

FCC Test Report

Report No: WD-RF-R-200337-A0

Product Name : Network Camera
Model Name : YGN2003
Series Model Name : YGN2000XXXXXXXXXXXXXXXXXX, YGN2001XXXXXXXXXXXXXXXXXX, YGN2002XXXXXXXXXXXXXXXXXX, YGN2003XXXXXXXXXXXXXXXXXX, YGN2004XXXXXXXXXXXXXXXXXX, YGN2005XXXXXXXXXXXXXXXXXX, YGN2006XXXXXXXXXXXXXXXXXX, YGN2007XXXXXXXXXXXXXXXXXX, YGN2008XXXXXXXXXXXXXXXXXX, YGN2009XXXXXXXXXXXXXXXXXX, YGN5000XXXXXXXXXXXXXXXXXX, YGN5001XXXXXXXXXXXXXXXXXX, YGN5002XXXXXXXXXXXXXXXXXX, YGN5003XXXXXXXXXXXXXXXXXX, YGN5004XXXXXXXXXXXXXXXXXX, YGN5005XXXXXXXXXXXXXXXXXX, YGN5006XXXXXXXXXXXXXXXXXX, YGN5007XXXXXXXXXXXXXXXXXX, YGN5008XXXXXXXXXXXXXXXXXX, YGN5009XXXXXXXXXXXXXXXXXX, YGN8000XXXXXXXXXXXXXXXXXX, YGN8001XXXXXXXXXXXXXXXXXX, YGN8002XXXXXXXXXXXXXXXXXX, YGN8003XXXXXXXXXXXXXXXXXX, YGN8004XXXXXXXXXXXXXXXXXX, YGN8005XXXXXXXXXXXXXXXXXX, YGN8006XXXXXXXXXXXXXXXXXX, YGN8007XXXXXXXXXXXXXXXXXX, YGN8008XXXXXXXXXXXXXXXXXX, YGN8009XXXXXXXXXXXXXXXXXX, YGM2000XXXXXXXXXXXXXXXXXX, YGM2001XXXXXXXXXXXXXXXXXX, YGM2002XXXXXXXXXXXXXXXXXX, YGM2003XXXXXXXXXXXXXXXXXX, YGM2004XXXXXXXXXXXXXXXXXX, YGM2005XXXXXXXXXXXXXXXXXX, YGM2006XXXXXXXXXXXXXXXXXX, YGM2007XXXXXXXXXXXXXXXXXX, YGM2008XXXXXXXXXXXXXXXXXX, YGM2009XXXXXXXXXXXXXXXXXX, YGM5000XXXXXXXXXXXXXXXXXX, YGM5001XXXXXXXXXXXXXXXXXX, YGM5002XXXXXXXXXXXXXXXXXX, YGM5003XXXXXXXXXXXXXXXXXX, YGM5004XXXXXXXXXXXXXXXXXX, YGM5005XXXXXXXXXXXXXXXXXX, YGM5006XXXXXXXXXXXXXXXXXX, YGM5007XXXXXXXXXXXXXXXXXX, YGM5008XXXXXXXXXXXXXXXXXX, YGM5009XXXXXXXXXXXXXXXXXX, AVN2000XXXXXXXXXXXXXXXXXX, AVN2001XXXXXXXXXXXXXXXXXX, AVN2002XXXXXXXXXXXXXXXXXX, AVN2003XXXXXXXXXXXXXXXXXX, AVN2004XXXXXXXXXXXXXXXXXX, AVN2005XXXXXXXXXXXXXXXXXX, AVN2006XXXXXXXXXXXXXXXXXX, AVN2007XXXXXXXXXXXXXXXXXX, AVN2008XXXXXXXXXXXXXXXXXX, AVN2009XXXXXXXXXXXXXXXXXX, AVN5000XXXXXXXXXXXXXXXXXX, AVN5001XXXXXXXXXXXXXXXXXX, AVN5002XXXXXXXXXXXXXXXXXX, AVN5003XXXXXXXXXXXXXXXXXX, AVN5004XXXXXXXXXXXXXXXXXX, AVN5005XXXXXXXXXXXXXXXXXX, AVN5006XXXXXXXXXXXXXXXXXX, AVN5007XXXXXXXXXXXXXXXXXX, AVN5008XXXXXXXXXXXXXXXXXX, AVN5009XXXXXXXXXXXXXXXXXX, AVN8000XXXXXXXXXXXXXXXXXX, AVN8001XXXXXXXXXXXXXXXXXX, AVN8002XXXXXXXXXXXXXXXXXX, AVN8003XXXXXXXXXXXXXXXXXX, AVN8004XXXXXXXXXXXXXXXXXX, AVN8005XXXXXXXXXXXXXXXXXX, AVN8006XXXXXXXXXXXXXXXXXX, AVN8007XXXXXXXXXXXXXXXXXX, AVN8008XXXXXXXXXXXXXXXXXX, AVN8009XXXXXXXXXXXXXXXXXX, AVM2000XXXXXXXXXXXXXXXXXX, AVM2001XXXXXXXXXXXXXXXXXX, AVM2002XXXXXXXXXXXXXXXXXX, AVM2003XXXXXXXXXXXXXXXXXX, AVM2004XXXXXXXXXXXXXXXXXX, AVM2005XXXXXXXXXXXXXXXXXX, AVM2006XXXXXXXXXXXXXXXXXX, AVM2007XXXXXXXXXXXXXXXXXX, AVM2008XXXXXXXXXXXXXXXXXX, AVM2009XXXXXXXXXXXXXXXXXX, AVM5000XXXXXXXXXXXXXXXXXX, AVM5001XXXXXXXXXXXXXXXXXX, AVM5002XXXXXXXXXXXXXXXXXX, AVM5003XXXXXXXXXXXXXXXXXX, AVM5004XXXXXXXXXXXXXXXXXX, AVM5005XXXXXXXXXXXXXXXXXX, AVM5006XXXXXXXXXXXXXXXXXX, AVM5007XXXXXXXXXXXXXXXXXX, AVM5008XXXXXXXXXXXXXXXXXX, AVM5009XXXXXXXXXXXXXXXXXX
X=0~9, A~Z, (), -, / or Blank
FCC ID : 2AX4HYGN2003A
Applicant : AVTECH Security Corporation
Received Date : Sep. 21, 2020
Tested Date : Oct. 20, 2020 ~ Nov. 13, 2020
Applicable Standard : 47 CFR FCC Part 15, Subpart C (Section 15.247)
KDB 558074 D01 DTS Meas. Guidance v05
ANSI C63.10 : 2013



Wendell Industrial Co., Ltd
Wendell EMC & RF Laboratory

Caution:

This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment.

Please note that the measurement uncertainty are provided for informational purpose only and are not used in determining the Pass/Fail results.

This report must not be used to claim product endorsement by TAF or any agency of the government.

The test report shall not be reproduced without the written approval of Wendell Industrial Co., Ltd..

Test Report

Issued Date: November 13, 2020

Project No.: 20Q092103

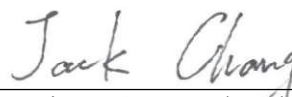
Product Name	Network Camera
Trade Name	AVTECH
Model Name	YGN2003
FCC ID	2AX4HYGN2003A
Applicant	AVTECH Security Corporation
Manufacturer	Q.S.C Industrial Co., Ltd
EUT Rated Voltage	AC 100 ~ 240V / 50 or 60Hz
EUT Test Voltage	AC 120V / 60Hz
EUT Supports Radios Application	WLAN 802.11b/g WLAN 802.11n (HT20/HT40)
Applicable Standard	47 CFR FCC Part 15, Subpart C (Section 15.247) KDB 558074 D01 DTS Meas. Guidance v05 ANSI C63.10 : 2013
Output Power	23.73 dBm
Test Result	Complied

Documented :



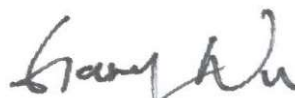
(Specialist / Emma Lu)

Technical Engineer :



(Deputy Section Manager / Jack Chang)

Approved :



(Project Manager / Gary Wu)

Table of Contents

Document Revision History	5
Summary of Test Result	6
1 Generation Information	7
1.1 Applicant	7
1.2 Manufacturer	7
1.3 Description of Equipment under Test	7
1.4 Test Mode Applicability And Tested Channel Detail	10
1.5 Configuration of Tested System	12
1.6 EUT Exercise Software	12
1.7 Tested System Details	13
1.8 Test Facility	14
1.9 Measurement Uncertainty	15
1.10 List of Test Equipment	16
2 Test Result	19
2.1 Antenna Requirement	19
2.1.1 Applicable Standard	19
2.1.2 Antenna Connected Construction	19
2.1.3 Antenna Gain	19
2.2 Peak Output Power Measurement	20
2.2.1 Limit	20
2.2.2 Test Setup	20
2.2.3 Test Procedure	20
2.2.4 Test Result	21
2.3 6dB Bandwidth Measurement	23
2.3.1 Limit	23
2.3.2 Test Setup	23
2.3.3 Test Procedure	23
2.3.4 Test Result	24
2.4 Power Spectral Density Measurement	28
2.4.1 Limit	28
2.4.2 Test Setup	28
2.4.3 Test Procedure	28
2.4.4 Test Result	29
2.5 Conducted Band Edges and Spurious Emission Measurement	33
2.5.1 Limit	33
2.5.2 Test Setup	33
2.5.3 Test Procedure	33
2.5.4 Test Result	34
2.6 Radiated Band Edges and Spurious Emission Measurement	46
2.6.1 Limit	46
2.6.2 Test Setup	47
2.6.3 Test Procedure	48
2.6.4 Duty Cycle	49
2.6.5 Test Result of Radiated Band Edge Measurement	49
2.6.6 Test Result of Radiated Spurious Emission Measurement	66
2.7 AC Conducted Emissions Measurement	93

2.7.1	Limit	93
2.7.2	Test Setup.....	93
2.7.3	Test Procedure.....	94
2.7.4	Test Result	95

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

Document Revision History

Report No.	Issue date	Description
WD-RF-R-200337-A0	November 13, 2020	Initial report

Summary of Test Result

Ref. Std. Clause	Test Items	Result
15.203 15.247(C)	Antenna Requirement	Pass
15.247(b)	Peak Output Power	Pass
15.247(a)(2)	6dB Bandwidth	Pass
15.247(e)	Power Spectral Density	Pass
15.247(d)	Conducted Band Edges and Conducted Spurious Emission	Pass
15.247(d)	Radiated Band Edges and Radiated Spurious Emission	Pass
15.207	AC Conducted Emission	Pass

1 Generation Information

1.1 Applicant

AVTECH Security Corporation
10F, E Building, No. 19-11, San Chung Rd., Nankang, Taipei, 115, Taiwan, R.O.C.

1.2 Manufacturer

Q.S.C Industrial Co., Ltd
5F, No. 193-2, Zhongxing N. St., Sunchong Dist., New Taipei City 241, Taiwan, R.O.C

1.3 Description of Equipment under Test

Product Name	Network Camera
Model No.	YGN2003
FCC ID	2AX4HYGN2003A
Frequency Range	802.11b/g/n-20MHz: 2412~2462MHz 802.11n-40MHz: 2422~2452MHz
Number of Channels	802.11b/g/n-20MHz: 11, n-40MHz: 7
Data Rate	802.11b: 1-11Mbps, 802.11g: 6-54Mbps, 802.11n: up to 150Mbps
Channel separation	802.11b/g/n: 5 MHz
Type of Modulation	802.11b:DSSS (DBPSK, DQPSK, CCK) 802.11g/n:OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna Information	Refer to the table "Antenna List"
EUT Supports Radios Application	WLAN 802.11b/g WLAN 802.11n (HT20/HT40)
EUT Rated Voltage	AC 100 ~ 240V / 50 or 60Hz
EUT Test Voltage	AC 120V / 60Hz

The EUT uses following adapter.

Trade Name	HONOTO
Model No.	ADS-10LA-06 05010EPCU
Input Power	AC 100-240V~50/60Hz Max. 0.3A
Output Power	DC 5V/2.0A
Power Line	Non-shielded, Non-Core, 2m

Antenna List

No.	Manufacturer	Model No.	Antenna Type	Peak Gain
1	WIESON	GY196HT402-001	External PCB Antenna	3.08 dBi for 2.4GHz

Remark: The antenna of EUT is conforming to FCC 15.203

Channel List

802.11b/g/n HT20		802.11n HT40	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2412	--	--
02	2417	--	--
03	2422	03	2422
04	2427	04	2427
05	2432	05	2432
06	2437	06	2437
07	2442	07	2442
08	2447	08	2447
09	2452	09	2452
10	2457	--	--
11	2462	--	--

Test Frequencies in each operating band

Frequency range over which the device operates in each operating band (Note 1)	Number of test frequencies required	Location of test frequencies inside the operating frequency range (Note 1,2)
≤ 1 MHz	1	near centre
> 1 MHz and ≤ 10 MHz	2	1 near high end, 1 near low end
> 10 MHz	3	1 near high end, 1 near centre, and 1 near low end

Note 1: The frequency range over which the device operates in a given operating band is the difference between the highest and lowest frequencies on which the device can be tuned within that given operating band. The frequency range can be smaller than or equal to the operating band, but cannot be greater than the operating band.

Note 2: In the third column of table 1, “near” means as close as possible to or at the centre / low end / high end of the frequency range over which the device operates.

Firmware / Software Version

1	Product Name	Network Camera
2	Model No.	YGN2003
3	Test SW Version	Putty_Ver.0.63
4	RF power setting in TEST SW	☐ RF power setting was not able to alter during testing. ☒ RF power setting was able to alter during testing. (See the following table)

Parameters of test software setting

Type of Modulation	Channel	Frequency (MHz)	Set Value
802.11b	01	2412	56
	06	2437	56
	11	2462	52
802.11g	01	2412	52
	06	2437	52
	11	2462	48
802.11n HT20	01	2412	52
	06	2437	52
	11	2462	48
802.11n HT40	03	2422	52
	06	2437	52
	09	2452	48

1.4 Test Mode Applicability And Tested Channel Detail

1. This device is a Network Camera with a built-in Wi-Fi transceiver.
2. Series model differences are market segments.
3. These tests were performed on a sample of equipment to demonstrate compliance with 47 CFR FCC Part 15, Subpart C (Section 15.247).
4. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports.
5. The worst case was found when positioned on X axis for radiated emission. Following test modes were selected for the final test, and the final worst case is recorded in the report:

EUT Configure Mode	RE < 1G	RE ≥ 1G	ACM	ACP	Description
--	☒	☒	☒	☐	Transmit WIFI
--	☐	☐	☐	☒	Normal Link

Note : RE<1G: Radiated Emission below 1GHz RE≥1G: Radiated Emission above 1GHz
ACM: Antenna Port Conducted Measurement ACP: AC Power Line Conducted Emission

Following channel(s) was (were) selected for the final test as listed below:

Radiated Spurious Emission Measurement(Below 1GHz):

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
--	802.11b	1 ~ 11	06	DSSS	1

Radiated Spurious Emission Measurement(Above 1GHz):

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
--	802.11b	1 ~ 11	01, 06, 11	DSSS	1
--	802.11g	1 ~ 11	01, 06, 11	OFDM	6
--	802.11n HT20	1 ~ 11	01, 06, 11	OFDM	6.5
--	802.11n HT40	3 ~ 9	03, 06, 09	OFDM	13.5

Radiated Band Edge Emission Measurement(Above 1GHz):

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
--	802.11b	1 ~ 11	01, 11	DSSS	1
--	802.11g	1 ~ 11	01, 11	OFDM	6
--	802.11n HT20	1 ~ 11	01, 11	OFDM	6.5
--	802.11n HT40	3 ~ 9	03, 09	OFDM	13.5

Peak Output Power, 6dB Bandwidth, Power Spectral Density, Conducted Spurious Emission:

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
--	802.11b	1 ~ 11	01, 06, 11	DSSS	1
--	802.11g	1 ~ 11	01, 06, 11	OFDM	6
--	802.11n HT20	1 ~ 11	01, 06, 11	OFDM	6.5
--	802.11n HT40	3 ~ 9	03, 06, 09	OFDM	13.5

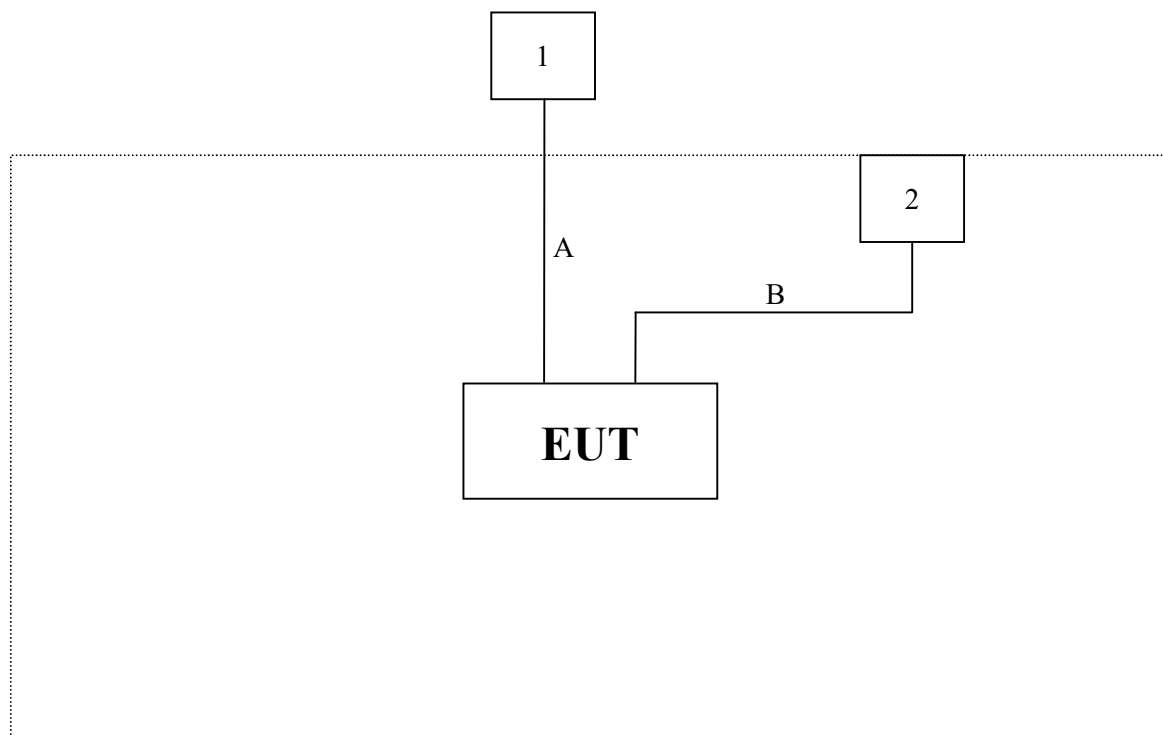
Conducted Band Edges:

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
--	802.11b	1 ~ 11	01, 11	DSSS	1
--	802.11g	1 ~ 11	01, 11	OFDM	6
--	802.11n HT20	1 ~ 11	01, 11	OFDM	6.5
--	802.11n HT40	3 ~ 9	03, 09	OFDM	13.5

AC Conducted Emission:

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
--	802.11b	1 ~ 11	06	DSSS	1

1.5 Configuration of Tested System



Test Table

1.6 EUT Exercise Software

1. Setup the EUT as shown in Section 1.5
2. Execute software "Putty_Ver.0.63".
3. Configure the test mode, the test channel, and the data rate.
4. Press "OK" to start the continuous transmit.
5. Verify that the EUT works properly.

1.7 Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

No.	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook PC	acer	N16Q1	NXVF4TA023742254147600	Non-shielded, 1 Core, 0.8m
2	Adapter	SHENZHEN HONOR ELECTRONIC CO.,LTD	ADS-10LA-06 05010EPCU	N/A	Non-shielded, Non-Core, 2m

No.	Signal Cable Type	Signal cable Description
A	LAN Cable	Non-shielded, Non-Core, 6m
B	Power Cable	Non-shielded, Non-Core, 2m

1.8 Test Facility

Items	Required (IEC 60068-1)	Actual
Temperature (°C)	15-35	25
Humidity (% RH)	25-75	65
Barometric pressure (mbar)	860-1060	1001

Description: Accredited by TAF

Accredited Number: 2965

Issued by: Wendell Industrial Co., Ltd

Lab Address: 6F/6F-1, No.188, Baoqiao Rd., Xindian Dist.,
New Taipei City 23145, Taiwan R.O.C

Test Lab: Wendell EMC & RF Laboratory

Test Location: 1F., No. 119, Wugong 3rd Rd., Wugu Dist.,
New Taipei City 248, Taiwan (R.O.C.)

Designation Number: TW0025

Test Firm Registration Number: 665221

1.9 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence (level based on a coverage factor K=2)

Measurement Project	Measuring Range	Expended Uncertainty
AC Conducted Emission	0.150 ~ 30 MHz	2.9 dB
Radiated Emission	0.009 ~ 30 MHz	4.2 dB
	30 ~ 1000 MHz	3.7 dB
	1000 ~ 18000 MHz	3.8 dB
	18000 ~ 40000 MHz	3.7 dB
RF Power, Conducted	1000 ~ 6000 MHz	0.51 dB
Occupied Bandwidth	1000 ~ 6000 MHz	2.4 %
Power Density	1000 ~ 6000 MHz	1.7 dB
Duty Cycle	1000 ~ 6000 MHz	1.3 %
Conducted Unwanted Emission Strength	1000 ~ 6000 MHz	1.8 dB
Frequency Stability	1000 ~ 6000 MHz	6.3×10^{-8}
DC Power Supply	0.5 ~ 30 V	3.2 %
Temperature	15 ~ 30 °C	1.1 °C
Humidity	40 ~ 80 %	3.4 %

Note: Please note that the measurement uncertainty are provided for informational purpose only and are not used in determining the Pass/Fail results.

1.10 List of Test Equipment

For Conducted measurements / RF Conducted Measurement Room

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
✓	Spectrum analyzer	Keysight	N9010A	MY54200737	2020/9/3	2021/9/2
✓	Wideband Peak Power Meter	Anritsu	ML2495A	1733007	2020/9/2	2021/9/1
✓	Pulse Power Sensor + Precision Adaptor	Anritsu	MA2411B	1726022	2020/9/2	2021/9/1
	Temperature Chamber	TAICHY	MHK-225LK	1061121	2020/4/28	2021/4/27
	Wireless Connectivity Tester	R&S	CMW270	101307	2020/5/19	2021/5/18
✓	Attenuator	MVE	MVE2211-10	CT-9-056	2020/9/3	2021/9/2
	Attenuator	MVE	MVE2211-20	CT-9-057	2020/9/3	2021/9/2
	Attenuator	MVE	MVE2211-30	CT-9-058	2020/9/3	2021/9/2
	Power Divider	MVE	MVE8546	170826003	2020/9/3	2021/9/2
	Power Splitter	MVE	MVE8547	170302047	2020/9/3	2021/9/2
	DC Power Supply	GW INSTEK	GPC-3060D	GER817636	2020/9/4	2021/9/3

Remark:

1. All equipments are calibrated every one year.
2. The test instruments marked with “✓” are used to measure the final test results.

For AC Conduction measurements / Conducted Room

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
✓	EMI Test Receiver	R&S	ESR3	102309	2020/5/21	2021/5/20
✓	2-Line V-Network LISN	R&S	ENV216	101185	2020/5/27	2021/5/26
✓	LISN	SCHWARZBECK	NSLK 8127RC	05028	2020/5/27	2021/5/26
✓	Transient Limiter	EM Electronics Corporation	EM-7600	857	2020/5/25	2021/5/24
✓	50ohm Cable	EMCI	EMCCFD300-BM-BM-5000	170613	2020/5/25	2021/5/24
✓	50 ohm terminal impedance	HUBER+SUHNER	50 ohm terminal impedance	CT-1-109-1	2020/5/26	2021/5/25

Remark:

1. All equipments are calibrated every one year.
2. The test instruments marked with “✓” are used to measure the final test results.
3. Test Software version: FARAD EZ-EMC Ver.EMC-CON 3A1

For Radiated measurements / 9x6x6 Semi Anechoic Room

Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
✓ Spectrum Analyzer	Keysight	N9010A	MY52220228	2020/7/28	2021/7/ 27
✓ EMI Receiver	Keysight	N9038A	MY51210173	2020/7/30	2021/7/ 29
✓ Pre-Amplifier	EMEC	EMC330	060668	2020/7/28	2021/7/ 29
✓ Pre-Amplifier	EMCI	EMC051845SE	980525	2020/9/4	2021/9/3
✓ Pre-Amplifier	EMCI	EMC184045SE	980515	2020/9/4	2021/9/3
✓ Pre-Amplifier	EMEC	EM01G18G	060648	2020/9/4	2021/9/3
✓ Cable	EMEC	EM-CB400	105060103	2020/9/2	2021/9/1
✓ Cable	EMEC	EM-CB400	105060102	2020/7/29	2021/7/28
✓ Cable	EMEC	EM-CB400	105060101	2020/7/28	2021/7/27
✓ Cable	EMCI	EMC102-KM-KM-600	170637	2019/12/4	2020/12/3
✓ Cable	HUBER+SUHNER	SF102	MY2751/2	2020/7/29	2021/7/28
✓ Cable	EMCI	EMC102-KM-KM-3000	170635	2020/7/30	2021/7/ 29
✓ Loop Antenna	EMCI	LPA600	277	2020/7/30	2021/7/ 29
✓ TRILOG super broad Antenna	Schwarzbeck	VULB 9168	VULB 9168-700 & 1421	2020/7/30	2021/7/ 29
✓ Horn Antenna	Schwarzbeck	BBHA 9120D	01557	2020/7/30	2021/7/ 29
✓ Horn Antenna	Schwarzbeck	BBHA 9170	703	2020/7/30	2021/7/ 29
✓ RF Filter	EMEC	BRF-2400-2500	002	2020/7/30	2021/7/ 29
RF Filter	EMEC	BRF-5150-5350	104	2020/9/3	2021/9/2
RF Filter	EMEC	BRF-5470-5725	092	2020/9/3	2021/9/2
RF Filter	EMEC	BRF-5725-5875	091	2020/9/3	2021/9/2
✓ RF Filter	EMEC	HPF-2800	002	2020/9/3	2021/9/2
RF Filter	EMEC	HPF-5850	059	2020/9/3	2021/9/2
SMA Notch Filter	MVE	MFN-902.928.S1	190604001	2020/9/3	2021/9/2

Remark:

1. All equipments are calibrated every one year.
2. The test instruments marked with "✓" are used to measure the final test results.
3. Test Software version: FARAD EZ-EMC Ver.WD-03A1-1

2 Test Result

2.1 Antenna Requirement

2.1.1 Applicable Standard

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

An intentional radiator shall be designed to ensure that no antenna other than as furnished by the responsible party shall be used with the device. If transmitting antennas of directional gain greater than 6dBi are using the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi, for compliance to FCC 47CFR 15.247 (c) requirements.

2.1.2 Antenna Connected Construction

Non-standard antenna connector is used.

2.1.3 Antenna Gain

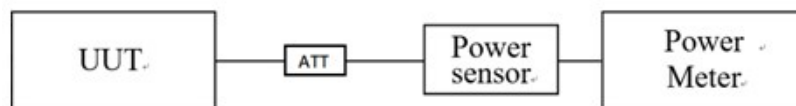
No.	Manufacturer	Model No.	Antenna Type	Peak Gain
1	WIESON	GY196HT402-001	External PCB Antenna	3.08 dBi for 2.4GHz

2.2 Peak Output Power Measurement

2.2.1 Limit

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 1W. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

2.2.2 Test Setup



2.2.3 Test Procedure

1. Enable the EUT transmit continuously.
2. Let EUT be connected to the power meter, and record the max. reading.
3. Measurement using a gated RF average power meter, since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.

2.2.4 Test Result

802.11b

Frequency (MHz)	Peak power (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
2412	22.18	--	--	≤ 30	Pass
2437	22.42	--	--	≤ 30	Pass
2462	21.21	--	--	≤ 30	Pass

Remark:

1. Peak Power = Reading value on power meter + cable loss
2. $10 \log(X/\text{mW}) = \text{dBm}$, $X=1$ watt (Limit)
1 watt = 30 dBm

802.11g

Frequency (MHz)	Peak power (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
2412	20.61	--	--	≤ 30	Pass
2437	20.99	--	--	≤ 30	Pass
2462	19.39	--	--	≤ 30	Pass

Remark:

1. Peak Power = Reading value on power meter + cable loss
2. $10 \log(X/\text{mW}) = \text{dBm}$, $X=1$ watt (Limit)
1 watt = 30 dBm

802.11n HT20

Frequency (MHz)	Peak power (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
2412	23.11	--	--	≤ 30	Pass
2437	23.73	--	--	≤ 30	Pass
2462	21.91	--	--	≤ 30	Pass

Remark:

1. Peak Power = Reading value on power meter + cable loss
2. $10 \log(X/\text{mW}) = \text{dBm}$, $X=1 \text{ watt}$ (Limit)
1 watt = 30 dBm

802.11n HT40

Frequency (MHz)	Peak power (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
2422	23.10	--	--	≤ 30	Pass
2437	23.36	--	--	≤ 30	Pass
2452	21.41	--	--	≤ 30	Pass

Remark:

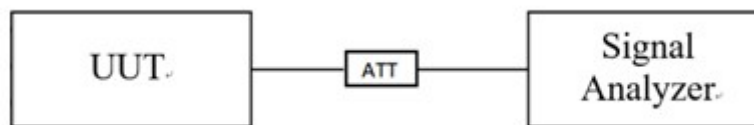
1. Peak Power = Reading value on power meter + cable loss
2. $10 \log(X/\text{mW}) = \text{dBm}$, $X=1 \text{ watt}$ (Limit)
1 watt = 30 dBm

2.3 6dB Bandwidth Measurement

2.3.1 Limit

The minimum 6 dB bandwidth shall be at least 500 kHz.

2.3.2 Test Setup



2.3.3 Test Procedure

1. Enable the EUT transmit continuously.
2. Spectrum analyzer set:
 - a) RBW = 100 kHz
 - b) VBW $\geq$ 3 RBW
 - c) Detector = peak
 - d) Sweep time = auto couple
 - e) Trace mode = max hold.

2.3.4 Test Result

802.11b

Frequency (MHz)	6dB BW (kHz)		Limit (kHz)	Result
	Chain A	Chain B		
2412	10080	--	≥ 500	Pass
2437	10090	--	≥ 500	Pass
2462	10080	--	≥ 500	Pass



802.11g

Frequency (MHz)	6dB BW (kHz)		Limit (kHz)	Result
	Chain A	Chain B		
2412	16380	--	≥ 500	Pass
2437	16380	--	≥ 500	Pass
2462	16390	--	≥ 500	Pass



802.11n HT20

Frequency (MHz)	6dB BW (kHz)		Limit (kHz)	Result
	Chain A	Chain B		
2412	17570	--	≥ 500	Pass
2437	17580	--	≥ 500	Pass
2462	17600	--	≥ 500	Pass



802.11n HT40

Frequency (MHz)	6dB BW (kHz)		Limit (kHz)	Result
	Chain A	Chain B		
2422	35240	--	≥ 500	Pass
2437	35200	--	≥ 500	Pass
2452	35220	--	≥ 500	Pass

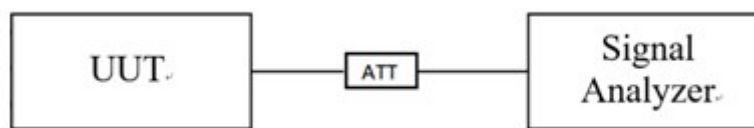


2.4 Power Spectral Density Measurement

2.4.1 Limit

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

2.4.2 Test Setup



2.4.3 Test Procedure

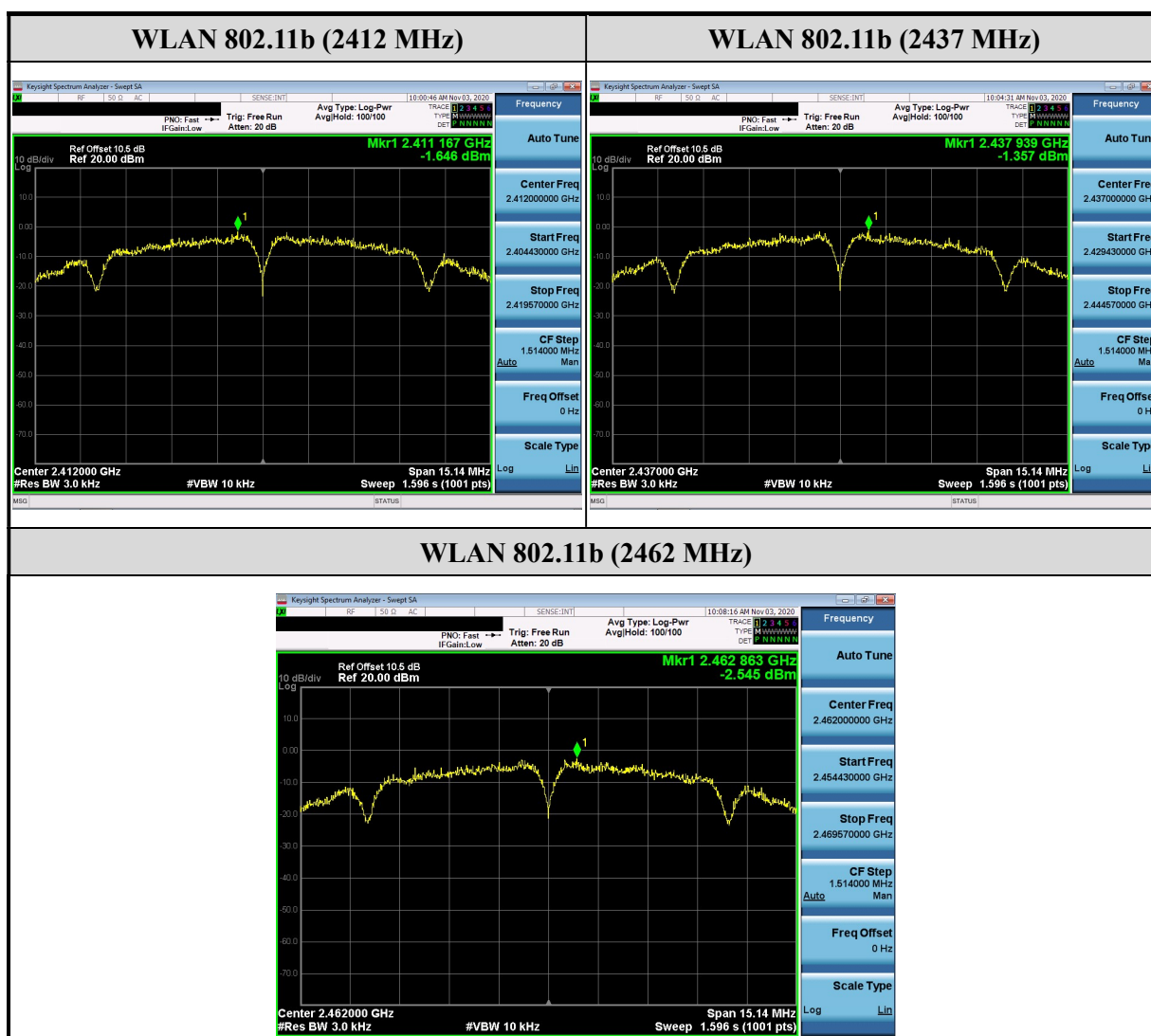
1. Enable the EUT transmit continuously.
2. Spectrum analyzer set:
 - a) RBW = 3 kHz ~ 100 kHz
 - b) VBW $\geq$ 3 RBW
 - c) Span = 1.5 times DTS Channel 6dB Bandwidth
 - d) Detector = peak
 - e) Sweep time = auto couple
 - f) Trace mode = max hold.

2.4.4 Test Result

802.11b

Frequency (MHz)	Power Spectral Density (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
2412	-1.646	--	--	≤ 8	Pass
2437	-1.357	--	--	≤ 8	Pass
2462	-2.545	--	--	≤ 8	Pass

Remark: PSD = Reading value on spectrum analyzer + cable loss



802.11g

Frequency (MHz)	Power Spectral Density (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
2412	-10.373	--	--	≤ 8	Pass
2437	-11.682	--	--	≤ 8	Pass
2462	-13.101	--	--	≤ 8	Pass

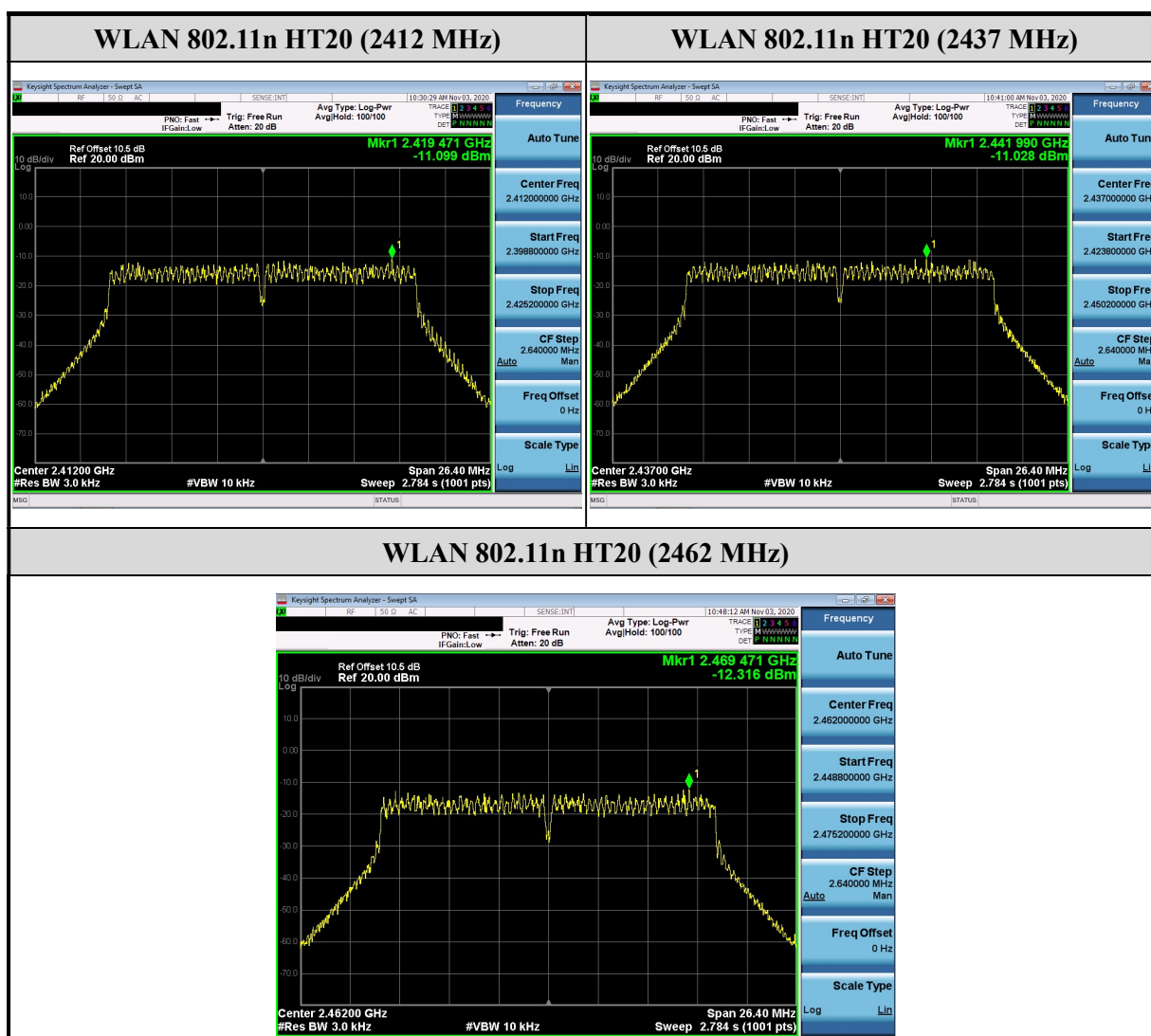
Remark: PSD = Reading value on spectrum analyzer + cable loss



802.11n HT20

Frequency (MHz)	Power Spectral Density (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
2412	-11.099	--	--	≤ 8	Pass
2437	-11.028	--	--	≤ 8	Pass
2462	-12.316	--	--	≤ 8	Pass

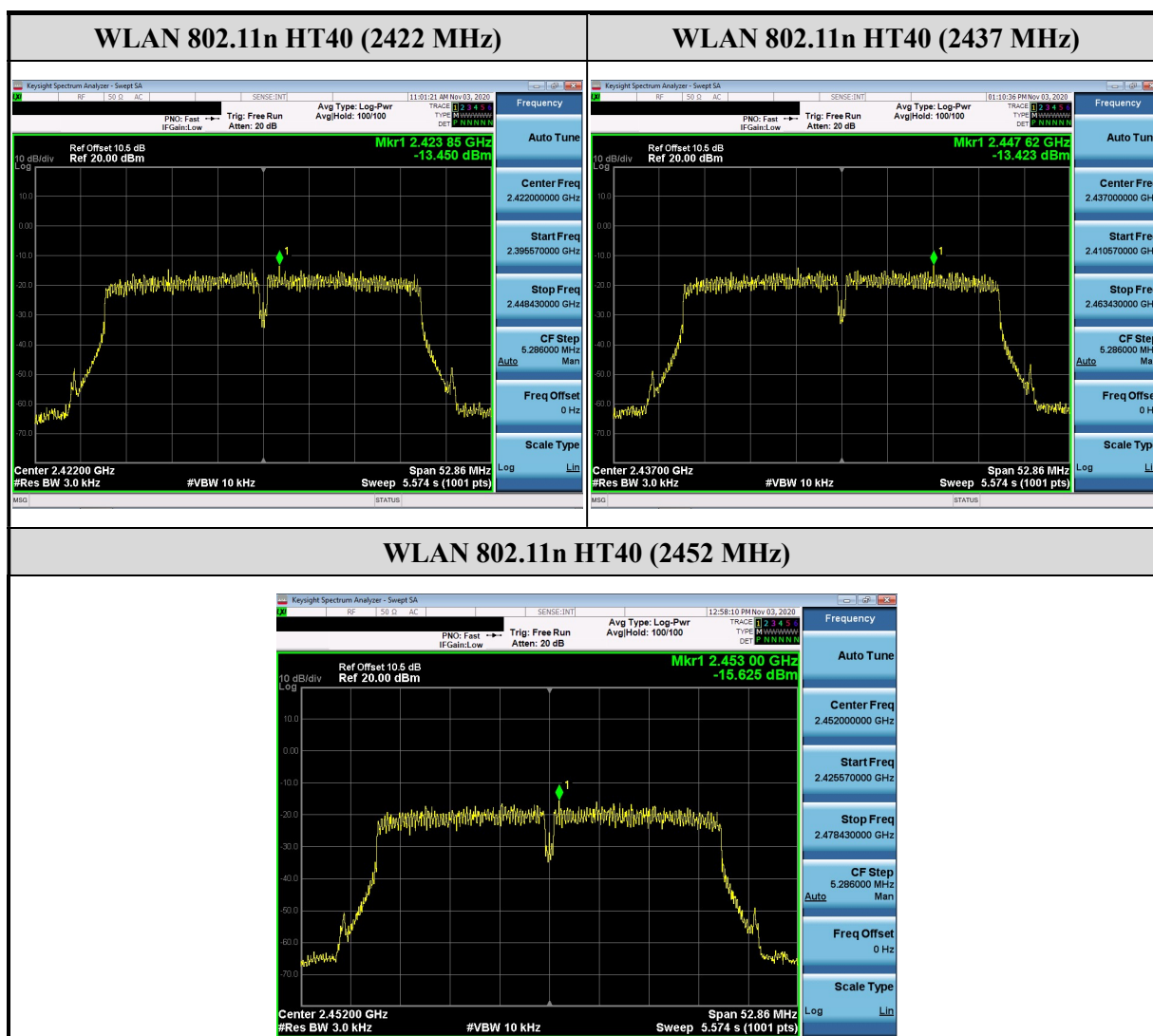
Remark: PSD = Reading value on spectrum analyzer + cable loss



802.11n HT40

Frequency (MHz)	Power Spectral Density (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
2422	-13.450	--	--	≤ 8	Pass
2437	-13.423	--	--	≤ 8	Pass
2452	-15.625	--	--	≤ 8	Pass

Remark: PSD = Reading value on spectrum analyzer + cable loss



2.5 Conducted Band Edges and Spurious Emission Measurement

2.5.1 Limit

In any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in must also comply with the radiated emission limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB

2.5.2 Test Setup



2.5.3 Test Procedure

1. Enable the EUT transmit continuously.
2. Spectrum analyzer set :
 - a) RBW = 100 kHz
 - b) VBW $\geq$ 3 RBW
 - c) Detector = peak
 - d) Sweep time = auto couple
 - e) Trace mode = max hold.