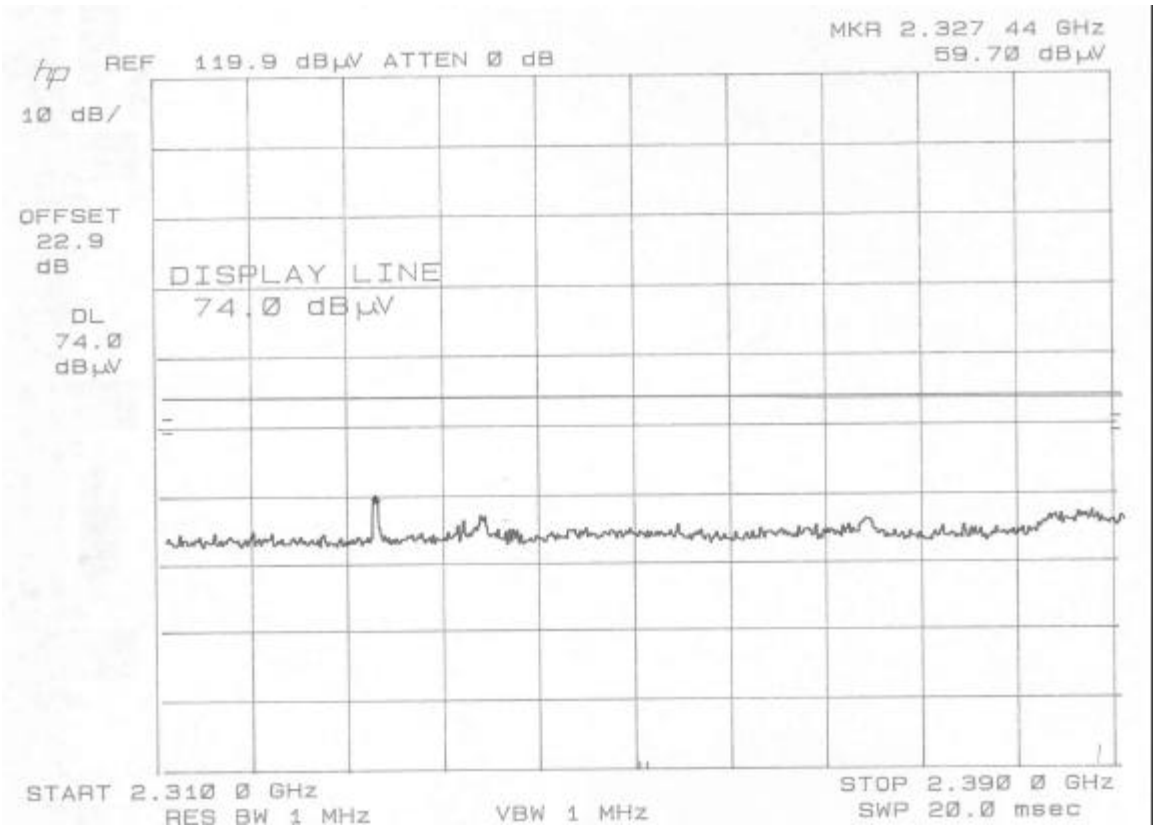
LOWER RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR LOW FREQUENCY CHANNELS – VERTICAL PEAK



LOWER RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR LOW FREQUENCY CHANNELS – VERTICAL AVERAGE



LOWER RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR LOW FREQUENCY CHANNELS – HORIZONTAL PEAK



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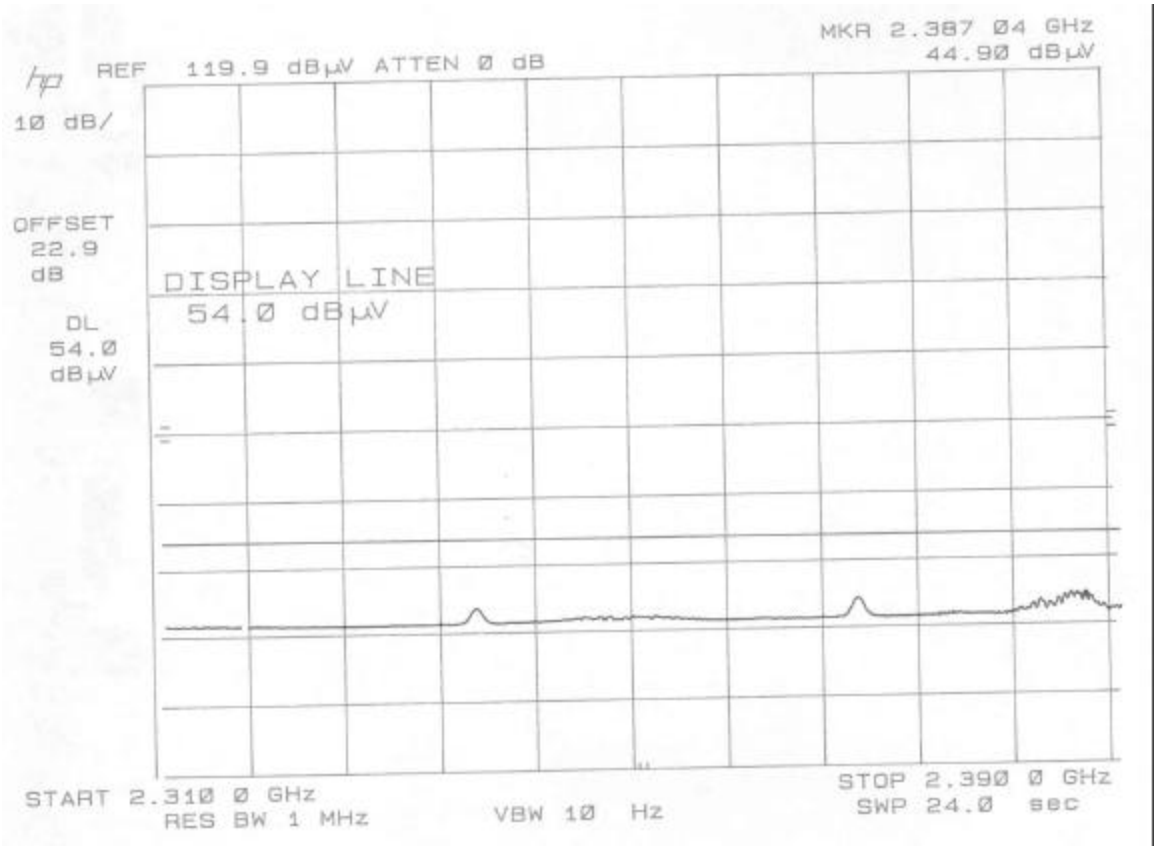
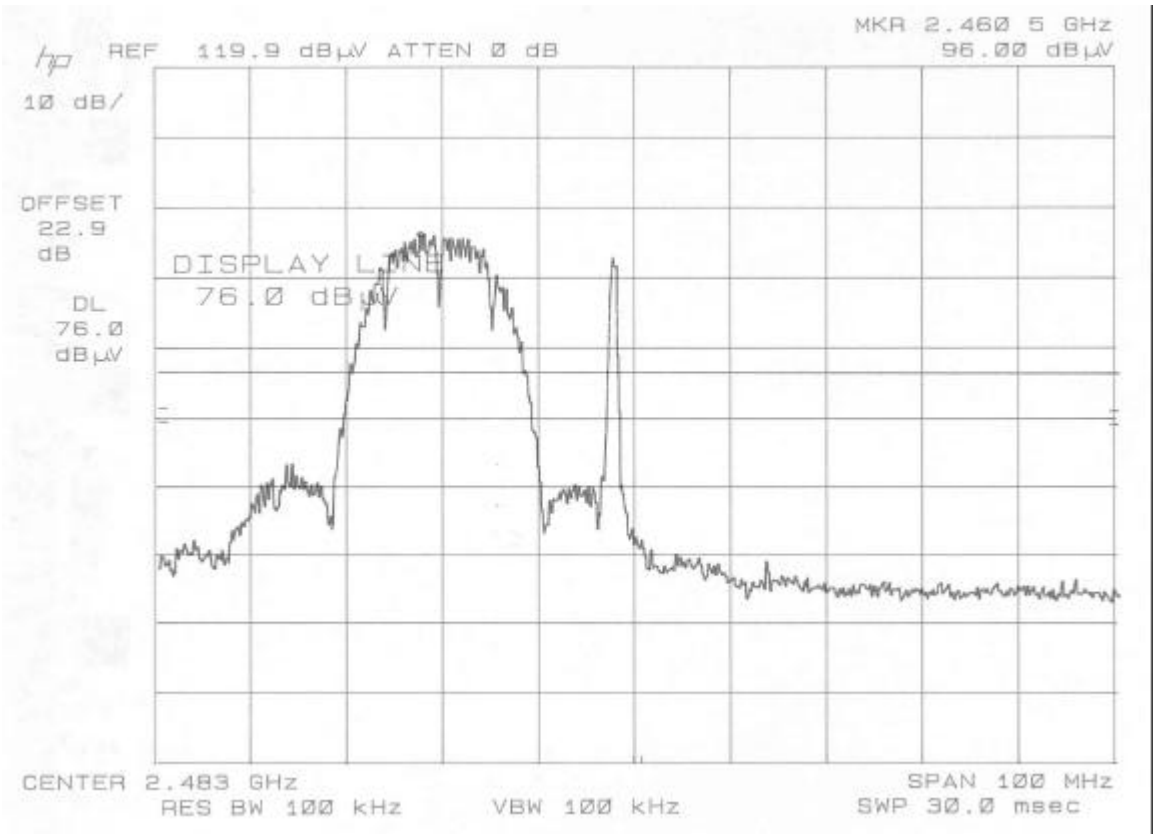
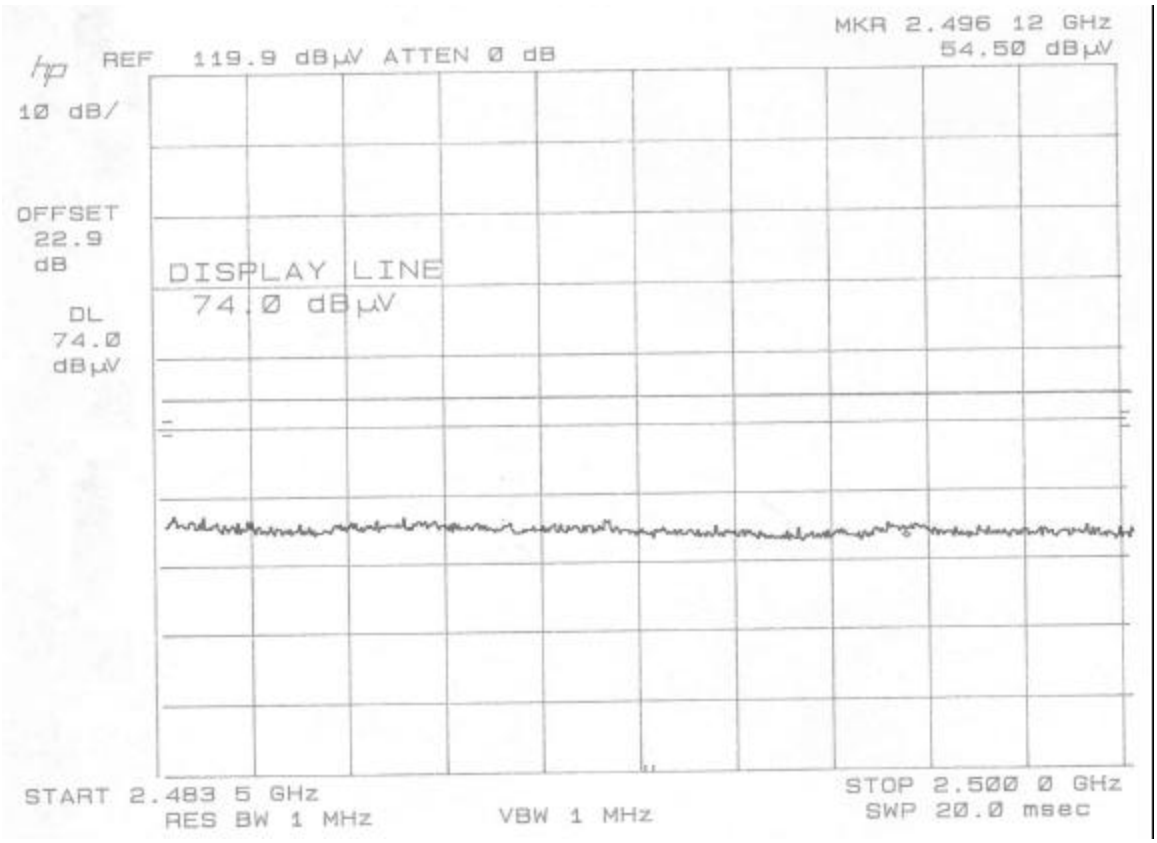


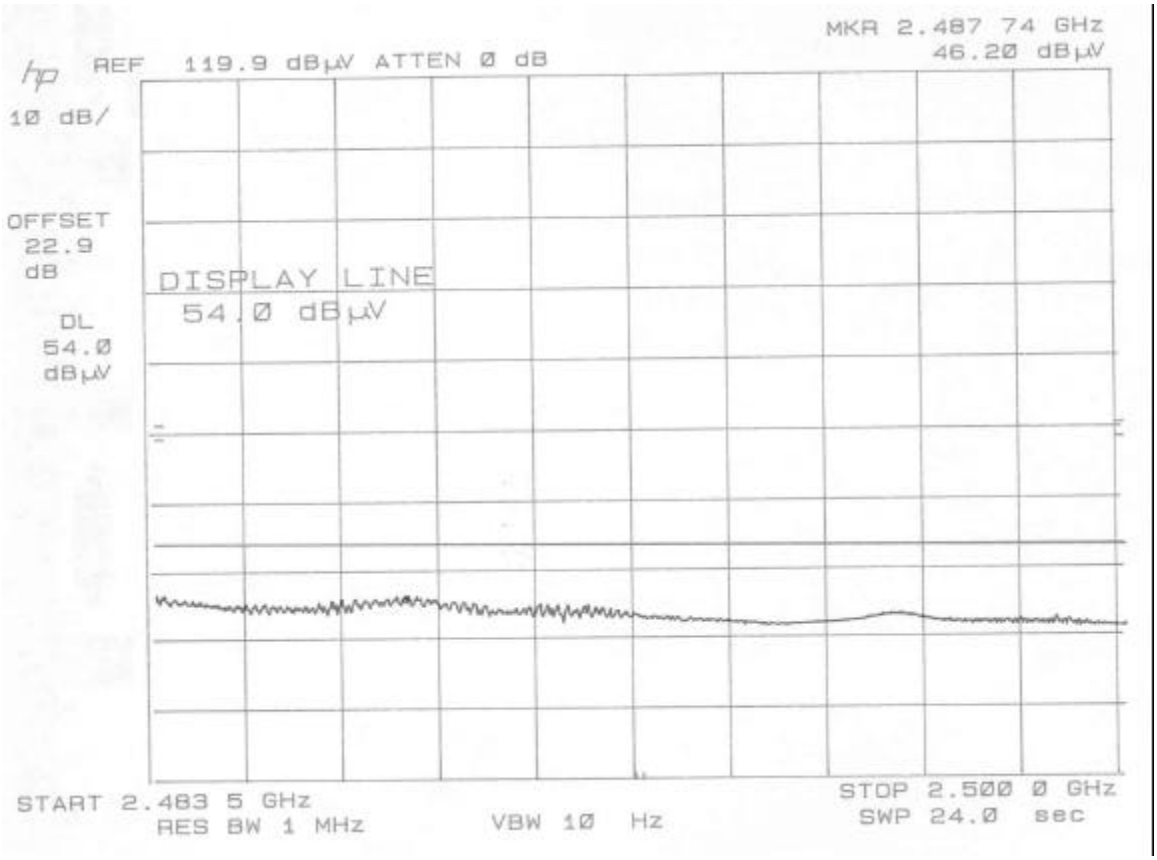
UPPER BAND EDGE WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR HIGH FREQUENCY CHANNELS



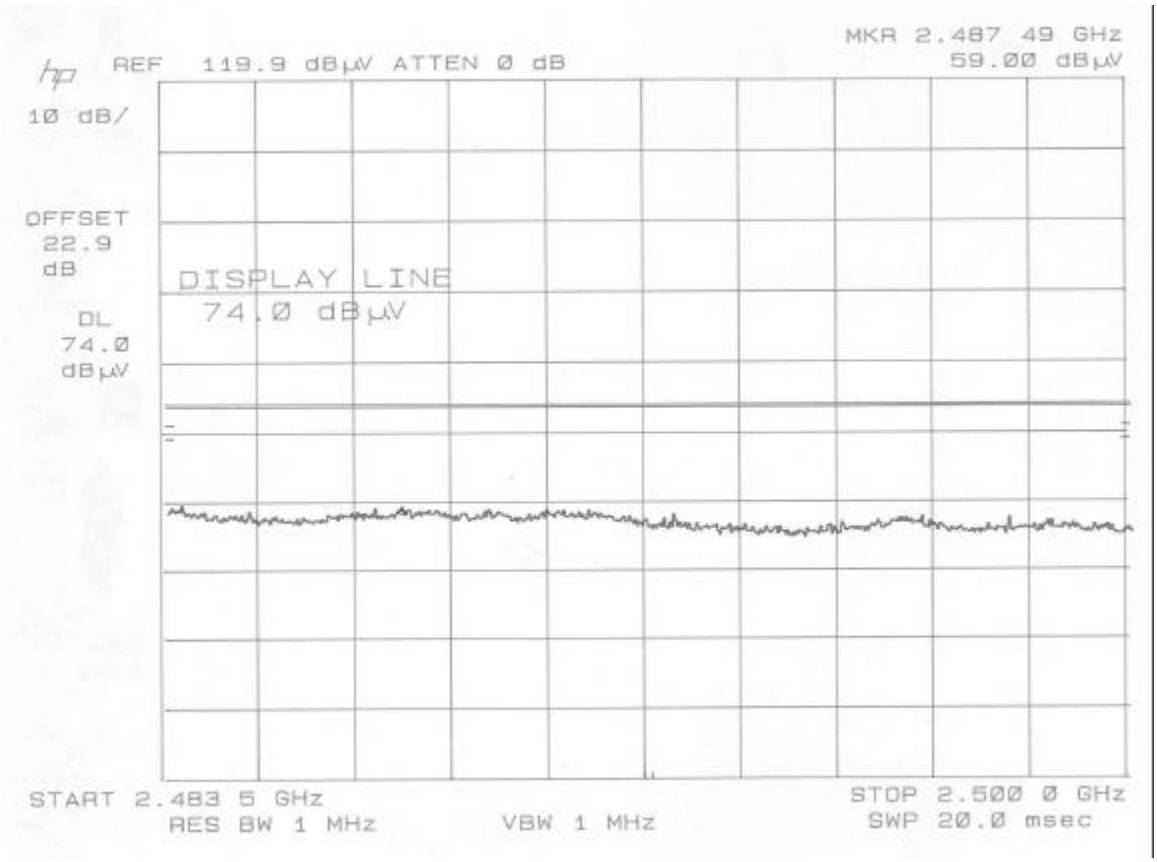
UPPER RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR HIGH FREQUENCY CHANNELS – VERTICAL PEAK



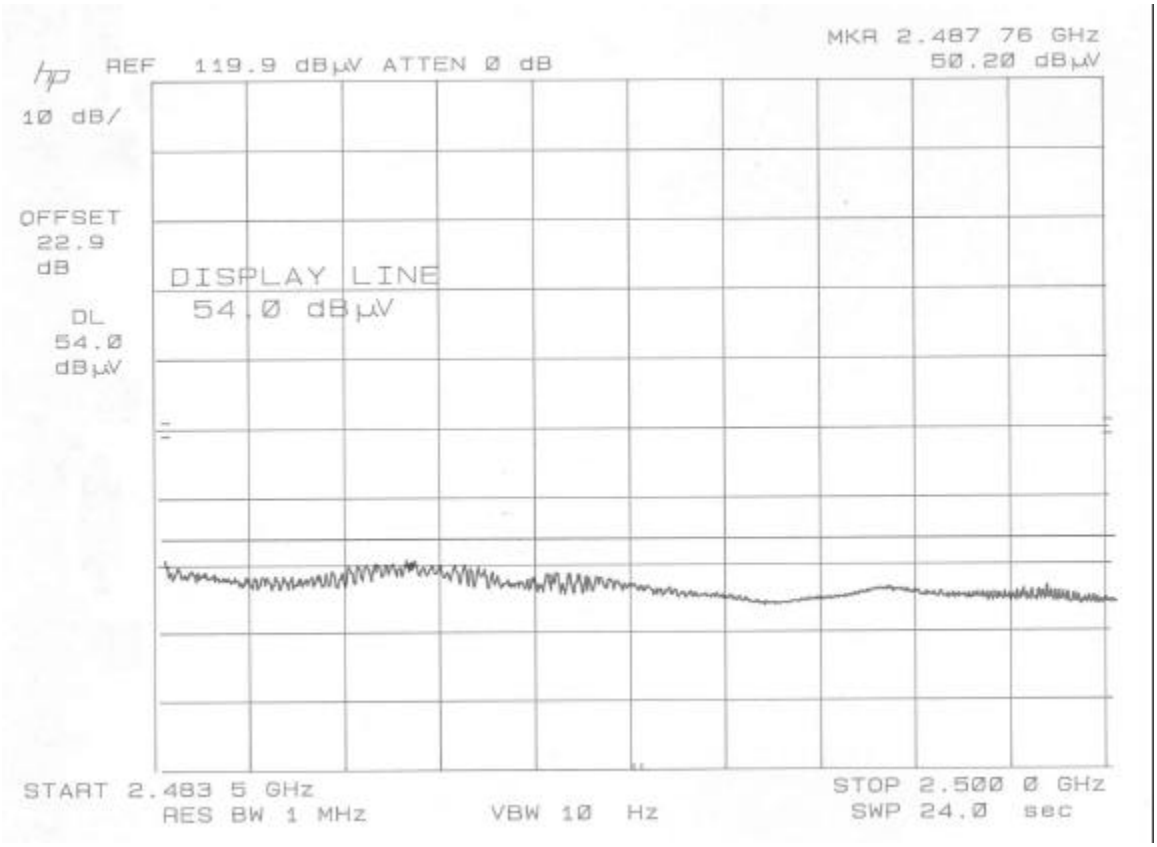
UPPER RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR HIGH FREQUENCY CHANNELS – VERTICAL AVERAGE



UPPER RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR HIGH FREQUENCY CHANNELS – HORIZONTAL PEAK



UPPER RESTRICTED BAND WITH CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY AT THEIR HIGH FREQUENCY CHANNELS – HORIZONTAL AVERAGE



SPURIOUS RADIATED EMISSIONS WITH WORST CASE CONFIGURATION OF CO-LOCATED BLUETOOTH AND WLAN OPERATING SIMULTANEOUSLY

	Description of Test:			Spurious Radiated Emissions							
	Project Number:			02U1644							
			Date:	12/12/02							
	Test Engineer:			Chin Pang							
			Site:	Chin Pang							
		Company:		Toshiba							
	EUT Description:			Touch Screen / Bluetooth / WLAN							
	Test Configuration:			EUT / AC Adapter / Laptop							
	Mode of Operation:			WLAN transmitting at maximum power, Mid channel 2437 MHz							
				Bluetooth transmitting at maximum power, 2437 MHz							
	Specification Distance:			3.0	meters						
	Actual Distance:			3.0	meters	Cable Length:		16.0	feet		

Freq	Pol	Det	SA	Dist	AF	Preamp	Filter	Cable	Field	Limit	Margin
GHz	V/H		dBuV	dB	dB/m	dB	dB	dB	dBuV/m	dBuV/m	dB
4.874	V	Peak	39.9	0.0	33.9	36.0	1.0	6.1	44.9	74.0	-29.1
4.874	V	Avg	37.0	0.0	33.9	36.0	1.0	6.1	42.0	54.0	-12.0
4.874	H	Peak	38.1	0.0	33.9	36.0	1.0	6.1	43.1	74.0	-30.9
4.874	H	Avg	33.0	0.0	33.9	36.0	1.0	6.1	38.0	54.0	-16.0
7.312	V	Peak	42.5	0.0	37.2	36.3	1.0	7.8	52.1	74.0	-21.9
7.312	V	Avg	37.6	0.0	37.2	36.3	1.0	7.8	47.2	54.0	-6.8
7.312	H	Peak	40.1	0.0	37.2	36.3	1.0	7.8	49.7	74.0	-24.3
7.312	H	Avg	33.3	0.0	37.2	36.3	1.0	7.8	42.9	54.0	-11.1
Note 1: No other spurious emissions were detected above the system noise floor.											

7.2. SETUP PHOTOS

END OF REPORT