LTA
Laboratory for Test & Approval Co.,Ltd.

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SENA

Dates of Tests: December 21 ~ 29, 2008
Test Report S/N: LR500190901A
Test Site : LTA CO., LTD.

CERTIFICATION OF COMPLIANCE

FCC ID. **S7APARANIUD100**

APPLICANT **Sena Technologies, Inc.**

Equipment Class	**:**	**Part 15 Spread Spectrum Transmitter (DSS)**
Manufacturing Description	**:**	**Bluetooth USB Adaptor**
Manufacturer	**:**	**Sena Technologies, Inc.**
Model name	**:**	**Parani-UD100**
Test Device Serial No.:	**:**	**Identical prototype**
Rule Part(s)	**:**	**FCC Part 15.247 Subpart C; ANSI C-63.4-2003**
Frequency Range	**:**	**2402 ~ 2480MHz**
RF power	**:**	**14.40 dBm - Conducted**
Data of issue	**:**	**January 05, 2009**

This test report is issued under the authority of:

Dong –Min JUNG, Technical Manager

The test was supervised by:

Kyung-Taek LEE, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. This report must not be used by the applicant to claim product endorsement by any agency.

NVLAP

NVLAP LAB Code.: 200723-0

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1. General information's

1-1 Test Performed

Company name	:	LTA Co., Ltd.
Address	:	243, Jubug-ri,Yangji-Myeon,Youngin-Si, Kyunggi-Do, Korea. 449-822
Web site	:	http://www.ltalab.com
E-mail	:	chahn@ltalab.com
Telephone	:	+82-31-323-6008
Facsimile		+82-31-323-6010

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competents of calibration and testing laboratory".

1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
NVLAP	U.S.A	200723-0	2009-09-30	ECT accredited Lab.
RRL	KOREA	KR0049	2009-06-20	EMC accredited Lab.
FCC	U.S.A	610755	2011-04-22	FCC filing
VCCI	JAPAN	R2133, C2307	2011-06-21	VCCI registration
IC	CANADA	IC5799	2010-05-03	IC filing

2. Information's about test item

2-1 Applicant & Manufacturer

Company name	:	Sena Technologies, Inc.
Address	:	210 Yangjae-dong Seocho-gu Seoul 137-130 Korea
Tel / Fax	:	+82-2-571-8283/ +82-2-573-7710

2-2 Equipment Under Test (EUT)

Trade name	:	Bluetooth USB Adaptor
FCC ID	:	S7APARANIUD100
Model name	:	Parani-UD100
Serial number	:	Identical prototype
Date of receipt	:	December 15, 2008
EUT condition	:	Pre-production, not damaged
Antenna type	:	External antenna (M/N: R-AN2400-1901RS) Max Gain 5.37 dBi External antenna (M/N: R-AN2400-5801RS) Max Gain 3.17 dBi External antenna (M/N: AN2400-3306RS) Max Gain 1.40 dBi
Frequency Range	:	2402 ~ 2480MHz
RF output power	:	Maximum 14.40 dBm
Number of channels	:	79
Channel spacing	:	1MHz
Channel Access Protocol	:	Frequency Hopping Spread Spectrum (FHSS)
Type of Modulation	:	Basic Mode(GFSK), EDR Mode(Pi/4 DQPSK, 8DPSK)
Power Source	:	5 Vdc from PC

2-3 Tested frequency

	LOW	MID	HIGH
Frequency (MHz)	2402	2441	2480

2-4 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
PC	dx7400 microtower	CNG8330J9S	HP
MONITOR	HSTND-2311-A	CNC816QHF2	HP
KEYBOARD	SK-8115	68A-04Q6	DELL
MOUSE	MO56UO	F0J00NOL	DELL
PRINTER	STYLUS C65	FXSY002205	EPSON

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status (note 1)
15.247(a)	Carrier Frequency Separation	> 25 kHz	Conducted	C
15.247(a)	Number of Hopping Frequencies	> 15 hops		C
15.247(a)	20 dB Bandwidth 99% Bandwidth	> 1.5 MHz		C
15.247	Dwell Time	< 0.4 seconds		C
15.247(b)	Transmitter Output Power	< 250 mWatt		C
15.247(d)	Conducted Spurious emission	> 20 dBc		C
15.247(d)	Band Edge	> 20 dBc		C
15.249 / 15.209	Field Strength of Harmonics	< 54 dBuV (at 3m)	Radiated	C
15.109	Field Strength	-		C
15.207 /15.107	AC Conducted Emissions	EN 55022	Line Conducted	C
15.203	Antenna requirement	-	-	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

The sample was tested according to the following specification:

FCC Parts 15.247; ANSI C-63.4-2003

→ Antenna Requirement

The Sena Technologies, Inc. Parani-UD100 unit complies with the requirement of §15.203.

The antenna connector is the reverse polarity SMA connector.

3.2 Transmitter requirements

3.2.1 Carrier Frequency Separation

Procedure:

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

The spectrum analyzer is set to:

Span = 3 MHz (wide enough to capture the peaks of two adjacent channels)

RBW = 10 kHz (1% of the span or more) Sweep = auto

VBW = 10 kHz Detector function = peak

Trace = max hold

Measurement Data:

Test Results	
Carrier Frequency Separation (MHz)	**Result**
1.005	Complies

- See next pages for actual measured spectrum plots.

Minimum Standard:

The EUT shall have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of 20dB bandwidth of the hopping channel, whichever is greater.

Measurement Setup

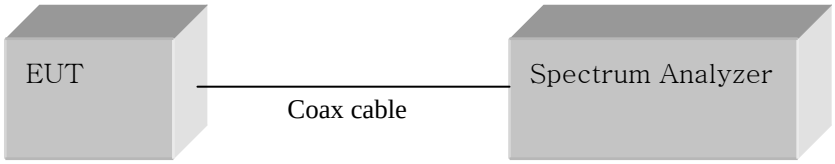
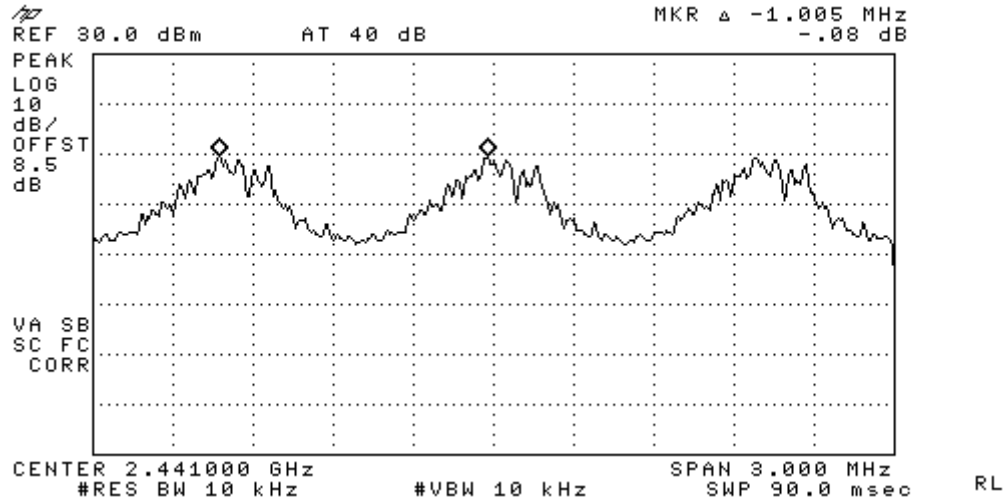


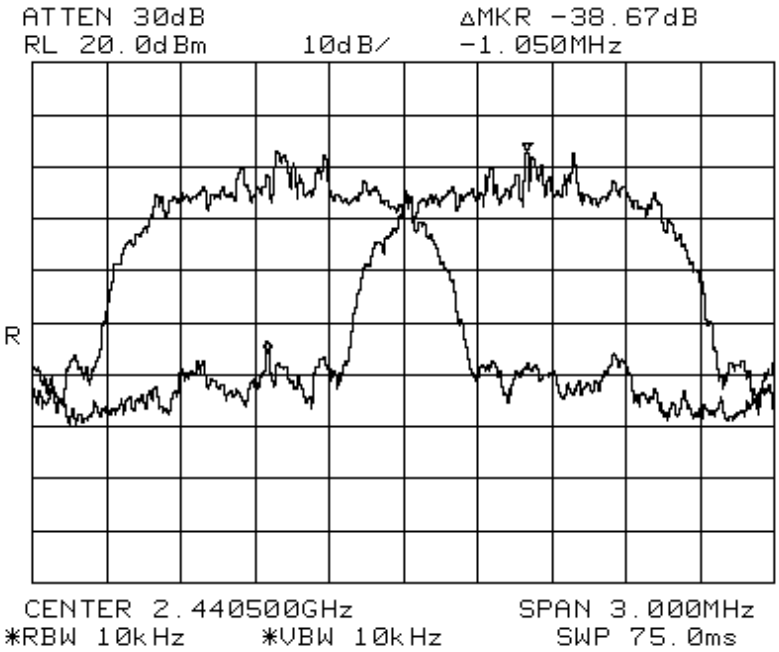
Figure 1: Measurement setup for the carrier frequency separation

Carrier Frequency Separation

Basic Mode



EDR Mode



3.2.2 Number of Hopping Frequencies

Procedure:

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

To get higher resolution, four frequency ranges within the 2400 ~ 2483.5 MHz FH band were examined.

The spectrum analyzer is set to:

Frequency range 1: Start = 2400.0MHz, Stop = 2441.5 MHz

2: Start = 2441.5MHz, Stop = 2483.5 MHz

RBW = 100 kHz (1% of the span or more) Sweep = auto

VBW = 100 kHz (VBW ≥ RBW) Detector function = peak

Trace = max hold Span > 40MHz

Measurement Data: Complies

Total number of Hopping Channels	79

- See next pages for actual measured spectrum plots.

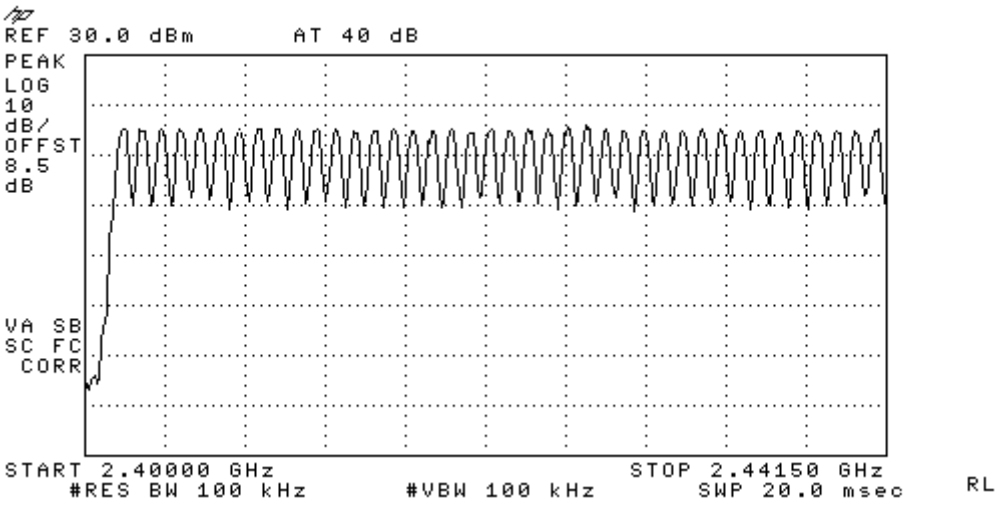
Minimum Standard:

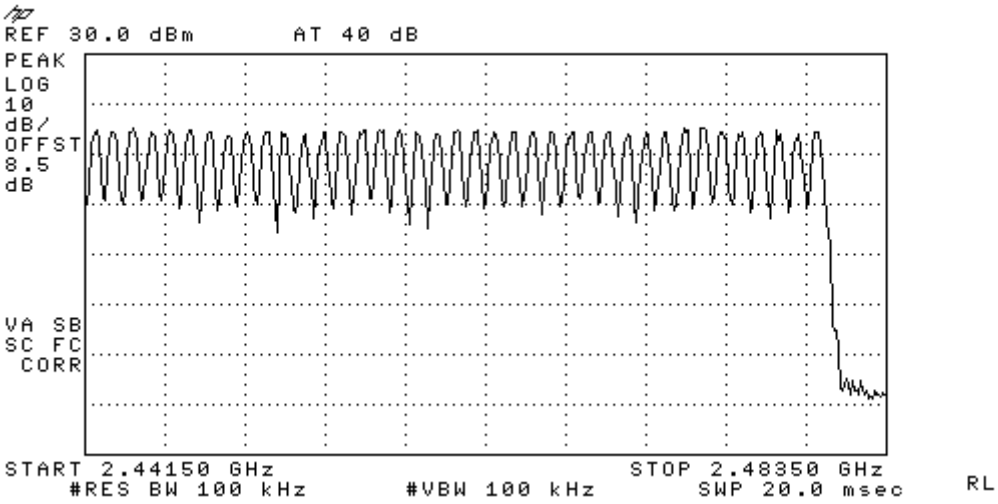
At least 15 hopes

Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

Number of Hopping Frequencies





3.2.3 20 dB Bandwidth

Procedure:

The bandwidth at 20 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 3 MHz (approximately 2 or 3 times of the 20 dB bandwidth)

RBW = 30 kHz

VBW = 30 kHz (VBW ≥ RBW)

Trace = max hold

Sweep = auto

Detector function = peak

dB/Div = 5dB

Measurement Data: Basic Mode

Frequency (MHz)	Channel No.	Test Results(MHz)	
		20dB Bandwidth	99% Bandwidth
2402	0	0.938	0.908
2441	39	0.945	0.900
2480	78	0.930	0.915

Measurement Data: EDR Mode

Frequency (MHz)	Channel No.	Test Results(MHz)	
		20dB Bandwidth	99% Bandwidth
2402	0	1.298	1.165
2441	39	1.283	1.165
2480	78	1.283	1.165

- See next pages for actual measured spectrum plots.

Minimum Standard:

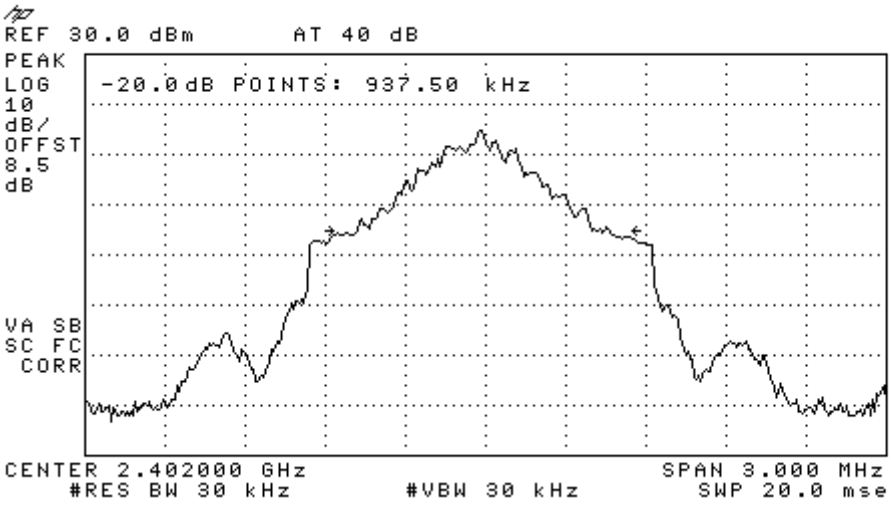
The EUT shall have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of 20dB bandwidth of the hopping channel, whichever is greater. Therefor, limit of 20dB bandwidth is 1.5MHz.

Measurement Setup

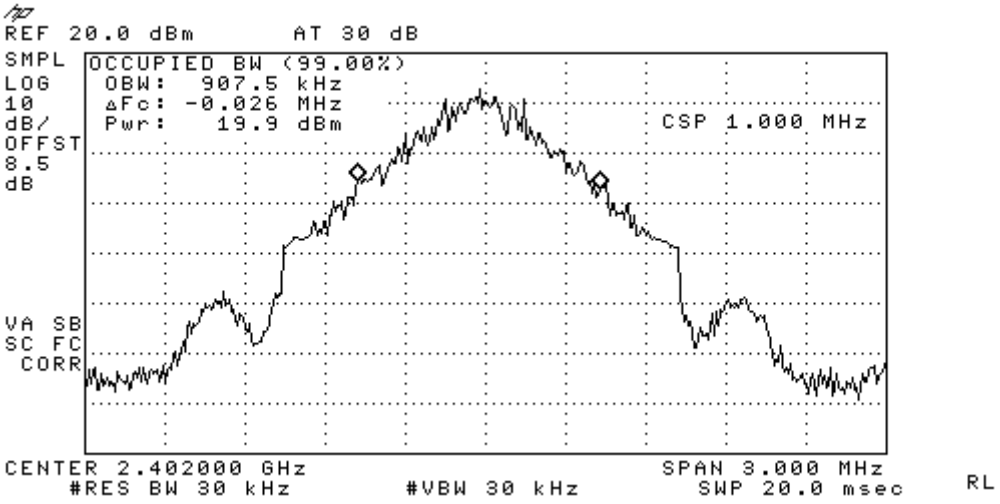
Same as the Chapter 3.2.1 (Figure 1)

Channel 1 of basic mode

20 dB Bandwidth

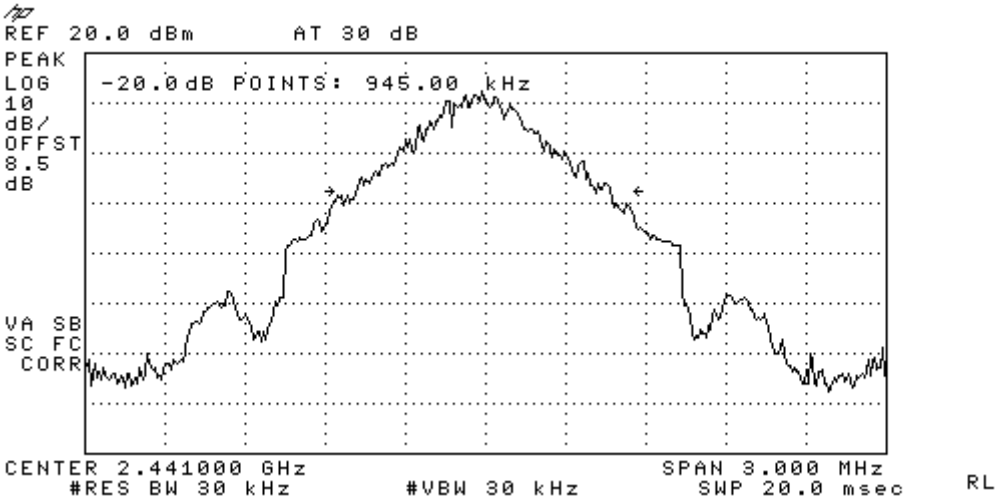


99% Bandwidth

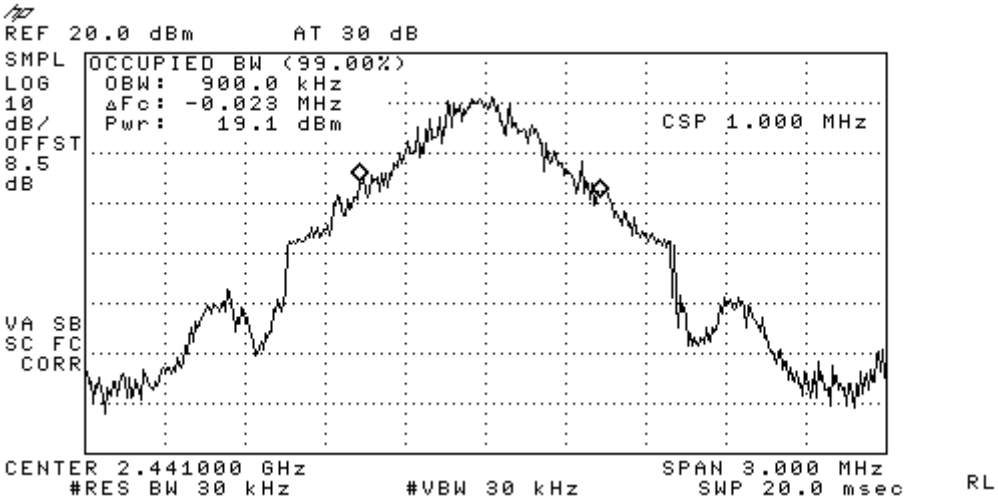


Channel 2 of basic mode

20 dB Bandwidth

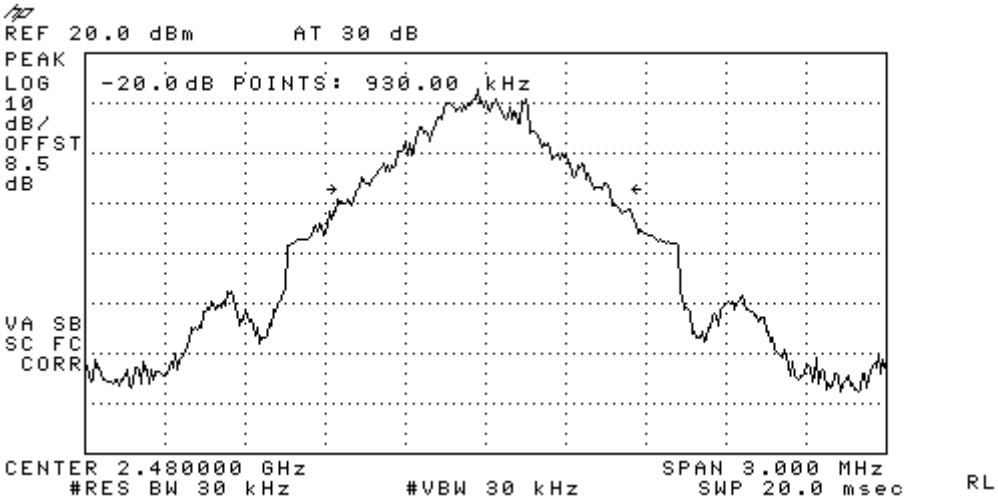


99% Bandwidth

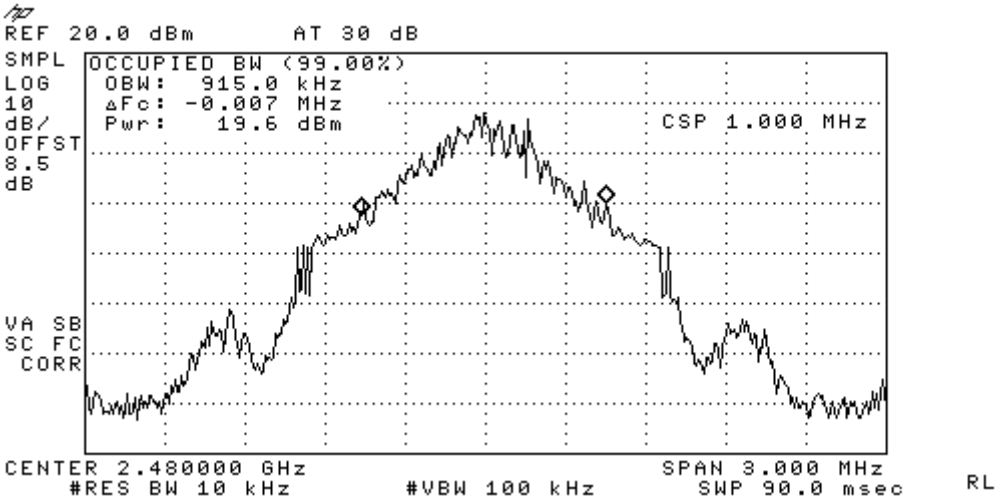


Channel 3 of basic mode

20 dB Bandwidth

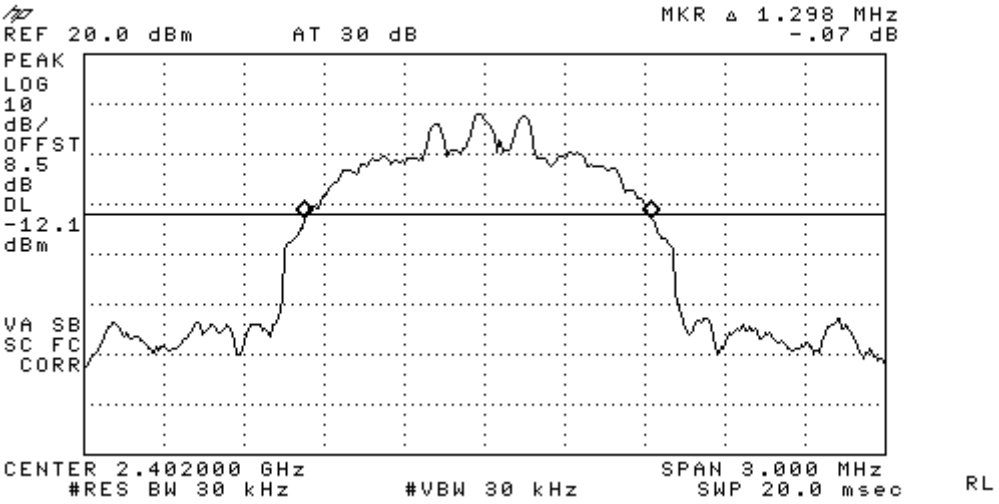


99% Bandwidth

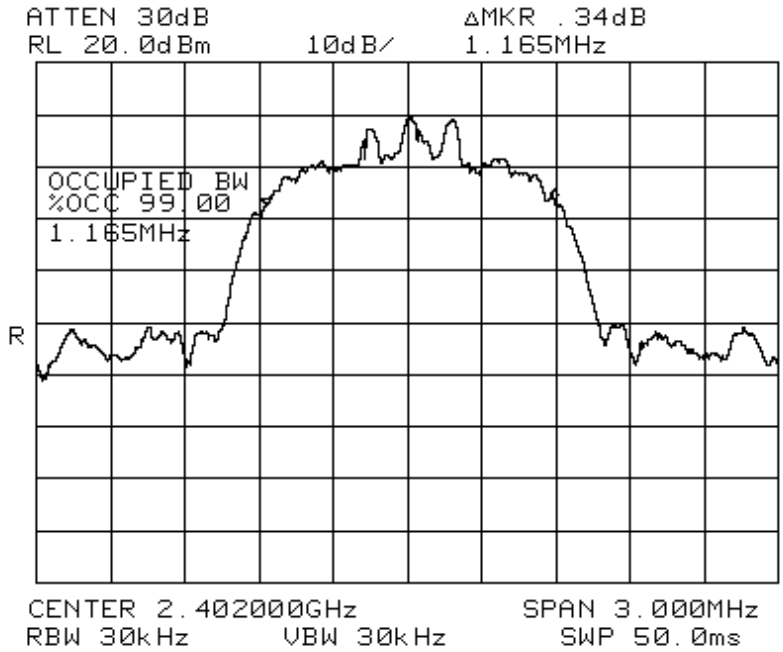


Channel 1 at EDR mode

20 dB Bandwidth

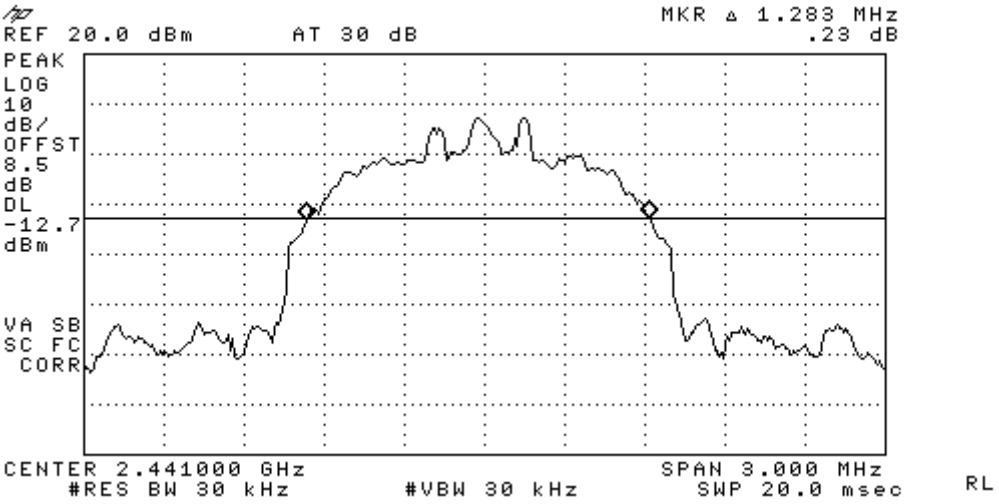


99% Bandwidth

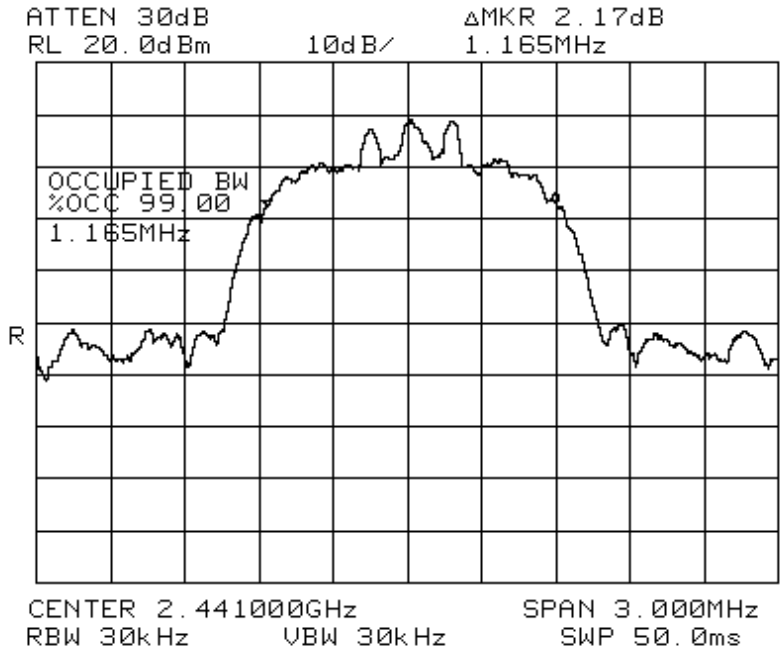


Channel 2 at EDR mode

20 dB Bandwidth

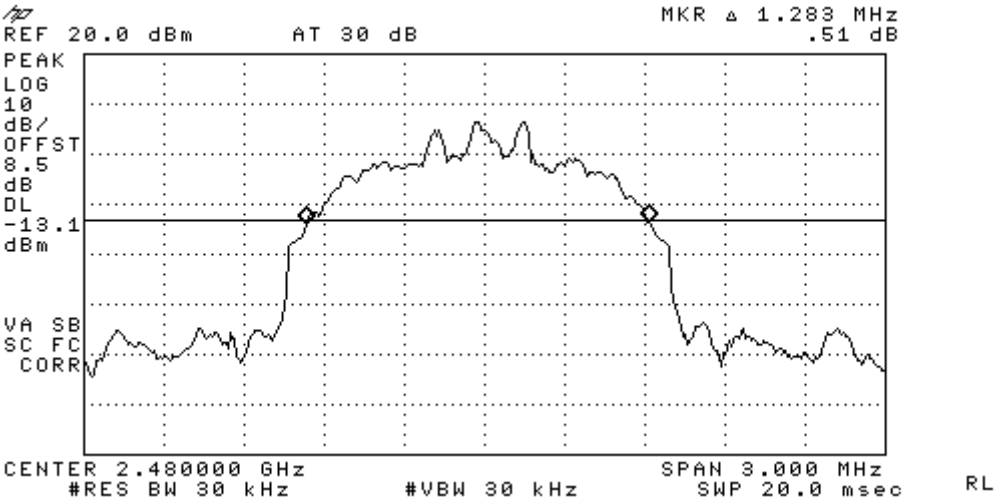


99% Bandwidth

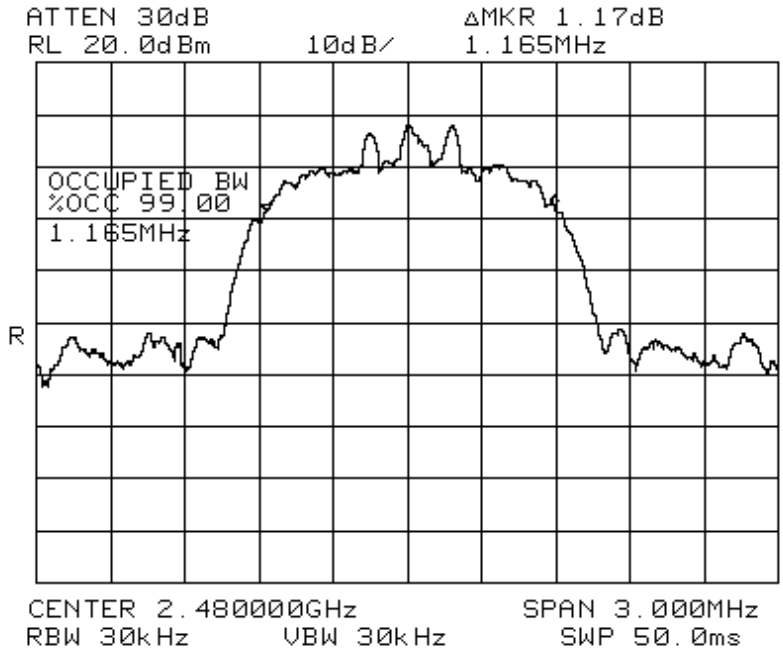


Channel 3 at EDR mode

20 dB Bandwidth



99% Bandwidth



3.2.4 Time of Occupancy (Dwell Time)

Procedure:

The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to:

Center frequency = 2441 MHz — Span = zero

RBW = 1 MHz — VBW = 1 MHz (VBW ≥ RBW)

Trace = max hold — Detector function = peak

Measurement Data:

Channel Number	Channel Frequency (MHz)	Packet Type	Test Results		
			Duration Time (ms)	Dwell Time (ms)	Result
39	2441	Basic DH 1	0.415	132.85	Complies
		Basic DH 3	1.665	268.33	Complies
		Basic DH 5	2.925	311.48	Complies
		EDR 3Mbps DH5	2.933	312.37	Complies

- See next pages for actual measured spectrum plots.
- dwell time = {(number of hopping per second / number of slot) x duration time per channel} x 0.4 ms

Minimum Standard:

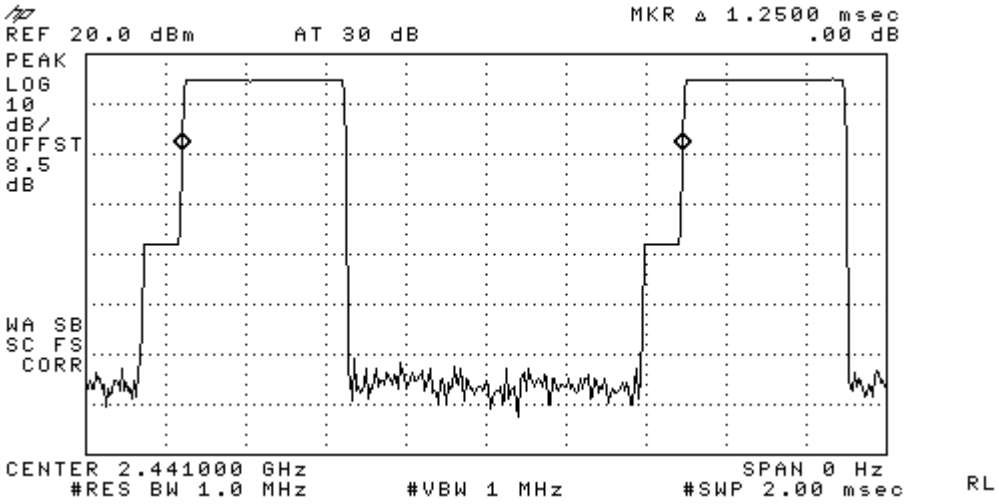
0.4 seconds within a 30 second period per any frequency

Measurement Setup

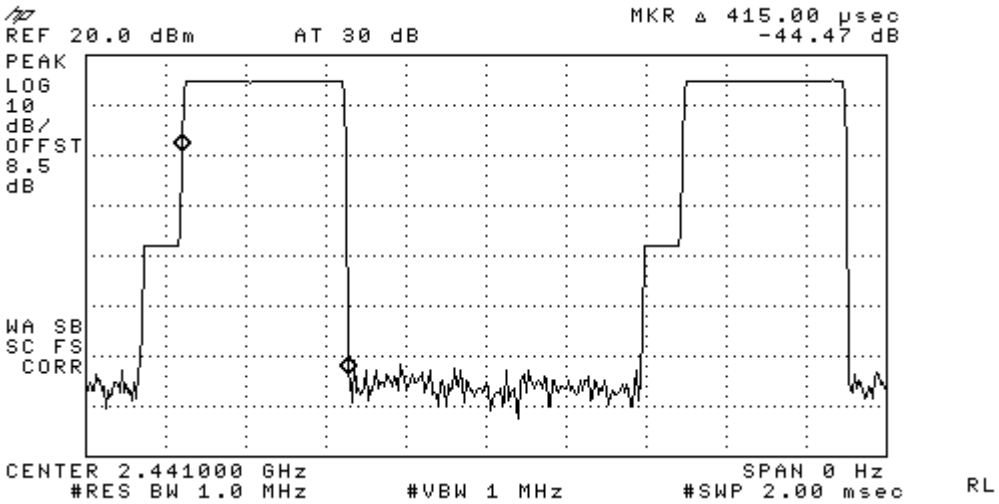
Same as the Chapter 3.2.1 (Figure 1)

DH1 at basic mode

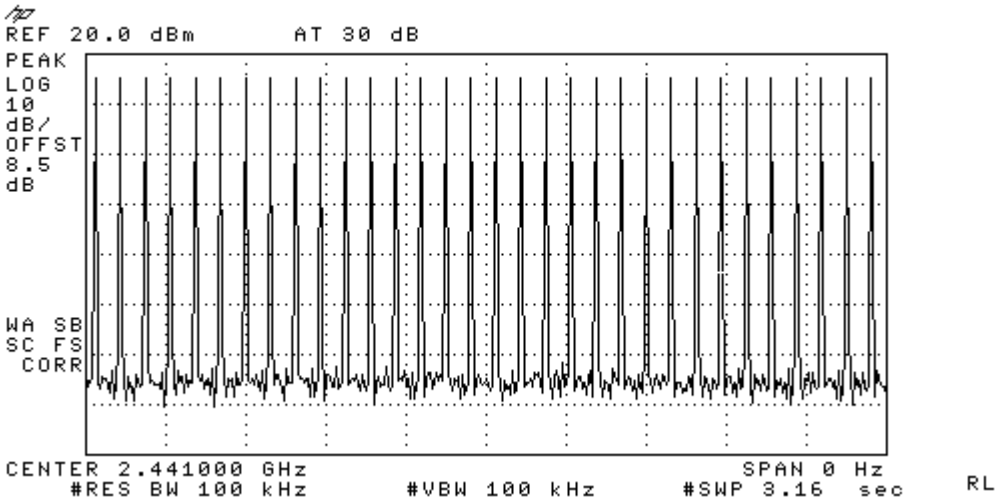
Period



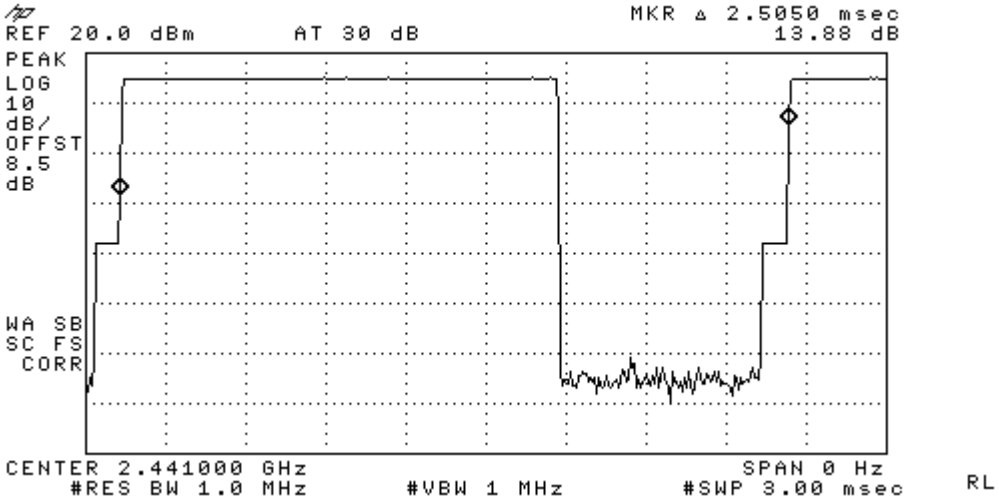
Dwell time



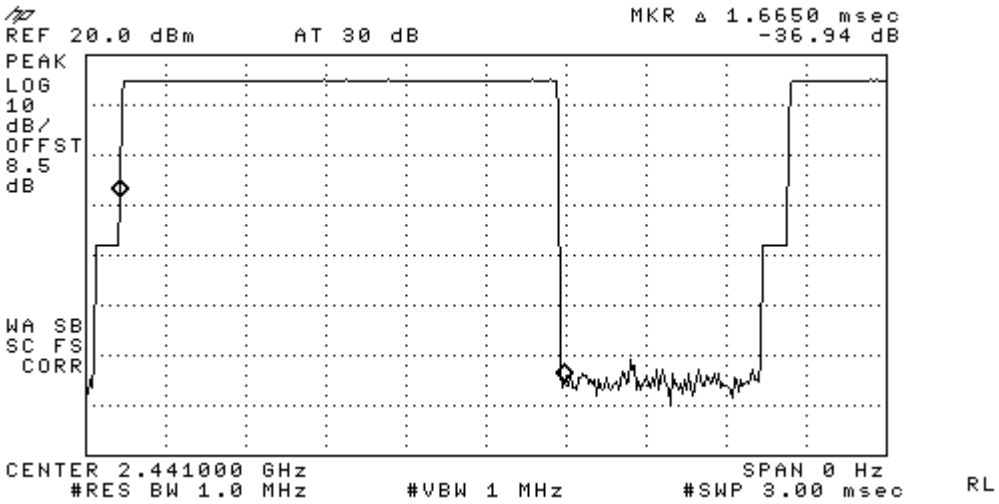
Number of hopping channel within 3.16 second



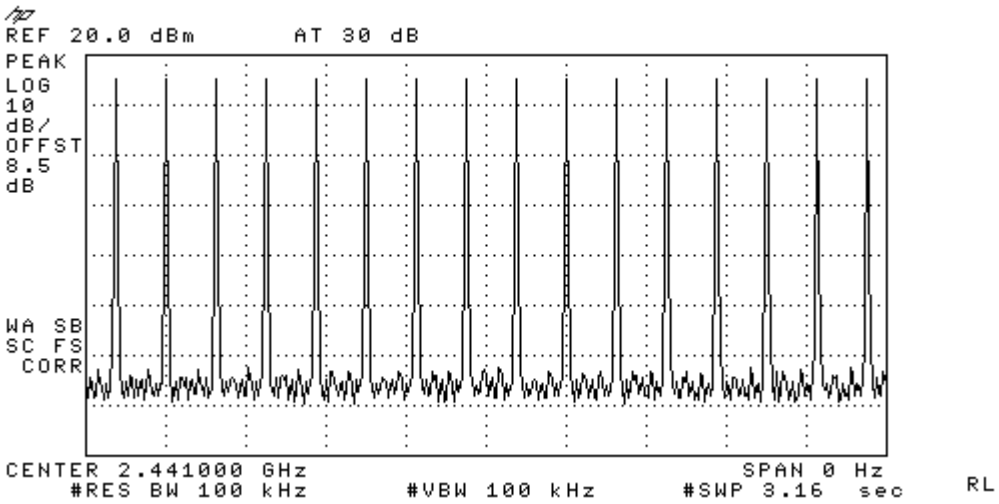
DH3 at basic mode
Period



Dwell time

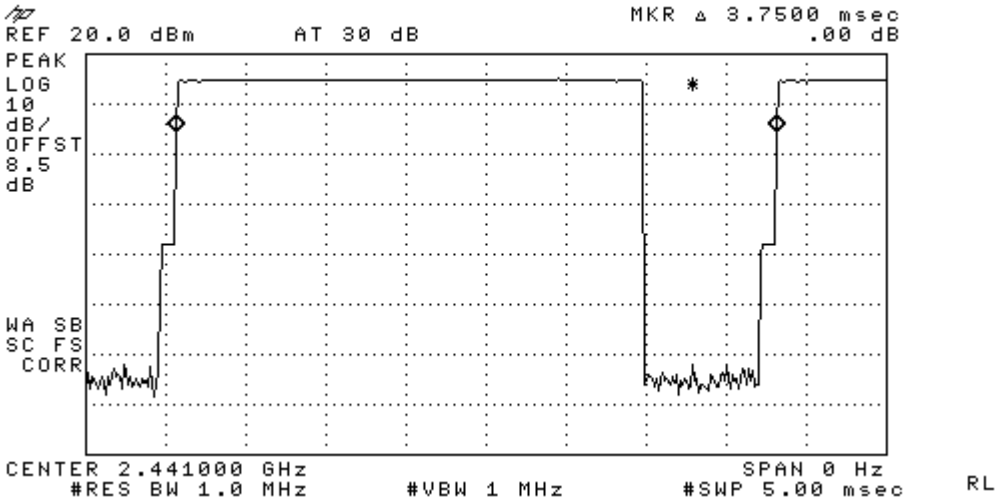


Number of hopping channel within 3.16 second

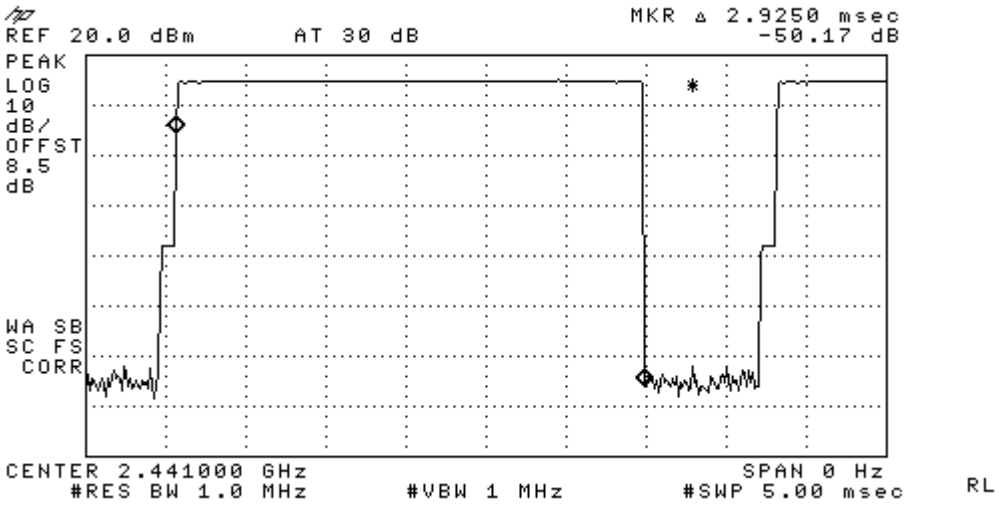


DH5 at basic mode

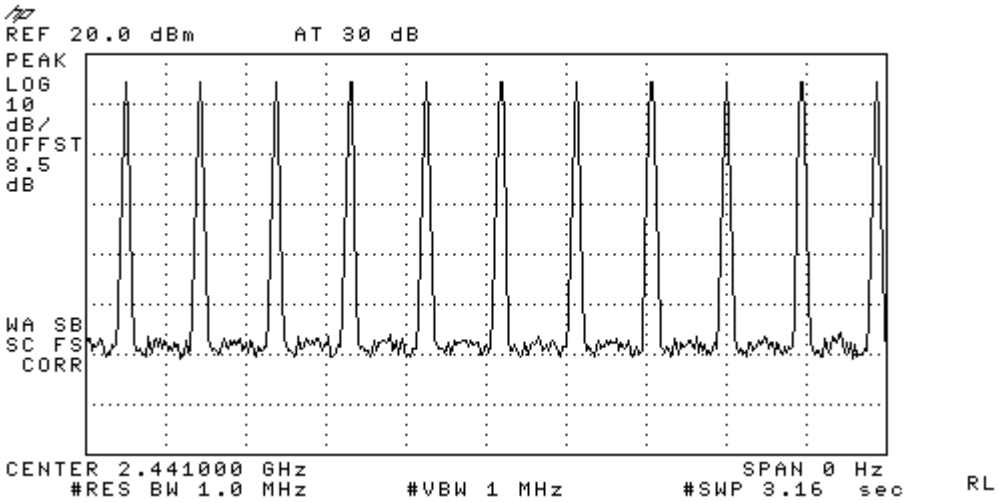
Period



Dwell time

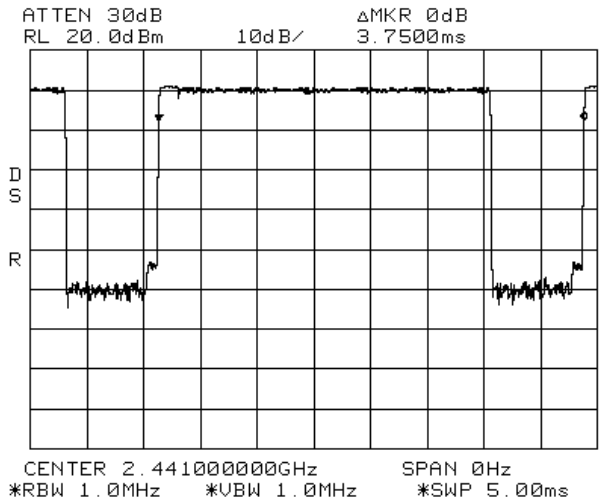


Number of hopping channel within 3.16 second

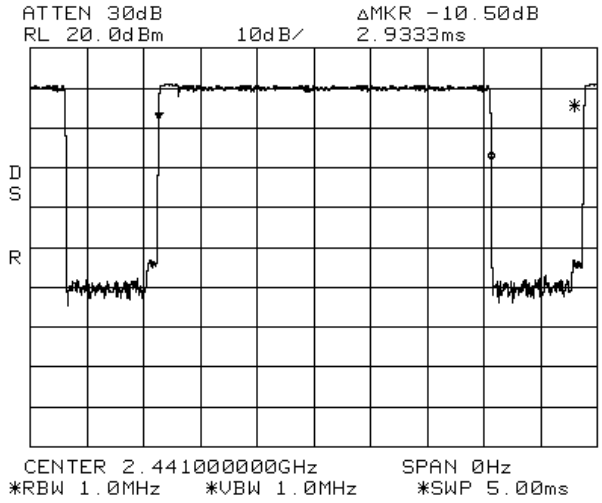


DH5 at EDR mode with 3Mbps

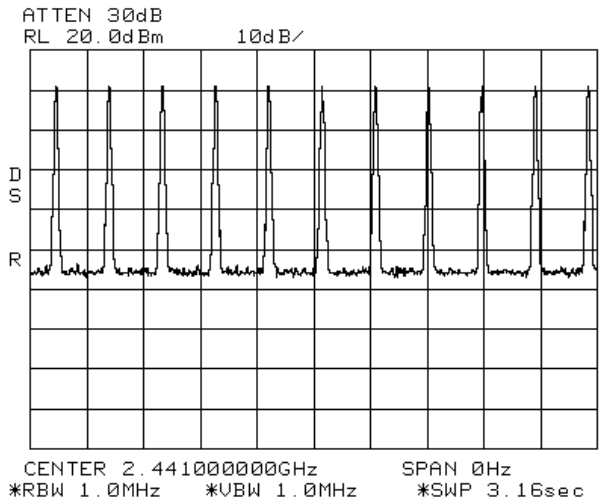
Period



Dwell time



Number of hopping channel within 3.16 second



3.2.5 Transmitter Output Power

Procedure:

The peak output power was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 20 MHz (approximately 5 times of the 20 dB bandwidth)

RBW = 3 MHz (greater than the 20dB bandwidth of the emission being measured)

VBW = 3 MHz (VBW ≥ RBW) Detector function = peak

Trace = max hold Sweep = auto

Measurement Data: Basic Mode

Frequency (MHz)	Ch.	Test Results		
		dBm	mW	Result
2402	0	**14.40**	**27.54**	Complies
2441	39	**14.03**	**25.29**	Complies
2480	78	**13.44**	**22.08**	Complies

Measurement Data: EDR Mode

Frequency (MHz)	Ch.	Test Results		
		dBm	mW	Result
2402	0	**6.93**	**4.93**	Complies
2441	39	**6.73**	**4.71**	Complies
2480	78	**5.99**	**3.97**	Complies

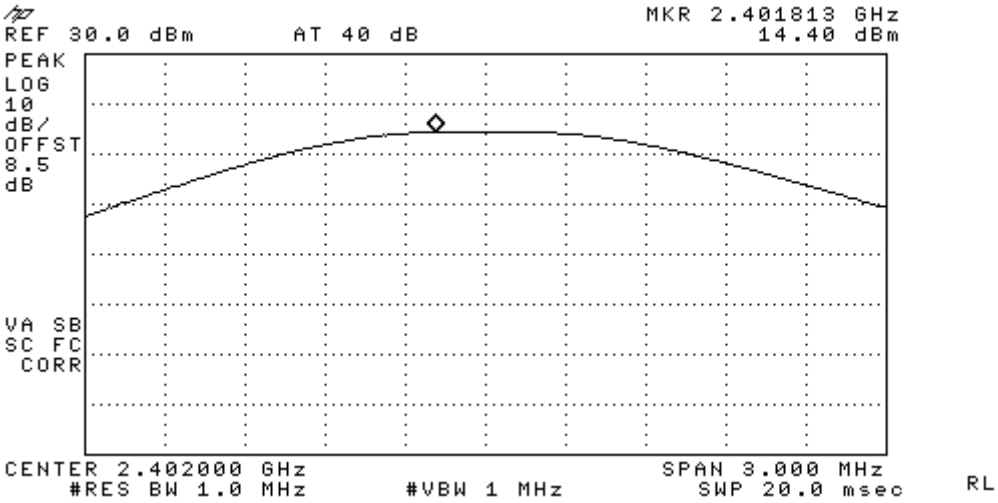
- See next pages for actual measured spectrum plots.

Minimum Standard:	< 250 mW

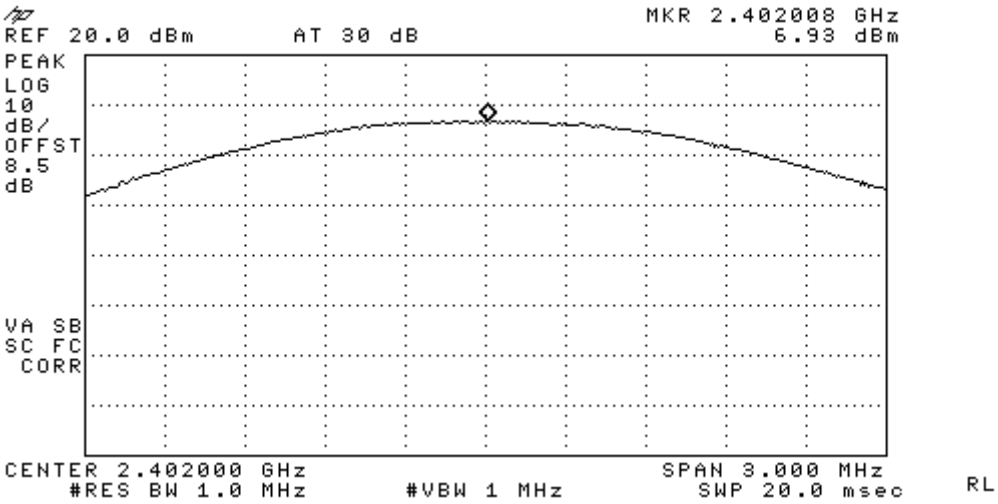
Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

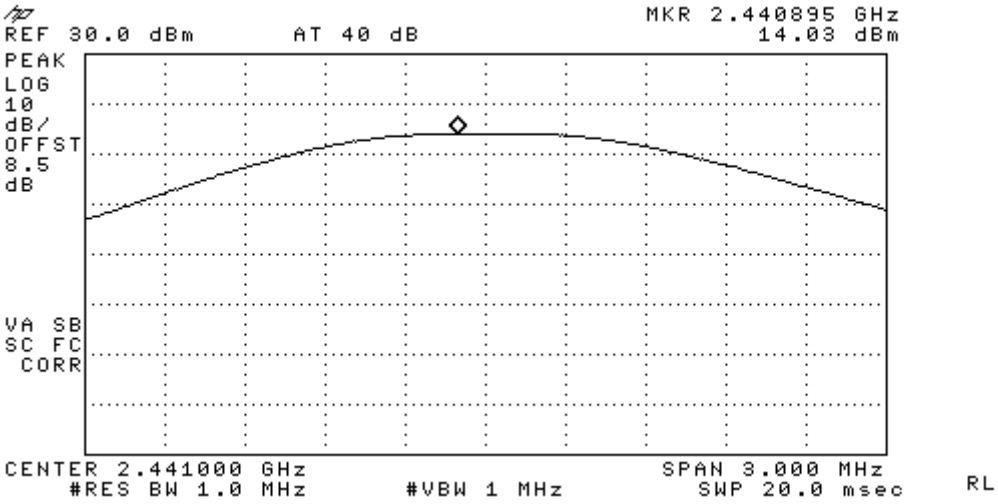
Channel 1
Basic mode



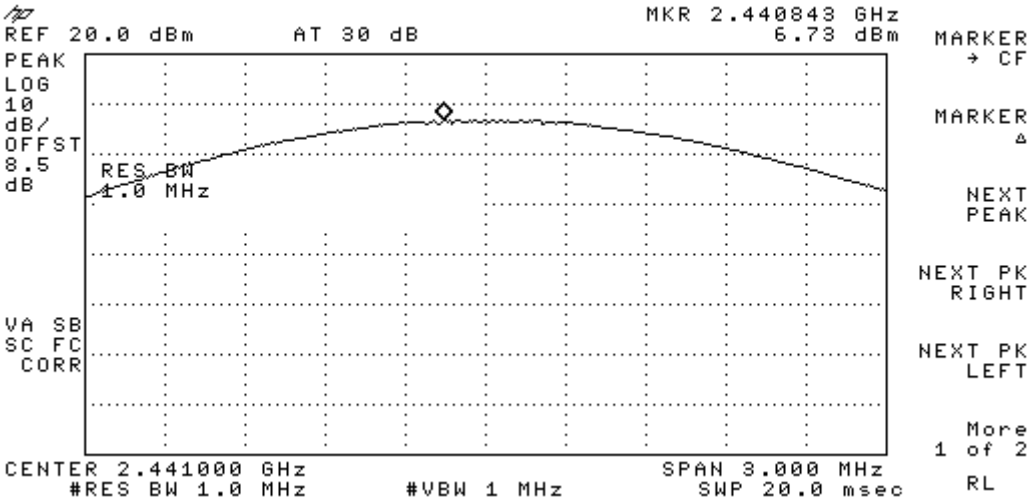
EDR mode



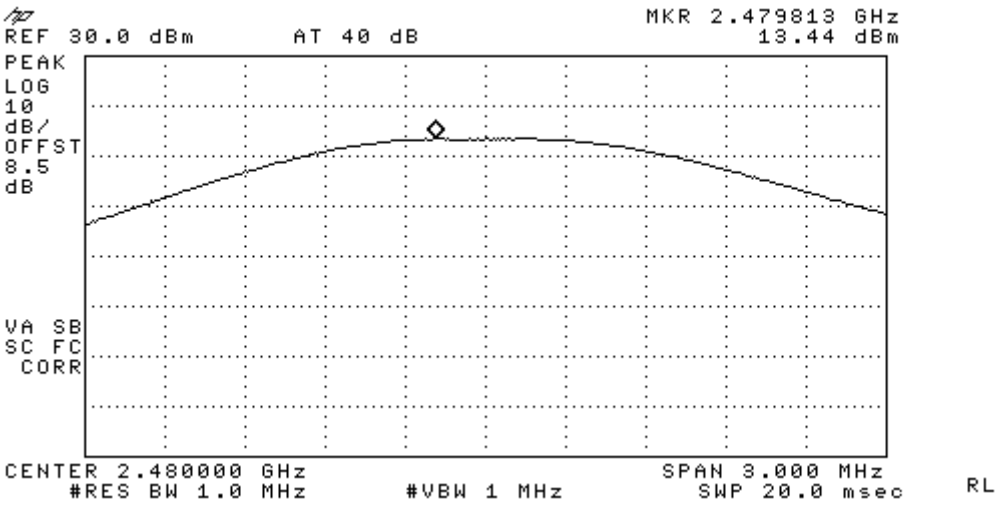
Channel 2
Basic mode



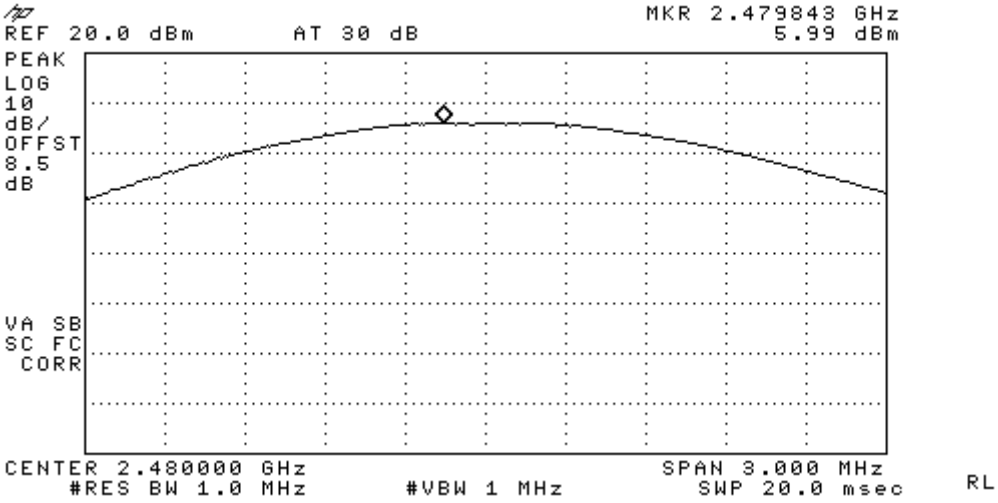
EDR mode



Channel 3
Basic mode



EDR mode



3.2.6 Band Edge

Procedure:

The bandwidth at 20dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz	VBW = 100 kHz
Span = 10 MHz	Detector function = peak
Trace = max hold	Sweep = auto

Measurement Data: Complies

- All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

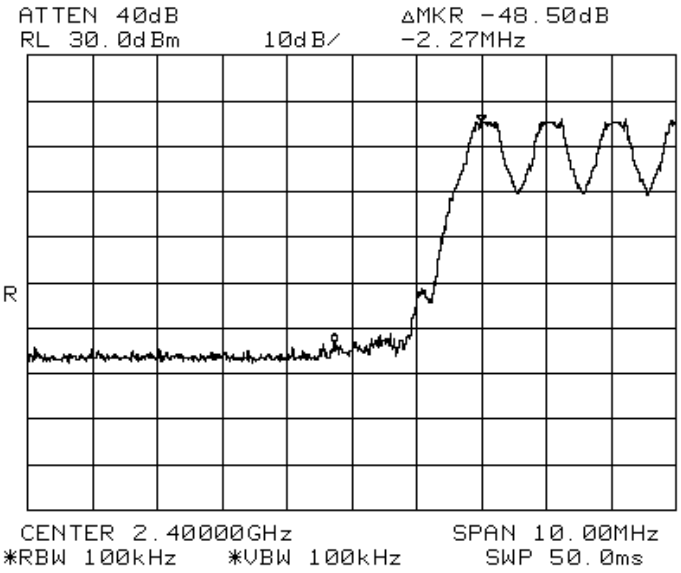
Minimum Standard:	> 20 dBc

Measurement Setup

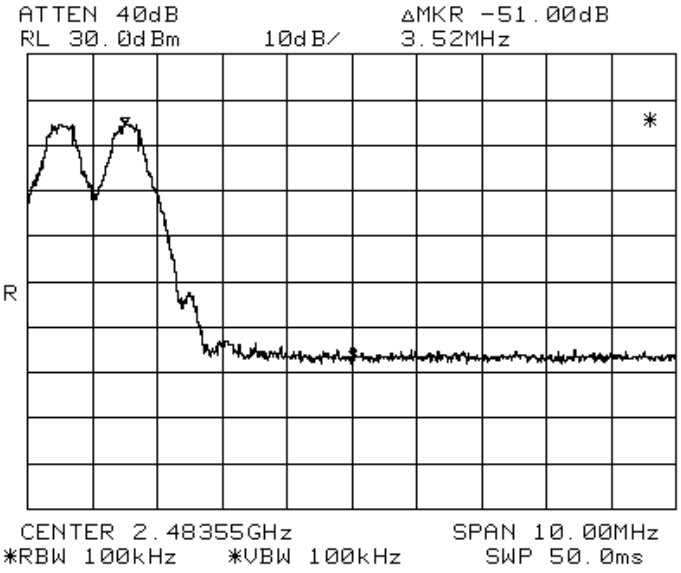
Same as the Chapter 3.2.1 (Figure 1)

Band – edge of Basic Mode

Lower edge



Upper edge



Band-edges in the restricted band 2483.5 ~ 2500 MHz measurement

- **Document DA 00-705 Marker Delta Method**

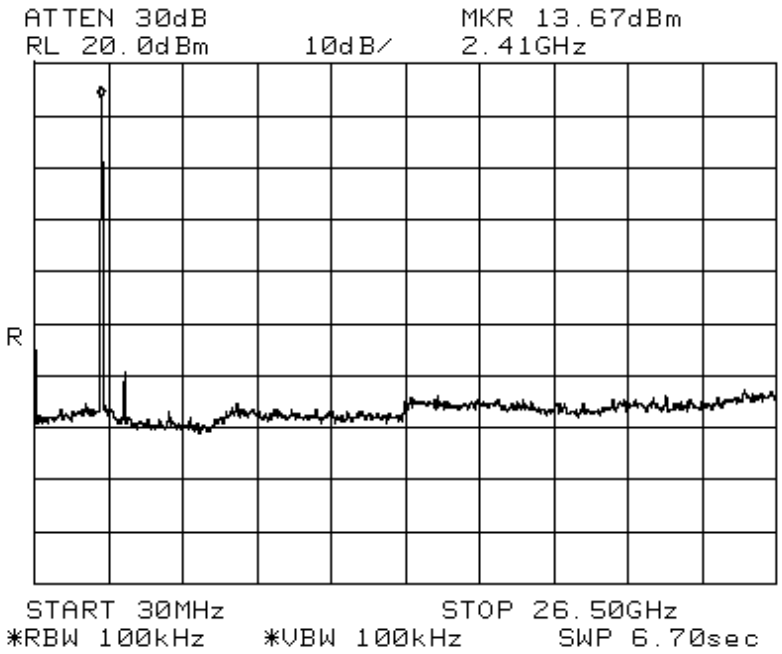
Frequency (MHz)	Detect mode	Pol.	Reading (dBuV/m)	T.F (dB)	Step 1 Data	delta	Step 3 Data	Limit
2483.5	PK	V	111.8	1.1	112.9	51.0	61.9	74
	AV	V	101.3	1.1	102.4	51.0	51.4	54

Note) Step 1 = Reading + T.F **T.F = Ant.F + Cable loss – PreAmp Gain**

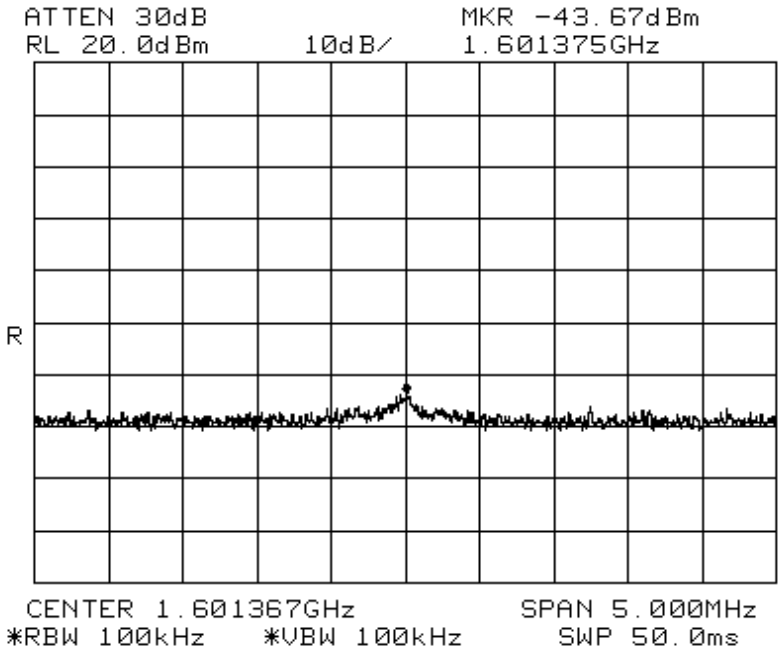
Step 3 = Step 1 – Delta Value

Unwanted Emission – Low channel

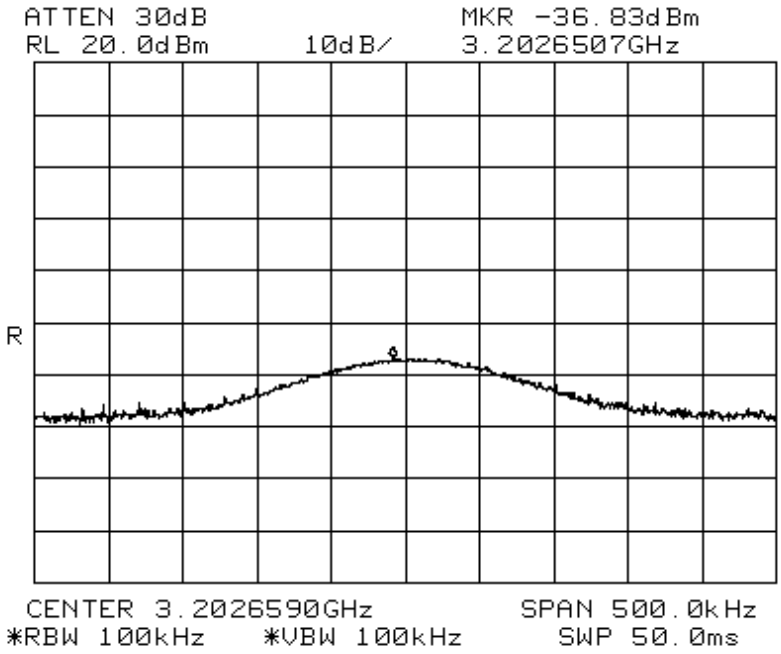
Frequency Range = 30 MHz ~ 26.5 GHz



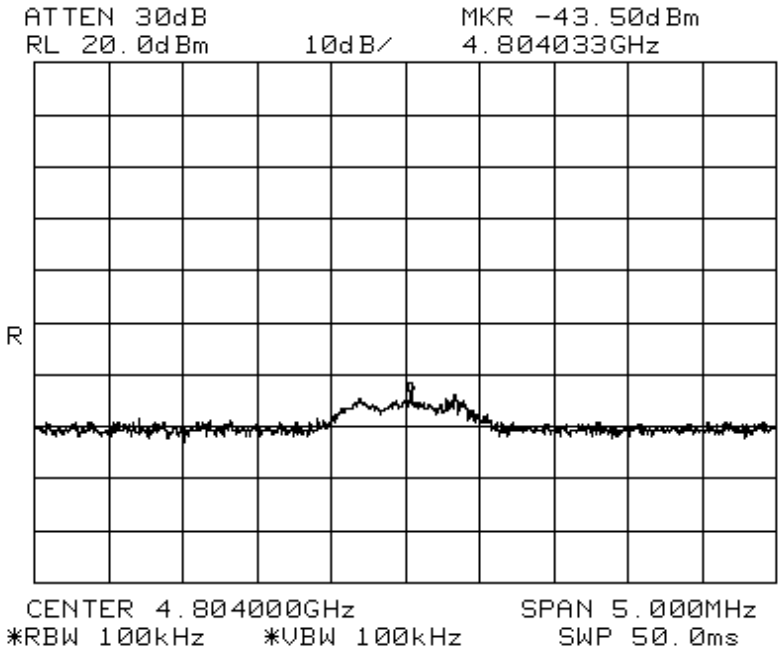
-43.67 dBm at 1.602 GHz



-36.83 dBm at 3.203 GHz

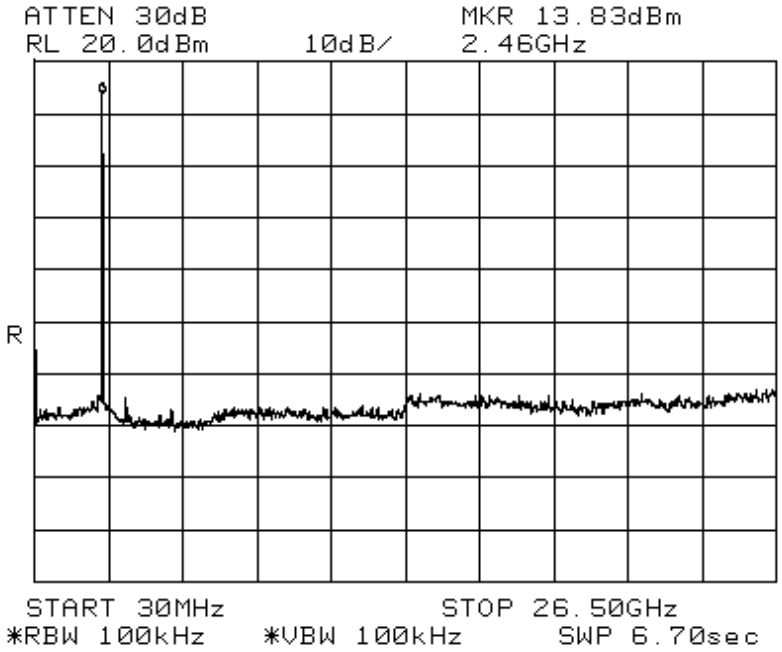


-43.50 dBm at 4.804 GHz

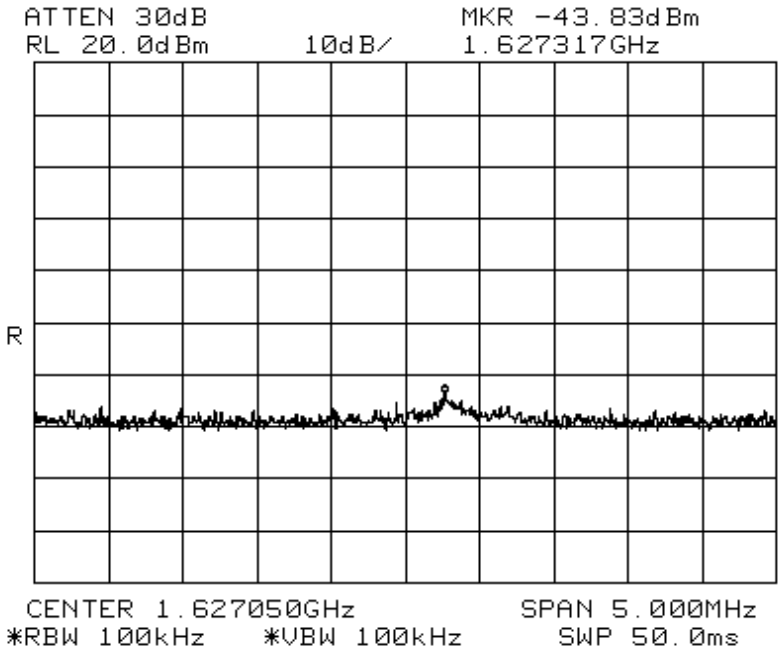


Unwanted Emission – Middle channel

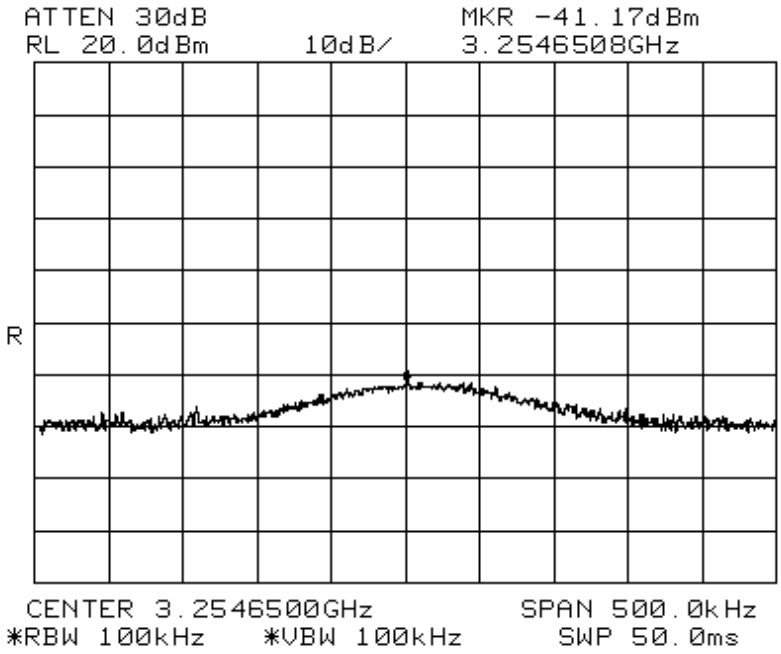
Frequency Range = 30 MHz ~ 26.5 GHz



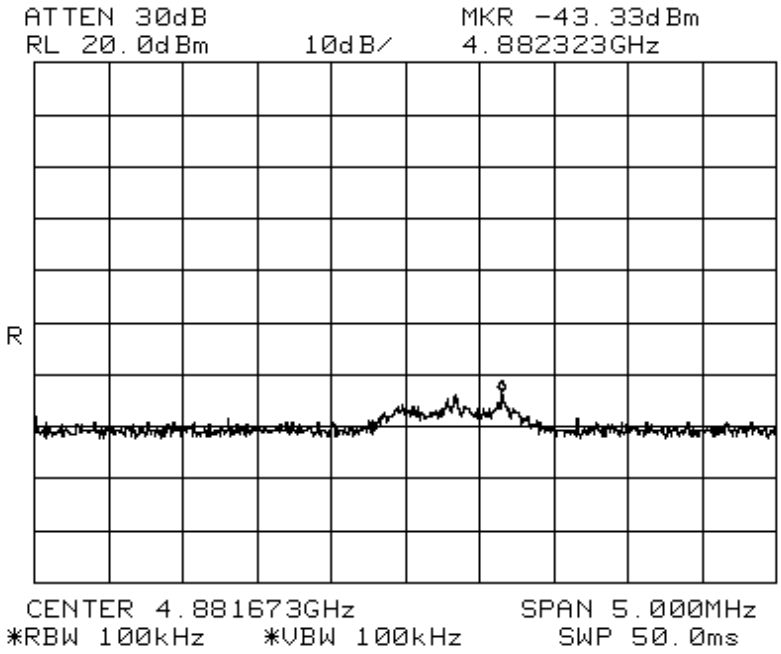
-43.83 dBm at 1.627 GHz



-41.17 dBm at 3.255 GHz

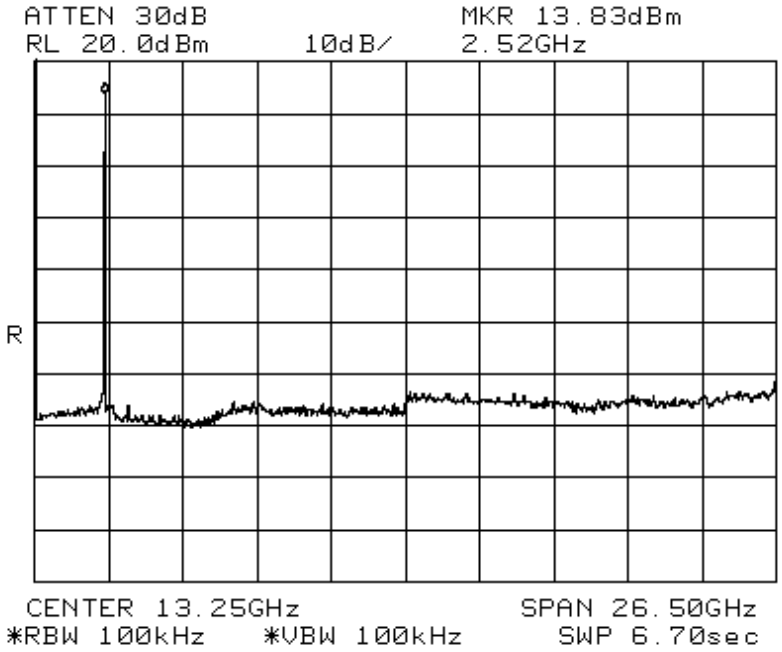


-43.33 dBm at 4.882 GHz

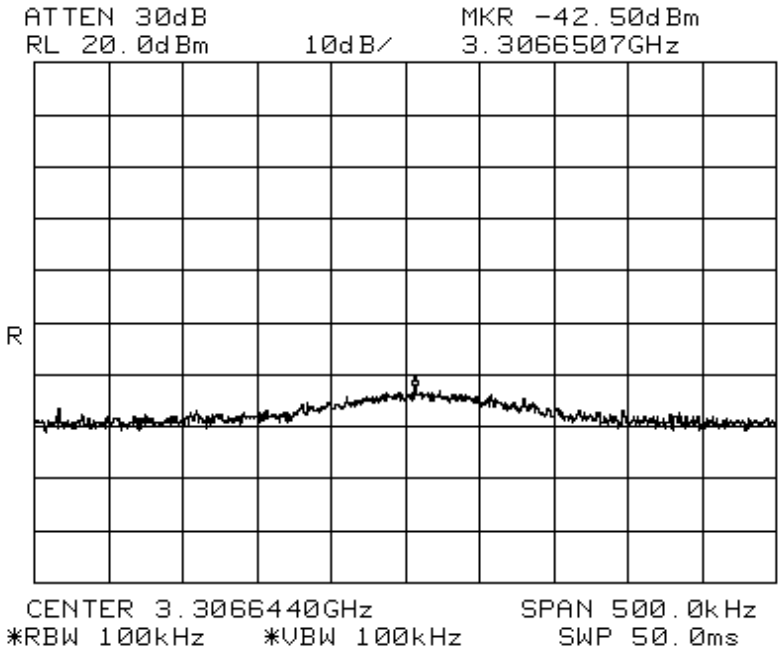


Unwanted Emission – High channel

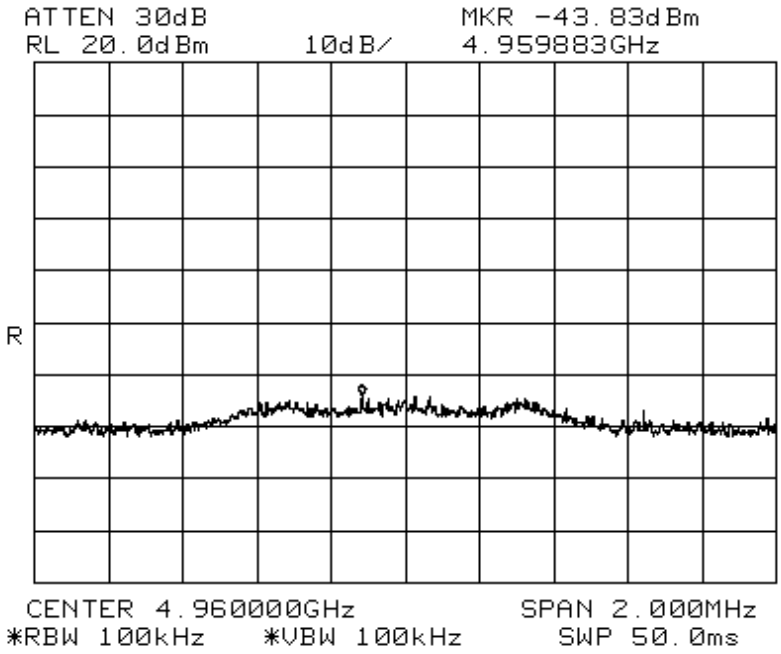
Frequency Range = 30 MHz ~ 26.5 GHz



-42.50 dBm at 3.307 GHz



-43.83 dBm at 4.960 GHz



3.2.7 Field Strength of Harmonics

Procedure:

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 30 MHz ~ 10th harmonic.

RBW = 100 kHz (30MHz ~ 1 GHz) Peak:VBW ≥ RBW

= 1 MHz (1 GHz ~ 10th harmonic) Average:VBW=10Hz

Span = 100 MHz Detector function = Peak and Average

Trace = max hold Sweep = auto

Measurement Data: Complies

- Refer to the next page.
- No other emissions were detected at a level greater than 10dB below limit.
- The three antennas were used with this EUT during the Testing.
- The used antenna is “R-AN2400-1901RS” and it gave the worse case emissions.

Minimum Standard: FCC Part 15.209(a)

Frequency (MHz)	Limit (uV/m) @ 3m
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

Measurement Data:

1. PEAK data

Low channel		Mid channel		High channel	
Frequency (MHz)	**Level (dBuV/m)**	**Frequency (MHz)**	**Level (dBuV/m)**	**Frequency (MHz)**	**Level (dBuV/m)**
-	-	-	-	-	-
No emissions were detected at a level greater than 20dB below limit.					
-	-	-	-	-	-
-	-	-	-	-	-
Measurement uncertainty		± 6 dB			

2. AVERAGE data

Low channel		Mid channel		High channel	
Frequency (MHz)	**Level (dBuV/m)**	**Frequency (MHz)**	**Level (dBuV/m)**	**Frequency (MHz)**	**Level (dBuV/m)**
-	-	-	-	-	-
No emissions were detected at a level greater than 20dB below limit.					
-	-	-	-	-	-
-	-	-	-	-	-
Measurement uncertainty		± 6 dB			

Normal operation mode

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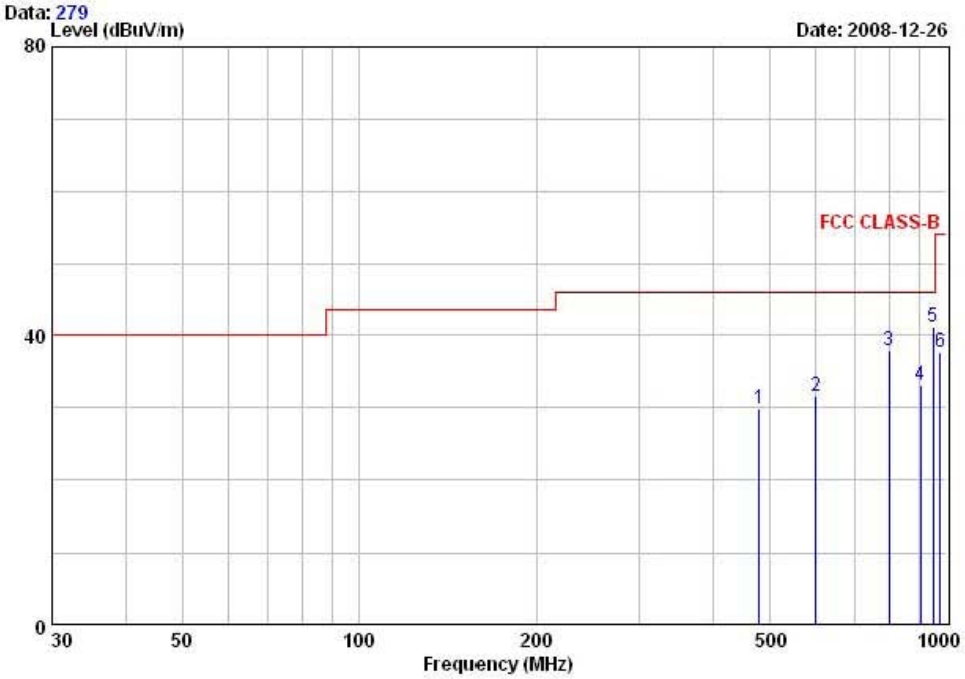
Gyeonggi-do 449-822 Korea
Tel :+82-31-3236008,9
Fax:+82-31-3236010

EUT/Model No.: Parani-UD100 TEST MODE: Bluetooth mode

Temp Humi : 0 / 12 Tested by: KIM.B.S



	Freq	Reading	C.F	Result QK	Limit	Margin	Height	Angle	Polarity
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	deg	
1	480.15	35.70	-5.84	29.86	46.00	16.14	100	0	HORIZONTAL
2	600.32	34.00	-2.32	31.68	46.00	14.32	141	255	HORIZONTAL
3	799.95	36.50	1.36	37.86	46.00	8.14	107	352	VERTICAL
4	903.19	29.50	3.62	33.12	46.00	12.88	110	290	HORIZONTAL
5	950.66	36.10	5.02	41.12	46.00	4.88	100	350	HORIZONTAL
6	978.40	32.20	5.57	37.77	54.00	16.23	130	64	VERTICAL

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

3.2.8 AC Conducted Emissions

Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

Measurement Data: Complies

- See next pages for actual measured spectrum plots.
- No emissions were detected at a level greater than 10dB below limit.
- The used antenna is "R-AN2400-1901RS" and it gave the worse case emissions.

Minimum Standard: FCC Part 15.207(a)/EN 55022

Frequency Range (MHz)	Conducted Limit (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

AC Conducted Emissions at normal operation mode – Line

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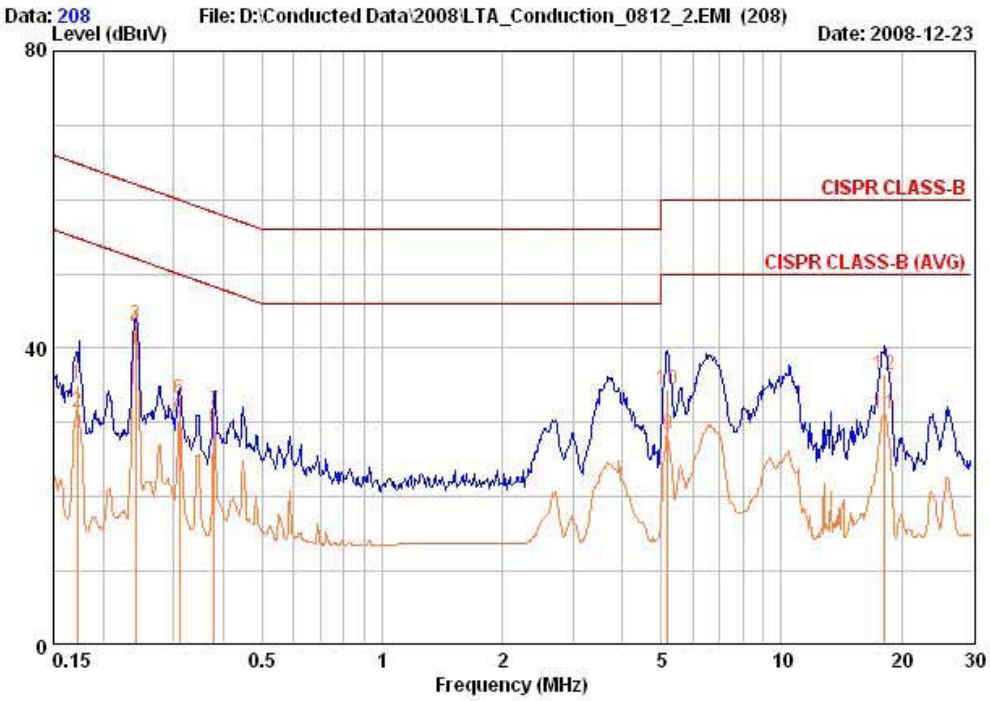
Fax:+82-31-323-6010

EUT / Model No.	: Parani-UD100	Phase	: LINE
Test Mode	: BT mode	Test Power	: 120 / 60
Temp./Humi.	: 20 / 17	Test Engineer	: B.S KIM



Freq	RD QP	RD AV	C.F	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV
MHz	dBuV	dBuV	dB	dBuV	dBuV	dBuV	dBuV	dB	dB
0.172	25.60	22.00	9.47	35.07	31.47	64.86	54.86	29.80	23.40
0.241	33.80	33.00	9.44	43.24	42.44	62.06	52.06	18.83	9.63
0.310	23.70	21.00	9.47	33.17	30.47	59.97	49.97	26.80	19.50
0.379	22.20	19.70	9.50	31.70	29.20	58.30	48.30	26.60	19.10
5.182	24.70	18.60	9.68	34.38	28.28	60.00	50.00	25.62	21.72
18.154	26.30	21.10	10.16	36.46	31.26	60.00	50.00	23.54	18.74

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

AC Conducted Emissions at normal operation mode – Neutral

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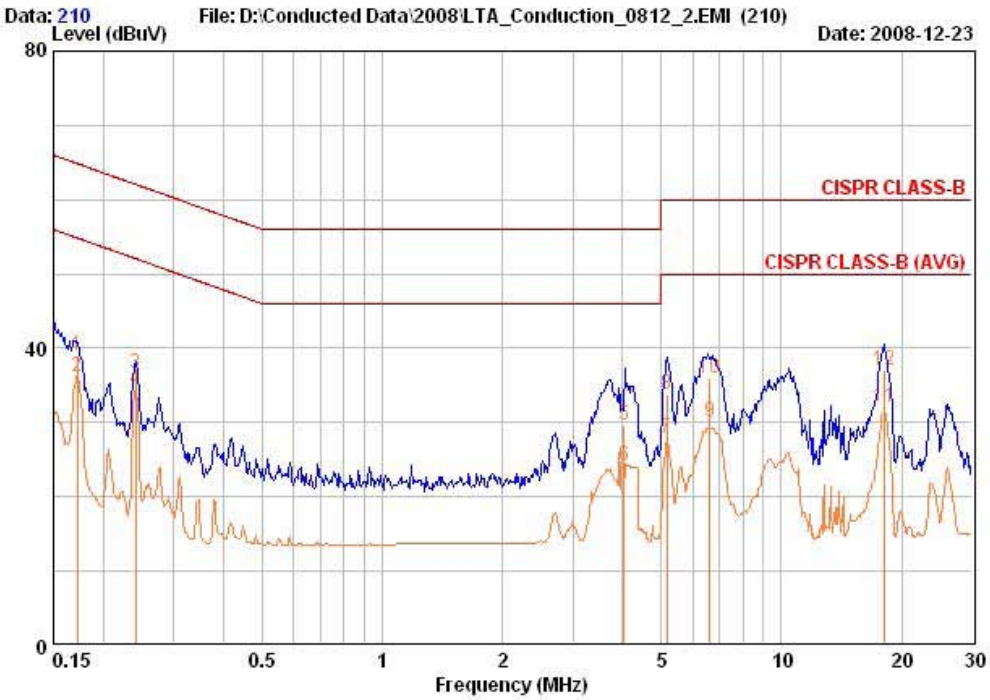
Tel :+82-31-323-6008
Fax:+82-31-323-6010

EUT / Model No.	: Parani-UD100	Phase	: NEUTRAL
Test Mode	: BT mode	Test Power	: 120 / 60
Temp./Humi.	: 20 / 17	Test Engineer	: B.S KIM



Freq	RD QP	RD AV	C.F	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV
MHz	dBuV	dBuV	dB	dBuV	dBuV	dBuV	dBuV	dB	dB
0.172	29.50	26.70	9.53	39.03	36.23	64.86	54.86	25.84	18.64
0.241	27.20	25.10	9.43	36.63	34.53	62.06	52.06	25.43	17.53
4.040	19.90	14.60	9.68	29.58	24.28	56.00	46.00	26.42	21.72
5.169	24.10	18.20	9.68	33.78	27.88	60.00	50.00	26.22	22.12
6.627	26.30	20.40	9.74	36.04	30.14	60.00	50.00	23.96	19.86
18.123	26.90	21.80	10.19	37.09	31.99	60.00	50.00	22.91	18.01

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

APPENDIX

TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Serial No.	Manufacturer	Next Cal. Date
1	Spectrum Analyzer	8594E	3649A03649	HP	Apr-09
2	Signal Generator	8648C	3623A02597	HP	Apr-09
3	Attenuator (3dB)	8491A	37822	HP	Oct-09
4	Attenuator (10dB)	8491A	63196	HP	Oct-09
5	EMI Test Receiver	ESVD	843748/001	R&S	Aug-09
6	LISN	KNW-407	8-1430-1	Kyoritsu	Jan-09
7	Two-Line V-Network	ESH3-Z5	893045/017	R&S	Oct-09
8	RF Amplifier	8447D	2949A02670	HP	Jan-09
9	RF Amplifier	8447D	2439A09058	HP	Oct-09
10	RF Amplifier	8449B	3008A02126	HP	Apr-09
11	Test Receiver	ESHS10	828404009	R&S	Aug-09
12	TRILOG Antenna	VULB 9160	9160-3212	SCHWARZBECK	Jul-09
13	Log.-Per. Antenna	VULP 9118	9118 A 401	SCHWARZBECK	Apr-09
14	Biconical Antenna	BBA 9106	VHA 9103-2315	SCHWARZBECK	Apr-09
15	Horn Antenna	3115	00055005	ETS LINDGREN	Mar-09
16	Dipole Antenna	VHA9103	2116	SCHWARZBECK	Nov-09
17	Dipole Antenna	VHA9103	2117	SCHWARZBECK	Nov-09
18	Dipole Antenna	VHA9105	2261	SCHWARZBECK	Nov-09
19	Dipole Antenna	VHA9105	2262	SCHWARZBECK	Nov-09
20	Spectrum Analyzer	8591E	3649A05888	HP	Oct-09
21	Spectrum Analyzer	8563E	3425A02505	HP	Apr-09
22	Spectrum Analyzer	ESU	100109	R&S	Mar-06
23	Hygro-Thermograph	THB-36	0041557-01	ISUZU	Apr-09
24	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	Jun-09
25	RF Switch	MP59B	6200414971	ANRITSU	Jun-09
26	RF Switch	MP59B	6200438565	ANRITSU	Jun-09
27	Power Divider	11636A	6243	HP	Oct-09
28	DC Power Supply	6622A	3448A03079	HP	Oct-09
29	Combiner / Divider	11636A	6243	HP	Oct-09
30	Frequency Counter	5342A	2826A12411	HP	Apr-09
31	Power Meter	EPM-441A	GB32481702	HP	Apr-09
32	Power Sensor	8481A	2702A64048	HP	Apr-09
33	Audio Analyzer	8903B	3729A18901	HP	Oct-09
34	Modulation Analyzer	8901B	3749A05878	HP	Oct-09
35	TEMP & HUMIDITY Chamber	YJ-500	L05022	JinYoung Tech	Oct-09
36	LOOP-ANTENNA	FMZB 1516	151602/94	SCHWARZBECK	Mar-09
37	Stop Watch	HS-3	601Q09R	CASIO	Apr-09