Shenzhen Huatongwei International Inspection Co., Ltd.
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TEST REPORT

For WIFI

Report Reference No. ..... :	**TRE1603019104**	R/C…….: 14043
Applicant's name ..... :	**Vonino Electronics Limited**	
Address.....:	Miramar Tower 10F - no1010, 132 Nathan Road, Tsim Sha Tsui, Kowloon, Hong Kong	
Manufacturer.....:	Vonino Electronics Limited	
Address.....:	Miramar Tower 10F - no1010, 132 Nathan Road, Tsim Sha Tsui, Kowloon, Hong Kong	
Test item description ..... :	**XAVY L8 / Epic M8**	
Trade Mark .....:	vonino	
Model/Type reference.....:	T8S	
Listed Model(s) .....:	-	
Standard ..... :	**ETSI EN 300 328 V1.9.1: 2015-02**	
Date of receipt of test sample……..:	Mar 29, 2016	
Date of testing……:	Mar 30, 2016- Apr 20, 2016	
Date of issue……...:	Apr 20, 2016	
Result..... ……...:	**PASS**	

Compiled by (position+printed name+signature)..:	File administrators Shayne Zhu	Shayne Zhu
Supervised by (position+printed name+signature)..:	Project Engineer Lion Cai	Lion Cai
Approved by (position+printed name+signature)..:	RF Manager Hans Hu	Hans Hu

Testing Laboratory Name ..... :	**Shenzhen Huatongwei International Inspection Co., Ltd**
Address.....:	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

Contents

1. Test standards and Test description

1.1. Test Standards

The tests were performed according to following standards:

ETSI EN 300 328 V1.9.1(2015-02) –Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive

1.2. Test Description

Test item	Standards requirement	Result
Maximum transmit power	ETSI EN 300 328 Sub-clause 4.3.2.2	Pass
Power Spectral Density	ETSI EN 300 328 Sub-clause 4.3.2.3	Pass
Duty Cycle, Tx-sequence, Tx-gap	ETSI EN 300 328 Sub-clause 4.3.2.4	N/A
Medium Utilisation (MU) factor	ETSI EN 300 328 Sub-clause 4.3.2.5	N/A
Adaptivity	ETSI EN 300 328 Sub-clause 4.3.2.6	N/A
Occupied Channel Bandwidth	ETSI EN 300 328 Sub-clause 4.3.2.7	Pass
Transmitter unwanted emissions in the out-of-band domain	ETSI EN 300 328 Sub-clause 4.3.2.8	Pass
Transmitter unwanted emissions in the spurious domain	ETSI EN 300 328 Sub-clause 4.3.2.9	Pass
Receiver spurious emissions	ETSI EN 300 328 Sub-clause 4.3.2.10	Pass
Receiver Blocking	ETSI EN 300 328 Sub-clause 4.3.2.11	N/A
Geo-location capability	ETSI EN 300 328 Sub-clause 4.3.2.12	N/A

Remark: The measurement uncertainty is not included in the test result.

N/A is an abbreviation for Not Applicable and means this test item is not applicable for this device according to the technology characteristic of device.

2. Summary

2.1. Client Information

Applicant:	Vonino Electronics Limited
Address:	Miramar Tower 10F - no1010, 132 Nathan Road, Tsim Sha Tsui, Kowloon, Hong Kong
Manufacturer:	Vonino Electronics Limited
Address:	Miramar Tower 10F - no1010, 132 Nathan Road, Tsim Sha Tsui, Kowloon, Hong Kong

2.2. Product Description

Name of EUT	XAVY L8 / Epic M8
Trade Mark:	vonino
Model/Type reference:	T8S
Listed Model(s):	-
Power supply:	DC 3.7V From internal battery
Adapter information:	Model:FJ-SW728L0502000UE Input:AC 100-240V,50/60Hz 0.4A Max Output: 5Vd.c., 2000mA
WIFI	
Supported type:	802.11b/802.11g/802.11n(H20)/802.11n(H40)
Modulation:	802.11b: DSSS 802.11g/802.11n(H20)/802.11n(H40):OFDM
Operation frequency:	802.11b/802.11g/802.11n(H20): 2412MHz~2472MHz 802.11n(H40): 2422MHz~2462MHz
Channel number:	802.11b/802.11g/802.11n(H20): 13 802.11n(H40): 9
Channel separation:	5MHz
Antenna type:	Internal Antenna

Operation Frequency List:

802.11b/g/n(H20)		**802.11n(H40)**	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	01	--
02	2417	02	--
03	2422	03	2422
⋮	⋮	⋮	⋮
07	2442	07	2442
⋮	⋮	⋮	⋮
11	2462	11	2462
12	2465	12	--
13	2472	13	--

Technical index for WIFI	
Supported type:	WIFI
Operation frequency:	2412MHz~2472MHz
Channel number:	13
Channel separation:	5MHz
Modulation:	☐ FHSS ☒ DSSS
Type of Equipment:	☒ Stand-alone ☐ Combined Equipment ☐ Plug-in radio device ☐ Other
Adaptive / non-adaptive equipment	☐ non-adaptive Equipment ☐ adaptive Equipment without the possibility to switch to a non-adaptive mode ☒ adaptive Equipment which can also operate in a non-adaptive mode
Operating mode:	☒ Single Antenna Equipment ☒ Equipment with only 1 antenna ☐ Equipment with 2 diversity antennas but only 1 antenna active at any moment in time ☐ Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1antenna is used.
	☐ Smart Antenna Systems - Multiple Antennas without beam forming ☐ Single spatial stream / Standard throughput ☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1 ☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2
	☐ Smart Antenna Systems - Multiple Antennas with beam forming ☐ Single spatial stream / Standard throughput ☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1 ☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2
Antenna type:	☒ Integral Antenna ☐ Temporary RF connector provided ☒ No temporary RF connector provided Antenna Gain: ....1.2.... dBi Beamforming gain: ....0.....dB
	☐ Dedicated Antennas (equipment with antenna connector) ☐ Single power level with corresponding antenna(s) ☐ Multiple power settings and corresponding antenna(s) Number of different Power Levels: ..... Power Level 1: ..... dBm Power Level 2: ..... dBm Power Level 3: ..... dBm

Information is provided by the supplier	
In case of FHSS modulation:	☐ In case of non-Adaptive Frequency Hopping equipment: The number of Hopping Frequencies: ……..
	☐ In case of Adaptive Frequency Hopping Equipment: The maximum number of Hopping Frequencies: …….. The minimum number of Hopping Frequencies: ……..
	The Dwell Time: ……..
	The Minimum Channel Occupation Time: ……..
In case of adaptive equipment:	The Channel Occupancy Time implemented by the equipment: /.. ms
	☒ The equipment has implemented an LBT based DAA mechanism In case of equipment using modulation different from FHSS: ☐ The equipment is Frame Based equipment ☒ The equipment is Load Based equipment ☐ The equipment can switch dynamically between Frame Based and Load Based equipment The CCA time implemented by the equipment: ../.. µs
	☐ The equipment has implemented an non-LBT based DAA mechanism
	☐ The equipment can operate in more than one adaptive mode
In case of non-adaptive Equipment	The maximum RF Output Power (e.i.r.p.): ……. dBm The maximum (corresponding) Duty Cycle: ……. %

The worst case operational mode for each of the following tests:	
RF Output Power	9.93 dBm
Occupied Channel Bandwidth	36.36MHz
Transmitter unwanted emissions in the OOB domain	Reference to section 4.5
Transmitter unwanted emissions in the spurious domain	Reference to section 4.6
Receiver spurious emissions	Reference to section 4.7
☐ FHSS	
Dwell time:	
Minimum FrequencyOccupation:	
Hopping Sequence:	
Hopping Frequency Separation	
☒ Other	
Power Spectral Density:	1.71dBm/MHz
☒ Adaptive equipment	
Adaptivity:	-
Receiver Blocking:	-
☐ Non-adaptiveequipment	
Duty cycle:	
Tx-Sequence:	
Tx-gap:	
Medium Utilisation:	

2.3. EUT operation mode

The EUT has been tested under test mode condition. The Applicant provides software to control the EUT for staying in continous transmitting and receiving mode for testing.

And found which the below bit rate is worst case mode, so only show data which it is a worst case mode.

Mode	Bit rate (worst mode)
802.11b	1Mbps
802.11g	6Mbps
802.11n(H20)	6.5Mbps
802.11n(H40)	13.5Mbps

2.4. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

		Length (m) :	/
		Shield :	/
		Detachable :	/
		Manufacturer :	/
		Model No. :	/

2.5. Modifications

No modifications were implemented to meet testing criteria.

3. Test Environment

3.1. Address of the test laboratory

Laboratory:Shenzhen Huatongwei International Inspection Co., Ltd.
Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China
Phone: 86-755-26748019 Fax: 86-755-26748089

3.2. Test Facility

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

CNAS-Lab Code: L1225
Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: February 28, 2015. Valid time is until February 27, 2018.

A2LA-Lab Cert. No. 3902.01
Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until December 31, 2016.

FCC-Registration No.: 317478
Shenzhen Huatongwei International Inspection Co., 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 317478, Renewal date Jul. 18, 2014, valid time is until Jul. 18, 2017.

IC-Registration No.: 5377A&5377B
The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A on Dec. 31, 2013, valid time is until Dec. 31, 2016.
Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377B on Dec.03, 2014, valid time is until Dec.03, 2017.

ACA
Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

VCCI
Radiated disturbance above 1GHz measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-292. Date of Registration: Dec. 24, 2013. Valid time is until Dec. 23, 2016.
Telecommunication Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-1837. Date of Registration: May 07, 2013. Valid time is until May 06, 2016.

DNV
Shenzhen Huatongwei International Inspection Co., Ltd. has been found to comply with the requirements of DNV towards subcontractor of EMC and safety testing services in conjunction with the EMC and Low voltage Directives and in the voluntary field. The acceptance is based on a formal quality Audit and follow-ups according to relevant parts of ISO/IEC Guide 17025 (2005), in accordance with the requirements of the DNV Laboratory Quality Manual towards subcontractors. Valid time is until Aug. 24, 2016.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature	Normal Temperature:	25°C
	High Temperature:	55°C
	Low Temperature:	-20°C
Voltage	Normal Voltage	DC 3.70V
	High Voltage	DC 4.25V
	Low Voltage	DC 3.50V
Other	lative Humidity	55 %
	Air Pressure	989 hPa

3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics;Part 1" and TR-100028-02 "Electromagnetic compatibilityand Radio spectrum Matters (ERM);Uncertainties in the measurementof mobile radio equipment characteristics;Part 2 " and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Frequency range	25 Hz	(1)
Transmitter power conducted	0.57 dB	(1)
Power Spectral Density	2.20 dB	(1)
Radiated spurious emission	2.20 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

3.5. Equipments Used during the Test

TS8997						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	Signal generator	R&S	SMB100A	177956	11/3/2015	11/2/2016
2	Signal and spectrum analyzer	R&S	FSV40	100048	11/3/2015	11/2/2016
3	OSP	R&S	OSP120	101317	11/3/2015	11/2/2016
4	OSP	R&S	OSP-B157	100890	11/3/2015	11/2/2016
5	Climate Chamber	ESPEC	EL-10KA	05107008	11/3/2015	11/2/2016
6	POWER SUPPLY	R&S	NGMO1	1504.8420	11/3/2015	11/2/2016
7	Vector signal generator	R&S	SMBV100A	260790	NA	NA

The Cal. Interval was one year

4. Test conditions and Results

4.1. Maximum transmit power

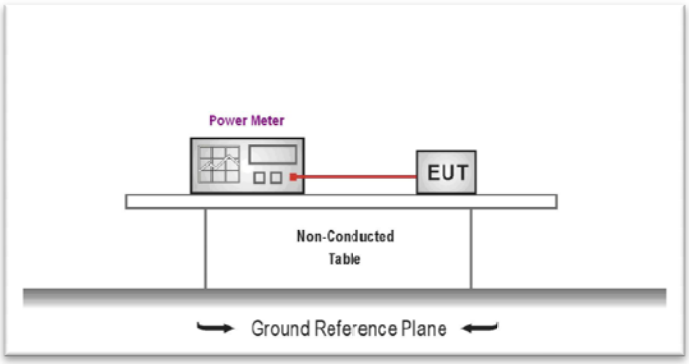
Requirements & Limits

ETSI EN 300 328 Sub-clause 4.3.2.2.2

For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm.
The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. See clause 5.3.1 m). For non-adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be equal to or less than the value declared by the supplier.

This limit shall apply for any combination of power level and intended antenna assembly.

TEST CONFIGURATION



TEST PROCEDURE

1.Please refer to ETSI EN 300 328 Sub-clause 5.1 for the test conditions.

2. Please refer to ETSI EN 300 328 Sub-clause 5.3.2.2.1.2 for the measruement method.

Power Meter: sample speed 1MS/s
Test bursts: 600

TEST RESULTS

Test conditions		Channel	EIRP(dBm)				Limit (dBm)	Result
Temperature (℃)	Voltage (V)		802.11b	802.11g	802.11n (H20)	802.11n (H40)		
Tnor=25	3.70	01/03	9.37	8.79	8.46	8.32	20.00	Pass
		07	9.82	9.23	9.43	9.69		
		13/11	9.64	9.42	9.62	9.53		
Tlow=-20	3.50	01/03	9.27	8.68	8.35	8.19		
		07	9.73	9.14	9.33	9.58		
		13/11	9.52	9.30	9.50	9.39		
	4.25	01/03	9.52	8.95	8.62	8.51		
		07	9.91	9.32	9.52	9.80		
		13/11	9.74	9.52	9.72	9.65		
Thigh=+55	3.50	01/03	9.26	8.68	8.34	8.19		
		07	9.73	9.14	9.34	9.58		
		13/11	9.51	9.28	9.48	9.37		
	4.25	01/03	9.45	8.87	8.55	8.42		
		07	9.93	9.34	9.55	9.82		
		13/11	9.76	9.55	9.75	9.68		

Note :
1. *Measured EIRP include the cable loss and antenna gain.*
2. *Test channel 01, 07, 13 for 802.11b/802.11g/802.11n(H20), test channel 03, 07, 11 for 802.11n(H40).*

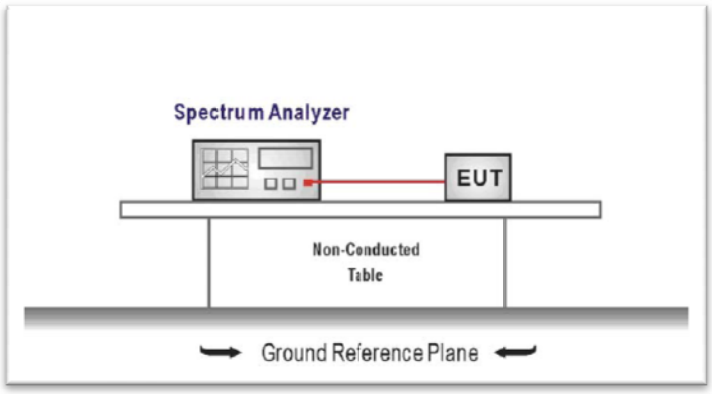
4.2. Maximum e.i.r.p. spectral density

Requirements & Limits

ETSI EN 300 328 Sub-clause 4.3.2.3.3

For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to 10 dBm per MHz.

TEST CONFIGURATION



TEST PROCEDURE

1.Please refer to ETSI EN 300 328 Sub-clause 5.1 for the test conditions.

2.Please refer to ETSI EN 300 328 Sub-clause 5.3.3.2.1 for the measurement method.

Frequency range： 2400MHz-2483.5MHz
RBW/VBW： 10KHz/30KHz
Sweep points/time：>8350 / Auto
Detector： RMS

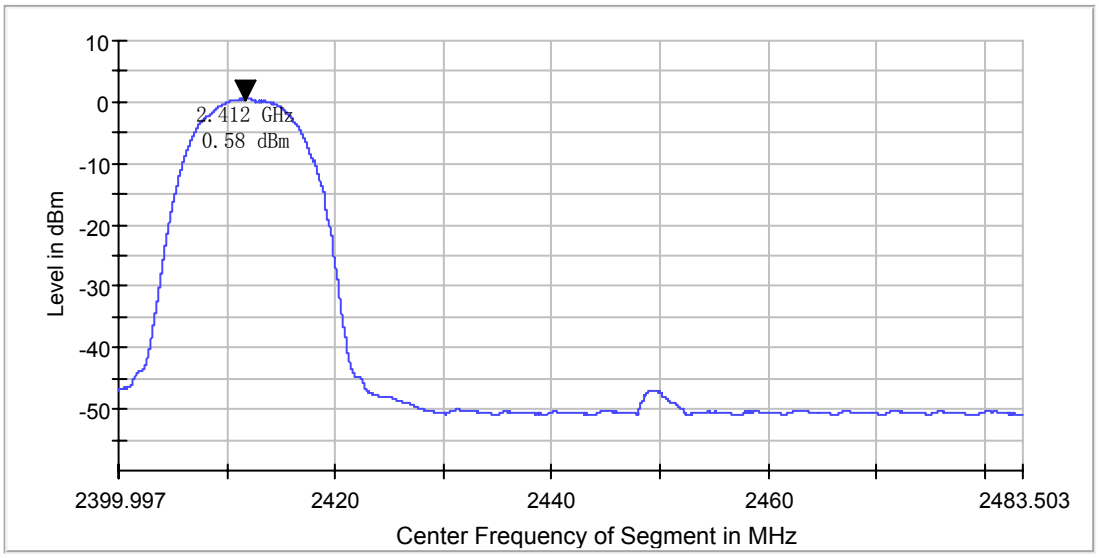
TEST RESULTS

Mode	*Channel*	*EIRP Density (dBm/MHz)*	*Limit (dBm/MHz)*	*Result*
802.11b	*CH01*	*0.58*	*10.00*	*Pass*
	CH07	*1.13*		
	CH13	*1.71*		
802.11g	*CH01*	*-1.37*		
	CH07	*-1.12*		
	CH13	*-0.96*		
802.11n(H20)	*CH01*	*-2.09*		
	CH07	*-0.05*		
	CH13	*0.02*		
802.11n(H40)	*CH03*	*-5.79*		
	CH07	*-3.92*		
	CH11	*-4.07*		

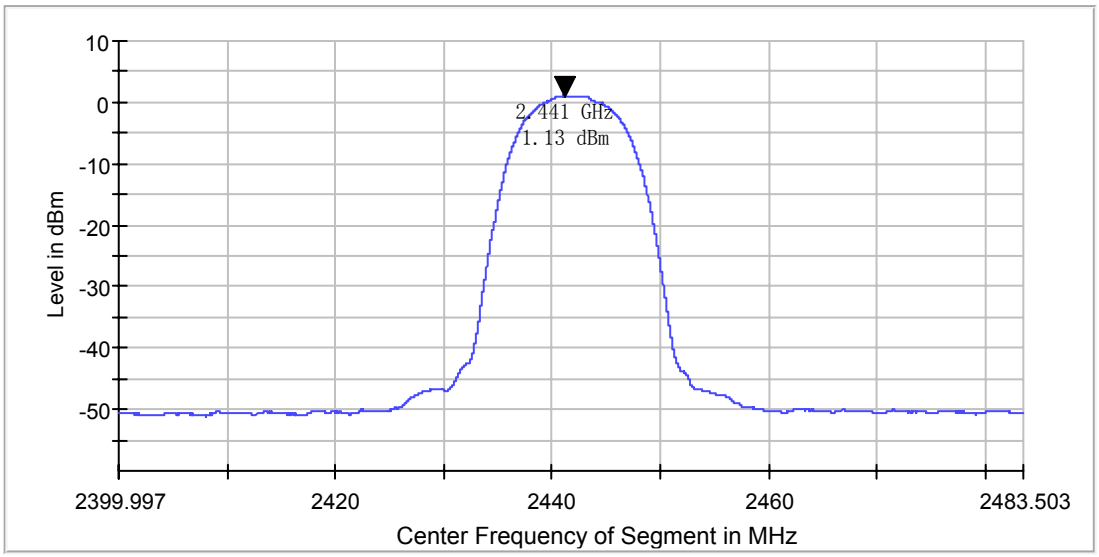
Note: Measured value include the cable loss and antenna gain.

Test plot as follows:

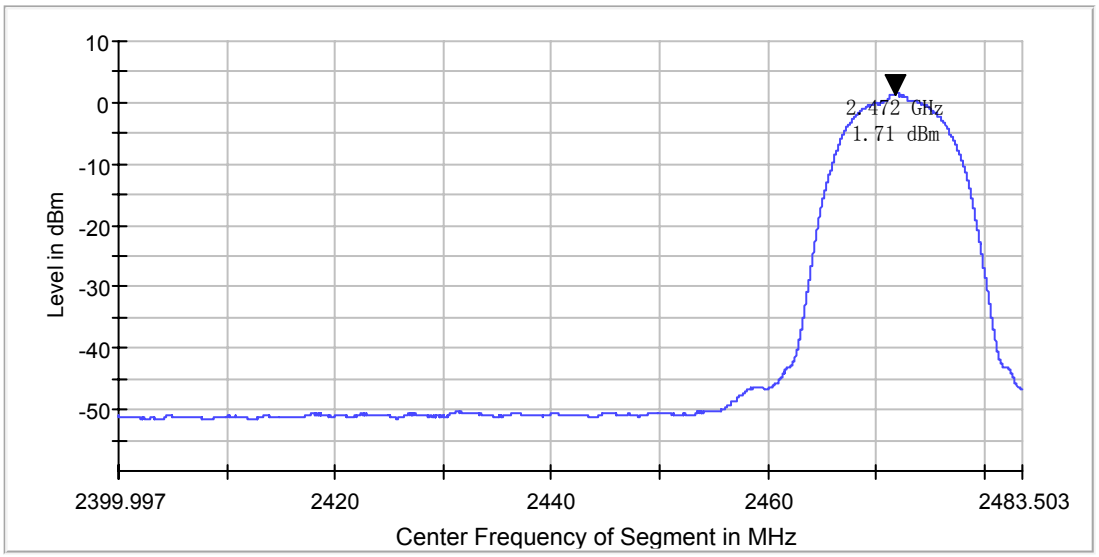
802.11b



CH01

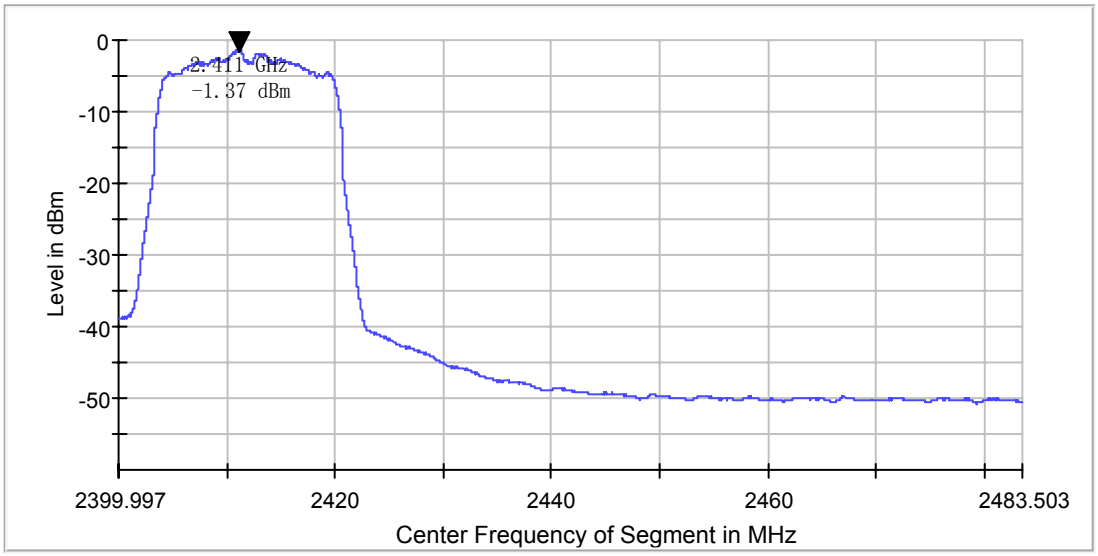


CH07

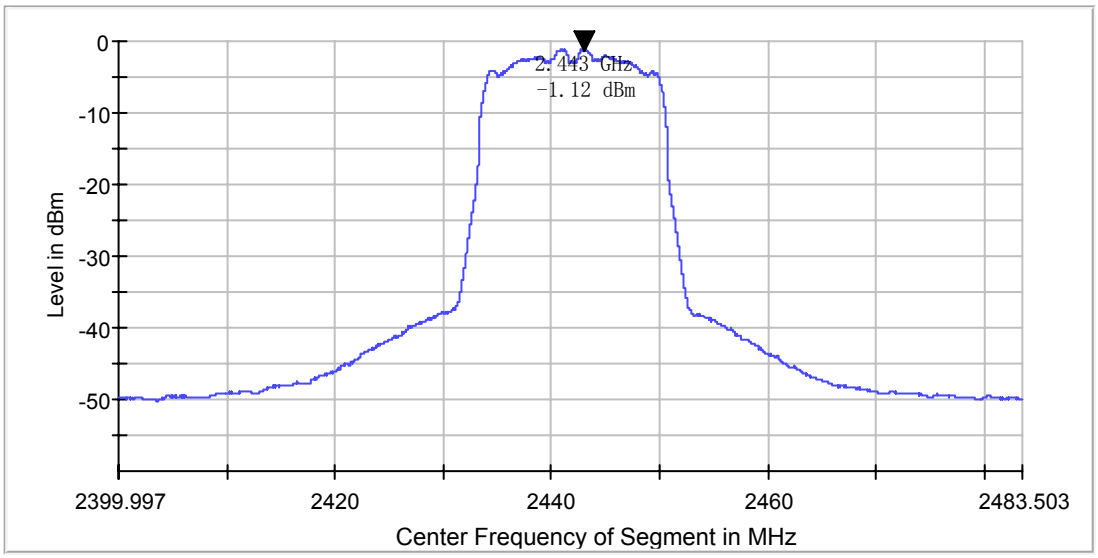


CH13

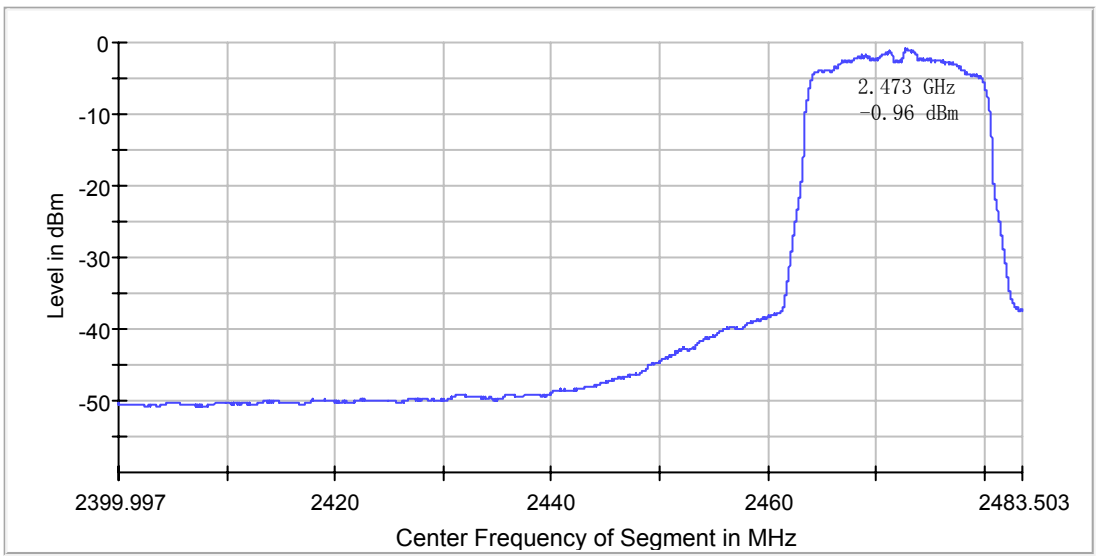
802.11g



CH01

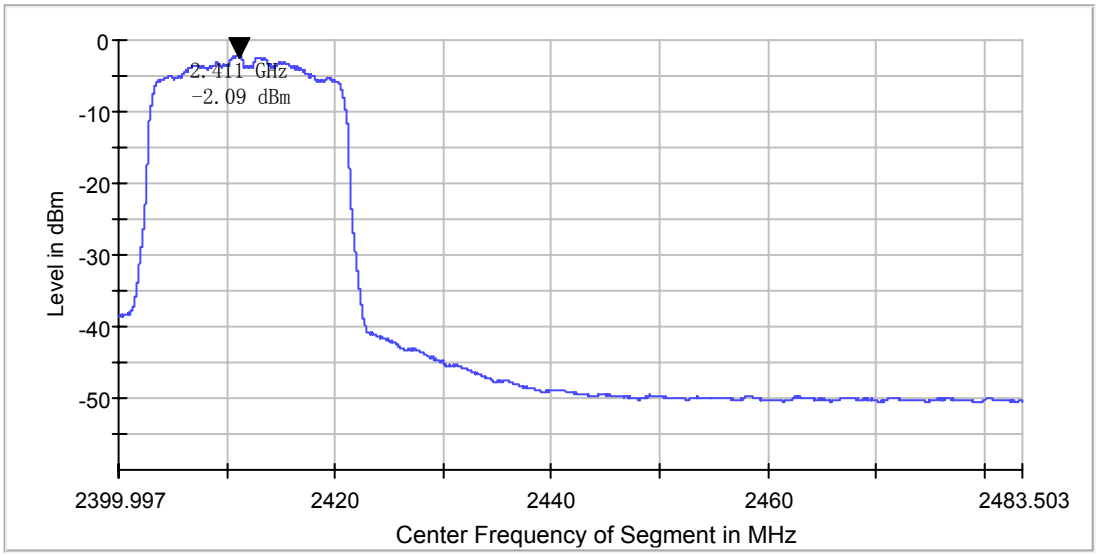


CH07

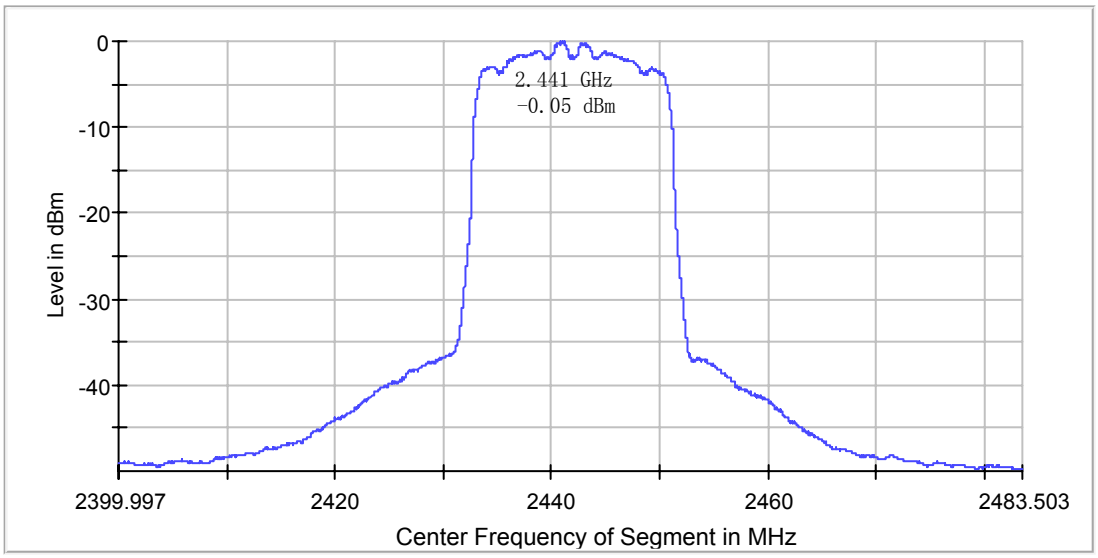


CH13

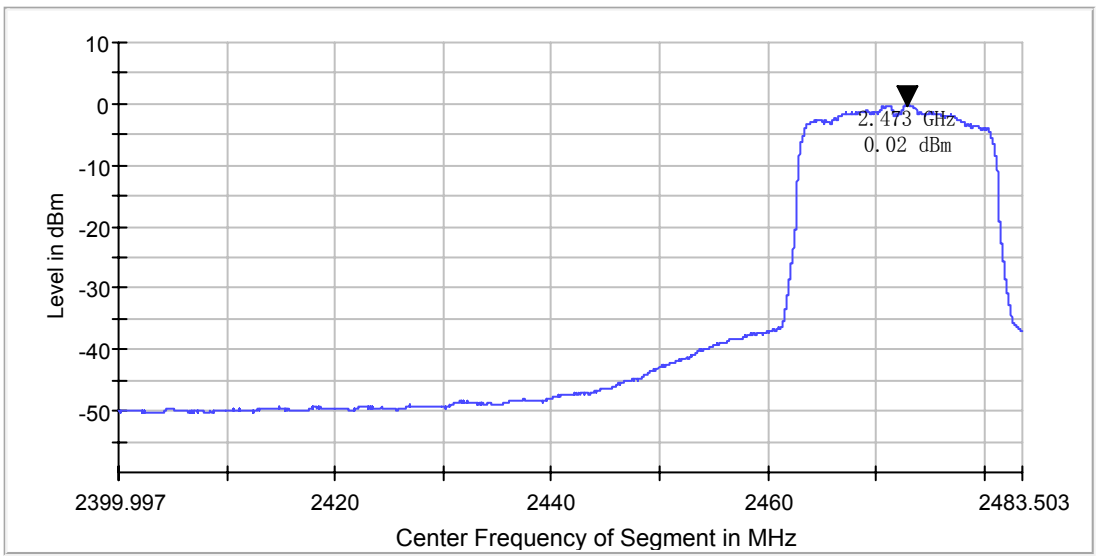
802.11n(H20)



CH01

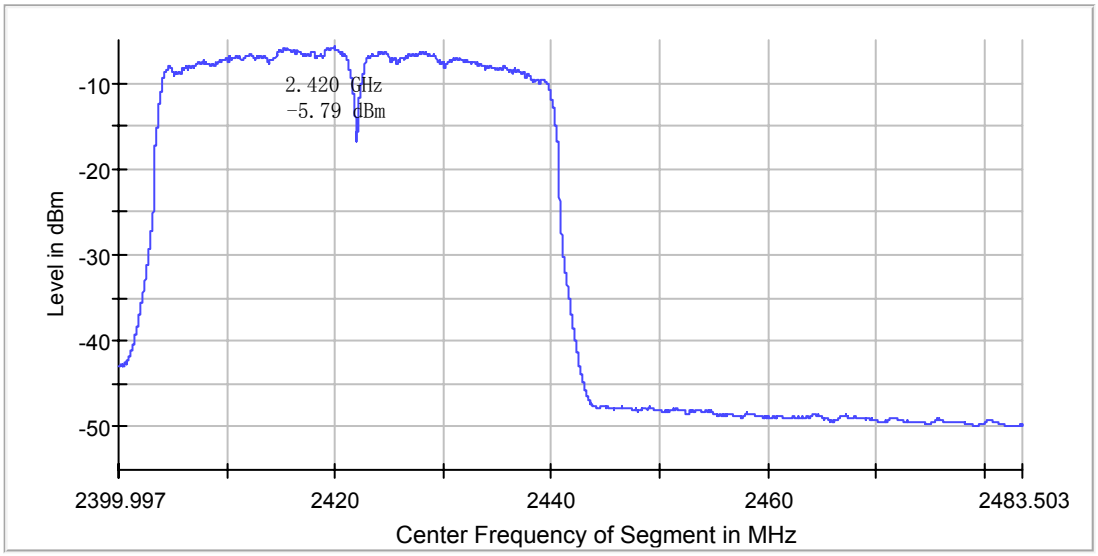


CH07

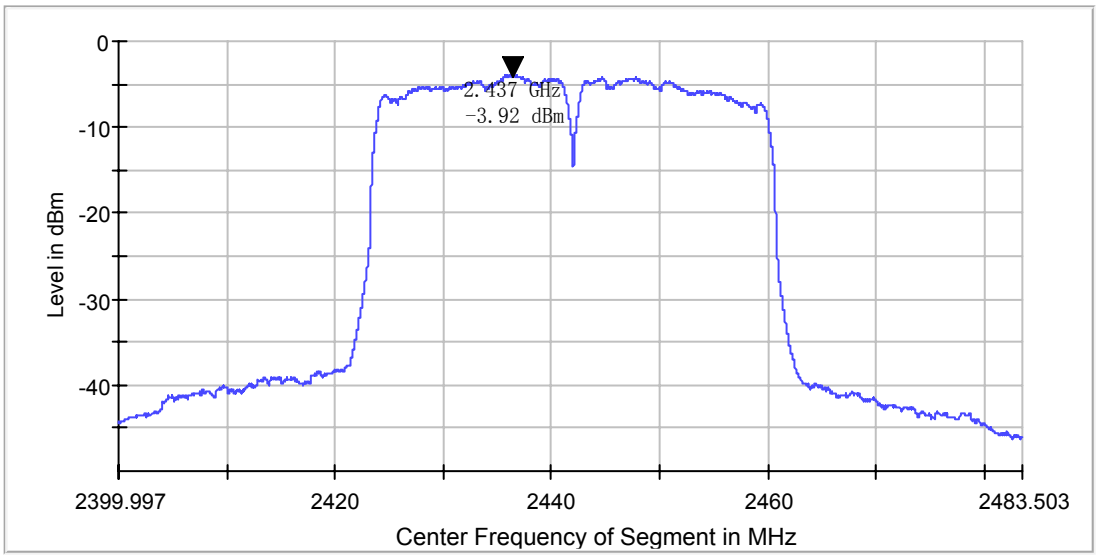


CH13

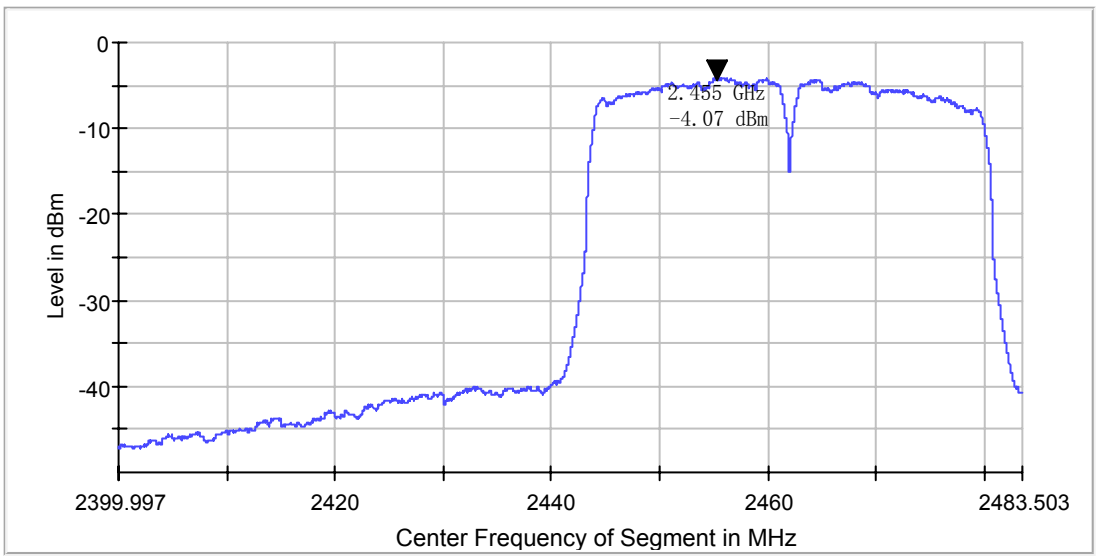
802.11n(H40)



CH03



CH07



CH11

4.3. Adaptivity and Recever blocking

Requirements & Limits

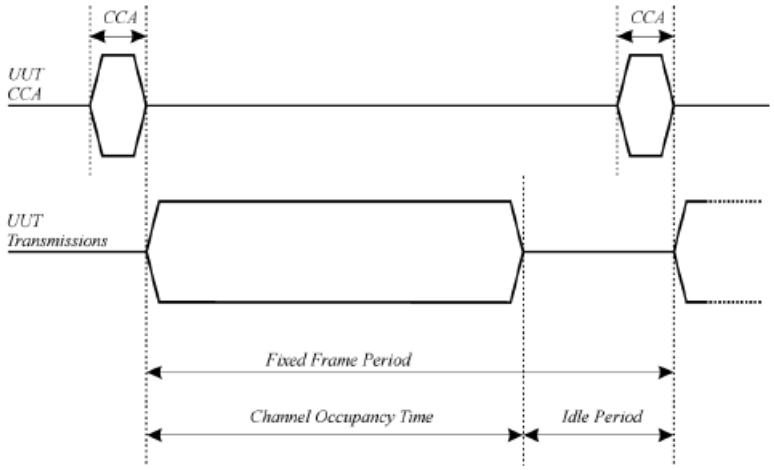
ETSI EN 300 328 Sub-clause 4.3.2.6 and Sub-clause 4.3.2.11.3

The frequency range of the equipment is determined by the lowest and highest
Non-LBT based Detect and Avoid

1 During normal operation,the equipment shall evaluate the presence of a singnal on its current operating channel.If it is determined that a signal is present with a level above the detection threshold defined in step 5 the channel shall be marked as 'unavallable'.
2 The channel shall remain unavailable for a minimum time equal to 1 second after which the channel may be considered again as an ‘available’ channel;
3 COT ⩽ 40 ms;
4 Idle Period = 5% of COT of the Channel Occupancy Time with a minimum of 100 μs; After this, the procedure as in step 1 needs to be repeated.
5 Detection threshold level = -70dBm/MHz + (20dBm – Pout e.i.r.p)/1MHz (Pout in dBm);

LBT based Detect and Avoid (Frame Based Equipment):

1 Minimum Clear Channel Assessment (CCA) time ⩾18 us;
2 The equipment is allowed to continue Short Control Signalling Transmissions on this channel providing it complies with the requirements given in clause 4.3.2.6.4(If implemented, Short Control Signalling Transmissions of adaptive equipment using wide band modulations other than FHSS shall have a maximum TxOn / (TxOn + TxOff) ratio of 10 % within any observation period of 50 ms.);
3 COT = 1~10 ms; Idle Period = 5% of COT;
4 Control frames are allowed but data frames are not allowed;CCA⩽COT,See figure below;



5 Detection threshold level = -70dBm/MHz + (20dBm – Pout e.i.r.p)/1MHz (Pout in dBm);

LBT based Detect and Avoid (Load Based Equipment):

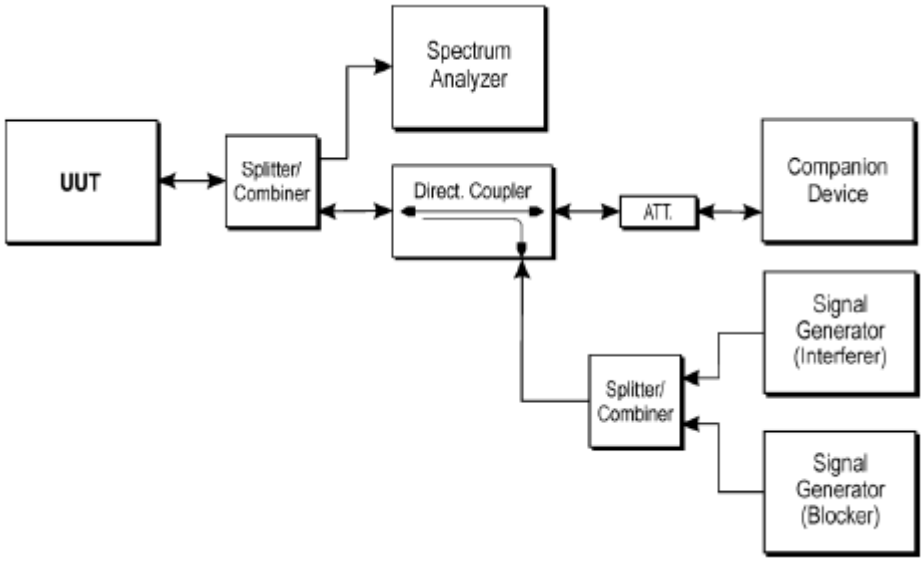
1 Minimum Clear Channel Assessment (CCA) time ⩾18 us;
2 The equipment is allowed to continue Short Control Signalling Transmissions on this channel providing it complies with the requirements given in clause 4.3.2.6.4(If implemented, Short Control Signalling Transmissions of adaptive equipment using wide band modulations other than FHSS shall have a maximum TxOn / (TxOn + TxOff) ratio of 10 % within any observation period of 50 ms.);
3 COT ⩽ 13ms, after which the device shall perform a new CCA as described in step 1 ;
4 Control frames are allowed but data frames are not allowed;CCA⩽COT;
5 Detection threshold level = -70dBm/MHz + (20dBm – Pout e.i.r.p)/1MHz (Pout in dBm).

Receiver Blocking

Adaptive equipment using wide band modulations other than FHSS, shall comply with the requirements defined in clause 4.3.2.6.2 (non-LBT based DAA) or clause 4.3.2.6.3 (LBT based DAA) in the presence of a blocking signal with characteristics as provided in below.

Equipment Type (LBT / non- LBT)	Wanted signal mean power from companion device	Blocking signal frequency [MHz]	Blocking signal power [dBm]	Type of interfering signal
LBT	sufficient to maintain the link (see note 2)	2 395 or 2 488,5 (see note 1)	-35	CW
Non-LBT	-30 dBm			
NOTE 1: The highest blocking frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest blocking frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. See clause 5.3.7.1.				
NOTE 2: A typical value which can be used in most cases is -50 dBm/MHz.				

TEST CONFIGURATION



TEST PROCEDURE

1.Please refer to ETSI EN 300 328 Sub-clause 5.1 for the test conditions.

2.Please refer to ETSI EN 300 328 Sub-clause 5.3.7.2 for the measurement method.

LBT based adaptive equipment using modulations other than FHSS

Step 1:

- The UUT shall connect to a companion device during the test.
- Adjust the received signal level.
- The analyser shall be set as follows:

RBW: ⩾ Occupied Channel Bandwidth (if the analyser does not support this setting, the highest available setting shall be used) (10MHz)
VBW: 3 × RBW (if the analyser does not support this setting, the highest available setting shall be used) (10MHz)
Detector Mode: RMS
Centre Frequency: Equal to the centre frequency of the operating channel
Span: 0 Hz
Sweep time: > Channel Occupancy Time of the UUT
Trace Mode: Clear/Write
Trigger Mode: Video

Step 2:
Configure the UUT for normal transmissions with a sufficiently high payload.

Step 3:
Adding the interference signal.

The power spectral density level (at the input of the UUT) of this interference signal shall be equal to the detection threshold.

Step 4:
Verification of reaction to the interference signal.

Step 5:
Adding the blocking signal.
The blocking signal power level shall be equal to -35dBm.

Step 6:
Removing the interference and blocking signal

Step 7:
Step 2 to step 6 shall be repeated for next frequencies to be tested.

TEST RESULTS

Not Application,This requirement dose not apply for equipment with a maximum declared RF Output power level of less than 10dBm e.i.r.p or for equioment when operating in a mode where the RF Output power is less than 10dBm e.i.r.p. The EUT's RF Output power is less 10dBm.

4.4. Occpied Channel Bandidth

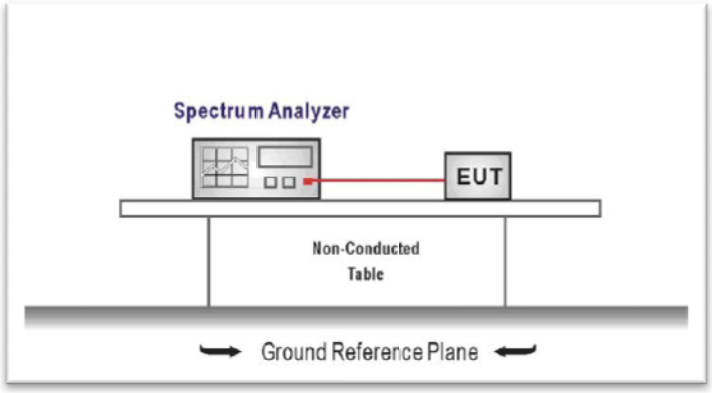
Requirements & Limits

ETSI EN 300 328 Sub-clause 4.3.2.7.3

The Occupied Channel Bandwidth shall fall completely within the band given in clause 1.

In addition, for non-adaptive systems using wide band modulations other than FHSS and with e.i.r.p greater than 10 dBm, the occupied channel bandwidth shall be less than 20 MHz.

TEST CONFIGURATION



TEST PROCEDURE

1.Please refer to ETSI EN 300 328 Sub-clause 5.1 for the test conditions.

2.Please refer to ETSI EN 300 328 Sub-clause 5.3.8.2.1 for the measurement method.

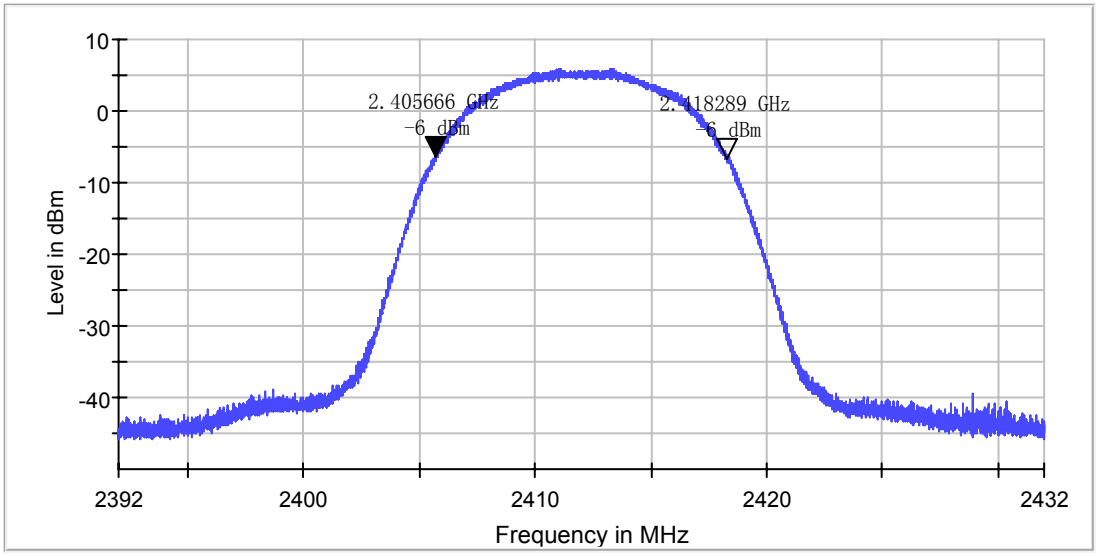
Connect the UUT to the spectrum analyser and use the following settings:
Centre Frequency: The centre frequency of the channel under test
Resolution BW: ~ 1 % of the span without going below 1 %(500KHz for 20MHz BW/1MHz for 40MHz BW)
Video BW: 3 × RBW(1.5MHz for 20MHz BW/3MHz for 40MHz BW)
Frequency Span: 2 × Occupied Channel Bandwidth (e.g. 40 MHz for a 20 MHz channel)
Detector Mode: RMS
Trace Mode: Max Hold
Seep time: 1 s

TEST RESULTS

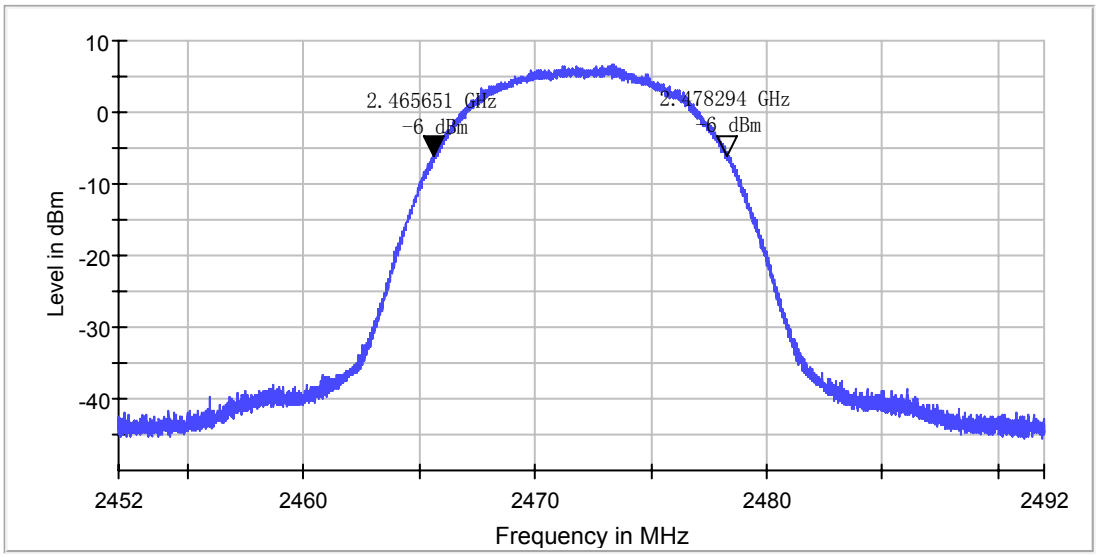
Modulation	Channel	Occupied Channel Bandwidth (MHz)	Result
802.11b	CH01	12.62	Pass
	CH13	12.64	
802.11g	CH01	17.36	
	CH13	17.40	
802.11n(H20)	CH01	18.23	
	CH13	18.30	
802.11n(H40)	CH03	36.27	
	CH11	36.36	

Test plot as follows:

802.11b

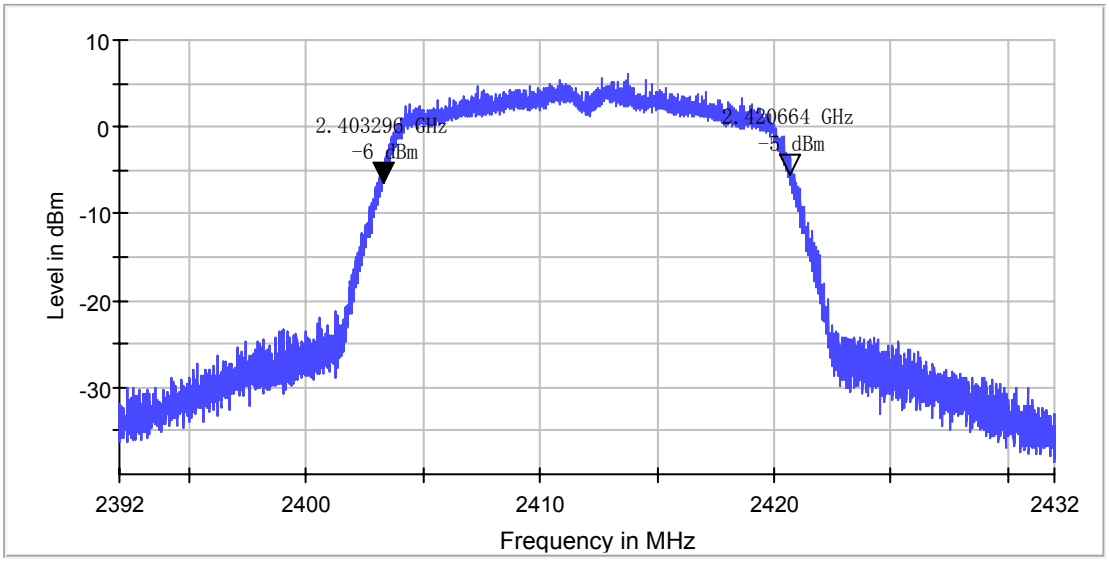


CH01

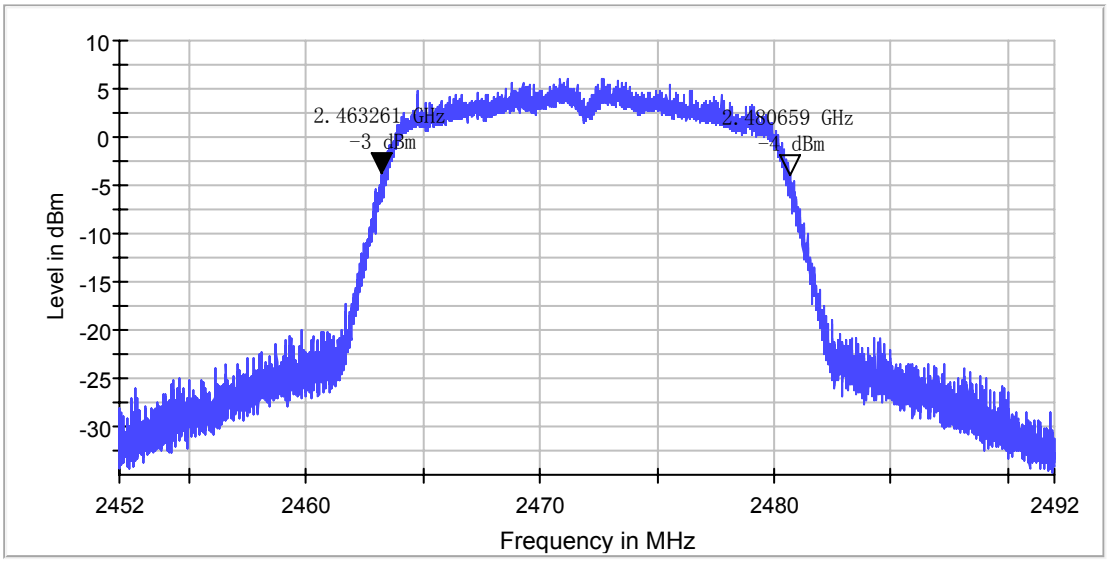


CH13

802.11g

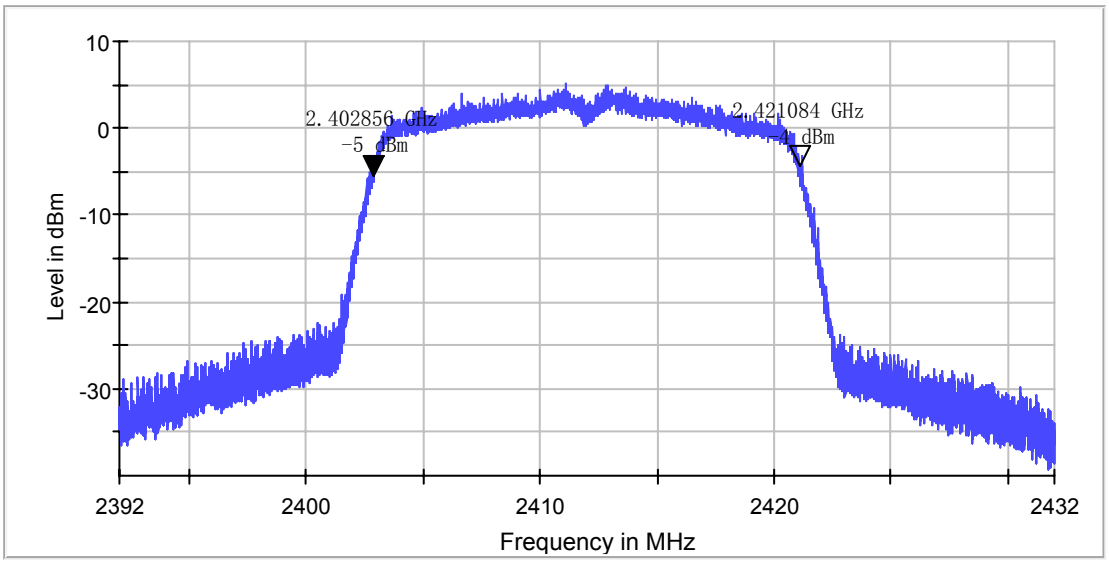


CH01

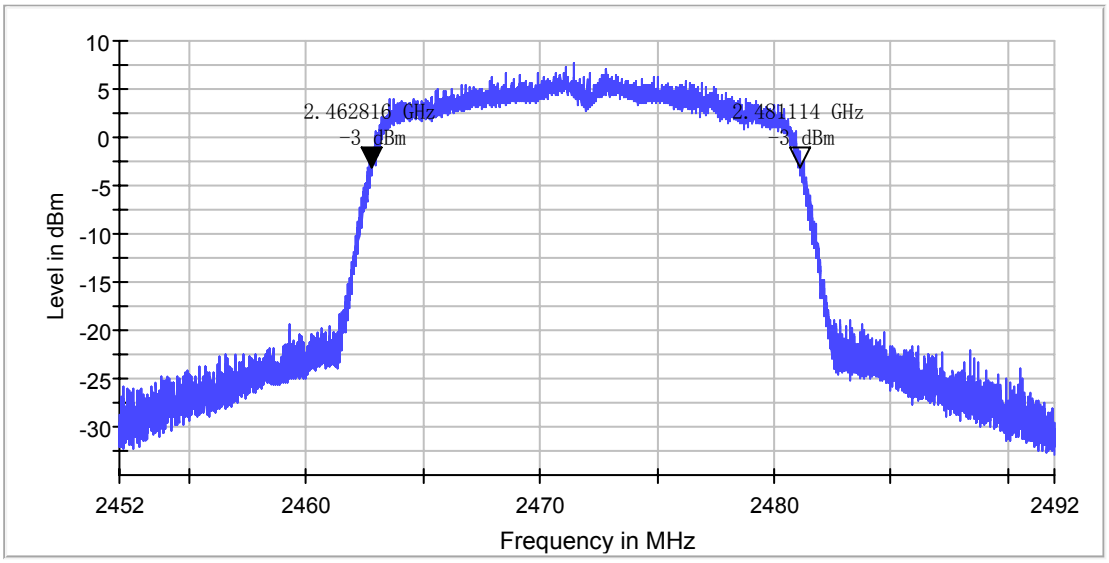


CH13

802.11n(H20)

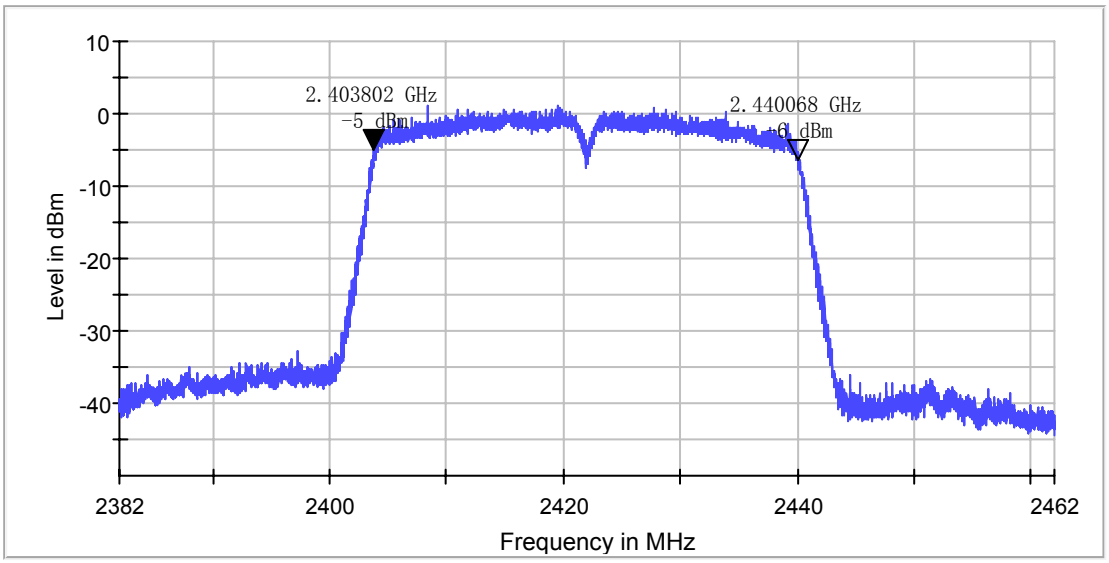


CH01

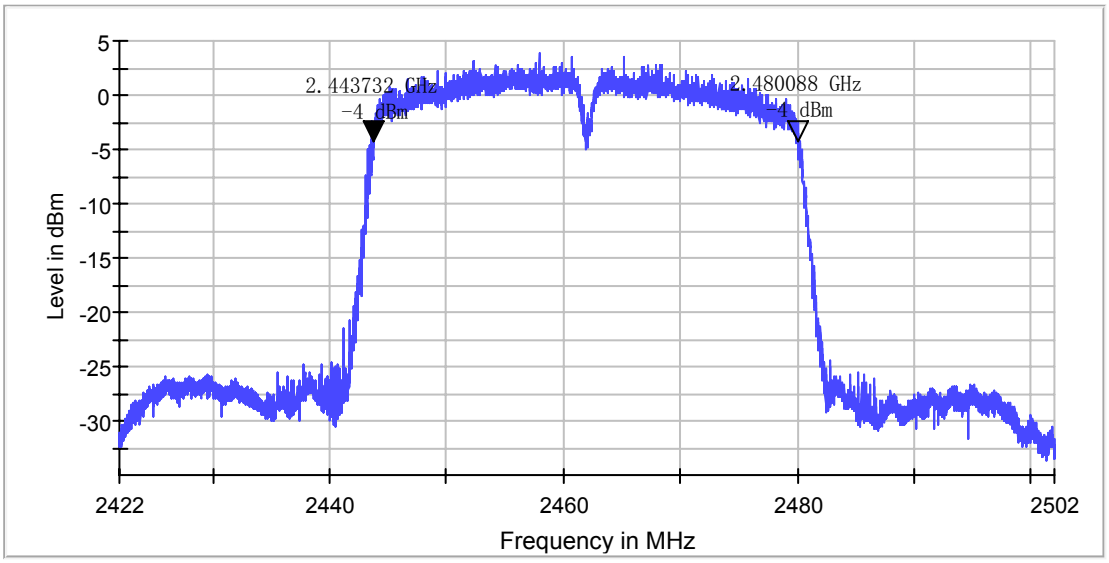


CH13

802.11n(H40)



CH03



CH11

4.5. Transmitter unwanted emissions in the out-of-band domain

Requirements & Limits

ETSI EN 300 328 Sub-clause 4.3.2.7.2

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 3.
NOTE: Within the 2 400 MHz to 2 483,5 MHz band, the Out-of-band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement in clause 4.3.2.7.

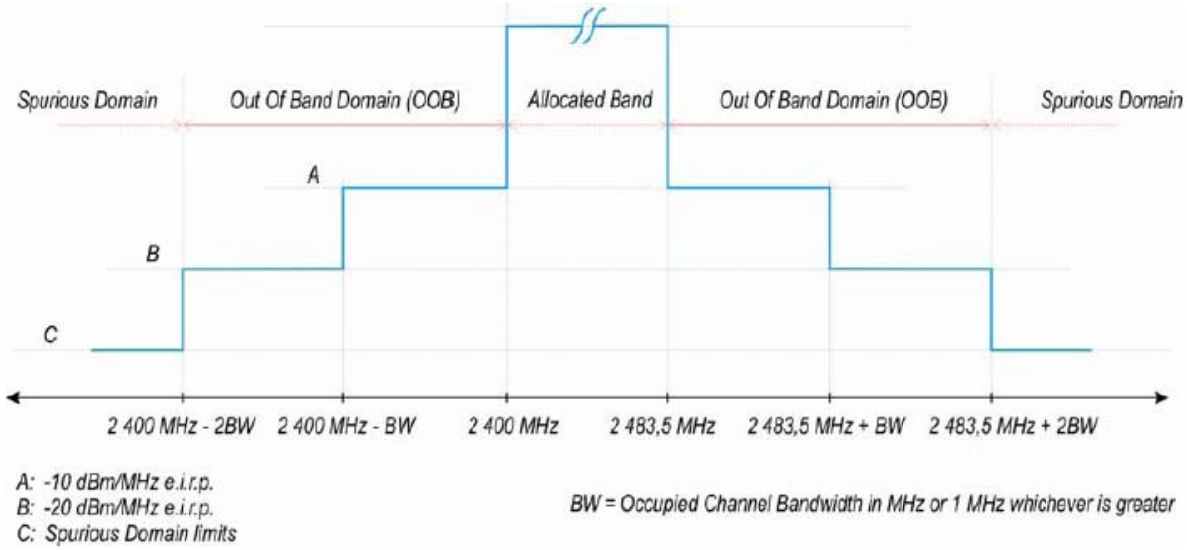
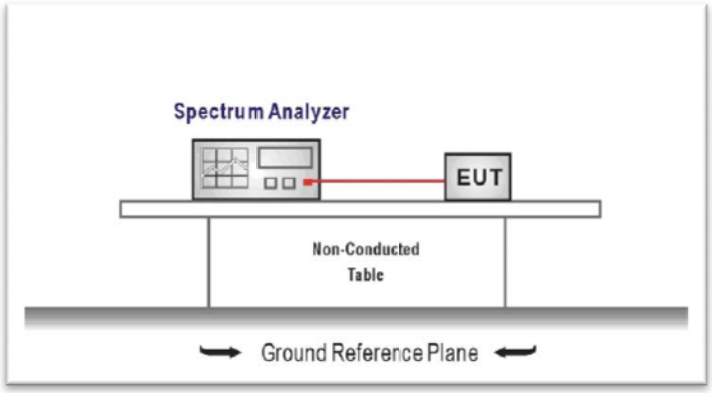


Figure 3: Transmit mask

TEST CONFIGURATION



TEST PROCEDURE

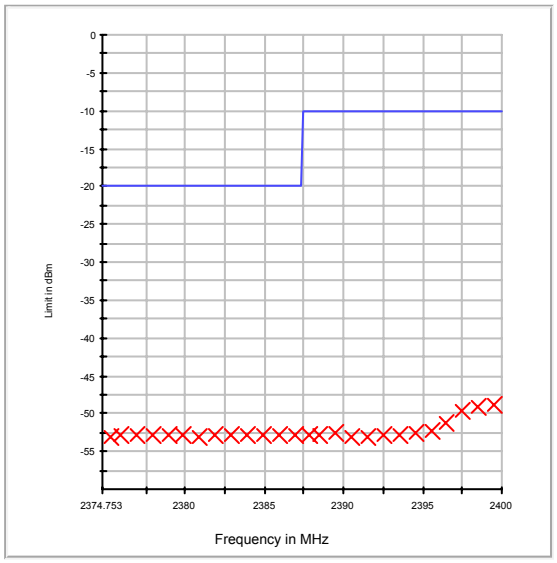
1.Please refer to ETSI EN 300 328 Sub-clause 5.1 for the test conditions.

2.Please refer to ETSI EN 300 328 Sub-clause 5.3.9.2.1 for the measurement method.

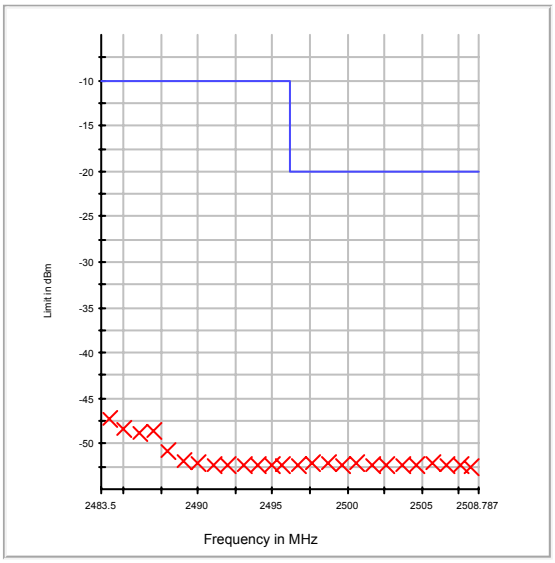
RBW/ VBW：1MHz/3MHz
Span： 0Hz
Filter mode：Channel filter
Detector： RMS

TEST RESULTS

802.11b							
Test conditions		Channel	Frequency range (MHz)		Level (dBm)	Limit (dBm)	Result
Temperature (℃)	Voltage (V)		Start	Stop			
Tnor=25	3.70	01	2400-2OBW	2400-OBW	*-52.03*	*<-20*	Pass
			2400-OBW	2400	*-48.65*	*<-10*	Pass
		13	2484	2484+OBW	*-47.59*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-52.12*	*<-20*	Pass
Tlow=-20	3.50	01	2400-2OBW	2400-OBW	*-52.32*	*<-20*	Pass
			2400-OBW	2400	*-47.91*	*<-10*	Pass
		13	2484	2484+OBW	*-48.42*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-52.95*	*<-20*	Pass
	4.25	01	2400-2OBW	2400-OBW	*-53.41*	*<-20*	Pass
			2400-OBW	2400	*-48.91*	*<-10*	Pass
		13	2484	2484+OBW	*-47.62*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-52.21*	*<-20*	Pass
Thigh=+55	3.50	01	2400-2OBW	2400-OBW	*-53.58*	*<-20*	Pass
			2400-OBW	2400	*-49.39*	*<-10*	Pass
		13	2484	2484+OBW	*-47.07*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-52.92*	*<-20*	Pass
	4.25	01	2400-2OBW	2400-OBW	*-52.73*	*<-20*	Pass
			2400-OBW	2400	*-50.02*	*<-10*	Pass
		13	2484	2484+OBW	*-46.61*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-52.64*	*<-20*	Pass



CH01

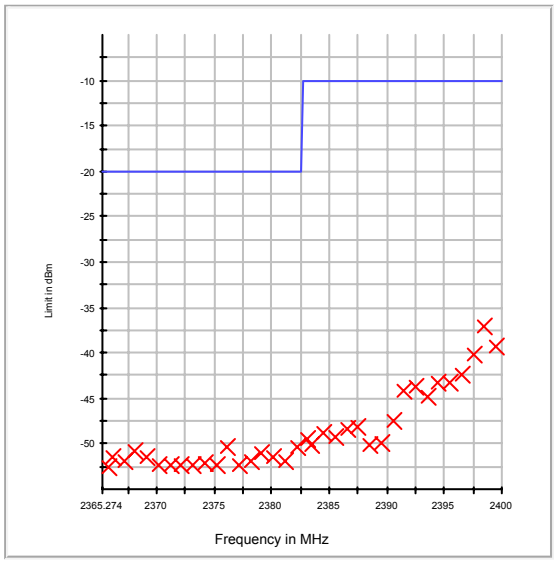


CH13

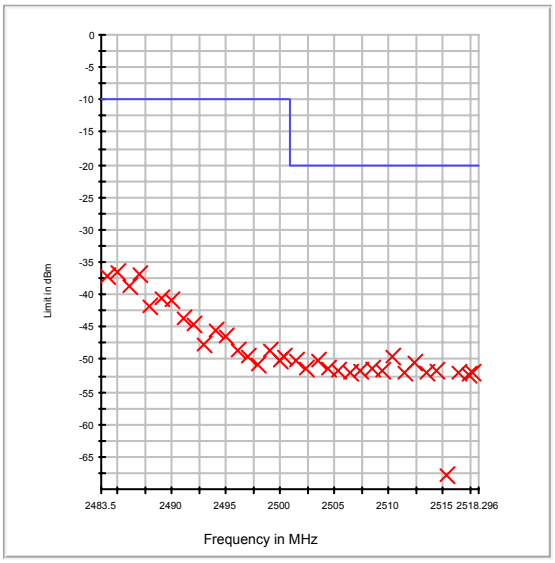
Note:

1. *Radiant level is far less than the limit, Only show the worst test result.*
2. Only show the test plot on normal condition

802.11g							
Test conditions		Channel	Frequency range (MHz)		Level (dBm)	Limit (dBm)	Result
Temperature (℃)	Voltage (V)		Start	Stop			
Tnor=25	3.70	01	2400-2OBW	2400-OBW	*-50.02*	*<-20*	Pass
			2400-OBW	2400	*-37.53*	*<-10*	Pass
		13	2484	2484+OBW	*-37.05*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-50.04*	*<-20*	Pass
Tlow=-20	3.50	01	2400-2OBW	2400-OBW	*-50.50*	*<-20*	Pass
			2400-OBW	2400	*-37.27*	*<-10*	Pass
		13	2484	2484+OBW	*-36.57*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-49.28*	*<-20*	Pass
	4.25	01	2400-2OBW	2400-OBW	*-51.21*	*<-20*	Pass
			2400-OBW	2400	*-36.74*	*<-10*	Pass
		13	2484	2484+OBW	*-36.13*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-49.61*	*<-20*	Pass
Thigh=+55	3.50	01	2400-2OBW	2400-OBW	*-50.75*	*<-20*	Pass
			2400-OBW	2400	*-36.62*	*<-10*	Pass
		13	2484	2484+OBW	*-35.78*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-49.08*	*<-20*	Pass
	4.25	01	2400-2OBW	2400-OBW	*-51.12*	*<-20*	Pass
			2400-OBW	2400	*-36.39*	*<-10*	Pass
		13	2484	2484+OBW	*-36.65*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-48.93*	*<-20*	Pass



CH01

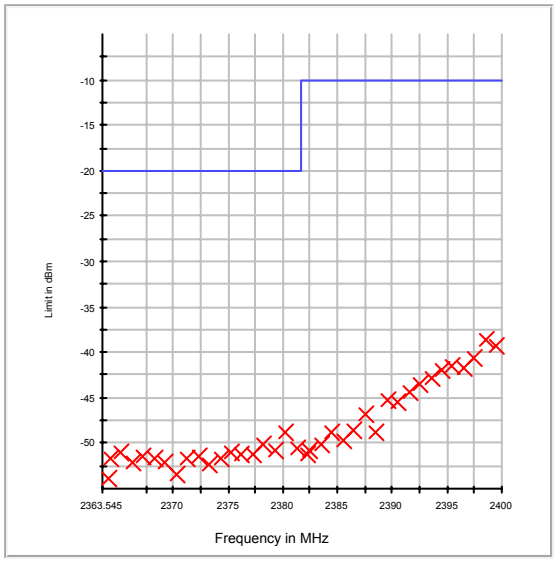


CH13

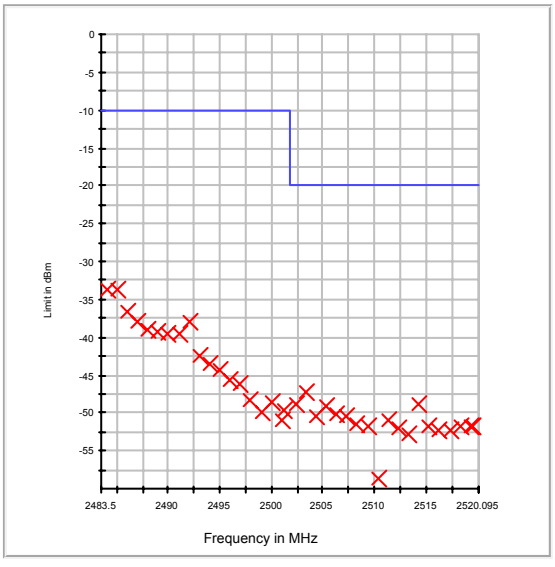
Note:

1. *Radiant level is far less than the limit, Only show the worst test result.*
2. Only show the test plot on normal condition

802.11n(H20)							
Test conditions		Channel	Frequency range (MHz)		Level (dBm)	Limit (dBm)	Result
Temperature (℃)	Voltage (V)		Start	Stop			
Tnor=25	3.70	01	2400-2OBW	2400-OBW	*-48.03*	*<-20*	Pass
			2400-OBW	2400	*-38.68*	*<-10*	Pass
		13	2484	2484+OBW	*-38.26*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-47.14*	*<-20*	Pass
Tlow=-20	3.50	01	2400-2OBW	2400-OBW	*-47.24*	*<-20*	Pass
			2400-OBW	2400	*-38.18*	*<-10*	Pass
		13	2484	2484+OBW	*-37.48*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-46.46*	*<-20*	Pass
	4.25	01	2400-2OBW	2400-OBW	*-47.64*	*<-20*	Pass
			2400-OBW	2400	*-38.72*	*<-10*	Pass
		13	2484	2484+OBW	*-36.82*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-46.95*	*<-20*	Pass
Thigh=+55	3.50	01	2400-2OBW	2400-OBW	*-47.10*	*<-20*	Pass
			2400-OBW	2400	*-39.61*	*<-10*	Pass
		13	2484	2484+OBW	*-36.95*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-47.73*	*<-20*	Pass
	4.25	01	2400-2OBW	2400-OBW	*-47.10*	*<-20*	Pass
			2400-OBW	2400	*-39.26*	*<-10*	Pass
		13	2484	2484+OBW	*-37.63*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-47.23*	*<-20*	Pass



CH01

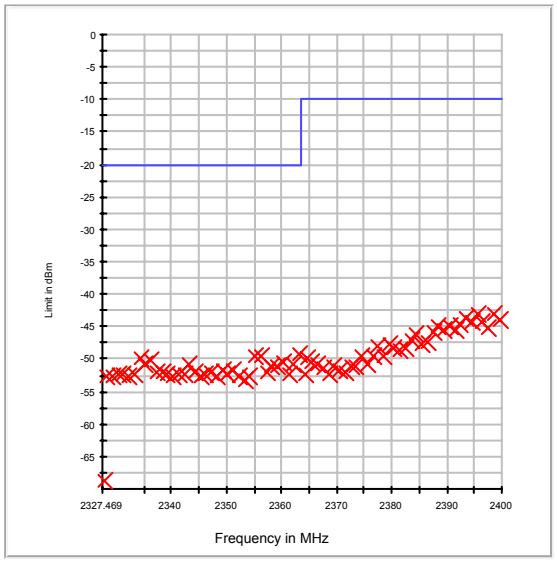


CH13

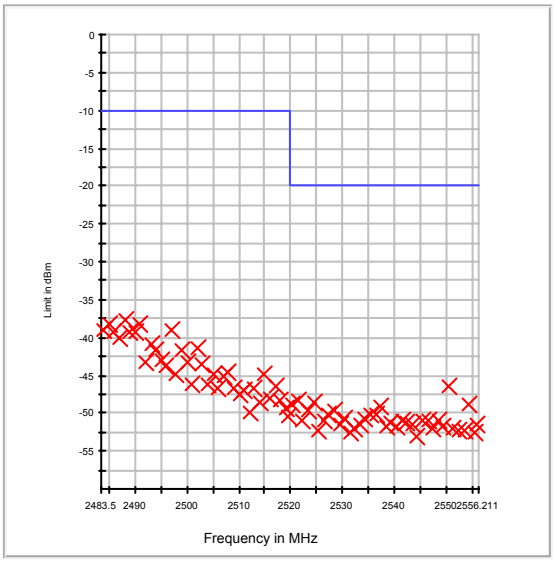
Note:

1. *Radiant level is far less than the limit, Only show the worst test result.*
2. Only show the test plot on normal condition

802.11n(H40)							
Test conditions		Channel	Frequency range (MHz)		Level (dBm)	Limit (dBm)	Result
Temperature (℃)	Voltage (V)		Start	Stop			
Tnor=25	3.70	03	2400-2OBW	2400-OBW	*-49.63*	*<-20*	Pass
			2400-OBW	2400	*-42.59*	*<-10*	Pass
		11	2484	2484+OBW	*-37.55*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-46.03*	*<-20*	Pass
Tlow=-20	3.50	03	2400-2OBW	2400-OBW	*-48.86*	*<-20*	Pass
			2400-OBW	2400	*-42.10*	*<-10*	Pass
		11	2484	2484+OBW	*-38.31*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-45.36*	*<-20*	Pass
	4.25	03	2400-2OBW	2400-OBW	*-49.25*	*<-20*	Pass
			2400-OBW	2400	*-42.63*	*<-10*	Pass
		11	2484	2484+OBW	*-37.66*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-45.84*	*<-20*	Pass
Thigh=+55	3.50	03	2400-2OBW	2400-OBW	*-48.71*	*<-20*	Pass
			2400-OBW	2400	*-41.76*	*<-10*	Pass
		11	2484	2484+OBW	*-37.54*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-45.08*	*<-20*	Pass
	4.25	03	2400-2OBW	2400-OBW	*-48.72*	*<-20*	Pass
			2400-OBW	2400	*-41.41*	*<-10*	Pass
		11	2484	2484+OBW	*-36.87*	*<-10*	Pass
			2484+OBW	2484+2OBW	*-45.57*	*<-20*	Pass



CH03



CH11

Note:

1. *Radiant level is far less than the limit, Only show the worst test result.*
2. Only show the test plot on normal condition

4.6. Transmitter spurious emissions

Requirements & Limits

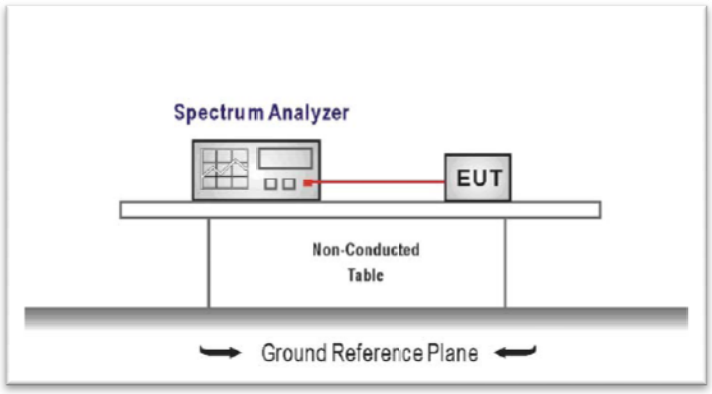
ETSI EN 300 328 Sub-clause 4.3.2.9.3

- The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 1.

Table 1: Transmitter limits for spurious emissions

Frequency Range	Maximum power e.r.p.(.≤1 GHz) e.i.r.p.(＞1 GHz)	Limit when Standby
30 MHz to 47 MHz	-36 dBm	100 KHz
47 MHz to 74 MHz	-54 dBm	100 KHz
74MHz to 87.5 MHz	-36 dBm	100 KHz
87.5 MHz to 118 MHz	-54 dBm	100 KHz
118 MHz to 174 MHz	-36 dBm	100 KHz
174 MHz to 230 MHz	-54 dBm	100 KHz
230 MHz to 470 MHz	-36 dBm	100 KHz
470 MHz to 862 MHz	-54 dBm	100 KHz
862 MHz to 1 GHz	-36 dBm	100 KHz
1 GHz to 12.75 GHz	-30 dBm	1 MHz

TEST CONFIGURATION



TEST PROCEDURE

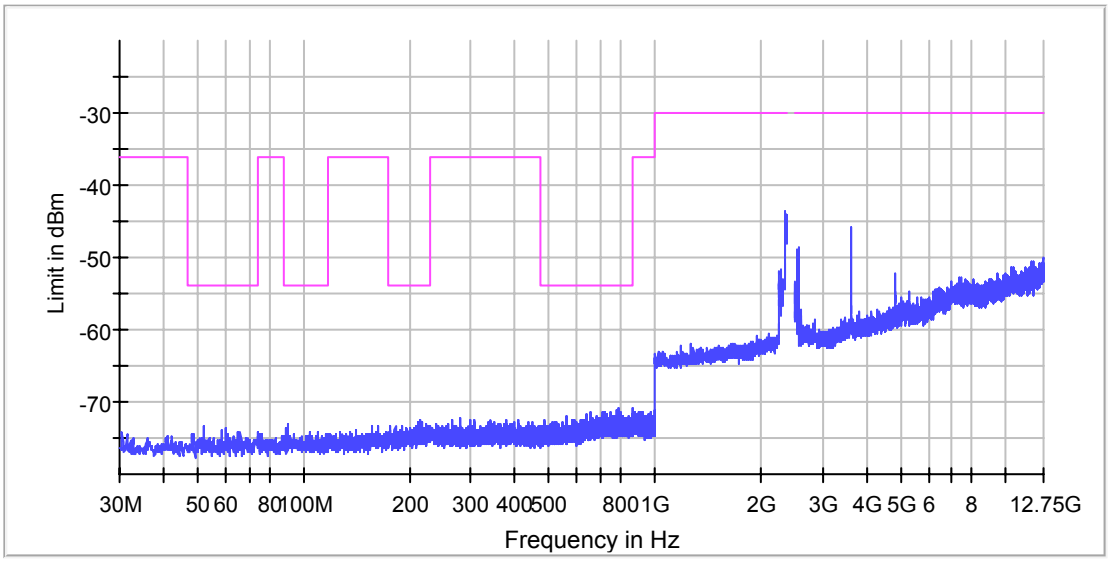
1. Please refer to ETSI EN 300 328 Sub-clause 5.1 for the test conditions.
2. Please refer to ETSI EN 300 328 Sub-clause 5.3.10.2 for the measurement method.

Resolution Bandwidth: 100 kHz (< 1 GHz) / 1 MHz (> 1 GHz)
Video Bandwidth: 300 kHz (< 1 GHz) / 3 MHz (> 1 GHz)
Detector: Peak for prescan/RMS for emission retest

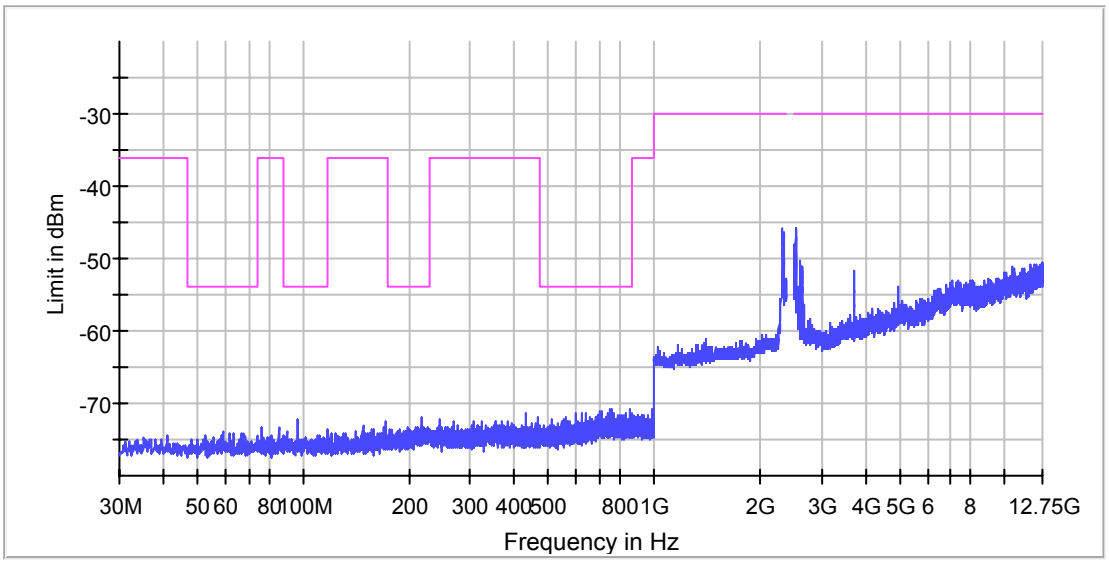
TEST RESULTS

Test Mode	Continue Transmit

802.11b



CH01



CH13

Note: The Transmitter spurious emission are performed the each mode, the datum recorded is the worst case for all the mode at 802.11b mode.

4.7. Receiver spurious emissions

Requirements & Limits

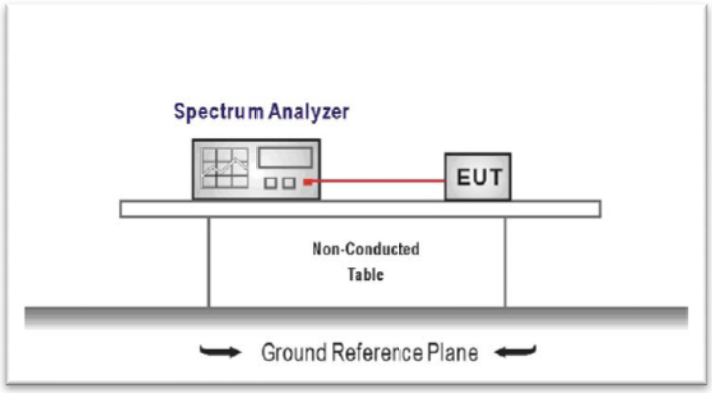
ETSI EN 300 328 Sub-clause 4.3.2.10.3

The spurious emissions of the receiver shall not exceed the values given in table 2.

Table 2: spurious emission limits for receivers

Frequency	Maximum power, e.r.p.	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 KHz
1 GHz to 12.75 GHz	-47 dBm	1 MHz

TEST CONFIGURATION



TEST PROCEDURE

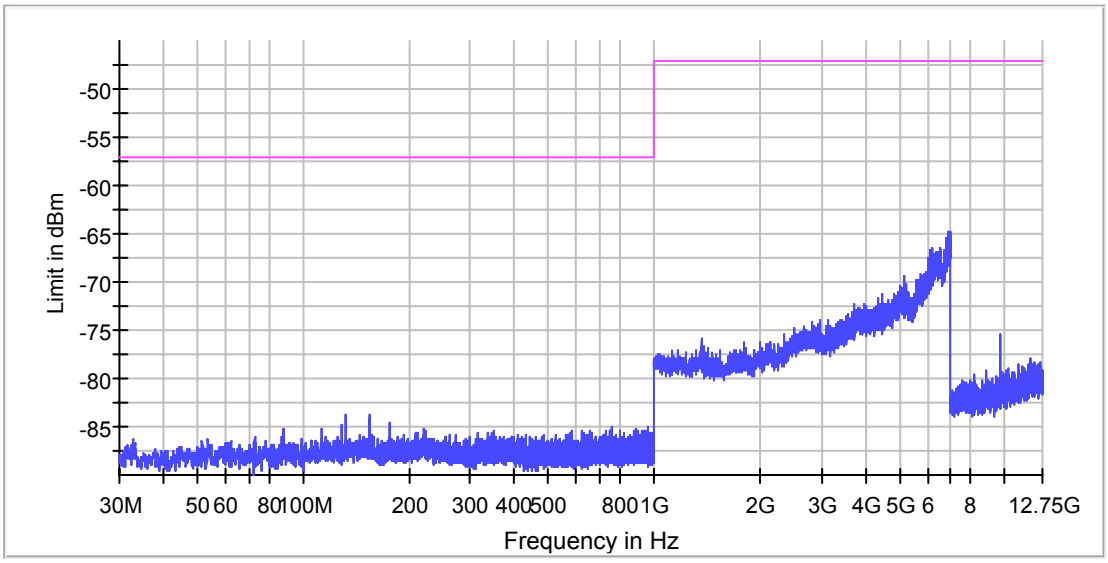
1. Please refer to ETSI EN 300 328 Sub-clause 5.1 for the test conditions.
2. Please refer to ETSI EN 300 328 Sub-clause 5.3.11.2 for the measurement method.

Resolution Bandwidth: 100 kHz (< 1 GHz) / 1 MHz (> 1 GHz)
Video Bandwidth: 300 kHz (< 1 GHz) / 3 MHz (> 1 GHz)
Detector: Peak for prescan/RMS for emission retest

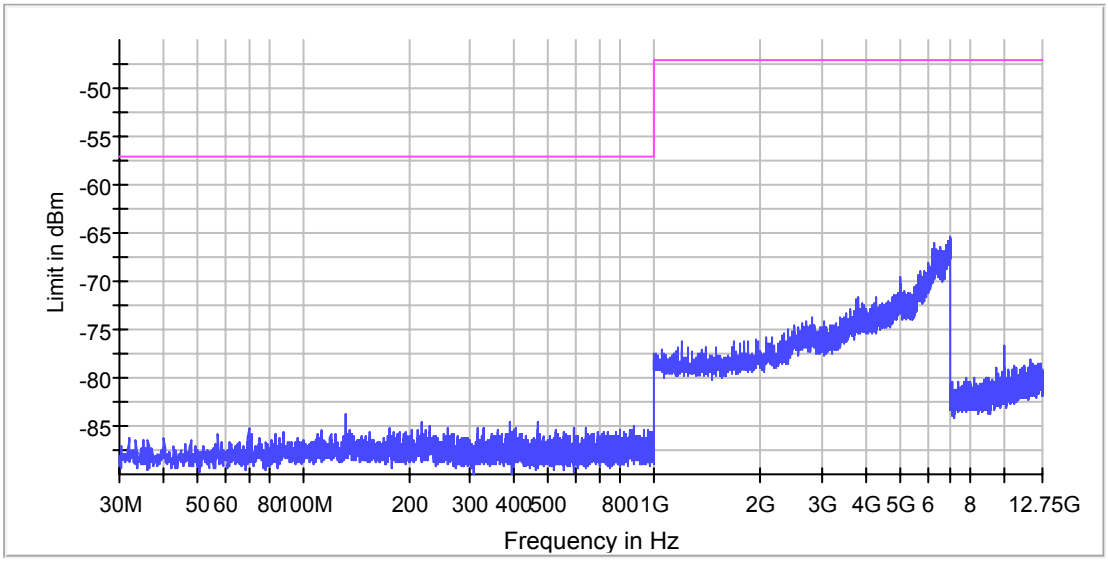
TEST RESULTS

Test Mode	Receive/idle

802.11b



CH01



CH13

Note: The Transmitter spurious emission are performed the each mode, the datum recorded is the worst case for all the mode at 802.11b mode.

5. Test Setup Photos of the EUT

6. External and Internal Photos of the EUT

Reference to the test report No.: TRE1603019101

----------End of Report----------