

TEST REPORT For FCC

Test Report No. : TK-FR9012

Date of Issue : 08/20/2009

Description of Product : Self-Mobil ordering system

Model No. : JK-S7

Applicant : **JSP LINE KOREA CO.,LTD.**
#907, Innoplex Tower 9th, 471-47, Gasan-Dong,
Geumchen-Gu, Seoul 153-803 Republic of Korea

Manufacturer : **JSP LINE KOREA CO.,LTD.**
#907, Innoplex Tower 9th, 471-47, Gasan-Dong,
Geumchen-Gu, Seoul 153-803 Republic of Korea


Standards : FCC Part 15 Subpart C §15.247

Test Date : 08/04/2009 ~ 08/20/2009

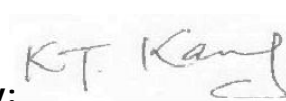
Test Results : ☒ PASS ☐ FAIL

The test results relate only to the items tested.

Tested by:


Kyu-Chul Shin
Test Engineer
Date:08/20/2009

Reviewed by:


KT Kang
Technical Manager
Date: 08/20/2009

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1.0 General Product Description

Equipment model name	: JK-S7
Serial number	: Prototype
EUT condition	: Pre-production, not damaged
Antenna type	: Chip antenna Gain 1.8dBi
Frequency Range	: 2412Mhz ~ 2472MHz(DSSS/OFDM)
RF output power	: 16.22 dBm Peak Conducted (802.11b) : 19.28 dBm Peak Conducted (802.11g)
Number of channels	: 11
Channel Spacing	: 5 MHz
Transfer Rate	: 11/5.5/2/1Mbps for 802.11b : 54/48/36/24/18/12/9/6Mbps for 802.11g
Type of Modulation	: CCK, DQPSK, DBPSK for DSSS : 64QAM, 16QAM, QPSK, BPSK for OFDM
Power Source	: Li-Polymer Battery (DC 3.7V)

1.1 Tested Frequency

	LOW	MID	HIGH
Frequency (MHz) For 802.11b	2412	2437	2462
Frequency (MHz) For 802.11g	2412	2437	2462

1.2 Model Differences

Not applicable

1.3 Device Modifications

The following modifications were necessary for compliance:
Not applicable

1.4 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.	FCC ID or DoC
EUT	JSP LINE KOREA CO.,LTD	JK-S7	-	-
Notebook	F U J I T S U L T D	LIFEBOOK S-5582	434230343466	DoC



1.5 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.6 Test Facility

477-6, Hager-Ri, Yoju-Up, Yoju-Gun Kyunggi-Do, 469-803, Korea

1.7 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	 93250
KOREA	KCC	EMI (10 meter Open Area Test Site and conducted sites)	 No. 51, KR0025

2.0 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status (note 1)
15.247(a)	6 dB Bandwidth	> 500kHz	Conducted	C
15.247(b)	Transmitter Output Power	< 1Watt		C
15.247(d)	Conducted Spurious emission	> 20 dBc		C
15.247(d)	Band Edge	> 20 dBc		C
15.247(d)	Transmitter Power Spectral Density	< 8dBm @ 3kHz		C
				C
15.209	Field Strength of Harmonics	< 54 dBuV (at 3m)	Radiated	C
15.207	AC Conducted Emissions	EN 55022	Line Conducted	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 Part 15.247, ANSI C63.4-2003

2.1 Technical Characteristic Test

2.1.1 6dB Bandwidth - 15.247(a)

Procedure:

The bandwidth at 6dB below the highest in-band spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate frequencies.

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 6dB 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 6 dB bandwidth of the emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz

Span = 40 MHz

VBW = 100 kHz (VBW ≥ RBW)

Sweep = auto

Trace = max hold

Detector function = peak

Measurement Data:

Mode	Frequency (MHz)	Channel No.	Test Results	
			Measured Bandwidth (MHz)	Result
802.11b	2412	1	9.92	Complies
	2437	6	10.00	Complies
	2462	11	9.92	Complies
802.11g	2412	1	16.64	Complies
	2437	6	16.64	Complies
	2462	11	16.64	Complies

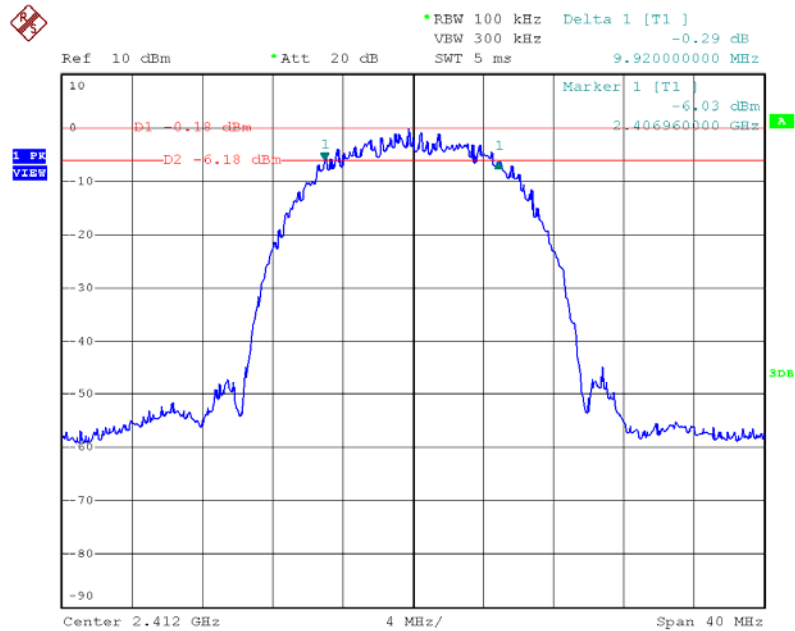
- See next pages for actual measured spectrum plots.

Minimum Standard:

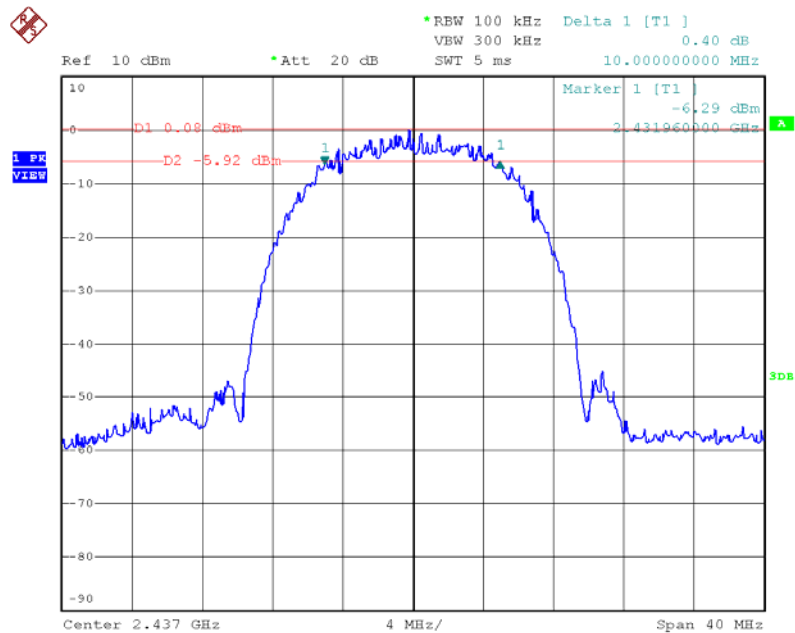
6 dB Bandwidth > 500kHz

See next pages for actual measured spectrum plots.

802.11b

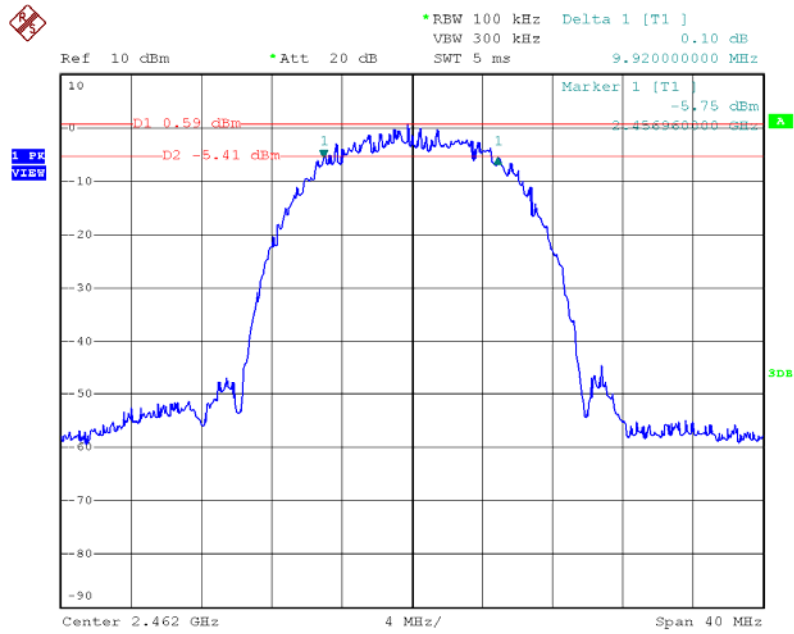


Date: 8.JUL.2009 06:43:26



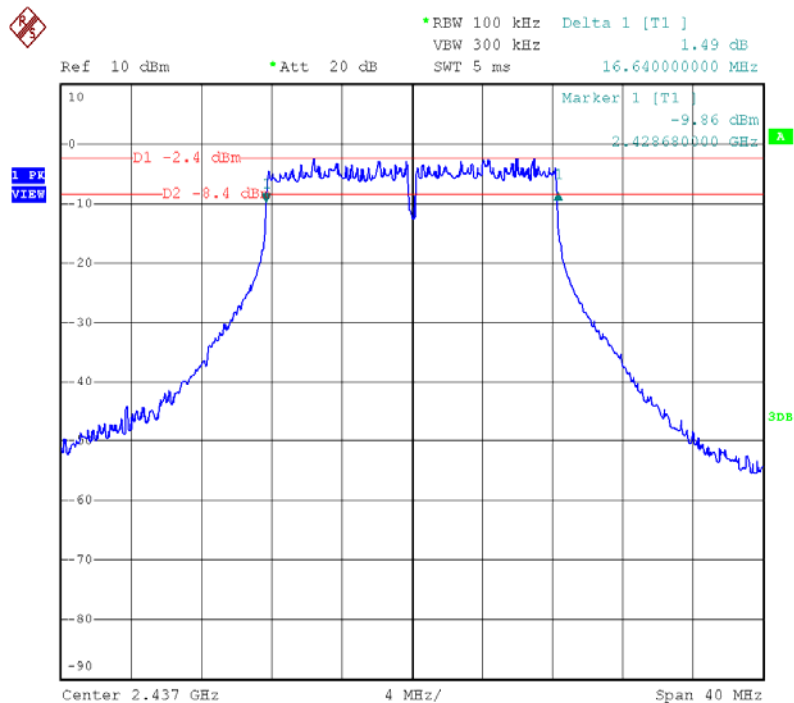
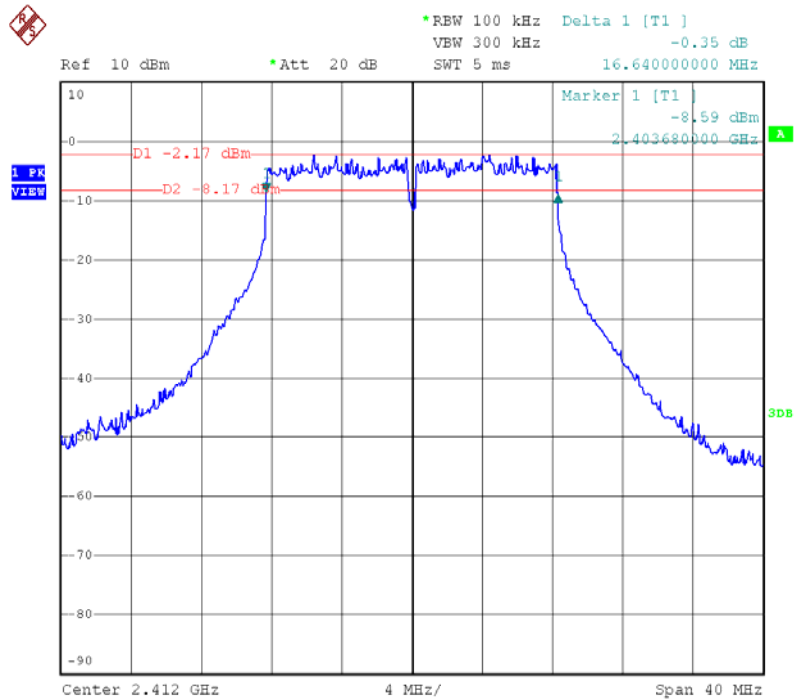
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802.11b

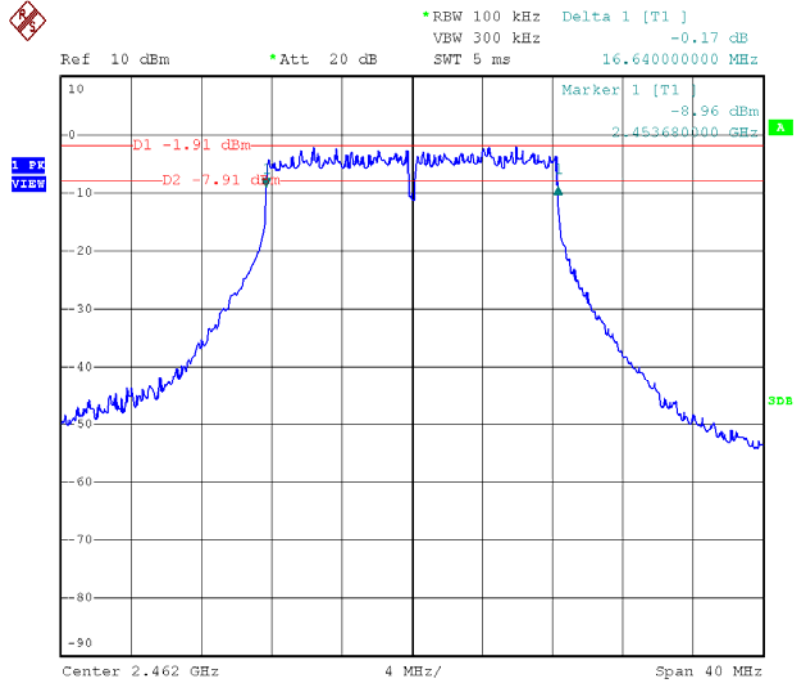


Date: 8.JUL.2009 06:45:59

802.11g



802.11g



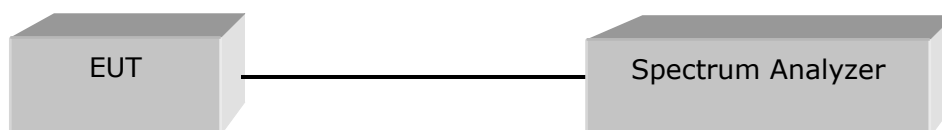
2.1.2 Maximum peak Conducted Output Power-15.247(b)

Test Location

RF Test Room

Test Procedures

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.



Limit

< 1 W

Test Results

802.11b mode

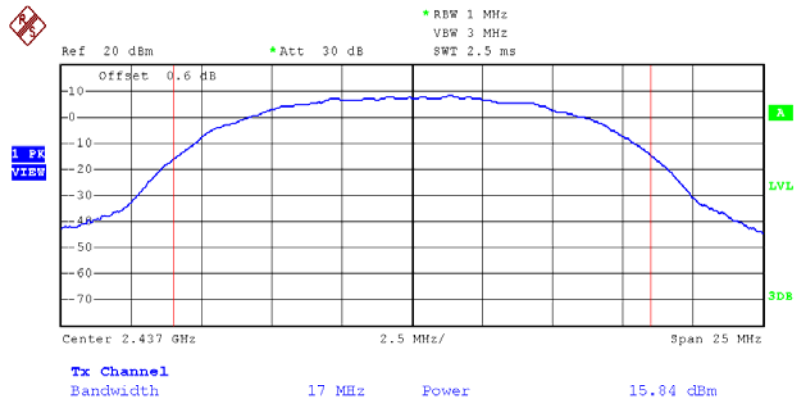
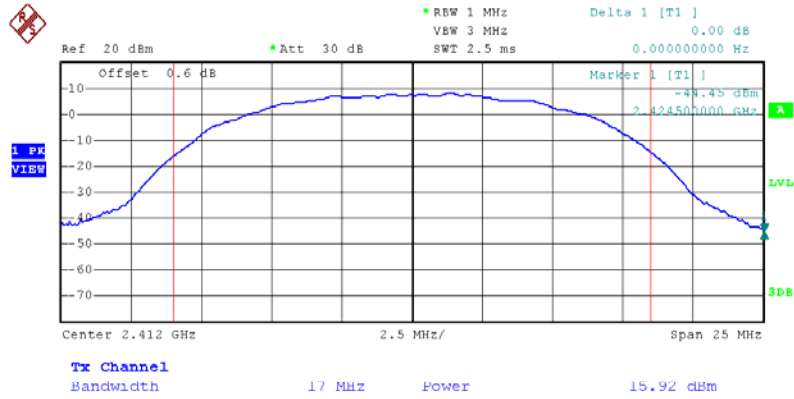
Frequency (MHz)	Channel No.	Peak output power(dBm)	Limit	Result
2412	Low	15.92	30dBm	Complies
2437	Middle	15.84	30dBm	Complies
2462	High	16.22	30dBm	Complies

802.11g mode

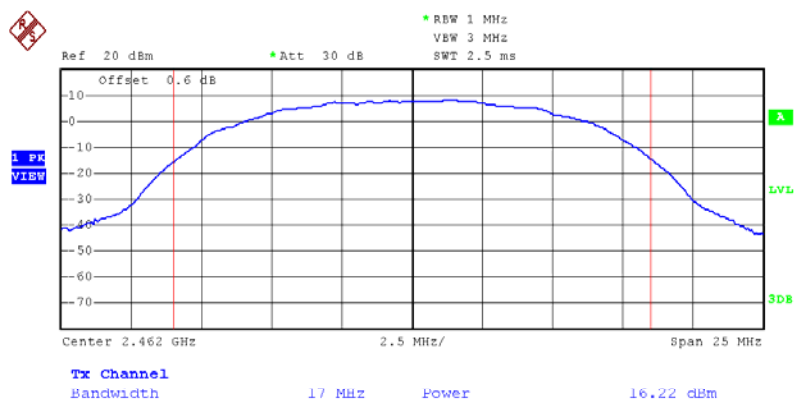
Frequency (MHz)	Channel No.	Peak output power(dBm)	Peak output power(mW)	Result
2412	Low	19.19	30dBm	Complies
2437	Middle	18.80	30dBm	Complies
2462	High	19.28	30dBm	Complies

See next pages for actual measured spectrum plots.

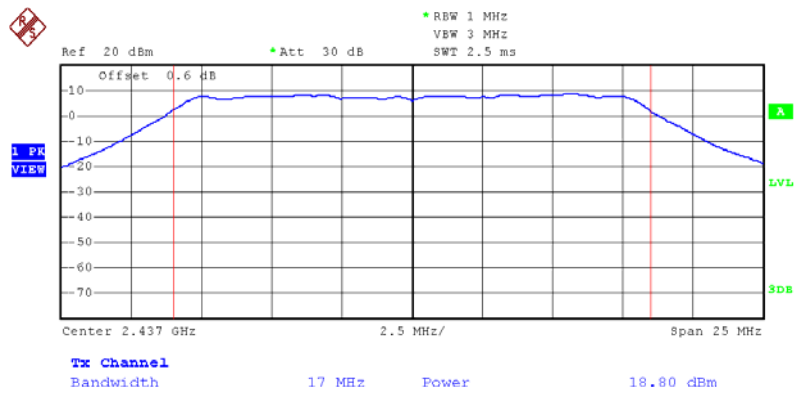
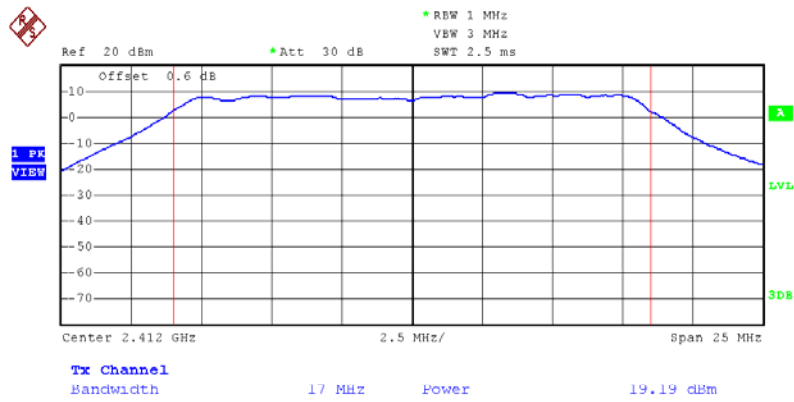
Peak Conducted Output Power – 802.11b



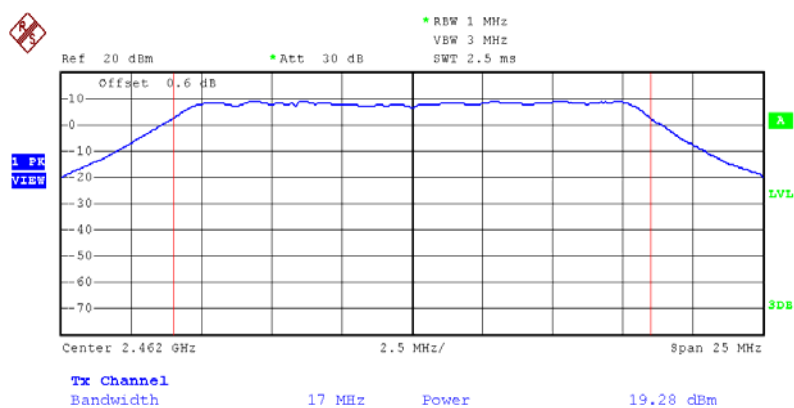
Peak Conducted Output Power – 802.11b



Peak Conducted Output Power – 802.11g



Peak Conducted Output Power – 802.11g



2.1.3 Power Spectral Density-15.247(d)

Procedure:

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

The spectrum analyzer is set to:

RBW = 3 kHz

VBW = (VBW ≥ RBW)

Sweep = 100KHz(Span/3KHz)

Span = 300 KHz

Detector function = peak

Trace = max hold

Measurement Data:

Mode	Frequency (MHz)	Ch.	Test Results	
			dBm	Result
802.11b	2412	1	-13.68	Complies
	2437	6	-14.22	Complies
	2462	11	-13.83	Complies
802.11g	2412	1	-18.24	Complies
	2437	6	-19.59	Complies
	2462	11	-18.36	Complies

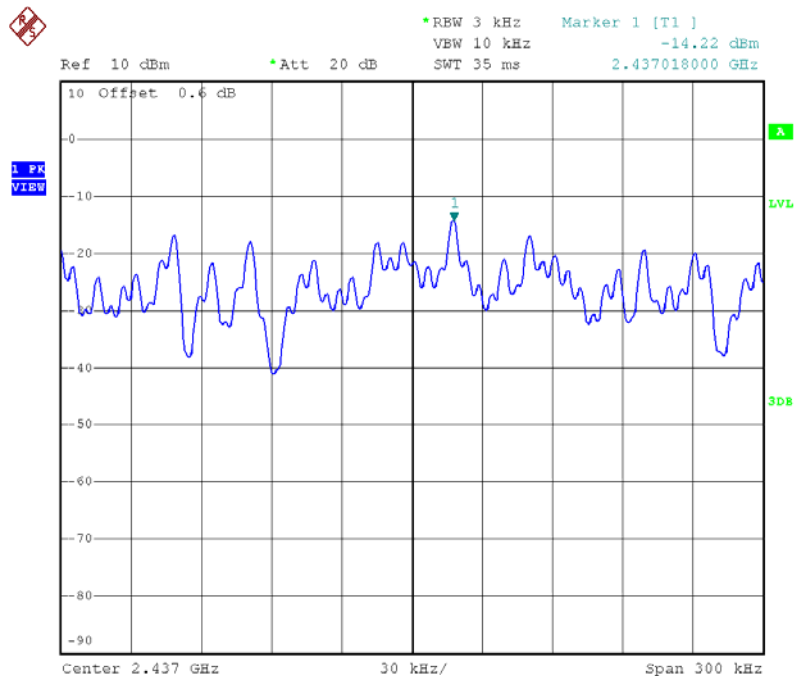
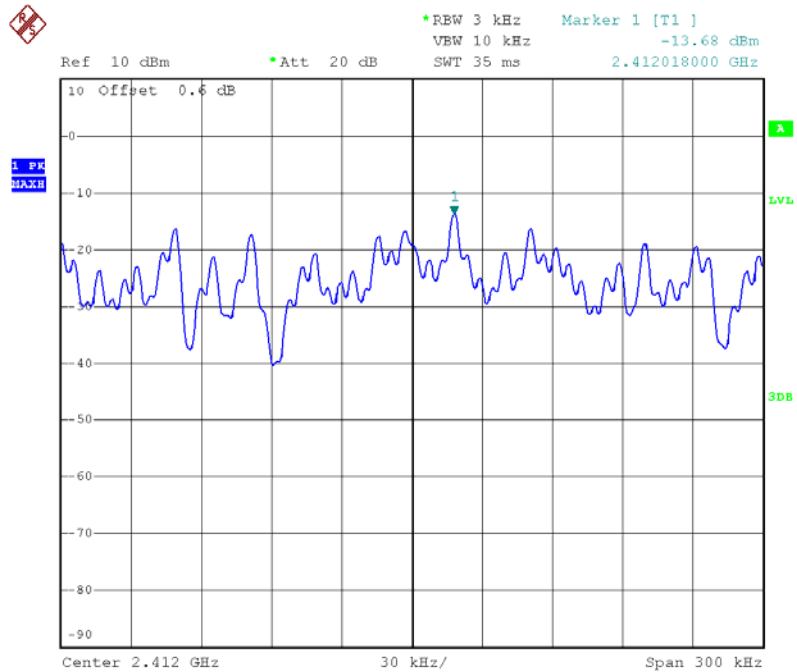
- See next pages for actual measured spectrum plots.

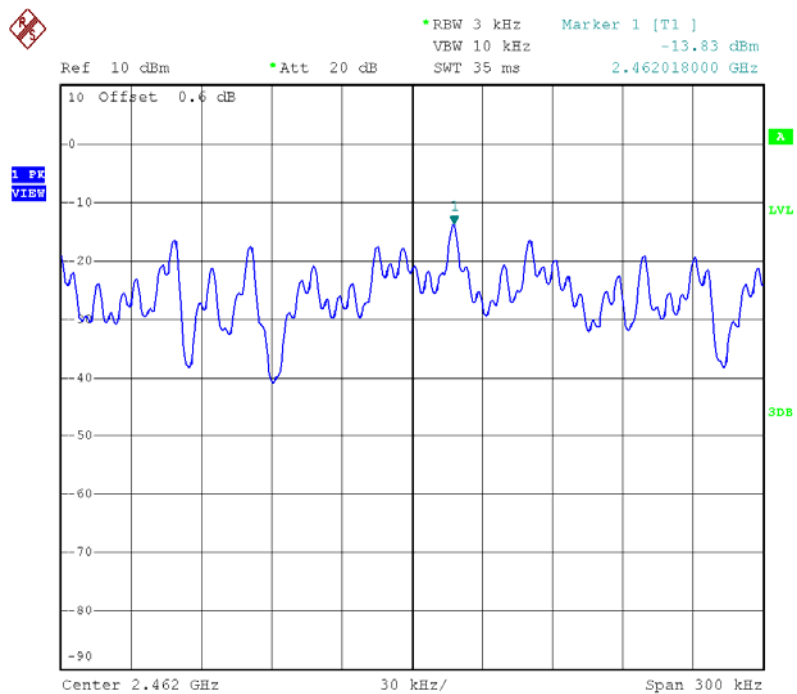
Minimum Standard:

Power Spectral Density	< 8dBm @ 3kHz BW
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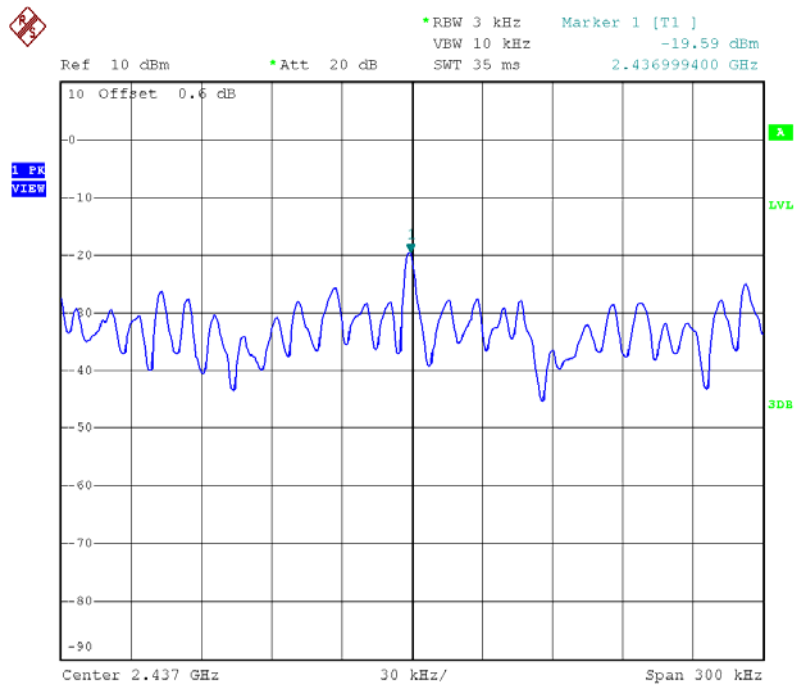
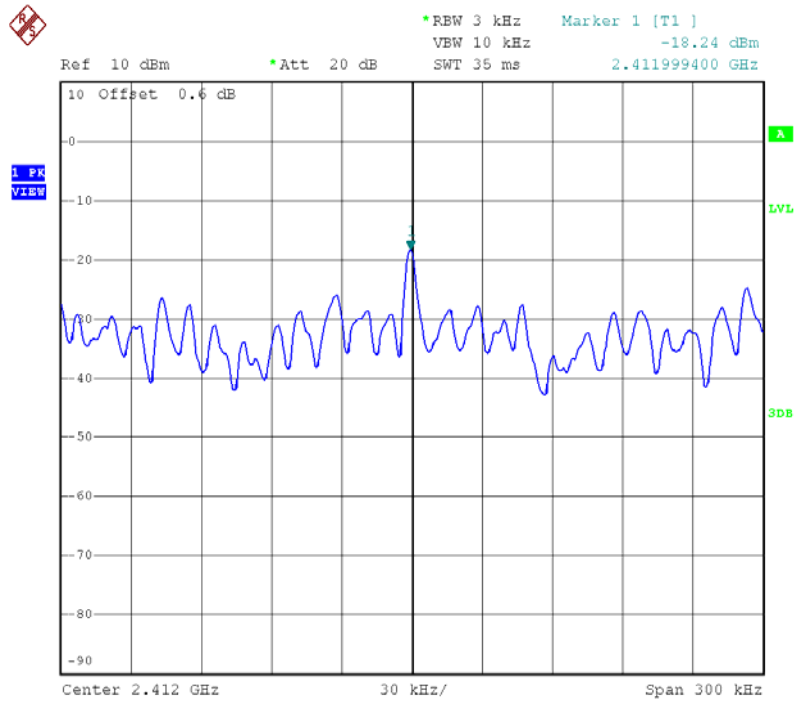
See next pages for actual measured spectrum plots.

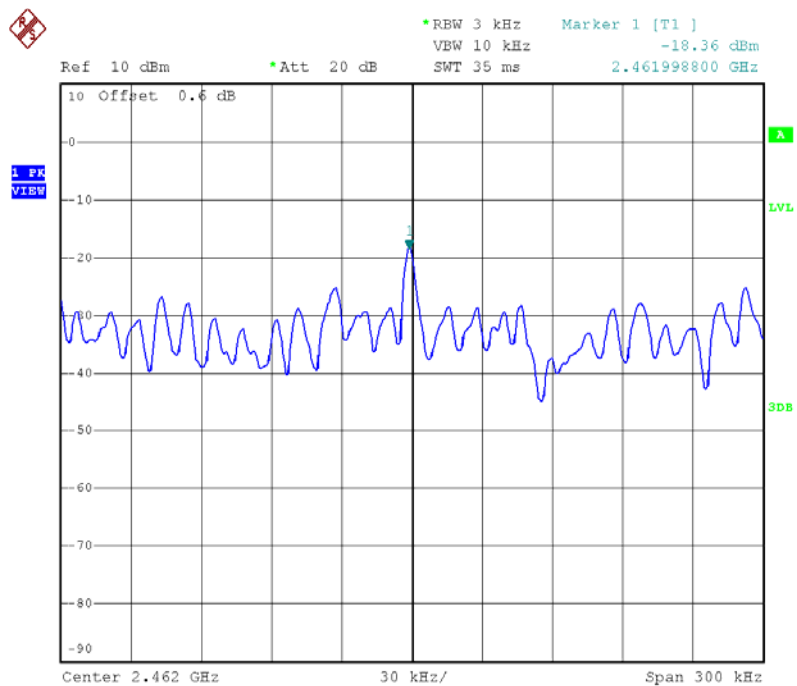
802.11b Power Density Measurement





802.11g Power Density Measurement





2.1.4 Band - edge -15.247(d)

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 is operating in transmission mode at the appropriate frequencies.

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 = 40 MHz

Detector function = peak

Trace = max hold

Sweep = auto

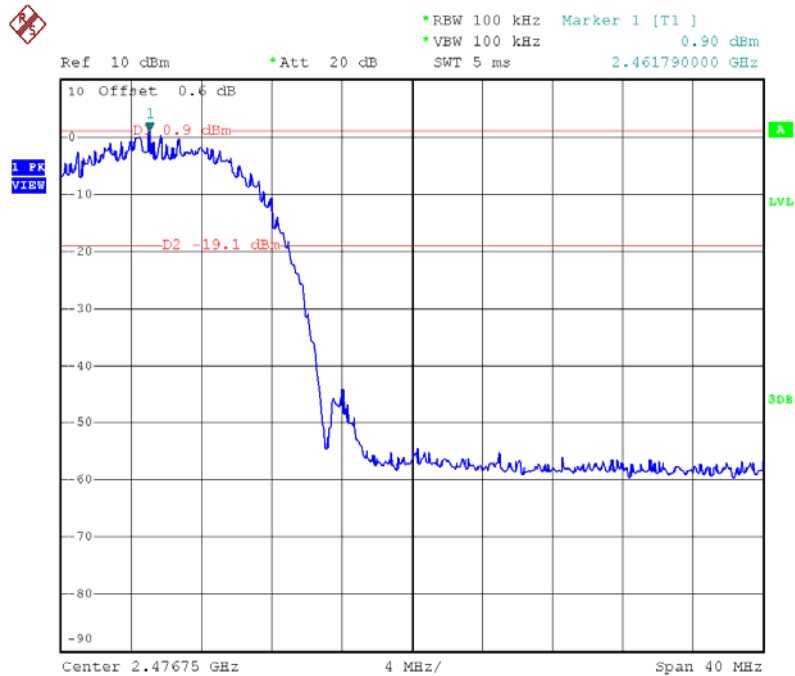
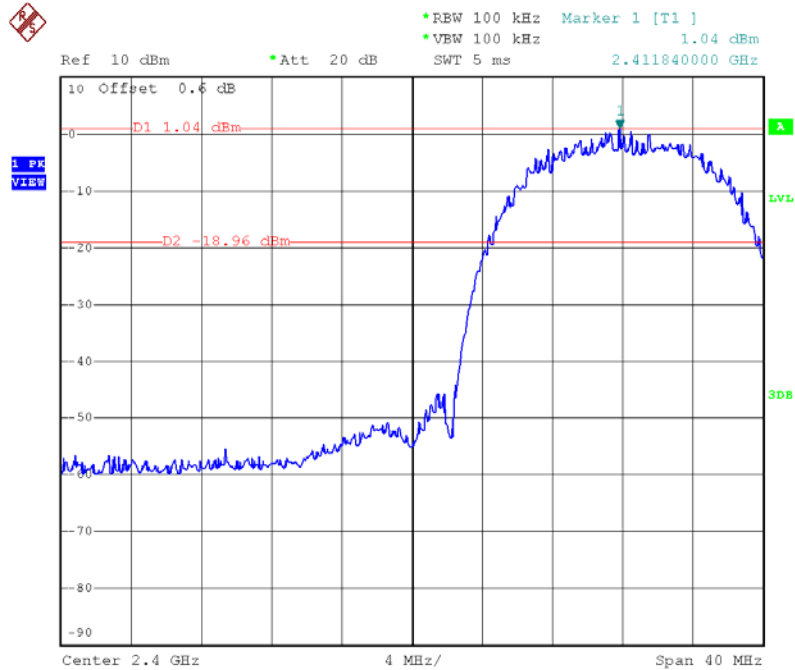
Measurement Data: Complies

- 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.

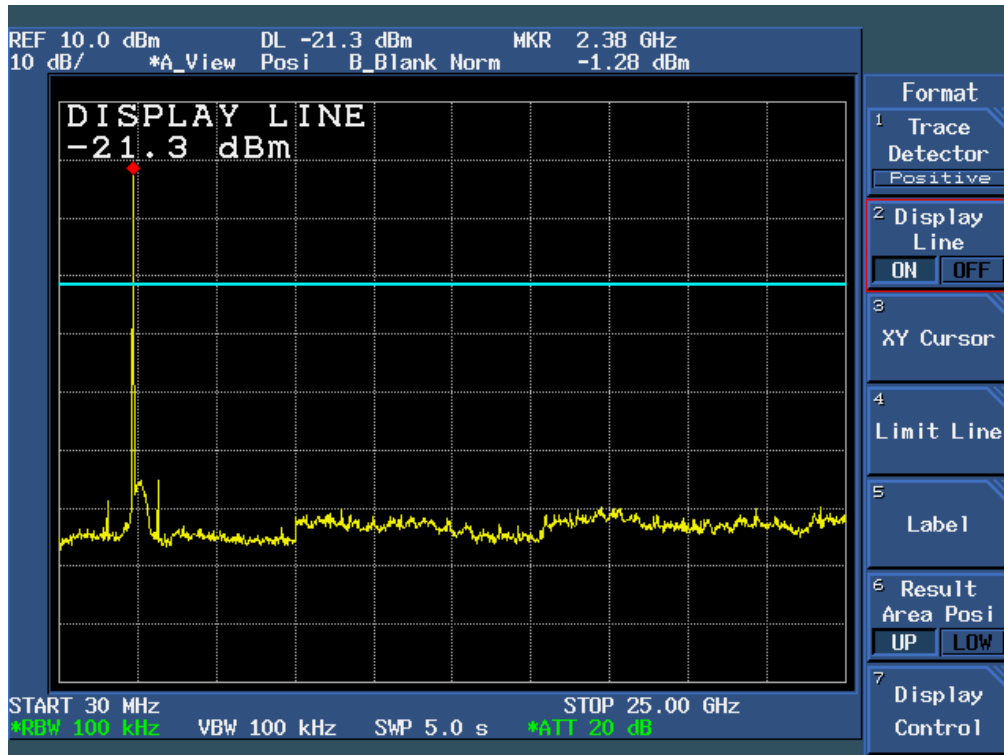
Minimum Standard:	> 20 dBc
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See next pages for actual measured spectrum plots.

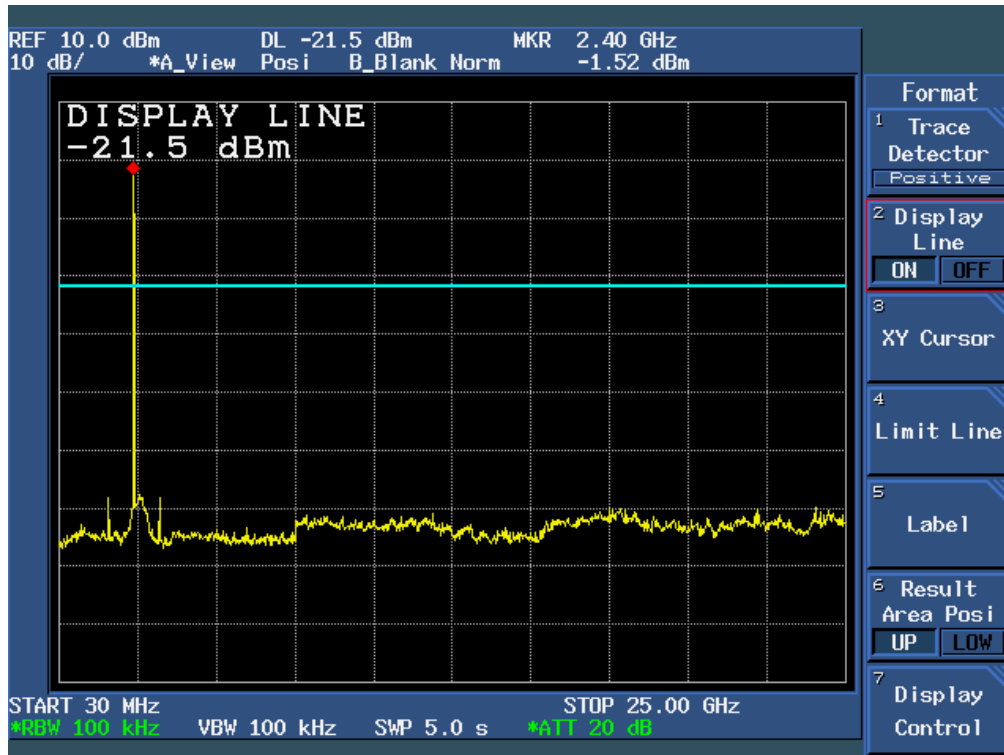
802.11b Band-edge Measurements



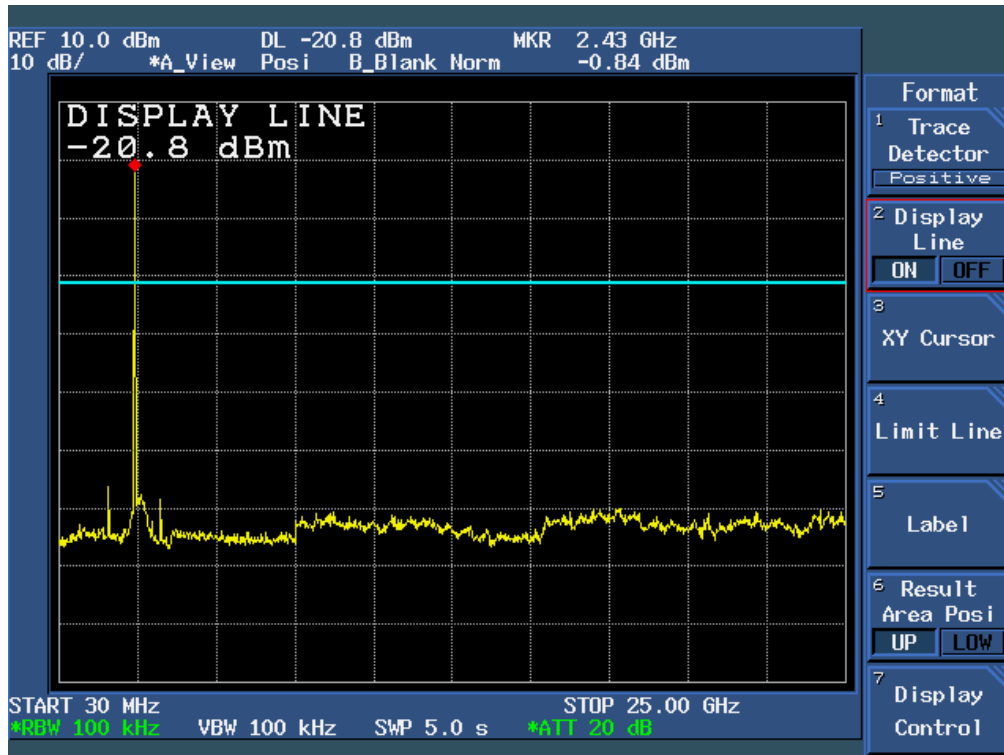
Band – edge (at 20 dB blow) – Low channel (802.11b)
Frequency Range = 30 MHz ~ 10th harmonic



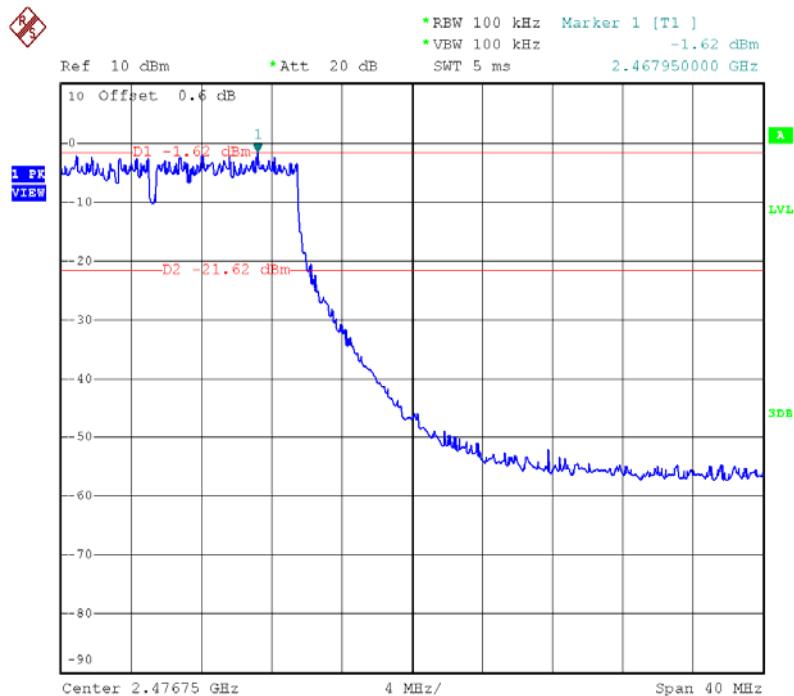
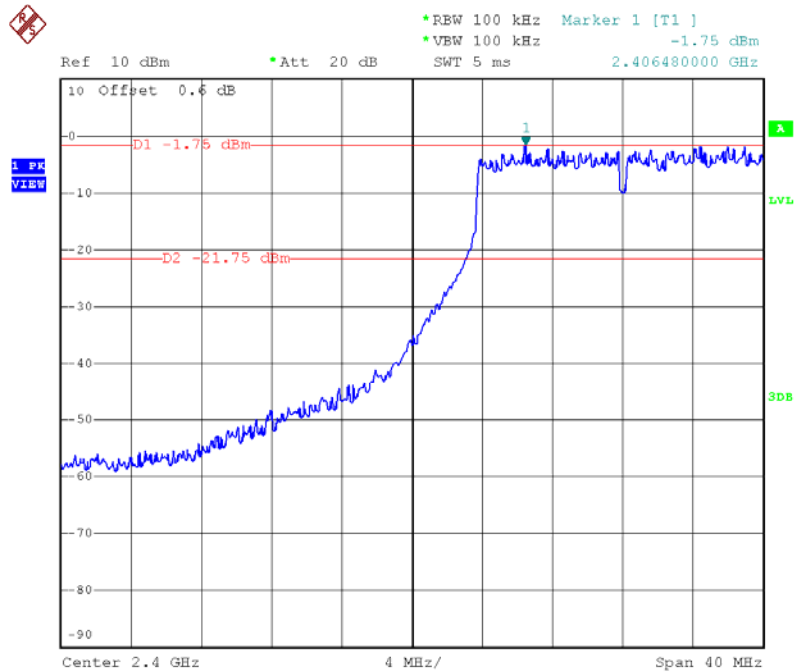
Band – edge (at 20 dB blow) – Mid channel (802.11b)
Frequency Range = 30 MHz ~ 10th harmonic



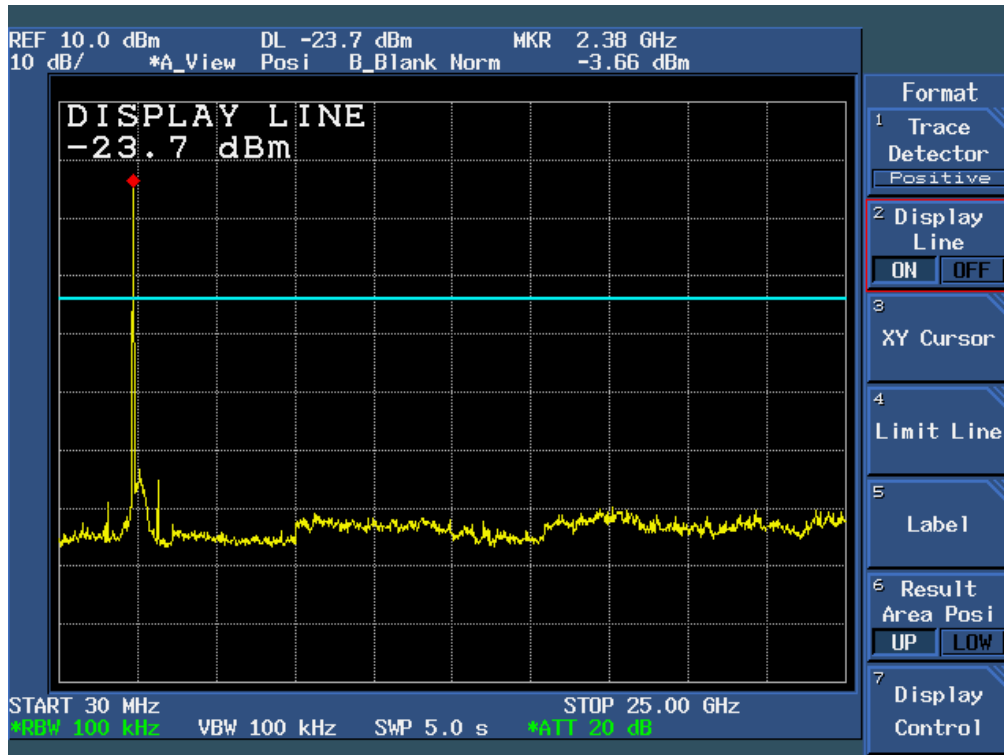
Band – edge (at 20 dB blow) – High channel(802.11b)
Frequency Range = 30 MHz ~ 10th harmonic



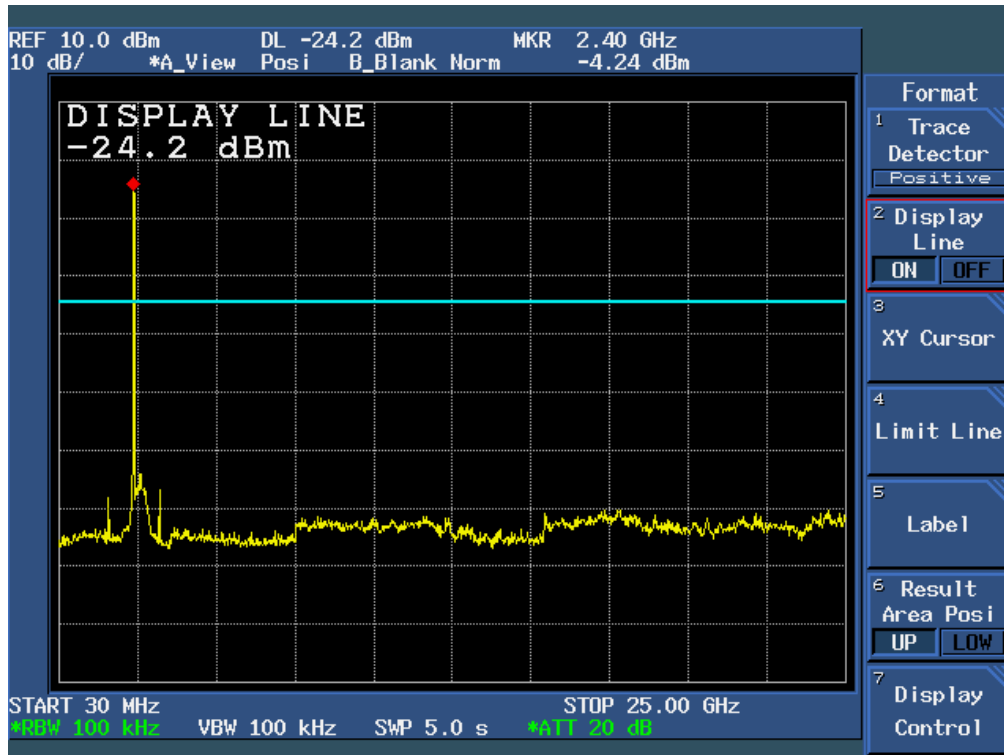
802.11g Band-edge Measurements



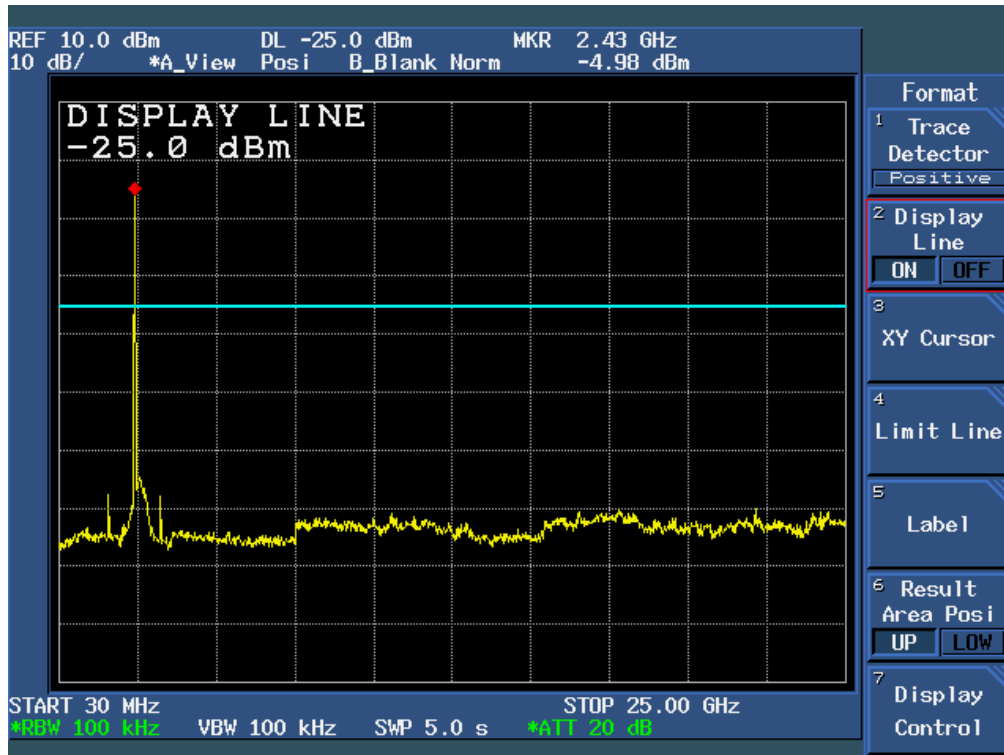
Band – edge (at 20 dB blow) – Low channel (802.11g)
Frequency Range = 30 MHz ~ 10th harmonic



Band – edge (at 20 dB blow) – Mid channel(802.11g)
Frequency Range = 30 MHz ~ 10th harmonic



Band – edge (at 20 dB blow) – High channel(802.11g)
Frequency Range = 30 MHz ~ 10th harmonic



2.1.5 Field Strength of Emissions 15.209

Test Location

☒ Testing was performed at a test distance of 3 meter Open Area Test Site

Test Procedures

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity. The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

The spectrum analyzer is set to:

Below 1GHz :

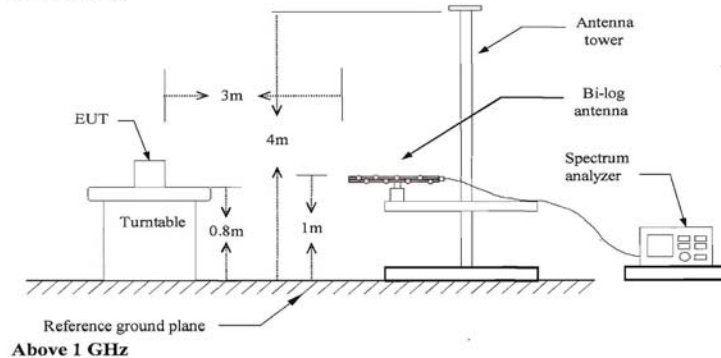
RBW=100KHz/VBW=300KHz/Sweep=AUTO

Above 1GHz:

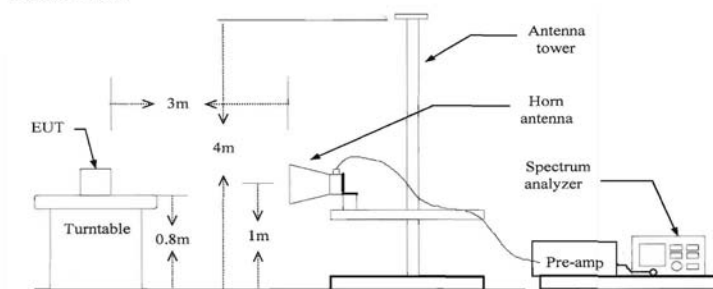
(a) PEAK:RBW=VBW=1MHz/Sweep=AUTO

(b) AVERAGE:RBW=1MHz/VBW=10Hz/Sweep=AUTO

Below 1 GHz



Above 1 GHz



Limit

- 15.209(a)

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

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

Test Results

EUT	Self-Mobil ordering system	Measurement Detail	
Model	JK-S7	Frequency Range	Below 1000MHz
Channel	-	Detector function	Quasi-Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
924.80	36.1	-9.9	Quasi-Peak

Test Data

No	Emission Frequency (MHz)	Meter Reading dBuV/m	Ant. Polarity	Correction Factor dB	Cable Loss dB	Field Strength (dBuV/m)	Margin (dBuV)	Limit (dBuV/m)
1	575.60	8.8	H	17.9	4.3	30.9	-15.1	46.0
2	575.80	8.9	V	17.9	4.3	31.0	-15.0	46.0
3	599.90	7.5	H	18.3	4.3	30.1	-15.9	46.0
4	626.60	9.8	V	18.8	4.4	33.1	-12.9	46.0
5	675.10	8.0	V	19.5	4.7	32.1	-13.9	46.0
6	675.10	8.0	H	19.5	4.7	32.1	-13.9	46.0
7	726.60	8.4	H	20.0	4.9	33.3	-12.7	46.0
8	726.60	8.4	V	20.0	4.9	33.3	-12.7	46.0
9	791.50	8.5	V	20.7	5.2	34.3	-11.7	46.0
10	791.50	8.6	H	20.7	5.2	34.4	-11.6	46.0
11	801.20	8.5	H	20.7	5.2	34.4	-11.6	46.0
12	859.40	8.7	H	21.2	5.4	35.4	-10.6	46.0
13	859.40	8.7	V	21.2	5.4	35.4	-10.6	46.0
14	924.80	8.5	V	21.9	5.6	36.1	-9.9	46.0
15	990.30	8.5	V	22.2	5.7	36.4	-17.6	54.0

Test Results

EUT	Self-Mobil ordering system	Measurement Detail	
Model	JK-S7	Frequency Range	1-25GHz
Channel	Channel 1	Detector function	Average/Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
-	-	-	Average/Peak

Test Data – 802.11b

Frequency	Reading A/P	Pol.	Height	Correction			Limits/ Detector A/P	Result A/P
				Factor				
[MHz]	[dBuV/m]		[m]	Antenna	Amp.Gain	Cable	[dBuV/m]	[dBuV/m]
No emissions were detected at a level greater than 20dB below limit.								

Test Data – 802.11g

Frequency	Reading A/P	Pol.	Height	Correction			Limits/ Detector A/P	Result A/P
				Factor				
[MHz]	[dBuV/m]		[m]	Antenna	Amp.Gain	Cable	[dBuV/m]	[dBuV/m]
No emissions were detected at a level greater than 20dB below limit.								

Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

Frequency	Reading	Pol.	Height	Correction			Limits	Result
				Factor				
[MHz]	[dBuV/m]		[m]	Antenna	Amp. Gain	Cable	[dBuV/m]	[dBuV/m]
No emissions were detected at a level greater than 20dB below limit.								

Test Results

EUT	Self-Mobil ordering system	Measurement Detail	
Model	JK-S7	Frequency Range	1-25GHz
Channel	Channel 6	Detector function	Average/Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
-	-	-	Average/Peak

Test Data – 802.11b

Frequency	Reading A/P	Pol.	Height	Correction			Limits/ Detector A/P	Result A/P
				Factor				
[MHz]	[dBuV/m]		[m]	Antenna	Amp.Gain	Cable	[dBuV/m]	[dBuV/m]
No emissions were detected at a level greater than 20dB below limit.								

Test Data – 802.11g

Frequency	Reading A/P	Pol.	Height	Correction			Limits/ Detector A/P	Result A/P
				Factor				
[MHz]	[dBuV/m]		[m]	Antenna	Amp.Gain	Cable	[dBuV/m]	[dBuV/m]
No emissions were detected at a level greater than 20dB below limit.								

Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

Frequency	Reading	Pol.	Height	Correction			Limits	Result
[MHz]	[dBuV/m]			Factor				
				Antenna	Amp. Gain	Cable		
No emissions were detected at a level greater than 20dB below limit.								

Test Results

EUT	Self-Mobil ordering system	Measurement Detail	
Model	JK-S7	Frequency Range	1-25GHz
Channel	Channel 11	Detector function	Average/Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
-	-	-	Average/Peak

Test Data – 802.11b

Frequency	Reading A/P	Pol.	Height	Correction			Limits/ Detector A/P	Result A/P
				Factor				
[MHz]	[dBuV/m]		[m]	Antenna	Amp.Gain	Cable	[dBuV/m]	[dBuV/m]
No emissions were detected at a level greater than 20dB below limit								

Test Data – 802.11g

Frequency	Reading A/P	Pol.	Height	Correction			Limits/ Detector A/P	Result A/P
				Factor				
[MHz]	[dBuV/m]		[m]	Antenna	Amp.Gain	Cable	[dBuV/m]	[dBuV/m]
No emissions were detected at a level greater than 20dB below limit								

Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

Frequency	Reading	Pol.	Height	Correction			Limits	Result
				Factor				
[MHz]	[dBuV/m]		[m]	Antenna	Amp. Gain	Cable	[dBuV/m]	[dBuV/m]
No emissions were detected at a level greater than 20dB below limit.								

2.1.6 AC Conducted Emissions 15.207

Test Location

Shielded Room

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.

Amplitude measurements were performed with a quasi-peak detector and an average detector.

Limit

- 15.207(a)

Frequency (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.

Test Results

The requirements are:

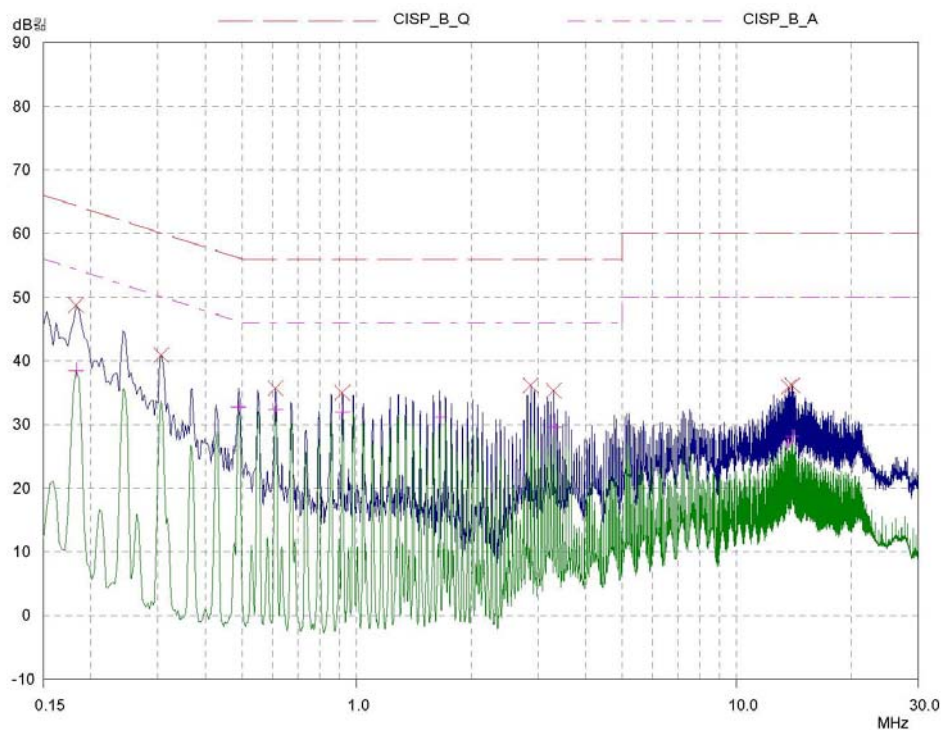
☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
0.180	49.22	15.26	Quasi-peak

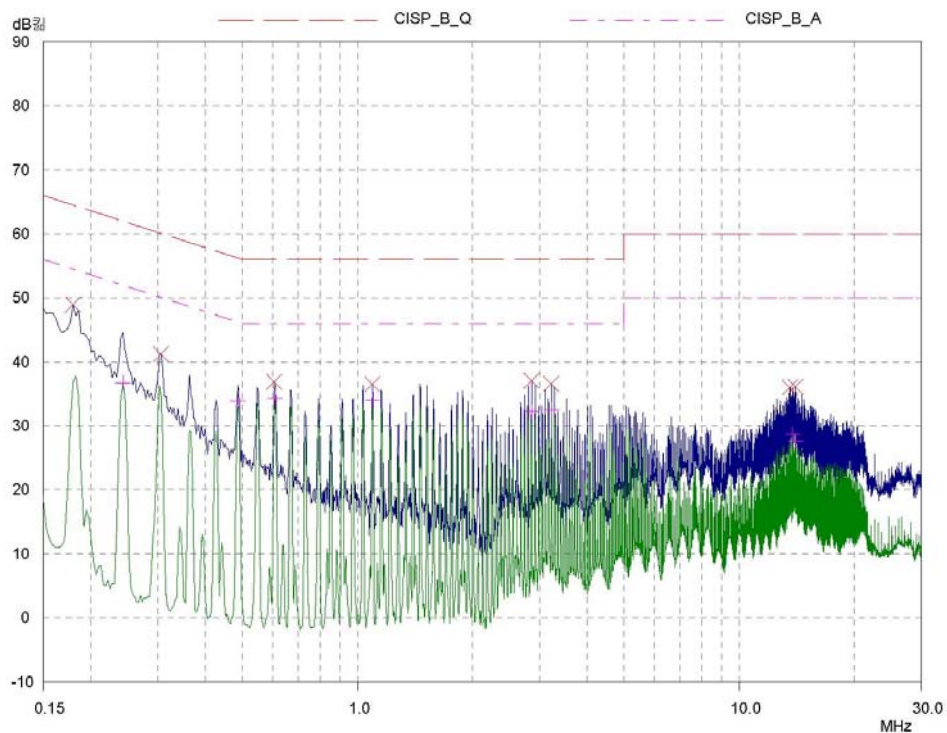
Test Data

측정주파수 [MHz]	보정 계수		극성	준첨두값			평균값		
	LISN	케이블		제한값	측정값	결과값	제한값	측정값	결과값
0.180	0.10	0.18	N	64	48.94	49.22	54	37.00	37.28
0.183	0.06	0.18	H	64	48.74	48.98	54	38.49	38.73
0.306	0.06	0.10	H	60	40.91	41.07	50	34.00	34.16
0.306	0.07	0.10	N	60	41.21	41.38	50	36.00	36.17
0.606	0.05	0.08	N	56	36.87	37.00	46	34.30	34.43
0.612	0.05	0.07	H	56	35.72	35.84	46	32.43	32.55
0.918	0.05	0.04	H	56	34.98	35.07	46	31.98	32.07
1.095	0.06	0.07	N	56	36.53	36.66	46	33.97	34.10
2.862	0.08	0.09	N	56	37.04	37.21	46	32.24	32.41
2.877	0.08	0.09	H	56	36.15	36.32	46	30.00	30.17
3.225	0.09	0.05	N	56	36.58	36.72	46	32.48	32.62
3.306	0.08	0.04	H	56	35.31	35.44	46	29.66	29.79
13.575	0.46	0.08	N	60	36.01	36.55	50	28.60	29.14
13.701	0.46	0.08	H	60	35.92	36.46	50	26.90	27.44
14.007	0.48	0.10	H	60	36.14	36.72	50	28.12	28.70
14.061	0.49	0.10	N	60	36.10	36.69	50	27.60	28.19

[HOT]



[NEUTRAL]



APPENDIX A – Test Equipment Used For Tests

No	Description	Manufacturer	Model No.	Serial No.	Due Cal.
1	Test Receiver	Rohde & Schwarz	ESHS 10	862970/018	2010.06.1
2	Test Receiver	Rohde & Schwarz	ESVS 10	826008/014	2010.05.2
3	Spectrum Analyzer	Hewlett Packard	8566B	2311A02394	2010.05.1
4	Spectrum Analyzer	Rohde & Schwarz	FSP13	100130	2010.05.1
5	Modulation Analyzer	Hewlett Packard	8901B	3438A05094	2010.05.1
6	Audio analyzer	Hewlett Packard	8903B	3011A12915	2010.05.1
7	Preamplifier	Hewlett Packard	8447F	2805A02570	2010.05.1
8	Preamplifier	A.H. Systems	PAM-0118	164	2010.04.1
9	Signal Generator	Hewlett Packard	8673D	2708A00448	2010.05.1
10	Power Meter	Hewlett Packard	437B	312U24787	2010.04.2
11	Power Sensor	Hewlett Packard	8482B	3318A06943	2010.05.1
12	Loop Antenna	Rohde & Schwarz	HFH2-Z2.335.4711.52	826532/006	2011.02.0
13	Dipole Antenna	Rohde & Schwarz	VHAP	574	2010.07.0
14	Dipole Antenna	Rohde & Schwarz	VHAP	575	2010.07.1
15	Dipole Antenna	Rohde & Schwarz	UHAP	545	2010.07.1
16	Dipole Antenna	Rohde & Schwarz	UHAP	546	2010.07.0
17	Biconical Antenna	Eaton Corp.	94455-1	0977	2010.07.0
18	Biconical Antenna	EMCO	3104C	9111-2468	2010.07.0
19	Log Periodic Antenna	EMCO	3146	2051	2010.06.0
20	Log Periodic Antenna	EMCO	3146	8901-2320	2010.07.0
21	Horn Antenna	A.H. Systems	SAS-571	414	2011.03.1
22	LISN	EMCO	3810/2	2228	2010.05.1
23	Waveform Generator	Hewlett Packard	33120A	US34001190	2010.05.1
24	Digital Oscilloscope	Tektronix	TDS 340A	B012287	2010.05.1 5
25	Dummy Load	Bird Electronics	8251	11511	2010.04.1