



## CTC Laboratories, Inc.

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# TEST REPORT

**Report No.** ..... : **CTC20210068E07**

**Applicant** ..... : **XonTel Technology Trd. Co. W.L.L**

Address..... : Kuwait City, Qibla, Aladel Tower, F21, state of Kuwait

Manufacturer..... : XonTel Technology Trd. Co. W.L.L

Address..... : Kuwait City, Qibla, Aladel Tower, F21, state of Kuwait

**Product Name** ..... : **IP Phone**

Trade Mark ..... : XonTel

Model/Type reference..... : XT-40G

Listed Model(s) ..... : N/A

**Standard** ..... : **ETSI EN 300 440 V2.2.1: 2018-07**

Date of receipt of test sample... : Mar. 10, 2020

Date of testing ..... : Mar. 11, 2020 to Mar. 23, 2020

Date of issue..... : Jan. 20, 2021

**Result**..... : **PASS**

Compiled by:

(Printed name+signature)

Terry Su

*Terry Su*

Supervised by:

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Approved by:

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Walter Chen

**Testing Laboratory Name** ..... : **CTC Laboratories, Inc.**

Address..... : 2/F., Building 1 and 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Longhua District, Shenzhen, Guangdong, China

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## 1. TEST SUMMARY

### 1.1. Test Standards

The tests were performed according to following standards:

[ETSI EN 300 440 V2.2.1: 2018-07](#) – Short Range Devices (SRD); Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

### 1.2. Report version

Revised No.	Date of issue	Description
01	Jan. 20, 2021	Original

*Note: Update applicant, manufacturer, trademark and model name, This report is based on the report of CTC20200268E13.*



### 1.3. Test Description

Radio Spectrum Matter (RSM) Part of Transmitter			
Test Item	Test require	Result	Test Engineer
Equivalent isotropic ally radiated power (e.i.r.p.)	Sub-clause 4.2.2	Pass	Ray Luo
Permitted range of operating frequencies	Sub-clause 4.2.3	Pass	Ray Luo
Unwanted emissions in the spurious domain	Sub-clause 4.2.4	Pass	Ray Luo
Duty cycle	Sub-clause 4.2.5	N/A	N/A
Additional requirements for FHSS equipment	Sub-clause 4.2.6	N/A	N/A
Radio Spectrum Matter (RSM) Part of Receiver			
Test Item	Test require	Result	Test Engineer
Adjacent channel selectivity	Sub-clause 4.3.3	Pass	Ray Luo
Blocking or desensitization	Sub-clause 4.3.4	Pass	Ray Luo
Receiver spurious emissions	Sub-clause 4.3.5	Pass	Ray Luo
Spectrum access techniques	Sub-clause 4.4	Pass	Ray Luo

Note:

1. The measurement uncertainty is not included in the test result.
2. N/A: means this test item is not applicable for this device according to the technology characteristic of device.



## 1.4. Test Facility

### Address of the report laboratory

#### CTC Laboratories, Inc.

Add: 2/F., Building 1 and 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Longhua District, Shenzhen, Guangdong, China

### Laboratory accreditation

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

#### CNAS-Lab Code: L5365

CTC Laboratories, Inc. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

#### A2LA-Lab Cert. No.: 4340.01

CTC Laboratories, Inc. 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 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

#### Industry Canada (Registration No.: 9783A, CAB Identifier: CN0029)

CTC Laboratories, Inc. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9783A on Jan, 2016.

#### FCC (Registration No.: 951311, Designation Number CN1208)

CTC Laboratories, Inc. 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 951311, Aug 26, 2017.

## 1.5. 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 compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the CTC Laboratories, Inc. 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.

Below is the best measurement capability for CTC Laboratories, Inc.



Test Items	Measurement Uncertainty	Notes
Maximum transmit power	$\pm 1.5\text{dB}$	(1)
Power Spectral Density	$\pm 1.5\text{dB}$	(1)
Duty Cycle, Tx-sequence, Tx-gap	$\pm 5\%$	(1)
Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	$\pm 5\%$	(1)
Hopping Frequency Separation	$\pm 5\%$	(1)
Medium Utilisation (MU) factor	$\pm 5\%$	(1)
Adaptively	$\pm 5\%$	(1)
Occupied Channel Bandwidth	$\pm 5\%$	(1)
Transmitter unwanted emissions in the out-of-band domain	$\pm 2.8\text{dB}$	(1)
Transmitter unwanted emissions in the spurious domain	$\pm 2.8\text{dB}$	(1)
Receiver spurious emissions	$\pm 2.8\text{dB}$	(1)
Receiver Blocking	$\pm 2.8\text{dB}$	(1)

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



## 1.6. Environmental conditions

Normal Condition	Temperature	15 °C to 35 °C	
	Relative humidity	20 % to 75 %.	
	Voltage	<input checked="" type="checkbox"/> Mains voltage	Nominal mains voltage
		<input type="checkbox"/> Lead-acid battery	1.1 * the nominal voltage of the battery
Extreme Condition	Temperature	<input type="checkbox"/> Other	The normal test voltage shall be that declared by the equipment provider
		<input checked="" type="checkbox"/> The temperature range as declared by the manufacturer	
		<input type="checkbox"/> Temperature category I (General): -20 °C to +55 °C	
		<input type="checkbox"/> Temperature category II (Portable): -10 °C to +55 °C	
		<input type="checkbox"/> Temperature category III (Equipment for normal indoor use): 5 °C to +35 °C	
	Voltage	<input type="checkbox"/> Mains voltage	±10 %* the nominal mains voltage
		<input type="checkbox"/> Lead-acid battery	1,3 and 0,9 multiplied by the nominal voltage of the battery
		<input type="checkbox"/> Leclanché or the lithium battery	Lower extreme voltage: 0.85*the nominal voltage upper extreme voltage: The nominal voltage
		<input type="checkbox"/> Nickel-cadmium battery	Lower extreme voltage: 0.9*the nominal voltage upper extreme voltage: The nominal voltage
		<input checked="" type="checkbox"/> Other	The normal test voltage shall be that declared by the equipment provider

Normal Condition	V <sub>N</sub> =Normal Voltage	AC 230V
	T <sub>N</sub> =Normal Temperature	25 °C
Extreme Condition	V <sub>L</sub> =Lower Voltage	AC 120V
	T <sub>L</sub> =Lower Temperature	-20 °C
	V <sub>H</sub> =Higher Voltage	AC 240V
	T <sub>H</sub> =Higher Temperature	55 °C



## 2. GENERAL INFORMATION

### 2.1. Client Information

Applicant:	XonTel Technology Trd. Co. W.L.L
Address:	Kuwait City, Qibla, Aladel Tower, F21, state of Kuwait
Manufacturer:	XonTel Technology Trd. Co. W.L.L
Address:	Kuwait City, Qibla, Aladel Tower, F21, state of Kuwait





## 2.2. General Description of EUT

Product Name:	IP Phone				
Trade Mark:	XonTel				
Model/Type reference:	XT-40G				
Listed Model(s):	N/A				
Power supply:	5Vdc/2A from AC/DC Adapter Supplied from POE				
Adapter 1 Model:	F12W8-050200SPAV Input: AC100-240V 50/60Hz 0.3A Output:5V/2A				
Adapter 2 Model:	F12W8-050200SPAB Input: AC100-240V 50/60Hz 0.3A Output:5V/2A				
Hardware version:	N/A				
Software version:	N/A				
RF Specification					
Support type:	<input checked="" type="checkbox"/> 802.11a		<input checked="" type="checkbox"/> 802.11n		<input checked="" type="checkbox"/> 802.11ac
Support bandwidth:	802.11a	<input checked="" type="checkbox"/> 20MHz			
	802.11n	<input checked="" type="checkbox"/> 20MHz	<input checked="" type="checkbox"/> 40MHz		
	802.11ac	<input checked="" type="checkbox"/> 20MHz	<input checked="" type="checkbox"/> 40MHz	<input checked="" type="checkbox"/> 80MHz	<input type="checkbox"/> 160MHz
Operation frequency:	<input checked="" type="checkbox"/> Higher Band 5725MHz-5850MHz				
Modulation:	<input checked="" type="checkbox"/> BPSK	<input checked="" type="checkbox"/> QPSK	<input checked="" type="checkbox"/> 16QAM	<input checked="" type="checkbox"/> 64QAM	
Antenna type:	FPC Antenna				
Antenna gain:	2.3dBi				

### Operation Frequency List:

Band (MHz)	20MHz Bandwidth		40MHz Bandwidth		80MHz Bandwidth	
	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
5725MHz-5850MHz	149	5745	151	5755	155	5775
	153	5765				
	157	5785	159	5795		
	161	5805				
	165	5825				



Test channel is below:

Band(MHz)	Test Channel	Frequency		
		20MHz	40MHz	80MHz
5725MHz-5850MHz	CH <sub>L</sub>	5745	5755	-
	CH <sub>M</sub>	5785	-	5775
	CH <sub>H</sub>	5825	5795	-

### 2.3. EUT operation mode

Mode 1	The EUT has been tested under test mode condition. The Applicant provides software to control the EUT for staying in continuous transmitting and receiving mode for testing.
Mode 2	Normal communication for test channel

### 2.4. Measurement Instruments List

Tonscend JS0806-2 Test system						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated until
1	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 28, 2019	Dec. 27, 220
2	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Mar. 16, 2020	Mar. 15, 2021
3	MXG Vector Signal Generator	Agilent	N5182A	MY47420864	Dec. 28, 2019	Dec. 27, 220
4	Signal Generator	Agilent	E8257D	MY46521908	Dec. 28, 2019	Dec. 27, 220
5	Power Sensor	Agilent	U2021XA	MY5365004	Dec. 28, 2019	Dec. 27, 220
6	Power Sensor	Agilent	U2021XA	MY5365006	Dec. 28, 2019	Dec. 27, 220
7	Simultaneous Sampling DAQ	Agilent	U2531A	TW54493510	Dec. 28, 2019	Dec. 27, 220
8	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	116410	Dec. 28, 2019	Dec. 27, 220
9	Climate Chamber	ESPEC	MT3065	/	Dec. 28, 2019	Dec. 27, 220
10	300328 v2.2.2 test system	TONSCEND	v2.6	/	/	/

Transmitter spurious emissions & Receiver spurious emissions						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated until
1	EMI Test Receiver	Rohde & Schwarz	ESCI	100658	Dec. 28, 2019	Dec. 27, 220
2	High pass filter	micro-tranics	HPM50111	142	Dec. 28, 2019	Dec. 27, 220
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Dec. 28, 2019	Dec. 27, 220
4	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25841	Dec. 28, 2019	Dec. 27, 220

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5	Loop Antenna	LAPLAC	RF300	9138	Dec. 28, 2019	Dec. 27, 220
6	Spectrum Analyzer	Rohde & Schwarz	FSU26	100105	Dec. 28, 2019	Dec. 27, 220
7	Horn Antenna	Schwarzbeck	BBHA 9120D	647	Dec. 28, 2019	Dec. 27, 220
8	Pre-Amplifier	HP	8447D	1937A03050	Dec. 28, 2019	Dec. 27, 220
9	Pre-Amplifier	EMCI	EMC05183 5	980075	Dec. 28, 2019	Dec. 27, 220
10	Antenna Mast	UC	UC3000	N/A	N/A	N/A
11	Turn Table	UC	UC3000	N/A	N/A	N/A
12	Cable Below 1GHz	Schwarzbeck	AK9515E	33155	Dec. 28, 2019	Dec. 27, 220
13	Cable Above 1GHz	Hubersuhner	SUCOFLE X102	DA1580	Dec. 28, 2019	Dec. 27, 220

Note: The cable loss has calculated in test result which connection between each test instruments.

### 3. TEST ITEM AND RESULTS

#### 3.1. Equivalent isotropically radiated power (e.i.r.p.)

##### Limit

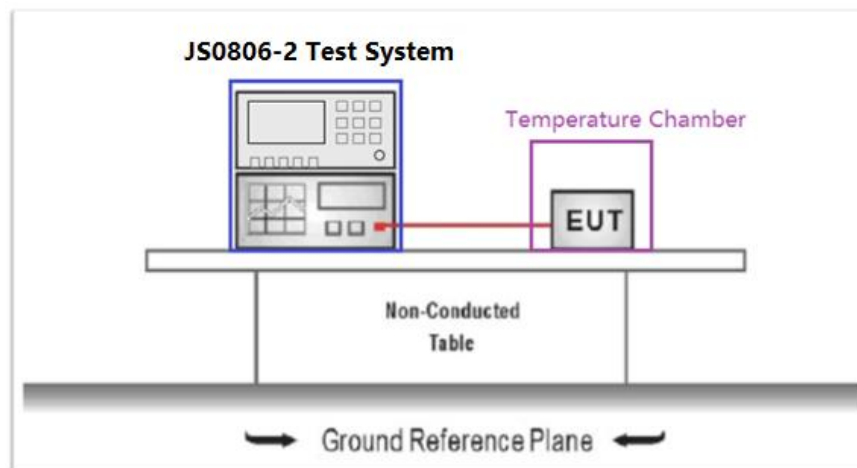
##### ETSI EN 300 440 Sub-clause 4.2.2.4

The transmitter maximum e.i.r.p. under normal and extreme test conditions is provided in table 2.

**Table 2: Maximum radiated power (e.i.r.p.)**

Entry	Frequency Bands	Power	Application	Notes
1	2 400 MHz to 2 483,5 MHz	10 mW e.i.r.p.	Non-specific short range devices	
2	2 400 MHz to 2 483,5 MHz	25 mW e.i.r.p.	Radiodetermination devices	
3	(a) 2 446 MHz to 2 454 MHz	500 mW e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and Annex G
4	(b) 2 446 MHz to 2 454 MHz	4 W e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and Annex G
5	5 725 MHz to 5 875 MHz	25 mW e.i.r.p.	Non-specific short range devices	
6	9 200 MHz to 9 500 MHz	25 mW e.i.r.p.	Radiodetermination devices	
7	9 500 MHz to 9 975 MHz	25 mW e.i.r.p.	Radiodetermination devices	
8	10,5 GHz to 10,6 GHz	500 mW e.i.r.p.	Radiodetermination devices	
9	13,4 GHz to 14,0 GHz	25 mW e.i.r.p.	Radiodetermination devices	
10	17,1 GHz to 17,3 GHz	400 mW e.i.r.p.	Radiodetermination devices	See Annex H
11	24,00 GHz to 24,25 GHz	100 mW e.i.r.p.	Non-specific short range devices and radiodetermination devices	
NOTE: The spectrum ranges in some entries are not harmonised throughout all EU territory, specifically entries 4, 9, and 11 have been identified as such. Implementers are cautioned to refer to CEPT/ERC Recommendation 70-03 [i.2] as well as current National Radio plans to verify acceptance within intended regions of use.				

##### Test Configuration



##### Test Procedure

Please refer to ETSI EN 300 440 Sub-clause 4.2.2.3.2 for the measurement method.

**Test Mode**

Please reference to the section 2.3 mode 1.

**Test Results**

Type	Bandwidth (MHz)	Channel	EIRP	Limit (dBm)	Result
802.11a	20	CH <sub>L</sub>	12.10	14.00	Pass
		CH <sub>M</sub>	11.44		
		CH <sub>H</sub>	11.45		
802.11n	20	CH <sub>L</sub>	12.04	14.00	Pass
		CH <sub>M</sub>	11.93		
		CH <sub>H</sub>	11.15		
	40	CH <sub>L</sub>	11.14	14.00	Pass
		CH <sub>H</sub>	11.38		
802.11ac	20	CH <sub>L</sub>	10.42	14.00	Pass
		CH <sub>M</sub>	10.37		
		CH <sub>H</sub>	9.61		
	40	CH <sub>L</sub>	9.31	14.00	Pass
		CH <sub>H</sub>	8.89		
	80	CH <sub>L</sub>	8.87	14.00	Pass

## 3.2. Permitted range of operating frequencies

### Limit

#### ETSI EN 300 440 Sub-clause 4.2.3.5

The width of the power spectrum envelope is  $f_H - f_L$  for a given operating frequency. In equipment that allows adjustment or selection of different operating frequencies, the power envelope takes up different positions in the allowed band. The frequency range is determined by the lowest value of  $f_L$  and the highest value of  $f_H$  resulting from the adjustment of the equipment to the lowest and highest operating frequencies.

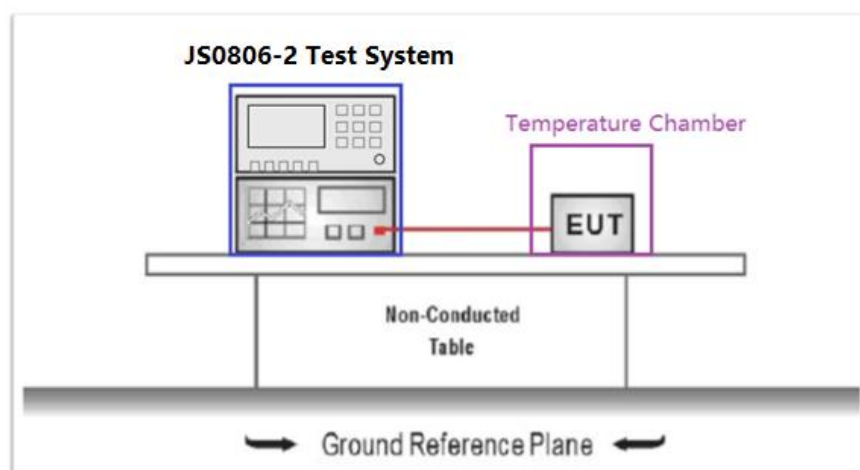
The occupied bandwidth (i.e. the bandwidth in which 99 % of the wanted emission is contained) of the transmitter shall fall within the assigned frequency band.

For all equipment the frequency range shall lie within the frequency band given by clause 4.2.2.4, table 2. For non-harmonized frequency bands the available frequency range may differ between national administrations.

**Table 2: Maximum radiated peak power (e.i.r.p.)**

Frequency Bands	Power	Application	Notes
2 400 MHz to 2 483,5 MHz	10 mW e.i.r.p.	Non-specific short range devices	
2 400 MHz to 2 483,5 MHz	25 mW e.i.r.p.	Radio determination devices	
(a) 2 446 MHz to 2 454 MHz	500 mW e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and annex D
(b) 2 446 MHz to 2 454 MHz	4 W e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and annex D
5 725 MHz to 5 875 MHz	25 mW e.i.r.p.	Non-specific short range devices	
9 200 MHz to 9 500 MHz	25 mW e.i.r.p.	Radio determination devices	
9 500 MHz to 9 975 MHz	25 mW e.i.r.p.	Radio determination devices	
10,5 GHz to 10,6 GHz	500 mW e.i.r.p.	Radio determination devices	
13,4 GHz to 14,0 GHz	25 mW e.i.r.p.	Radio determination devices	
17,1 GHz to 17,3 GHz	400 mW e.i.r.p.	Radio determination devices	See annex F
24,00 GHz to 24,25 GHz	100 mW e.i.r.p.	Non-specific short range devices and Radio determination devices	

### Test Configuration



### Test Procedure

Please refer to ETSI EN 300 440 Sub-clause 4.2.3.3 for the measurement method.

**Test Mode**

Please reference to the section 2.3 mode 1.

**Test Results****Permitted range of operating frequencies**

Mode	Test conditions		Channel	f <sub>L</sub> (MHz)	f <sub>H</sub> (MHz)	Limit	Result
	Temp	Vol					
802.11a	T <sub>N</sub>	V <sub>N</sub>	CH <sub>L</sub>	5745.12	-	f <sub>L</sub> ≥5.725GHz and f <sub>H</sub> ≤5.850GHz	Pass
			CH <sub>H</sub>	-	5825.10		
	T <sub>L</sub>	V <sub>L</sub>	CH <sub>L</sub>	5744.96	-		
			CH <sub>H</sub>	-	5824.99		
		V <sub>H</sub>	CH <sub>L</sub>	5745.02	-		
			CH <sub>H</sub>	-	5825.03		
	T <sub>H</sub>	V <sub>L</sub>	CH <sub>L</sub>	5745.03	-		
			CH <sub>H</sub>	-	5825.02		
		V <sub>H</sub>	CH <sub>L</sub>	5744.99	-		
			CH <sub>H</sub>	-	5825.00		
802.11n 20MHz	T <sub>N</sub>	V <sub>N</sub>	CH <sub>L</sub>	5744.89	-	f <sub>L</sub> ≥5.725GHz and f <sub>H</sub> ≤5.850GHz	Pass
			CH <sub>H</sub>	-	5825.11		
	T <sub>L</sub>	V <sub>L</sub>	CH <sub>L</sub>	5744.86	-		
			CH <sub>H</sub>	-	5825.12		
		V <sub>H</sub>	CH <sub>L</sub>	5745.02	-		
			CH <sub>H</sub>	-	5824.96		
	T <sub>H</sub>	V <sub>L</sub>	CH <sub>L</sub>	5745.03	-		
			CH <sub>H</sub>	-	5824.99		
		V <sub>H</sub>	CH <sub>L</sub>	5745.00	-		
			CH <sub>H</sub>	-	5825.03		
802.11ac 20MHz	T <sub>N</sub>	V <sub>N</sub>	CH <sub>L</sub>	5745.01	-	f <sub>L</sub> ≥5.725GHz and f <sub>H</sub> ≤5.850GHz	Pass
			CH <sub>H</sub>	-	5825.62		
	T <sub>L</sub>	V <sub>L</sub>	CH <sub>L</sub>	5745.00	-		
			CH <sub>H</sub>	-	5825.44		
		V <sub>H</sub>	CH <sub>L</sub>	5745.04	-		
			CH <sub>H</sub>	-	5824.86		
	T <sub>H</sub>	V <sub>L</sub>	CH <sub>L</sub>	5744.68	-		
			CH <sub>H</sub>	-	5825.11		

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		$V_H$	$CH_L$	5744.87	-		
			$CH_H$	-	5824.78		
802.11n 40MHz	$T_N$	$V_N$	$CH_L$	5754.88	-	$f_L \geq 5.725\text{GHz}$ and $f_H \leq 5.850\text{GHz}$	Pass
			$CH_H$	-	5795.02		
	$T_L$	$V_L$	$CH_L$	5755.12	-		
			$CH_H$	-	5794.89		
		$V_H$	$CH_L$	5755.03	-		
			$CH_H$	-	5794.85		
	$T_H$	$V_L$	$CH_L$	5755.06	-		
			$CH_H$	-	5795.13		
		$V_H$	$CH_L$	5754.86	-		
			$CH_H$	-	5795.02		
802.11ac 40MHz	$T_N$	$V_N$	$CH_L$	5755.11	-	$f_L \geq 5.725\text{GHz}$ and $f_H \leq 5.850\text{GHz}$	Pass
			$CH_H$	-	5794.95		
	$T_L$	$V_L$	$CH_L$	5755.10	-		
			$CH_H$	-	5795.32		
		$V_H$	$CH_L$	5755.03	-		
			$CH_H$	-	5795.16		
	$T_H$	$V_L$	$CH_L$	5754.87	-		
			$CH_H$	-	5794.86		
		$V_H$	$CH_L$	5754.96	-		
			$CH_H$	-	5794.79		
802.11ac 80MHz	$T_N$	$V_N$	$CH_L$	5775.12	-	$f_L \geq 5.725\text{GHz}$ and $f_H \leq 5.850\text{GHz}$	Pass
	$T_L$	$V_L$	$CH_L$	5775.13	-		
		$V_H$	$CH_L$	5775.06	-		
	$T_H$	$V_L$	$CH_L$	5775.11	-		
		$V_H$	$CH_L$	5774.96	-		



**99% Occupied bandwidth**

Mode	Channel	Occupied bandwidth (MHz)	$f_L$ (MHz)	$f_H$ (MHz)	Limit	Result
802.11a	CH <sub>L</sub>	16.413	5736.7560	5753.1690	$f_L \geq 5.725\text{GHz}$ and $f_H \leq 5.850\text{GHz}$	Pass
	CH <sub>H</sub>	16.453	5816.7360	5833.1890		
802.11n 20MHz	CH <sub>L</sub>	17.668	5736.1311	5753.7989	$f_L \geq 5.725\text{GHz}$ and $f_H \leq 5.850\text{GHz}$	Pass
	CH <sub>H</sub>	17.703	5816.1211	5833.8239		
802.11ac 20MHz	CH <sub>L</sub>	17.683	5736.1211	5753.8039	$f_L \geq 5.725\text{GHz}$ and $f_H \leq 5.850\text{GHz}$	Pass
	CH <sub>H</sub>	17.688	5816.1211	5833.8089		
802.11n 40MHz	CH <sub>L</sub>	36.225	5736.8523	5773.0777	$f_L \geq 5.725\text{GHz}$ and $f_H \leq 5.850\text{GHz}$	Pass
	CH <sub>H</sub>	36.265	5776.8423	5813.1077		
802.11ac 40MHz	CH <sub>L</sub>	36.395	5736.7623	5773.1577	$f_L \geq 5.725\text{GHz}$ and $f_H \leq 5.850\text{GHz}$	Pass
	CH <sub>H</sub>	36.405	5776.7623	5813.1677		
802.11ac 80MHz	CH <sub>L</sub>	86.329	5732.3853	5818.7145	$f_L \geq 5.725\text{GHz}$ and $f_H \leq 5.850\text{GHz}$	Pass

### 3.3. Unwanted emissions in the spurious domain

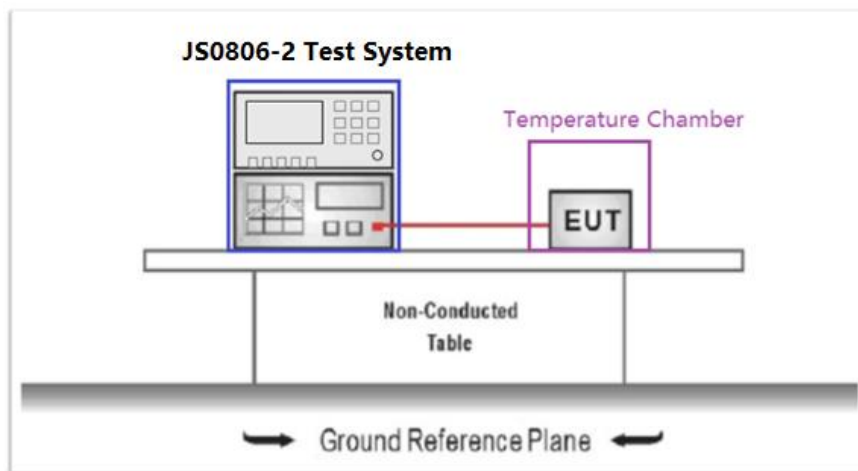
#### Limit

##### ETSI EN 300 440 Sub-clause 4.2.4.4

The maximum power limits of any unwanted emissions in the spurious domain are given in the below table

State	47MHz to 74MHz 87.5 to 118MHz 174MHz to 230MHz 470MHz to 862MHz	Other frequencies $\leq$ 1000MHz	Frequencies $>$ 1000MHz
Operating	4nW / -54dBm	250nW / -36dBm	1 $\mu$ W / -30dBm
Standby	2nW / -57dBm	2nW / -57dBm	20nW / -47dBm

#### Test Configuration



#### Test Procedure

Please refer to ETSI EN 300 440 Sub-clause 4.2.4.3.1 for the measurement method.

#### Test Mode

Please reference to the section 2.3 mode 1.

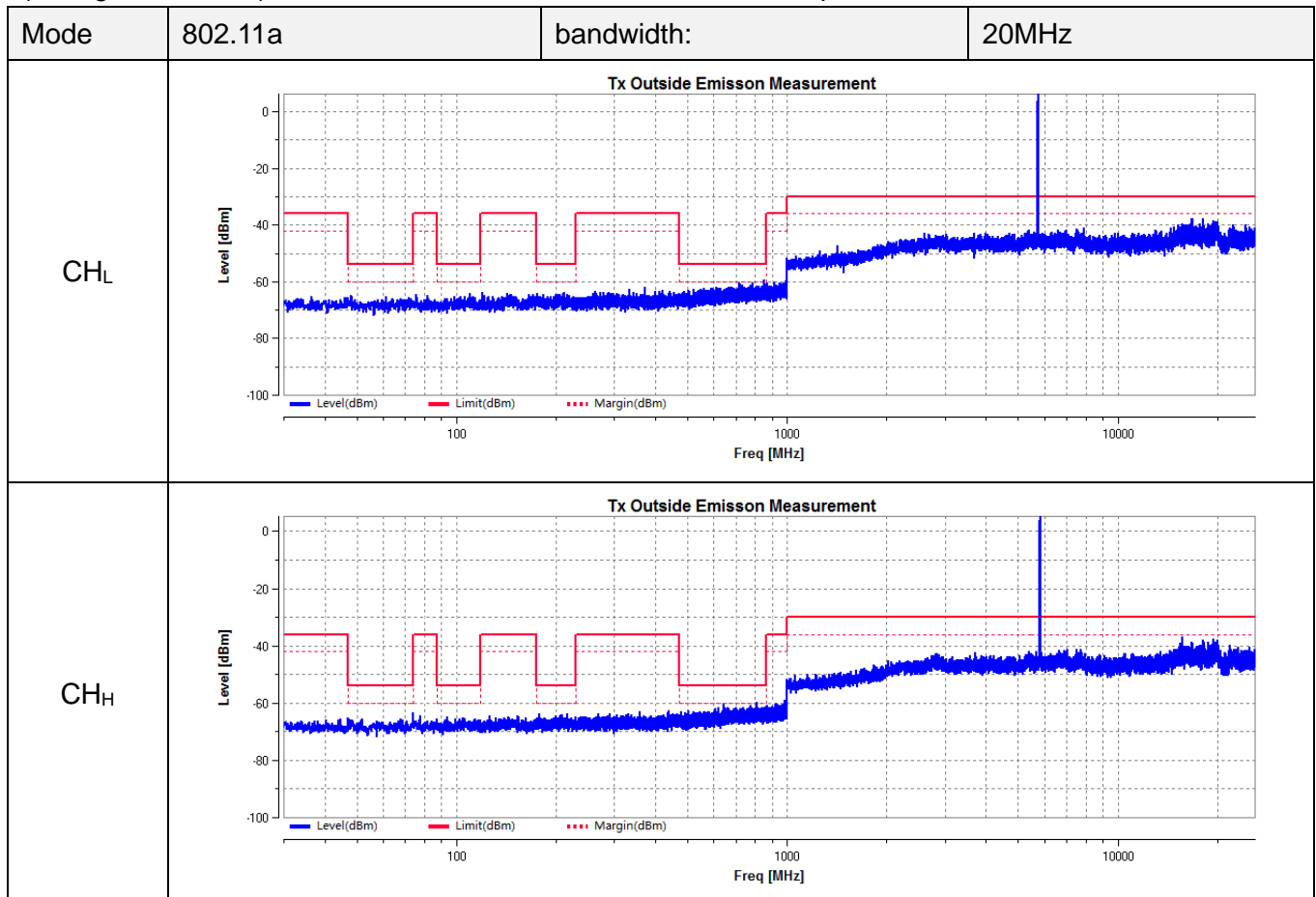
**Test Result**

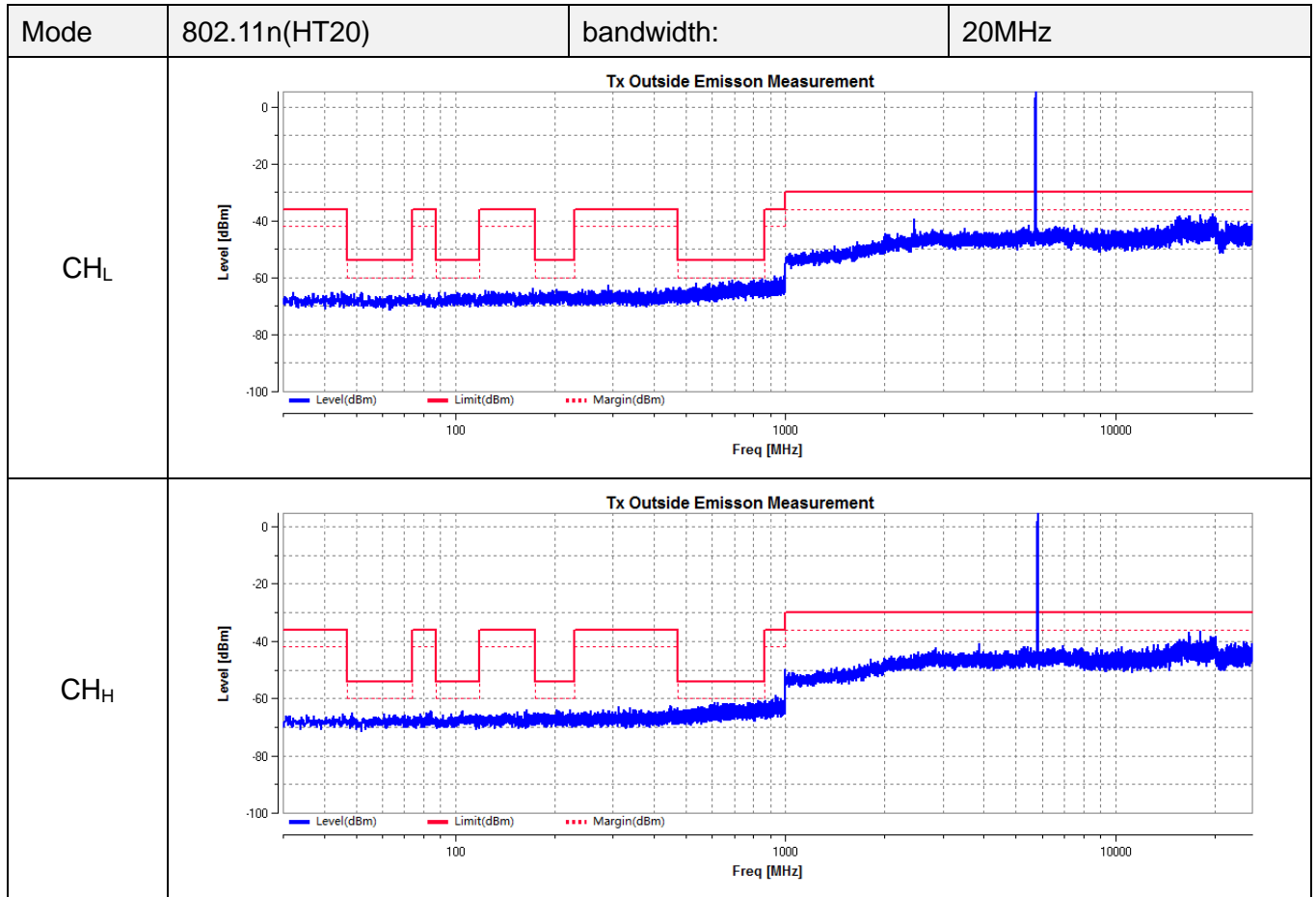
Note: 1. Pre-scan all of 802.11a, 802.11n (HT20), 802.11n (HT40), 802.11ac (HT20), 802.11ac (HT40), 802.11ac (HT80) mode, and found the 20MHz mode which were the worst case, so only show the test data for worst case.

2. The signal which over the limit is the main wave signal.

3. 12.75GHz ~ 40GHz (10 times the carrier frequency)

The EUT was pre-scanned the frequency band (12.75GHz~40GHz), found the radiated level (Background noise) lower than the limit, so don't show on the report.







Mode	802.11ac(HT20)	bandwidth:	20MHz
CH <sub>L</sub>	<p>Tx Outside Emission Measurement</p> <p>Level [dBm]</p> <p>Freq [MHz]</p> <p>Level(dBm) Limit(dBm) Margin(dBm)</p>		
CH <sub>H</sub>	<p>Tx Outside Emission Measurement</p> <p>Level [dBm]</p> <p>Freq [MHz]</p> <p>Level(dBm) Limit(dBm) Margin(dBm)</p>		

### 3.4. Transmitter unwanted emissions in the spurious domain-Radiated measurements

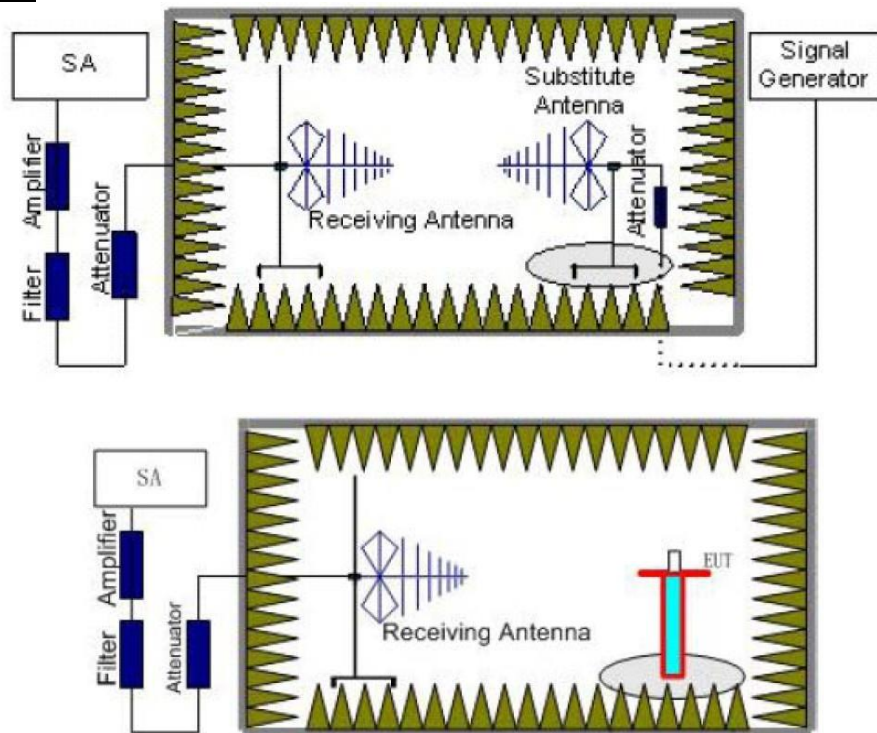
#### Limit

#### ETSI EN 300 440 Sub-clause 4.2.4.4

The transmitter unwanted emissions in the spurious domain shall not exceed the values given in the below table

Frequency range	Maximum power	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz 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

Please refer to ETSI EN 301 893 Sub-clause 5.4.5.2.1 for the measurement method.

#### Test Mode

Continuous transmitting.

#### Test Result

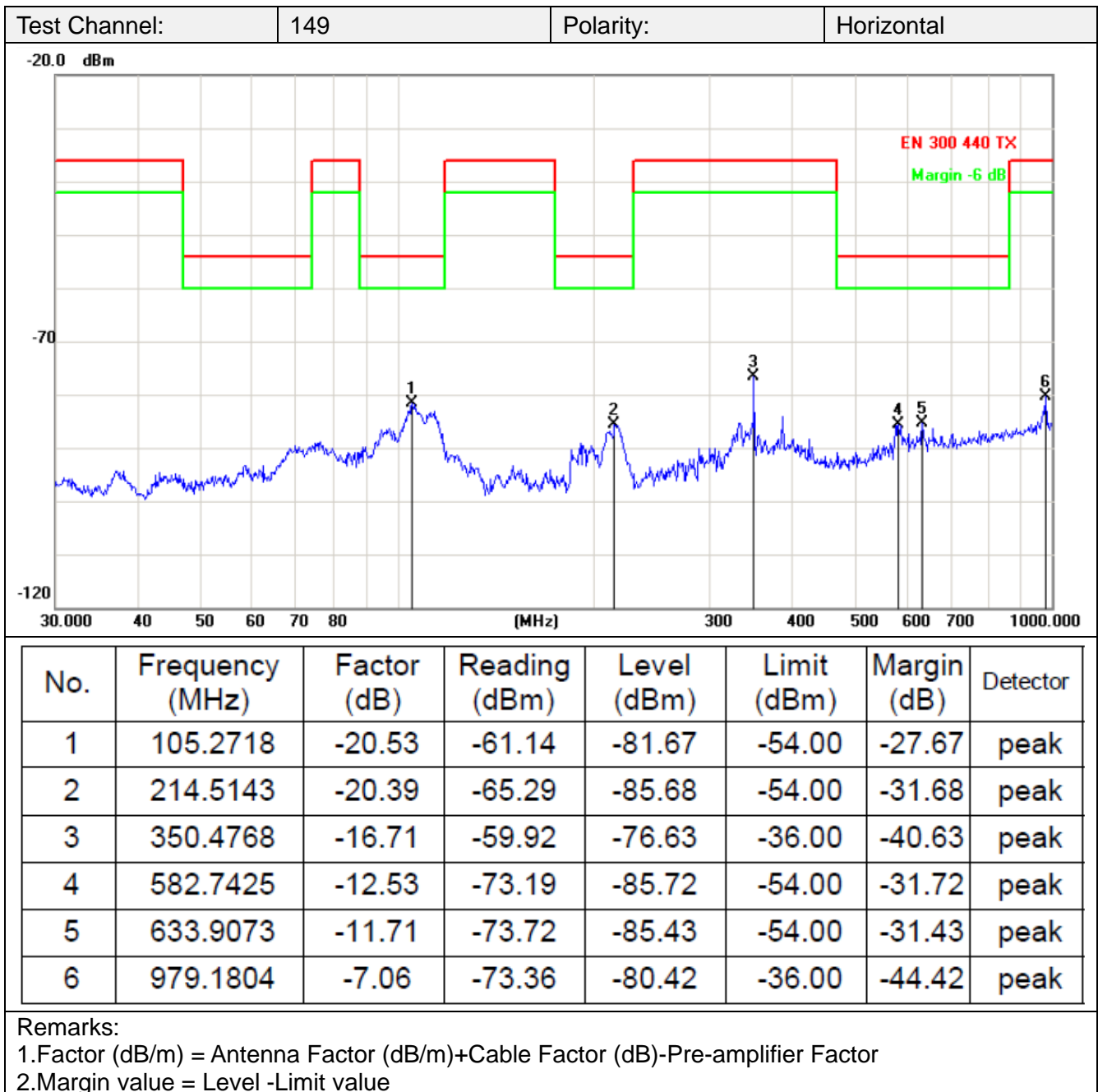
Note:

1. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "Z axis" position was the worst, and test data recorded in this report.
2. Pre-scan all bandwidth found the 20MHz CH100 which it is worse case, so only show the test data for worse case.
3. 12.75GHz ~ 40GHz(10 times the carrier frequency)

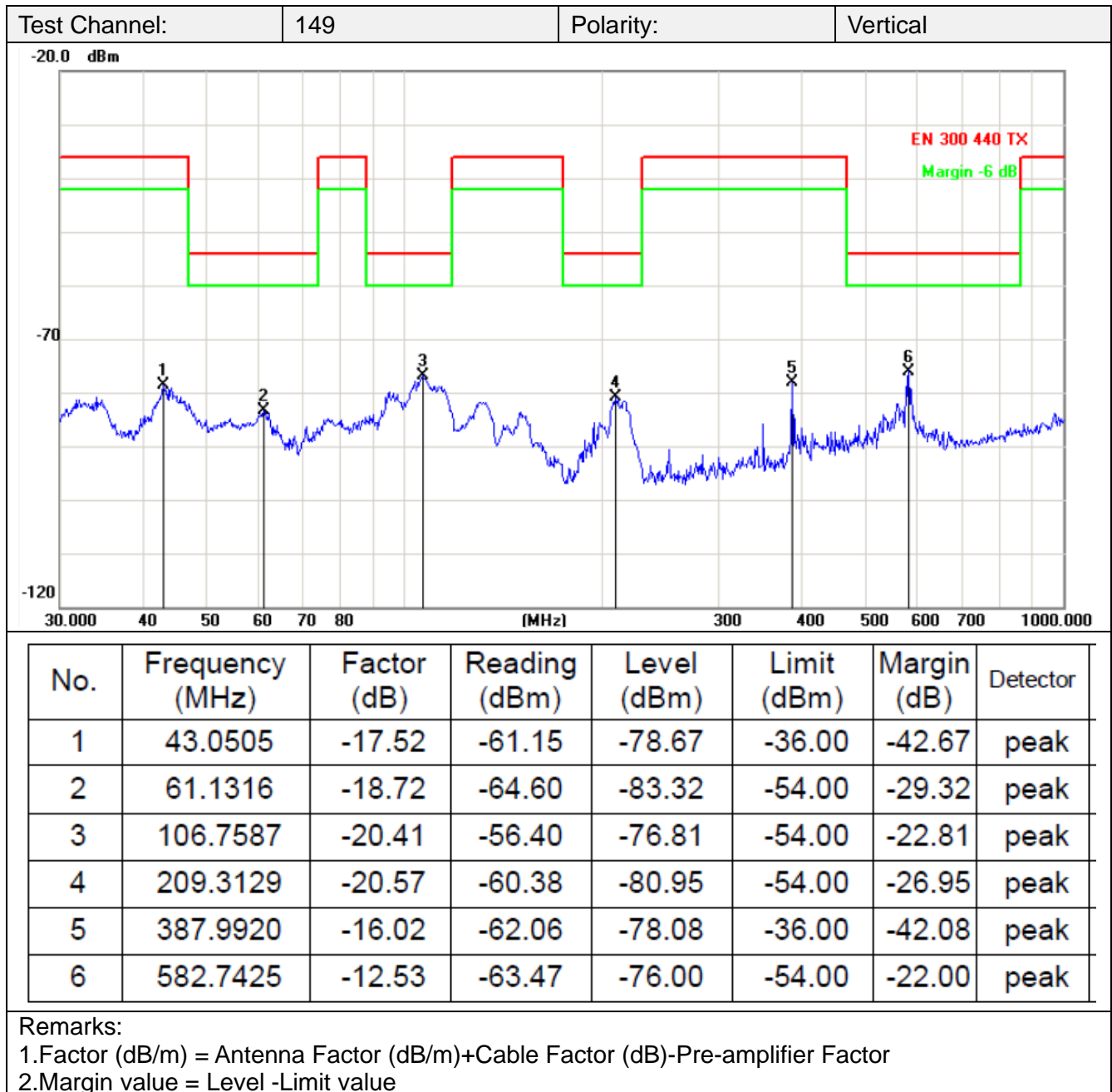


The EUT was pre-scanned the frequency band (12.75GHz~40GHz), found the radiated level (Background noise) lower than the limit, so don't show on the report.

### (1) Below 1G



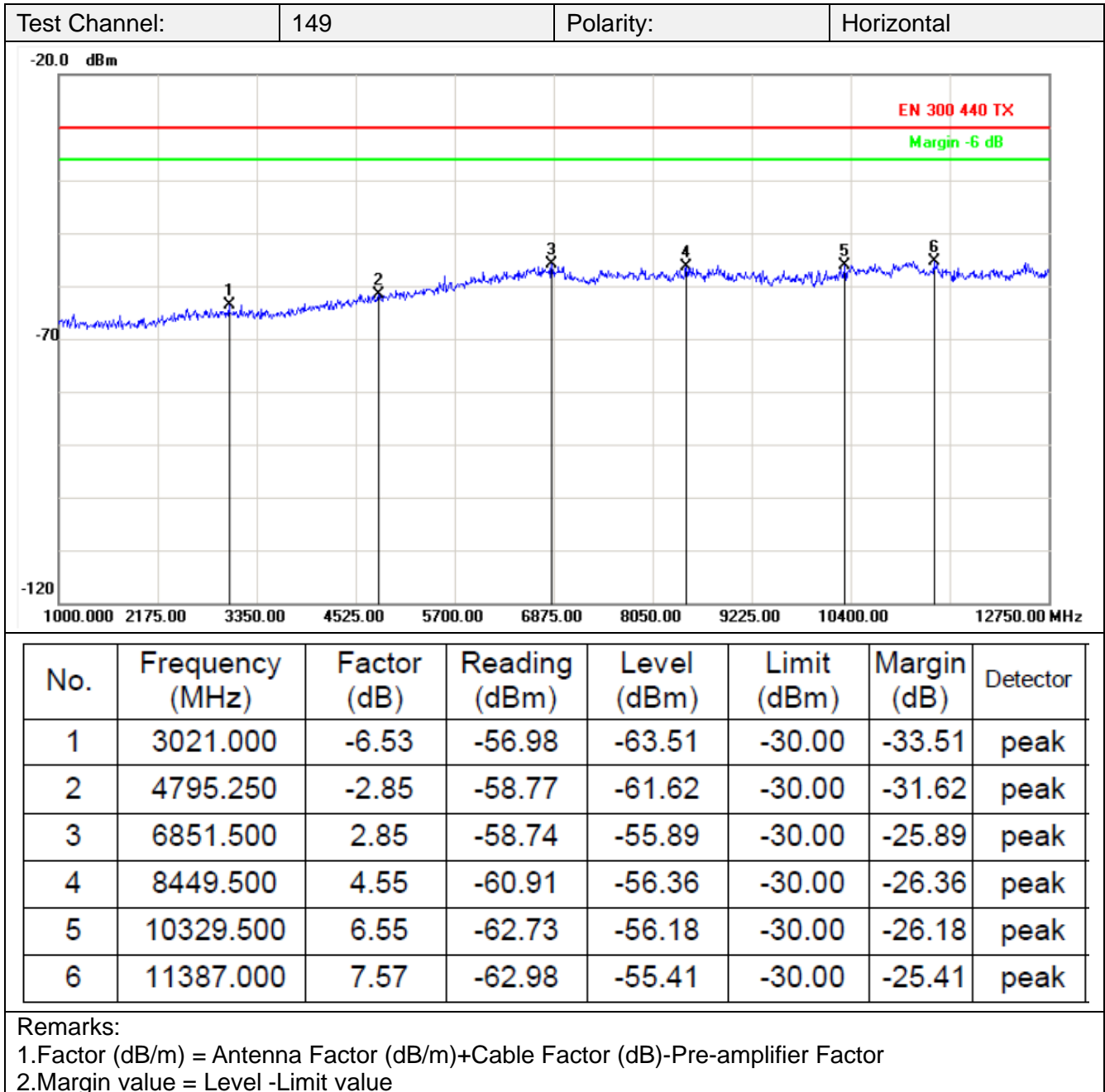


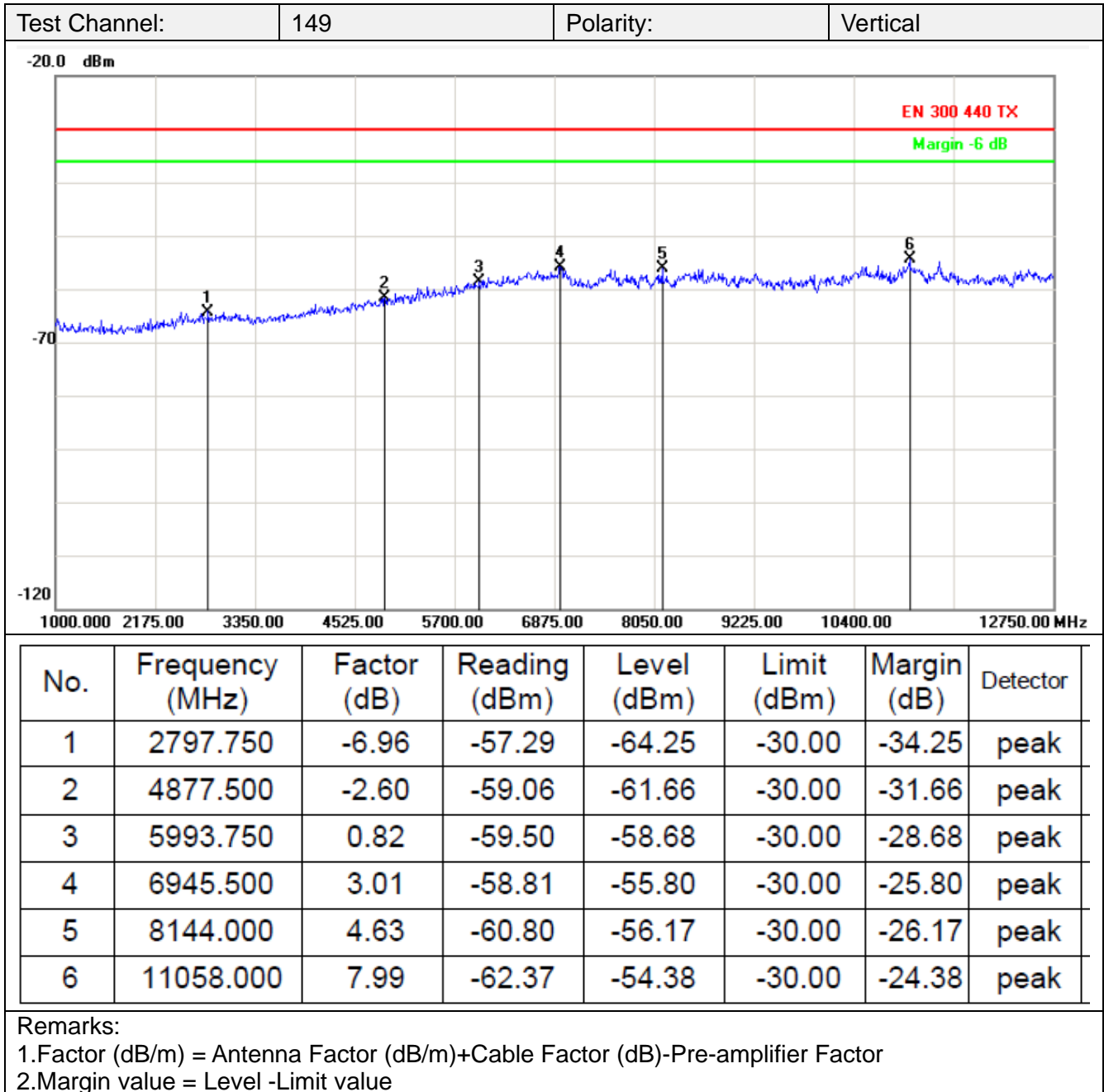






## (2) Above 1G





### 3.5. Duty Cycle

#### Limit

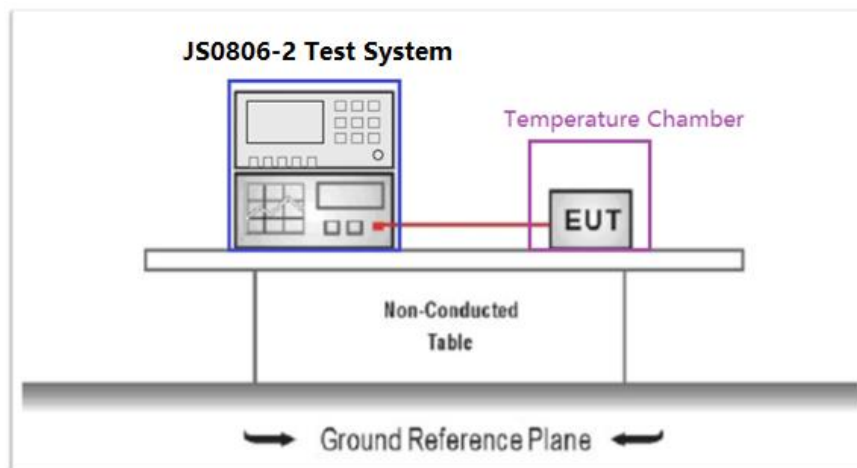
#### ETSI EN 300 440 Sub-clause 4.2.5.4

Table 4 defines the maximum duty cycle within a 1 hour period.

Table 4: Duty cycle limits

Frequency Band	Duty cycle	Application	Notes
2 400 MHz to 2 483,5 MHz	No Restriction	Generic use	
2 400 MHz to 2 483,5 MHz	No Restriction	Detection, movement and alert applications	
(a) 2 446 MHz to 2 454 MHz	No Restriction	RFID	Limits shown in annex D shall apply
(b) 2 446 MHz to 2 454 MHz	≤ 15 %	RFID	Limits shown in annex D shall apply
5 725 MHz to 5 875 MHz	No Restriction	Generic use	
9 200 MHz to 9 500 MHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
9 500 MHz to 9 975 MHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
10,5 GHz to 10,6 GHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
13,4 GHz to 14,0 GHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
17,1 GHz to 17,3 GHz	DAA or equivalent techniques	Radiodetermination: GBSAR detecting and movement and alert applications	Limits shown in annex F shall apply
24,00 GHz to 24,25 GHz	No Restriction	Generic use and for Radiodetermination: radar, detection, movement and alert applications	

#### Test Configuration



#### Test Procedure

Please refer to ETSI EN 300 440 Sub-clause 4.2.5.3 for the measurement method.

#### Test Mode

Please reference to the section 2.3 mode 1.



**Test Result**

☒ Not Applicable



### 3.6. Receiver category

The product family of short range radio devices is divided into three receiver categories, see table 5, each having a set of relevant receiver requirements and minimum performance criteria. The set of receiver requirements depends on the choice of receiver category by the equipment manufacturer.

Table 5: Receiver categories

Receiver category	Relevant receiver clauses	Risk assessment of receiver performance
1	4.3.3, 4.3.4 and 4.3.5	Highly reliable SRD communication media: e.g. serving human life inherent systems (may result in a physical risk to a person).
2	4.3.4 and 4.3.5	Medium reliable SRD communication media e.g. causing inconvenience to persons, which cannot simply be overcome by other means.
3	4.3.5	Standard reliable SRD communication media e.g. Inconvenience to persons, which can simply be overcome by other means (e.g. manual).

The product is belong to receiver category 2 by the manufacturer declare.

### 3.7. Adjacent channel selectivity

#### Limit

##### ETSI EN 300 440 Sub-clause 4.3.3.4

The adjacent channel selectivity of the equipment under specified conditions shall not be less than  $-30 \text{ dBm} + k$ .

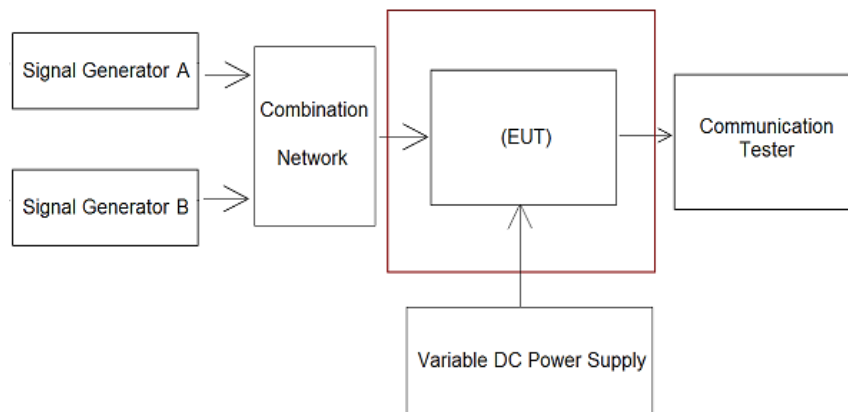
Receiver category	Limit
1	$\geq -30 \text{ dBm} + k$
2	No Limit
3	No Limit

The correction factor,  $k$ , is as follows:  $k = -20 \log f - 10 \log BW$

Where:

- $f$  is the frequency in GHz;
- $BW$  is the channel bandwidth in MHz.

#### Test Configuration



#### Test Procedure

Please refer to ETSI EN 300 440 Sub-clause 4.3.3.3 for the measurement method.

#### Test Mode

Please reference to the section 2.3 mode 2.

#### Test Result

☒ Not Applicable

### 3.8. Blocking or desensitization

#### Limit

##### ETSI EN 300 440 Sub-clause 4.3.4.4

The blocking level, for any frequency within the specified ranges, shall not be less than the values given in table, except at frequencies on which spurious responses are found.

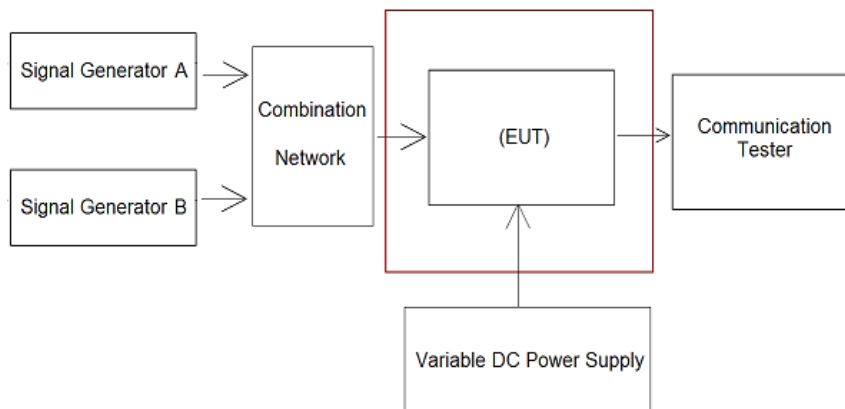
Receiver category	Limit
1	$\geq -30 \text{ dBm} + k$
2	$\geq -45 \text{ dBm} + k$
3	No Limit

The correction factor,  $k$ , is as follows:  $k = -20 \log f - 10 \log BW$

Where:

- $f$  is the frequency in GHz;
- $BW$  is the channel bandwidth in MHz.

#### Test Configuration



#### Test Procedure

Please refer to ETSI EN 300 440 Sub-clause 4.3.4.3 for the measurement method.

#### Test Mode

Please reference to the section 2.3 mode 2.

**Test Result**

Type	Bandwidth (MHz)	Test Frequency (GHz)	K (correction factor)	Blocking Frequency(MHz)	Blocking Level(dBm)	Limit (dB)	Result
802.11a	20	CH <sub>L</sub>	-28.20	6745	-15.61	-58.20	Pass
				6145	-25.36		
				5945	-34.26		
				5545	-26.35		
				5345	-24.44		
				4745	-12.63		
		CH <sub>M</sub>	-28.26	6785	-11.62	-58.26	
				6185	-27.21		
				5985	-17.15		
				5585	-37.65		
				5385	-21.63		
				4785	-13.62		
		CH <sub>H</sub>	-28.32	6825	-14.26	-58.32	
				6225	-19.62		
				6025	-25.62		
				5625	-27.25		
				5425	-27.62		
				4825	-15.62		
802.11n	20	CH <sub>L</sub>	-28.20	6745	-14.12	-58.20	Pass
				6145	-19.63		
				5945	-24.15		
				5545	-29.63		
				5345	-14.58		
				4745	-25.62		
		CH <sub>M</sub>	-28.26	6785	-21.48	-58.26	
				6185	-19.63		
				5985	-24.15		
				5585	-29.62		
				5385	-25.15		
				4785	-10.26		
		CH <sub>H</sub>	-28.32	6825	-11.63	-58.32	
				6225	-15.15		
				6025	-36.21		
				5625	-31.02		
				5425	-19.62		
				4825	-10.25		
	40	CH <sub>L</sub>	-31.22	7755	-14.62	-61.22	Pass
				6555	-15.62		
				6155	-11.52		
				5355	-37.34		
				4955	-17.36		
				3755	-18.26		

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		CH <sub>H</sub>	-31.28	7795	-10.36	-61.28	
				6595	-12.16		
				6195	-22.63		
				5395	-14.26		
				4995	-16.96		
				3795	-10.16		
802.11ac	20	CH <sub>L</sub>	-28.20	6745	-16.26	-58.20	Pass
				6145	-16.36		
				5945	-27.25		
				5545	-26.65		
				5345	-17.15		
				4745	-31.02		
		CH <sub>M</sub>	-28.26	6785	-11.26	-58.26	
				6185	-11.63		
				5985	-15.26		
				5585	-21.63		
				5385	-14.62		
				4785	-10.26		
		CH <sub>H</sub>	-28.32	6825	-12.63	-58.32	
				6225	-14.26		
				6025	-25.63		
				5625	-31.25		
				5425	-16.26		
				4825	-12.63		
	40	CH <sub>L</sub>	-31.22	7755	-13.26	-61.22	
				6555	-14.96		
				6155	-26.21		
				5355	-26.47		
				4955	-19.63		
				3755	-11.47		
CH <sub>H</sub>		-31.28	7795	-17.96	-61.28		
			6595	-26.23			
			6195	-22.36			
			5395	-15.23			
			4995	-19.62			
			3795	-15.63			
80		CH <sub>L</sub>	34.26	9775	-25.63	-64.26	Pass
				7375	-26.47		
				6575	-24.96		
				4975	-25.15		
	4175			-14.12			
	1775			-12.96			

Test Signal Generator A= -76.65dBm; The Bandwidth declared by the manufacturer.

Test Signal Generator A= -76.65dBm; The Bandwidth declared by the manufacturer.

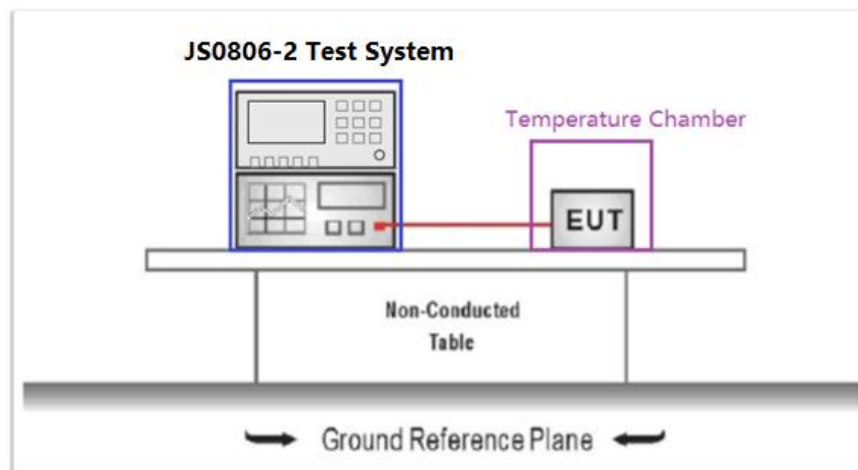
### 3.9. Receiver spurious radiation

#### LIMIT

##### ETSI EN 300 440 Sub-clause 4.3.5.4

Frequency range	Level
25MHz to 1000MHz	2 nW / -57dBm
Above 1000MHz	20 nW / -47dBm

#### Test Configuration



#### Test Procedure

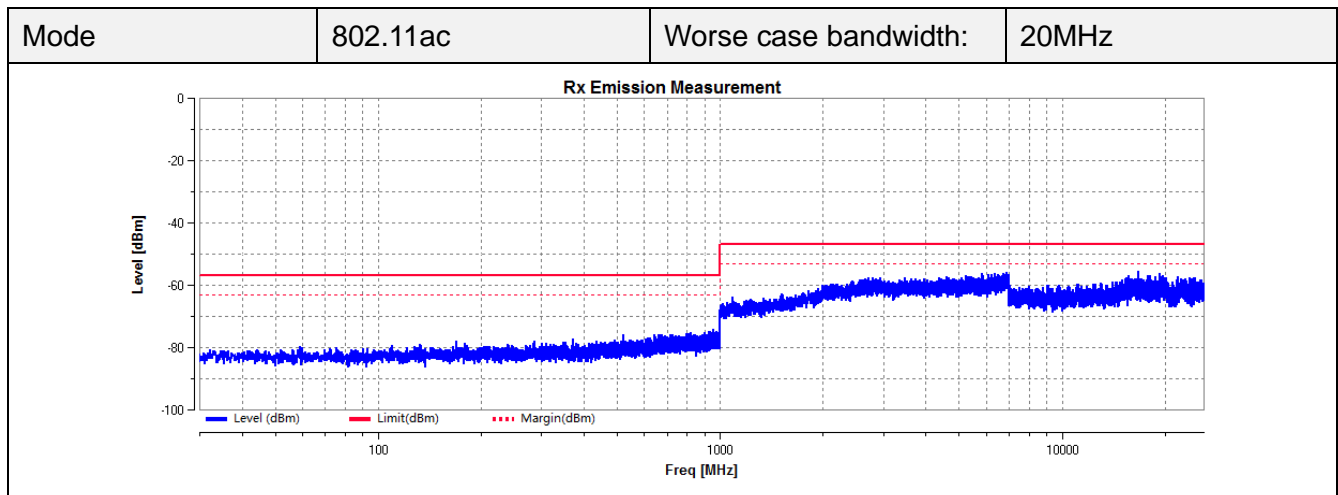
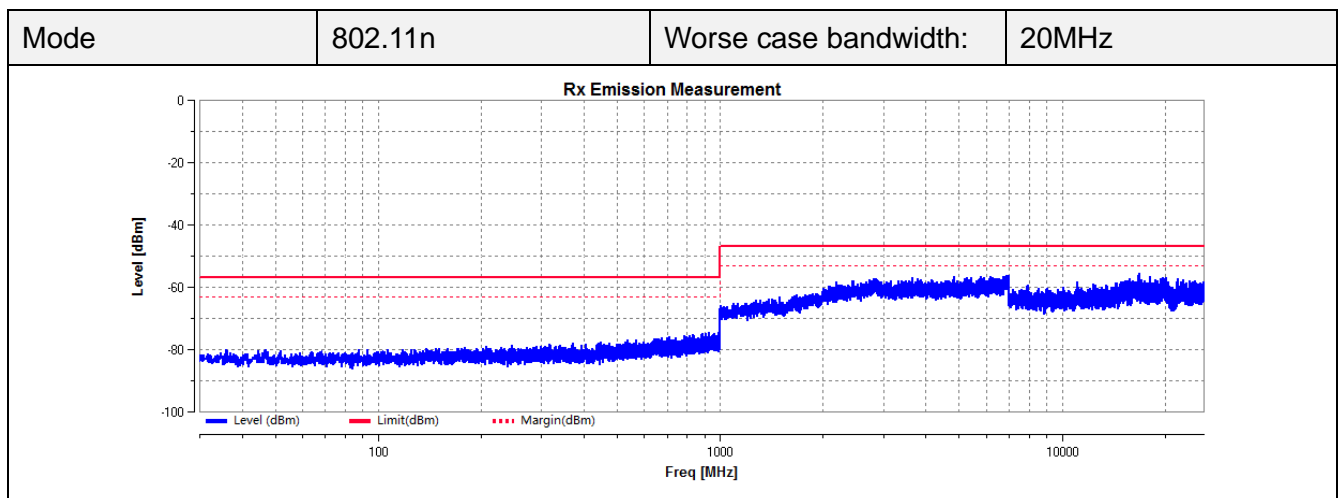
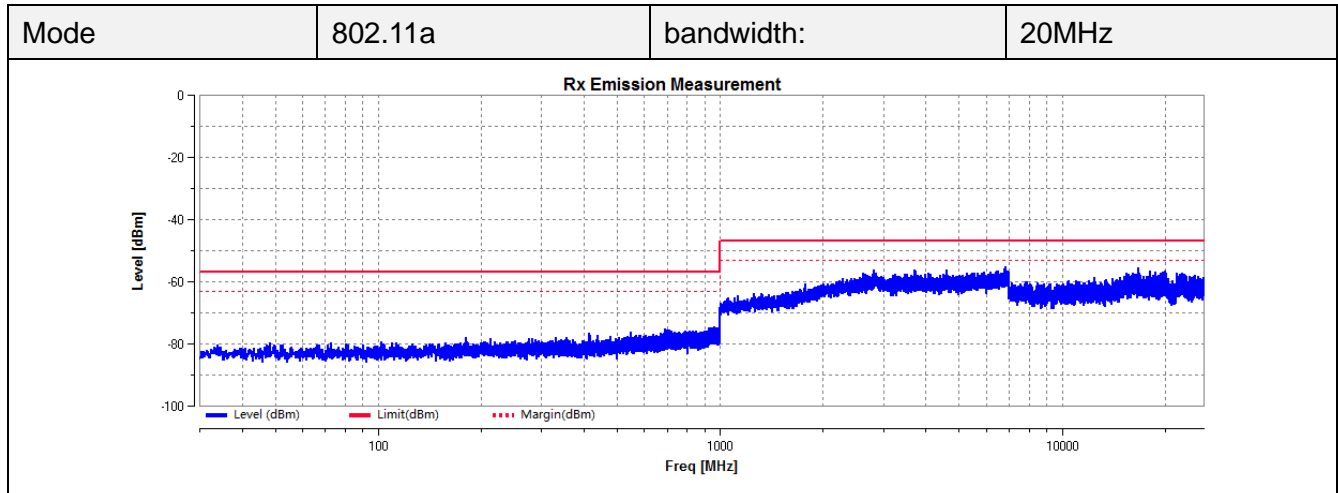
Please refer to ETSI EN 300 440 Sub-clause 4.3.5.3.1 for the measurement method.

#### Test Mode

Please reference to the section 2.3 mode 1.

#### Test Result

Note: Pre-scan all of 802.11a, 802.11n (HT20), 802.11n(HT40), 802.11ac(HT20), 802.11ac(HT40), 802.11ac (HT80) mode, and found the 20MHz mode which were the worst case, so only show the test data for worst case.



### 3.10. Receiver spurious emissions-Radiated measurements

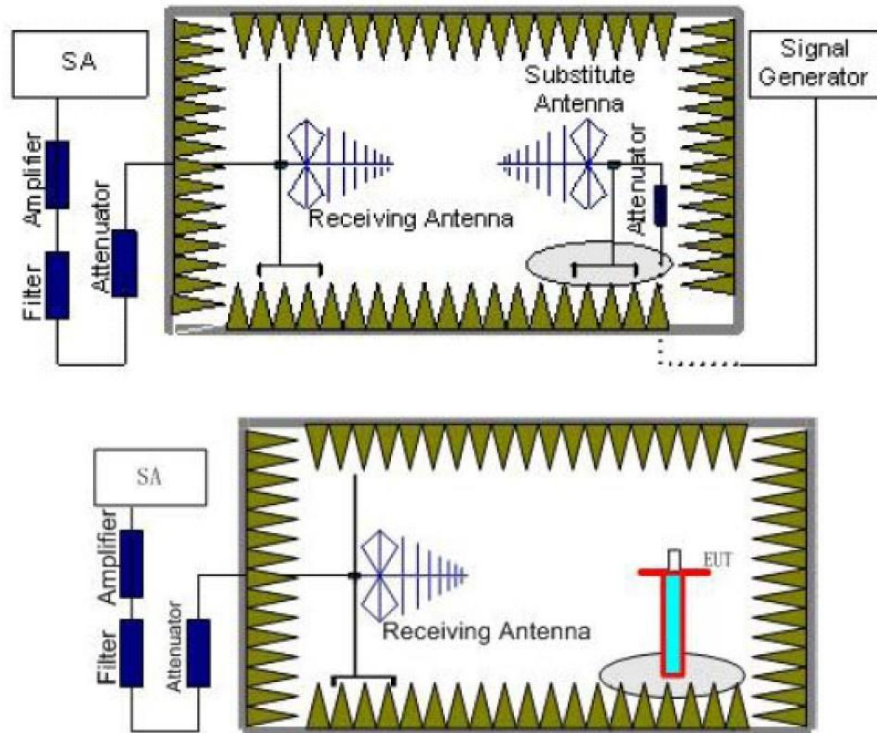
#### Limit

#### ETSI EN 300 440 Sub-clause 4.3.5.4

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

Frequency range	Maximum power	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

Please refer to ETSI EN 301 893 Sub-clause 5.4.6.2.1 for the measurement method.

#### Test Mode

Continuous receiving.

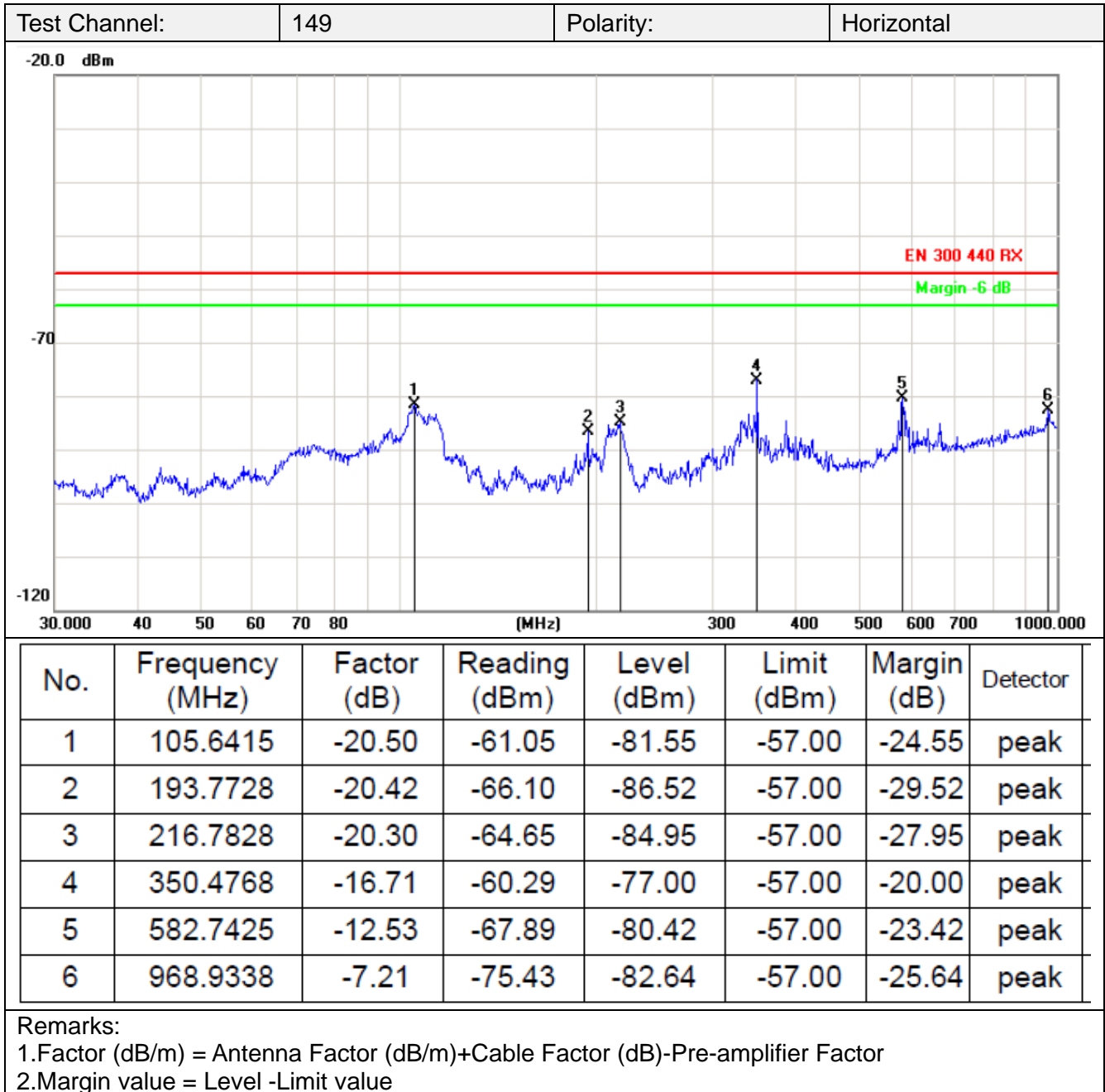
#### Test Result

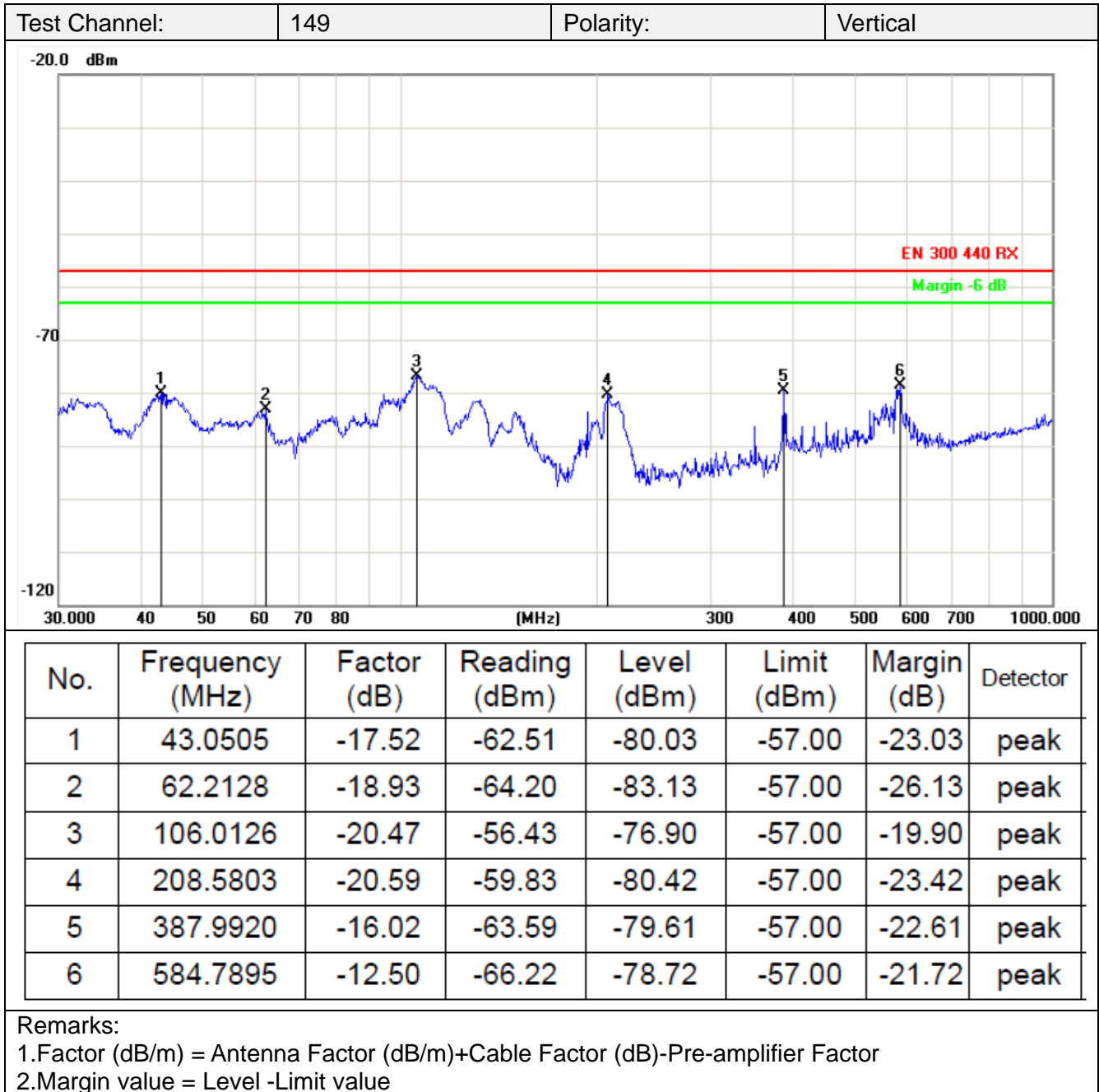
Note:

1. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "Z axis" position was the worst, and test data recorded in this report.
2. Pre-scan all bandwidth found the 20MHz CH100 which it is worse case, so only show the test data for worse case.
3. 18GHz ~ 26GHz(5 times the carrier frequency)  
The EUT was pre-scanned the frequency band (18GHz~26GHz), found the radiated level (Background noise) lower than the limit, so don't show on the report.



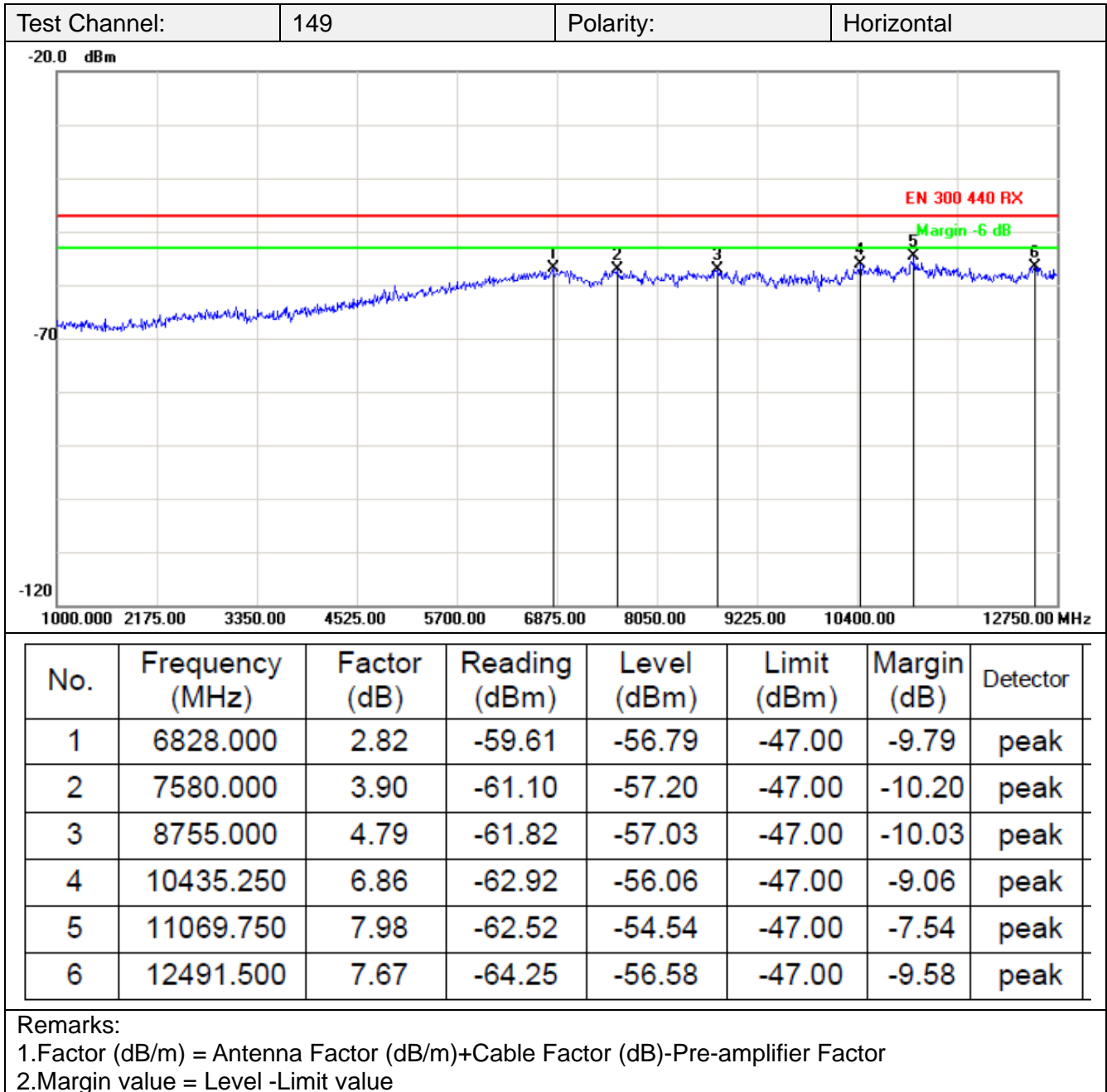
## (1) Below 1G



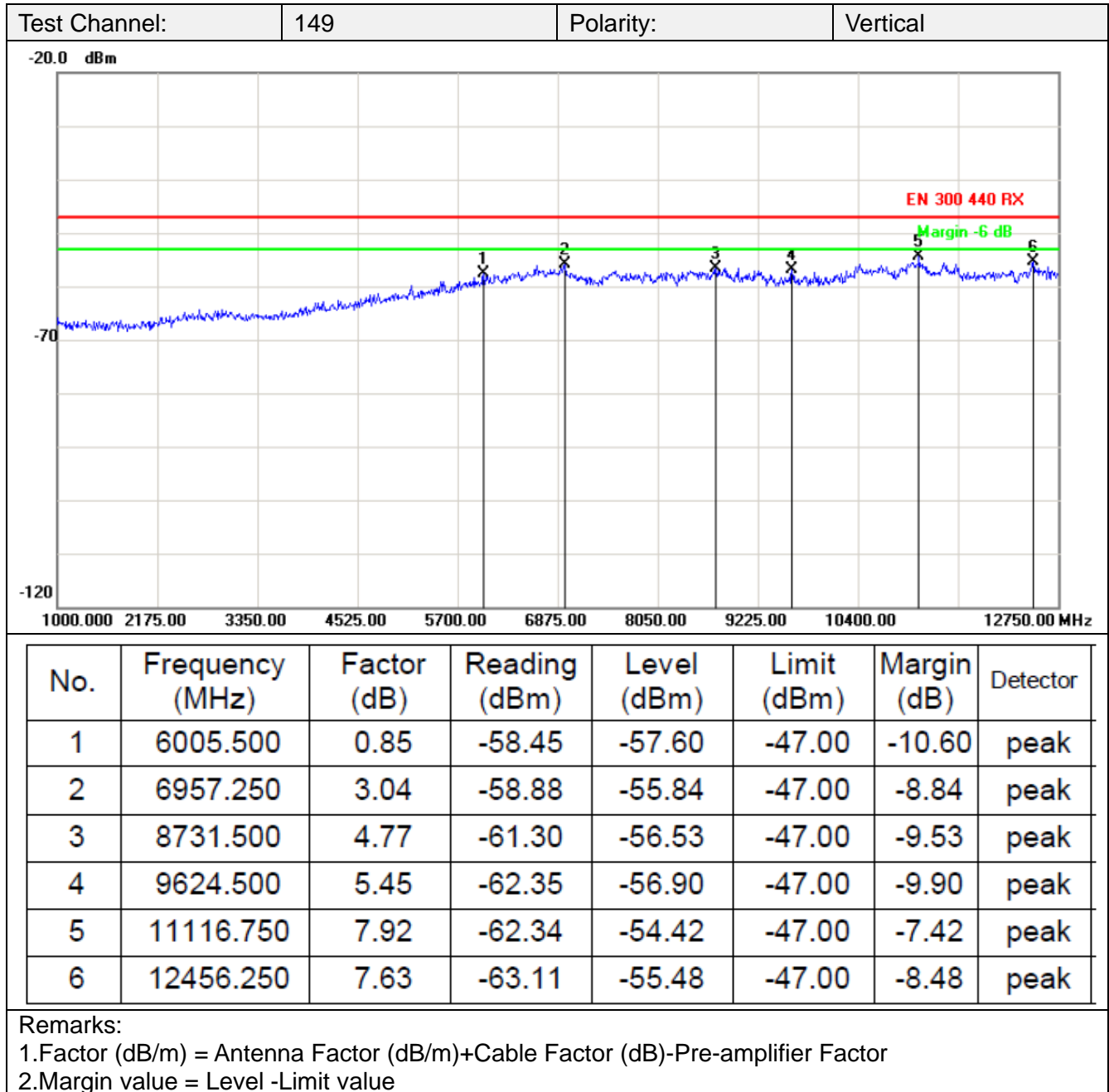




## (2) Above 1G









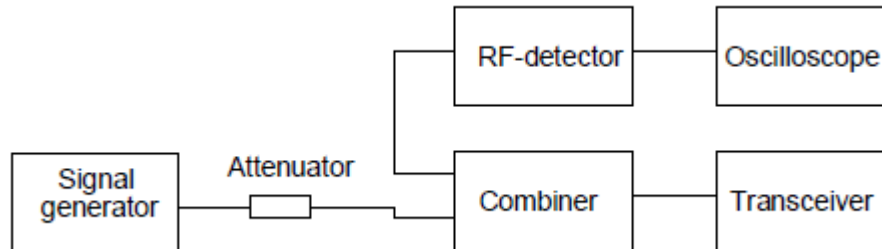


### 3.11. Spectrum access techniques

#### Limit

Shall be declared in the test report by the equipment provider.

#### Test Configuration



#### Test Procedure

Please refer to ETSI EN 300 440 Sub-clause 4.4.2.2.2 for the measurement method.

#### Test Mode

Please reference to the section 2.3 mode 1.

#### Test Result

The product is belong to Spectrum access techniques by the manufacturer declare.



## 4. EUT TEST PHOTOS

Reference to the test report No.: CTC20210068E03.



## 5. PHOTOGRAPHS OF EUT CONSTRUCTIONAL

Reference to the test report No.: CTC20210068E02.

\*\*\*\*\*THE END\*\*\*\*\*