

CFR 47 FCC Part 15.247

TEST REPORT

Product : **Transceiver**

Trade Name : N/A

Model Number : AL-2050-EDPB

FCC ID : ELVNTRLE

Prepared for

Nutek Corporation

No.167, Lane 235, Bauchiau Rd., Shindian City,
Taipei County, 23145 Taiwan

TEL. : +886 2 2918 9478

FAX. : +886 2 2917 9069

Prepared by

Interocean EMC Technology Corp.

No. 5-2, Lin 1, Tin-Fu, Lin-Kou Dist., New Taipei City,
Taiwan 244, R.O.C.

TEL.: +886 2 2600 6861

FAX.: +886 2 2600 6859

Remark :

The test report consists of **51** pages in total. It shall not be reproduced except in full, without the written approval of IETC. This document may be altered or revised by IETC only, and shall be noted in the revision section of the document.
The test result in the report is only subjected to the test sample.

Table of Contents

1	General Information	5
1.1	Description of Equipment Under Test	5
1.2	Table for Carrier Frequencies	6
1.3	Details of Tested Supporting System	7
1.4	Test Facility	9
1.5	Test Equipment	10
1.6	Summary of Measurement	11
1.7	Justification	12
2	Test specifications	13
2.1	Test standard	13
2.2	Operation mode	13
3	20dB Bandwidth test	14
3.1	Limit	14
3.2	Configuration of Measurement	14
3.3	Test Procedure	14
3.4	Test Result	14
4	Carrier Frequency Separation test	17
4.1	Limit	17
4.2	Configuration of Measurement	17
4.3	Test Procedure	17
4.4	Test Result	17
5	Number of hopping frequencies test	20
5.1	Configuration of Measurement	20
5.2	Test Procedure	20
5.3	Test Result	20
6	Time of Occupancy (dwell time) test	22
6.1	Limit	22
6.2	Configuration of Measurement	22
6.3	Test Procedure	22
6.4	Test Result	22
7	Maximum Output Power test	24
7.1	Limit	24
7.2	Configuration of Measurement	24
7.3	Test Procedure	24
7.4	Test Result	24

8	RF Conducted spurious emission	27
8.1	Limit	27
8.2	Configuration of Measurement	27
8.3	Test Procedure	27
8.4	Test Result	27
9	RF Radiated spurious emission test	33
9.1	Limit	33
9.2	Configuration of Measurement	33
9.3	Test Procedure	34
9.4	Test Result	34
10	AC Power Line Conducted Emission test	39
10.1	Limits	39
10.2	Configuration of Measurement	39
10.3	Test Procedures	39
10.4	Test Result	39
11	Photographs of Test	42
11.1	Radiated Emission Measurement	42
12	Photographs of EUT	45

Statement of Compliance

Applicant: Nutek Corporation
Manufacturer: Nutek Corporation
Product: Transceiver
Model No.: AL-2050-EDPB
Tested Power Supply: DC 3.7V from battery
Date of Final Test: Dec. 24, 2012
Revision of Report: Rev. 04

Configuration of Measurements and Standards Used :

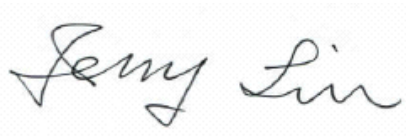
FCC Rules and Regulations Part 15 Subpart C

I HEREBY CERTIFY THAT: The data shown in this report were made in accordance with the procedures given in ANSI C63.4, and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

- Note:** 1. The result of the testing report relate only to the item tested.
2. The testing report shall not be reproduced expect in full, without the written approval of IETC

Report Issued: 2013/01/17

Project Engineer: 
Elli Chang

Approved: 
Jerry Liu

1 General Information

1.1 Description of Equipment Under Test

Product	: Transceiver
Model Number	: AL-2050-EDPB
Applicant	: Nutek Corporation No.167, Lane 235, Bauchiau Rd., Shindian City, Taipei County, 23145 Taiwan
Manufacturer	: Nutek Corporation No.167, Lane 235, Bauchiau Rd., Shindian City, Taipei County, 23145 Taiwan
Power Supply	: DC 3.7V from battery
Operating Frequency	: 909.333MHz ~ 918.769MHz
Channel Number	: 25 channels
Type of Modulation	: SST
Antenna Description	: This device uses Helix antenna. Antenna gain 0dBi. The antenna is integral to the device, thereby meeting the requirement of FCC 15.203.
Date of Test	: Sep. 18 ~ Dec. 24, 2012
Additional Description	: 1) The Model Number " AL-2050-EDPB " is representative selected in the test and included in this report. 2) For more detail specification about EUT, please refer to the user's manual.

1.2 Table for Carrier Frequencies

Channel	Frequency (MHz)	Channel	Frequency (MHz)
CH0	909.3330	CH13	914.5810
CH1	909.6590	CH14	914.9470
CH2	910.0490	CH15	915.2820
CH3	910.4000	CH16	915.6360
CH4	910.7370	CH17	916.0000
CH5	911.1110	CH18	916.3240
CH6	911.4670	CH19	916.6830
CH7	912.5000	CH20	917.0290
CH8	912.8420	CH21	917.7140
CH9	913.2000	CH22	918.0690
CH10	913.5480	CH23	918.4000
CH11	913.8820	CH24	918.7690
CH12	914.2330		

1.3 Hopping Sequence

11, 10, 15, 3, 0, 2, 5, 13, 4, 9, 8, 18, 22, 14, 17, 1, 23, 21, 19, 7, 24, 6, 16, 20, 12

1.4 Details of Tested Supporting System

1.4.1 Personal Computer

PC31

Model Number : SGH017PFWL
CPU Speed : Intel Core 2 Duo E5400
RAM : 2GB DDR3 1333MHz
EMC Compliance : CE, TUV, NCC, BSMI: R33275
Hard Disk Driver : 250GB Serial ATA2 3.0Gb/s 7200rpm
Manufacturer : HP
Switching Power Supply : LiteOn, PS-4321-9HP, 320W
Power Cord : Non-shielded, Detachable, 1.8m, w/o core

1.4.2 Monitor

MT28

Model Number : CMV 92GH 19"
Serial Number : 92GHAGCN9120288
EMC Compliance : FCC, CE, BSMI: R31374, UL, TUV
Manufacturer : CHIMEI
Power Cord : Non-shielded, Detachable, 1.8m, w/o core
D-Sub Cable : Non-shielded, Detachable, 1.8m

1.4.3 Keyboard

KB35 (USB)

Model Number : Y-U0011
Serial Number : N/A
EMC Compliance : CE, FCC, C-Tick, BSMI T51160, VCCI
Manufacturer : LOGITECH
Data Cable : Non-Shielded, Un-detachable, 1.5m

1.4.4 Mouse

USB62

Model Number : M-U0028
Serial Number : N/A
EMC Compliance : FCC, CE, BSMI T41126, VCCI
Manufacturer : LOGITECH
Data Cable : Non-shielded, Un-detachable, 1.8m

1.4.5 Printer

PR20

Model Number : ESPON ACULASER M1200
Serial Number : LWVZ127636
EMC Compliance : BSMI 33126, CE
Manufacturer : EPSON
Data Cable : Shielded, Detachable, 1.8m
Power Cord : Non-shielded, Un-detachable, 1.8m

1.4.6 Test Cable

USB Cable : Non-shielded, Detachable, 1.0m, w/o core

1.5 Test Facility

- Site Description** : Conducted 1 OATS 2 RF Test Room
- Name of Firm** : Interocean EMC Technology Corp.
- Company web** : <http://www.ietc.com.tw>
- Location** : No. 5-2, Lin 1, Tin-Fu, Lin-Kou Dist., New Taipei City, Taiwan 244, R.O.C.
- Site Filing** :
- Federal Communication Commissions – USA
Registration No.: 96399 (OATS 1 & 2)
Registration No.: 518958 (OATS 3)
Designation No.: TW1020
 - Voluntary Control Council for Interference by Information Technology Equipment (VCCI) – Japan
Member No.: 1349
Registration No. (Conducted Room): C-1094
Registration No. (Conducted Room): T-1562
Registration No. (OATS 1): R-1040; G-274
Registration No. (OATS 2): R-1041
 - Industry Canada (IC)
OUR FILE: 46405-4437 Submission: 145171
Registration No. (OATS 1): Site# 4437A-1
Registration No. (OATS 2): Site# 4437A-2
Registration No. (OATS 3): Site# 4437A-3
- Site Accreditation** :
- Bureau of Standards and Metrology and Inspection (BSMI) – Taiwan, R.O.C.
Accreditation No.:
SL2-IN-E-0026 for CNS13438 / CISPR22
SL2-R1-E-0026 for CNS13439 / CISPR13
SL2-R2-E-0026 for CNS13439 / CISPR13
SL2-A1-E-0026 for CNS13783-1 / CISPR14-1
SL2-L1-E-0026 for CNS 14115 / CISPR 15
 - Taiwan Accreditation Foundation (TAF)
Accrditation No.: 1113
 - TÜV NORD
Certificate No: TNTW0801R-04



1.6 Test Equipment

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100836	2013/08/08
Biconical Antenna	Schwarzbeck	BBA 9106	VHA 9103-2419	2013/03/28
Log Antenna	Schwarzbeck	UHALP 9108 A	0739	2013/03/28
Pre-Amplifier	SCHAFFNER	CPA9231A	3351	2013/01/17
RF Cable	IETC	8DFB	CBL14	2013/07/12
Spectrum Analyzer	R&S	FSP40	100478	2013/05/29
Preamplifier	Agilent	8449B	3008A01434	2013/05/02
Preamplifier	Agilent	83050A	3950A00225	2013/08/28
Horn Antenna	COM-POWER	AH-118	10081	2013/05/29
Horn Antenna	Schwarzbeck	BBHA 9120	9120D-583	2013/05/01
Horn Antenna	Schwarzbeck	BBHA 9170	213	2013/07/24
Cable	HARBOUR	27478LL142	CBL22	2013/09/27
EMI Test Receiver	Rohde & Schwarz	ESCS 30	830245/027	2013/10/10
RF Cable	HARBOUR	RG58/U	CBL39	2013/11/08
L.I.S.N.	Schwarzbeck	NNLK8121	8121417	2013/08/07
L.I.S.N.	Schaffner	MN2050D	1596	2013/07/22

Note: The above equipments are within the valid calibration period.

1.7 Summary of Measurement

Report Clause	Test Parameter	Reference Document CFR47 Part15	Results
3	20dB Bandwidth test	§15.247(a)(1)	Pass
4	Carrier Frequency Separation test	§15.247(a)(1)	Pass
5	Number of hopping frequencies test	§15.247(a)(1)	Pass
6	Time of Occupancy (dwell time) test	§15.247(a)(1)	Pass
7	Maximum Peak output power test	§15.247(b)	Pass
8	RF Conducted spurious emission	§15.247(c)	Pass
9	RF Radiated spurious emission test	§15.205, 15.209	Pass
	Emission on the Band Edge test	§15.247(d)	Not Applicable
10	AC Power Line Conducted Emission test	§15.207	Pass

1.8 Justification

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of the frequency band were all arrive limit requirement, thus we evaluate the EUT pass the specified test.

2 Test specifications

2.1 Test standard

The EUT was performed according to FCC Part 15 Subpart C Section 15.247 procedure and setup followed by ANSI C63.4, 2003 requirements.

2.2 Operation mode

By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "X axis" position was the worst, then the final test was executed the worst condition and test data were recorded in this report

The EUT was operated in continuous transmission mode during all of the tests.



X axis mode



Y axis mode



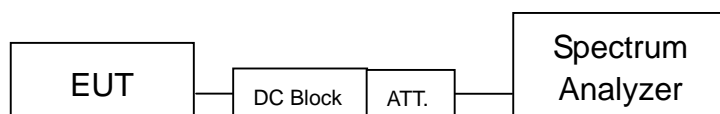
Z axis mode

3 20dB Bandwidth test

3.1 Limit

For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

3.2 Configuration of Measurement



3.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

The 20dB bandwidth per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 10 kHz, the video bandwidth \geq RBW, and the SPAN may equal to approximately 2 to 3 time the 20dB bandwidth.

3.4 Test Result

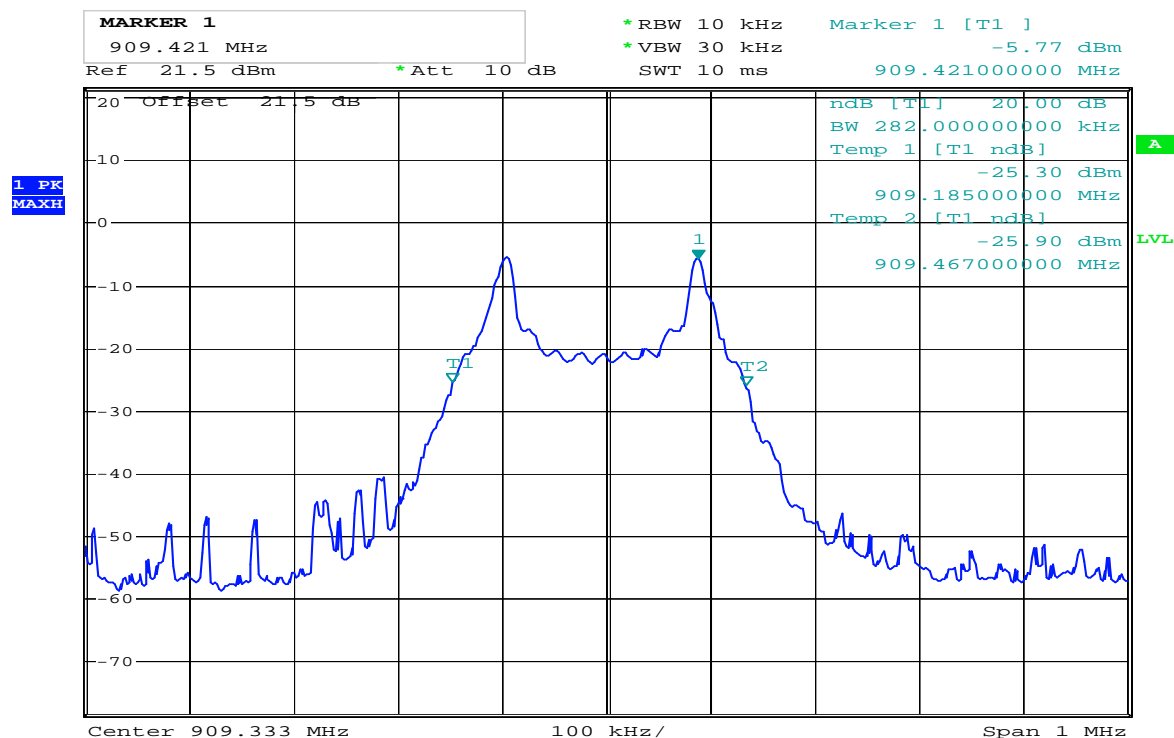
PASS.

The final test data is shown as following pages.

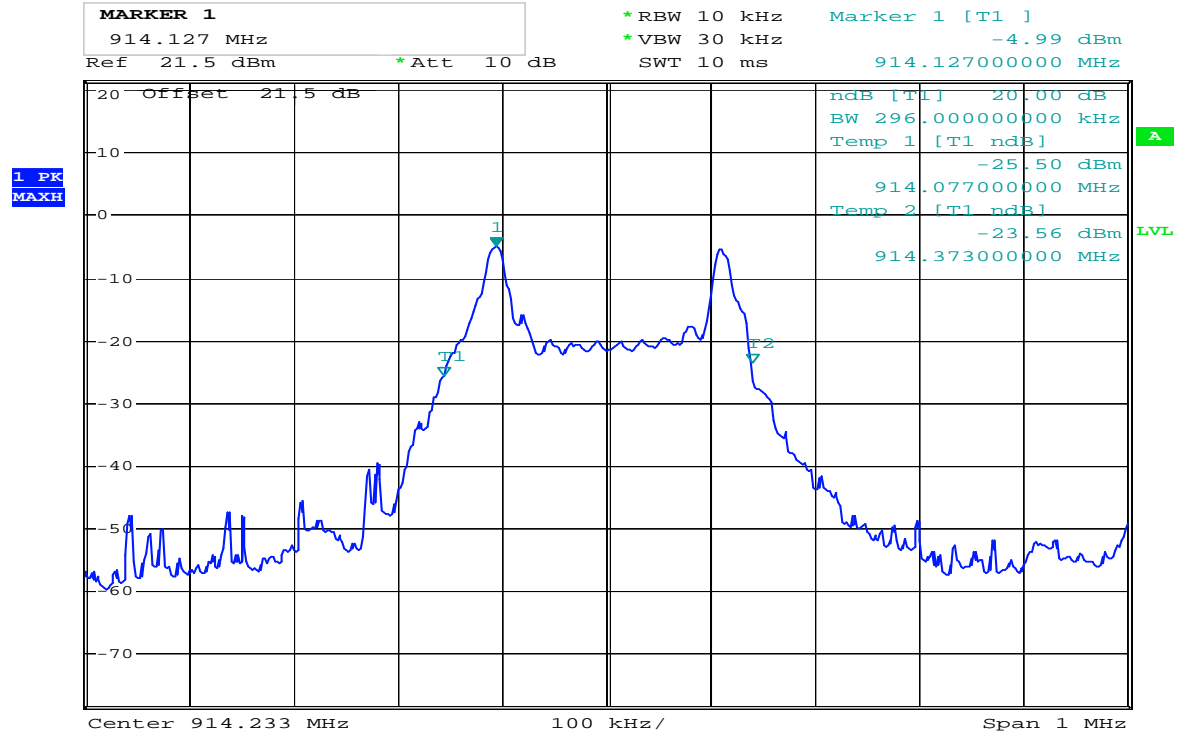
20dB bandwidth

Modulation	CH No.	Freq. (MHz)	20dB Bandwidth (kHz)	Limit (kHz)
SST	0	909.333	282.00	250 - 500
	12	914.233	296.00	250 - 500
	24	918.769	278.00	250 - 500

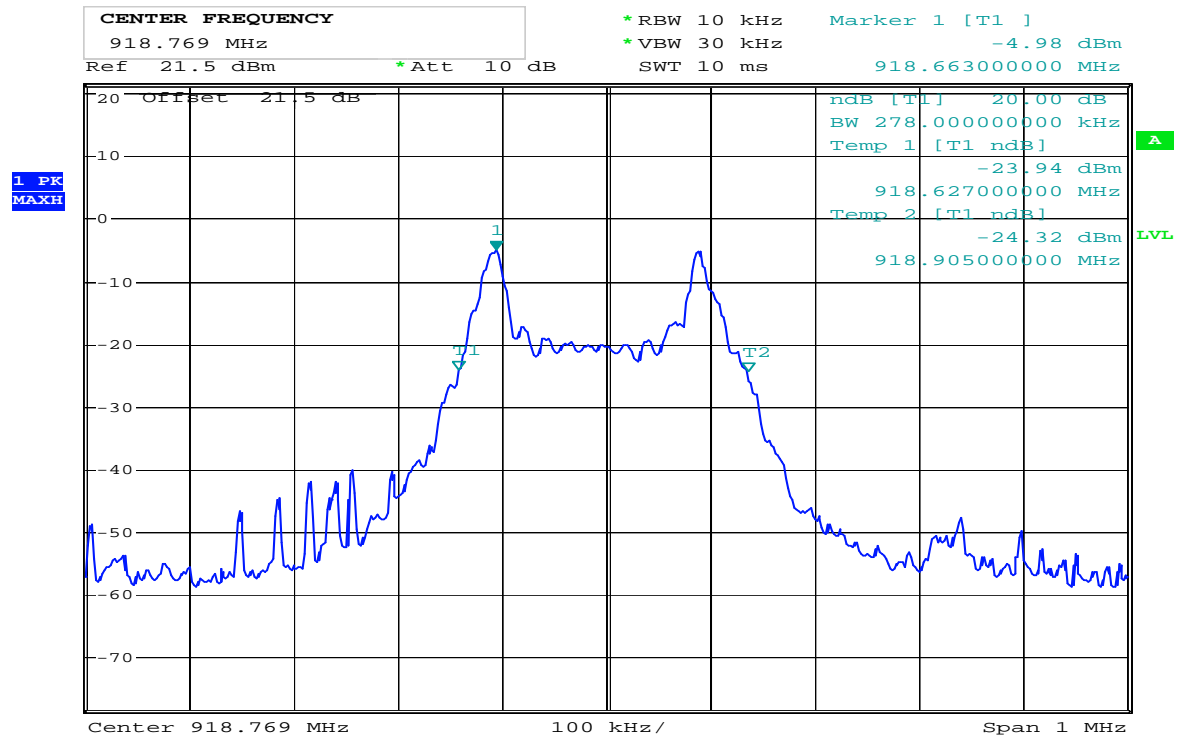
CH0 909.333MHz



CH12 914.233MHz



CH24 918.769MHz

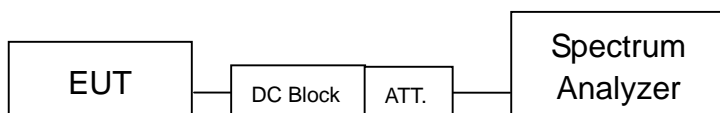


4 Carrier Frequency Separation test

4.1 Limit

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

4.2 Configuration of Measurement



4.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

The carrier frequency separation per FCC Part15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at $\geq 1\%$ of the span, the video bandwidth \geq RBW, and the SPAN was wide enough to capture the peaks of two adjacent channels.

4.4 Test Result

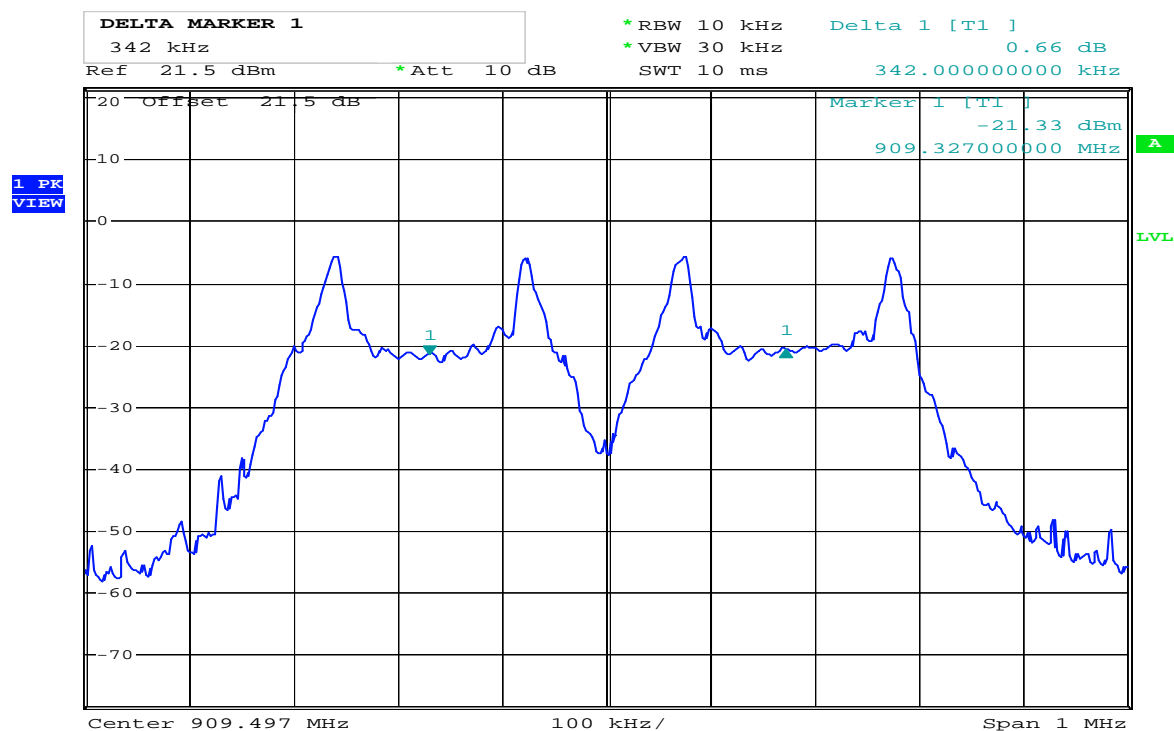
PASS.

The final test data is shown as following pages.

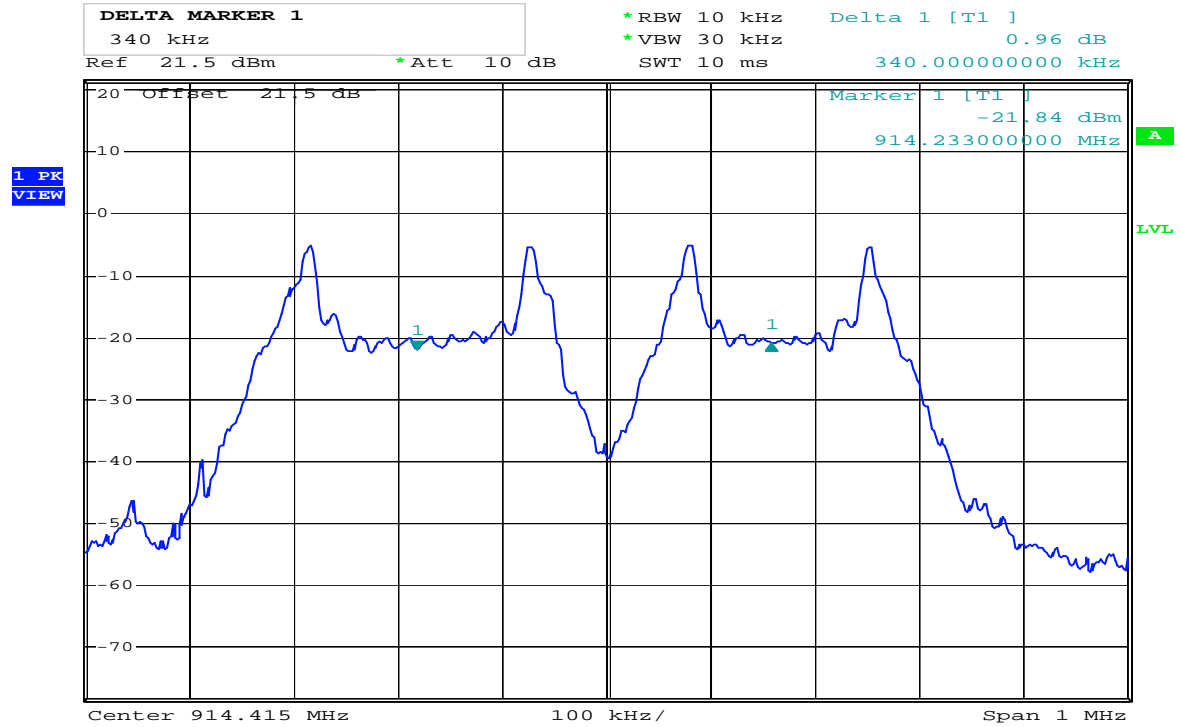
Carrier Frequency Separation test

Modulation type	Frequency (MHz)	Separation (kHz)
SST	909.333 - 909.659	342
SST	914.233 - 914.581	340
SST	918.400 - 918.769	368

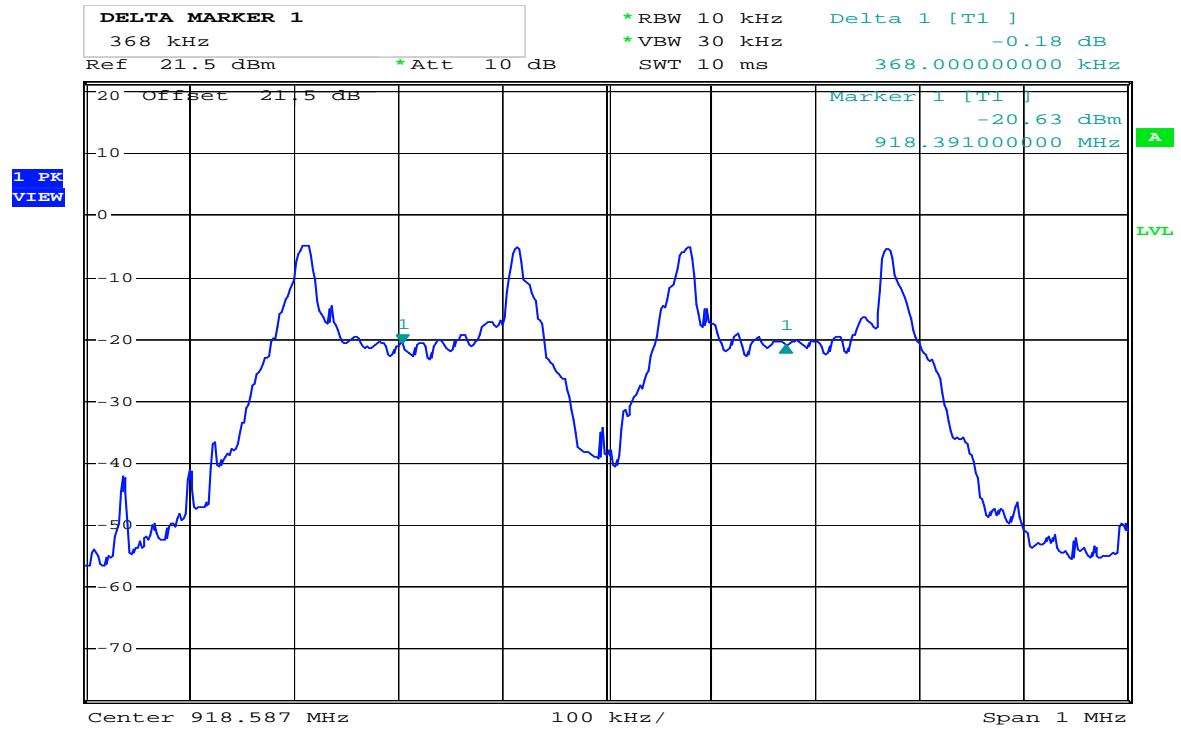
Channel Separation (909.6MHz)



Channel Separation (914.233MHz)

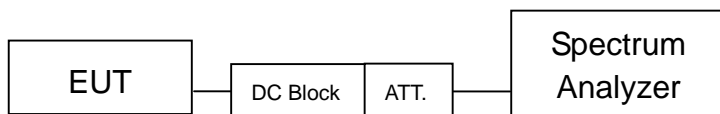


Channel Separation (918.769MHz)



5 Number of hopping frequencies test

5.1 Configuration of Measurement



5.2 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

The number of hopping frequencies per FCC Part15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at $\geq 1\%$ of the span, the video bandwidth \geq RBW, and the SPAN was the frequency band of operation.

5.3 Test Result

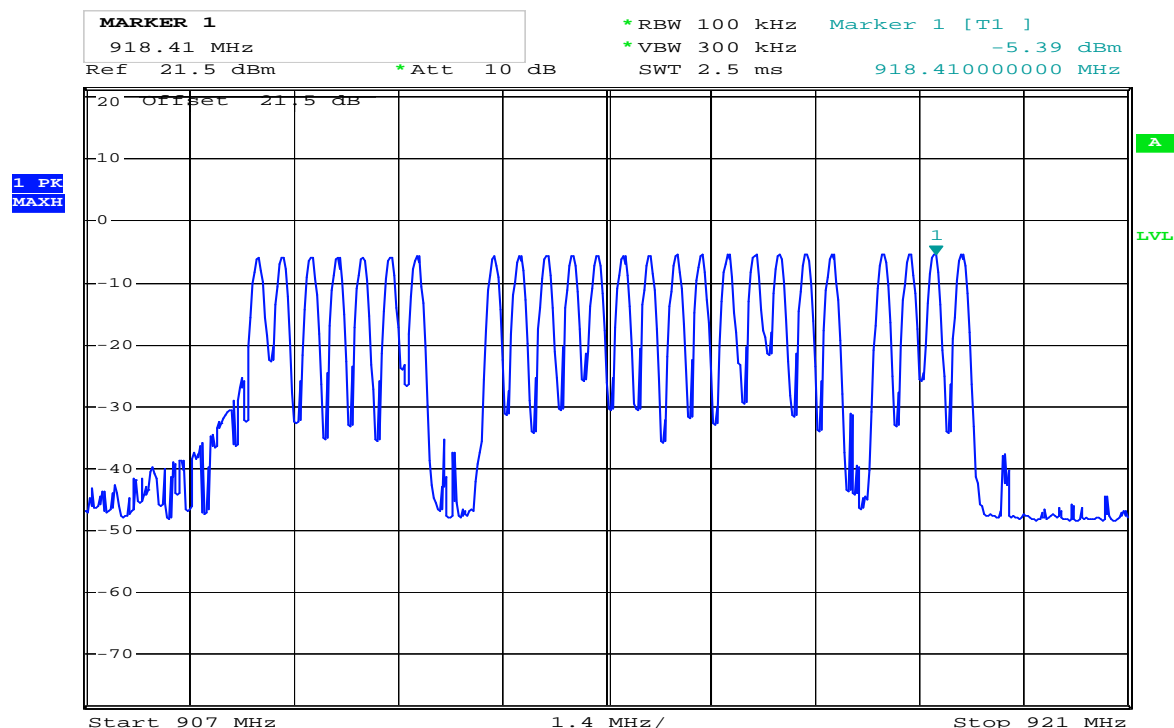
PASS.

The final test data is shown as following pages.

Number of hopping frequencies test

Modulation	No. of Hopping CH.
SST	25

Channel Number

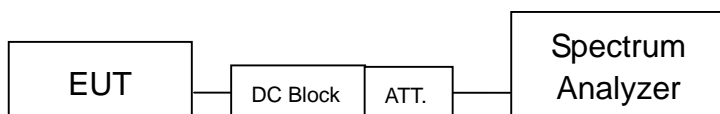


6 Time of Occupancy (dwell time) test

6.1 Limit

For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

6.2 Configuration of Measurement



6.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

According to FCC Part15.247(a)(1) the time of occupancy (dwell time) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 1MHz, the video bandwidth \geq RBW and the zero span function of spectrum analyzer was enable. The EUT has its hopping function enable.

6.4 Test Result

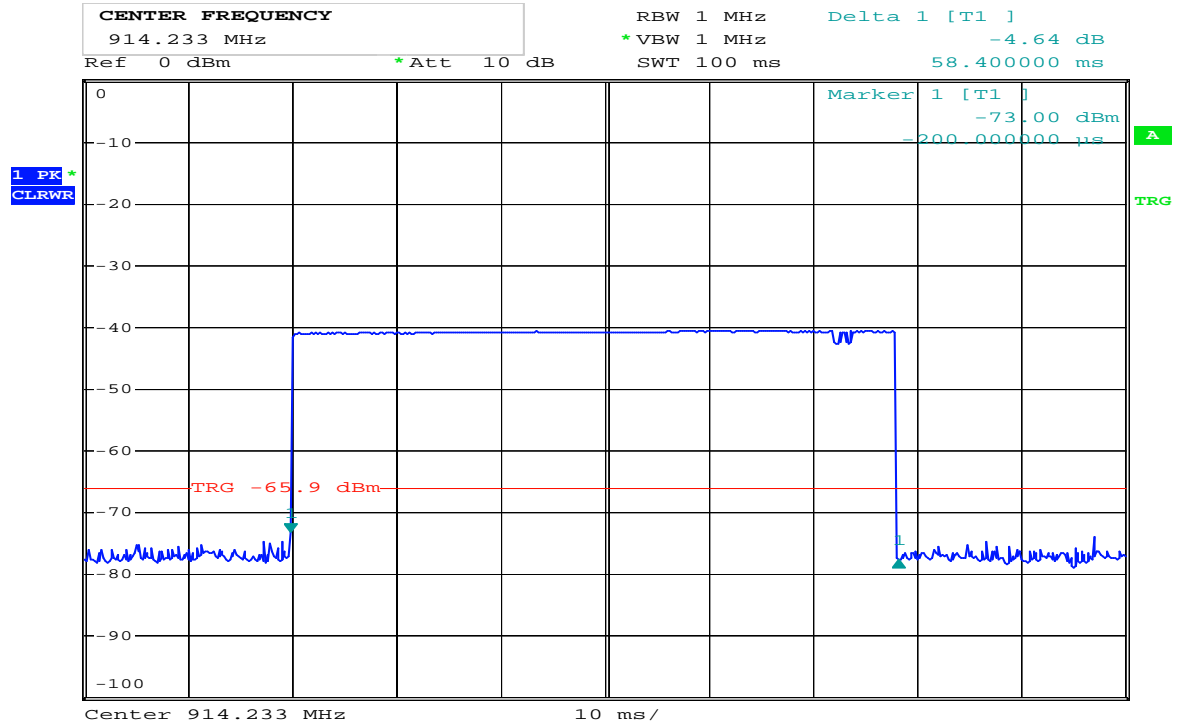
PASS.

The final test data is shown as following pages.

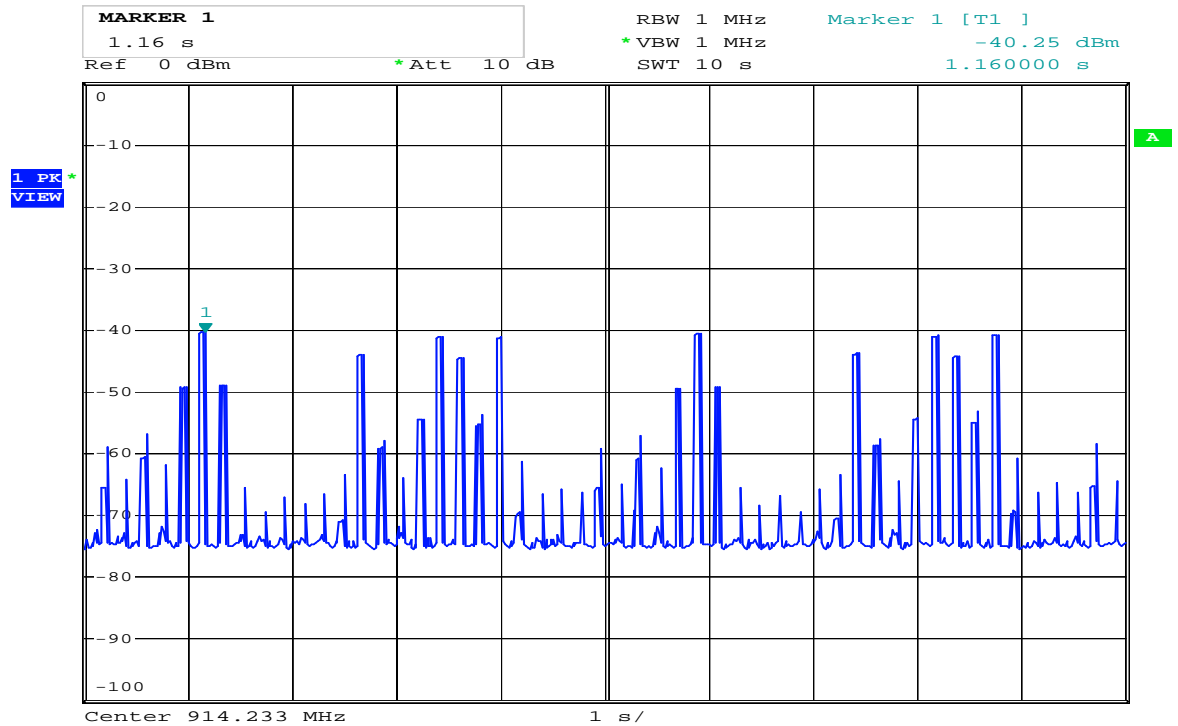
Time of Occupancy (dwell time) test

4 occurrences in 10 seconds x 58.4 ms = 233.6 ms which is less than 400 ms.

Dwell time-1



Dwell time-2

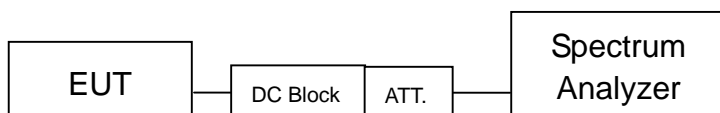


7 Maximum Output Power test

7.1 Limit

For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

7.2 Configuration of Measurement



7.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

For FCC Part 15.247(b) the power output per was measured on the EUT using a 50 ohm SMA cable connected to peak Spectrum Analyzer. Peak output power was read directly from Spectrum Analyzer. The test was performed at 3 channels (lowest, middle and highest).

7.4 Test Result

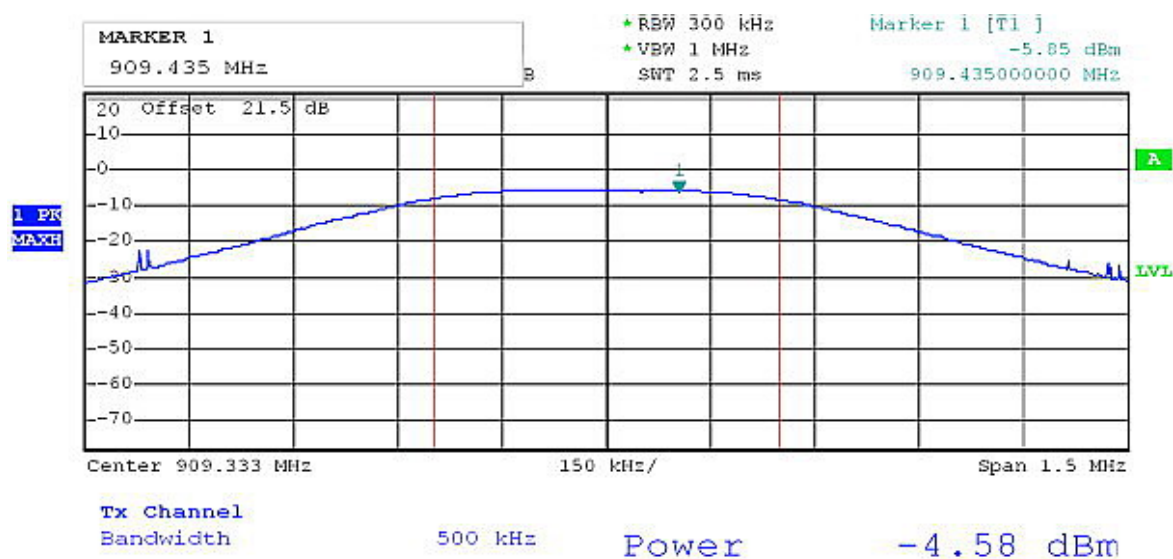
PASS.

The final test data is shown as following pages.

Maximum output power

CH	Freq. (MHz)	Test Voltage (Vdc)	Maximum transmit power		Limit (dBm)	Margin (dB)
			(dBm)	(watts)		
0	909.333	DC 3.7V	-4.58	0.00035	24	-28.58
12	914.233	DC 3.7V	-4.20	0.00038	24	-28.20
24	918.769	DC 3.7V	-3.92	0.00041	24	-27.92

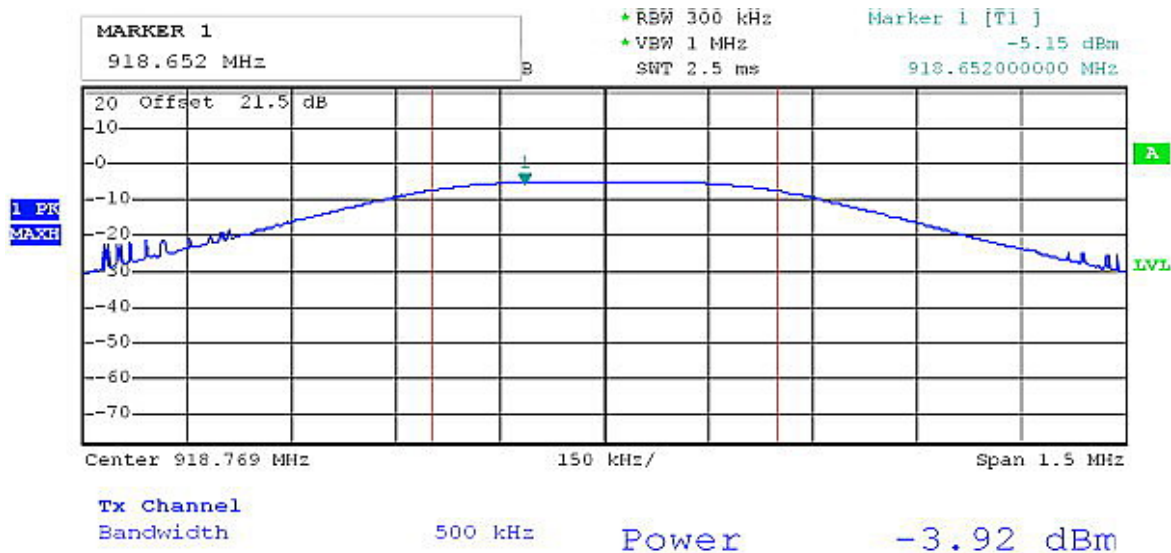
CH0 909.333MHz



CH12 914.233MHz



CH24 918.769MHz



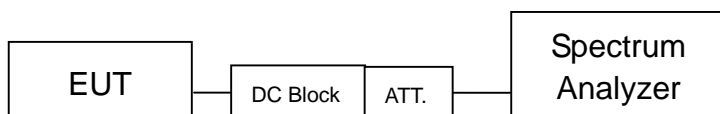
8 RF Conducted spurious emission

8.1 Limit

According to FCC Part 15.247(d) requirement :

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

8.2 Configuration of Measurement



8.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

RF antenna conducted spurious emissions was measured from the EUT antenna port using a 50ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 100 kHz.

The measurements were performed from 30MHz to 10GHz.

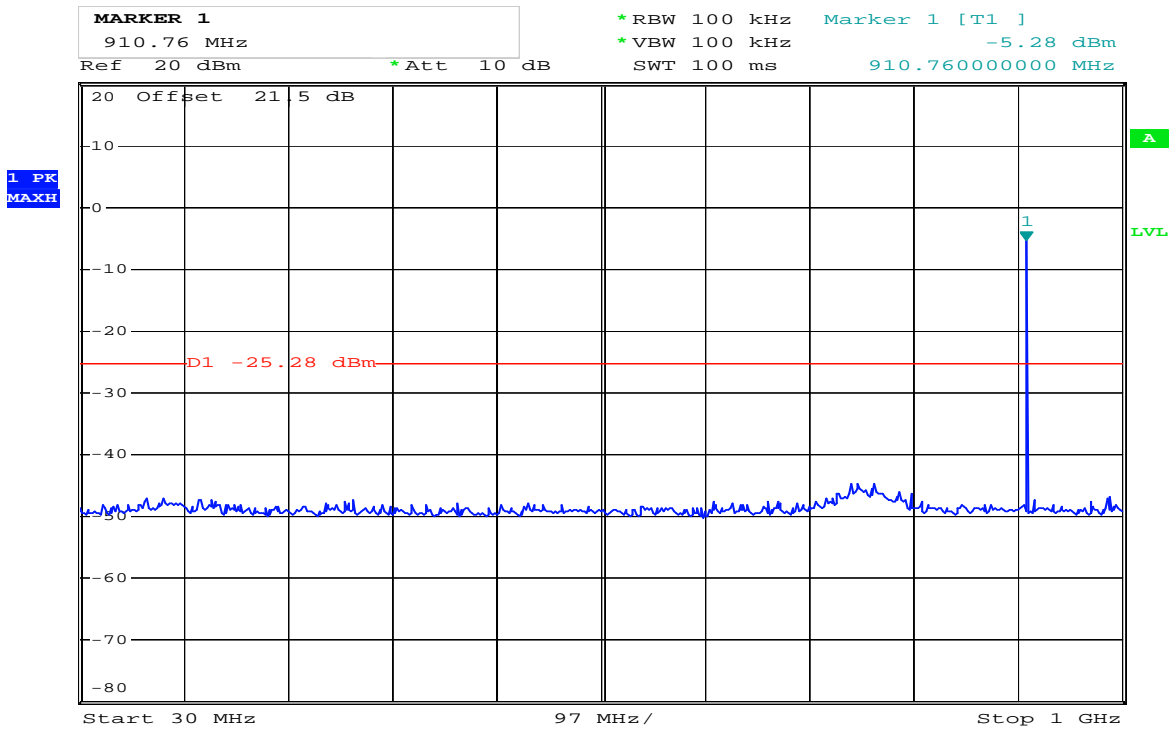
8.4 Test Result

PASS.

The final test data is shown as following pages.

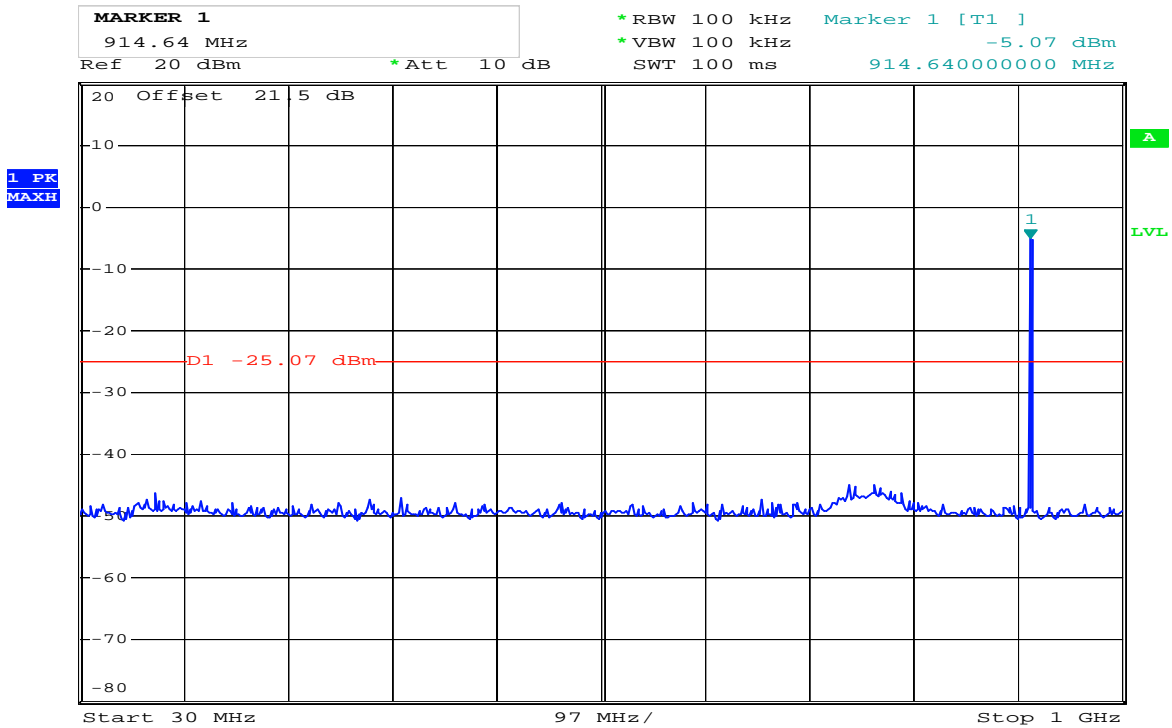
Conducted spurious emission

CH0 909.333MHz (30MHz ~ 1GHz)



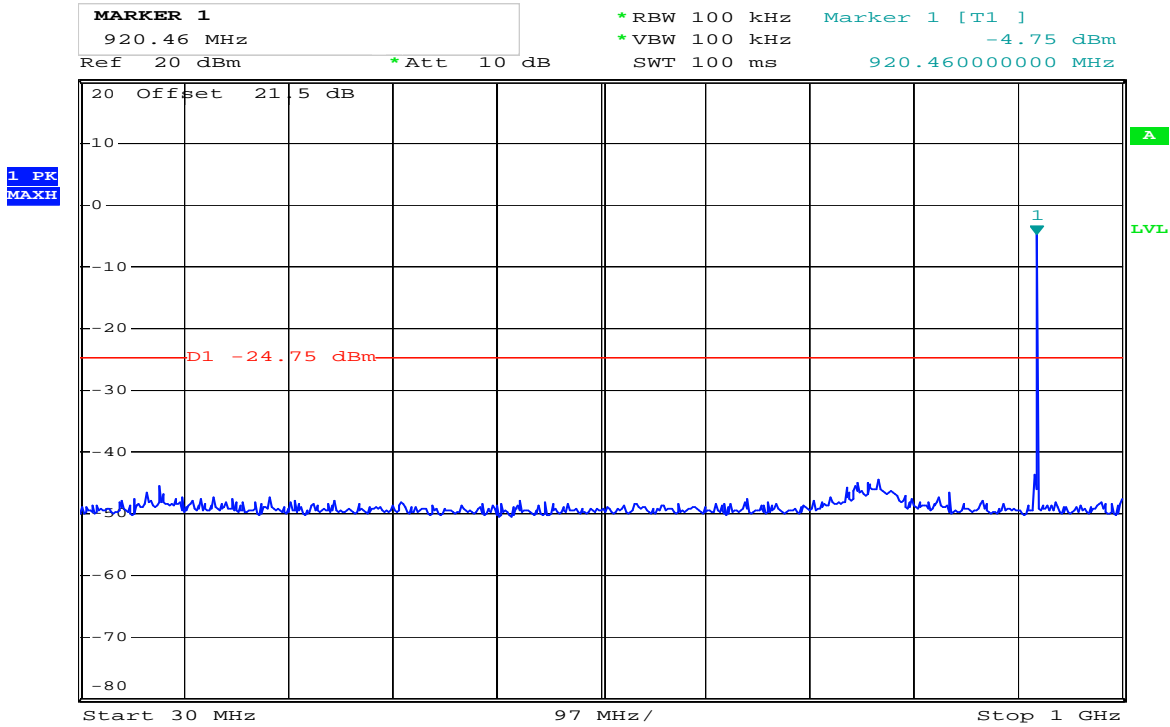
1

CH12 914.233MHz (30MHz ~ 1GHz)

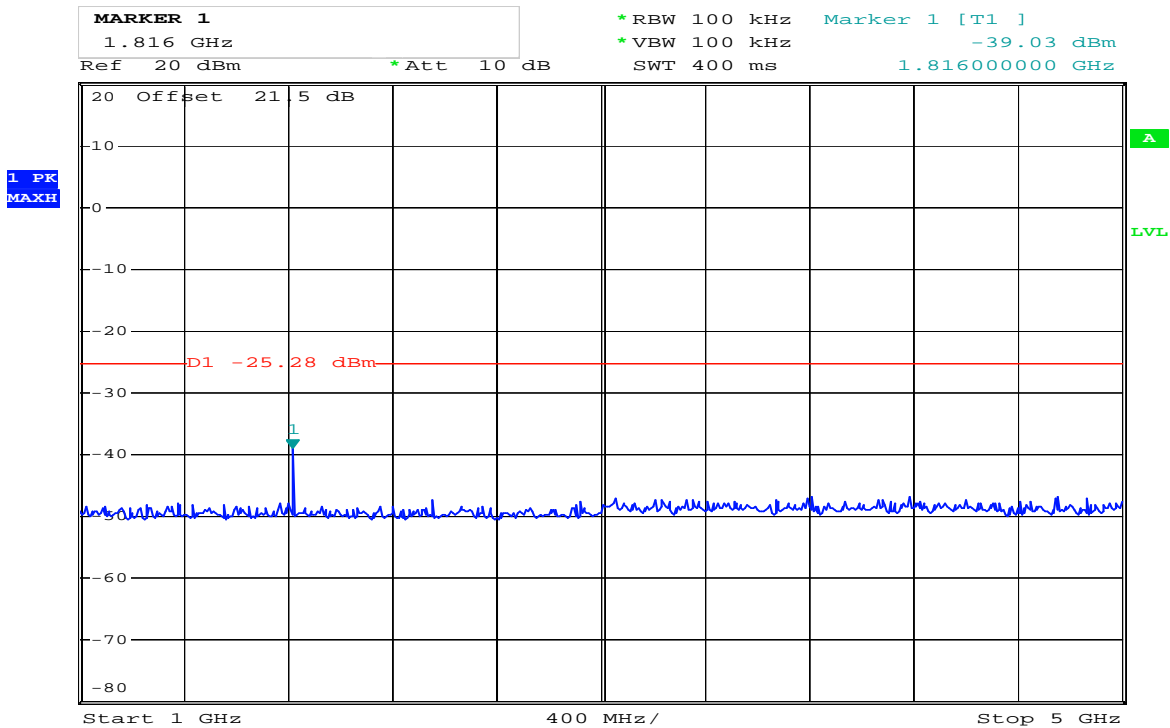


Date: 24.DEC.2012 09:28:02

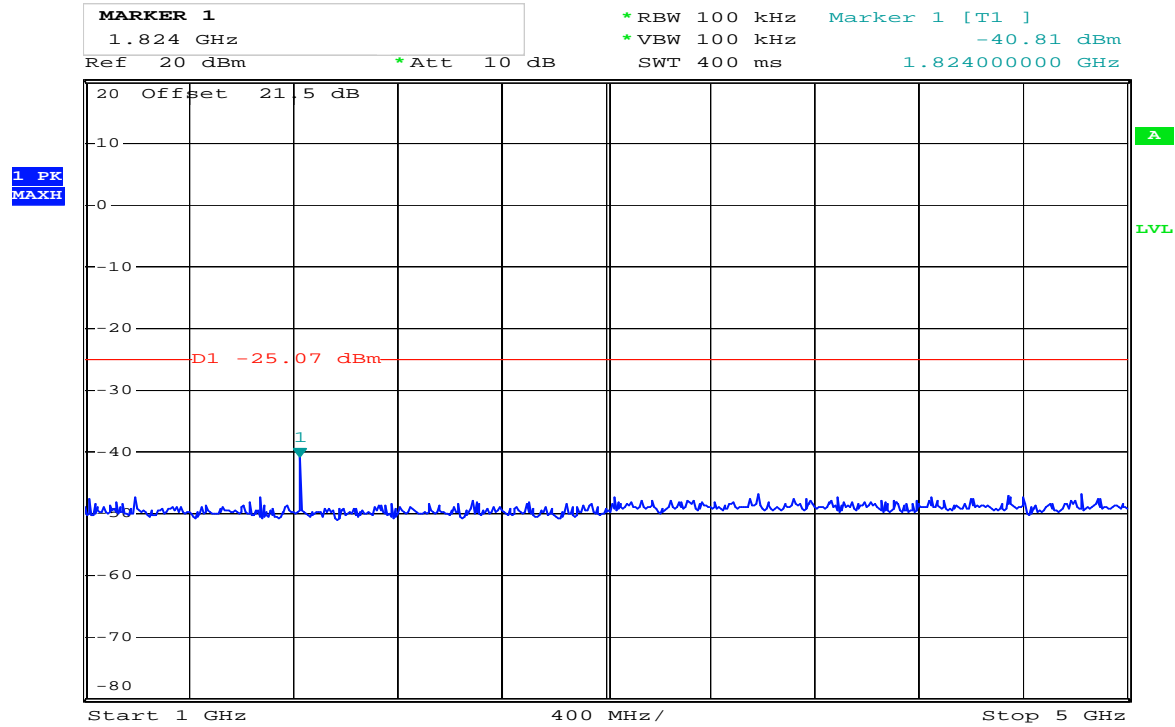
CH24 918.769MHz (30MHz ~ 1GHz)



CH0 909.333MHz (1~5GHz)

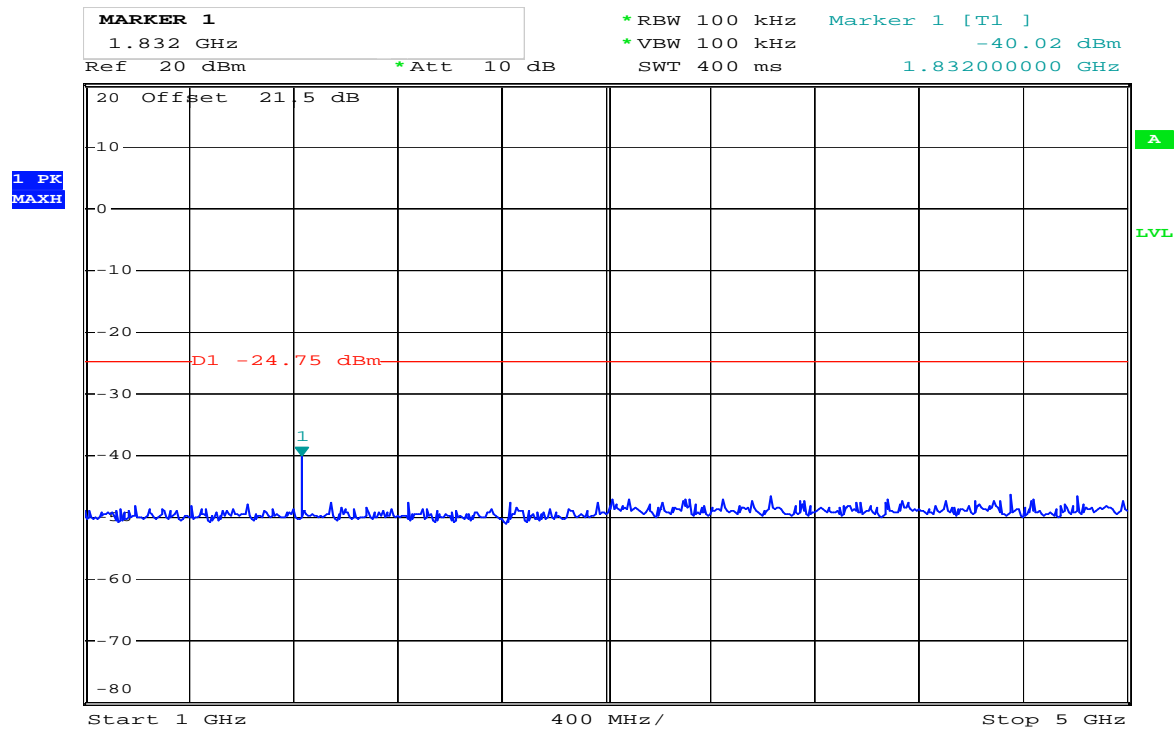


CH12 914.233MHz (1~5GHz)

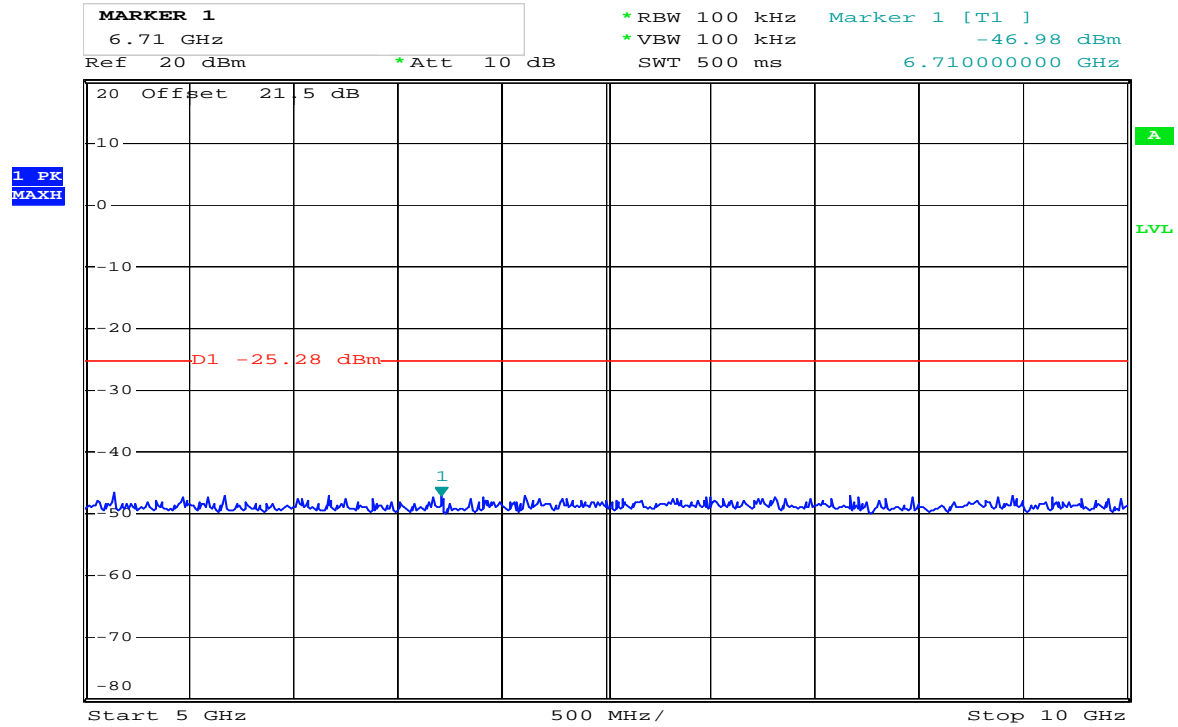


Date: 27 DEC 2012 09:20:33

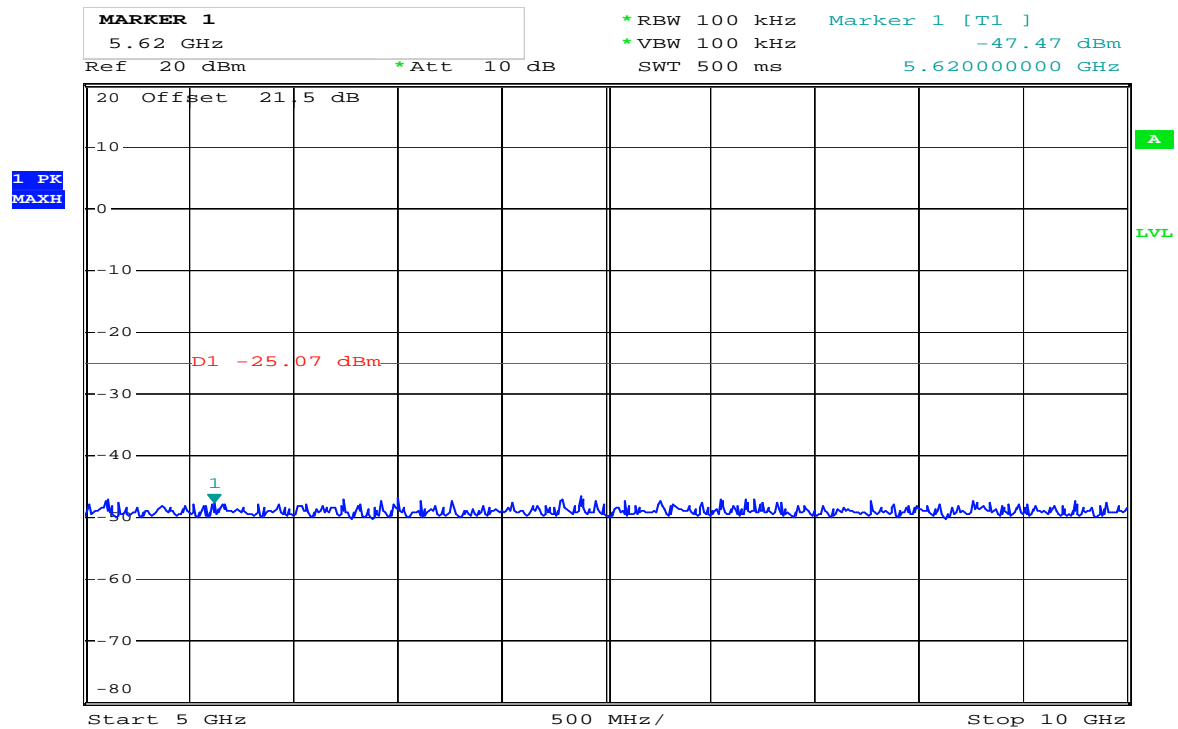
CH24 918.769MHz (1~5GHz)



CH0 909.333MHz (5~10GHz)



CH12 914.233MHz (5~10GHz)



9 RF Radiated spurious emission test

9.1 Limit

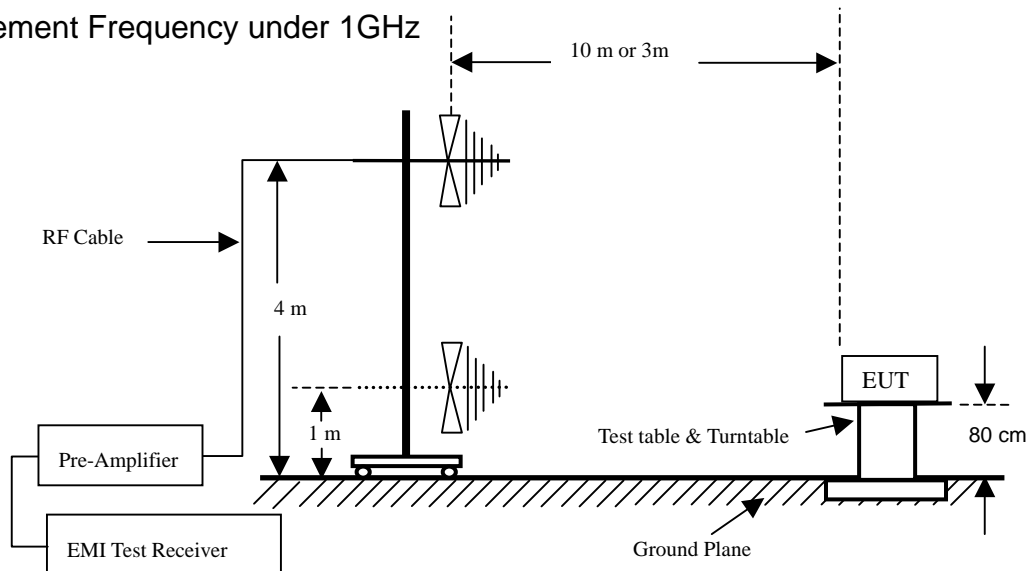
For intentional radiator, the radiated emission shall comply with FCC Part 15.209(a).

For intentional radiators, according to FCC Part 15.247 (a), operation under this provision is limited to frequency hopping and direct sequence spread spectrum, and the out band emission shall be comply with FCC Part 15.247 (c)

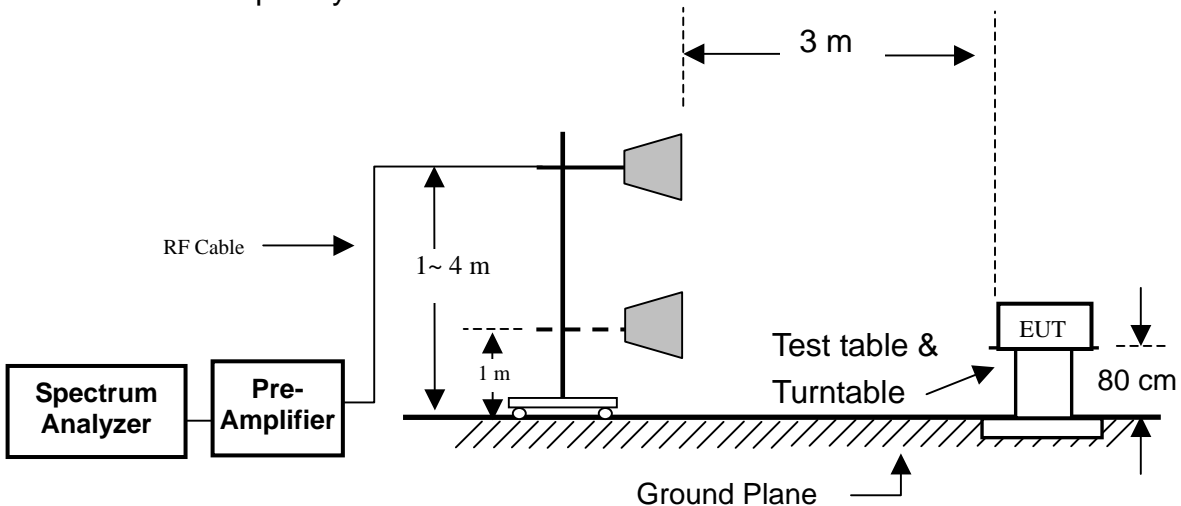
Frequency (MHz)	Field strength dB(μ V/m)	Measurement distance (meters)
1.705~30.0	29.5	30
30 ~ 88	40	3
88~216	43.5	3
216~960	46	3
Above 960	54	3

9.2 Configuration of Measurement

Measurement Frequency under 1GHz



Measurement Frequency above 1GHz



9.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

Radiated emission measurements were performed from 30MHz to 10GHz. Spectrum Analyzer set as below: For frequency range from 30MHz to 1GHz: RBW=100kHz or greater. For frequencies above 1GHz: set RBW=VBW=1MHz for peak detector and RBW=1MHz, VBW=10Hz for average detector.

The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and whole system. During the test, all cables were arranged to present worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meter and down to 1 meter.

9.4 Test Result

PASS.

The final test data is shown as following pages.

Radiated spurious emission

Test Environment

Ambient temperature : 21.2°C

Relative humidity : 52%

Radiated Emission below 1GHz

After verifying low, middle and high channel (909.333MHz, 914.233MHz and 918.769MHz).

Worst case was found at High channel (X axis).								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamp (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
111.680	H	43.17	29.97	13.19	26.39	43.52	-17.13	QP
158.550	H	41.03	30.20	17.25	28.08	43.52	-15.44	QP
196.630	H	37.27	29.87	19.44	26.84	43.52	-16.68	QP
280.330	H	38.56	30.04	22.43	30.95	46.02	-15.07	QP
344.890	H	39.79	29.48	18.57	28.88	46.02	-17.14	QP
465.290	H	36.75	29.44	22.11	29.42	46.02	-16.60	QP
110.890	V	45.95	29.98	14.29	30.26	43.52	-13.26	QP
185.630	V	38.91	29.76	19.50	28.65	43.52	-14.87	QP
205.780	V	38.00	29.95	20.03	28.08	43.52	-15.44	QP
269.860	V	38.76	30.08	22.02	30.70	46.02	-15.32	QP
367.400	V	39.05	29.40	19.31	28.96	46.02	-17.06	QP
429.310	V	37.73	29.17	20.98	29.54	46.02	-16.48	QP

Remark : Corrected Level = Reading + Correction Factor – Preamp

Correction Factor = Antenna Factor + Cable Loss

The present spurious only show those points are above noise level and the frequency range test from 30MHz to 1GHz.

Radiated spurious emission

Radiated Emission above 1GHz

CH0 (909.333MHz)								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamp (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
1818.666	H	51.56	27.83	29.60	53.33	54	-0.67	PK
2727.999	H	35.37	27.76	32.57	40.18	54	-13.82	PK
3637.332	H	35.77	27.71	34.45	42.51	54	-11.49	PK
4546.665	H	38.62	27.33	36.98	48.27	54	-5.73	PK
5455.998	H	35.42	27.61	39.19	47.00	54	-7.00	PK
*6365.331	H	34.68	27.07	41.69	49.30	54	-4.70	PK
1818.666	V	56.24	27.83	29.60	58.01	74	-15.99	PK
1818.666	V	48.46	27.83	29.60	50.23	54	-3.77	AV
2727.999	V	35.61	27.76	32.57	40.42	54	-13.58	PK
3637.332	V	35.43	27.71	34.45	42.17	54	-11.83	PK
4546.665	V	38.63	27.33	36.98	48.28	54	-5.72	PK
5455.998	V	36.03	27.61	39.19	47.61	54	-6.39	PK
*6365.331	V	34.36	27.07	41.69	48.98	54	-5.02	PK

Remark : Corrected Level = Reading + Correction Factor – Preamp

Correction Factor = Antenna Factor + Cable Loss

* Mark indicated background noise level.

CH12 (914.233MHz)								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamp (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
1828.466	H	51.80	27.84	29.62	53.58	54	-0.42	PK
2742.699	H	35.55	27.75	32.62	40.42	54	-13.58	PK
3656.932	H	35.92	27.70	34.54	42.76	54	-11.24	PK
4571.165	H	39.28	27.34	37.05	48.99	54	-5.01	PK
5485.398	H	35.29	27.62	39.25	46.92	54	-7.08	PK
*6399.631	H	35.14	27.04	41.81	49.91	54	-4.09	PK
1828.466	V	56.53	27.84	29.62	58.31	74	-15.69	PK
1828.466	V	48.68	27.84	29.62	50.46	54	-3.54	AV
2742.699	V	35.83	27.75	32.62	40.70	54	-13.30	PK
3656.932	V	35.67	27.70	34.54	42.51	54	-11.49	PK
4571.165	V	38.79	27.34	37.05	48.50	54	-5.50	PK
5485.398	V	35.45	27.62	39.25	47.08	54	-6.92	PK
*6399.631	V	34.54	27.04	41.81	49.31	54	-4.69	PK

Remark : Corrected Level = Reading + Correction Factor – Preamp

Correction Factor = Antenna Factor + Cable Loss

* Mark indicated background noise level.

CH24 (918.769MHz)								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamp (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
1837.538	H	52.11	27.85	29.65	53.91	54	-0.09	PK
2756.307	H	35.66	27.75	32.67	40.58	54	-13.42	PK
3675.076	H	35.71	27.70	34.62	42.63	54	-11.37	PK
4593.845	H	38.22	27.35	37.11	47.98	54	-6.02	PK
5512.614	H	34.67	27.61	39.31	46.37	54	-7.63	PK
*6431.383	H	34.31	27.01	41.93	49.23	54	-4.77	PK
1837.538	V	57.25	27.85	29.65	59.05	74	-14.95	PK
1837.538	V	49.05	27.85	29.65	50.85	54	-3.15	AV
2756.307	V	35.80	27.75	32.67	40.72	54	-13.28	PK
3675.076	V	35.39	27.70	34.62	42.31	54	-11.69	PK
4593.845	V	39.21	27.35	37.11	48.97	54	-5.03	PK
5512.614	V	35.44	27.61	39.31	47.14	54	-6.86	PK
*6431.383	V	34.62	27.01	41.93	49.54	54	-4.46	PK

Remark : Corrected Level = Reading + Correction Factor – Preamp

Correction Factor = Antenna Factor + Cable Loss

* Mark indicated background noise level.

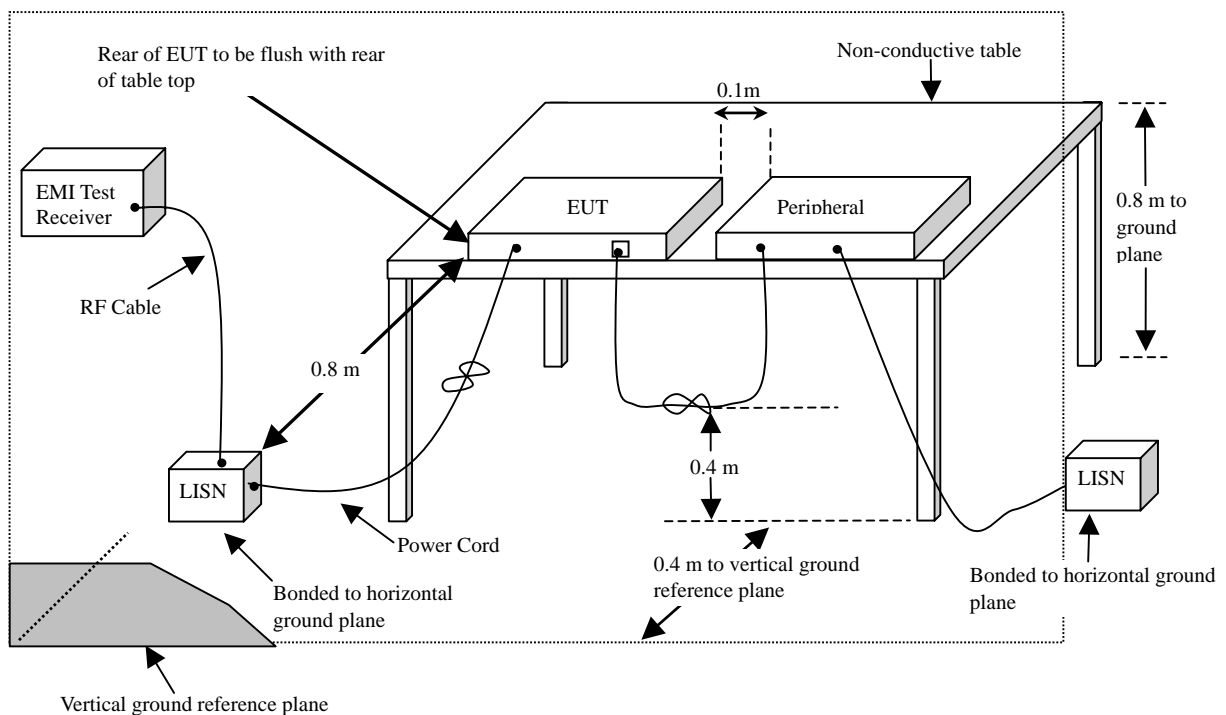
10 AC Power Line Conducted Emission test

10.1 Limits

Frequency (MHz)	Quasi-Peak (dB μ V)	Average (dB μ V)
0.15 to 0.5	66 to 56	56 to 46
> 0.5 to 5	56	46
> 5 to 30	60	50

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 30 MHz.

10.2 Configuration of Measurement



10.3 Test Procedures

The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

- 1) The EUT was placed 80cm height above ground on a non-conductive table and vertical conducting plane located 40cm to the rear of the EUT.
- 2) The EUT was connected to the main power through Line Impedance Stabilization Networks (LISN). This setup provided a 50ohm/50mH coupling impedance for the measuring equipment. The auxiliary equipment will place in secondary LISN.
- 3) Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2003 on conducted measurement.

10.4 Test Result

PASS.

The final test data is shown as following pages.

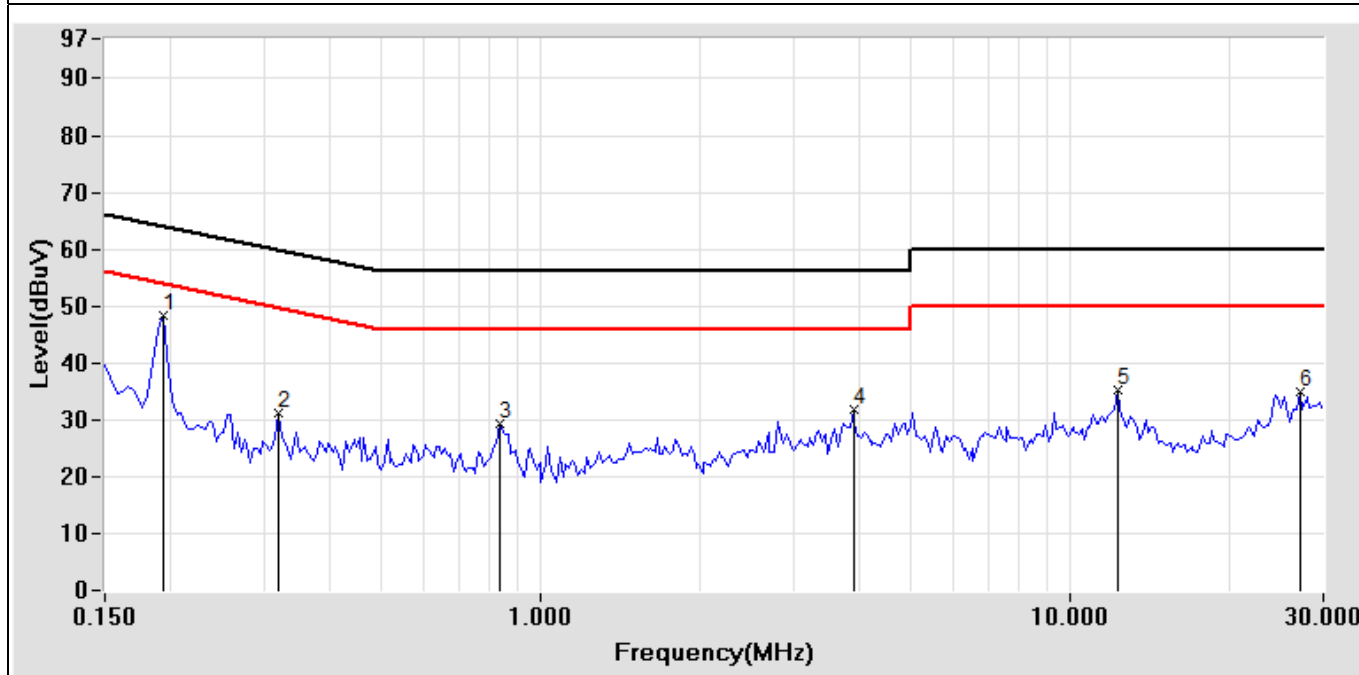
Power Line Conducted Test Data

EUT: Transceiver CLIENT: Nutek Corporation MODEL: AL-2050-EDPB RATING: From PC Temperature: 26.1 °C Humidity: 50 %	POLARITY: Line DISTANCE: Serial No.: FILE/DATA#: Nutek.emi/5 OPERATOR: Elli TEST SITE: Conducted 1
---	---

Frequency (MHz)	Factor (dB)	Meter Reading (dBµV)		Emission Level (dBµV)		Limits (dBµV)		Margin (dB)	
		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.193	0.23	46.05	40.86	46.28	41.09	63.91	53.91	-17.63	-12.82
0.318	0.23	28.72	24.90	28.95	25.13	59.76	49.76	-30.81	-24.63
0.834	0.24	25.88	22.28	26.12	22.52	56.00	46.00	-29.88	-23.48
3.896	0.24	26.07	21.21	26.31	21.45	56.00	46.00	-29.69	-24.55
12.298	0.65	27.19	21.39	27.84	22.04	60.00	50.00	-32.16	-27.96
27.240	1.45	26.79	17.51	28.24	18.96	60.00	50.00	-31.76	-31.04

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



Test Mode: Working Mode

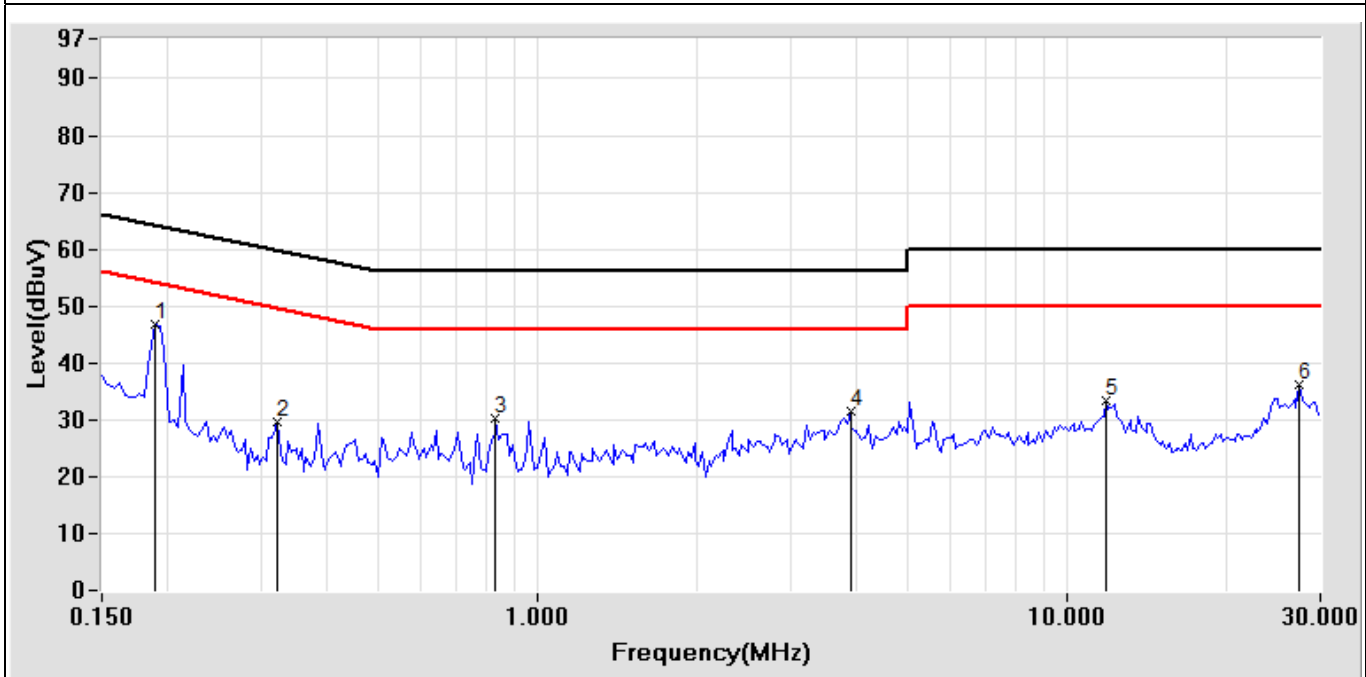
Power Line Conducted Test Data

EUT: Transmitter CLIENT: Nutek Corporation MODEL: AL-2050-EDPB RATING: From PC Temperature: 26.1 °C Humidity: 50 %	POLARITY: Neutral DISTANCE: Serial No.: FILE/DATA#: Nutek.emi/4 OPERATOR: Elli TEST SITE: Conducted 1
---	--

Frequency (MHz)	Factor (dB)	Meter Reading (dBµV)		Emission Level (dBµV)		Limits (dBµV)		Margin (dB)	
		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.189	0.25	46.20	40.44	46.45	40.69	64.08	54.08	-17.63	-13.39
0.322	0.26	27.65	24.21	27.91	24.47	59.66	49.66	-31.75	-25.19
0.830	0.27	27.61	23.66	27.88	23.93	56.00	46.00	-28.12	-22.07
3.900	0.29	28.30	23.09	28.59	23.38	56.00	46.00	-27.41	-22.62
11.791	0.70	25.93	19.77	26.63	20.47	60.00	50.00	-33.37	-29.53
27.369	1.44	27.43	17.99	28.87	19.43	60.00	50.00	-31.13	-30.57

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



Test Mode: Working Mode