Test Report of FCC CFR 47 Part 15 Subpart C

On Behalf of

TENVIS Technology Co., Ltd.

FCC ID:	**N6QIPROBOT3**
Product Description:	**IP Camera**
Model No.:	**IPROBOT 3**
Supplementary Model:	**IPROBOT 4,IPROBOT 5,IPROBOT 6,IP391W-HD,IP392W-HD, IP393W-HD,MINI319W-HD, MINI329W-HD,MINI339W-HD**
Brand Name:	**TENVIS**
Prepared for:	**TENVIS Technology Co., Ltd.** 301,Building 6,No.3,Puxiaxia'an Street, Liuyue, Henggang Town, Longgang District ,Shenzhen
Prepared by:	**Bontek Compliance Testing Laboratory Co., Ltd** 1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road, Nanshan, Shenzhen, China Tel: 86-755-86337020 Fax: 86-755-86337028
Report No.:	BCT12HR-1448E
Issue Date:	April 17, 2013
Test Date:	March 18~April 16, 2013

Tested by: Lion Cai

Reviewed by: Kendy Wang

Approved by: Tony Wu

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	**TENVIS Technology Co., Ltd.**
Address of Applicant:	301,Building 6,No.3,Puxiaxia'an Street, Liuyue, Henggang Town, Longgang District ,Shenzhen
Manufacturer:	**TENVIS Technology Co., Ltd.**
Address of Manufacturer:	301,Building 6,No.3,Puxiaxia'an Street, Liuyue, Henggang Town, Longgang District ,Shenzhen

General Description of E.U.T

Items	Description
EUT Description:	**IP Camera**
Trade Name:	TENVIS
Model No.:	**IPROBOT 3**
Supplementary Model:	IPROBOT 4,IPROBOT 5,IPROBOT 6,IP391W-HD,IP392W-HD, IP393W-HD,MINI319W-HD, MINI329W-HD,MINI339W-HD
Frequency Band:	IEEE 802.11b/g, IEEE 802.11n HT20 (ISM Band) : 2412MHz～2462MHz, IEEE 802.11n HT40 (ISM Band) : 2422MHz～2452MHz
Channel Spacing:	IEEE 802.11b/g, 802.11n HT20/HT40: 5MHz
Number of Channels:	IEEE 802.11b/g, 802.11n HT20:11 Channels IEEE 802.11n HT40 :7 Channels
Transmit Data Rate:	maximum of 150Mbps
Type of Modulation:	IEEE 802.11b：DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g：OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20/40：OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Type:	External antenna
Antenna Gain:	2dBi
Power Supply:	Input: DC 5V 1500mA
Adapter Information:	Model: RHD10W050150 Input:100-240V 50/60Hz 1.5A Output: 5VDC 1.5A

** The test data gathered are from the production sample provided by the manufacturer.*
** Supplementary models appearance , internal circuit and electrical principles are the same, just named and color differently*

1.2 Test Standards

The tests were performed based on the Electromagnetic Interference (EMI) tests performed on the EUT. Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 - 2003 Radiated testing was performed at an antenna to EUT distance 3 meters.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.207, 15.209 and 15.247 rules and the FCC publication KDB558074 of Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247).

1.3 Test Facility

All measurement required was performed at laboratory of Bontek Compliance Testing Laboratory Ltd at 1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road, Nanshan, Shenzhen, China.

The test facility is recognized, certified, or accredited by the following organizations:

FCC – Registration No.: 338263

BONTEK COMPLIANCE TESTING LABORATORY LTD. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 338263, March 03, 2011.

IC Registration No.: 7631A

The 3m alternate test site of BONTEK COMPLIANCE TESTING LABORATORY LTD. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 7631A on January 25, 2011.

CNAS - Registration No.: L3923

BONTEK COMPLIANCE TESTING LABORATORY LTD. to ISO/IEC 17025:25 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing. The acceptance letter from the CNAS is maintained in our files: Registration: L3923,March 22,2012.

TUV - Registration No.: UA 50203122-0001

BONTEK COMPLIANCE TESTING LABORATORY LTD. An assessment of the laboratory was conducted according to the"Procedures and Conditions for EMC Test Laboratories"with reference to EN ISO/IEC 17025 by a TUV Rheinland auditor. Audit Report NO. 17010783-002.

2. SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 or 10 meters from the leading edge of the turntable.

Support equipments or special accessories in test configuration：

AUX Description:	Manufacturer	Model No.	Certificate	CABLE
Host Computer	Dell	78MD82X	CE, FCC	1.5m Unshielded Power Cord
Monitor	Dell	E178Pc	CE, FCC	1.5m Unshielded Power Cord 1.8m shielded data Cable with core
Keyboard	Dell	L100	CE, FCC	1.8m shielded data Cable with core
LCD Colour TV	SHARP	LCD-32Z330A	CE, FCC	1.2m Unshielded Power Cord 1.5m shielded data Cable with core

2.3 General Test Procedures

Conducted Emissions:The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 7.1 of ANSI C63.4-2003 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

Radiated Emissions: The EUT is a placed on as turntable, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4-2003.

2.4 Measurement Uncertainty

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

Parameter	Uncertainty
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

Uncertainty figures are valid to a confidence level of 95%.

2.5 List of Measuring Equipments Used

Test equipments list of Shenzhen Bontek Compliance Testing Laboratory Co., Ltd.

No.	Instrument no.	Equipment	Manufacturer	Model No.	S/N	Last Calculator	Due Calculator
1	BCT-EMC001	EMI Test Receiver	R&S	ESCI	100687	2012-4-17	2013-4-16
2	BCT-EMC002	EMI Test Receiver	R&S	ESPI	100097	2012-11-1	2013-10-31
3	BCT-EMC003	Amplifier	HP	8447D	1937A02492	2012-4-20	2013-4-19
4	BCT-EMC004	Single Power Conductor Module	R&S	NNBM 8124	242	2012-4-20	2013-4-19
5	BCT-EMC005	Single Power Conductor Module	R&S	NNBM 8124	243	2012-4-20	2013-4-19
6	BCT-EMC006	Power Clamp	SCHWARZBECK	MDS-21	3812	2012-11-5	2013-11-4
7	BCT-EMC007	Positioning Controller	C&C	CC-C-1F	MF7802113	N/A	N/A
8	BCT-EMC008	`Electrostatic Discharge Simulator	TESEQ	NSG437	125	2012-11-2	2013-11-1
9	BCT-EMC009	Fast Transient Burst Generator	SCHAFFNER	MODULA6150	34572	2012-4-17	2013-4-16
10	BCT-EMC010	Fast Transient Noise Simulator	Noiseken	FNS-105AX	10501	2012-6-26	2013-6-25
11	BCT-EMC011	Color TV Pattern Genenator	PHILIPS	PM5418	TM209947	N/A	N/A
12	BCT-EMC012	Power Frequency Magnetic Field Generator	EVERFINE	EMS61000-8K	608002	2012-4-17	2013-4-16
14	BCT-EMC014	Capacitive Coupling Clamp	TESEQ	CDN8014	25096	2012-4-17	2013-4-16
15	BCT-EMC015	High Field Biconical Antenna	ELECTRO-METRICS	EM-6913	166	2011-11-28	2013-11-27
16	BCT-EMC016	Log Periodic Antenna	ELECTRO-METRICS	EM-6950	811	2011-11-28	2013-11-27
17	BCT-EMC017	Remote Active Vertical Antenna	ELECTRO-METRICS	EM-6892	304	2011-11-28	2013-11-27
18	BCT-EMC018	TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB9163	9163-324	2012-5-19	2014-5-18
19	BCT-EMC019	Horn Antenna	SCHWARZBECK	BBHA9120A	0499	2011-11-28	2013-11-27
20	BCT-EMC020	Teo Line Single Phase Module	SCHWARZBECK	NSLK8128	8128247	2012-11-1	2013-10-31
21	BCT-EMC021	Triple-Loop Antenna	EVERFINE	LLA-2	711002	2012-11-15	2013-11-14
22	BCT-EMC022	Electric bridge	Jhai	JK2812C	803024	N/A	N/A
23	BCT-EMC026	RF POWER AMPLIFIER	FRANKONIA	FLL-75	1020A1109	2012-4-17	2013-4-16
24	BCT-EMC027	CDN	FRANKONIA	CDN M2+M3	A3027019	2012-4-17	2013-4-16
25	BCT-EMC029	6DB Attenuator	FRANKONIA	N/A	1001698	2012-4-17	2013-4-16

26	BCT-EMC030	EM Injection clamp	FCC	F-203I-23mm	091536	2012-4-17	2013-4-16
27	BCT-EMC031	9kHz-2.4GHz signal generator 2024	MARCONI	10S/6625-99-457-8730	112260/042	2012-4-17	2013-4-16
28	BCT-EMC032	10dB attenuator	ELECTRO-METRICS	EM-7600	836	2012-4-17	2013-4-16
29	BCT-EMC033	ISN	TESEQ	ISN-T800	30301	2012-11-15	2013-11-14
30	BCT-EMC034	10KV surge generator	SANKI	SKS-0510M	048110003E 321	2012-11-01	2013-10-31
31	BCT-EMC035	HRMONICS&FLICK RE ANALYSER	VOLTECH	PM6000	200006700433	2012-11-20	2013-11-19
32	BCT-EMC036	Spectrum Analyzer	R&S	FSP	100397	2012-11-1	2013-10-31
33	BCT-EMC037	Broadband preamplifier	SCH WARZBECK	BBV9718	9718-182	2012-4-20	2013-4-19

3. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.207	AC Power Line Conducted Emission	Pass
FCC §15.247(b)	Maximum Peak Output Power	Pass
FCC §15.247(e)	Power Spectral Density	Pass
FCC §15.247(a)	6dB Bandwidth	Pass
FCC §15.247 (d)	Conducted Spurious Emission	Pass
FCC §15.205 and §15.209	Radiated Spurious Emission	Pass
FCC §15.203/15.247(b)/(c)	Antenna Requirement	Pass

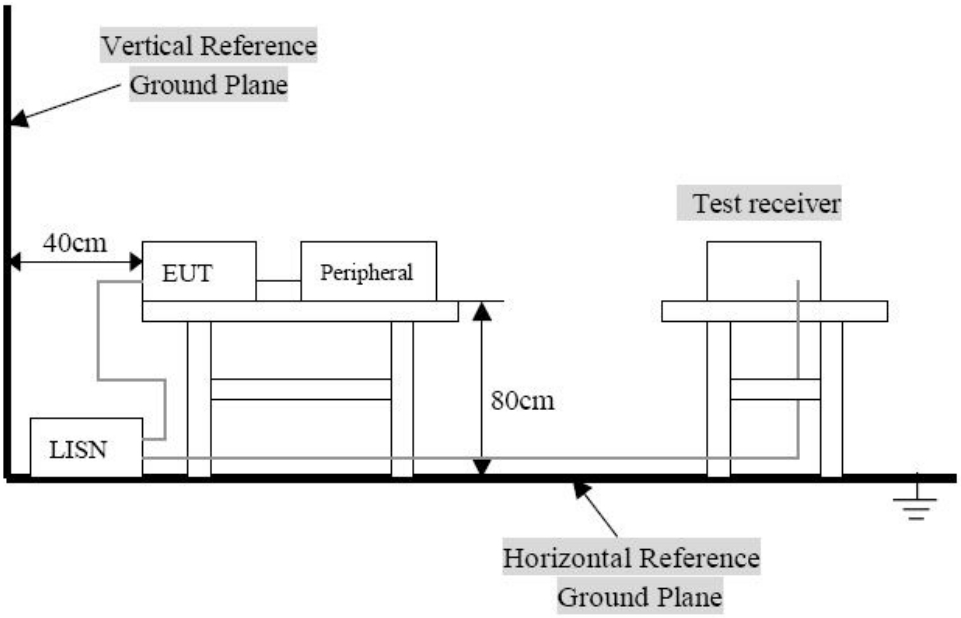
4. TEST OF AC POWER LINE CONDUCTED EMISSION

4.1 Applicable Standard

Refer to FCC §15.207.
For a Low-power Radio-frequency Device is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150～0.500	66～56	56～46
0.500～5.000	56	46
5.000～30.00	60	50

4.2 Test Setup Diagram



Remark: The EUT was connected to a 120 VAC/ 60Hz power source.

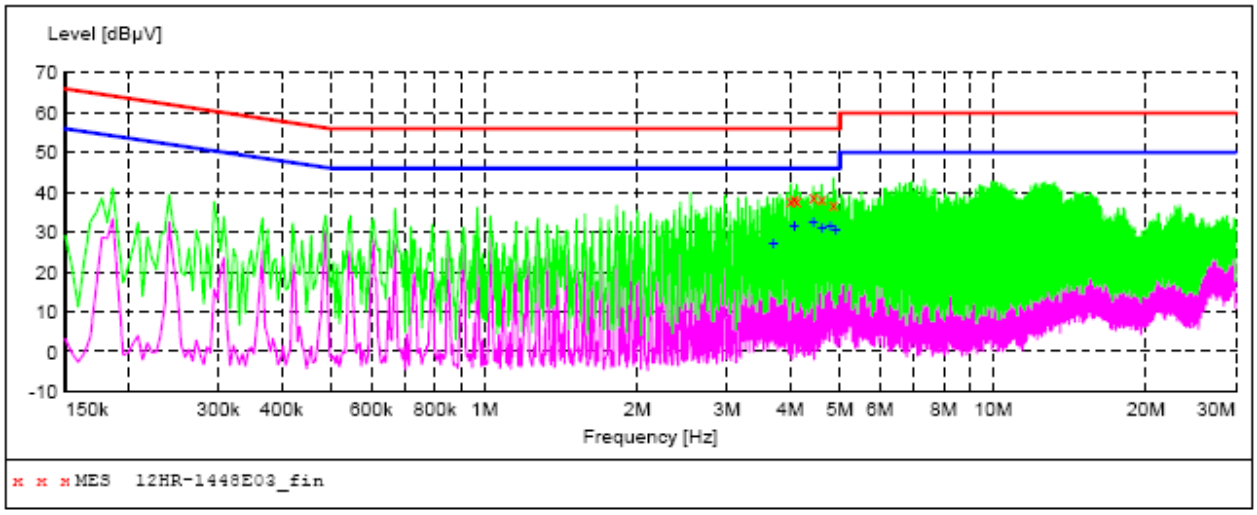
4.3 Test Result

Temperature (℃) : 23~25	EUT: IP Camera
Humidity (%RH): 45~58	M/N: IPROBOT 3
Barometric Pressure (mbar): 950~1000	Operation Condition: Normal operation

Conducted Emission:

EUT: IP Camera
Operating Condition: Normal operation
Test Site: Shielded Room
Operator: Andy
Test Specification: AC/DC adapter (AC 120V/60Hz)
Comment: Live Line

SCAN TABLE: "Voltage (9K-30M)FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "12HR-1448E03_fin"

3/30/2013 9:40PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
4.002000	37.80	10.3	56	18.2	QP	L1	GND
4.060500	38.50	10.3	56	17.5	QP	L1	GND
4.119000	37.90	10.3	56	18.1	QP	L1	GND
4.425000	39.00	10.3	56	17.0	QP	L1	GND
4.605000	38.40	10.3	56	17.6	QP	L1	GND
4.852500	37.10	10.4	56	18.9	QP	L1	GND

MEASUREMENT RESULT: "12HR-1448E03_fin2"

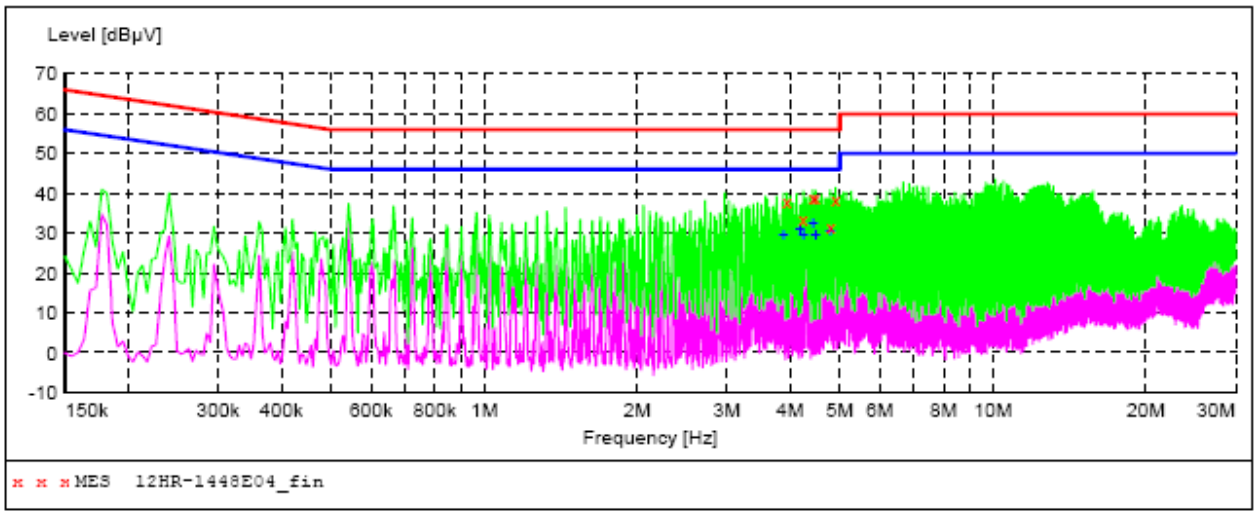
3/30/2013 9:40PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
3.700500	27.00	10.3	46	19.0	AV	L1	GND
4.060500	31.70	10.3	46	14.3	AV	L1	GND
4.425000	32.40	10.3	46	13.6	AV	L1	GND
4.605000	31.30	10.3	46	14.7	AV	L1	GND
4.789500	31.70	10.4	46	14.3	AV	L1	GND
4.911000	30.40	10.4	46	15.6	AV	L1	GND

Conducted Emission:

EUT: IP Camera
Operating Condition: Normal operation
Test Site: Shielded Room
Operator: Andy
Test Specification: AC/DC adapter (AC 120V/60Hz)
Comment: Neutral Line

SCAN TABLE: "Voltage (9K-30M)FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "12HR-1448E04_fin"

3/30/2013 9:43PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
3.939000	37.90	10.3	56	18.1	QP	N	GND
4.231500	33.70	10.3	56	22.3	QP	N	GND
4.425000	39.20	10.3	56	16.8	QP	N	GND
4.483500	38.70	10.3	56	17.3	QP	N	GND
4.803000	31.70	10.4	56	24.3	QP	N	GND
4.911000	38.30	10.4	56	17.7	QP	N	GND

MEASUREMENT RESULT: "12HR-1448E04_fin2"

3/30/2013 9:43PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
3.880500	29.60	10.3	46	16.4	AV	N	GND
4.182000	31.00	10.3	46	15.0	AV	N	GND
4.245000	29.80	10.3	46	16.2	AV	N	GND
4.425000	32.40	10.3	46	13.6	AV	N	GND
4.488000	29.90	10.3	46	16.1	AV	N	GND
4.785000	30.40	10.4	46	15.6	AV	N	GND

5. Test of Maximum Peak Output Power

5.1 Applicable Standard

Refer to FCC §15.247 (b)

5.2 EUT Setup

Spectrum Analyzer

5.3 Test Equipment List and Details

See section 2.5.

5.4 Test Procedure

This procedure should only be used when the maximum available RBW of the spectrum/signal analyzer is less than the DTS bandwidth. The transmitter output was connected to a spectrum analyzer and the parameter was set as below:

1. Set the RBW = maximum available (at least 1 MHz).

2. Set the VBW = 3 x RBW or maximum available setting (must be ≥ RBW).

3. Set the span to fully encompass the DTS bandwidth.

4. Detector = peak.

5. Sweep time = auto couple.

6. Trace mode = max hold.

7. Allow trace to fully stabilize.

8. Use the spectrum analyzer's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some analyzers, this may require a manual override to ensure use of peak detector). If the spectrum analyzer does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel bandwidth.

5.5 Test Result

Temperature (℃) : 22~23	EUT: IP Camera
Humidity (%RH): 50~54	M/N: IPROBOT 3
Barometric Pressure (mbar): 950~1000	Operation Condition: Tx Mode

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	15.86	30	PASS
Middle	2437	15.58	30	PASS
High	2462	15.25	30	PASS

NOTE : 1. At finial test to get the worst-case emission at 1Mbps.

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	13.58	30	PASS
Middle	2437	13.36	30	PASS
High	2462	12.99	30	PASS

NOTE : 1. At finial test to get the worst-case emission at 6Mbps.

IEEE 802.11n HT20mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	12.74	30	PASS
Middle	2437	12.46	30	PASS
High	2462	12.17	30	PASS

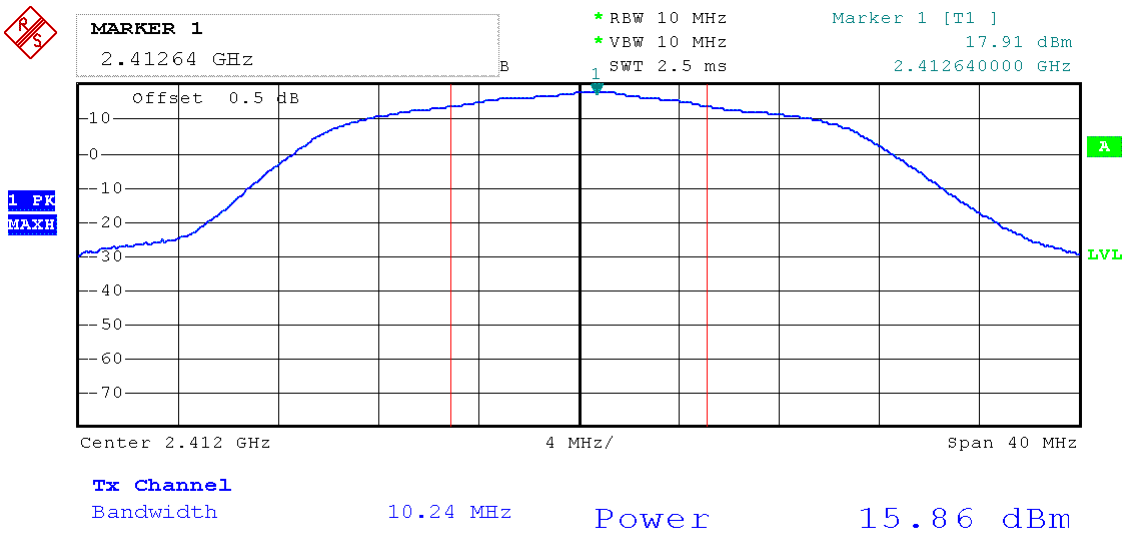
NOTE : 1. At finial test to get the worst-case emission at 13Mbps.

IEEE 802. 11n HT40 mode

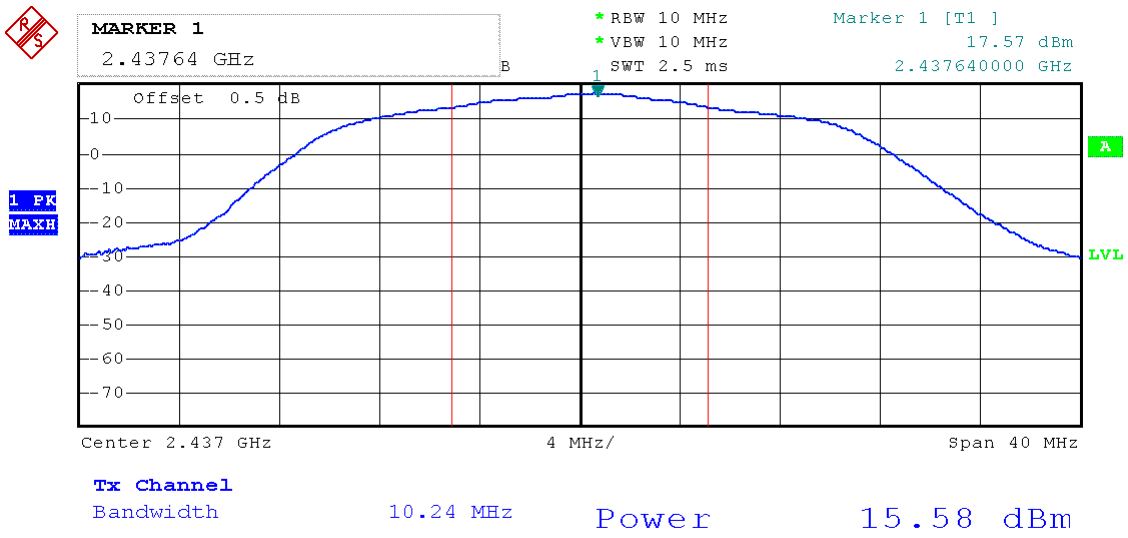
Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2422	11.43	30	PASS
Middle	2437	11.27	30	PASS
High	2452	11.11	30	PASS

NOTE : 1. At finial test to get the worst-case emission at 13Mbps.

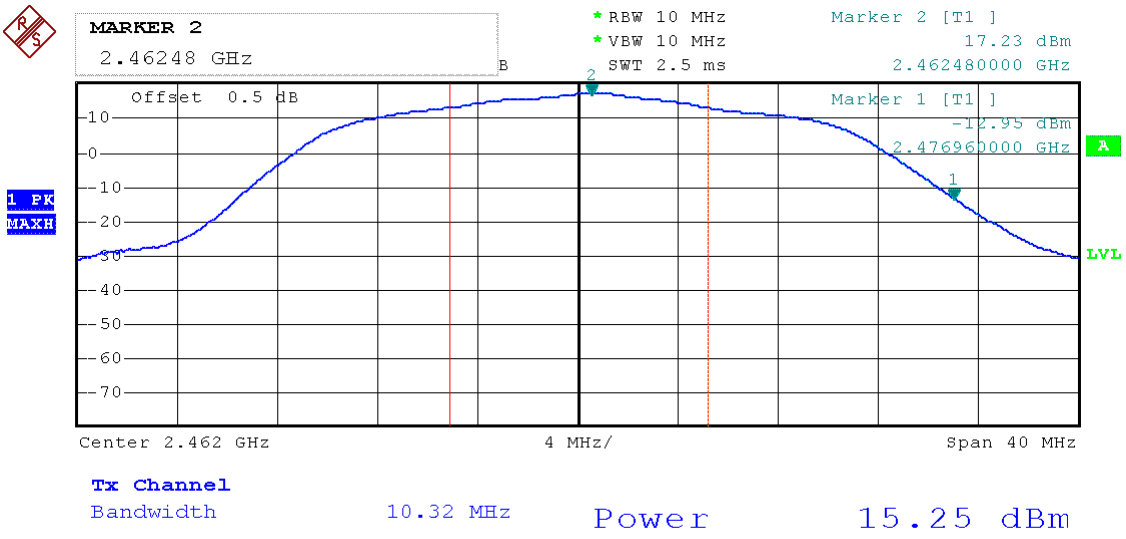
MAXIMUM PEAK OUTPUT POWER (802.11b MODE CH Low)



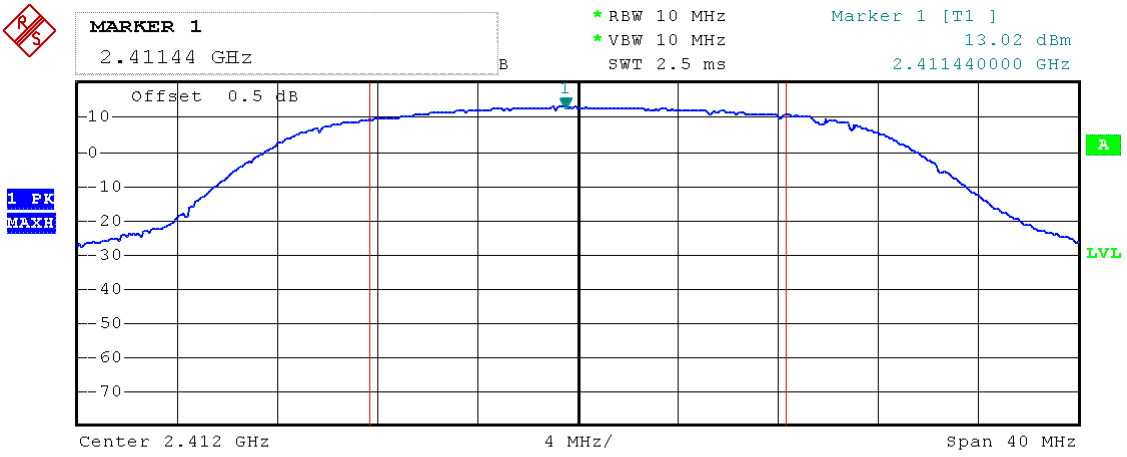
MAXIMUM PEAK OUTPUT POWER (802.11b MODE CH Mid)



MAXIMUM PEAK OUTPUT POWER (802.11b MODE CH High)



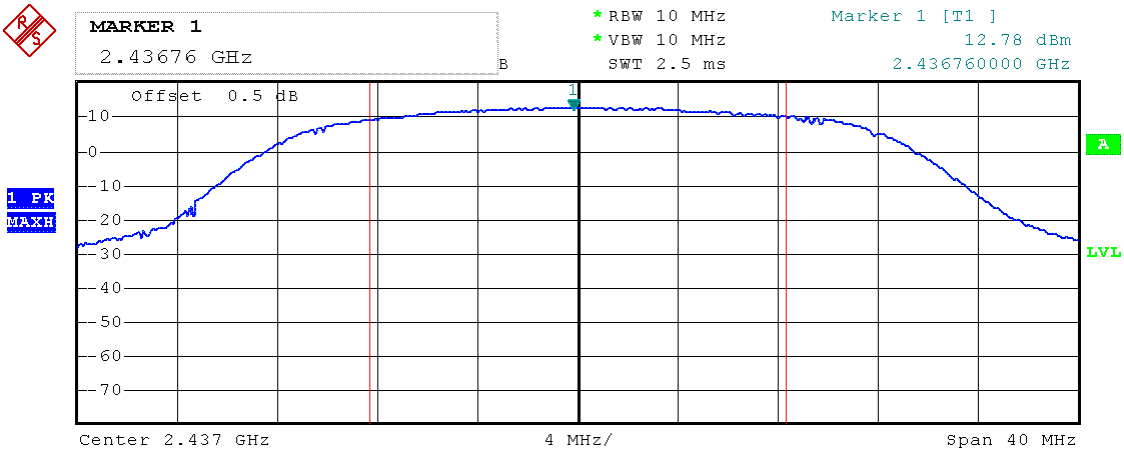
MAXIMUM PEAK OUTPUT POWER (802.11g MODE CH Low)



Tx Channel

Bandwidth	16.64 MHz	Power	13.58 dBm

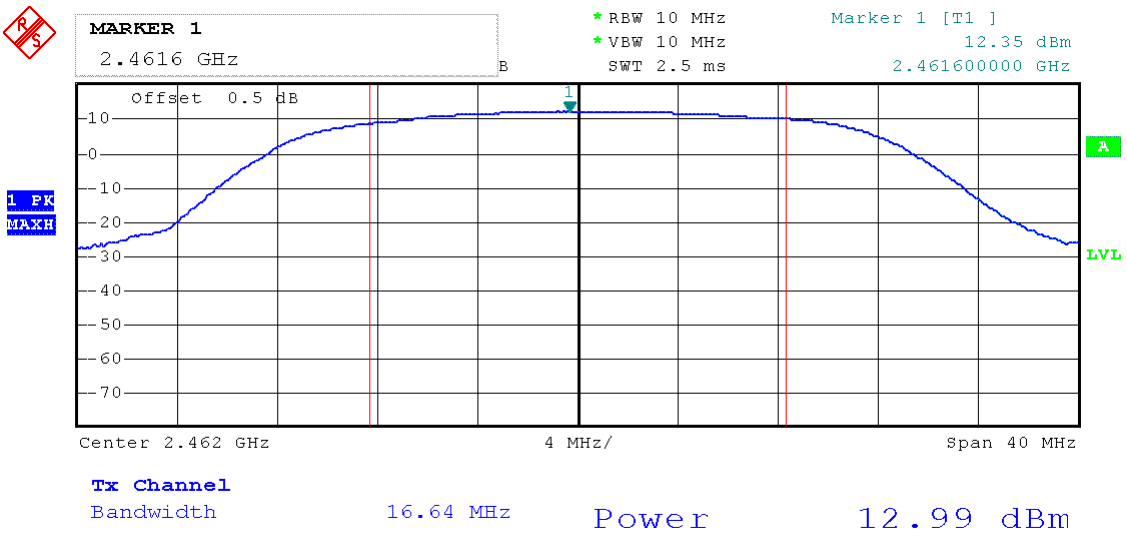
MAXIMUM PEAK OUTPUT POWER (802.11g MODE CH Mid)



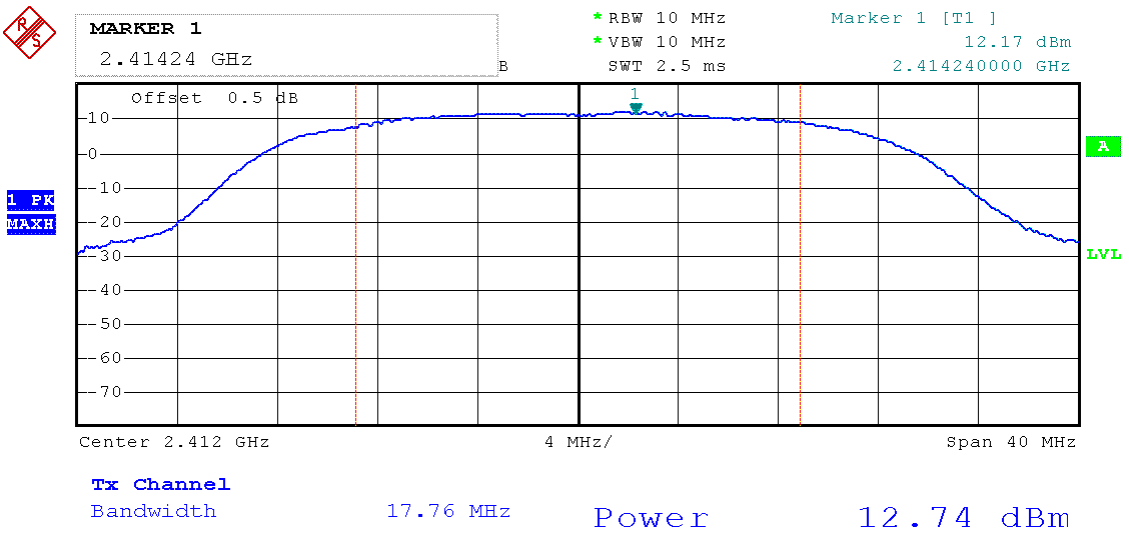
Tx Channel

Bandwidth	16.64 MHz	Power	13.36 dBm

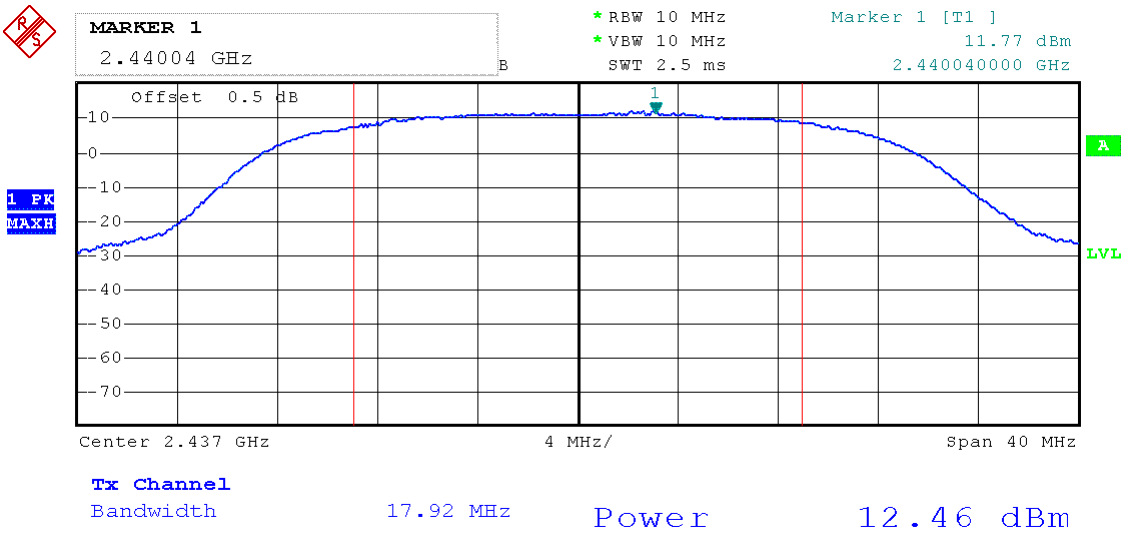
MAXIMUM PEAK OUTPUT POWER (802.11g MODE CH High)



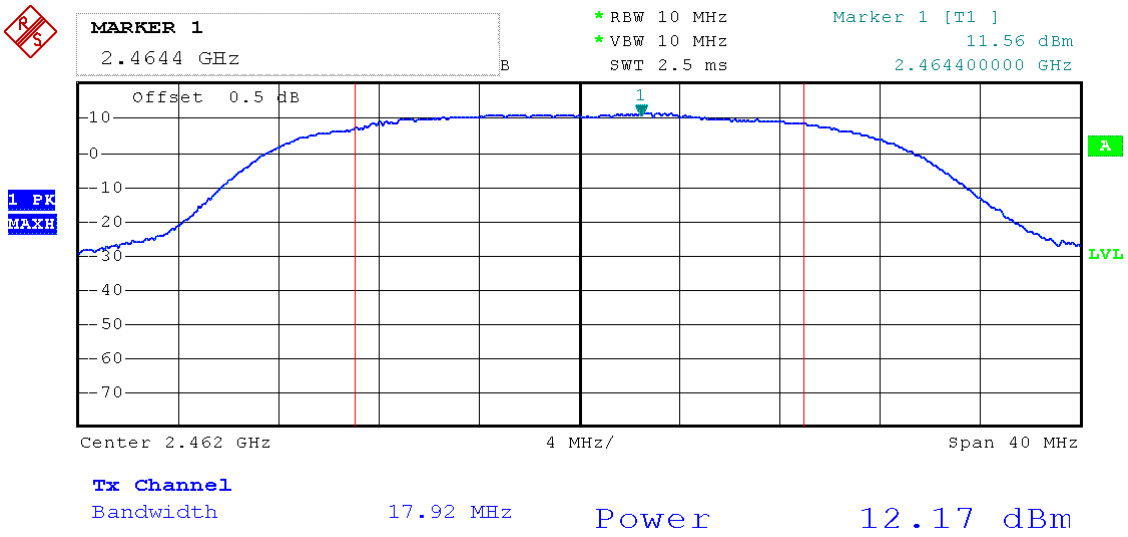
MAXIMUM PEAK OUTPUT POWER (802.11nHT20 MODE CH Low)



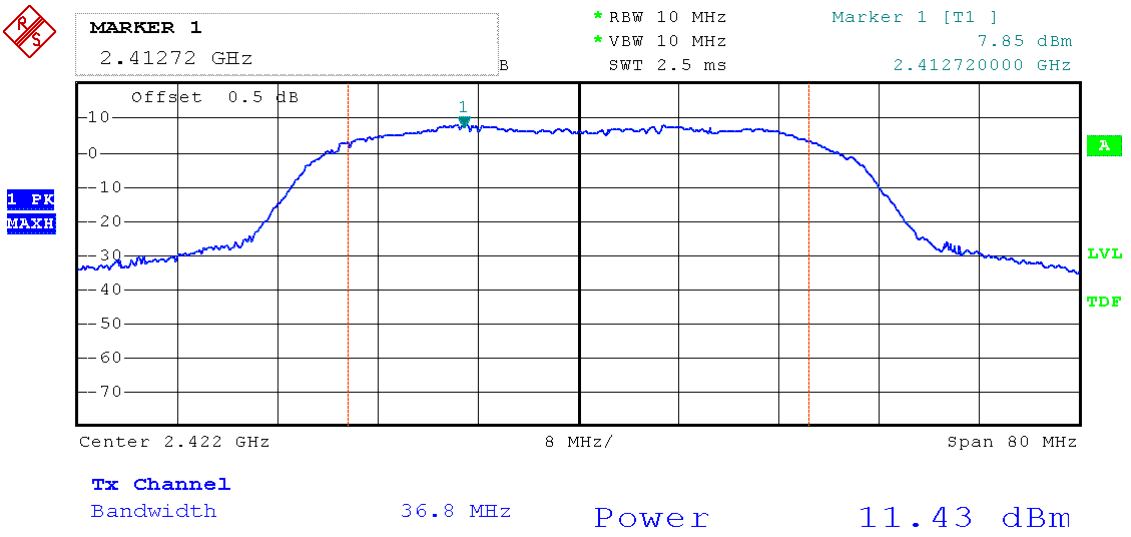
MAXIMUM PEAK OUTPUT POWER (802.11nHT20 MODE CH Mid)



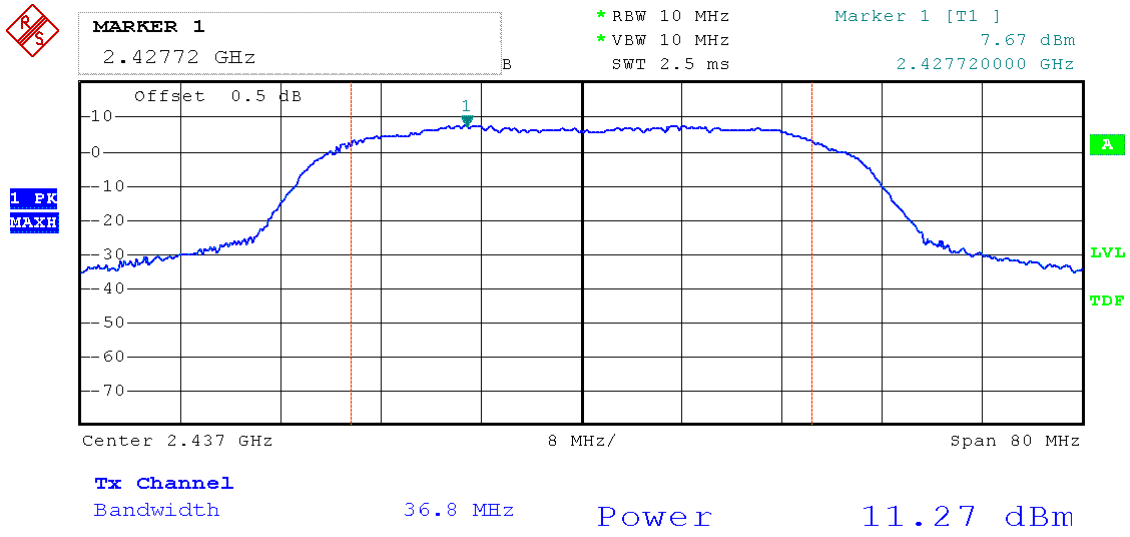
MAXIMUM PEAK OUTPUT POWER (802.11nHT20 MODE CH High)



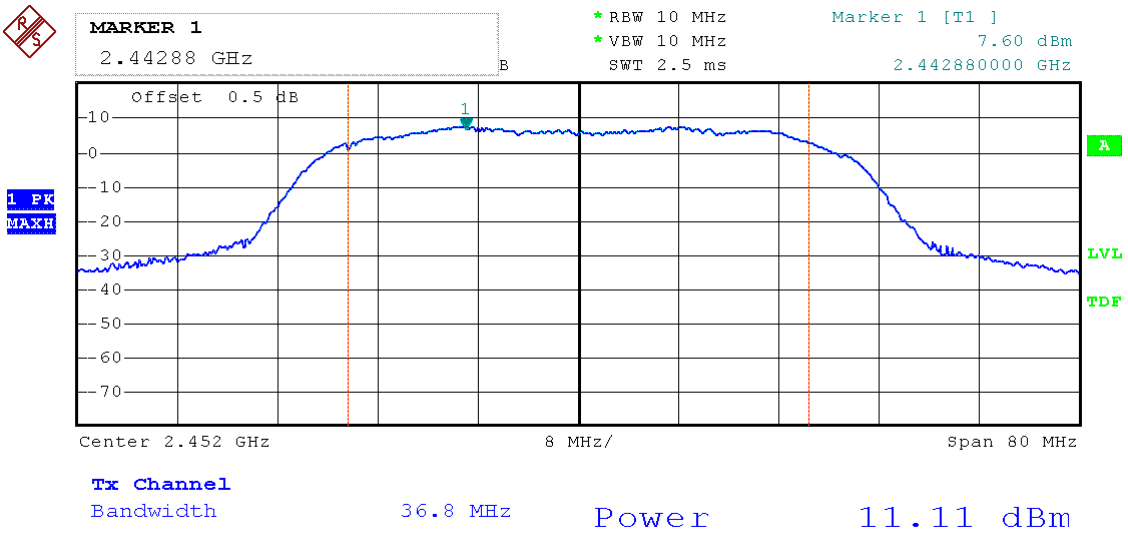
MAXIMUM PEAK OUTPUT POWER (802.11nHT40 MODE CH Low)



MAXIMUM PEAK OUTPUT POWER (802.11nHT40 MODE CH Mid)



MAXIMUM PEAK OUTPUT POWER (802.11nHT40 MODE CH High)



6. Test of Peak Power Spectral Density

6.1 Applicable Standard

Refer to FCC §15.247 (e).

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

6.2 EUT Setup

Spectrum Analyzer

6.3 Test Equipment List and Details

See section 2.5.

6.4 Test Procedure

The transmitter output was connected to the spectrum analyzer and the parameter was set as below:

1. Set analyzer center frequency to DTS channel center frequency.

2. Set the span to 1.5 times the DTS channel bandwidth.

3. Set the RBW ≥ 3 kHz.

4. Set the VBW ≥ 3 x RBW.

5. Detector = peak.

6. Sweep time = auto couple.

7. Trace mode = max hold.

8. Allow trace to fully stabilize.

9. Use the peak marker function to determine the maximum amplitude level.

10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.5 Test Result

Temperature (℃) : 22~23	EUT: IP Camera
Humidity (%RH): 50~54	M/N: IPROBOT 3
Barometric Pressure (mbar): 950~1000	Operation Condition: Tx Mode

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2412	-14.40	8	PASS
Middle	2437	-14.73	8	PASS
High	2462	-14.73	8	PASS

NOTE : 1. At finial test to get the worst-case emission at 1Mbps.

IEEE 802.11 g mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2412	-21.79	8	PASS
Middle	2437	-22.16	8	PASS
High	2462	-22.60	8	PASS

NOTE : 1. At finial test to get the worst-case emission at 6Mbps.

IEEE 802.11nHT20 mode

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2412	-21.59	8	PASS
Middle	2437	-21.84	8	PASS
High	2462	-22.26	8	PASS

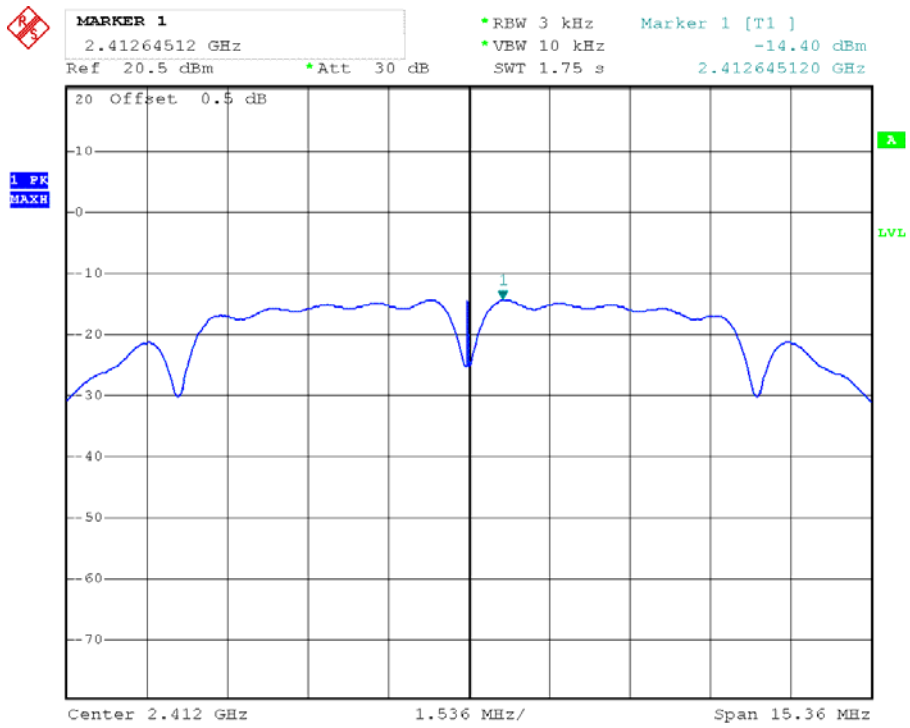
NOTE : 1. At finial test to get the worst-case emission at 13Mbps.

IEEE 802.11nHT40 mode

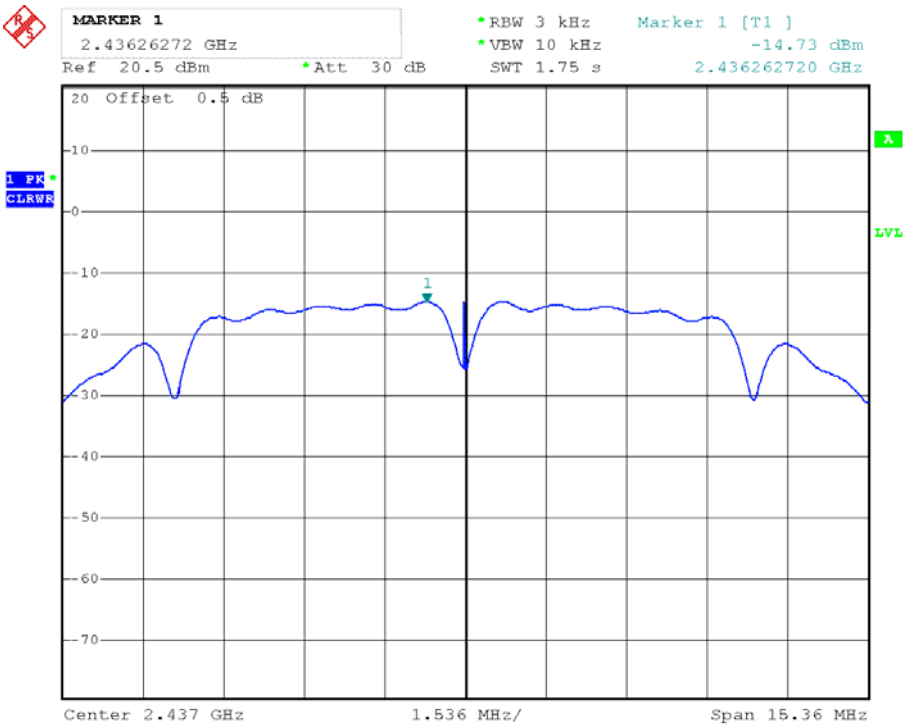
Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2422	-26.84	8	PASS
Middle	2437	-26.69	8	PASS
High	2452	-27.69	8	PASS

NOTE : 1. At finial test to get the worst-case emission at 13Mbps.

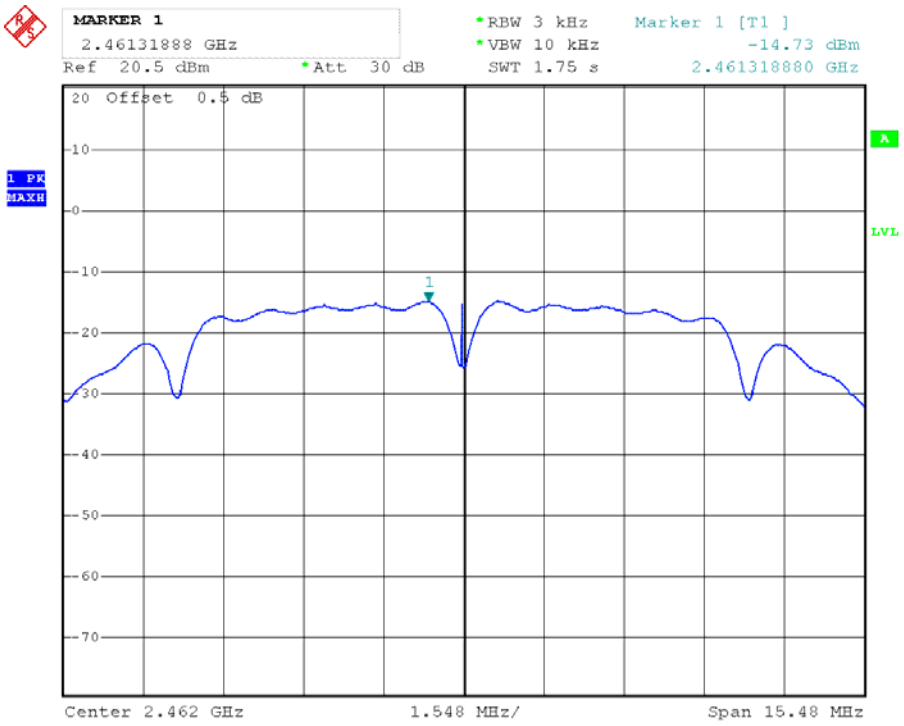
POWER SPECTRAL DENSITY (802.11b MODE CH Low)



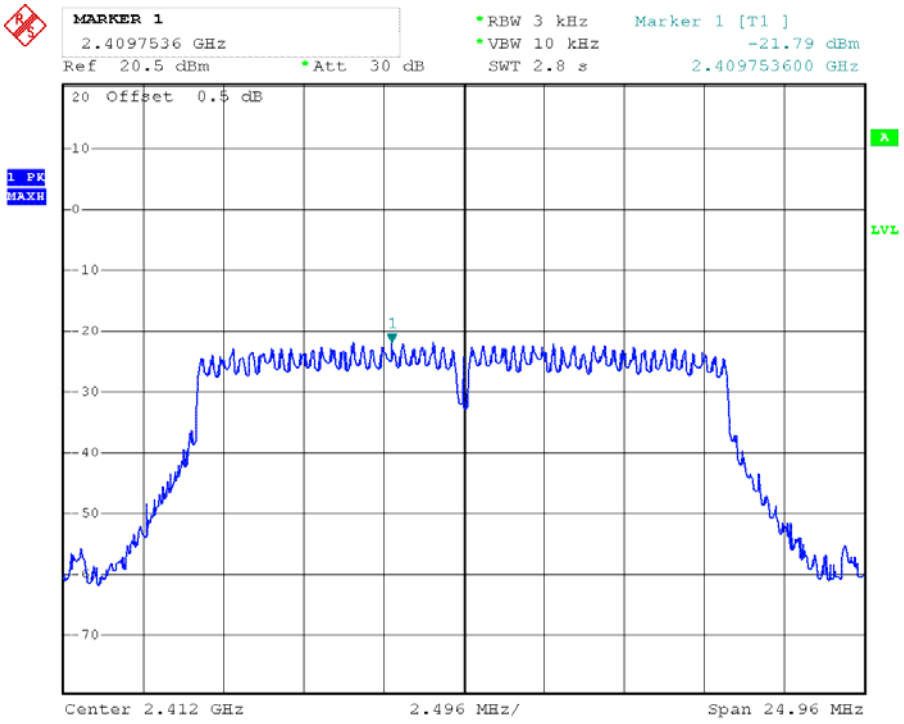
POWER SPECTRAL DENSITY (802.11b MODE CH Mid)



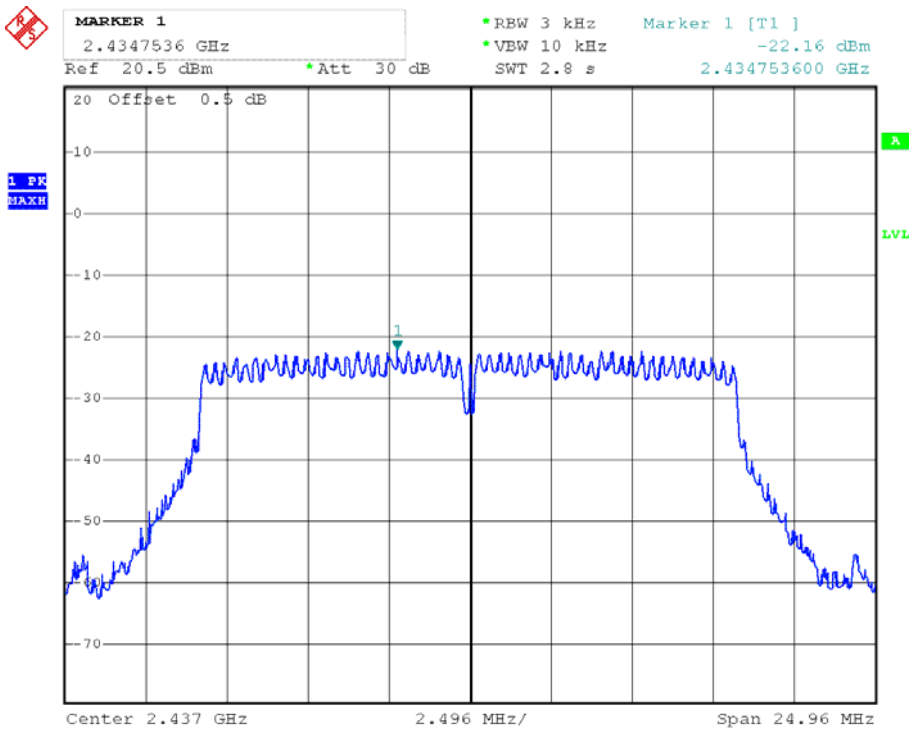
POWER SPECTRAL DENSITY (802.11b MODE CH High)



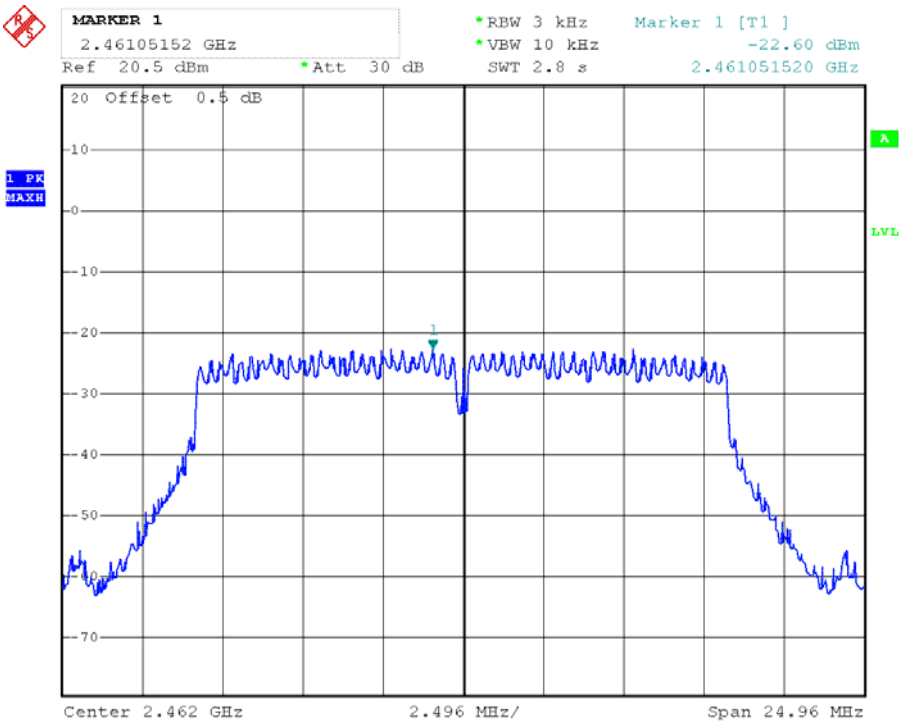
POWER SPECTRAL DENSITY (802.11g MODE CH Low)



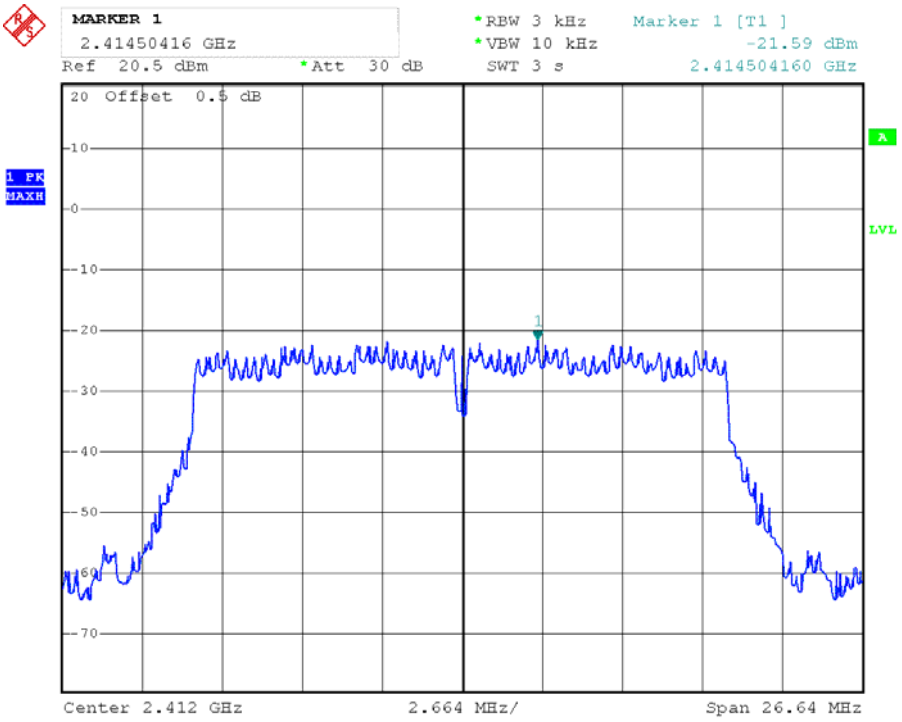
POWER SPECTRAL DENSITY (802.11g MODE CH Mid)



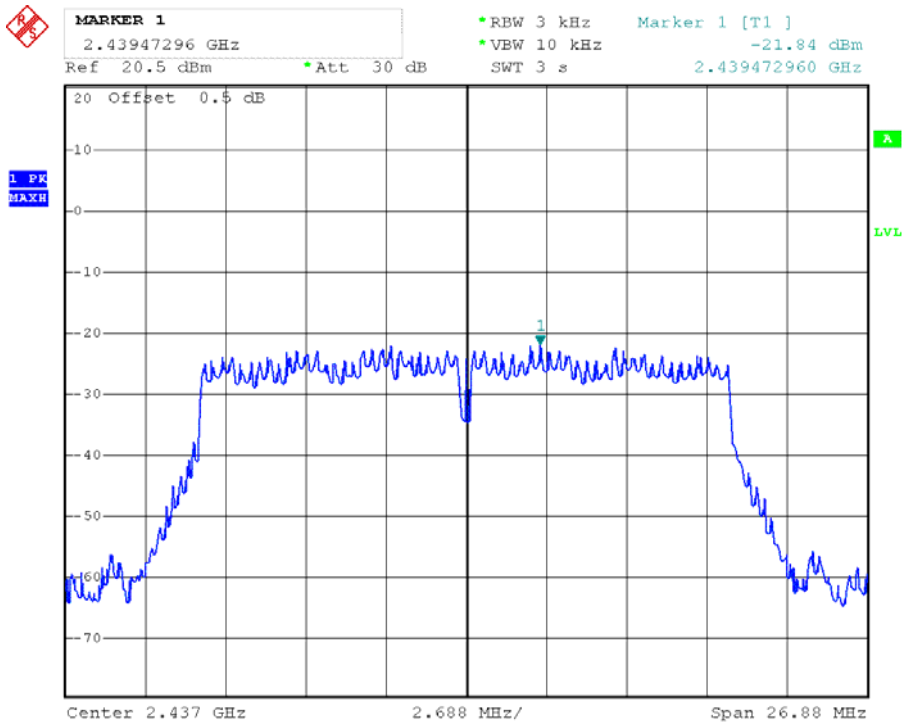
POWER SPECTRAL DENSITY (802.11g MODE CH High)



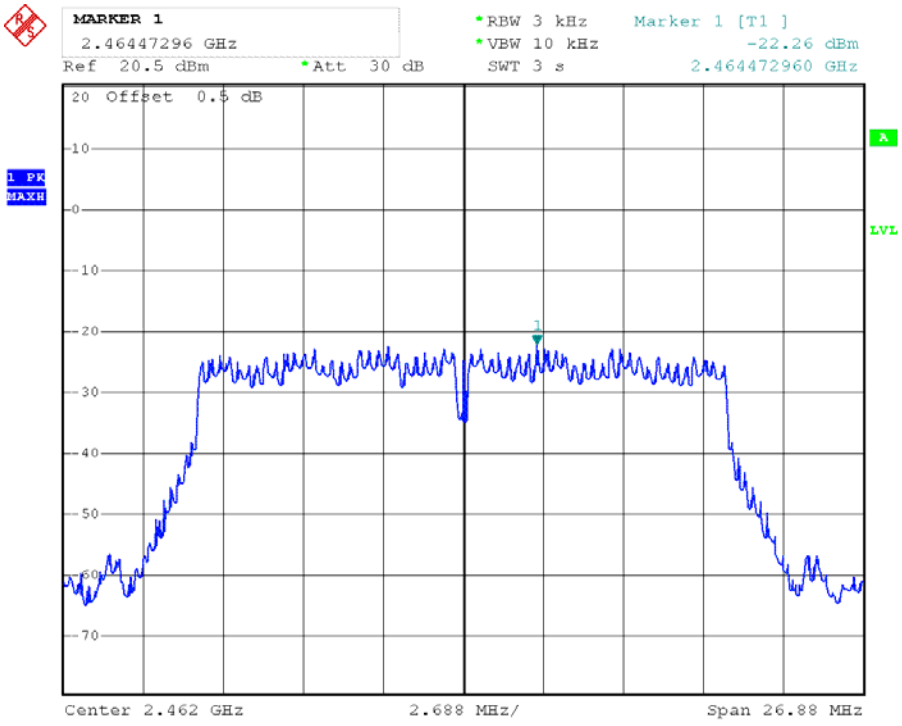
POWER SPECTRAL DENSITY (802.11nHT20 MODE CH Low)



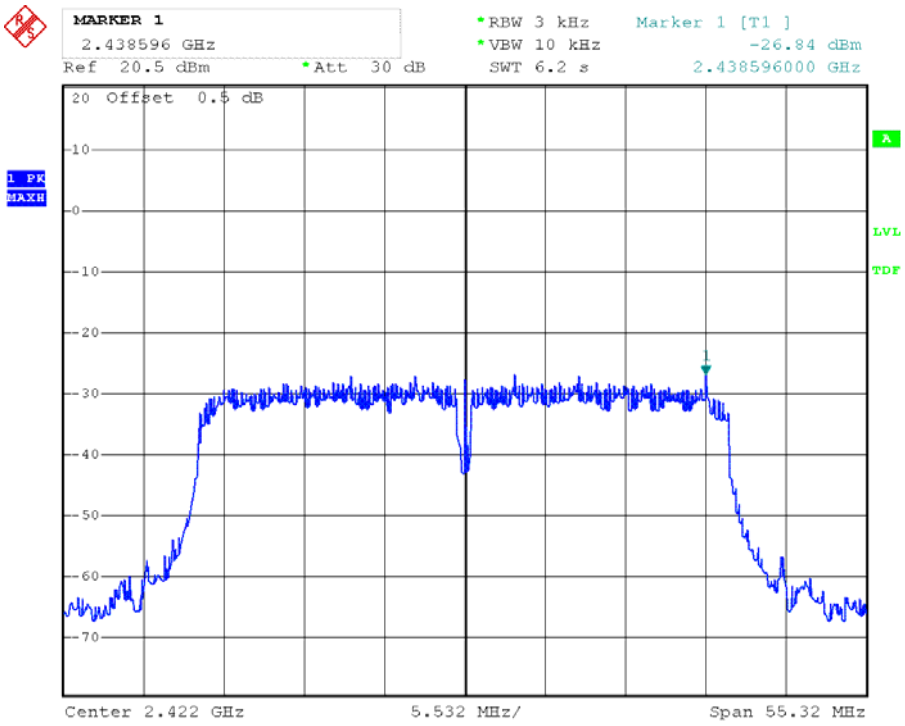
POWER SPECTRAL DENSITY (802.11nHT20 MODE CH Mid)



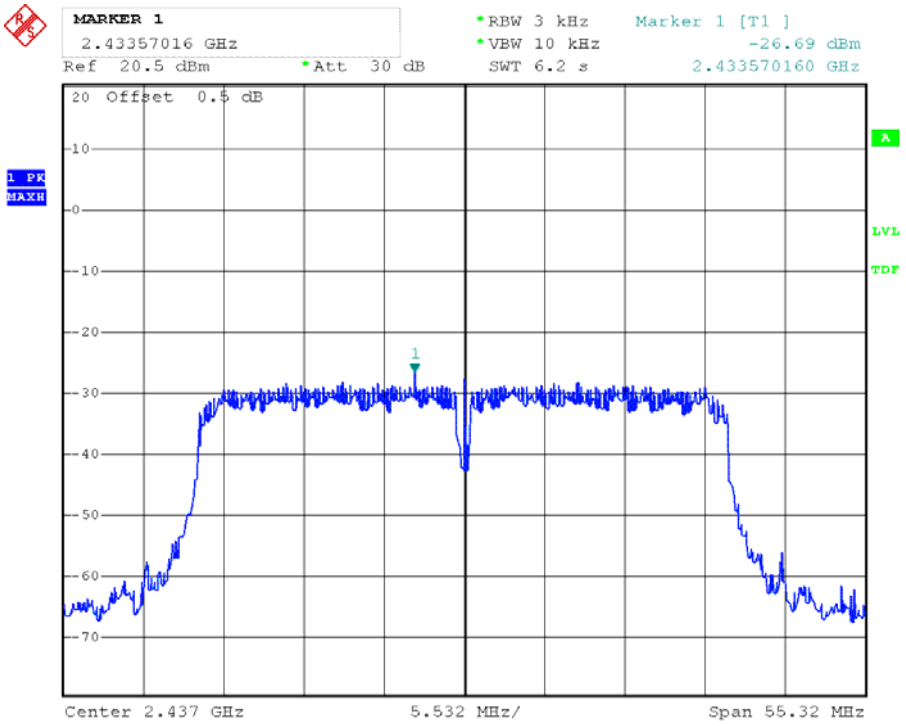
POWER SPECTRAL DENSITY (802.11nHT20 MODE CH High)



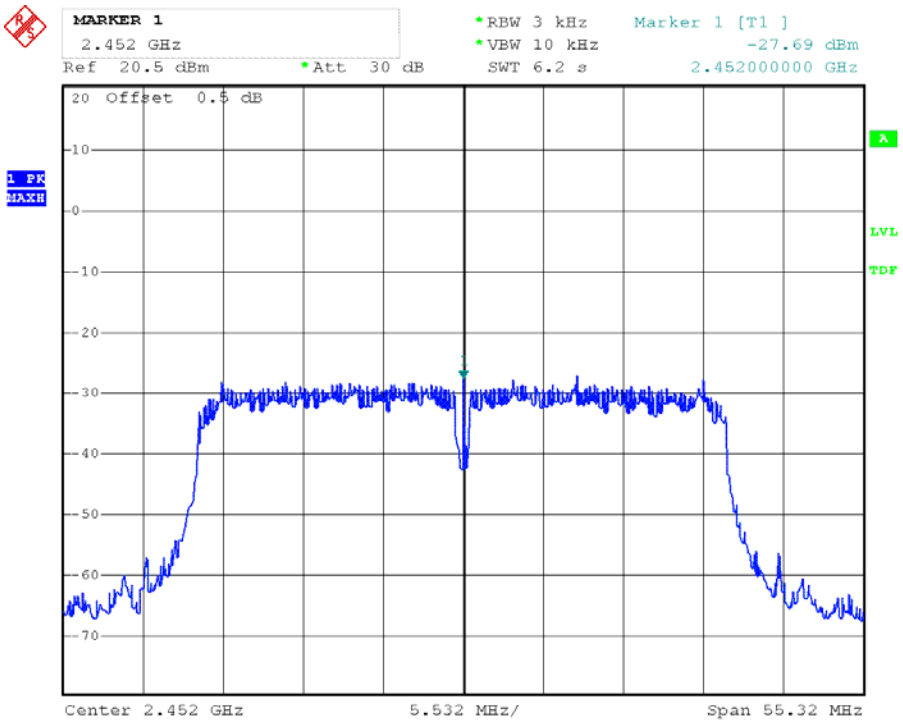
POWER SPECTRAL DENSITY (802.11nHT40 MODE CH Low)



POWER SPECTRAL DENSITY (802.11nHT40 MODE CH Mid)



POWER SPECTRAL DENSITY (802.11nHT40 MODE CH High)



7. Test of 6dB Bandwidth

7.1 Applicable Standard

Refer to FCC §15.247 (a) (2) .

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

7.2 EUT Setup

Spectrum Analyzer

7.3 Test Equipment List and Details

See section 2.5.

7.4 Test Procedure

The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB. The transmitter output was connected to a spectrum analyzer and the parameter was set as below:

1. Set resolution bandwidth (RBW) = 1-5% or DTS BW, not to exceed 100 kHz.

2. Set the video bandwidth (VBW) ⩾ 3 x RBW.

3. Detector = Peak.

4. Trace mode = max hold.

5. Sweep = auto couple.

6. Allow the trace to stabilize.

7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.5 Test Result

Temperature (℃) : 22~23	EUT: IP Camera
Humidity (%RH): 50~54	M/N: IPROBOT 3
Barometric Pressure (mbar): 950~1000	Operation Condition: Tx Mode

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	10.24	500	PASS
Middle	2437	10.24	500	PASS
High	2462	10.32	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 1Mbps.

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	16.64	500	PASS
Middle	2437	16.64	500	PASS
High	2462	16.64	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 6Mbps.

IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	17.76	500	PASS
Middle	2437	17.92	500	PASS
High	2462	17.92	500	PASS

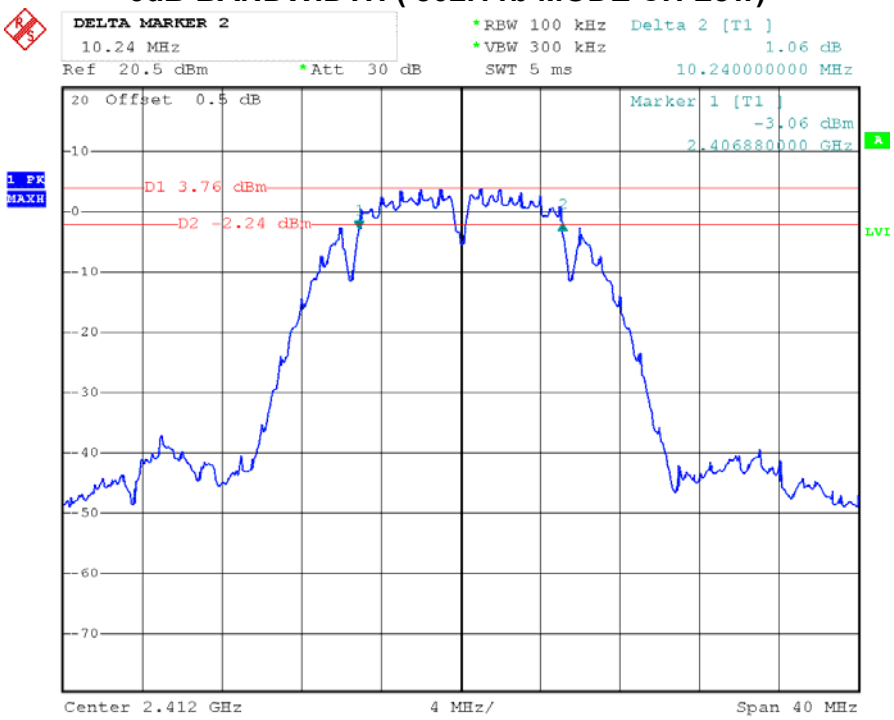
NOTE : 1. At finial test to get the worst-case emission at 13Mbps.

IEEE 802.11 n HT40mode

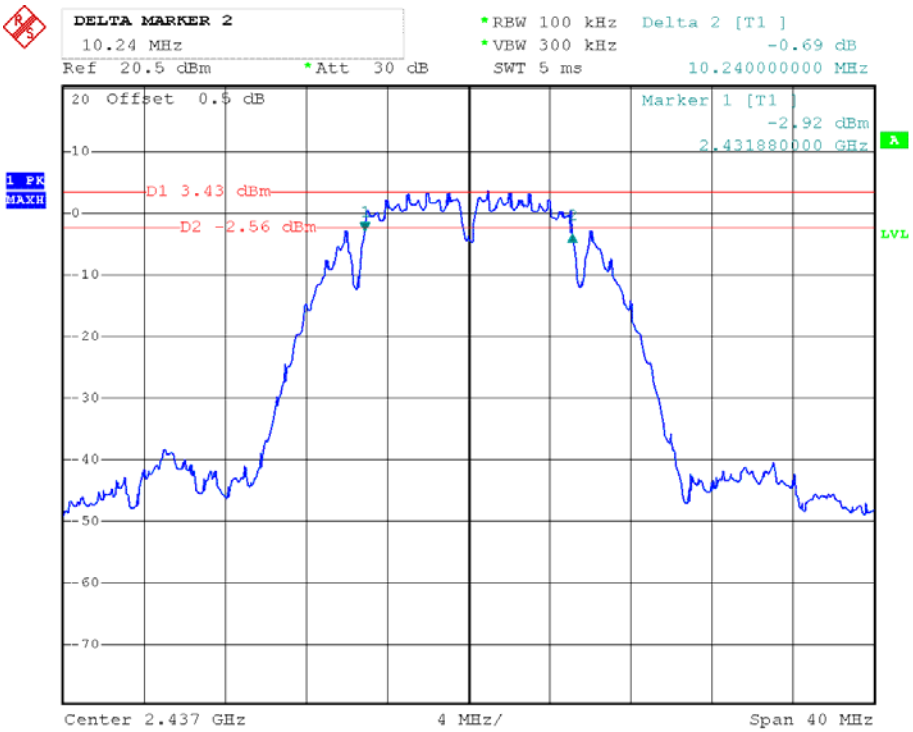
Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2422	36.80	500	PASS
Middle	2437	36.80	500	PASS
High	2452	36.80	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 13Mbps.

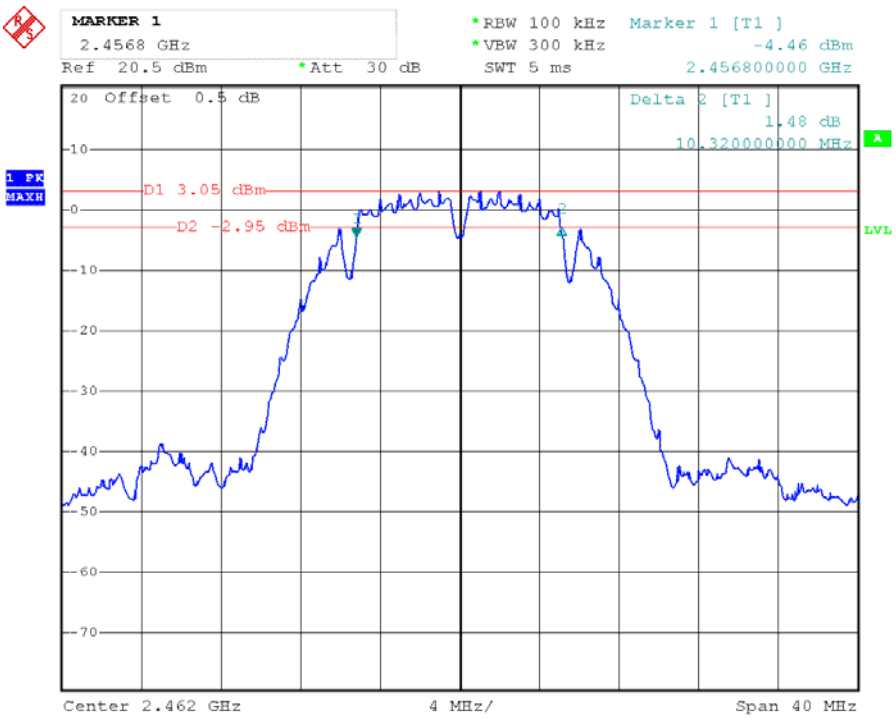
6dB BANDWIDTH (802.11b MODE CH Low)



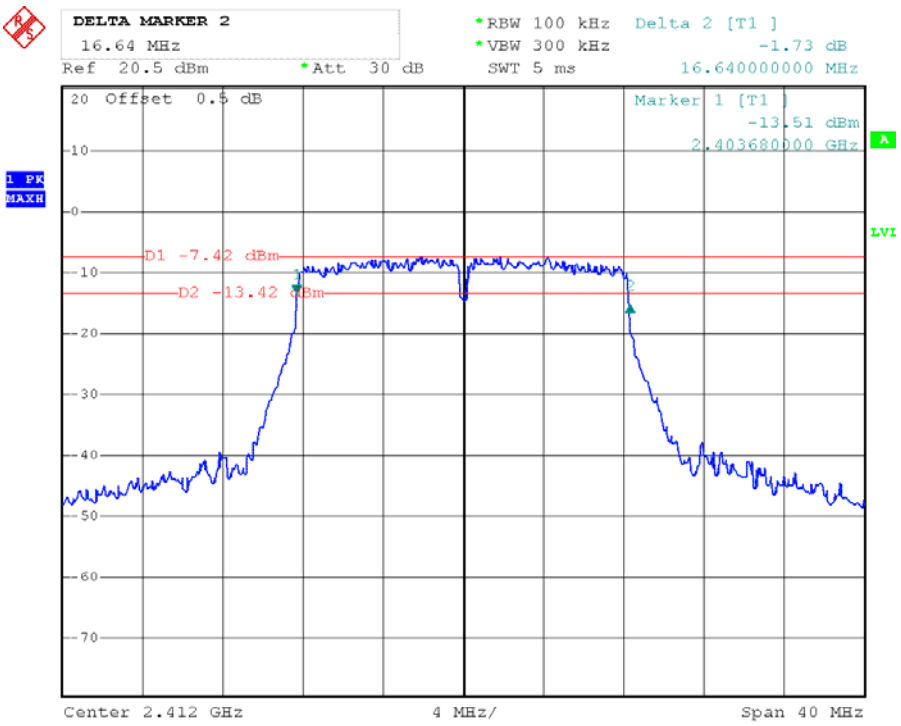
6dB BANDWIDTH (802.11b MODE CH Mid)



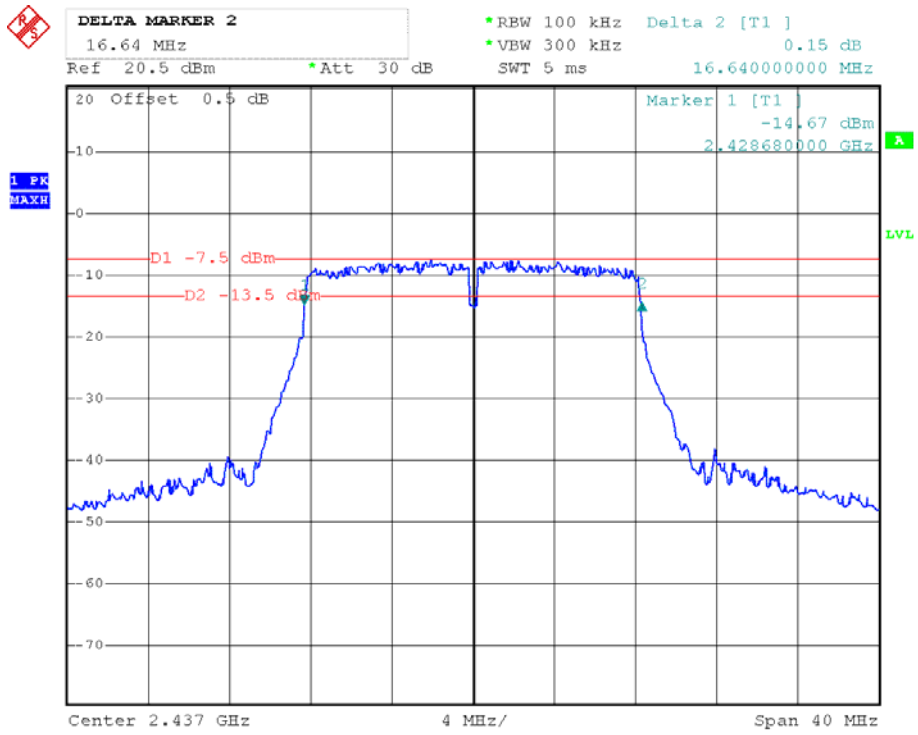
6dB BANDWIDTH (802.11b MODE CH High)



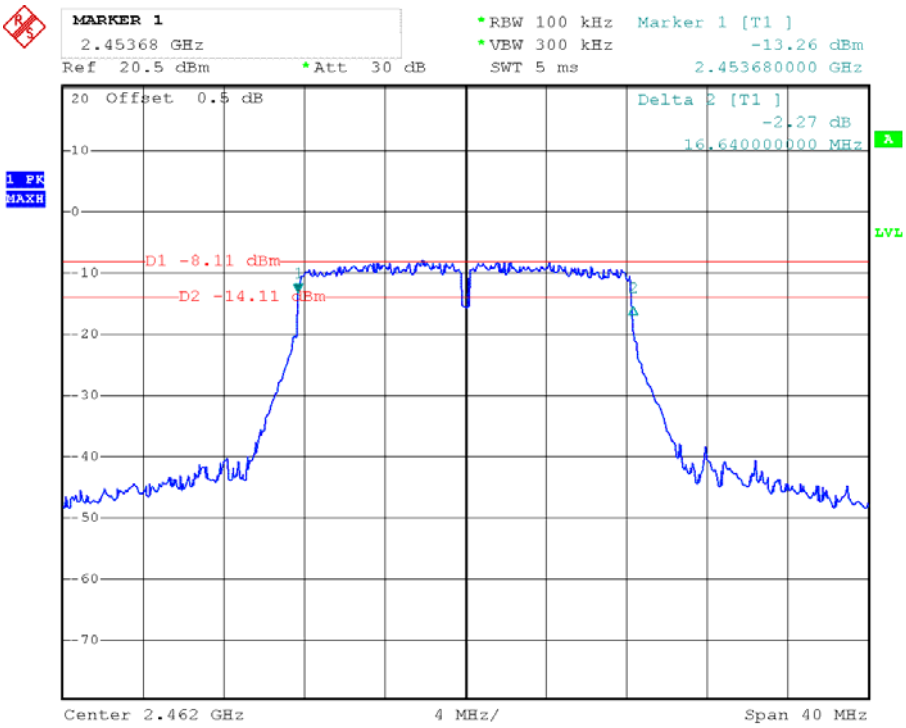
6dB BANDWIDTH (802.11g MODE CH Low)



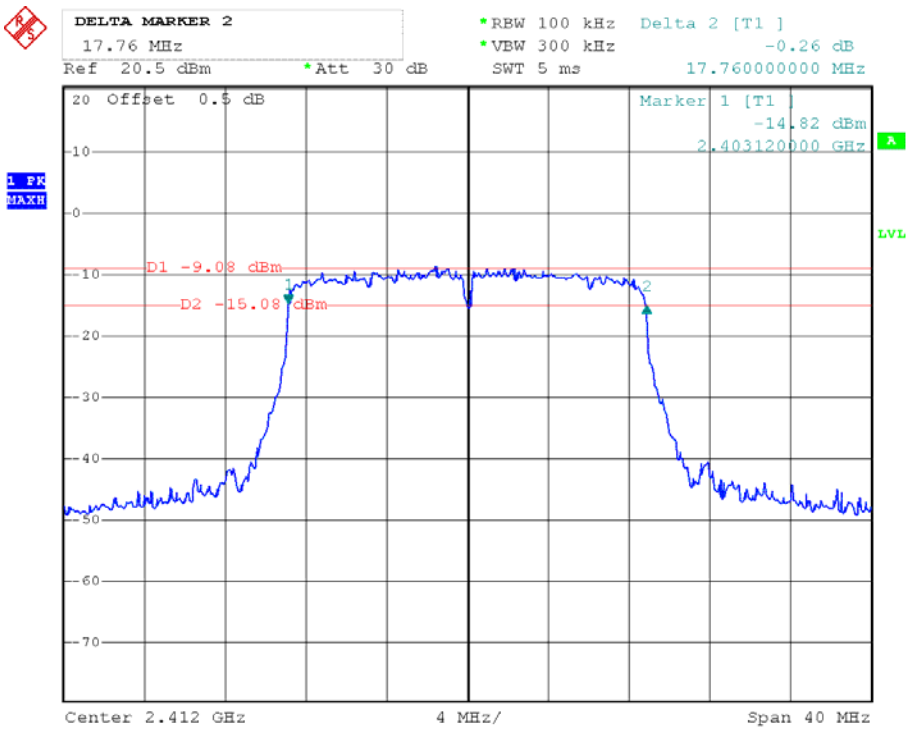
6dB BANDWIDTH (802.11g MODE CH Mid)



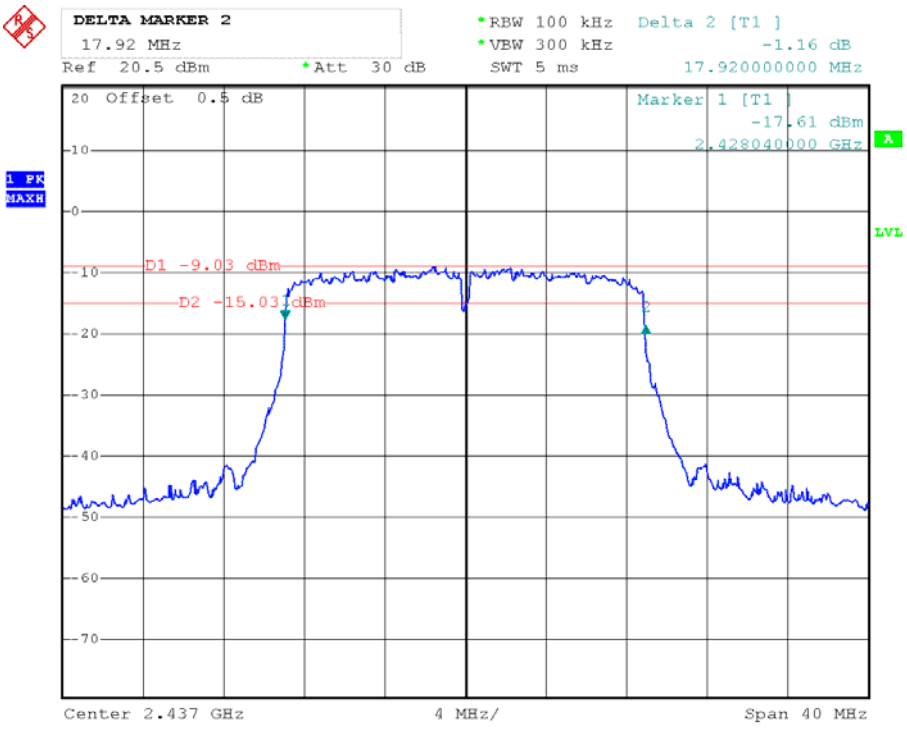
6dB BANDWIDTH (802.11g MODE CH High)



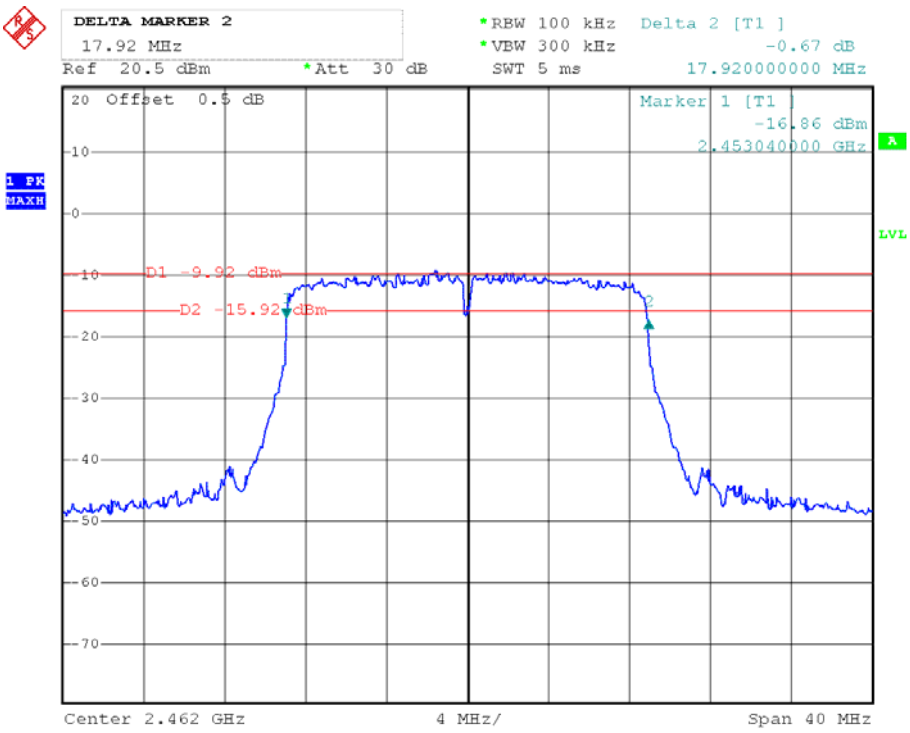
6dB BANDWIDTH (802.11n HT20 MODE CH Low)



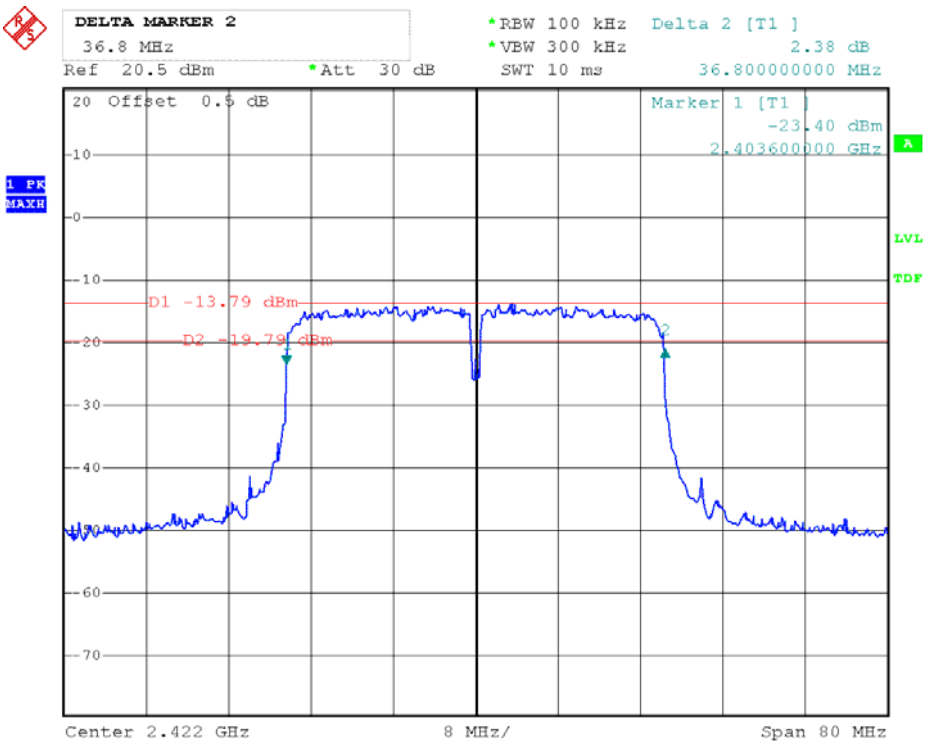
6dB BANDWIDTH (802.11n HT20 MODE CH Mid)



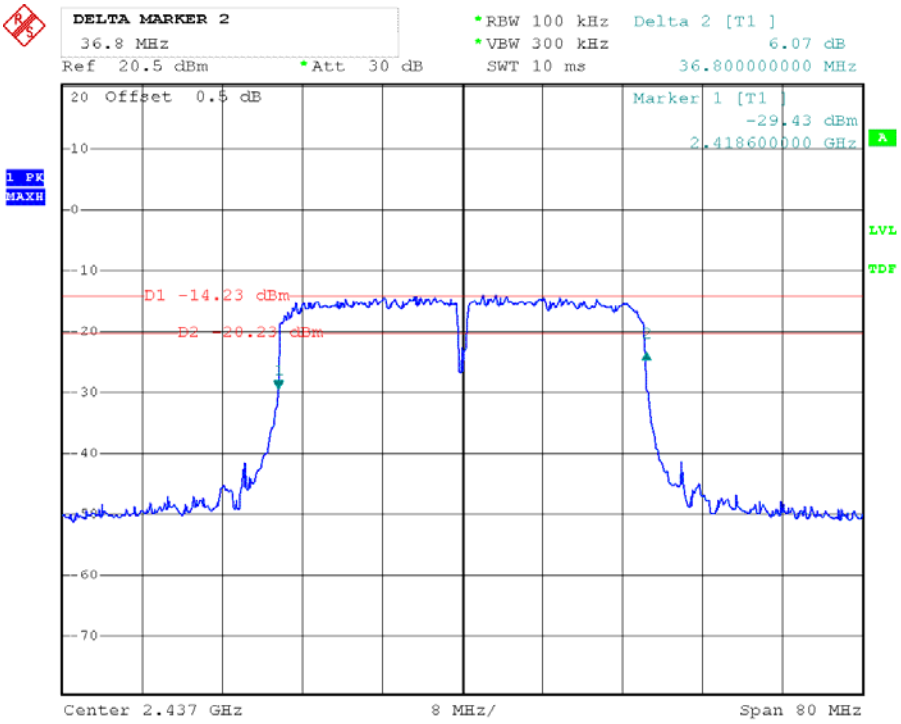
6dB BANDWIDTH (802.11n HT20 MODE CH High)



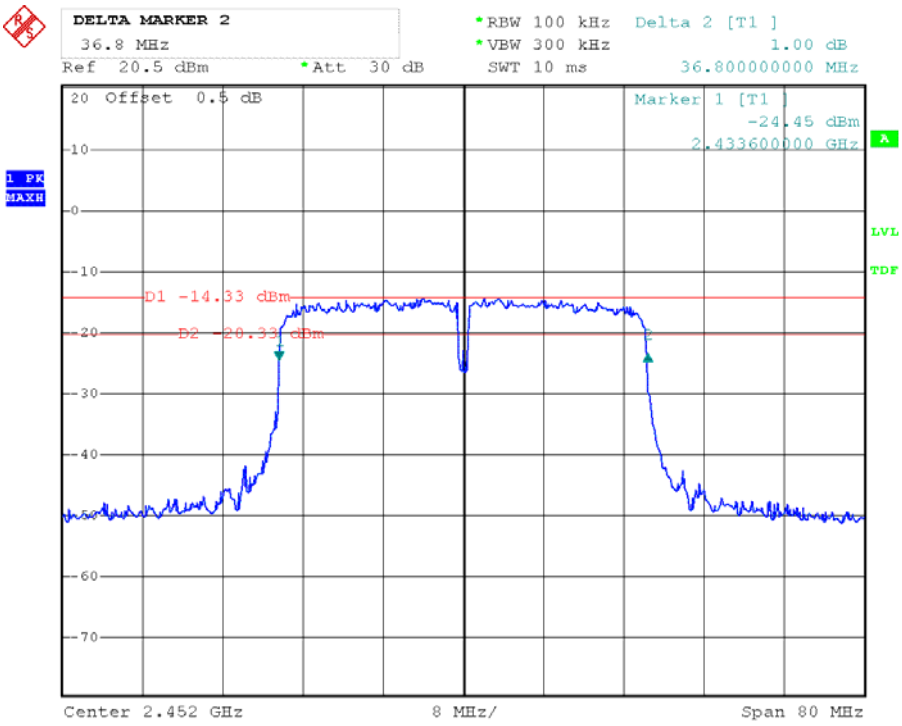
6dB BANDWIDTH (802.11n HT40 MODE CH Low)



6dB BANDWIDTH (802.11n HT40 MODE CH Mid)



6dB BANDWIDTH (802.11n HT40 MODE CH High)



8. Test of Conducted Spurious Emission

8.1 Applicable Standard

Refer to FCC §15.247 (d)

Output power was measured based on the use of RMS averaging over a time interval, therefore the required attenuation is 30 dB.

8.2 EUT Setup

Spectrum Analyzer

8.3 Test Equipment List and Details

See section 2.5.

8.4 Test Procedure

The transmitter output was connected to a spectrum analyzer. The spectrum from 30 MHz to 26.5 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.The parameter of the spectrum analyzer was set as below:

1. Set start frequency to DTS channel edge frequency.

2. Set stop frequency so as to encompass the spectrum to be examined.

3. Set RBW = 100 kHz.

4. Set VBW ≥ 300 kHz.

5. Detector = peak.

6. Trace Mode = max hold.

7. Sweep = auto couple.

8. Allow the trace to stabilize (this may take some time, depending on the extent of the span).

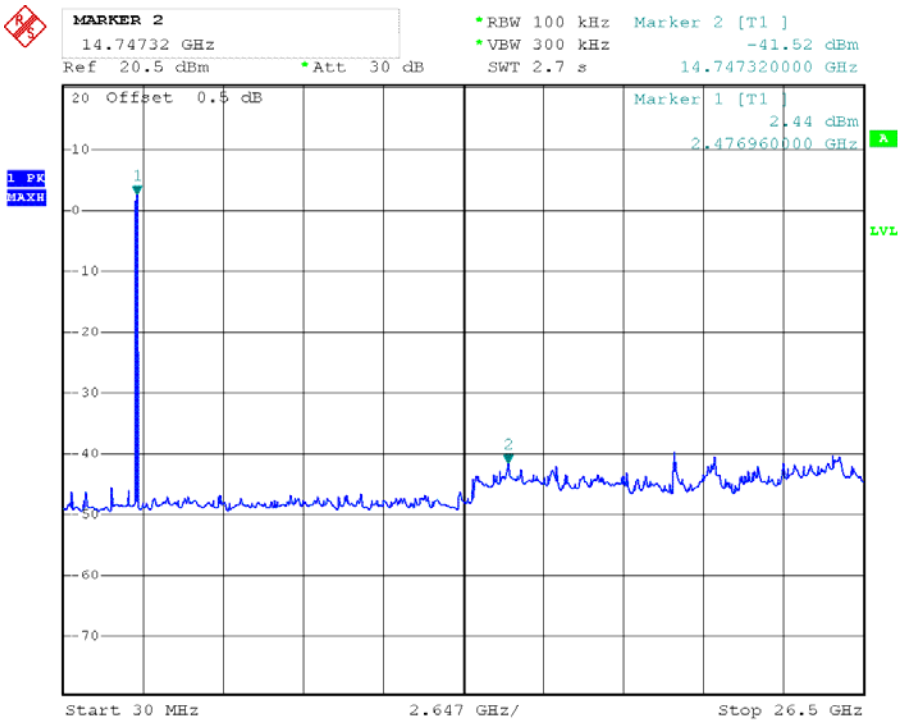
9. Use peak marker function to determine maximum amplitude of all unwanted emissions within any 100 kHz bandwidth.

8.5 Test Result

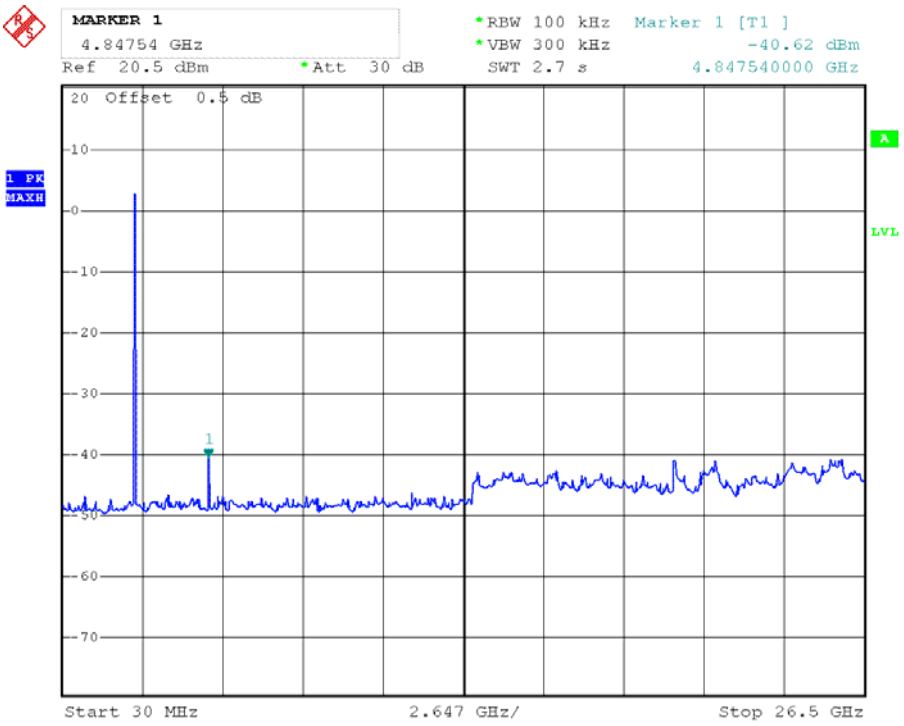
Temperature (℃) : 22~23	EUT: IP Camera
Humidity (%RH): 50~54	M/N: IPROBOT 3
Barometric Pressure (mbar): 950~1000	Operation Condition: TX Mode

IEEE 802.11b mode

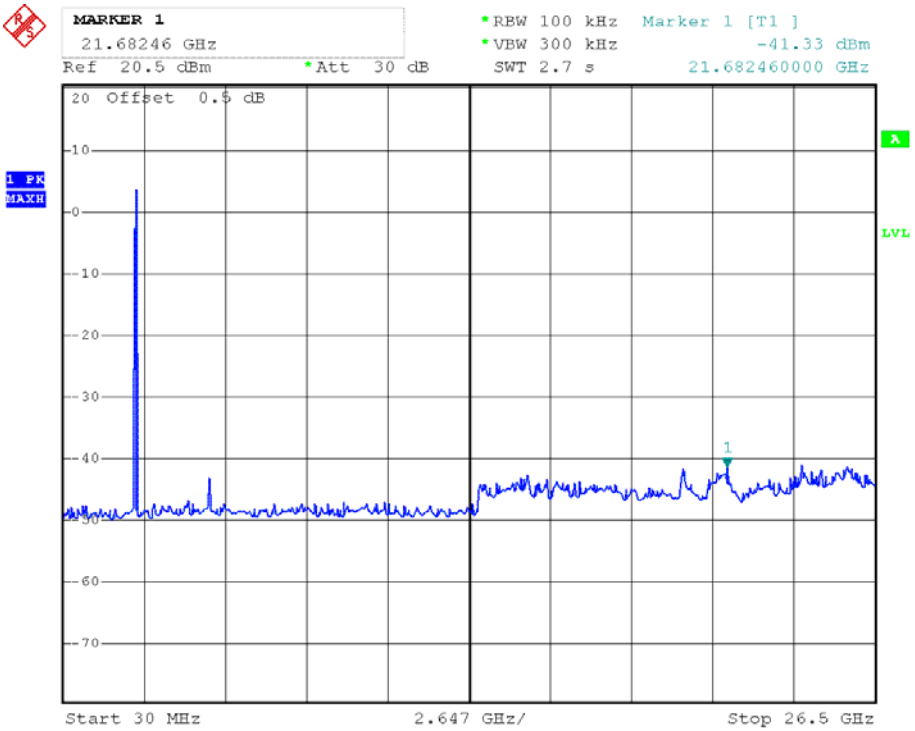
CH Low



CH Mid

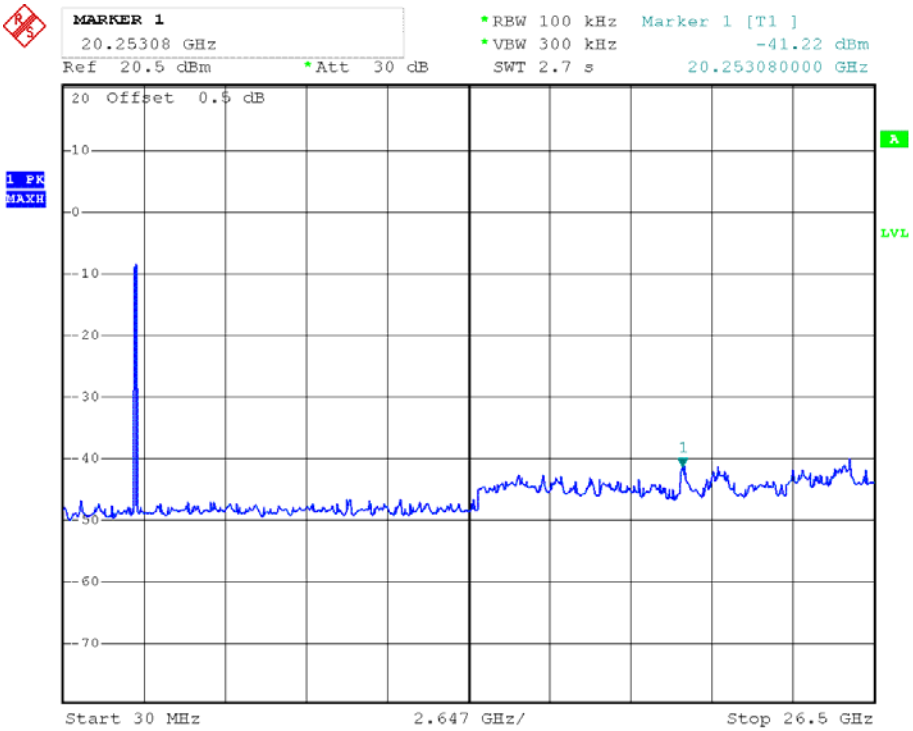


CH High

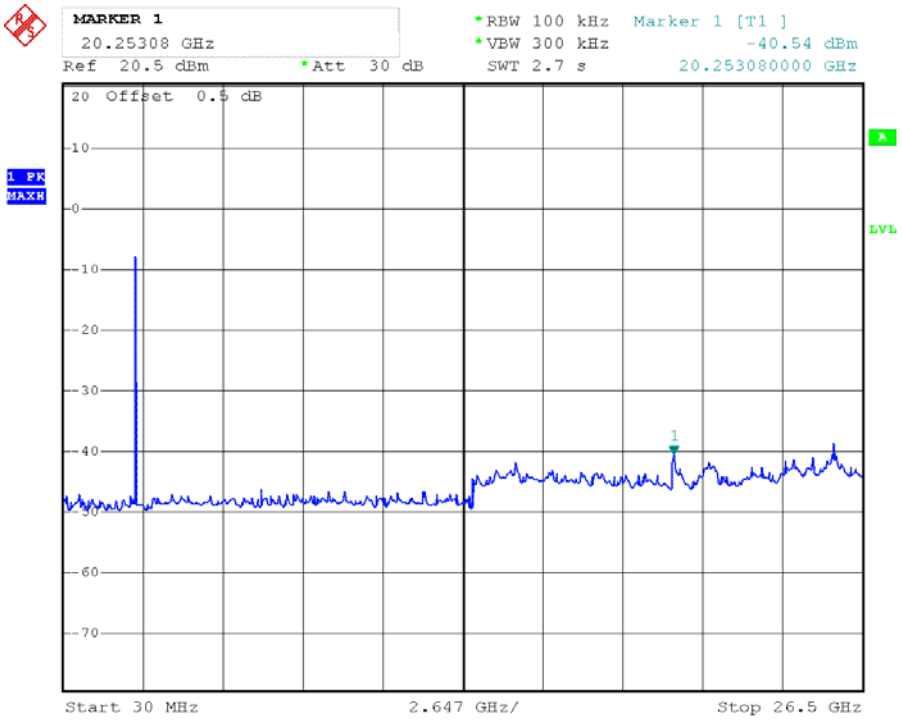


IEEE 802.11g mode

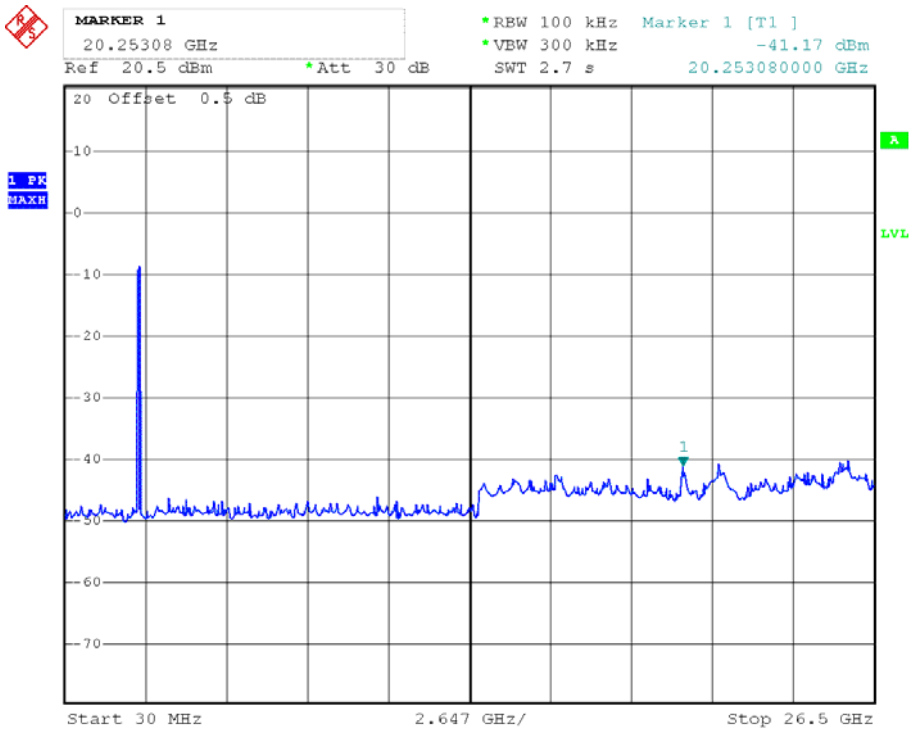
CH Low



CH Mid

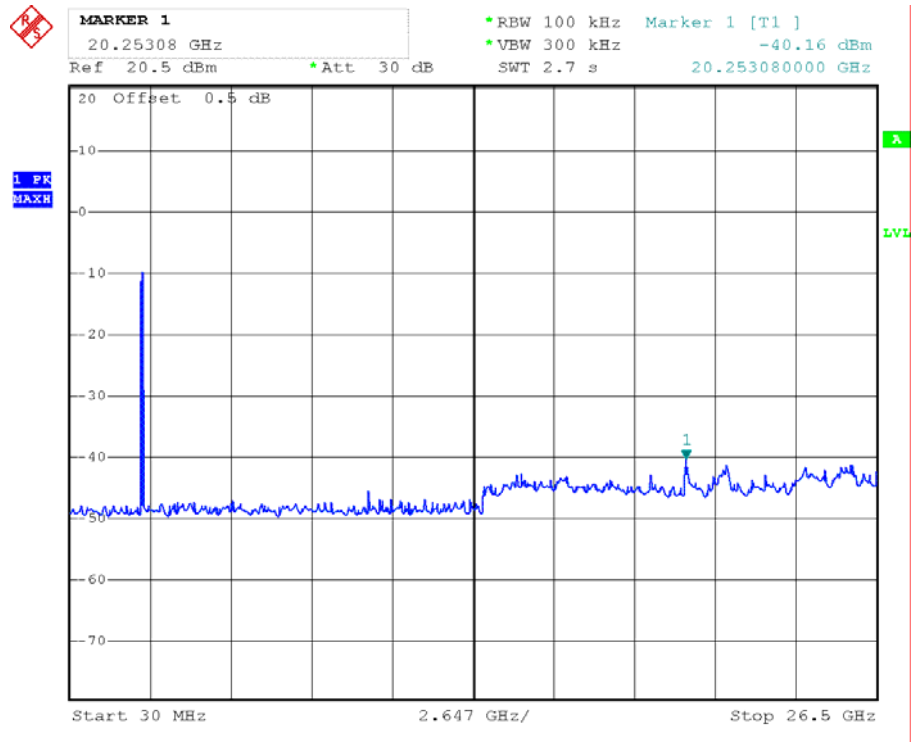


CH High

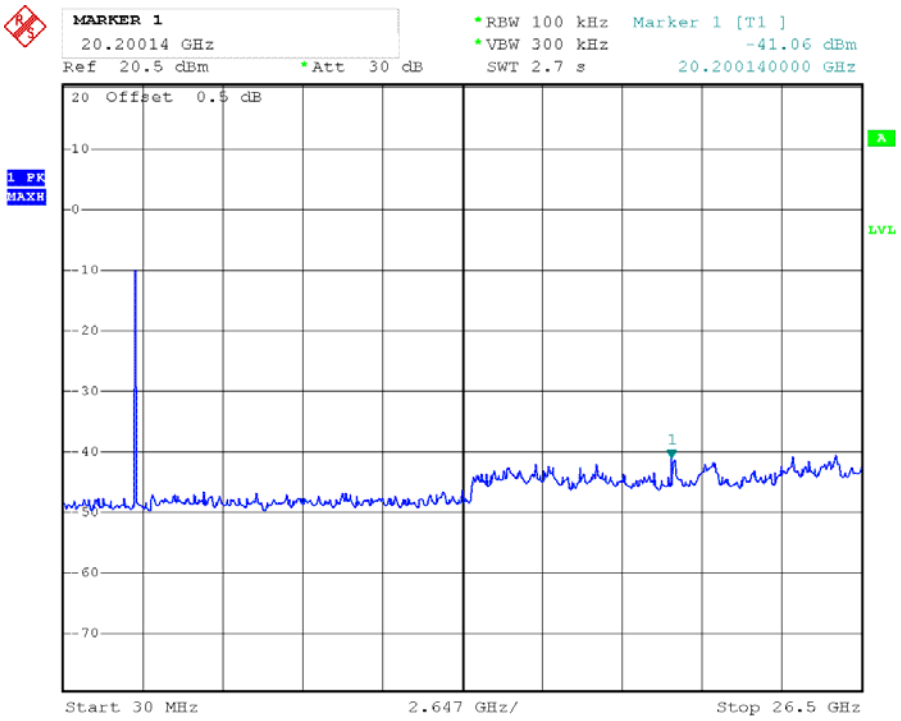


IEEE 802.11n HT20 mode

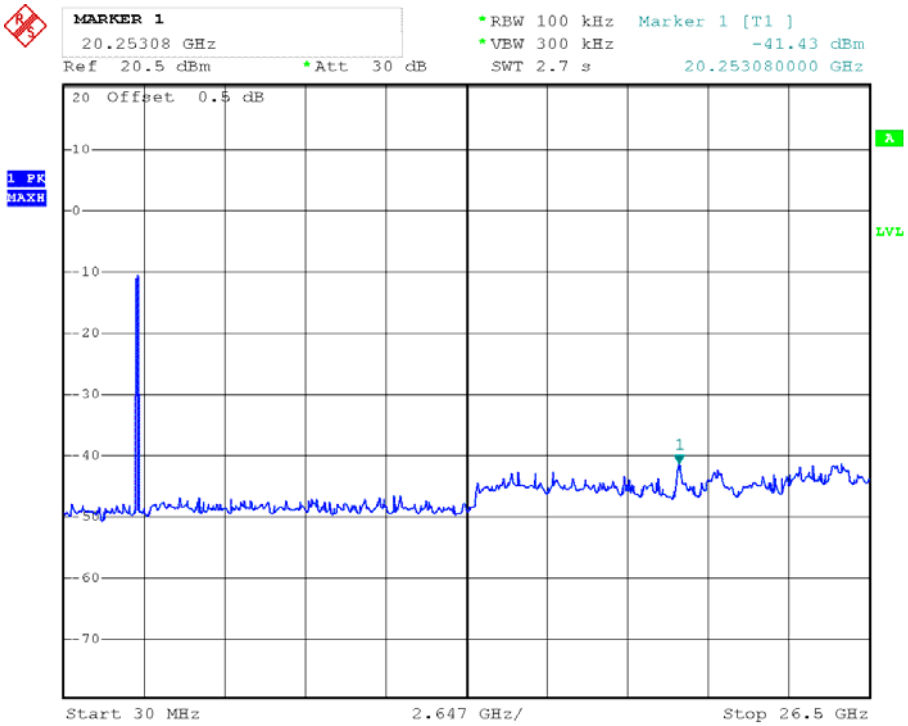
CH Low



CH Mid

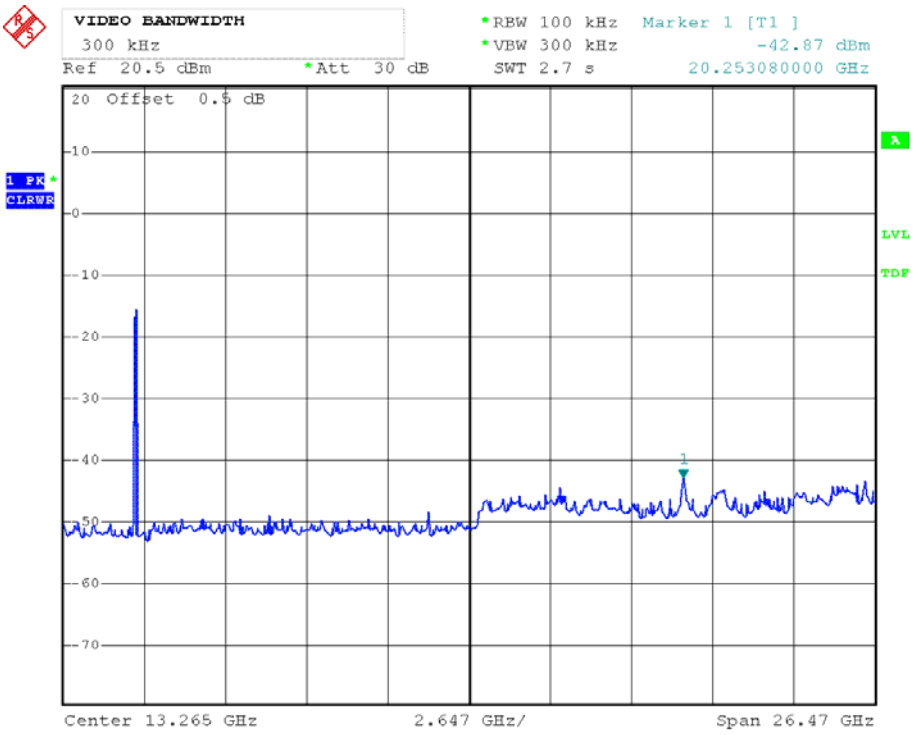


CH High

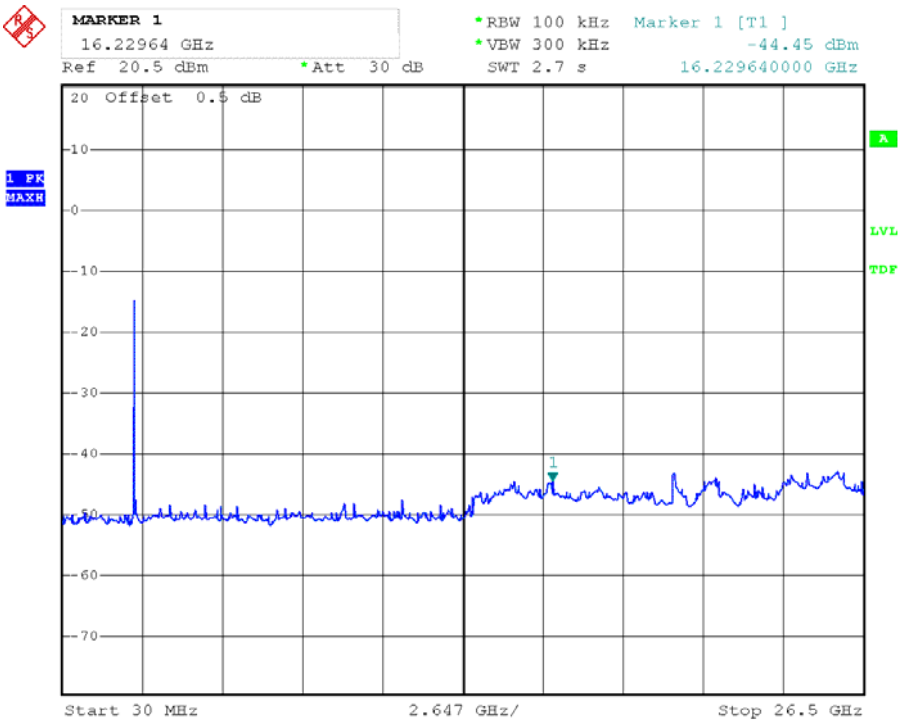


IEEE 802.11n HT40 mode

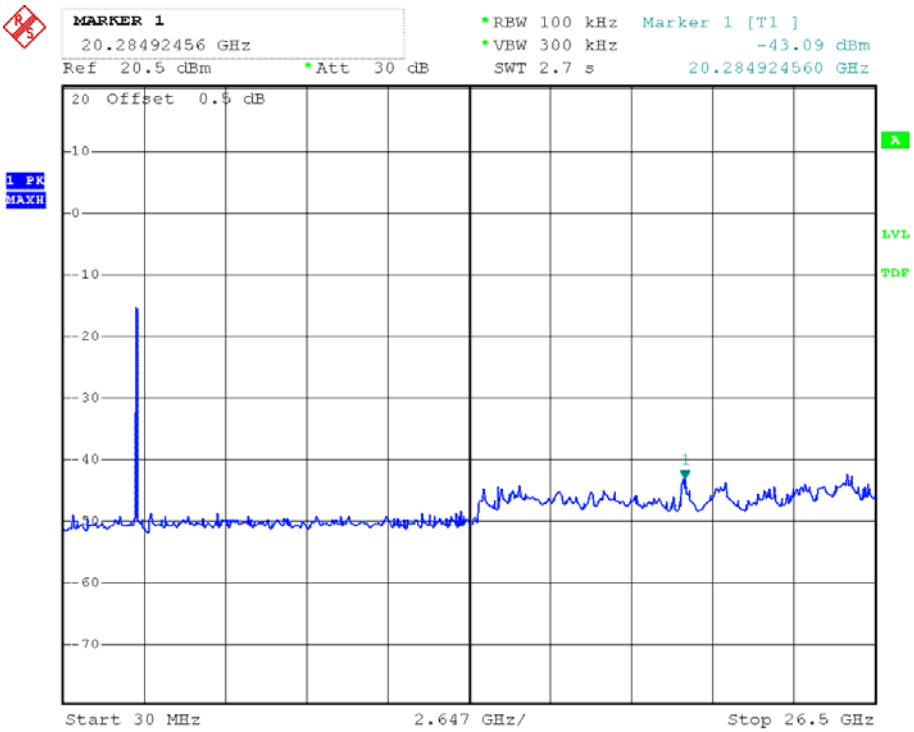
CH Low



CH Mid



CH High


MARKER 1
20.28492456 GHz
*RBW 100 kHz
*VBW 300 kHz
SWT 2.7 s
Marker 1 [T1]
-43.09 dBm
20.284924560 GHz
Ref 20.5 dBm
*Att 30 dB
20 Offset 0.5 dB
1 PK
MAXH
A
LVL
TDF
Start 30 MHz
2.647 GHz/
Stop 26.5 GHz

9. Test of Radiated Spurious Emission

9.1 Radiated Spurious Emission

9.1.1 Limits

15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 -1710	10.6 -12.7
6.26775 - 6.26825	108 -121.94	1718.8 - 1722.2	13.25 -13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 – 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 -16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 -335.4	3600 - 4400	([2])
13.36 - 13.41			

15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown is Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz

or 470-806 MHz, However, operation within these frequency bands is permitted under other sections of this Part, e-g, Sections 15.231 and 15.241.
15.209 (b) In the emission table above, the tighter limit applies at the band edges.

9.1.2 EUT Setup

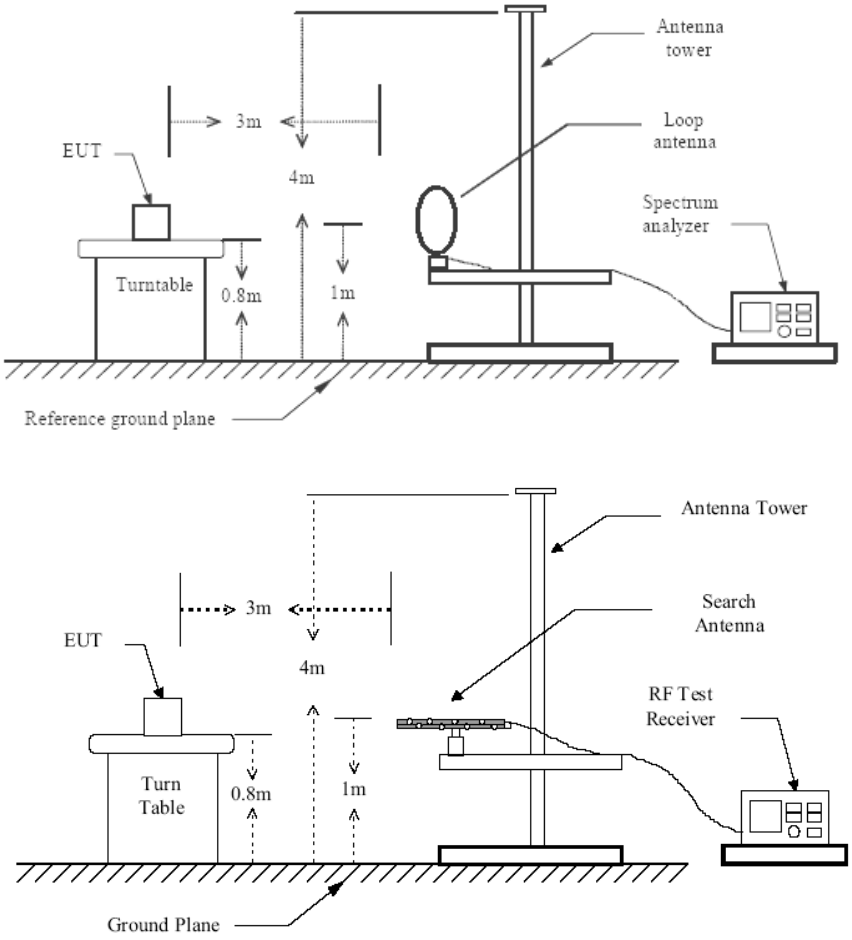


Figure 1 : Frequencies measured below 1 GHz configuration

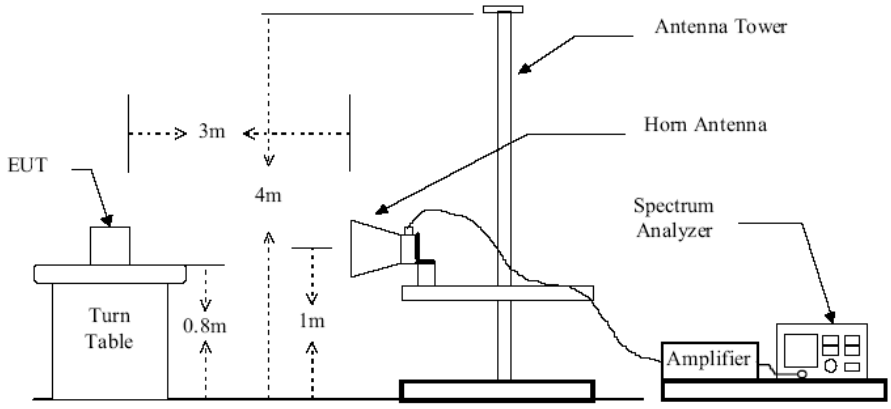


Figure 2 : Frequencies measured above 1 GHz configuration

9.1.3 Test Procedure

1. Configure the EUT according to ANSI C63.4-2003

2. The EUT was placed on the top of the turntable 0.8 meter above ground.

3. The turntable was rotated by 360 degrees to determine the position of the highest radiation.

4. For each suspected emission, the antenna tower was scanned (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.

5. According to the characteristic of the EUT crystals, the range of frequencies was investigated from 9KHz to 30MHz, 30MHz to 1GHz and 1GHz to 24.8GHz.

6. Any testing performed below 30 MHz was performed using a magnetic loop antenna in accordance with ANSI C63.10: section 4.5, Table 1

7. In accordance with 15.35(b), above 1 GHz, emissions measured using a peak detector shall not exceed a level 20 dB above the average limit.

8. Measurements at 2400 & 2483.5 MHz were made to ensure band edge compliance.

9. Testing was performed with the EUT orientated in three orthogonal planes and the maximum emissions level recorded. In addition, the EUT antenna was varied within its range of motion in order to maximise emissions.

10. For Frequencies below 1 GHz, RBW= 100 kHz, testing was performed with CISPR16 compliant test receiver with QP detector. Above 1 GHz tests were performed using a spectrum analyser using the following settings:
Peak RBW=VBW= 1MHz
Average RBW=VBW= 1MHz

These settings as per ANSI C63.10

9.1.4 Test Result

Temperature (℃) : 22~23	EUT: IP Camera
Humidity (%RH): 50~54	M/N: IPROBOT 3
Barometric Pressure (mbar): 950~1000	Operation Condition: Normal operation & TX Mode

Note: In this testing, the EUT was respectively tested in three different orientations. That is:

1. EUT was lie vertically, and then its Antenna oriented upward
2. EUT was lie vertically, and then its Antenna oriented downward
3. EUT was lie flatwise, and then its Antenna oriented to the receiving antenna

The worst test data see following pages
When the EUT was lie flatwise, and its Antenna oriented to the receiving antenna, the worst test data was got as following table.

WORST-CASE RADIATED EMISSION BELOW 30 MHz

Normal operating Mode:

Frequency	Meter Reading	Antenna Factor	Cable Loss	Emission Levels	Limits	Margin	Detector Mode
(MHz)	(dBμV)	(dB/M)	(dB)	(dBμV/M)	(dB μ V/M)	(dB)	PK/QP
0.470	20.90	7.88	1.03	29.81	67.0	-37.19	QP
17.50	20.83	8.77	1.19	30.79	49.5	-18.71	QP
19.60	21.41	8.76	1.08	31.19	49.5	-17.81	QP
25.10	23.42	7.35	1.66	32.43	49.5	-17.07	QP

WORST-CASE RADIATED EMISSION BELOW 1 GHz

Normal operating Mode:

Horizontal

Frequency	Meter Reading	Antenna Factor	Cable Loss	Emission Levels	Limits	Margin	Detector Mode
(MHz)	(dBμV)	(dB/M)	(dB)	(dBμV/M)	(dB μ V/M)	(dB)	PK/QP
85.33	26.50	8.98	1.18	36.67	40.00	-3.54	QP
160.01	16.50	12.60	1.59	30.69	43.50	-12.81	QP
402.48	14.50	14.44	2.72	36.66	46.00	-9.34	QP
652.74	14.50	18.00	3.05	35.55	46.00	-10.45	QP
726.46	9.60	20.84	3.84	34.28	46.00	-11.72	QP
823.46	10.30	21.80	4.14	36.24	46.00	-9.76	QP
N/A	----	----	----	----	----	----	----

Vertical

Frequency	Meter Reading	Antenna Factor	Cable Loss	Emission Levels	Limits	Margin	Detector Mode
(MHz)	(dBμV)	(dB/M)	(dB)	(dBμV/M)	(dB μ V/M)	(dB)	PK/QP
142.52	21.98	7.89	1.01	30.30	40.00	-9.12	QP
191.02	16.68	12.60	1.59	30.29	43.50	-12.63	QP
216.24	26.28	12.20	2.02	39.92	46.00	-5.50	QP
239.52	23.38	14.44	2.72	39.96	46.00	-5.46	QP
503.36	17.08	18.00	3.05	37.55	46.00	-7.87	QP
749.74	13.78	21.80	4.14	39.14	46.00	-6.28	QP
N/A	----	----	----	----	----	----	----

Note: Emission level (dBμV/m) =Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBμV).

WORST-CASE RADIATED EMISSION ABOVE 1 GHz

IEEE 802.11b TX (CH Low)

Horizontal

	TX / IEEE 802.11b mode / CH Low				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
	2412	109.93	30.52	3.05	41.06	0.58	103.02	N/A	N/A	P
	2412	95.56	30.52	3.05	41.06	0.58	88.62	N/A	N/A	A
*	4824.6	51.41	32.81	3.71	41.34	0.69	47.29	74.00	-26.71	P
*	4824.6	39.42	32.81	3.71	41.34	0.69	35.3	54.00	-18.70	A
	7236.8	50.02	38.83	4.93	41.42	1.44	53.79	74.00	-20.21	P
	7236.8	37.66	38.83	4.93	41.42	1.44	41.43	54.00	-12.57	A
	9646.3	48.92	38.75	5.74	38.43	0.61	55.59	74.00	-18.41	P
	9646.3	37.86	38.75	5.74	38.43	0.61	44.53	54.00	-9.47	A
	16333.71	----	----	----	----	----	----	----	----	P
	25386.64	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11b mode / CH Low				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
	2412	110.59	30.52	3.05	41.06	0.58	103.68	N/A	N/A	P
	2412	96.85	30.52	3.05	41.06	0.58	89.91	N/A	N/A	A
*	4824.3	53.79	32.81	3.70	41.34	0.69	49.66	74.00	-24.34	P
*	4824.3	42.17	32.81	3.70	41.34	0.69	38.04	54.00	-15.96	A
	7236.63	51.59	38.83	4.93	41.42	1.44	55.36	74.00	-18.64	P
	7236.63	40.02	38.83	4.93	41.42	1.44	43.79	54.00	-10.21	A
	9648.39	50.41	38.75	5.74	38.43	0.61	57.09	74.00	-16.91	P
	9648.39	39.85	38.75	5.74	38.43	0.61	46.53	54.00	-7.47	A
	16334.81	----	----	----	----	----	----	----	----	P
	25386.39	----	----	----	----	----	----	----	----	A

Note:
1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3.The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4.The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11b TX (CH Middle)

Horizontal

					Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
	2437	109.54	30.52	3.05	41.08	0.6	102.63	N/A	N/A	P
	2437	95.85	30.52	3.05	41.08	0.6	89.03	N/A	N/A	A
*	4876.98	51.45	32.93	3.73	41.41	0.71	47.41	74.00	-26.59	P
*	4876.98	42.13	32.93	3.73	41.41	0.71	38.09	54.00	-15.91	A
*	7309.86	50.41	38.93	4.96	41.32	1.59	54.57	74.00	-19.43	P
*	7309.86	39.59	38.93	4.96	41.32	1.59	43.75	54.00	-10.25	A
	9748.28	50.02	38.85	5.75	38.24	0.55	56.93	74.00	-17.07	P
	9748.28	38.82	38.85	5.75	38.24	0.55	45.73	54.00	-8.27	A
	16323.89	----	----	----	----	----	----	----	----	P
	25381.52	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11b mode / CH Middle				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
	2437	111.6	30.52	3.05	41.08	0.6	104.69	N/A	N/A	P
	2437	96.78	30.52	3.05	41.08	0.6	89.87	N/A	N/A	A
*	4877.37	53.81	32.93	3.73	41.42	0.71	49.77	74.00	-24.23	P
*	4877.37	44.01	32.93	3.73	41.42	0.71	39.97	54.00	-14.03	A
*	7309.7	51.68	38.93	4.96	41.32	1.59	55.84	74.00	-18.16	P
*	7309.7	41.1	38.93	4.96	41.32	1.59	45.26	54.00	-8.74	A
	9748.8	52.31	38.85	5.75	38.24	0.55	59.22	74.00	-14.78	P
	9748.8	40.74	38.85	5.75	38.24	0.55	47.65	54.00	-6.35	A
	16338.59	----	----	----	----	----	----	----	----	P
	25381.62	----	----	----	----	----	----	----	----	A

Note:
1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3.The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4.The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11b TX (CH High)

Horizontal

	TX / IEEE 802.11b mode / CH High				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
	2462	108.54	30.52	3.05	41.09	0.6	101.62	N/A	N/A	P
	2462	95.36	30.52	3.05	41.09	0.6	88.44	N/A	N/A	A
*	4924.30	52.63	33.03	3.76	41.49	0.73	48.67	74.00	-25.33	P
*	4924.30	42.28	33.03	3.76	41.49	0.73	38.32	54.00	-15.68	A
*	7386.14	51.41	39.04	4.99	41.21	1.76	55.99	74.00	-18.01	P
*	7386.14	39.68	39.04	4.99	41.21	1.76	44.26	54.00	-9.74	A
	9848.60	50.41	38.95	5.76	38.06	0.49	57.56	74.00	-16.44	P
	9848.60	39.13	38.95	5.76	38.06	0.49	46.27	54.00	-7.73	A
	16331.09	----	----	----	----	----	----	----	----	P
	25381.61	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11b mode / CH High				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
	2462	110.06	30.52	3.05	41.09	0.6	103.14	N/A	N/A	P
	2462	96.25	30.52	3.05	41.09	0.6	89.33	N/A	N/A	A
*	4924.48	54.01	33.03	3.76	41.49	0.73	50.05	74.00	-23.95	P
*	4924.48	43.62	33.03	3.76	41.49	0.73	39.66	54.00	-14.34	A
*	7386.53	52.58	39.04	4.99	41.21	1.76	57.16	74.00	-16.84	P
*	7386.53	40.74	39.04	4.99	41.21	1.76	45.32	54.00	-8.68	A
	9847.80	52.28	38.95	5.76	38.06	0.49	59.42	74.00	-14.58	P
	9847.80	41.52	38.95	5.76	38.06	0.49	48.66	54.00	-5.34	A
	16338.59	----	----	----	----	----	----	----	----	P
	25381.62	----	----	----	----	----	----	----	----	A

Note:
1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3.The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4.The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11g TX (CH Low)

Horizontal

	TX / IEEE 802.11g mode / CH Low				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
	2412	106.85	30.52	3.05	41.06	0.58	103.02	N/A	N/A	P
	2412	94.736	30.52	3.05	41.06	0.58	88.62	N/A	N/A	A
*	4824.23	52.31	32.81	3.71	41.34	0.69	48.19	74.00	-25.81	P
*	4824.23	42.30	32.81	3.71	41.34	0.69	38.18	54.00	-15.82	A
	7236.00	51.43	38.83	4.93	41.42	1.44	55.20	74.00	-18.8	P
	7236.00	40.54	38.83	4.93	41.42	1.44	44.31	54.00	-9.69	A
	9642.15	50.41	38.74	5.74	38.44	0.61	57.07	74.00	-16.93	P
	9642.15	39.14	38.74	5.74	38.44	0.61	45.80	54.00	-8.2	A
	16330.51	----	----	----	----	----	----	----	----	P
	25380.63	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11g mode / CH Low				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
	2412	107.96	30.52	3.05	41.06	0.58	103.02	N/A	N/A	P
	2412	94.23	30.52	3.05	41.06	0.58	88.62	N/A	N/A	A
*	4824.00	54.43	32.81	3.70	41.34	0.69	50.3	74.00	-23.70	P
*	4824.00	44.16	32.81	3.70	41.34	0.69	40.03	54.00	-13.97	A
	7236.39	51.81	38.83	4.93	41.42	1.44	55.58	74.00	-18.42	P
	7236.39	41.71	38.83	4.93	41.42	1.44	45.48	54.00	-8.52	A
	9641.57	52.40	38.74	5.74	38.44	0.62	59.06	74.00	-14.94	P
	9641.57	41.44	38.74	5.74	38.44	0.62	48.10	54.00	-5.90	A
	16330.38	----	----	----	----	----	----	----	----	P
	25380.69	----	----	----	----	----	----	----	----	A

Note:
1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3.The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4.The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11g TX (CH Middle)

Horizontal

	TX / IEEE 802.11g mode / CH Middle				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
	2437	106.54	30.52	3.05	41.08	0.6	99.63	N/A	N/A	P
	2437	94.12	30.52	3.05	41.08	0.6	87.21	N/A	N/A	A
*	4871.16	50.43	32.92	3.73	41.41	0.71	46.38	74.00	-27.62	P
*	4871.16	41.54	32.92	3.73	41.41	0.71	37.49	54.00	-16.51	A
*	7318.25	50.04	38.95	4.96	41.31	1.61	54.25	74.00	-19.75	P
*	7318.25	40.41	38.95	4.96	41.31	1.61	44.62	54.00	-9.38	A
	9748.35	50.43	38.85	5.75	38.24	0.55	57.34	74.00	-16.66	P
	9748.35	39.77	38.85	5.75	38.24	0.55	46.68	54.00	-7.32	A
	16332.15	----	----	----	----	----	----	----	----	P
	25381.03	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11g mode / CH Middle				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
	2437	107.46	30.52	3.05	41.08	0.6	100.55	N/A	N/A	P
	2437	94.17	30.52	3.05	41.08	0.6	87.26	N/A	N/A	A
*	4871.56	53.81	32.92	3.73	41.41	0.71	49.76	74.00	-24.24	P
*	4871.56	44.36	32.92	3.73	41.41	0.71	40.31	54.00	-13.69	A
*	7317.24	51.43	38.94	4.96	41.31	1.61	55.64	74.00	-18.36	P
*	7317.24	42.52	38.94	4.96	41.31	1.61	46.73	54.00	-7.27	A
	9747.26	52.53	38.85	5.75	38.25	0.55	59.44	74.00	-14.56	P
	9747.26	41.71	38.85	5.75	38.25	0.55	48.62	54.00	-5.38	A
	16332.02	----	----	----	----	----	----	----	----	P
	25381.01	----	----	----	----	----	----	----	----	A

Note:
1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3.The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4.The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11g TX (CH High)

Horizontal

	TX / IEEE 802.11g mode / CH High				Measurement Distance at 3m Horizontal polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
	2462	102.56	30.52	3.05	41.09	0.6	95.64	N/A	N/A	P
	2462	93.58	30.52	3.05	41.09	0.6	86.66	N/A	N/A	A
*	4924.35	51.43	33.03	3.76	41.49	0.73	47.47	74.00	-26.53	P
*	4924.35	40.45	33.03	3.76	41.49	0.73	36.49	54.00	-17.51	A
*	7384.86	50.06	39.04	4.99	41.21	1.75	54.63	74.00	-19.37	P
*	7384.86	38.84	39.04	4.99	41.21	1.75	43.41	54.00	-10.59	A
	9847.56	50.33	38.95	5.76	38.06	0.49	57.47	74.00	-16.53	P
	9847.56	40.04	38.95	5.76	38.06	0.49	47.18	54.00	-6.82	A
	16332.11	----	----	----	----	----	----	----	----	P
	25381.58	----	----	----	----	----	----	----	----	A

Vertical

	TX / IEEE 802.11g mode / CH High				Measurement Distance at 3m Vertical polarity					
	Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
	(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
	2462	104.56	30.52	3.05	41.09	0.6	97.64	N/A	N/A	P
	2462	93.85	30.52	3.05	41.09	0.6	86.93	N/A	N/A	A
*	4923.85	53.41	33.03	3.76	41.49	0.73	49.45	74.00	-24.55	P
*	4923.85	42.80	33.03	3.76	41.49	0.73	38.84	54.00	-15.16	A
*	7385.94	51.52	39.04	4.99	41.21	1.76	56.10	74.00	-17.90	P
*	7385.94	40.44	39.04	4.99	41.21	1.76	45.02	54.00	-8.98	A
	9847.59	52.83	38.95	5.76	38.06	0.49	59.97	74.00	-14.03	P
	9847.59	41.43	38.95	5.76	38.06	0.49	48.57	54.00	-5.43	A
	16331.39	----	----	----	----	----	----	----	----	P
	25381.34	----	----	----	----	----	----	----	----	A

Note:
1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3.The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4.The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11n HT20 TX (CH Low)

Horizontal

TX / IEEE 802.11n HT20 mode / CH Low				Measurement Distance at 3m Horizontal polarity					
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
2412	102.35	30.52	3.05	41.06	0.58	95.44	N/A	N/A	P
2412	93.58	30.52	3.05	41.06	0.58	86.67	N/A	N/A	A
4824.35	50.38	32.81	3.71	41.34	0.69	46.46	74.00	-27.54	P
4824.35	39.09	32.81	3.71	41.34	0.69	35.17	54.00	-18.83	A
7235.86	51.36	38.83	4.93	41.43	1.43	55.20	74.00	-18.80	P
7235.86	39.11	38.83	4.93	41.43	1.43	42.88	54.00	-11.12	A
9648.35	50.36	38.75	5.74	38.43	0.61	57.26	74.00	-16.74	P
9648.35	38.78	38.75	5.74	38.43	0.61	45.51	54.00	-8.49	A
16312.11	----	----	----	----	----	----	----	----	P
25382.33	----	----	----	----	----	----	----	----	A

Vertical

TX / IEEE 802.11n HT20 mode / CH Low				Measurement Distance at 3m Vertical polarity					
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
2412	104.78	30.52	3.05	41.06	0.58	97.87	N/A	N/A	P
2412	93.84	30.52	3.05	41.06	0.58	86.93	N/A	N/A	A
4823.59	52.78	32.81	3.70	41.34	0.69	48.63	74.00	-25.37	P
4823.59	41.39	32.81	3.70	41.34	0.69	37.27	54.00	-16.73	A
7236.24	53.40	38.83	4.93	41.42	1.44	57.12	74.00	-16.88	P
7236.24	41.39	38.83	4.93	41.42	1.44	45.16	54.00	-8.84	A
9647.15	52.28	38.75	5.74	38.43	0.61	59.25	74.00	-14.75	P
9647.15	40.50	38.75	5.74	38.43	0.61	47.18	54.00	-6.82	A
16332.11	----	----	----	----	----	----	----	----	P
25321.01	----	----	----	----	----	----	----	----	A

Note:
1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3.The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4.The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11n HT20 TX (CH Middle)

Horizontal

TX / IEEE 802.11n HT20 mode / CH Middle				Measurement Distance at 3m Horizontal polarity					
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
2437	102.35	30.52	3.05	41.08	0.6	102.35	N/A	N/A	P
2437	93.56	30.52	3.05	41.08	0.6	93.56	N/A	N/A	A
4872.69	50.38	32.92	3.73	41.41	0.71	46.23	74.00	-27.77	P
4872.69	40.50	32.92	3.73	41.41	0.71	36.55	54.00	-17.45	A
7311.54	50.01	38.94	4.96	41.32	1.60	54.29	74.00	-19.71	P
7311.54	38.79	38.94	4.96	41.32	1.60	42.97	54.00	-11.03	A
9748.27	50.38	38.85	5.75	38.24	0.55	57.29	74.00	-16.71	P
9748.27	39.99	38.85	5.75	38.24	0.55	47.00	54.00	-7.00	A
16332.15	----	----	----	----	----	----	----	----	P
25381.03	----	----	----	----	----	----	----	----	A

Vertical

TX / IEEE 802.11n HT20 mode / CH Middle				Measurement Distance at 3m Vertical polarity					
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
2437	105.67	30.52	3.05	41.08	0.6	98.76	N/A	N/A	P
2437	94.58	30.52	3.05	41.08	0.6	87.67	N/A	N/A	A
4873.26	52.28	32.92	3.73	41.41	0.71	48.48	74.00	-25.52	P
4873.26	42.47	32.92	3.73	41.41	0.71	38.42	54.00	-15.58	A
7312.25	51.98	38.94	4.96	41.32	1.60	56.26	74.00	-17.74	P
7312.25	40.39	38.94	4.96	41.32	1.60	44.57	54.00	-9.43	A
9748.65	51.82	38.85	5.75	38.24	0.55	58.75	74.00	-15.25	P
9748.65	41.39	38.85	5.75	38.24	0.55	48.30	54.00	-5.70	A
16331.10	----	----	----	----	----	----	----	----	P
25382.84	----	----	----	----	----	----	----	----	A

Note:
1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3.The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4.The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11n HT20 TX (CH High)

Horizontal

TX / IEEE 802.11n HT20 mode / CH High				Measurement Distance at 3m Horizontal polarity					
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
2462	103.84	30.52	3.05	41.09	0.6	96.92	N/A	N/A	P
2462	93.96	30.52	3.05	41.09	0.6	87.04	N/A	N/A	A
4923.85	51.28	33.03	3.76	41.49	0.73	47.12	74.00	-26.88	P
4923.85	40.49	33.03	3.76	41.49	0.73	36.63	54.00	-17.37	A
7386.54	50.42	39.04	4.99	41.21	1.76	55.00	74.00	-19.00	P
7386.54	39.62	39.04	4.99	41.21	1.76	44.30	54.00	-9.70	A
9849.33	50.01	38.95	5.76	38.06	0.49	57.26	74.00	-16.74	P
9849.33	39.79	38.95	5.76	38.06	0.49	46.95	54.00	-7.05	A
16331.13	----	----	----	----	----	----	----	----	P
25382.01	----	----	----	----	----	----	----	----	A

Vertical

TX / IEEE 802.11n HT20 mode / CH High				Measurement Distance at 3m Vertical polarity					
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
2437	106.64	30.52	3.05	41.09	0.6	99.72	N/A	N/A	P
2437	94.95	30.52	3.05	41.09	0.6	88.03	N/A	N/A	A
4923.16	53.40	33.03	3.76	41.48	0.73	49.59	74.00	-24.41	P
4923.16	42.31	33.03	3.76	41.48	0.73	38.47	54.00	-15.53	A
7385.46	53.00	39.04	4.99	41.21	1.75	57.67	74.00	-16.33	P
7385.46	41.47	39.04	4.99	41.21	1.75	46.04	54.00	-7.96	A
9849.17	52.48	38.95	5.76	38.06	0.49	59.61	74.00	-14.39	P
9849.17	42.79	38.95	5.76	38.06	0.49	49.96	54.00	-4.04	A
16331.13	----	----	----	----	----	----	----	----	P
25380.08	----	----	----	----	----	----	----	----	A

Note:
1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3.The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4.The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11n HT40 TX (CH Low)

Horizontal

TX / IEEE 802.11n HT40 mode / CH Low				Measurement Distance at 3m Horizontal polarity					
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
2422	99.85	30.52	3.05	41.06	0.58	92.94	N/A	N/A	P
2422	84.86	30.52	3.05	41.06	0.58	77.95	N/A	N/A	A
4843.16	50.55	32.85	3.72	41.36	0.70	46.66	74.00	-27.34	P
4843.16	40.17	32.85	3.72	41.36	0.70	36.08	54.00	-17.92	A
7264.86	50.18	38.87	4.94	41.38	1.50	54.06	74.00	-19.94	P
7264.86	38.87	38.87	4.94	41.38	1.50	42.8	54.00	-11.20	A
9687.35	50.55	38.79	5.75	38.36	0.59	57.32	74.00	-16.68	P
9687.35	39.28	38.79	5.75	38.36	0.59	46.07	54.00	-7.93	A
16312.13	----	----	----	----	----	----	----	----	P
25335.25	----	----	----	----	----	----	----	----	A

Vertical

TX / IEEE 802.11n HT40 mode / CH Low				Measurement Distance at 3m Vertical polarity					
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
2422	103.54	30.52	3.05	41.06	0.58	96.63	N/A	N/A	P
2422	88.86	30.52	3.05	41.06	0.58	81.95	N/A	N/A	A
4844.65	52.95	32.86	3.72	41.37	0.70	48.89	74.00	-25.11	P
4844.65	41.66	32.86	3.72	41.37	0.70	37.48	54.00	-16.52	A
7265.14	51.55	38.87	4.94	41.38	1.50	55.64	74.00	-18.36	P
7265.14	40.64	38.87	4.94	41.38	1.50	44.55	54.00	-9.45	A
9686.35	53.57	38.79	5.75	38.36	0.59	60.39	74.00	-13.61	P
9686.35	41.88	38.79	5.75	38.36	0.59	48.65	54.00	-5.35	A
16332.18	----	----	----	----	----	----	----	----	P
25381.79	----	----	----	----	----	----	----	----	A

Note:
1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3.The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4.The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11n HT40 TX (CH Mid)

Horizontal

TX / IEEE 802.11n HT40 mode / CH Middle				Measurement Distance at 3m Horizontal polarity					
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
2437	98.54	30.52	3.05	41.09	0.6	91.62	N/A	N/A	P
2437	84.65	30.52	3.05	41.09	0.6	77.73	N/A	N/A	A
4873.26	51.55	32.92	3.73	41.41	0.71	47.60	74.00	-26.40	P
4873.26	38.90	32.92	3.73	41.41	0.71	34.89	54.00	-19.11	A
7312.19	50.55	38.94	4.96	41.32	1.60	54.77	74.00	-19.23	P
7312.19	40.47	38.94	4.96	41.32	1.60	44.66	54.00	-9.34	A
9747.85	50.18	38.85	5.75	38.24	0.55	57.10	74.00	-16.90	P
9747.85	39.28	38.85	5.75	38.24	0.55	46.09	54.00	-7.91	A
16332.08	----	----	----	----	----	----	----	----	P
25383.21	----	----	----	----	----	----	----	----	A

Vertical

TX / IEEE 802.11n HT40 mode / CH Middle				Measurement Distance at 3m Vertical polarity					
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
2437	102.65	30.52	3.05	41.09	0.6	95.73	N/A	N/A	P
2437	88.64	30.52	3.05	41.09	0.6	81.72	N/A	N/A	A
4874.59	53.57	32.92	3.73	41.41	0.71	49.73	74.00	-24.27	P
4874.59	41.45	32.92	3.73	41.41	0.71	37.41	54.00	-16.59	A
7312.24	53.18	38.94	4.96	41.32	1.60	57.35	74.00	-16.65	P
7312.24	42.64	38.94	4.96	41.32	1.60	46.82	54.00	-7.18	A
9747.16	51.55	38.85	5.75	38.25	0.55	59.16	74.00	-14.84	P
9747.16	40.47	38.85	5.75	38.25	0.55	47.58	54.00	-6.32	A
16332.25	----	----	----	----	----	----	----	----	P
25381.17	----	----	----	----	----	----	----	----	A

Note:
1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3.The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4.The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

IEEE 802.11n HT40 TX (CH High)

Horizontal

TX / IEEE 802.11n HT40 mode / CH High				Measurement Distance at 3m Horizontal polarity					
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
2462	94.56	30.52	3.05	41.09	0.6	87.64	N/A	N/A	P
2462	84.63	30.52	3.05	41.09	0.6	77.71	N/A	N/A	A
4903.26	50.45	32.99	3.75	41.45	0.72	46.65	74.00	-27.35	P
4903.26	40.18	32.99	3.75	41.45	0.72	36.08	54.00	-17.92	A
7354.89	51.55	39.00	4.98	41.26	1.69	55.96	74.00	-18.04	P
7354.89	38.9	39.00	4.98	41.26	1.69	43.31	54.00	-10.69	A
9808.35	50.55	38.91	5.76	38.13	0.51	57.7	74.00	-16.3	P
9808.35	40.18	38.91	5.76	38.13	0.51	47.13	54.00	-6.87	A
16332.32	----	----	----	----	----	----	----	----	P
25380.85	----	----	----	----	----	----	----	----	A

Vertical

TX / IEEE 802.11n HT40 mode / CH High				Measurement Distance at 3m Vertical polarity					
Freq.	Reading	AF	Cable Loss	Pre-amp	Filter	Level	Limit	Margin	Mark
(MHz)	(dBμV)	(dB/m)	(dB)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	(P/Q/A)
2462	99.65	30.52	3.05	41.09	0.6	92.73	N/A	N/A	P
2462	85.67	30.52	3.05	41.09	0.6	78.75	N/A	N/A	A
4904.15	52.78	32.99	3.75	41.46	0.72	48.78	74.00	-25.22	P
4904.15	41.55	32.99	3.75	41.46	0.72	37.65	54.00	-16.35	A
7353.65	53.56	39.00	4.98	41.26	1.69	57.89	74.00	-16.11	P
7353.65	40.46	39.00	4.98	41.26	1.69	44.86	54.00	-9.14	A
9808.15	52.45	38.91	5.76	38.13	0.52	59.5	74.00	-14.5	P
9808.15	41.56	38.91	5.76	38.13	0.52	48.71	54.00	-5.29	A
16332.33	----	----	----	----	----	----	----	----	P
25382.84	----	----	----	----	----	----	----	----	A

Note:
1. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
2. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
3.The result basic equation calculation is as follow: Level = Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
4.The other emission levels were 20dB below the limit
5. The test limit distance is 3M limit.

9.2 RESTRICTED BAND EDGES

TEST RESULT

IEEE 802.11b mode

Channel	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Margin(dB)	Detector
	2390	54.53	74	-19.47	Peak
LOW	2390	48.00	54	-6.00	Average
	2483.5	53.35	74	-20.65	Peak
HIGH	2483.5	51.68	54	-2.32	Average

IEEE 802.11g mode

Channel	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Margin(dB)	Detector
	2390	53.55	74	-20.45	Peak
LOW	2390	47.79	54	-6.21	Average
	2483.5	53.30	74	-20.70	Peak
HIGH	2483.5	51.57	54	-2.43	Average

IEEE 802.11n HT20 mode

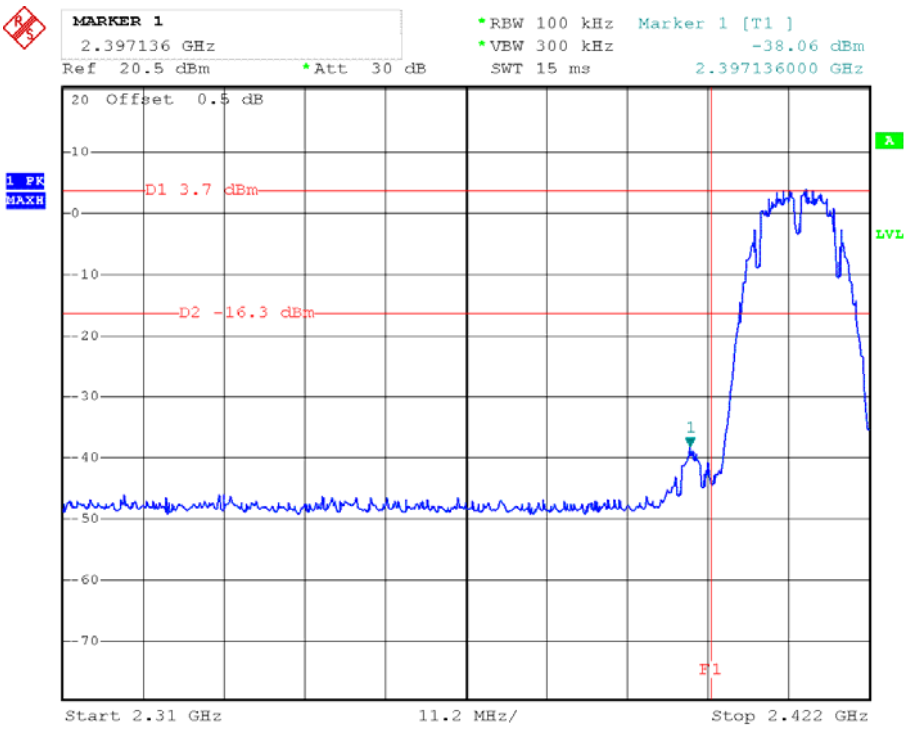
Channel	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Margin(dB)	Detector
	2390	52.93	74	-21.07	Peak
LOW	2390	48.18	54	-5.18	Average
	2483.5	53.27	74	-20.73	Peak
HIGH	2483.5	50.10	54	-3.90	Average

IEEE 802.11n HT40 mode

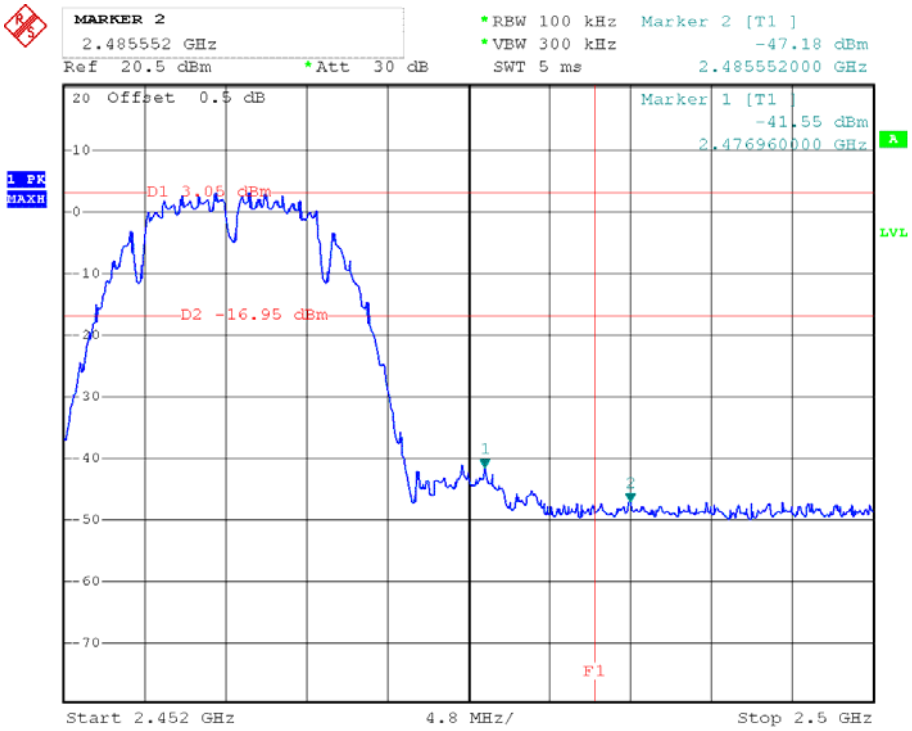
Channel	Freq.(MHz)	Level(dBuV)	Limit(dBuV)	Margin(dB)	Detector
	2390	53.32	74	-20.68	Peak
LOW	2390	51.82	54	-2.18	Average
	2483.5	55.61	74	-18.39	Peak
HIGH	2483.5	51.31	54	-2.69	Average

Test of Conducted band edges

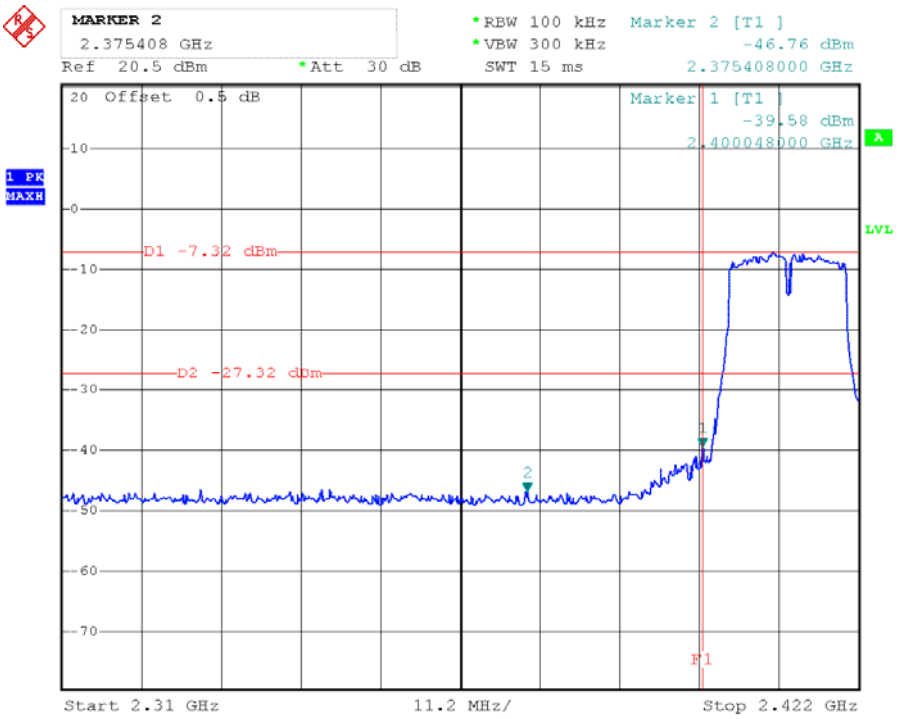
CH Low (802.11b MODE)



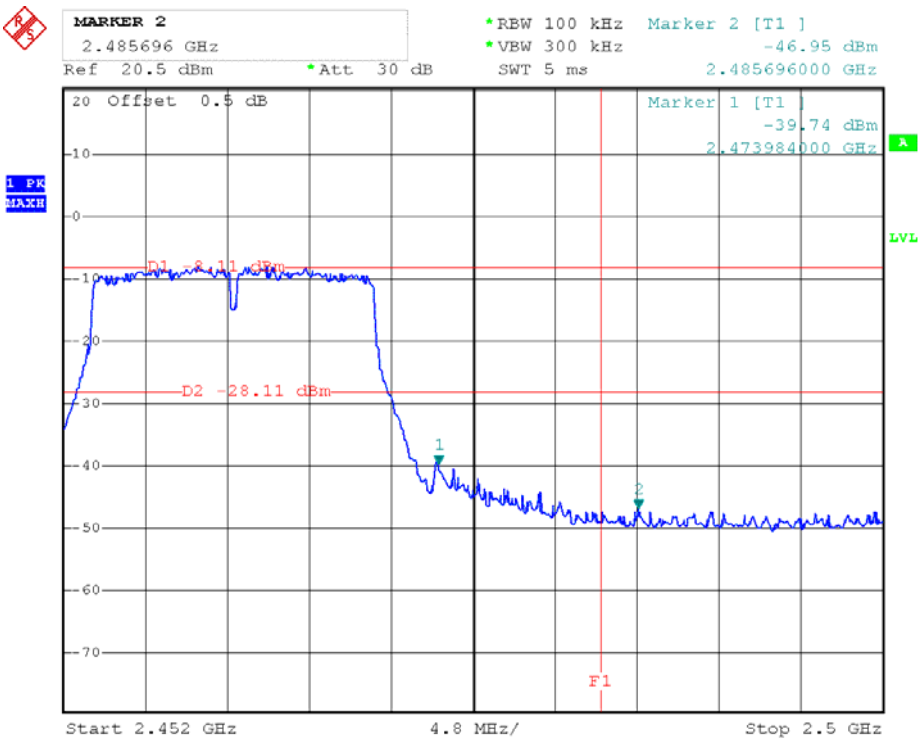
CH High (802.11b MODE)



CH Low (802.11g MODE)



CH High (802.11g MODE)



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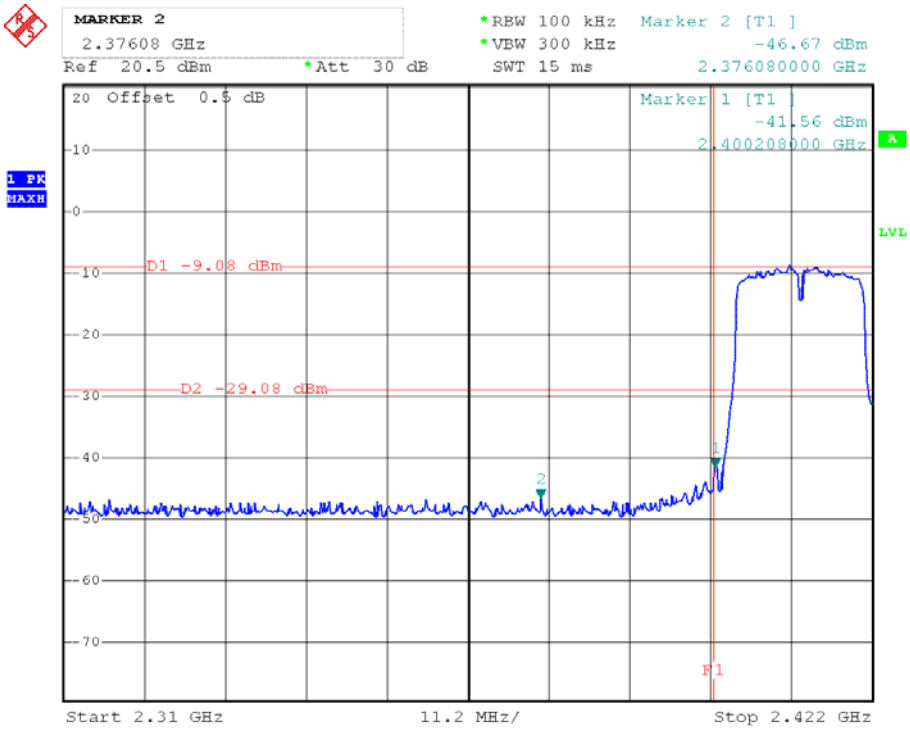

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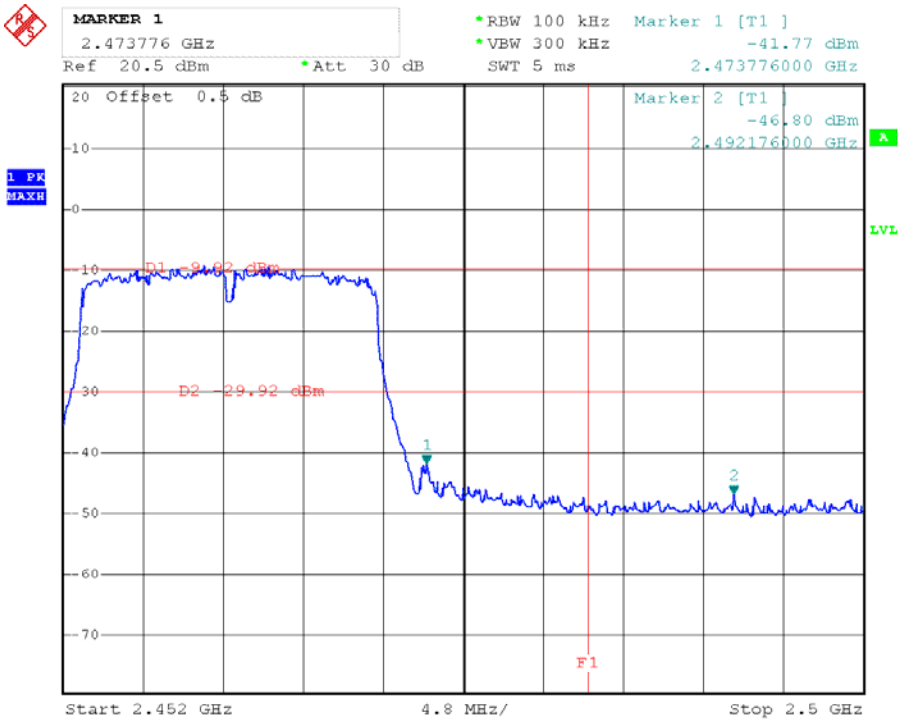

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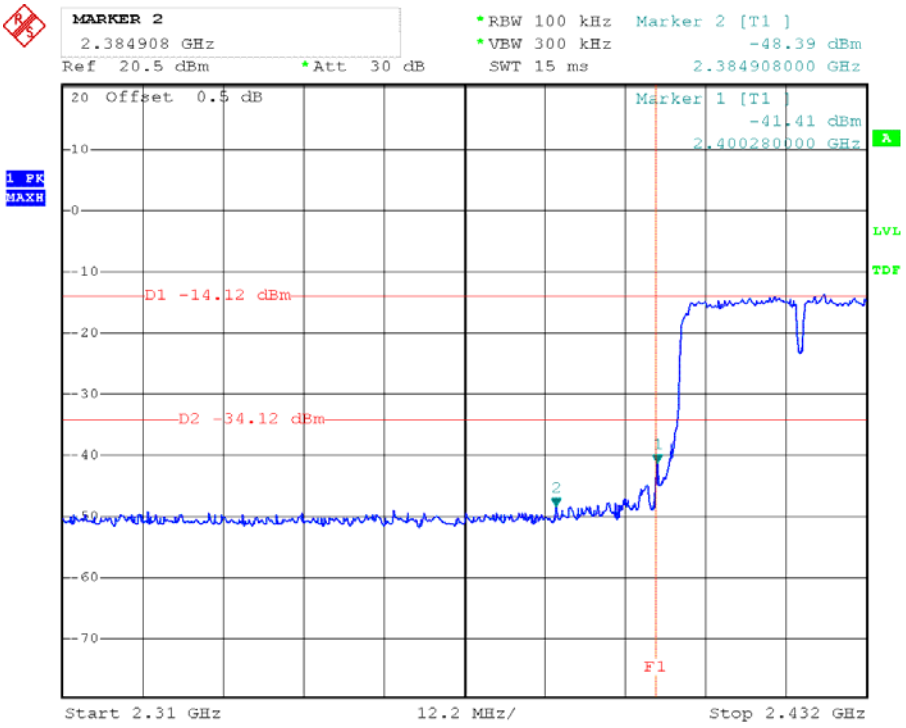

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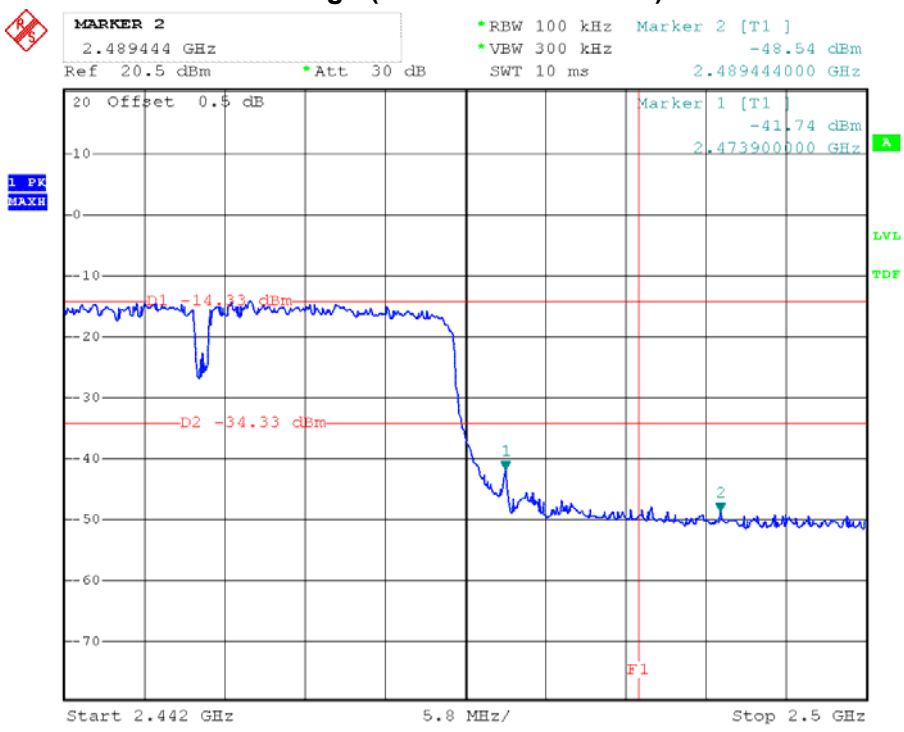

10. ANTENNA REQUIREMENT

10.1 Standard Applicable

Section 15.203:

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.

Section 15.247(b)/(c):

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

If the intentional radiator is used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

10.2 Antenna Connected Construction

The antenna is designed with permanent attachment and no consideration of replacement. The antenna used in this product is complied with Standard. The maximum Gain of the antenna lower than 6.0dBi and have the definite antenna Specification.