

FCC CFR47 PART 15 SUBPART C INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR

BLUETOOTH INTERFACE BOARD FOR MOBILE PRINTER

MODEL NUMBER: M291A

FCC ID: BKMFBM291A

REPORT NUMBER: 32LE0152-SH-A-R1

ISSUE DATE: AUGUST 27, 2012

Prepared for SEIKO EPSON CORPORATION 3-3-5 Owa Suwa-Shi, Nagano-Ken 392-8502 Japan

Prepared by UL Japan, Inc. Shonan EMC Lab. 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 JAPAN Telephone number : +81 463 50 6400 Facsimile number : +81 463 50 6401 JAB Accreditation No. : RTL02610



13-EM-F0429

Revision History

Rev.	lssue Date	Revisions	Revised By
	08/06/12	Initial Issue	S.Takano
1	08/27/12	Correction of misdescription (limit value) (P34,P69) *This report is a revised version of 32LE0152-SH-A, which is replaced with this report.	S.Takano

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SEIKO EPSON CORPORATION 3-3-5 Owa Suwa-Shi, Nagano-Ken 392-8502 Japan
EUT DESCRIPTION:	Bluetooth Interface board for mobile printer
MODEL:	M291A
SERIAL NUMBER:	2 (Antenna port tests), 1 (other tests),
DATE TESTED:	JULY 12 and 13, 2012

APPLICABLE STANDARDS				
STANDARD	TEST RESULTS			
CFR 47 Part 15 Subpart C	Pass			
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass			
INDUSTRY CANADA RSS-GEN Issue 3	Pass			

UL Japan Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Japan, Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Japan, Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Japan, Inc. will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by any government agency.

Approved & Released For UL Japan, Inc. By:

Tested By:

Amamura

Toyokazu Imamura Leader of EMC Service, UL Verification Service

Jakano

Shinichi Takano Engineer of WiSE Japan, UL Verification Service

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN.

UL Japan is accredited by JAB, Laboratory Code RTL02610. The full scope of accreditation can be viewed at http://www.jab.or.jp/cgi-bin/jab_exam_proof_j.cgi?page=2&authorization_number=RTL02610

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY	
Power Line Conducted Emission	150kHz-30MHz	+/- 3.5 dB
	30MHz-300MHz(3m)	+/- 4.9 dB
	300MHz-1000MHz(3m)	+/- 4.9 dB
Radiated Emission	1000MHz-15GHz(3m)	+/- 4.9 dB
	15GHz-18GHz(1m)	+/- 5.6 dB
	18GHz-26.5GHz(1m)	+/- 4.4 dB

Uncertainty figures are valid to a confidence level of 95% using a coverage factor k=2.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth Module (Power Class 2).

The radio module is manufactured by SMK Corporation.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	2.74	1.88
2402 - 2480	Enhanced 8PSK	2.94	1.97

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes Chip Antenna, with a maximum gain of +2.0 dBi.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was RF Test Tool for Bluetooth Device Ver1.2.2.

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5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case data rate for each mode is determined to be as follows, based on preliminary tests of the chipset utilized in this radio.

All final tests in the GFSK mode were made at 1 Mb/s. All final tests in the 8PSK mode were made at 3 Mb/s.

For radiated emissions below 1 GHz, all modes and channels are measured and the worst result is described.

The fundamental and spurious was measured in three different orientations X, Y and Z to find worst-case orientation, and final testing for radiated emissions was performed with EUT in following orientation.

	Horizontal	Vertical
Carrier	Y	Z
Spurious (below 1GHz)	Х	Х
Spurious (above 1GHz)	Z	Y
Spurious (Harmonics)	Y	Z

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5.6. **DESCRIPTION OF TEST SETUP**

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST						
Description	Description Manufacturer Model Serial Number					
Jig	SMK	BE005-A	-			
Jig	SMK	BE005-B	-			

I/O CABLES

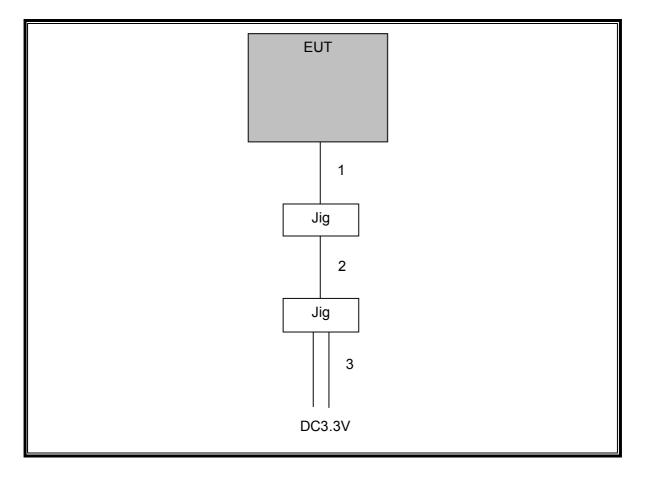
	I/O CABLE LIST							
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks		
1	FLAT	1	FPC	Un-Shielded	0.3m	N/A		
2	Jig	1	PIN	Un-Shielded	0.2m	N/A		
3	DC	1	DC	Un-Shielded	1.6m	N/A		

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SETUP DIAGRAM FOR RADIATED TESTS



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6. TEST AND MEASUREMENT EQUIPMENT

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

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2012/02/10 * 12
SAT6-03	Attenuator	JFW	50HF-006N	-	RE	2012/02/10 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2011/10/23 * 12
SCC- C1/C2/C3/C4/ C5/C10/SRSE -03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhn er/Suhner/Suhner/Suh ner/TOYO		-/0901-271(RF Selector)	RE	2012/04/10 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-	RE	2011/10/23 * 12
				A 0901		
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2012/02/06 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE,CE	2012/02/07 * 12
SJM-10	Measure	PROMART	SEN1935	-	RE,CE	-
SAEC- 03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2011/09/23 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO- DV(RE,CE,RFI,MF)	-	RE,CE	-
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2011/07/19 * 12
SCC-G03	Coaxial Cable	Suhner	SUCOFLEX 104A	46499/4A	RE	2012/04/10 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2012/05/22 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2011/08/28 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2012/03/16 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	RE	2011/12/27 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2011/12/27 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2012/03/30 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	0000018	RE	2012/03/12 * 12
SCC-G18	Coaxial Cable	Suhner	SUCOFLEX 104A	46292/4A	RE	2012/03/12 * 12

Test and Measurement Equipment (1/2)

The expiration date of the calibration is the end of the expired month.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

Test Item:

- **CE: Conducted emission,**
- **RE:** Radiated emission,
- AT: Antenna terminal conducted test

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Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	AT	2012/02/16 * 12
SCC-G11	Coaxial Cable	Suhner	SUCOFLEX 102	31595/2	AT	2012/03/12 * 12
SAT10-08	Attenuator	Weinschel	W54-10	-	AT	2012/03/12 * 12
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2012/04/19 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2012/04/19 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2012/03/26 * 12
SCC- C9/C10/SRSE -03	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/N S4906	-/0901-271(RF Selector)	CE	2012/04/10 * 12
SLS-05	LISN	Rohde & Schwarz	ENV216	100516	CE	2012/02/23 * 12
SAT3-06	Attenuator	JFW	50HF-003N	-	CE	2012/02/17 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	CE	2012/03/26 * 12
STM-05	Terminator	ТМЕ	CT-01 BP	-	CE	2012/01/05 * 12

Test and Measurement Equipment (2/2)

The expiration date of the calibration is the end of the expired month. As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

Test Item:

- CE: Conducted emission,
- **RE:** Radiated emission,
- AT: Antenna terminal conducted test

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7. ANTENNA PORT TEST RESULTS

7.1. **BASIC DATA RATE GFSK MODULATION**

7.1.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency	20 dB Bandwidth	99% Bandwidth
	(MHz)	(kHz)	(kHz)
Low	2402	923.446	905.3156
Middle	2441	921.996	906.5016
High	2480	919.833	902.2642

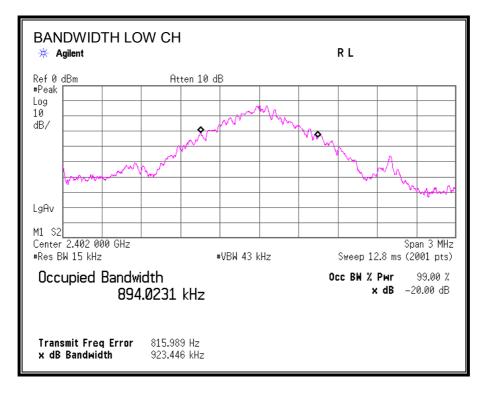
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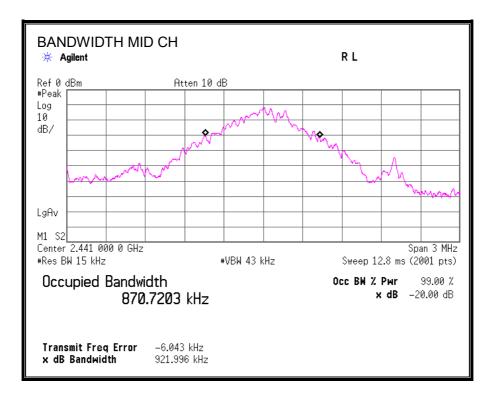
20 dB BANDWIDTH



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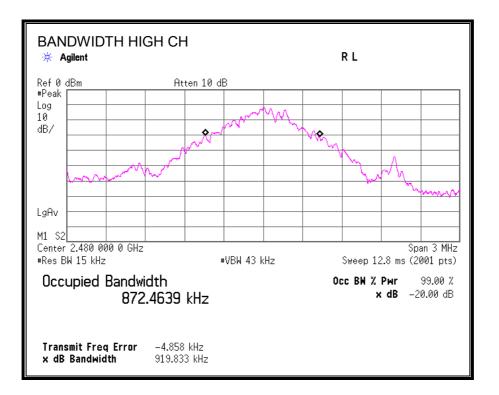
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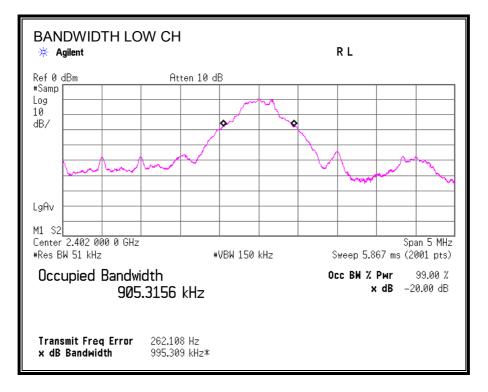


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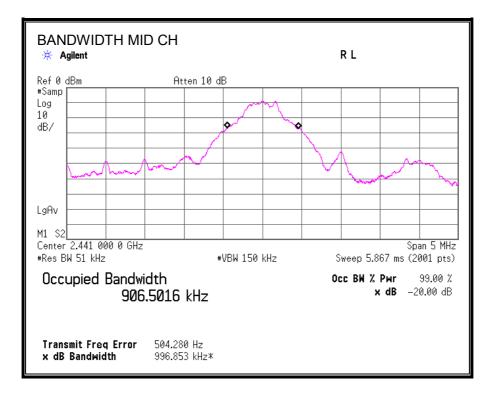
99% BANDWIDTH



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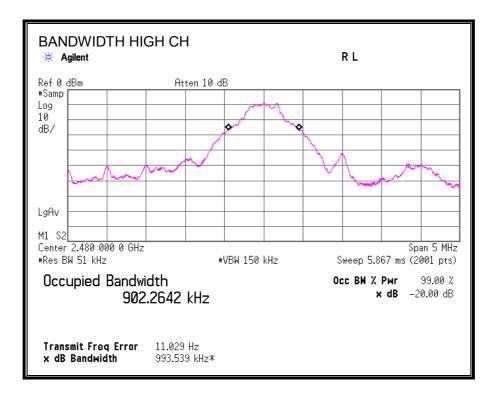
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7.1.2. HOPPING FREQUENCY SEPARATION

<u>LIMIT</u>

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

The channel separation was 1MHz and the test result was greater than the requirement that was 2/3 of 20 dB channel bandwidth.

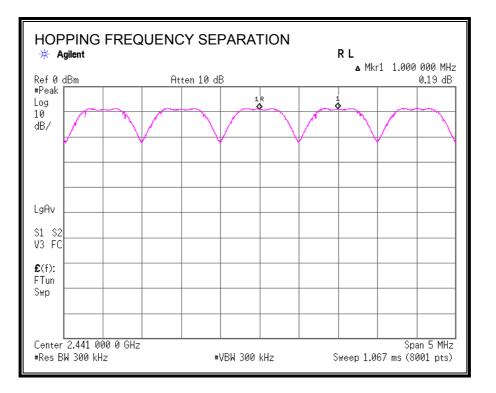
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RESULTS

HOPPING FREQUENCY SEPARATION



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7.1.3. NUMBER OF HOPPING CHANNELS

<u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 nonoverlapping channels.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

Test was not performed at AFH mode whose number of hopping channel is 20 channels because this Bluetooth radio is in compliance of Bluetooth Specification 2.1.

RESULTS

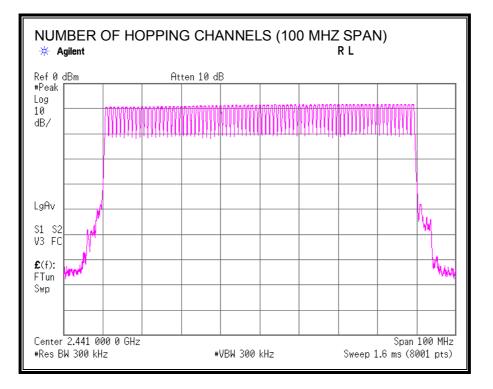
79 Channels observed.

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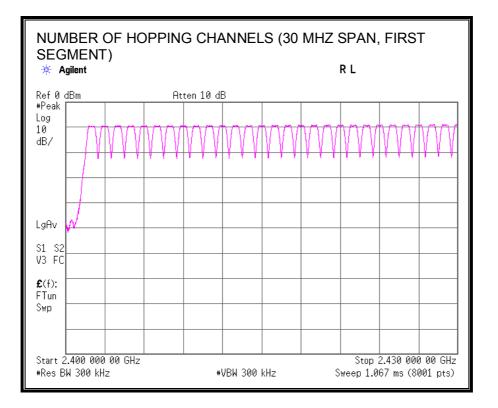
NUMBER OF HOPPING CHANNELS



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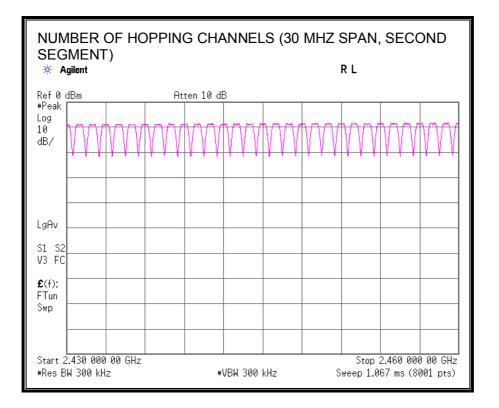
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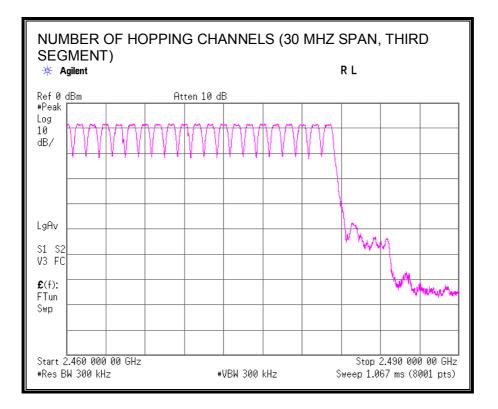


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7.1.4. AVERAGE TIME OF OCCUPANCY

<u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in N x 0.4s, where N is the number of channels being used in the hopping sequence ($20 \ge N \le 79$), is always less than 0.4s regardless of packet size (DH1, DH3 or DH5). This is confirmed in the test report for N=79.

RESULTS

Time Of Occupancy = 10 * xx pulses * yy msec = zz msec

GF	SK	Mode)

DH Packet	Pulse	Number of	Average	Limit	Margin
	Width (msec)	Pulses in 3.16	Time of (sec)	(sec)	(sec)
		seconds			
DH1	0.4060	32	0.1299	0.4	0.2701
DH3	1.6620	16	0.2659	0.4	0.1341
DH5	2.9150	11	0.3207	0.4	0.0794

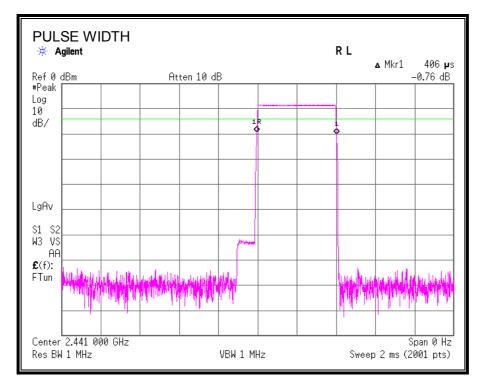
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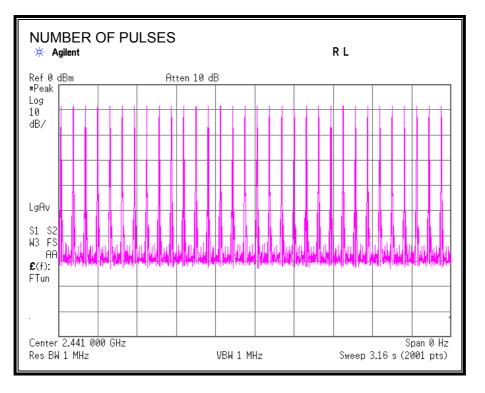
DH1 PULSE WIDTH



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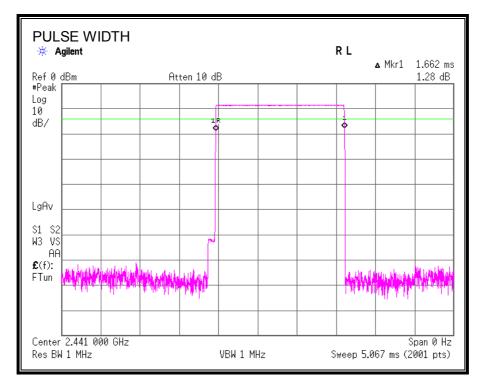
DH1 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

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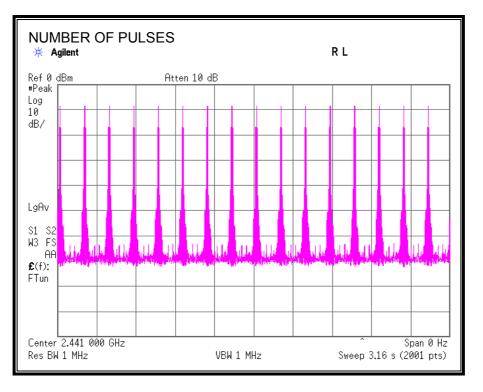
DH3 PULSE WIDTH



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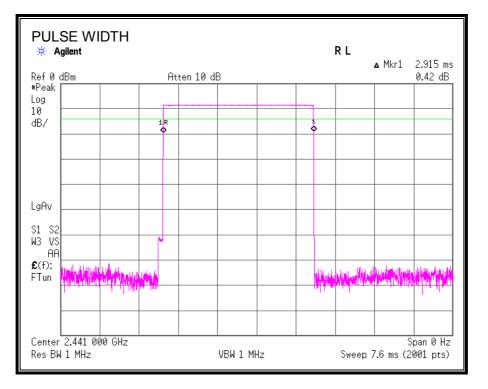
DH3 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

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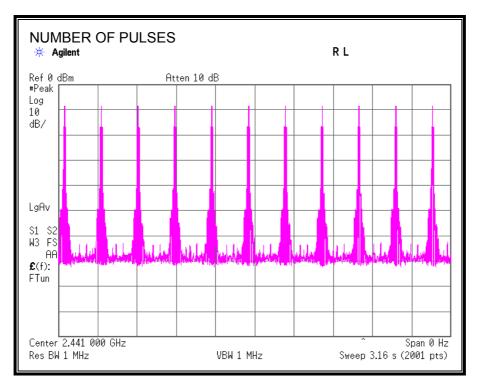
DH5 PULSE WIDTH



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DH5 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

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7.1.5. MAXIMUM PEAK OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 20.96 dBm.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Channel	Frequency	Output Power	factor (cable	Output Power	Limit	Margin
	(MHz)	Reading (dBm)	,ATT) (dB)	Result (dBm)	(dBm)	(dB)
Low	2402	-8.81	10.70	1.89	20.96	19.07
Middle	2441	-8.10	10.71	2.61	20.96	18.35
High	2480	-7.97	10.71	2.74	20.96	18.22

Sample calculation: Output Power Reading [dBm] + factor [dB]

Test was not performed at AFH mode because this Bluetooth radio is in compliance of Bluetooth Specification 2.1 and the output power at non-AFH mode is less than 20.96dBm.

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7.1.6. AVERAGE POWER

<u>LIMIT</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.70 – 10.71 dB (including 9.86 dB pad and 0.84 - 0.85 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Average Power
	(MHz)	(dBm)
Low	2402	-0.92
Middle	2441	-0.61
High	2480	-0.87

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7.1.7. CONDUCTED SPURIOUS EMISSIONS

<u>LIMITS</u>

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

In the frequency range below 30MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart. (9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=10kHz)

The spectrum from 9 kHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

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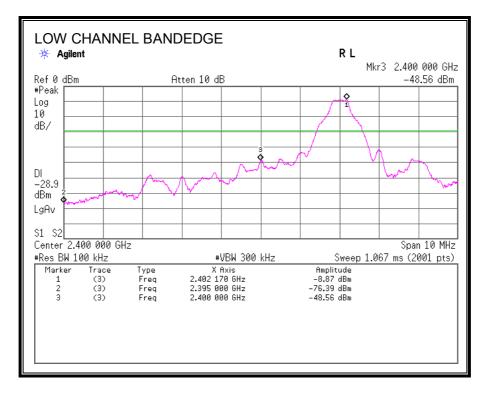
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RESULTS

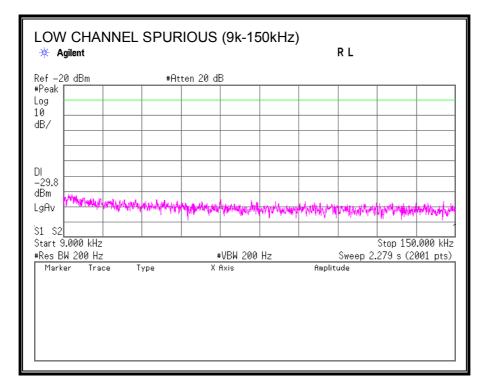
SPURIOUS EMISSIONS, LOW CHANNEL

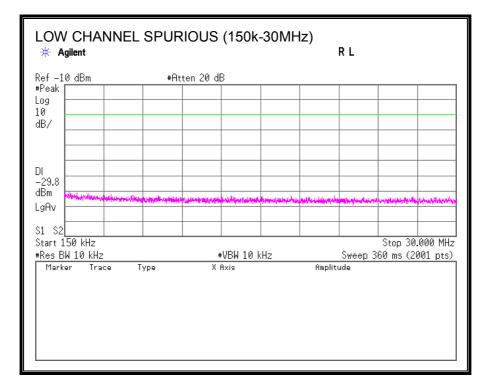


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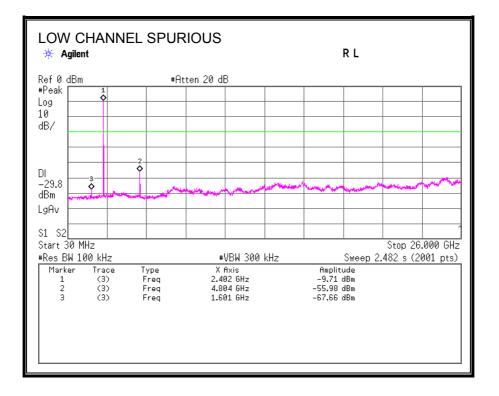


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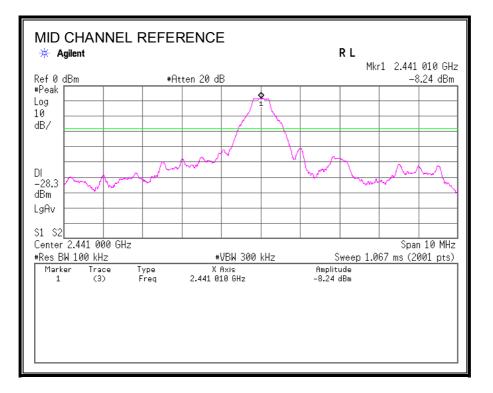


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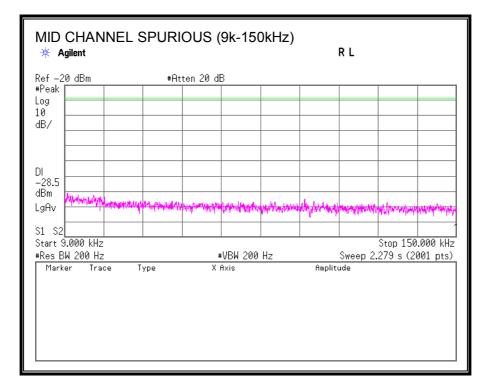
SPURIOUS EMISSIONS, MID CHANNEL

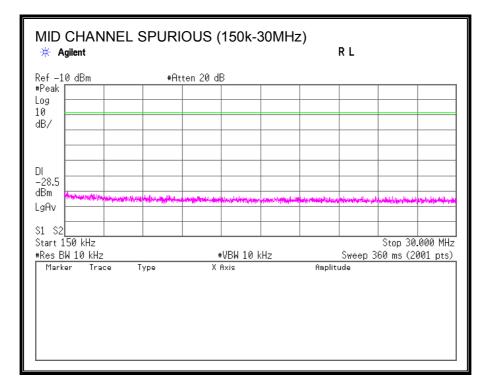


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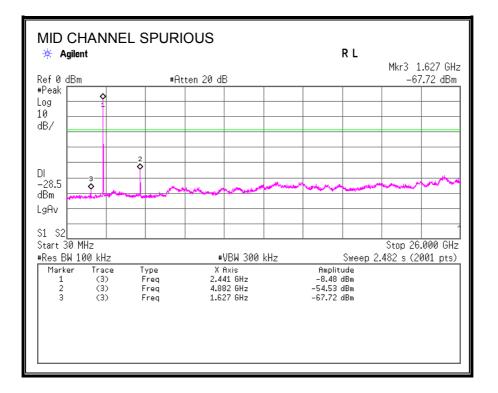


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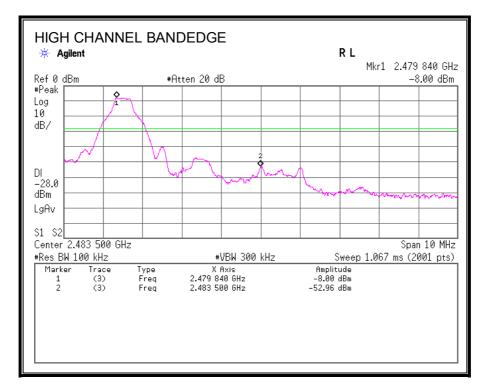


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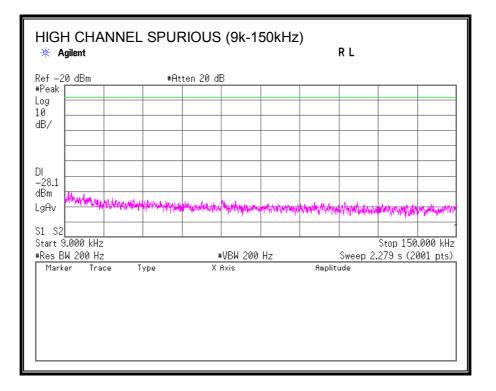
SPURIOUS EMISSIONS, HIGH CHANNEL

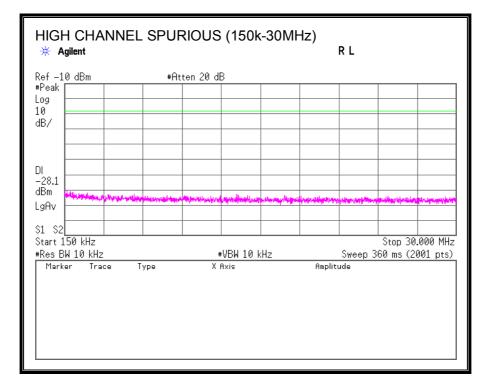


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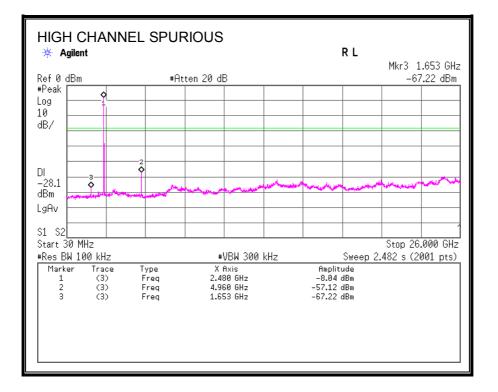


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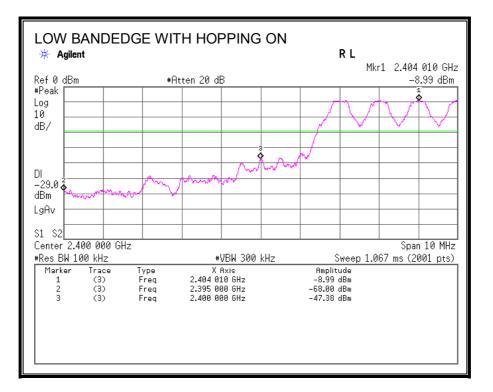


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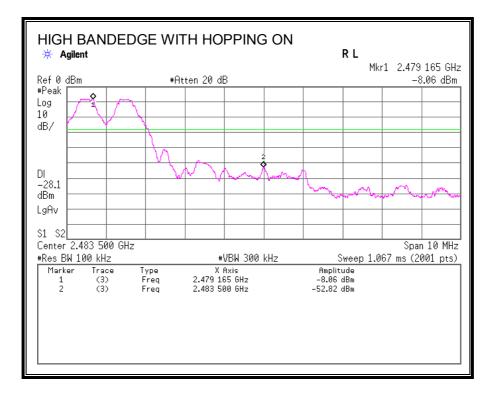
SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



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7.2. **ENHANCED DATA RATE 8PSK MODULATION**

7.2.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

Channel	Frequency	20 dB Bandwidth	99% Bandwidth	
	(MHz)	(kHz)	(kHz)	
Low	2402	1243	1169.7	
Middle	2441	1244	1169.2	
High	2480	1240	1173.3	

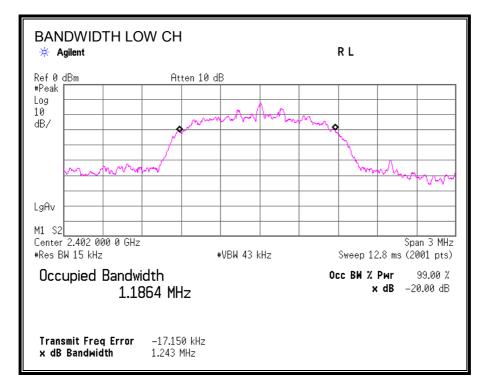
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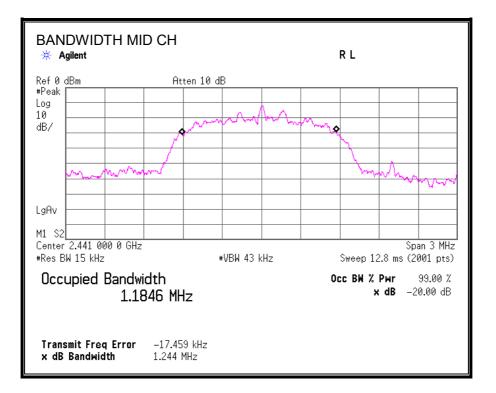
20 dB BANDWIDTH



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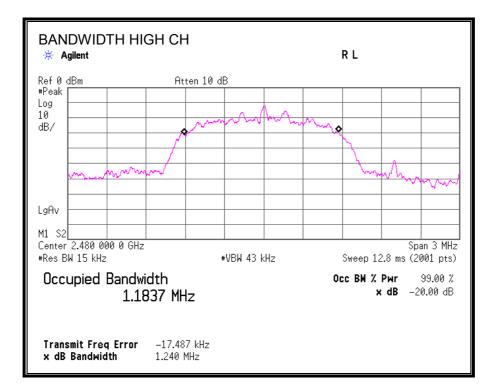
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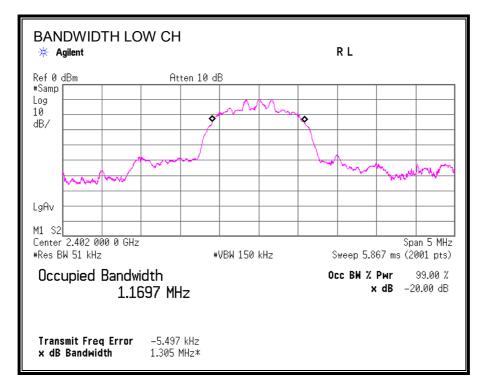
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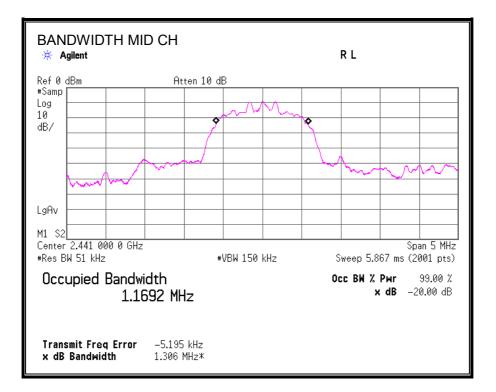
99% BANDWIDTH



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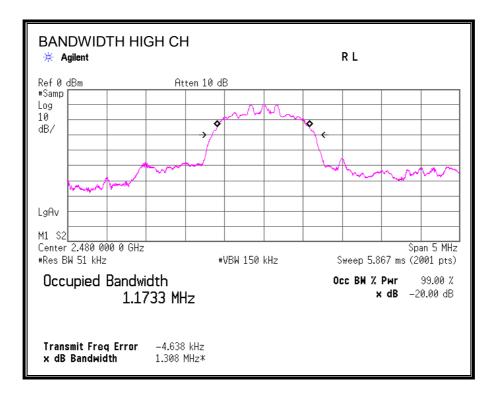
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7.2.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

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

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

RESULTS

The channel separation was 1MHz and the test result was greater than the requirement that was 2/3 of 20 dB channel bandwidth.

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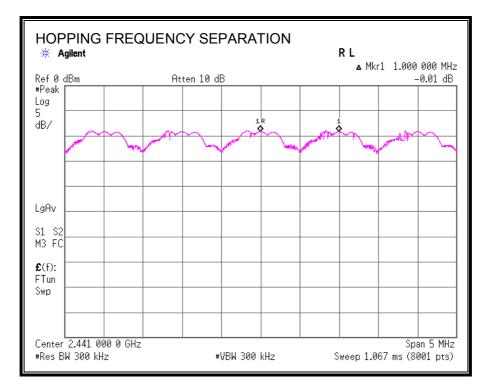
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RESULTS

HOPPING FREQUENCY SEPARATION



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7.2.3. NUMBER OF HOPPING CHANNELS

<u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 nonoverlapping channels.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

Test was not performed at AFH mode whose number of hopping channel is 20 channels because this Bluetooth radio is in compliance of Bluetooth Specification 2.1.

RESULTS

79 Channels observed.

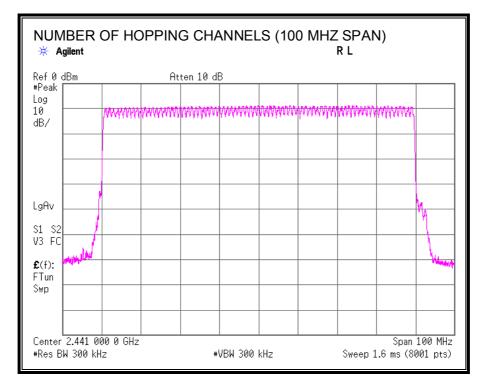
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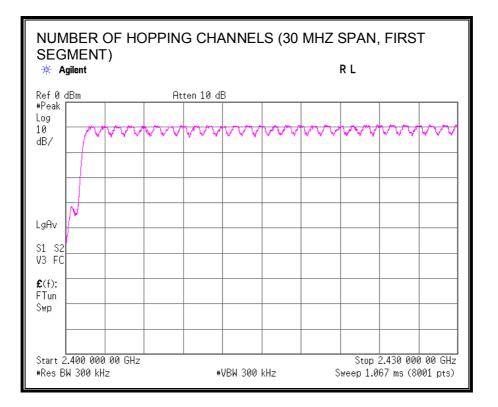
NUMBER OF HOPPING CHANNELS



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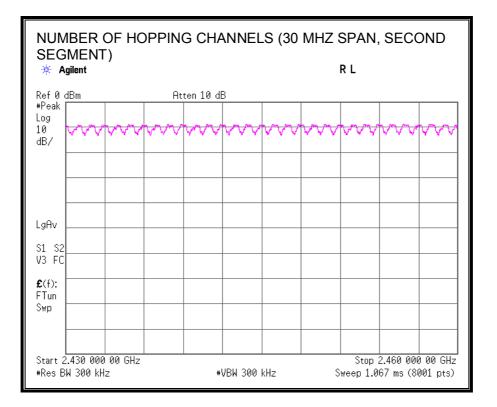
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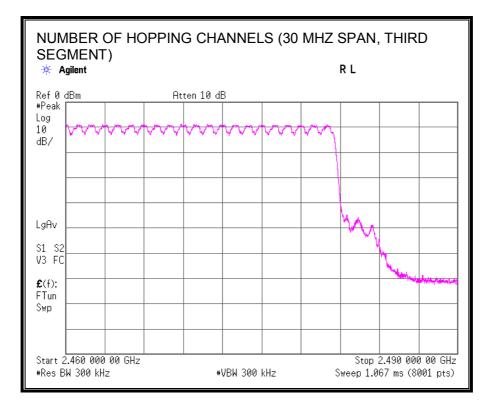
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7.2.4. AVERAGE TIME OF OCCUPANCY

<u>LIMIT</u>

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in N x 0.4s, where N is the number of channels being used in the hopping sequence ($20 \ge N \le 79$), is always less than 0.4s regardless of packet size (DH1, DH3 or DH5). This is confirmed in the test report for N=79.

<u>RESULTS</u>

Time of Occupancy = 10 * xx pulses * yy msec = zz msec

8PSK Mode

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
3DH1	0.42	32	0.134	0.4	0.266
3DH3	1.672	16	0.268	0.4	0.132
3DH5	2.926	11	0.322	0.4	0.078

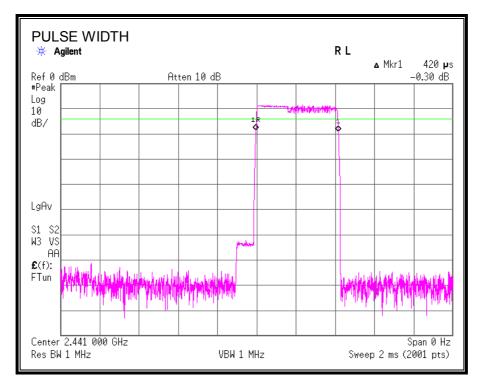
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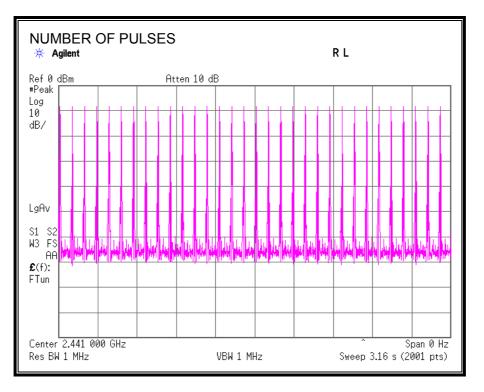
3DH1 PULSE WIDTH



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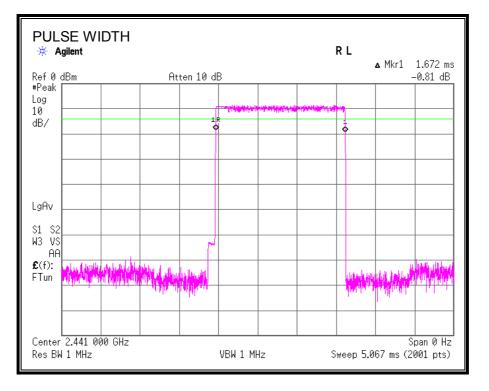
3DH1 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

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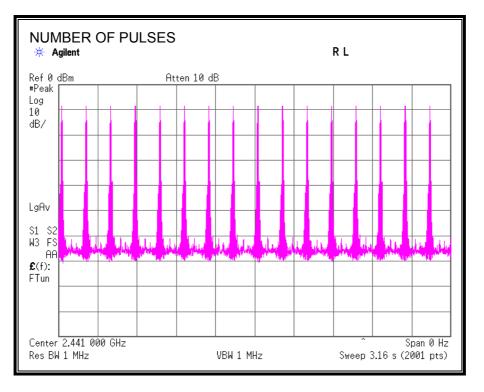
3DH3 PULSE WIDTH



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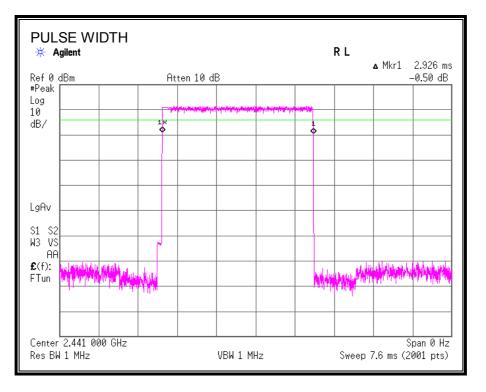
3DH3 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

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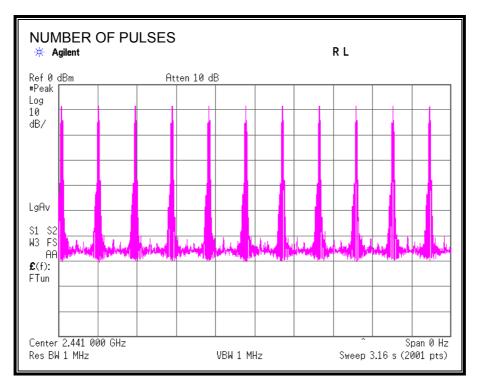
3DH5 PULSE WIDTH



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3DH5 NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

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7.2.5. MAXIMUM PEAK OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 20.96 dBm.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Channel	Frequency	Output Power	factor (cable	Output Power	Limit	Margin
	(MHz)	Reading (dBm)	,ATT) (dB)	Result (dBm)	(dBm)	(dB)
Low	2402	-7.98	10.70	2.72	20.96	18.24
Middle	2441	-7.77	10.71	2.94	20.96	18.02
High	2480	-7.95	10.71	2.76	20.96	18.20

Sample calculation: Output Power Reading [dBm] + factor [dB]

Test was not performed at AFH mode because this Bluetooth radio is in compliance of Bluetooth Specification 2.1 and the output power at non-AFH mode is less than 20.96dBm.

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7.2.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.70 – 10.71 dB (including 9.86 dB pad and 0.84 - 0.85 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	Average Power	
	(MHz)	(dBm)	
Low	2402	-1.11	
Middle	2441	-0.61	
High	2480	-0.87	

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7.2.7. CONDUCTED SPURIOUS EMISSIONS

<u>LIMITS</u>

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

In the frequency range below 30MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart. (9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=10kHz)

The spectrum from 9 kHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

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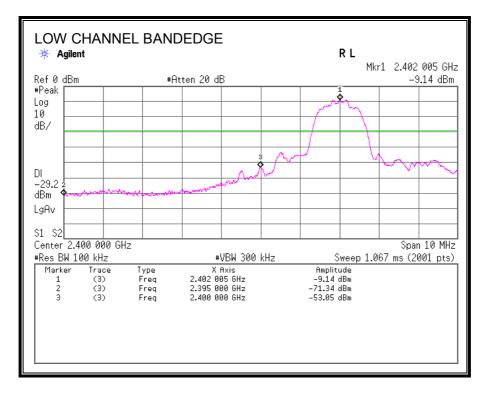
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RESULTS

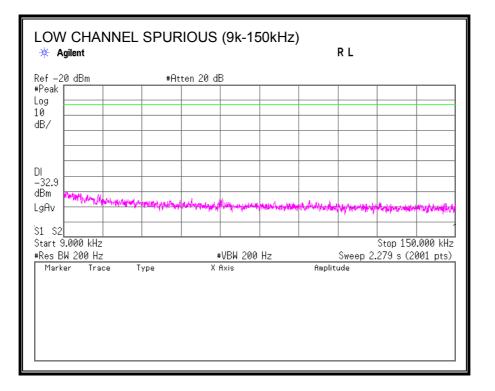
SPURIOUS EMISSIONS, LOW CHANNEL

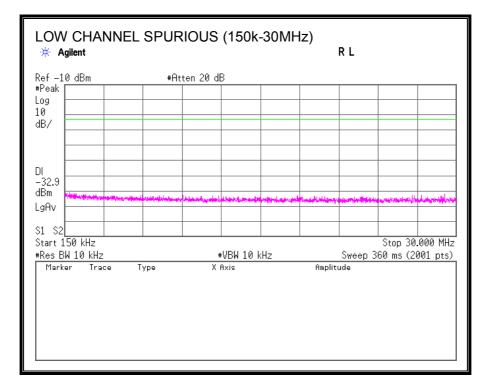


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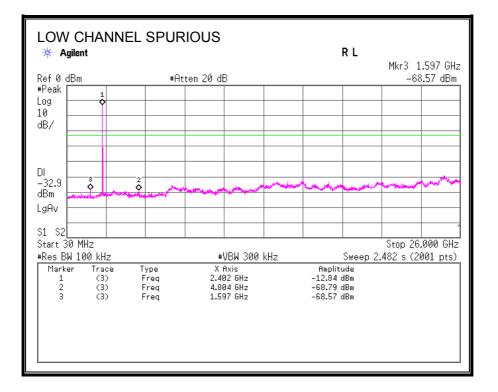


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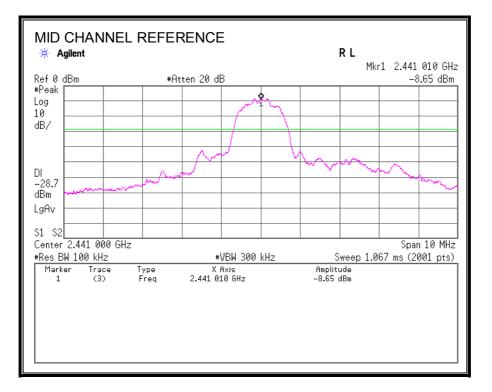


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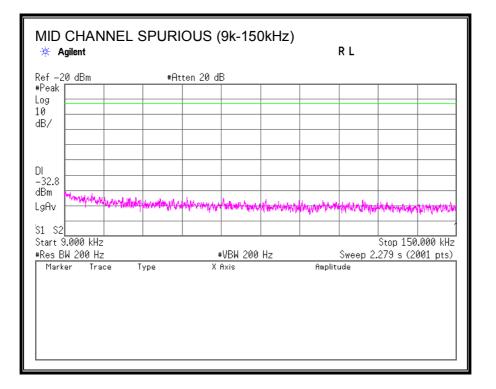
SPURIOUS EMISSIONS, MID CHANNEL

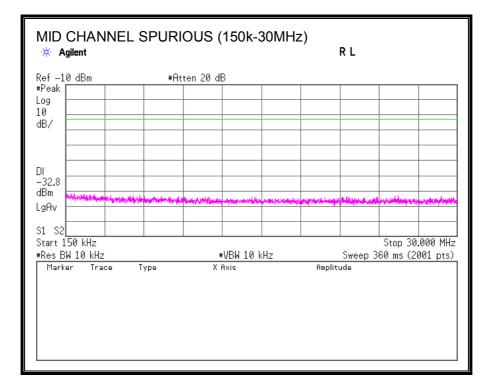


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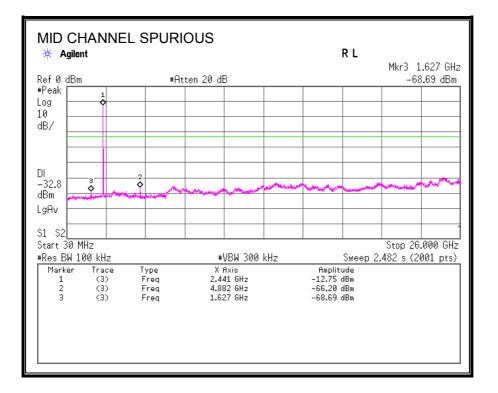


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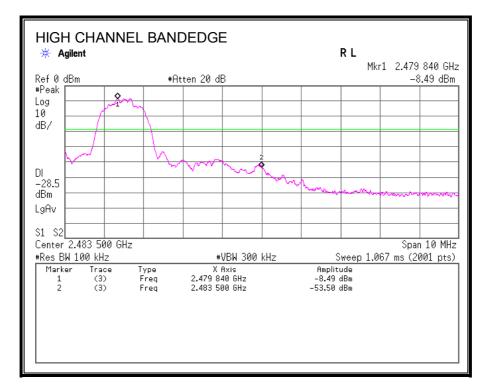


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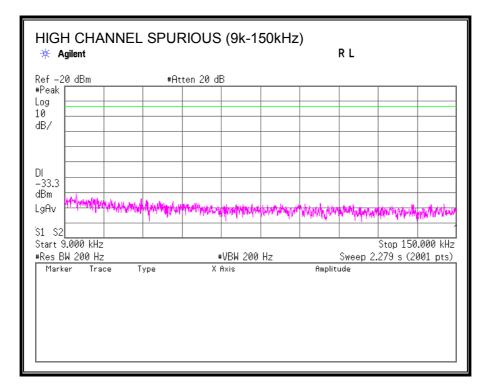
SPURIOUS EMISSIONS, HIGH CHANNEL

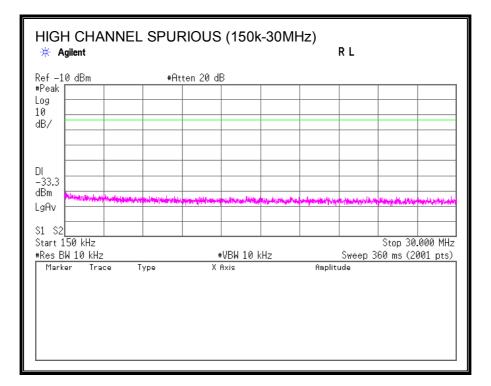


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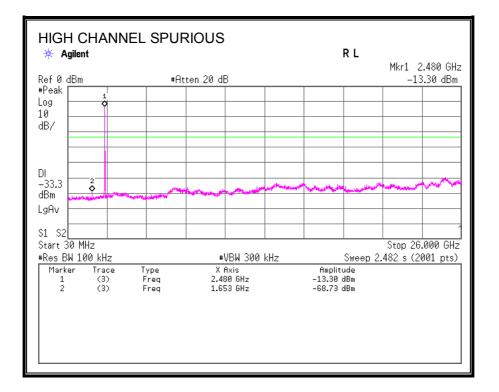


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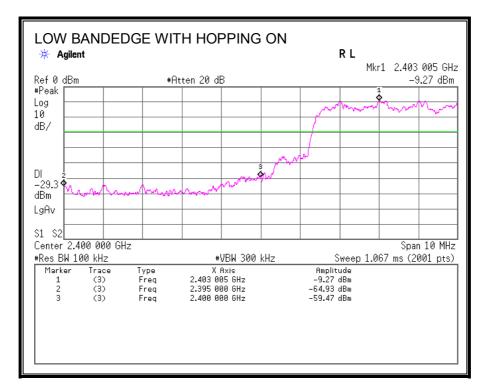


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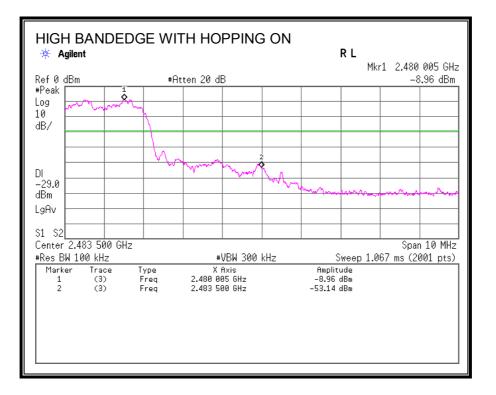
SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



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8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.5

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

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

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 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 with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. 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 emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

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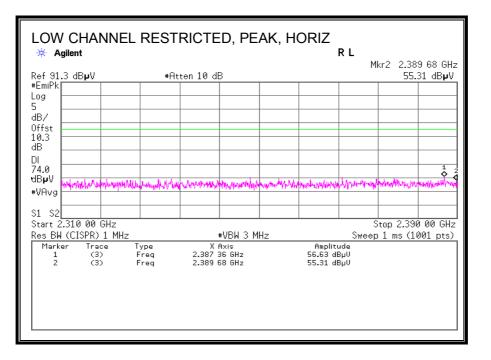
¹⁻²²⁻³ Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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8.2. TRANSMITTER ABOVE 1 GHz

8.2.1. BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

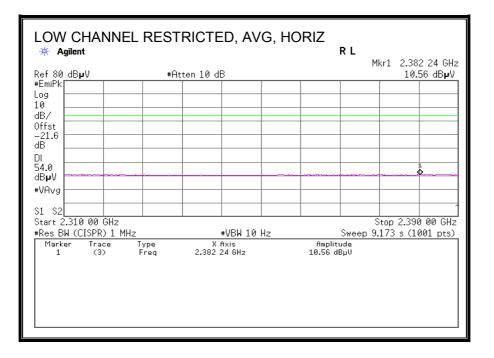


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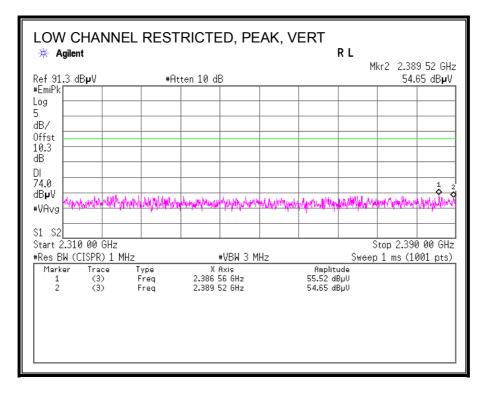


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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

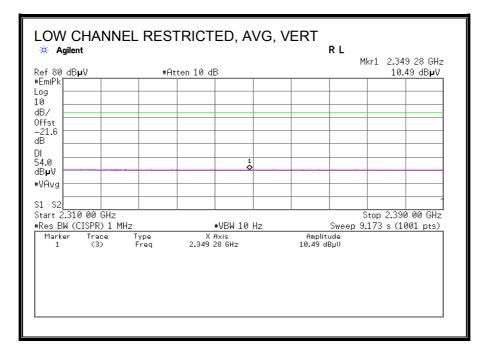


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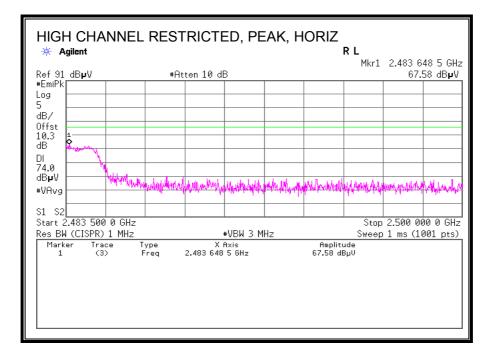


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RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

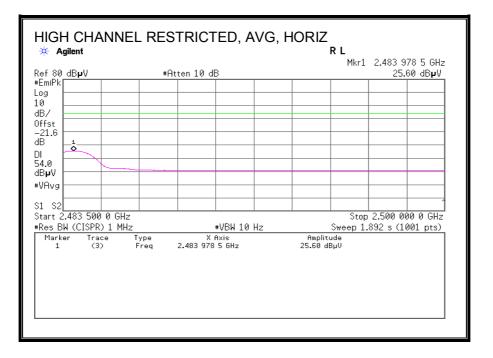


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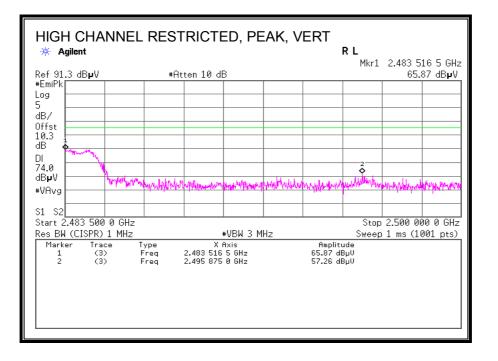


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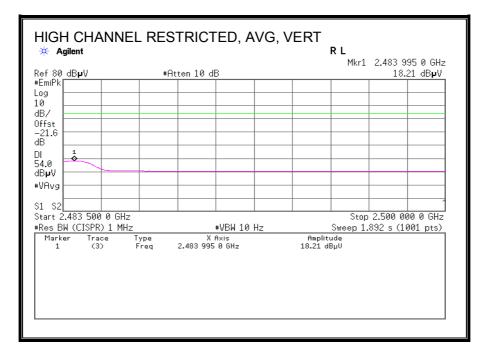
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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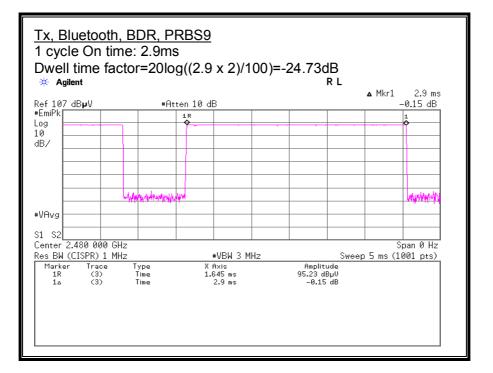


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Dwell time factor Calculation



On time of some channel during 100ms: Twice This is the worst case in hopping sequence of Bluetooth.

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			III Inner	Ine Cherry	m EMC L	h		No 2 Com	i Anechoic	Chamber			
Test pla Date	ice		UL Japan, July 13, 20		an EMU La	ω.		140.5 Sem	Anechoic	Chamber			
	ature / Humidi	ity	22 deg.C										
Enginee		-	Takahiro S										
Mode			Tx,	2402									
			Tx, Blueto										
	_		, AV: Average										
Polarity	Frequency	Detector	-	Ant.Fac.	Loss	Gain		Result	Limit	Margin	Height	Angle	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]		[dBuV/m]	[dBuV/m]	[dB]	[cm]	[deg.]	
Hori. Hori.	1601.000 2390.000	1	43.5 44.6	25.4 27.2	13.3 14.2	40.9 41.1		41.3 44.9	73.9 73.9	32.6 29.0	115 143	67 133	
Hori. Hori.	3204.000		44.0	27.2	5.7	41.1		39.5	73.9	34.4	143	133	
Hori.	4804.000	1	63.3	31.1	6.8	41.1		60.1	73.9	13.8	102	169	
Hori.	1601.000		33.9	25.4	13.3	40.9		31.7	53.9	22,2	115	67	
Hori.	3204.000	1	39.4	29.0	5.7	41.5		32.6	53.9	21.3	102	148	
Vert.	1601.000	PK	43.3	25.4	13.3	40.9		41.1	73.9	32.8	100	8	
Vert.	2390.000	1	45.8	27.2	14.2	41.1		46.1	73.9	27.8	152	232	
Vert.	3204.000	1	44.5	29.0	5.7	41.5		37.7	73.9	36.2	100	44	
Vert.	4804.000	1	58.2	31.1	6.8	41.1		55.0	73.9	18.9	144	318	
Vert.	1		34.4	25.4	13.3	40.9		32.2	53.9	21.7	100	8	
Vert.	3204.000	AV	36.8	29.0	5.7	41.5		30.0	53.9	23.9	100	44	
													ļ
	-		k, AV: Avera				-						1
Polarity	Frequency	Detector	-	Ant.Fac.	Loss	Gain	Dwell time	Result	Limit	Margin	Remark		
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	factor [dB]	[dBuV/m]	[dBuV/m]	[dB]	644.00-		{
	2390.000	AV	35.4	27.2	14.2	41.1	-24.7	11.0	53.9	47.0	(AV)VBW	1.10Hz	1
Hori.													
Hori.	4804.000		62.6	31.1	6.8	41.1	-24.7	34.7	53.9	19.2	(AV)VBW	:10Hz	
Hori. Vert.	4804.000 2390.000	AV	35.4	27.2	6.8 14.2	41.1 41.1	-24.7 -24.7	34.7 11.0	53.9 53.9	19.2 42.9	(AV)VBW (AV)VBW	/:10Hz /:10Hz	
Hori. Vert.	4804.000				6.8	41.1	-24.7	34.7	53.9	19.2 42.9	(AV)VBW	/:10Hz /:10Hz	
Hori. Vert.	4804.000 2390.000	AV	35.4	27.2	6.8 14.2	41.1 41.1	-24.7 -24.7	34.7 11.0	53.9 53.9	19.2 42.9	(AV)VBW (AV)VBW	/:10Hz /:10Hz	
Hori. Vert. Vert. Result = I	4804.000 2390.000 4804.000 Reading + Ant Fa	AV AV ctor + Loss	35.4 57.5 (Cable+Atter	27.2 31.1 mator+Filter-	6.8 14.2 6.8 -Distance fac	41.1 41.1 41.1 tor(above 15	-24.7 -24.7 -24.7 GHz)) - Gain	34.7 11.0 29.6	53.9 53.9 53.9	19.2 42.9 24.3	(AV)VBW (AV)VBW (AV)VBW	/:10Hz /:10Hz /:10Hz	Calculation")
Hori. Vert. Vert. Result = 1	4804.000 2390.000 4804.000 Reading + Ant Fa equency noises or	AV AV ctor + Loss nitted in thi	35.4 57.5 (Cable+Atter s report were	27.2 31.1 mator+Filter- not seen or h	6.8 14.2 6.8 -Distance fac	41.1 41.1 41.1 tor(above 15	-24.7 -24.7 -24.7 GHz)) - Gain	34.7 11.0 29.6	53.9 53.9 53.9	19.2 42.9 24.3	(AV)VBW (AV)VBW (AV)VBW	/:10Hz /:10Hz /:10Hz	Calculation")
Hori. Vert. Vert. Result = I *Other fro *No noise	4804.000 2390.000 4804.000 Reading + Ant Fa equency noises on e was detected abo	AV AV ctor + Loss mitted in thi ove the 3th	35.4 57.5 (Cable+Atter s report were order harmon	27.2 31.1 nuator+Filter- not seen or h ics.	6.8 14.2 6.8 Distance fact	41.1 41.1 41.1 tor(above 15) nargin (more	-24.7 -24.7 -24.7 GHz)) - Gain than 20dB).	34.7 11.0 29.6	53.9 53.9 53.9	19.2 42.9 24.3	(AV)VBW (AV)VBW (AV)VBW	/:10Hz /:10Hz /:10Hz	Calculation")
Hori. Vert. Vert. Result = I *Other fro *No noise	4804.000 2390.000 4804.000 Reading + Ant Fa equency noises on e was detected abo	AV AV ctor + Loss mitted in thi ove the 3th	35.4 57.5 (Cable+Atter s report were	27.2 31.1 nuator+Filter- not seen or h ics.	6.8 14.2 6.8 -Distance fac	41.1 41.1 41.1 tor(above 15) nargin (more	-24.7 -24.7 -24.7 GHz)) - Gain than 20dB).	34.7 11.0 29.6	53.9 53.9 53.9	19.2 42.9 24.3	(AV)VBW (AV)VBW (AV)VBW	/:10Hz /:10Hz /:10Hz	Calculation")
Hori. Vert. Vert. Result = 1 *Other fr *No noise Distance	4804.000 2390.000 4804.000 Reading + Ant Fa equency noises on e was detected above factor :	AV AV ctor + Loss mitted in thi ove the 3th 15GHz	35.4 57.5 (Cable+Atter s report were order harmon -40GHz :	27.2 31.1 mator+Filter- not seen or h ics.	6.8 14.2 6.8 Distance fact	41.1 41.1 41.1 tor(above 15) nargin (more	-24.7 -24.7 -24.7 GHz)) - Gain than 20dB).	34.7 11.0 29.6	53.9 53.9 53.9	19.2 42.9 24.3	(AV)VBW (AV)VBW (AV)VBW	/:10Hz /:10Hz /:10Hz	Calculation")
Hori. Vert. Vert. *Other fr *No noise Distance 20dBc D:	4804.000 2390.000 4804.000 Reading + Ant Fa equency noises or e was detected abo factor : ata Sheet	AV AV ctor + Loss mitted in thi ove the 3th 15GHz (RBW 100	35.4 57.5 (Cable+Atter s report were order harmon -40GHz : 0kHz, VBW 3	27.2 31.1 mator+Filter- not seen or h ics. 000kHz)	6.8 14.2 6.8 Distance fact ave enough r 20log(3.0m	41.1 41.1 41.1 tor(above 15) nargin (more /1.0m)= 9.	-24.7 -24.7 -24.7 GHz)) - Gain than 20dB).	34.7 11.0 29.6 (Amprifier) +	53.9 53.9 53.9 Dwell time f	19.2 42.9 24.3 factor (refer t	(AV)VBW (AV)VBW (AV)VBW (AV)VBW	/:10Hz /:10Hz /:10Hz	Calculation")
Hori. Vert. Vert. Result = 1 *Other fr *No noise Distance 20dBc D:	4804.000 2390.000 4804.000 Reading + Ant Fa equency noises on e was detected above factor :	AV AV ctor + Loss mitted in thi ove the 3th 15GHz	35.4 57.5 (Cable+Atter s report were order harmon -40GHz :	27.2 31.1 mator+Filter- not seen or h ics.	6.8 14.2 6.8 Distance fact	41.1 41.1 41.1 tor(above 15) nargin (more	-24.7 -24.7 -24.7 GHz)) - Gain than 20dB).	34.7 11.0 29.6	53.9 53.9 53.9	19.2 42.9 24.3	(AV)VBW (AV)VBW (AV)VBW	/:10Hz /:10Hz /:10Hz	Calculation")
Hori. Vert. Vert. Result = 1 *Other fr *No noise Distance 20dBc D:	4804.000 2390.000 4804.000 Reading + Ant Fa equency noises or e was detected abo factor : ata Sheet	AV AV ctor + Loss mitted in thi ove the 3th 15GHz (RBW 100	35.4 57.5 (Cable+Atter s report were order harmon -40GHz : 0kHz, VBW 3	27.2 31.1 nuator+Filter- not seen or h ics. 300kHz) Ant	6.8 14.2 6.8 Distance fact ave enough r 20log(3.0m	41.1 41.1 41.1 tor(above 15) nargin (more /1.0m)= 9.	-24.7 -24.7 -24.7 GHz)) - Gain than 20dB).	34.7 11.0 29.6 (Amprifier) +	53.9 53.9 53.9 Dwell time f	19.2 42.9 24.3 factor (refer t	(AV)VBW (AV)VBW (AV)VBW (AV)VBW	/:10Hz /:10Hz /:10Hz	Calculation")
Hori. Vert. Vert. Result = 1 *Other fr *No noise Distance 20dBc Dr Polarity	4804.000 2390.000 4804.000 Reading + Ant Fa equency noises or e was detected abu factor : ata Sheet Frequency	AV AV ctor + Loss nitted in thi ove the 3th 15GHz (RBW 100 Detector	35.4 57.5 (Cable+Atter s report were order harmon -40GHz : 0kHz, VBW 3 Reading	27.2 31.1 nuator+Filter- not seen or h ics. 000kHz) Ant Factor	6.8 14.2 6.8 Distance facture ave enough r 20log(3.0m Loss	41.1 41.1 41.1 tor(above 15 nargin (more /1.0m)= 9. Gain	-24.7 -24.7 -24.7 GHz)) - Gain than 20dB).	34.7 11.0 29.6 (Amprifier) + Result	53.9 53.9 53.9 Dwell time f	19.2 42.9 24.3 factor (refer t Margin	(AV)VBW (AV)VBW (AV)VBW (AV)VBW	/:10Hz /:10Hz /:10Hz	Calculation")
Hori. Vert. Vert. *Other fr *No noise Distance 20dBc D:	4804.000 2390.000 4804.000 Reading + Ant Fa equency noises or e was detected abo factor : ata Sheet Frequency [MHz]	AV AV ctor + Loss nitted in thi ove the 3th 15GHz (RBW 100 Detector	35.4 57.5 (Cable+Atter s report were order harmon -40GHz :)kHz, VBW 3 Reading [dBuV]	27.2 31.1 nuator+Filter- not seen or h ics. 300kHz) Ant Factor [dB/m]	6.8 14.2 6.8 -Distance fac uve enough r 20log(3.0m Loss [dB]	41.1 41.1 41.1 tor(above 15) nargin (more /1.0m)= 9. Gain [dB]	-24.7 -24.7 -24.7 GHz)) - Gain than 20dB).	34.7 11.0 29.6 (Amprifier) + Result [dBuV/m]	53.9 53.9 53.9 Dwell time f	19.2 42.9 24.3 factor (refer t Margin	(AV)VBW (AV)VBW (AV)VBW (AV)VBW o "Dwell t	/:10Hz /:10Hz /:10Hz	Calculation")
Hori. Vert. Vert. Vert. Vert. *Other fr *No noise Distance 20dBc D: Polarity Hori. Hori. Vert.	4804.000 2390.000 4804.000 Reading + Ant Fa equency noises or e was detected abo f factor : ata Sheet Frequency [MHz] 2402.000 2400.000	AV AV ctor + Loss mitted in thi tove the 3th 15GHz (RBW 100 Detector	35.4 57.5 (Cable+Atten s report were order harmon -40GHz : MtHz, VBW : Reading [dBuV] 97.6	27.2 31.1 mator+Filter- not seen or h ics. 00kHz) Ant Factor [dB/m] 27.3	6.8 14.2 6.8 Distance fac ave enough r 20log(3.0m Loss [dB] 14.2	41.1 41.1 41.1 tor(above 15: aargin (more /1.0m)= 9. Gain [dB] 41.1	-24.7 -24.7 -24.7 GHz)) - Gain than 20dB).	34.7 11.0 29.6 (Amprifier) + Result [dBuV/m] 98.0	53.9 53.9 53.9 Dwell time f	19.2 42.9 24.3 factor (refer t Margin [dB]	(AV)VBW (AV)VBW (AV)VBW (AV)VBW o "Dwell t	/:10Hz /:10Hz /:10Hz	Calculation")
Hori. Vert. Vert. Vert. *Other fr *No noise Distance 20dBc D: Polarity Hori. Hori. Vert. Vert.	4804.000 2390.000 4804.000 Reading + Ant Fa equency noises or e was detected abo f factor : ata Sheet Frequency [MHz] 2402.000 2400.000	AV AV AV ctor + Loss mitted in thi 15GHz 15GHz (RBW 100 Detector PK PK PK PK	35.4 57.5 (Cable+Attei s report were order harmon -40GHz : NkHz, VBW 3 [dBuV] 97.6 51.8 85.8 51.1	27.2 31.1 mator+Filter- not seen or h ics. (00kHz) Ant Factor [dB/m] 27.3 27.3 27.3 27.3 27.3	6.8 14.2 6.8 -Distance fac ave enough r 20log(3.0m [dB] 14.2 14.2 14.2 14.2 14.2	41.1 41.1 41.1 tor(above 15) nargin (more /1.0m)= 9. Gain [dB] 41.1 41.1 41.1	-24.7 -24.7 -24.7 GHz)) - Gain than 20dB). 5dB	34.7 11.0 29.6 (Amprifier) + [dBuV/m] 98.0 52.2 86.2 51.5	53.9 53.9 53.9 Dwell time f	19.2 42.9 24.3 factor (refer t Margin [dB]	(AV)VBW (AV)VBW (AV)VBW (AV)VBW o "Dwell to Remark Carrier	/:10Hz /:10Hz /:10Hz	Calculation")

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UL Japan, Inc. Shonan EMC Lab.

Test pla	ce.		UL Japan,	Inc. Show	an EMC L	ah		No 3 Sem	i Anechoic	Chamber			
Date			July 13, 20		LI DINC D			Lies belli	- meenore	- manuel			
Tempera	ature / Humidi	ity	22 deg.C	, 61 %RH									
Enginee	I		Takahiro S										
Mode			Tx,	2441									
			Tx, Blueto										
			, AV: Average,										
Polarity	Frequency	Detector	~	Ant.Fac.	Loss	Gain		Result	Limit	Margin	Height	-	Remark
l and	[MHz]	DW	[dBuV]	[dB/m]	[dB]	[dB]			[dBuV/m]	[dB]	[cm]	[deg.]	<u> </u>
Hori.	1627.000		45.6	25.4	13.4	40.9		41.3		32.6	115	67	
Hori. Hori.	4882.000 1627.000		65.7 35.4	31.2 25.4	6.9 13.4	40.9 40.9		44.9 39.5		29.0 34.4	143 102	133 148	
Hori. Vert.		PK	35.4 45.4	25.4	13.4	40.9		39.5 60.1		13.8	102	148	1
Vert.	4882.000		56.9	31.2	6.9	40.9		31.7			115		
Vert.	1628.031		35.6	25.4	13.4	40.9		32.6			102		
												1	
												1	
												1	
												1	
													<u> </u>
		(* PK: Pea	ık, AV: Avera	ge, QP: Qua	si-Peak)								
Polarity	Frequency	Detector		Ant.Fac.	Loss	Gain	Dwell time	Result	Limit	Margin	Remark]
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	factor [dB]	[dBuV/m]	[dBuV/m]	[dB]]
Hori.	4882.000		63.3	31.2	6.9	40.9	-24.7	35.8	53.9		(AV)VBW		
	4882.000	AV	55.6	31.2	6.9	40.9	-24.7	28.1	53.9	25.8	(AV)VBW	/:10Hz	
Vert.													
Vert.				I									
Vert.													
vert.													
	adding to A T		(Cable: Ar	Tile-	Distores 6	tar/aharra 150	10-1) (-i	(Amari 6-1)	Durall time		o "Devel" -	ima faat	Colculation"
Result = F	Reading + Ant Fa							(Amprifier) +	- Dwell time f	factor (refer t	o "Dwell t	ime factor	r Calculation")
Result = R	quency noises or	nitted in thi	s report were	not seen or h				(Amprifier) +	- Dwell time f	factor (refer t	o "Dwell t	ime factor	r Calculation")
Result = R 'Other fre 'No noise	equency noises or was detected ab	nitted in thi ove the 3th	is report were order harmon	not seen or h ics.	iave enough r	nargin (more	than 20dB).	(Amprifier) +	- Dwell time f	factor (refer t	o "Dwell t	ime factor	r Calculation")
Result = R 'Other fre 'No noise	equency noises or was detected ab	nitted in thi ove the 3th	s report were	not seen or h ics.		nargin (more	than 20dB).	(Amprifier) +	- Dwell time f	íactor (refer t	o "Dwell t	ime factor	r Calculation")
Result = R 'Other fre 'No noise	equency noises or was detected ab	nitted in thi ove the 3th	is report were order harmon	not seen or h ics.	iave enough r	nargin (more	than 20dB).	(Amprifier) +	- Dwell time f	actor (refer t	o "Dwell t	ime factor	r Calculation")
Result = R 'Other fre 'No noise	equency noises or was detected ab	nitted in thi ove the 3th	is report were order harmon	not seen or h ics.	iave enough r	nargin (more	than 20dB).	(Amprifier) +	- Dwell time f	ïactor (refer t	o "Dwell t	ime factor	r Calculation")
Result = R 'Other fre 'No noise	equency noises or was detected ab	nitted in thi ove the 3th	is report were order harmon	not seen or h ics.	iave enough r	nargin (more	than 20dB).	(Amprifier) +	- Dwell time f	factor (refer t	o "Dwell t	ime factor	r Calculation")
Result = R 'Other fre 'No noise	equency noises or was detected ab	nitted in thi ove the 3th	is report were order harmon	not seen or h ics.	iave enough r	nargin (more	than 20dB).	(Amprifier) +	Dwell time f	factor (refer t	o "Dwell t	ime factor	r Calculation")
Result = R 'Other fre 'No noise	equency noises or was detected ab	nitted in thi ove the 3th	is report were order harmon	not seen or h ics.	iave enough r	nargin (more	than 20dB).	(Amprifier) +	Dwell time f	factor (refer t	o "Dwell t	ime factor	r Calculation")
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Result = R *Other fre *No noise	equency noises or was detected ab	nitted in thi ove the 3th	is report were order harmon	not seen or h ics.	iave enough r	nargin (more	than 20dB).	(Amprifier) +	Dwell time f	íactor (refer t	o "Dwell t	ime factor	r Calculation")
Result = R *Other fre *No noise	equency noises or was detected ab	nitted in thi ove the 3th	is report were order harmon	not seen or h ics.	iave enough r	nargin (more	than 20dB).	(Amprifier) +	Dwell time f	factor (refer t	o "Dwell t	ime factor	r Calculation")
Result = R *Other fre *No noise	equency noises or was detected ab	nitted in thi ove the 3th	is report were order harmon	not seen or h ics.	iave enough r	nargin (more	than 20dB).	(Amprifier) +	Dwell time f	factor (refer t	o "Dwell t	ime factor	(Calculation")
Result = R *Other fre *No noise	equency noises or was detected ab	nitted in thi ove the 3th	is report were order harmon	not seen or h ics.	iave enough r	nargin (more	than 20dB).	(Amprifier) +	Dwell time f	factor (refer t	o "Dwell t	ime factor	(Calculation")
Result = R *Other fre	equency noises or was detected ab	nitted in thi ove the 3th	is report were order harmon	not seen or h ics.	iave enough r	nargin (more	than 20dB).	(Amprifier) +	Dwell time f	íactor (refer t	o "Dwell t	ime factor	: Calculation")
Result = R *Other fre *No noise	equency noises or was detected ab	nitted in thi ove the 3th	is report were order harmon	not seen or h ics.	iave enough r	nargin (more	than 20dB).	(Amprifier) +	Dwell time f	íactor (refer t	o "Dwell t	ime factor	: Calculation")
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Result = R *Other fre *No noise	equency noises or was detected ab	nitted in thi ove the 3th	is report were order harmon	not seen or h ics.	iave enough r	nargin (more	than 20dB).	(Amprifier) +	Dwell time f	factor (refer t	o "Dwell t	ime factor	: Calculation")
Result = R 'Other fre 'No noise	equency noises or was detected ab	nitted in thi ove the 3th	is report were order harmon	not seen or h ics.	iave enough r	nargin (more	than 20dB).	(Amprifier) +	Dwell time f	factor (refer t	o "Dwell t	ime factor	r Calculation")

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UL Japan, Inc. Shonan EMC Lab.

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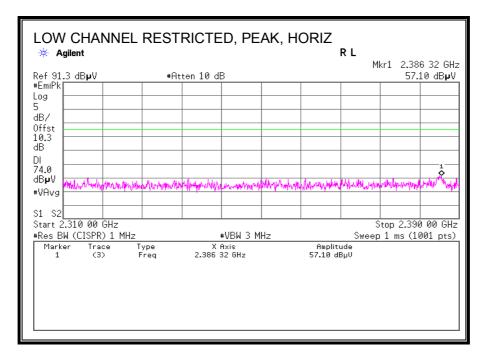
Date July 13, 2012 Temperature / Humidity 22 deg C , 61 %RH Engineer Takshiro Suzuki Mode Tx, Mode Tx, Polanty Frequency Petertor Reading Aut.Fac. Loss Gabin Gab (BHz) Gab (BUV)	Date July 13, 2012 Temperature / Humidity 22 deg C , 61 %RH Engineer Takahiro Suzuki Mode Tx, Mode Tx, Polarity Frequency Persity Aut.Fac. Limity Margin <	Date July 13, 2012 Temperature / Humidity 22 deg C , 61 %RH Engineer Takahiro Suzuki Mode Tx, Mode Tx, Polarity Frequency Persity Aut.Fac. Limity Margin <	Date July 13, 2012 Temperature / Humidity 22 deg C , 61 % RH Engineer Takhino Suzuki Mode Tx, Mode Tx, Polarity Precuency Petertor Result (MHz) (dB/v) (dB/v) (Date July 13, 2012 Temperature / Humidity 22 deg C , 61 %RH Engineer Takahiro Suzuki Mode Tx, Junty Frequency Polarity Frequency Polarity Frequency [MHz] Obtector Reading Aut Fax Hori. 1653.000 PK Sed. Polarity Frequency [MHz] Obtector Reading Aut Fax Hori. 1653.000 PK Sed. Polarity Frequency Idei 126. Hori. 1653.000 PK Sed. Polarity Sed. Vert. 1653.000 PK Sed. Polarity Frequency Vert. 1653.000 PK Sed. Polarity Frequency Vert. <t< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th>diated</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>							diated							
Temperature / Humidity 22 deg C 61 %RH Engineer Takahairo Suzuki Mode Tx, 2480 MHz Tx, Bluetooth, BDR, PRBS9 C FE: Pak, AV: Average, QP: Quasi-Peak) Polarity Frequency Detector Reading Ant Fac. Loss Gain Imit Imit Margin Height Angle Hori. 1653.000 PK 52.6 27.5 114.3 41.1 57.3 73.9 16.6 100 90 Hori. 1653.000 PK 55.6 27.5 14.3 41.1 57.3 73.9 16.6 100 90 Hori. 1653.000 PK 56.6 27.5 14.3 41.1 57.0 73.9 16.6 100 90 Hori. 1653.000 PK 56.6 27.5 14.3 41.1 57.0 73.9 16.6 100 150 Vert. 1653.000 PK 64.2 25.5 13.4 40.9 42.2 73.9 16.1 100 354 Vert. 1653.000 <t< th=""><th>Temperature / Humidity 22 deg C 61 %RH Engineer Takahairo Suzuki Mode Tx, 2480 MHz Tx, Bluetooth, BDR, PRBS9 C FE: Pak, AV: Average, QP: Quasi-Peak) Polarity Frequency Detector Reading Ant Fac. 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AV: Average, QP: Quasi-Peak) Polarity Frequency Detector Reading AntFac Loss Gain (dB) (dB) (dB) (dB) (m) (dBv/m) (dB) (m) (deg) Hori, 1653.000 PK 52.6 25.5 13.4 40.9 50.6 73.9 23.3 112 284 Hori, 1653.000 PK 55.1 31.4 6.9 40.8 55.6 73.9 17.3 100 5 Hori, 1653.000 PK 55.1 31.4 6.9 40.8 55.6 57.9 11.4 112 284 Hori, 1653.000 PK 55.1 31.4 6.9 40.8 55.6 57.9 11.4 112 284 Hori, 1653.000 PK 55.1 31.4 6.9 40.8 55.6 57.9 11.4 112 284 Hori, 1653.000 PK 55.1 31.4 6.9 40.8 65.6 17.9 12.3 100 5 Hori, 1653.000 PK 55.1 31.4 6.9 40.8 61.8 73.9 17.3 100 5 Hori, 1653.000 PK 55.2 25.5 13.4 40.9 44.2 73.9 29.7 102 346 Vert. 1653.000 PK 55.3 27.5 14.3 41.1 57.0 73.9 16.6 100 190 Vert. 4960.000 PK 55.1 31.4 6.9 40.8 61.8 73.9 12.1 100 354 Vert. 1653.000 PK 64.3 31.4 6.9 40.8 61.8 73.9 12.1 100 354 Vert. 1653.000 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Net 243.500 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Hori, 1653.000 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Hori, 1653.000 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Hori, 1653.000 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Hori, 2483.500 AV 34.2 27.5 14.3 41.1 24.7 24.2 53.9 29.7 (AV)WW:10Hz Hori, 2483.500 AV 48.2 27.5 14.3 41.1 24.7 24.2 53.9 29.7 (AV)WW:10Hz Hori, 2483.500 AV 48.2 27.5 14.3 41.1 24.7 24.2 53.9 20.7 (AV)WW:10Hz Hori, 2483.500 AV 48.2 27.5 14.3 41.1 24.7 24.2 53.9 20.7 (AV)WW:10Hz Hori, 4960.000 AV 58.8 31.4 6.9 40.8 24.7 3.6 53.9 22.3 (AV)WW:10Hz Hori, 4960.000 AV 58.8 31.4 6.9 40.8 24.7 3.5 3.9 30.7 (AV)WW:10Hz Hori, 4960.000 AV 48.2 27.5 14.3 41.1 24.7 24.7 24.2 53.9 30.7 (AV)WW:10Hz Hori, 4960.000 AV 48.2 33.1 4 6.9 40.8 24.7 33.5 33.9 23.3 (AV)WW:10Hz Hori, 4960.000 AV 45.2 33.1 4 6.9 40.8 24.7 33.5 33.9 23.3 (AV)WW:10Hz Hori, 4960.000 AV 45.2 33.1 4 6.9 40.8 24.7 33.5 33.9 30.8 (AV)WW:10Hz Hori, 4960.000 AV 45.2 33.1 4 6.9 40.8 24.7 33.5 33.9 30.8 (AV)WW:10Hz Hori, 4960.000 AV 45.2 33.1 4 6.9 40.8 24.7 33.9 30.8 (AV)WW:10Hz	Engineer Takahiro Suzuki Mode Tx, Mathiro Suzuki Tx, Bluetooth, BDR, PRBS9 r9E: Peak. AV: Average, QP: Quasi-Peak) Polarity Frequency Detector Reading AntFac Loss Gain (dB) (dB) (dB) (dB) (m) (dBv/m) (dB) (m) (deg) Hori, 1653.000 PK 52.6 25.5 13.4 40.9 50.6 73.9 23.3 112 284 Hori, 1653.000 PK 55.1 31.4 6.9 40.8 55.6 73.9 17.3 100 5 Hori, 1653.000 PK 55.1 31.4 6.9 40.8 55.6 57.9 11.4 112 284 Hori, 1653.000 PK 55.1 31.4 6.9 40.8 55.6 57.9 11.4 112 284 Hori, 1653.000 PK 55.1 31.4 6.9 40.8 55.6 57.9 11.4 112 284 Hori, 1653.000 PK 55.1 31.4 6.9 40.8 65.6 17.9 12.3 100 5 Hori, 1653.000 PK 55.1 31.4 6.9 40.8 61.8 73.9 17.3 100 5 Hori, 1653.000 PK 55.2 25.5 13.4 40.9 44.2 73.9 29.7 102 346 Vert. 1653.000 PK 55.3 27.5 14.3 41.1 57.0 73.9 16.6 100 190 Vert. 4960.000 PK 55.1 31.4 6.9 40.8 61.8 73.9 12.1 100 354 Vert. 1653.000 PK 64.3 31.4 6.9 40.8 61.8 73.9 12.1 100 354 Vert. 1653.000 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Net 243.500 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Hori, 1653.000 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Hori, 1653.000 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Hori, 1653.000 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Hori, 2483.500 AV 34.2 27.5 14.3 41.1 24.7 24.2 53.9 29.7 (AV)WW:10Hz Hori, 2483.500 AV 48.2 27.5 14.3 41.1 24.7 24.2 53.9 29.7 (AV)WW:10Hz Hori, 2483.500 AV 48.2 27.5 14.3 41.1 24.7 24.2 53.9 20.7 (AV)WW:10Hz Hori, 2483.500 AV 48.2 27.5 14.3 41.1 24.7 24.2 53.9 20.7 (AV)WW:10Hz Hori, 4960.000 AV 58.8 31.4 6.9 40.8 24.7 3.6 53.9 22.3 (AV)WW:10Hz Hori, 4960.000 AV 58.8 31.4 6.9 40.8 24.7 3.5 3.9 30.7 (AV)WW:10Hz Hori, 4960.000 AV 48.2 27.5 14.3 41.1 24.7 24.7 24.2 53.9 30.7 (AV)WW:10Hz Hori, 4960.000 AV 48.2 33.1 4 6.9 40.8 24.7 33.5 33.9 23.3 (AV)WW:10Hz Hori, 4960.000 AV 45.2 33.1 4 6.9 40.8 24.7 33.5 33.9 23.3 (AV)WW:10Hz Hori, 4960.000 AV 45.2 33.1 4 6.9 40.8 24.7 33.5 33.9 30.8 (AV)WW:10Hz Hori, 4960.000 AV 45.2 33.1 4 6.9 40.8 24.7 33.5 33.9 30.8 (AV)WW:10Hz Hori, 4960.000 AV 45.2 33.1 4 6.9 40.8 24.7 33.9 30.8 (AV)WW:10Hz	Enginer Takahiro Suzuki Mode Tx, Tx, Buteoth, BDR, PRBS9 Tx, Bluetoth, BDR, PRBS9 result (dBsu/m)	Engineer Mode Tx, Justoviti Suzuki Tx, Bluetooth, BDR, PRBS9 r 9E: Peak. AV: Average, QP: Quasi-Peak) Polarity Frequency Detector Reading Ant Fac. Loss Gain (dB) (dB) (dB) (dB) (m) (dB) (m) (dB) (m) (dBg) (Hrif) (dBv/m) (dB/m) (dB) (dB) (dB) (dB) (dB) (dB) (dB) (dB		ature / Humidi												
Mode Tx, 2480 MHz Tx, Bluetooth, BDR, PRBS9 Prior Prevention of the preventis of the prevention of the prevent were now the enouthem prevent	Mode Tx, 2480 MHz Tr, Bluetooth, BDR, PRBS9 Polarity Frequency Detector Result Limit Margin Reight Angle Remark Hori. 1653.000 PK 52.6 22.5 13.4 40.9 50.6 73.9 16.6 100 90 Hori. 1653.000 PK 55.6 27.5 14.3 41.1 57.3 73.9 16.6 100 90 Hori. 1653.000 PK 55.6 27.5 14.3 41.1 57.3 73.9 16.6 100 90 Hori. 1653.000 PK 55.6 27.5 14.3 40.9 44.2 73.9 16.9 100 190 Vert. 2493.500 PK 56.3 27.5 14.3 41.1 57.0 73.9 16.9 100 190 Vert. 2493.500 PK 64.3 31.4 6.9 40.8 61.8 73.9 12.1 100 354	Mode Tx, 2480 MHz Tr, Bluetooth, BDR, PRBS9 Polarity Frequency Detector Result Limit Margin Reight Angle Remark Hori. 1653.000 PK 52.6 22.5 13.4 40.9 50.6 73.9 16.6 100 90 Hori. 1653.000 PK 55.6 27.5 14.3 41.1 57.3 73.9 16.6 100 90 Hori. 1653.000 PK 55.6 27.5 14.3 41.1 57.3 73.9 16.6 100 90 Hori. 1653.000 PK 55.6 27.5 14.3 40.9 44.2 73.9 16.9 100 190 Vert. 2493.500 PK 56.3 27.5 14.3 41.1 57.0 73.9 16.9 100 190 Vert. 2493.500 PK 64.3 31.4 6.9 40.8 61.8 73.9 12.1 100 354	Mode Tx, 2480 MHz Tx, Bluetoofh, BDR, PRBS9 Polarity Frequency Detector Reading Ant Fac. Loss Gain Result Limit Margin Angle Remark Hori, 1653.000 PK 52.6 25.5 13.4 40.9 50.6 73.9 23.3 112 204 Hori, 1653.000 PK 55.6 27.5 14.3 41.1 57.3 73.9 16.6 100 90 Hori, 1653.000 PK 55.6 27.5 14.3 40.9 44.2 53.9 11.4 12 204 Hori, 1653.000 PK 45.3 27.5 14.3 40.9 44.2 73.9 16.6 100 190 Vert. 2483.500 PK 56.3 27.5 14.3 41.1 57.0 73.9 16.6 100 190 Vert. 2483.500 PK 64.3 31.4 6.9 40.8 61.8 7	Mode Tx, 2480 MHz Tr, Bluetooth, BDR, PRBS9 Polarity Frequency Detector Result Limit Margin Reight Angle Remark Polarity Frequency Detector Result Loss Gain Result Limit Margin Reight Angle Remark Hori. 1653.000 PK 52.6 27.5 13.4 40.9 50.6 73.9 16.6 100 90 Hori. 1653.000 PK 55.6 27.5 14.3 41.1 57.3 73.9 16.6 100 90 Hori. 1653.000 PK 55.6 27.5 14.3 40.9 44.2 73.9 13.7 100 5 Hori. 1653.000 PK 56.3 27.5 14.3 41.1 57.0 73.9 16.6 100 190 Vert. 2496.000 PK 56.3 27.5 14.3 41.1 57.0 73.9 16.9 100 </td <td></td> <td></td> <td>-7</td> <td></td>			-7											
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Polarity [Mffz] Detector (aBuV) Reading (aBuV) Ant Fac. (aBuV) Loss (aB) Gain (aB) Result (aBuV/m) Limit (aBuV/m) Margin (aB) Height (aBuV/m) Angle (aBuV) Remark Hori. 1653.000 PK 52.6 25.5 13.4 40.9 50.6 73.9 23.3 112 284 Hori. 2483.500 PK 55.6 27.5 14.3 41.1 57.3 73.9 16.6 100 90 Hori. 2493.500 PK 55.6 27.5 13.4 40.9 44.5 53.3 11.4 12 284 Hori. 1653.000 PK 56.3 27.5 14.3 41.1 57.0 73.9 16.9 100 190 Vert. 2483.500 PK 56.3 27.5 14.3 41.1 57.0 73.9 12.1 100 354 Vert. 1653.000 PK 66.3 31.4 6.9 40.8 61.8 73.9 12.1 <t< td=""><td>Polarity Frequency [Mffz] Detector Reading [dBwV] Ant Fac. [dBwV] Loss [dB] Gain [dB] Result [dBwV/m] Limit [dBwV/m] Margin [dB] Height [m] Angle [m] Remark [m] Hori. 1653.000 PK 52.6 27.5 13.4 40.9 50.6 73.9 23.3 112 284 Hori. 2483.500 PK 55.6 27.5 14.3 41.1 57.3 73.9 16.6 100 90 Hori. 2483.500 PK 55.6 27.5 13.4 40.9 44.5 53.9 11.4 112 284 Hori. 1653.000 PK 56.3 27.5 14.3 41.1 57.0 73.9 16.9 100 190 Vert. 2483.500 PK 56.3 27.5 14.3 41.1 57.0 73.9 12.1 100 354 Vert. 1653.000 PK 66.3 23.2 53.9 21.6 102 346 <t< td=""><td>Polarity Frequency [Mffz] Detector Reading [dBwV] Ant Fac. [dBwV] Loss [dB] Gain [dB] Result [dBwV/m] Limit [dBwV/m] Margin [dB] Height [m] Angle [m] Remark [m] Hori. 1653.000 PK 52.6 27.5 13.4 40.9 50.6 73.9 23.3 112 284 Hori. 2483.500 PK 55.6 27.5 14.3 41.1 57.3 73.9 16.6 100 90 Hori. 2483.500 PK 55.6 27.5 13.4 40.9 44.5 53.9 11.4 112 284 Hori. 1653.000 PK 56.3 27.5 14.3 41.1 57.0 73.9 16.9 100 190 Vert. 2483.500 PK 56.3 27.5 14.3 41.1 57.0 73.9 12.1 100 354 Vert. 1653.000 PK 66.3 23.2 53.9 21.6 102 346 <t< td=""><td>Polarity Frequency [MHz] Detector Reading Ant.Fac. 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Loss Gain facbn [dBu/Vm] [dBu/Vm] </td <td>Polarity</td> <td></td> <td>Detector</td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td>Remark</td>	Polarity		Detector	-									-	Remark
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73.9 12.1 100 354 Vert. 1653.000 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Vert. 1653.000 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Vert. 1653.000 AV 48.2 27.5 14.3 41.1 -24.7 23.6 29.7 (AV)VBW:10Hz <tr< td=""><td>Hori, Hori, 4960.000 PK 56.6 27.5 14.3 41.1 57.3 73.9 16.6 100 90 Hori, 1653.000 PK 59.1 31.4 6.9 40.8 56.6 73.9 17.3 100 5 Hori, 1653.000 PK 44.5 25.5 13.4 40.9 42.5 53.9 11.4 112 284 Vert. 1653.000 PK 56.3 27.5 14.3 41.1 57.0 73.9 16.5 100 190 Vert. 4960.000 PK 64.3 31.4 6.9 40.8 61.8 73.9 12.1 100 354 Vert. 1653.000 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Vert. 1653.000 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Vert. 1653.000 AV 48.2 27.5 14.3 41.1 -24.7 23.6 29.7 (AV)VBW:10Hz <tr< td=""><td>Hori, Hori, 4960.000 PK 56.6 27.5 14.3 41.1 57.3 73.9 16.6 100 90 Hori, 1653.000 PK 59.1 31.4 6.9 40.8 56.6 73.9 17.3 100 5 Hori, 1653.000 PK 44.5 25.5 13.4 40.9 42.5 53.9 11.4 112 284 Vert. 1653.000 PK 56.3 27.5 14.3 41.1 57.0 73.9 16.5 100 190 Vert. 4960.000 PK 64.3 31.4 6.9 40.8 61.8 73.9 12.1 100 354 Vert. 1653.000 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Vert. 1653.000 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Vert. 1653.000 AV 48.2 27.5 14.3 41.1 -24.7 23.6 29.7 (AV)VBW:10Hz <tr< td=""><td>Uari</td><td></td><td>DK</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr<></td></tr<></td></tr<>	Hori, Hori, 4960.000 PK 56.6 27.5 14.3 41.1 57.3 73.9 16.6 100 90 Hori, 1653.000 PK 59.1 31.4 6.9 40.8 56.6 73.9 17.3 100 5 Hori, 1653.000 PK 44.5 25.5 13.4 40.9 42.5 53.9 11.4 112 284 Vert. 1653.000 PK 56.3 27.5 14.3 41.1 57.0 73.9 16.5 100 190 Vert. 4960.000 PK 64.3 31.4 6.9 40.8 61.8 73.9 12.1 100 354 Vert. 1653.000 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Vert. 1653.000 AV 34.3 25.5 13.4 40.9 32.3 53.9 21.6 102 346 Vert. 1653.000 AV 48.2 27.5 14.3 41.1 -24.7 23.6 29.7 (AV)VBW:10Hz <tr< td=""><td>Hori, Hori, 4960.000 PK 56.6 27.5 14.3 41.1 57.3 73.9 16.6 100 90 Hori, 1653.000 PK 59.1 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Polarity Frequency Detector Reading [dBw] Ant.Fac. [dB/m] Loss [dB] Gain [dB] Dwell time factor [dB] Result Limit [dBuV/m] Margin [dB] Remark Hori. 2433.500 AV 48.2 27.5 14.3 41.1 -24.7 24.2 53.9 29.7 (AV)VBW:10Hz Hori. 4960.000 AV 58.8 31.4 6.9 40.8 -24.7 23.2 53.9 22.3 (AV)VBW:10Hz Vert. 2493.500 AV 42.2 27.5 14.3 41.1 -24.7 23.2 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Result = Reading + Ant Factor + Loss (Cable+Attennator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") "Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	Polarity Frequency Detector Reading Ant.Fac. [dB/m] Loss Gain [dB] Dwell time factor [dB] Result Limit Margin [dBJ Remark Hori. 2433.500 AV 48.2 27.5 14.3 41.1 -24.7 24.2 53.9 29.7 (AV)VBW:10Hz Hori. 2493.500 AV 48.2 27.5 14.3 41.1 -24.7 24.2 53.9 29.7 (AV)VBW:10Hz Vert. 2493.500 AV 47.2 27.5 14.3 41.1 -24.7 23.2 53.9 30.7 (AV)VBW:10Hz Vert. 2493.500 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 18.8 (AV)VBW:10Hz Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation")	Polarity Frequency Detector Reading Ant.Fac. [dB/m] Loss Gain [dB] Dwell time factor [dB] Result Limit Margin [dBJ Remark Hori. 2433.500 AV 48.2 27.5 14.3 41.1 -24.7 24.2 53.9 29.7 (AV)VBW:10Hz Hori. 2493.500 AV 48.2 27.5 14.3 41.1 -24.7 24.2 53.9 29.7 (AV)VBW:10Hz Vert. 2493.500 AV 47.2 27.5 14.3 41.1 -24.7 23.2 53.9 30.7 (AV)VBW:10Hz Vert. 2493.500 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 18.8 (AV)VBW:10Hz Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation")	Polarity Frequency [MHz] Detector [dBuV] Reading [dB/m] Ant Fac. [dB] Loss [dB] Gain [dB] Dwell time factor [dB] Result [dBuV/m] Limit [dBu/m] Margin [dB] Remark Hori. 2433.500 AV 48.2 27.5 14.3 41.1 -24.7 24.2 53.9 29.7 (AV)VBW:10Hz Hori. 4960.000 AV 58.8 31.4 6.9 40.8 -24.7 23.2 53.9 22.3 (AV)VBW:10Hz Vert. 2493.500 AV 42.2 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculat	Polarity Frequency Detector Reading Ant.Fac. [dB/m] Loss Gain [dB] Dwell time factor [dB] Result Limit Margin [dBJ Remark Hori. 2433.500 AV 48.2 27.5 14.3 41.1 -24.7 24.2 53.9 29.7 (AV)VBW:10Hz Hori. 2493.500 AV 48.2 27.5 14.3 41.1 -24.7 24.2 53.9 29.7 (AV)VBW:10Hz Vert. 2493.500 AV 47.2 27.5 14.3 41.1 -24.7 23.2 53.9 30.7 (AV)VBW:10Hz Vert. 2493.500 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 18.8 (AV)VBW:10Hz Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation")														
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Hori. 2483.500 AV 48.2 27.5 14.3 41.1 -24.7 24.2 53.9 29.7 (AV)VBW:10Hz Hori. 4960.000 AV 58.8 31.4 6.9 40.8 -24.7 31.6 53.9 22.3 (AV)VBW:10Hz Vert. 2483.500 AV 47.2 27.5 14.3 41.1 -24.7 23.2 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 23.2 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 18.8 (AV)VBW:10Hz Result = Reading + Aut Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") "Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). "No noise was detected above the 3th order harmonics.	Hori. 2483.500 AV 48.2 27.5 14.3 41.1 -24.7 24.2 53.9 29.7 (AV)VBW:10Hz Hori. 4960.000 AV 58.8 31.4 6.9 40.8 -24.7 31.6 53.9 22.3 (AV)VBW:10Hz Vert. 2483.500 AV 47.2 27.5 14.3 41.1 -24.7 23.2 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Result = Reading + Aut Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") "Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB)." "No noise was detected above the 3th order harmonics."	Hori. 2483.500 AV 48.2 27.5 14.3 41.1 -24.7 24.2 53.9 29.7 (AV)VBW:10Hz Hori. 4960.000 AV 58.8 31.4 6.9 40.8 -24.7 31.6 53.9 22.3 (AV)VBW:10Hz Vert. 2483.500 AV 47.2 27.5 14.3 41.1 -24.7 23.2 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Result = Reading + Aut Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") "Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB)." "No noise was detected above the 3th order harmonics."	Hori. 2483.500 AV 48.2 27.5 14.3 41.1 -24.7 24.2 53.9 29.7 (AV)VBW:10Hz Hori. 4960.000 AV 58.8 31.4 6.9 40.8 -24.7 31.6 53.9 22.3 (AV)VBW:10Hz Vert. 2483.500 AV 47.2 27.5 14.3 41.1 -24.7 23.2 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Result = Reading + Aut Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") "Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB)." "No noise was detected above the 3th order harmonics."	Hori. 2483.500 AV 48.2 27.5 14.3 41.1 -24.7 24.2 53.9 29.7 (AV)VBW:10Hz Hori. 4960.000 AV 58.8 31.4 6.9 40.8 -24.7 31.6 53.9 22.3 (AV)VBW:10Hz Vert. 2483.500 AV 47.2 27.5 14.3 41.1 -24.7 23.2 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Result = Reading + Aut Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") "Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB)." "No noise was detected above the 3th order harmonics."	lolainy		Delector	-							-	Remark		
Hori. 4960.000 AV 58.8 31.4 6.9 40.8 -24.7 31.6 53.9 22.3 (AV)VBW:10Hz Vert. 2483.500 AV 47.2 27.5 14.3 41.1 -24.7 23.2 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 18.8 (AV)VBW:10Hz Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") *Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	Hori. 4960.000 AV 58.8 31.4 6.9 40.8 -24.7 31.6 53.9 22.3 (AV)VBW:10Hz Vert. 2483.500 AV 47.2 27.5 14.3 41.1 -24.7 23.2 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") *Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	Hori. 4960.000 AV 58.8 31.4 6.9 40.8 -24.7 31.6 53.9 22.3 (AV)VBW:10Hz Vert. 2483.500 AV 47.2 27.5 14.3 41.1 -24.7 23.2 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") *Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	Hori. 4960.000 AV 58.8 31.4 6.9 40.8 -24.7 31.6 53.9 22.3 (AV)VBW:10Hz Vert. 2483.500 AV 47.2 27.5 14.3 41.1 -24.7 23.2 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") "Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	Hori. 4960.000 AV 58.8 31.4 6.9 40.8 -24.7 31.6 53.9 22.3 (AV)VBW:10Hz Vert. 2483.500 AV 47.2 27.5 14.3 41.1 -24.7 23.2 53.9 30.7 (AV)VBW:10Hz Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 30.7 (AV)VBW:10Hz Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") *Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	Hori.		AV		-		-			-	-	(AV)VBW	:10Hz	
Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 18.8 (AV)VBW:10Hz Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") "Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). "No noise was detected above the 3th order harmonics.	Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 18.8 (AV)VBW:10Hz Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") "Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). "No noise was detected above the 3th order harmonics.	Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 18.8 (AV)VBW:10Hz Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") "Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). "No noise was detected above the 3th order harmonics.	Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 18.8 (AV)VBW:10Hz Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") "Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). "No noise was detected above the 3th order harmonics.	Vert. 4960.000 AV 62.3 31.4 6.9 40.8 -24.7 35.1 53.9 18.8 (AV)VBW:10Hz Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") "Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). "No noise was detected above the 3th order harmonics.														
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") *Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") *Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") *Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") *Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 15GHz)) - Gain(Amprifier) + Dwell time factor (refer to "Dwell time factor Calculation") *Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	Vert.	2483.500	AV	47.2	27.5	14.3	41.1	-24.7	23.2	53.9	30.7	(AV)VBW	:10Hz	
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	Vert.	4960.000	AV	62.3	31.4	6.9	40.8	-24.7	35.1	53.9	18.8	(AV)VBW	:10Hz	
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.														
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	*Other frequency noises omitted in this report were not seen or have enough margin (more than 20dB). *No noise was detected above the 3th order harmonics.	Result = T	Reading + Ant Vo.	tor + Loss	(Cable+Attor	unator+Filter	Distance feet	tor(shove 150	Hz)) - Gaint	(Amprifier) +	Dwell time 6	actor (refer *	"Dwall +	ime factor	Calculation")
Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB	Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB	Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB	Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB	Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB	*Other fre *No noise	equency noises on e was detected abo	nitted in thi ove the 3th	s report were order harmon	not seen or h ics.	ave enough n	nargin (more	than 20dB).						,
					Distance	factor :	15GHz	-40GHz :		20log(3.0m	/1.0m)= 9.5	dB						

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8.2.2. ENHANCED DATA RATE 8PSK MODULATION

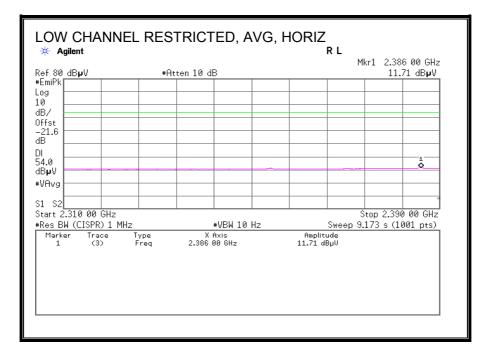
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



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1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN TEL: +81 463 50 6400 FAX: +81 463 50 6401

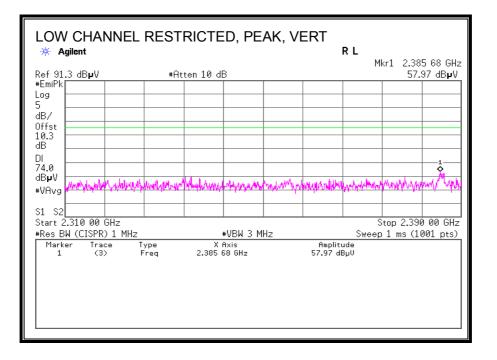


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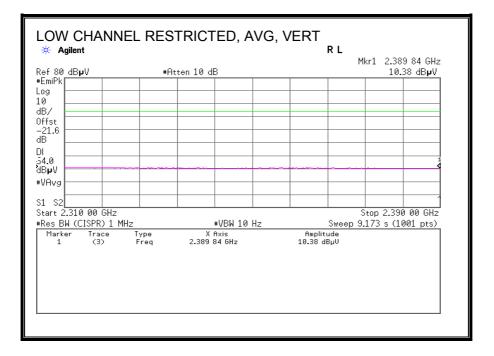
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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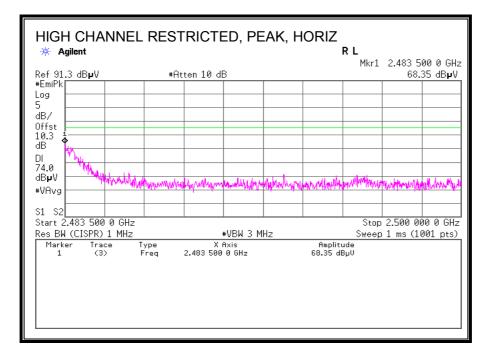


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RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

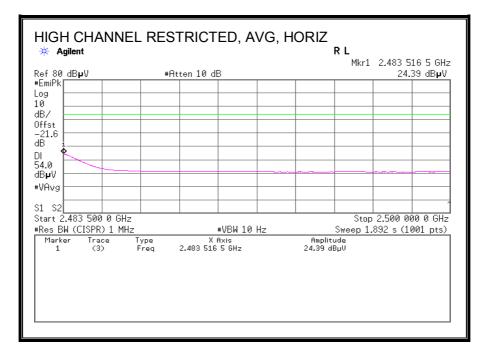


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TEL: +81 463 50 6400

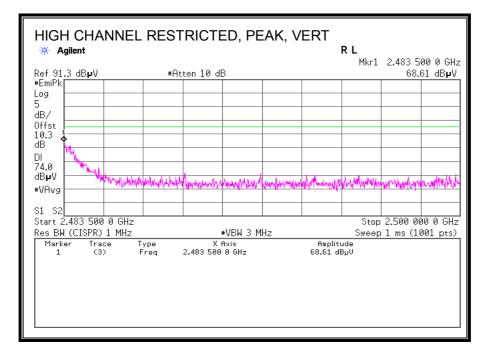


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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

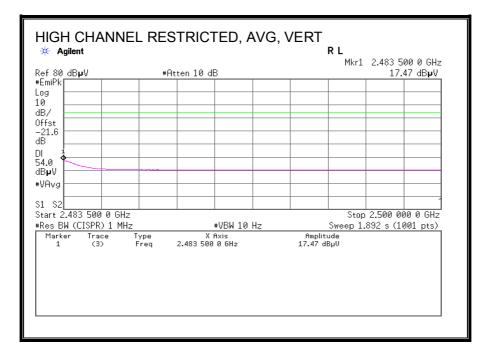


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TEL: +81 463 50 6400

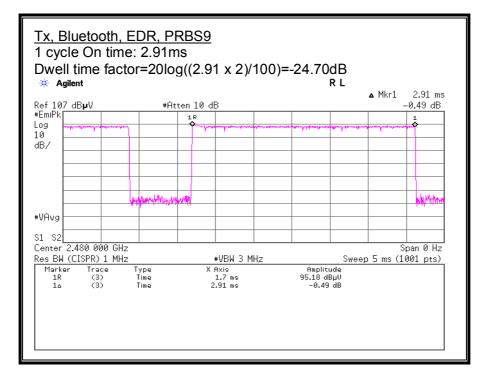


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Dwell time factor Calculation



On time of some channel during 100ms: Twice This is the worst case in hopping sequence of Bluetooth.

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	ce		UL Japan,	Inc. Shon	an EMC La	ıb.		No.3 Sem	i Anechoic	Chamber			
Date			July 13, 20										
-	ature / Humidi	ity	22 deg.C										
Enginee	1		Takahiro S										
Mode			Tx, Tx, Divete	2402 oth, EDR,									
		(* DK · Deak	AV: Average										
Polarity	Frequency	Detector	Reading	Ant.Fac.	Loss	Gain		Result	Limit	Margin	Height	Angle	Remark
lonany	[MHz]	Dettector	[dBuV]	[dB/m]	[dB]	[dB]		[dBuV/m]		[dB]	[cm]	[deg.]	remark
Hori.	1597.000	PK	45.9	25.4	13.3	40.9		43.7	73.9	30.2	100	18	
Hori.	2390.000	PK	46.9	27.2	14.2	41.1		47.2	73.9	26.7	100	247	,
Hori.	4804.000		61.5	31.1	6.8	41.1		58.3	73.9	15.6		109	
Hori.	1597.000		34.3	25.4	13.3	40.9		32.1	53.9	21.8		18	
Vert.	1597.000		45.2	25.4	13.3	40.9		43.0	73.9	30.9		184	
Vert.	2390.000		44.7	27.2	14.2	41.1		45.0	73.9	28.9		232	
Vert.	4804.000		55.3	31.1	6.8	41.1		52.1	73.9	21.8		148 184	
Vert.	1597.000	AV	34.0	25.4	13.3	40.9		31.8	53.9	22.1	100	184	
		(* DV- D	k, AV: Avera		: D1-)								
Polarity	Frequency	Detector	Reading	Ant.Fac.	Loss	Gain	Dwell time	Result	Limit	Margin	Remark		1
Folarity	[MHz]	Detector	[dBuV]	[dB/m]	[dB]	[dB]	factor [dB]	[dBuV/m]	[dBuV/m]	[dB]	Remark		
Hori.	2390.000	AV	34.8	27.2	14.2	41.1	-24.7	10.4	53.9		(AV)VBW	/•10Hz	1
Hori.	4804.000		44.7	31.1	6.8	41.1	-24.7	16.8			(AV)VBW		
Vert.	2390.000		35.3	27.2	14.2	41.1	-24.7	10.9			(AV)VBW		
Vert.	4804.000	AV	39.8	31.1	6.8	41.1	-24.7	11.9	53.9	42.0	(AV)VBW	/:10Hz	
Result = F	Reading + Ant Fa	ctor + Loss	(Cable+Atter	uator+Filter-	Distance fact	or(above 15	GHz)) - Gain	(Amprifier) +	Dwell time f	actor (refer t	o "Dwell ti	ime facto	r Calculation")
*Other fre	equency noises or	nitted in thi	s report were	not seen or h				(Amprifier) +	Dwell time f	àctor (refer t	o "Dwell ti	ime facto	r Calculation")
*Other fre	equency noises or was detected ab	nitted in thi ove the 3th	s report were	not seen or h ics.		nargin (more	than 20dB).	(Amprifier) +	Dwell time f	àctor (refer t	o "Dwell ti	ime facto	r Calculation")
*Other fre *No noise Distance 20dBc Da	equency noises or e was detected ab factor : nta Sheet	nitted in thi ove the 3th 15GHz (RBW 100	s report were order harmon -40GHz : 0kHz, VBW 3	not seen or h ics. 300kHz)	ave enough n 20log(3.0m	nargin (more /1.0m)= 9.5	than 20dB).					ime facto	r Calculation")
*Other fre *No noise Distance 20dBc Da	equency noises or was detected ab factor :	nitted in thi ove the 3th 15GHz	s report were order harmon -40GHz :	not seen or h ics.	ave enough n	nargin (more	than 20dB).	(Amprifier) + Result	Dwell time f	actor (refer t Margin	o "Dwell ti Remark	ime facto	r Calculation")
*Other fre *No noise Distance 20dBc Da	equency noises or e was detected ab factor : nta Sheet	nitted in thi ove the 3th 15GHz (RBW 100	s report were order harmon -40GHz : 0kHz, VBW 3	not seen or h ics. 300kHz) Ant	ave enough n 20log(3.0m	nargin (more /1.0m)= 9.5	than 20dB).					ime facto	r Calculation")
*Other fre *No noise Distance	equency noises or e was detected abo factor : ata Sheet Frequency	nitted in thi ove the 3th 15GHz (RBW 100 Detector	s report were order harmon -40GHz : 0kHz, VBW : Reading	not seen or h ics. 300kHz) Ant Factor	ave enough n 20log(3.0m Loss	nargin (more /1.0m)= 9.3 Gain	than 20dB).	Result	Limit	Margin		ime facto	r Calculation")
*Other fre *No noise Distance 20dBc Da Polarity Hori. Hori.	equency noises or was detected ab factor : ta Sheet Frequency [MHz] 2402.000 2400.000	nitted in thi ove the 3th 15GHz (RBW 100 Detector PK PK	s report were order harmon -40GHz : kHz, VBW 3 Reading [dBuV] 95.9 45.7	not seen or h ics. 300kHz) Ant Factor [dB/m] 27.3 27.3	ave enough n 20log(3.0m Loss [dB] 14.2 14.2	Aargin (more /1.0m)= 9.1 Gain [dB] 41.1 41.1	than 20dB).	Result [dBuV/m] 96.3 46.1	Limit [dBuV/m] - 76.3	Margin	Remark	ime facto	r Calculation")
*Other fre *No noise Distance 20dBc Da Polarity	equency noises or was detected ab factor : ata Sheet Frequency [MHz] 2402.000	(RBW 100 Detector PK PK PK	s report were order harmon -40GHz : PkHz, VBW 3 Reading [dBuV] 95.9	not seen or h ics. 300kHz) Ant Factor [dB/m] 27.3	ave enough n 20log(3.0m Loss [dB] 14.2	(more (1.0m)= 9.1 Gain [dB] 41.1	than 20dB).	Result [dBuV/m] 96.3	Limit [dBuV/m] - 76.3	Margin [dB]	Remark	ime facto	r Calculation")

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UL Japan, Inc. Shonan EMC Lab.

Test pla	ce		UL Japan,	Inc. Shon	an EMC La	ıb.		No.3 Semi	i Anechoic	Chamber			
Date			July 13, 20	012									
	ature / Humidi	ity		, 61 %RH									
Enginee	ſ		Takahiro S										
Mode			Tx, Ty Plutor	2441 oth, EDR, P									
		(* PK · Peak	, AV: Average										
Polarity	Frequency	Detector		Ant.Fac.	Loss	Gain		Result	Limit	Margin	Height	Angle	Remark
-	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]		[dBuV/m]	[dBuV/m]	[dB]	[cm]	[deg.]	
Hori.	1627.000	PK	46.4	25.4	13.4	40.9		44.3	73.9	29.6	100	247	
Hori.	4882.000		61.6	31.2	6.9	40.9		58.8	73.9	15.1	100	104	
lori.	1627.000		34.3	25.4	13.4	40.9		32.2	53.9	21.7	100	247	
Vert.	1627.000		46.2	25.4	13.4	40.9		44.1	73.9	29.8	100	18	
Vert.	4882.000		56.5	31.2	6.9	40.9		53.7	73.9	20.2	100	358	
/ert.	1627.000	AV	34.2	25.4	13.4	40.9		32.1	53.9	21.8	100	18	
			k, AV: Avera										
Polarity	Frequency	Detector		Ant.Fac.	Loss	Gain	Dwell time	Result	Limit	Margin	Remark		
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	factor [dB]		[dBuV/m]	[dB]	({
Hori.		AV	45.6	31.2	6.9	40.9	-24.7	18.1	53.9		(AV)VBW		
/ert.	4882.000	AV	42.3	31.2	6.9	40.9	-24.7	14.8	53.9	39.1	(AV)VBW	:10Hz	
								1					
					I								
Result = F	Reading + Ant Fa	ctor + Loss	(Cable+Atter	nuator+Filter-	Distance fact	or(above 150	GHz)) - Gain	(Amprifier) +	Dwell time f	actor (refer to	o "Dwell t	ime factor	r Calculation")
⁺Other fre	equency noises or	nitted in th	is report were	not seen or h				(Amprifier) +	Dwell time f	actor (refer to	o "Dwell t	ime factor	r Calculation")
*Other fre *No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer to	o "Dwell t	ime factor	Calculation")
®Other fre ®No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were	not seen or h ics.		uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer to	o "Dwell t	ime factor	r Calculation")
⁺Other fre ⁺No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer to	o "Dwell t	ime factor	r Calculation")
⁺Other fre ⁺No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer to	o "Dwell t	ime factor	Calculation")
⁺Other fre ⁺No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer to	o "Dwell t	ime factor	(Calculation")
⁺Other fre ⁺No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer to	o "Dwell t	ime factor	(Calculation'')
⁺Other fre ⁺No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer to	o "Dwell t	ime factor	(Calculation'')
®Other fre ®No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer to	o "Dwell t	ime factor	(Calculation'')
⁺Other fre	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	· Dwell time f	actor (refer te	o "Dwell t	ime factor	(Calculation'')
®Other fre ®No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer te	o "Dwell t	ime factor	(Calculation'')
®Other fre ®No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer te	o "Dwell t	ime factor	(Calculation'')
⁺Other fre ⁺No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer to	o "Dwell t	ime factor	(Calculation'')
⁺Other fre ⁺No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer te	o "Dwell t	ime factor	c Calculation")
®Other fre ®No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer te	o "Dwell t	ime factor	(Calculation'')
®Other fre ®No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer to	o "Dwell t	ime factor	(Calculation'')
®Other fre ®No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer te	o "Dwell t	ime factor	(Calculation'')
⁺Other fre ⁺No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer to	o "Dwell t	ime factor	(Calculation'')
⁺Other fre ⁺No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer to	o "Dwell t	ime factor	(Calculation'')
Other fre No noise	equency noises or was detected ab	nitted in th ove the 3th	is report were order harmor	not seen or h ics.	ave enough n	uargin (more	than 20dB).	(Amprifier) +	Dwell time f	actor (refer to	o "Dwell t	ime factor	c Calculation")

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UL Japan, Inc. Shonan EMC Lab.

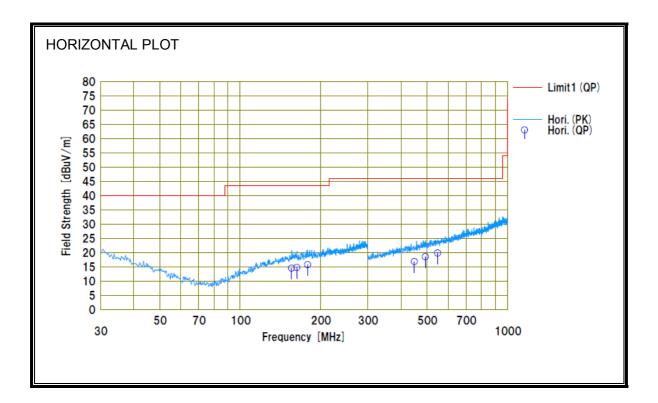
				Ra	diated	Emis	<u>sion</u>						
Test place Date Temperature / Humie Engineer Mode	lity	July 13, 20	, 61 %RH		ıb.		No.3 Sem	i Anechoic	Chamber				
	(* DI7. D1	Tx, Blutoo	oth, EDR, P	RBS9									
Polarity Frequency	(* PK: Peak Detector	, AV: Average Reading	, QP: Quasi-Pe Ant.Fac.	ak) Loss	Gain		Result	Limit	Margin	Height	Angle	Remark	٦
[MHz]	DI C	[dBuV]	[dB/m]	[dB]	[dB]		[dBuV/m]	[dBuV/m]	[dB]	[cm]	[deg.]		
Hori. 1653.000 Hori. 2483.500		46.2 56.2	25.5 27.5	13.4 14.3	40.9 41.1		44.2 56.9	73.9 73.9	29.7 17.0	100 100	184 105		
Hori. 4960.000		62.8	31.4	6.9	40.8		60.3	73.9	13.6	100			
Hori. 1653.00		33.9	25.5	13.4	40.9		31.9	53.9	22.0	100			
Vert. 1653.000		48.2	25.5	13.4	40.9		46.2	73.9	27.7	100			
Vert. 2483.500 Vert. 4960.000		57.2 54.1	27.5 31.4	14.3 6.9	41.1 40.8		57.9 51.6	73.9 73.9	16.0 22.3	100 100			
Vert. 1653.000		33.0	25.5	13.4	40.8		31.0	73.9 53.9	22.3	100			
			age, QP: Quas									•	-
Polarity Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell time factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark			
Hori. 2483.50	AV	48.0	27.5	14.3	41.1	-24.7	24.0	53.9		(AV)VBV	/:10Hz	1	
Hori. 4960.000		48.9	31.4	6.9	40.8	-24.7	21.7	53.9		(AV)VBV			
Vert. 2483.500 Vert. 4960.000		47.5 39.6	27.5 31.4	14.3 6.9	41.1 40.8	-24.7 -24.7	23.5 12.4	53.9 53.9		(AV)VBV (AV)VBV			
Result = Reading + Ant F *Other frequency noises *No noise was detected a Distance factor :	omitted in thi bove the 3th	s report were	not seen or h ucs.		nargin (more	than 20dB).	(Amprifier) +	Dwell time f	àctor (refer t	o "Dwell t	ime factor	r Calculation")	

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8.3. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

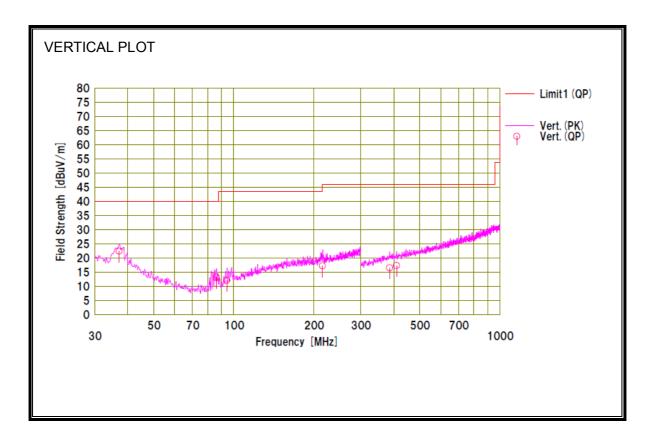


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SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



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HORIZONTAL AND VERTICAL DATA	
DATA OF RADIATED EMISSION TEST UL JapanJnc. Shonan EMC Lab. No.3 Semi-Anechoic Chamber Date : 2012/07/12	
Company : SEIKO EPSON Corporation Mode : Tx DH5 2402MHz Kind of EUT : Blutooth Interface board Module Report No. : 32LE0152-SH Model No. : M219A Power : DC3.3V Serial No. : 1 Temp./Humi. : 23deg.C. / 63%RH Remarks : HorX. VerX-axis : : : :	
Limit1 : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK Engineer : Takahiro Suzuki	
<< OP DATA >>	
Image Option Option </td <td></td>	
Calculation:Result [dBuV/m] =Reading [dBuV] +Ant.Fac [dB/m] +Loss (Cable+ATT) [dB] -Gain (AMP) [dB] Ant.Type=BC-Biconical Antenna. LP-Logperiodic Antenna. SHA03:Horn Antenna	

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9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

Frequency of Emission (MHz)	Conducted I	.imit (dBuV)
	Quasi-peak	Average
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.

TEST PROCEDURE

ANSI C63.4

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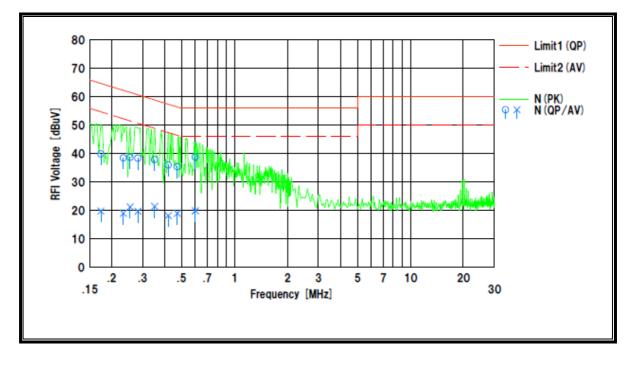
RESULTS

Com	pany		SEIKO EI	DEON C	ormore	ion		Mo				: Shonan EMC Lab. No.3 Shielded Roc Date : 2012/07/1
Kind Mod Seri	of EUT el No. al No. arks		Blutooth W219A 1	Interfac	boar	d Modu	le	Rep	wer mp./Hu	mi.	: 32 : DC : 22	DH5 2441MHz LE0152-SH-A 333V deg.C. / 57%RH
	11 : FCC 2 : FCC		207)	OP AV				En	gineer		= Ta	kahiro Suzuki
No. 1 2 3 4 5 6 7 8	Freq. [MHz] 0.17397 0.23366 0.25514 0.28267 0.35173 0.42019 0.47380 0.59985	Rea <0P> [dBuV] 272 258 260 257 252 233 227 261	[dBuV]7.16.38.67.08.75.56.37.2	CFac [d8] 127 127 127 127 127 127 127 127 127	(dbuV) 39.9 38.5 38.7 38.4 37.9 36.0 35.4	dfs <av> [dBuV] 198 190 213 197 214 182 190 199</av>	LI <0P> [dBuV] 64.7 62.3 61.5 60.7 58.9 57.4 56.4 56.0	tt <av> [dBuV] 547 523 515 507 489 47.4 46.4 46.0</av>	Ma <0P> [dB] 248 238 228 223 210 214 210 172	(dB) (dB) 34.9 33.3 30.2 31.0 27.5 29.2 27.4 26.1		Comment
8 9 10 11 12 13 14 15 16	0.17397 0.23366 0.25267 0.35173 0.42019 0.47380 0.59985	260 254 259 269 252 237 227	6.7 7.1 5.4 6.1 7.5 8.0 7.6 5.1	127 127 127 127 127 127 127 127	387 381 385 387 385 385 385 370	184 188 181 188 202 207 203 179	647 623 615 607 589 564 564 560	547 523 515 507 489 474 464 460	260 242 229 2203 195 200 205	35.3 32.5 33.4 31.9 28.7 26.7 26.1 28.2		
											F L L L L L	

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LINE 1 RESULTS

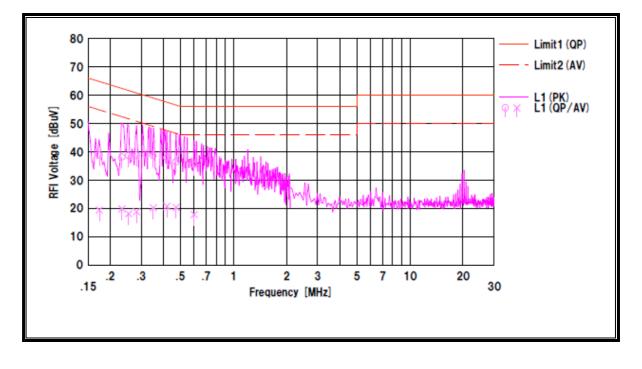


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LINE 2 RESULTS



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