



Shenzhen Huaxin Information Technology Service Co., Ltd

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检测
TESTING
CNAS L18255

TEST REPORT

Report No.	: HX260119R002
Applicant	: SuZhou Solargy New Energy Technology Co., LTD
Address	: No. 003, 1st Floor, Building A, Shangkun Industrial Park, 2001 Yingbin West Road, Bacheng Town, Kunshan City, China
Manufacturer.....	: SuZhou Solargy New Energy Technology Co., LTD
Address.....	: No. 003, 1st Floor, Building A, Shangkun Industrial Park, 2001 Yingbin West Road, Bacheng Town, Kunshan City, China
Product Name	: Solar electronic parasol
Trade Mark	: /
Model/Type reference.....	: ZL01
Listed Model(s).....	: ZL01-90
Standard	: ETSI EN 300 328 V2.2.2: 2019-07
Date of receipt of test sample...:	Dec. 26, 2025
Date of testing.....	Dec. 27, 2025 ~ Jan. 19, 2026
Date of issue.....	Jan. 20, 2026
Result.....	: PASS
Compiled by: (Printed name + signature)	Sain Liao <i>Sain</i>
Approved by: (Printed name + signature)	Terry Su <i>Terry Su</i>
Testing Laboratory Name.....	: Shenzhen Huaxin Information Technology Service Co., Ltd
Address	: 101, R & D Building, No.3 guansheng 4th Road, Luhua Community, Guanhu Street, Longhua District, Shenzhen, Guangdong, China
This test report shall not be copied in any form except with the written approval of our laboratory. The customer shall not claim that the product has been endorsed by Shenzhen Huaxin Information Technology Service Co., Ltd. based on this report, The test results in the report are only applicable to the samples tested. Without the signatures of the compiled engineer and the approver, the test report will be invalid. Any objection shall be submitted to Shenzhen Huaxin Information Technology Service Co., Ltd. within 15 days from the date of receiving the report. After this period, it will not be considered. The test report only corresponds to the test sample.	



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1. TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

[ETSI EN 300 328 V2.2.2: 2019-07](#)—Wideband transmission systems; Data transmission equipment operating in the 2.4 GHz ISM band and using wide band modulation techniques; Harmonised Standard for access to radio spectrum

1.2. Report version

Revised No.	Date of issue	Description
01	Jan. 20, 2026	Original



1.3. Test Description

Radio Spectrum Matter (RSM) Part of Transmitter			
Test Item	Test require	Result	Test Engineer
RF Output power	clause 4.3.1.2	Pass	Sain Liao
Duty Cycle, Tx-sequence, Tx-gap	clause 4.3.1.3	N/A	N/A
Accumulated Transmit Time, Minimum Frequency Occupation and Hopping Sequence	clause 4.3.1.4	Pass	Sain Liao
Hopping Frequency Separation	clause 4.3.1.5	Pass	Sain Liao
Medium Utilisation (MU) factor	clause 4.3.1.6	N/A	N/A
Adaptivity	clause 4.3.1.7	N/A	N/A
Occupied Channel Bandwidth	clause 4.3.1.8	Pass	Sain Liao
Transmitter unwanted emissions in the out-of-band domain	clause 4.3.1.9	Pass	Sain Liao
Transmitter unwanted emissions in the spurious domain	clause 4.3.1.10	Pass	Sain Liao
Radio Spectrum Matter (RSM) Part of Receiver			
Test Item	Test require	Result	Test Engineer
Receiver spurious emissions	clause 4.3.1.11	Pass	Sain Liao
Receiver Blocking	clause 4.3.1.12	Pass	Sain Liao
Geo-location capability	clause 4.3.1.13	N/A	N/A

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

Shenzhen Huaxin Information Technology Service Co., Ltd

Add: 101, R & D Building, No.3 guansheng 4th Road, Luhua Community, Guanhu Street, Longhua District, Shenzhen, Guangdong, China

Laboratory accreditation

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

A2LA-Lab Cert. No.: 6855.01

Shenzhen Huaxin Information Technology Service 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: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

Industry Canada (Company Number: 31786, CAB Identifier: CN0147)

Shenzhen Huaxin Information Technology Service Co., Ltd EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 31786.

FCC (Registration No.: 932271, Designation Number CN1344)

Shenzhen Huaxin Information Technology Service 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 NO.: 932271.

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 Shenzhen Huaxin Information Technology Service 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.

Below is the best measurement capability for Shenzhen Huaxin Information Technology Service Co., Ltd



Test Items	Measurement Uncertainty	Notes
RF output power	$\pm 0.60\text{dB}$	(1)
Duty Cycle	$\pm 0.566\text{dB}$	(1)
Tx-sequence	$\pm 0.566\text{dB}$	(1)
Tx-gap	$\pm 0.566\text{dB}$	(1)
Medium Utilization (MU) factor	$\pm 0.566\text{dB}$	(1)
Dwell time	$\pm 0.028\%$	(1)
Minimum Frequency Occupation	$\pm 0.028\%$	(1)
Hopping Sequence	$\pm 1.9\%$	(1)
Hopping Frequency Separation	$\pm 1.9\%$	(1)
Occupied Channel Bandwidth	$\pm 3.70\%$	(1)
Transmitter unwanted emissions in the out-of-band domain	$\pm 1.4\text{dB}$	(1)
Transmitter unwanted emissions in the spurious domain	30MHz~1GHz: $\pm 4.63\text{dB}$ Above 1GHz: $\pm 4.41\text{dB}$	(1)
Receiver spurious emissions	30MHz~1GHz: $\pm 4.63\text{dB}$ Above 1GHz: $\pm 4.41\text{dB}$	(1)

Note (1): This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

1.6. Environmental conditions

Normal Condition	Temperature	25 °C
	Relative humidity	55 %
	Air Pressure	101 kPa
	Voltage	The equipment shall be the nominal voltage for which the equipment was designed.
Extreme Condition	Temperature	Measurements shall be made over the extremes of the operating temperature range as declared by the manufacturer
	Voltage	Measurements shall be made over the extremes of the operating temperature range as declared by the manufacturer

Normal Condition	T_N =Normal Temperature	25 °C
Extreme Condition	T_L =Lower Temperature	-20 °C
	T_H =Higher Temperature	60 °C



2. GENERAL INFORMATION

2.1. Client Information

Applicant:	SuZhou Solargy New Energy Technology Co., LTD
Address:	No. 003, 1st Floor, Building A, Shangkun Industrial Park, 2001 Yingbin West Road, Bacheng Town, Kunshan City, China
Manufacturer:	SuZhou Solargy New Energy Technology Co., LTD
Address:	No. 003, 1st Floor, Building A, Shangkun Industrial Park, 2001 Yingbin West Road, Bacheng Town, Kunshan City, China

2.2. General Description of EUT

Product Name:	Solar electronic parasol
Trade Mark:	/
Model/Type reference:	ZL01
Listed Model(s):	ZL01-90
Model Different:	All these models are identical in the same PCB, layout and electrical circuit, The difference is Appearance color and aluminum thickness.
Power supply:	24Vdc/2.5A from AC/DC Adapter 14.4Vdc from 5000mAh Li-ion Battery
Hardware version:	ZL-LMS-H1.0
Software version:	ZL-LMS-V1.0
Antenna type:	PCB Antenna
Antenna gain:	1dBi
Technical index for Bluetooth	
Modulation:	GFSK, $\pi/4$ -DQPSK, 8-DPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Test frequency:	CH00: 2402MHz CH39: 2441MHz CH78: 2480MHz
Modulation:	☒ FHSS ☐ Other forms of modulation GFSK
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
Receiver categories:	☐ Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p. shall be considered as receiver category 1 equipment. ☒ Non-adaptive equipment with a Medium Utilization (MU) factor greater



	than 1 % and less than or equal to 10 % or adaptive equipment with a maximum RF output power of 10 dBm e.i.r.p. shall be considered as receiver category 2 equipment. ☐ Non-adaptive equipment with a maximum Medium Utilization (MU) factor of 1 % or adaptive equipment with a maximum RF output power of 0 dBm e.i.r.p. shall be considered as receiver category 3 equipment.
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 1 antenna 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:	☒ PCB Antenna ☐ Temporary RF connector provided ☒ No temporary RF connector provided ☐ 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: 79 The minimum number of Hopping Frequencies: 79 The Dwell Time: 323.008 Max
☒ In case of adaptive	The Channel Occupancy Time implemented by the equipment:../.. ms



equipment:	☒ 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: μ s ☐ 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: % Equipment with dynamic behaviour, that behaviour is described here. (e.g. the different combinations of duty cycle and corresponding power levels to be declared):
☐ In case of Smart Antenna Systems:	The number of Receive chains: The number of Transmit chains: In case of beam forming, the maximum (additional) beam forming gain: dB



2.3. Accessory Equipment information

Equipment Information			
Name	Model	S/N	Manufacturer
Laptop	ThinkPad Edge E430	/	Lenovo
Cable Information			
Name	Shielded Type	Ferrite Core	Length
/	/	/	/
Test Software Information			
Name	Versions	/	/
cmd.exe	/	/	/



2.4. Measurement Instruments List

RF Test System - SRD					
Item	Test Equipment	Manufacturer	Model No.	Versions/ Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY51280803	Apr. 08, 2026
2	Wideband Radio Communication Tester	R&S	CMW500	157763	Apr. 08, 2026
3	MXG Vector Signal Generator	Agilent	N5182A	101795	Apr. 08, 2026
4	EXG Analog Signal Generator	Agilent	N5181A	MY47421151	Apr. 08, 2026
5	RF Sensor Unit	Techy	TR1029-2	20220428P009	Apr. 08, 2026
6	High and low temperature test chamber	Asprey	LX-225L	2020091401	Apr. 08, 2026
7	SRD Test Software	TACHOY	RTS	V1.0.0	/
8	2G/3G/4G Test Software	TST	TST-PASS	V2.0	/

Radiated emission					
Item	Test Equipment	Manufacturer	Model No.	Versions/ Serial No.	Calibrated until
1	EMI spectrum receiver	R&S	ESR7	102543	Apr. 08, 2026
2	9*6*6 anechoic chamber	Mao Rui	9*6*6	/	Apr. 08, 2026
3	Spectrum analyzer	R&S	FSV40-N	101795	Apr. 09, 2026
4	Preamplifier	Agilent	8449B	3008A00551	Apr. 09, 2026
5	Preamplifier	HP	8447D	1616A02061	Apr. 08, 2026
6	Horn Antenna	A. H. System, Inc	SAS-571	915	Apr. 18, 2026
7	Trilog-Broadband Antenna	SCHWARZBEC K	VULB 9168	01318	Apr. 18, 2026
8	6dB Fixed Attenuator	SKET	AP_DC01G-2W-N-6 dB	SK2021012803	Apr. 08, 2026
9	Test Software	SKET	EMC-I	V1.4.0.1	/
10	Wideband Radio Communication Tester	R&S	CMW500	157763	Apr. 08, 2026

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



3. TEST ITEM AND RESULTS

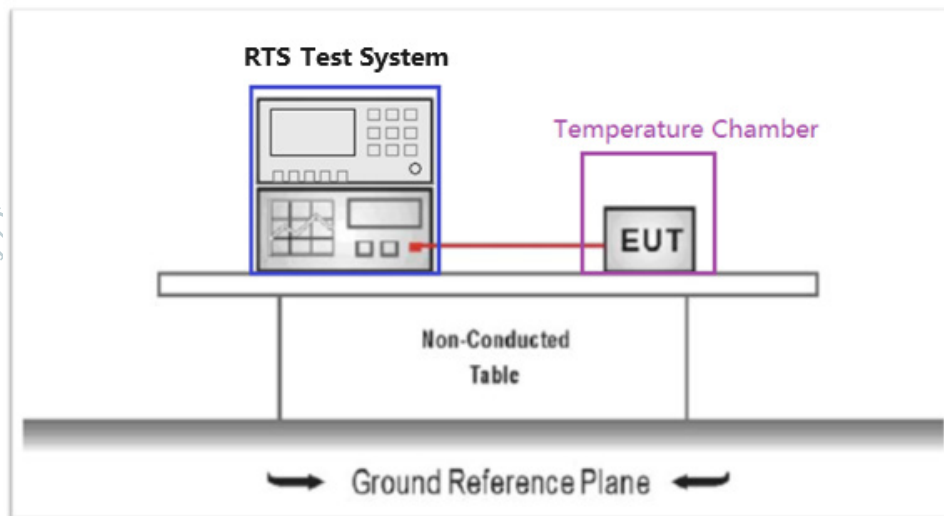
3.1. RF Output Power

Limit

ETSI EN 300 328 Sub-clause 4.3.2.2.3

1. For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm.
2. The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. 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.

Test Configuration



Test Procedure

Please refer to ETSI EN 300 328 Sub-clause 5.4.2.2.1 for the measurement method.

Test Results

Please see the appendix.

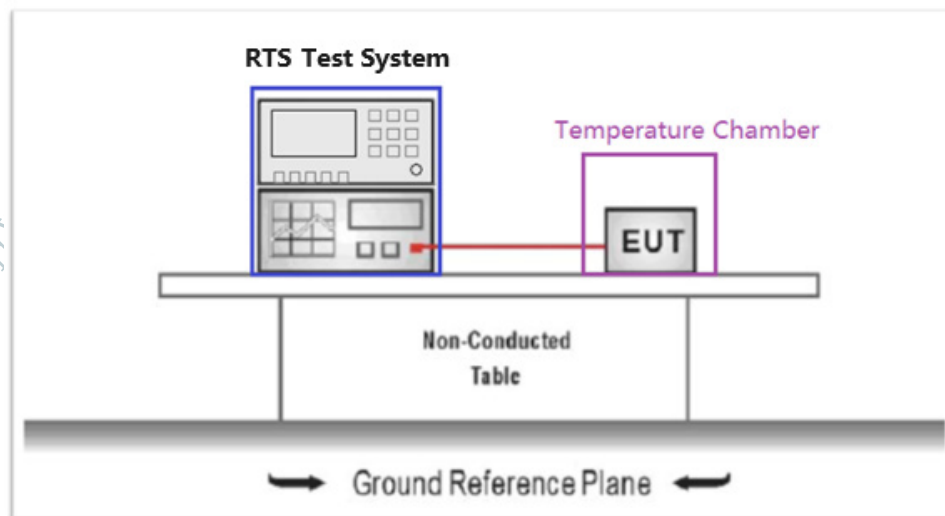
3.2. Duty Cycle, Tx-sequence, Tx-gap

Limit

ETSI EN 300 328 V2.2.2 Sub-clause 4.3.1.3.3 & 4.3.2.4.3

1. For non-adaptive FHSS equipment, the Duty Cycle shall be equal to or less than the maximum value declared by the supplier. In addition, the maximum Tx-sequence time shall be 5 ms while the minimum Tx-gap time shall be 5 ms.
2. For equipment using wide band modulations other than FHSS, the Duty Cycle shall be equal to or less than the maximum value declared by the supplier.
The Tx-sequence time shall be equal to or less than 10 ms. The minimum Tx-gap time following a Tx-sequence shall be equal to the duration of that proceeding Tx-sequence with a minimum of 3,5 ms.

Test Configuration



Test Procedure

Please refer to ETSI EN 300 328 Sub-clause 5.4.2.2.1.3 for the measurement method.

Test Results

Not applicable to this device which was adaptive equipment and cannot operate in a non-adaptive mode.



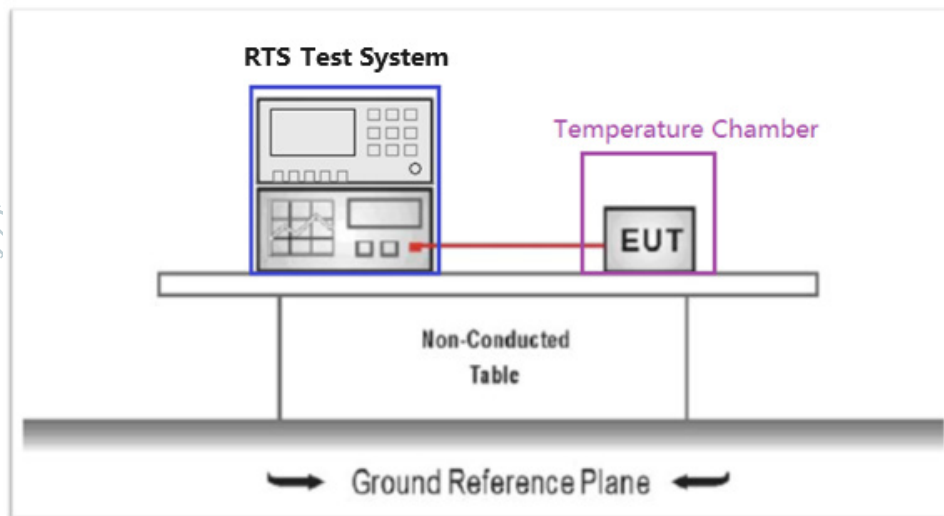
3.3. Accumulated Transmit Time, Minimum Frequency Occupation and Hopping Sequence

Limit

ETSI EN 300 328 Sub-clause 4.3.1.4.3

1. Adaptive Frequency Hopping systems shall be capable of operating over a minimum of 70 % of the band specified in the band 2,4 GHz to 2,4835 GHz.
2. The Accumulated Transmit Time on any hopping frequency shall not be greater than 400 ms within any observation period of 400 ms multiplied by the minimum number of hopping frequencies (N) that have to be used.
3. The hopping sequence(s) shall contain at least N hopping frequencies at all times, where N is 15 or 15 divided by the minimum Hopping Frequency Separation in MHz, whichever is the greater.

Test Configuration



Test Procedure

Please refer to ETSI EN 300 328 Sub-clause 5.4.4.2.1 for the measurement method.

Test Result

Please see the appendix.



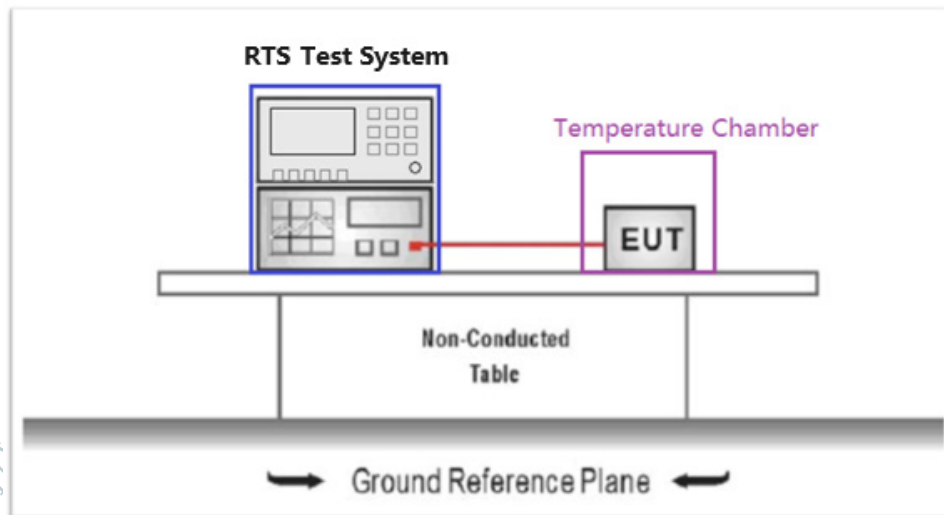
5.1. Hopping Frequency Separation

Limit

ETSI EN 300 328 Sub-clause 4.3.1.5.3.2

For adaptive Frequency Hopping equipment, the minimum Hopping Frequency Separation shall be 100 kHz

Test Configuration



Test Procedure

Please refer to ETSI EN 300 328 Sub-clause 5.4.4.2.1 for the measurement method.

Test Result

Please see the appendix.

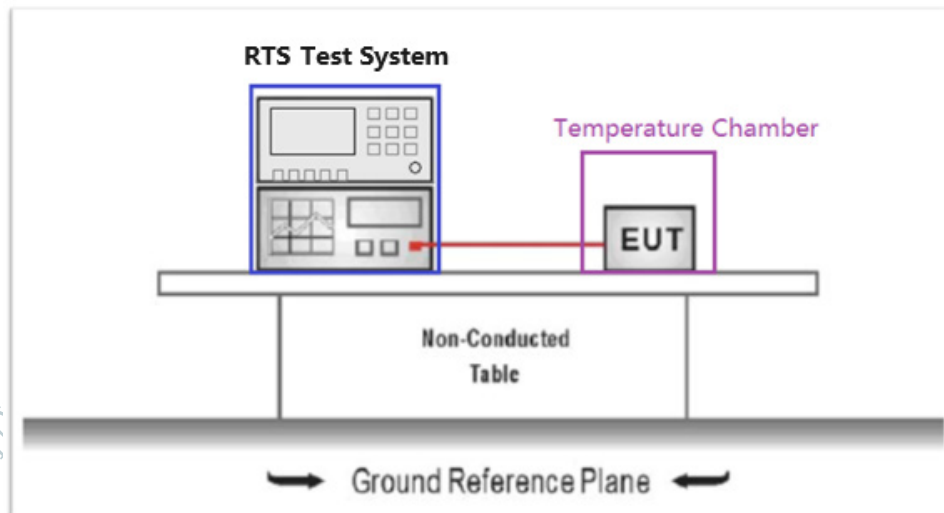
3.4. Medium Utilisation (MU) factor

Limit

ETSI EN 300 328 V2.2.2 Sub-clause 4.3.1.6.3&4.3.2.5.3

The maximum Medium Utilisation factor for non-adaptive equipment shall be 10 %.

Test Configuration



Test Procedure

Please refer to ETSI EN 300 328 Sub-clause 5.4.2.2.1.4 for the measurement method.

Test Results

Not applicable to this device which cannot operation in a non-adaptive mode.



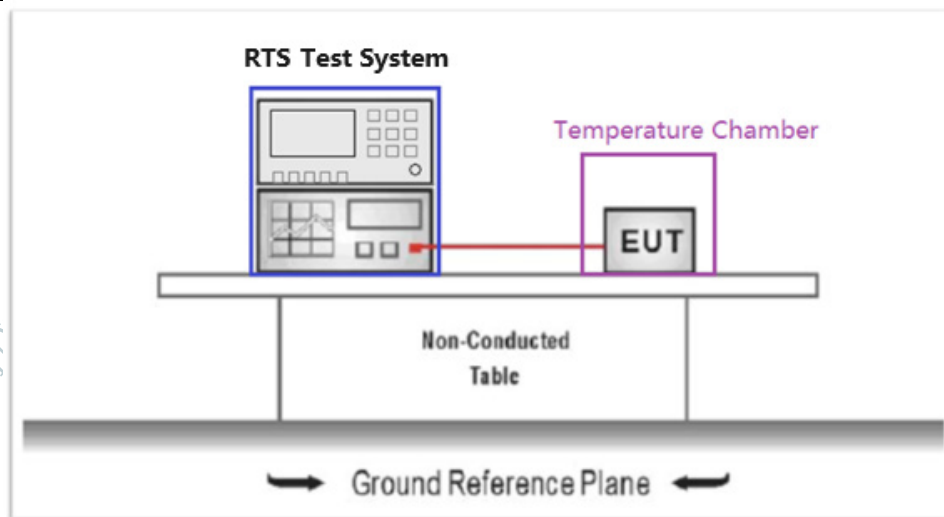
3.5. Occupied Channel Bandwidth

Limit

ETSI EN 300 328 Sub-clause 4.3.2.7.3

1. The Occupied Channel Bandwidth shall fall completely within the band given in the band 2,4 GHz to 2,4835 GHz.
2. In addition, for non-adaptive equipment 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

Please refer to ETSI EN 300 328 Sub-clause 5.4.7.2.1 for the measurement method.

Test Result

Please see the appendix.

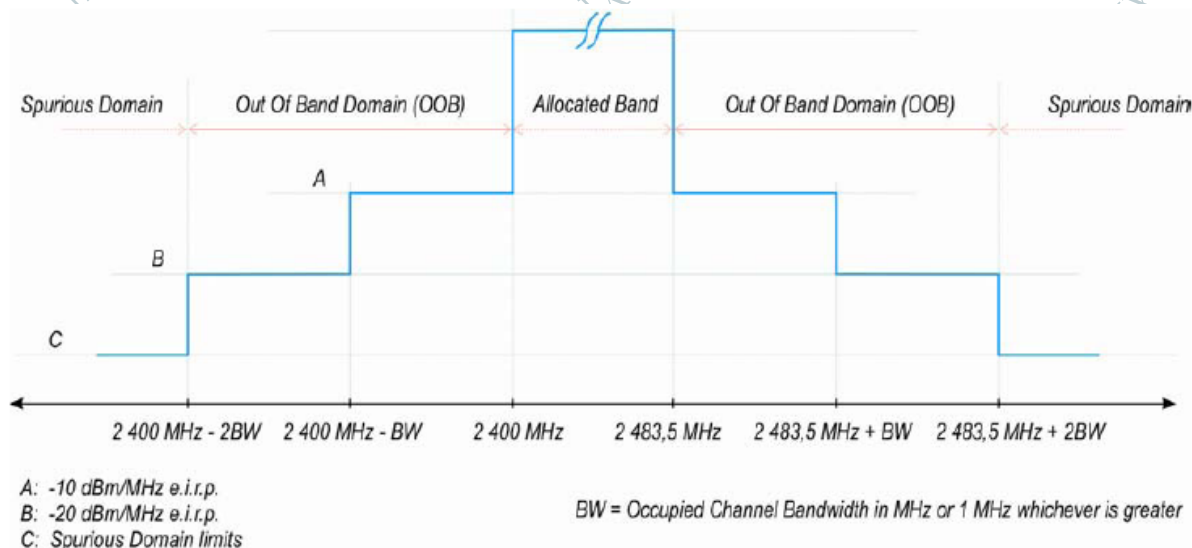


3.6. Transmitter unwanted emissions in the out-of-band domain

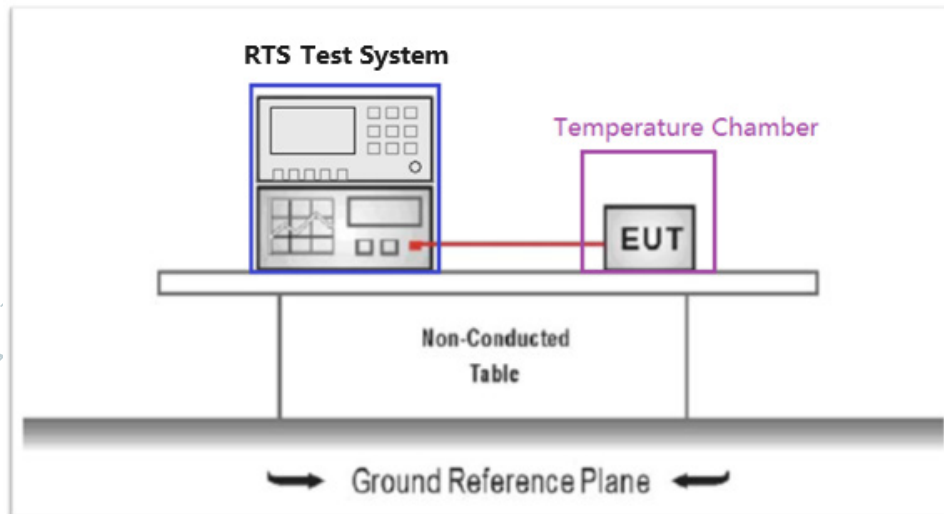
Limit

ETSI EN 300 328 V2.2.2 Sub-clause 4.3.1.9.3&4.3.2.8.3

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 1.



Test Configuration



Test Procedure

Please refer to ETSI EN 300 328 Sub-clause 5.4.8.2.1 for the measurement method.

Test Result

Please see the appendix.



3.7. Transmitter unwanted emissions in the spurious domain-Conducted measurements

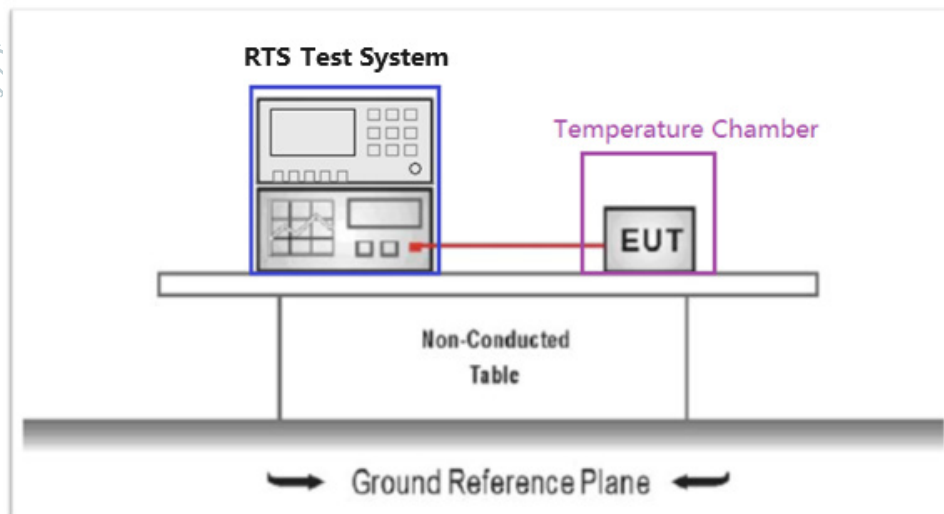
Limit

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 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 694 MHz	-54 dBm	100 kHz
694 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 300 328 Sub-clause 5.4.9.2.1 for the measurement method.

Test Result

Please see the appendix.

3.8. Transmitter unwanted emissions in the spurious domain-Radiated measurements

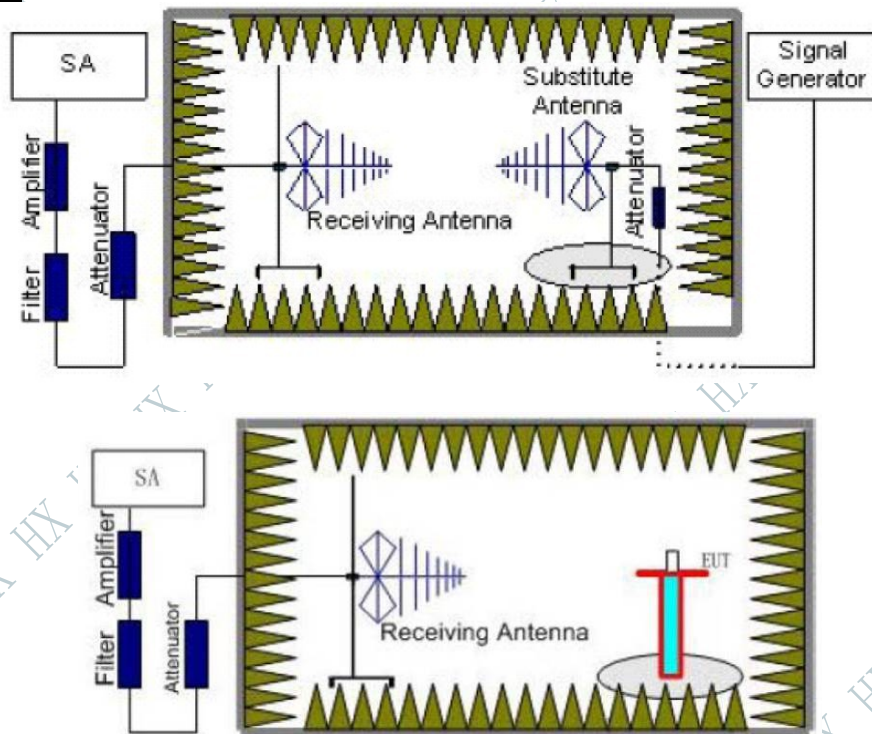
Limit

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 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 694 MHz	-54 dBm	100 kHz
694 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 300 328 Sub-clause 5.4.9.2.2 for the measurement method.

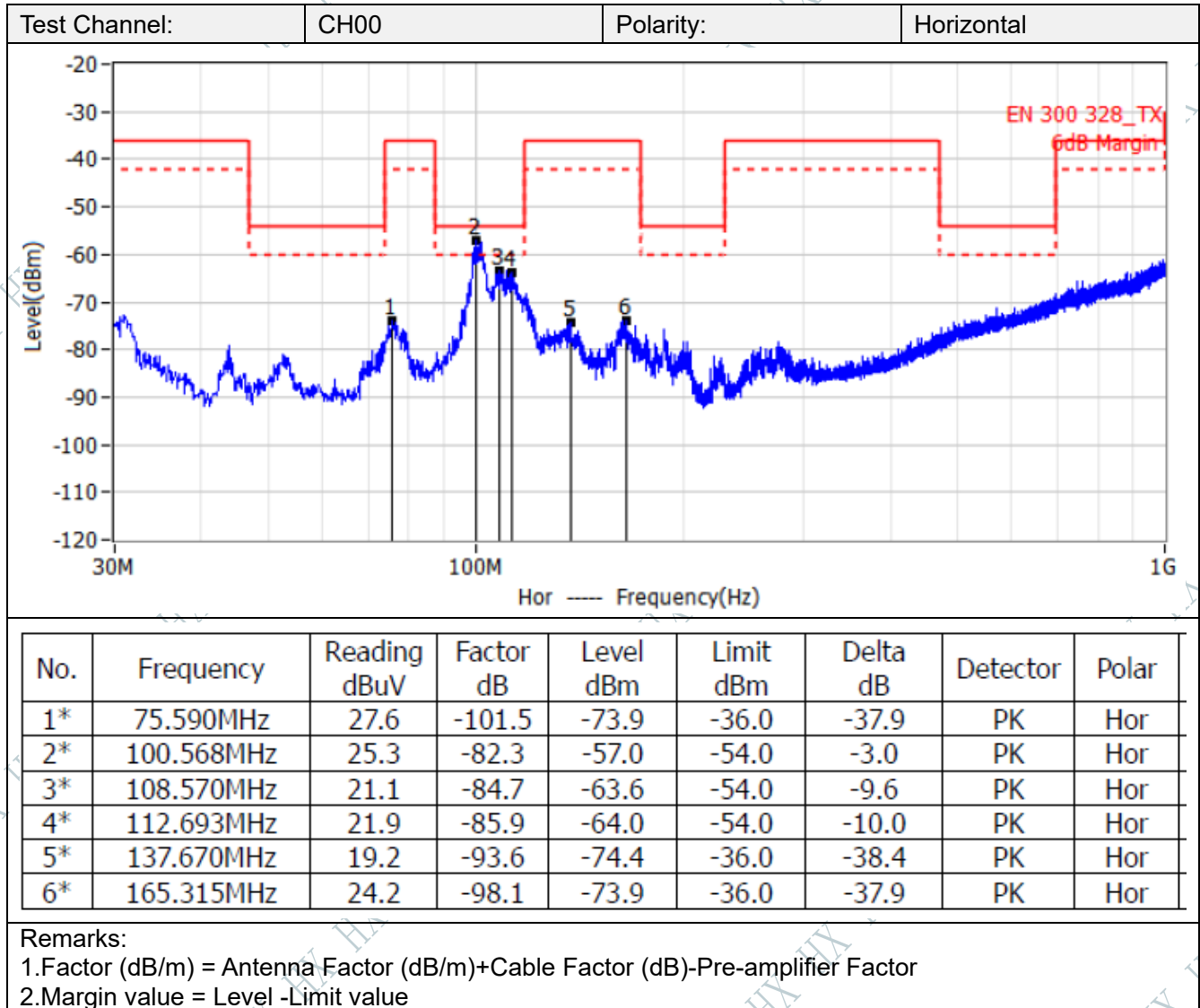
Test Result

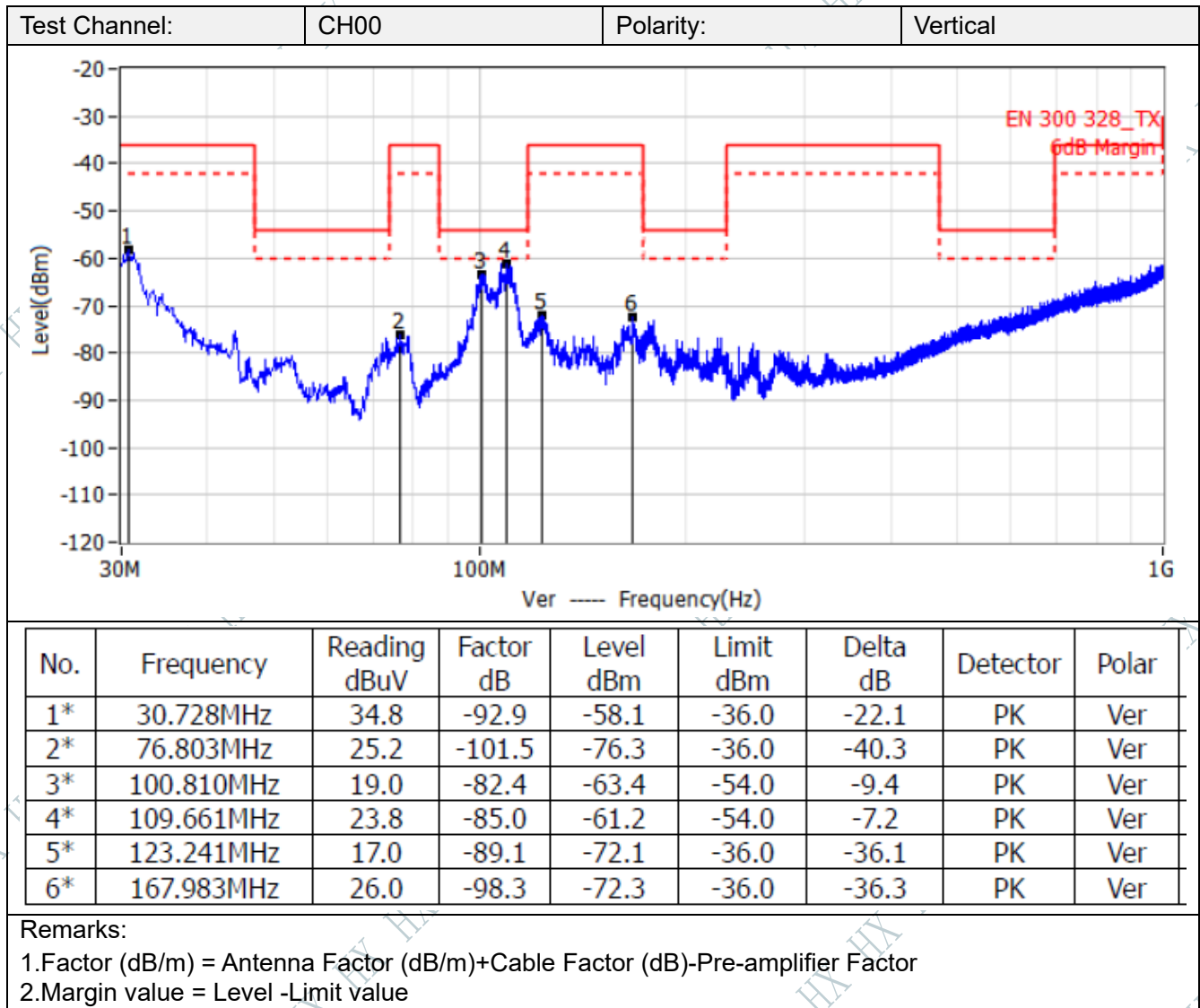
Note:

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 GFSK, $\pi/4$ -DQPSK, 8-DPSK modulation, and found the GFSK modulation LCH which it is worse case, so only show the test data for worse case.



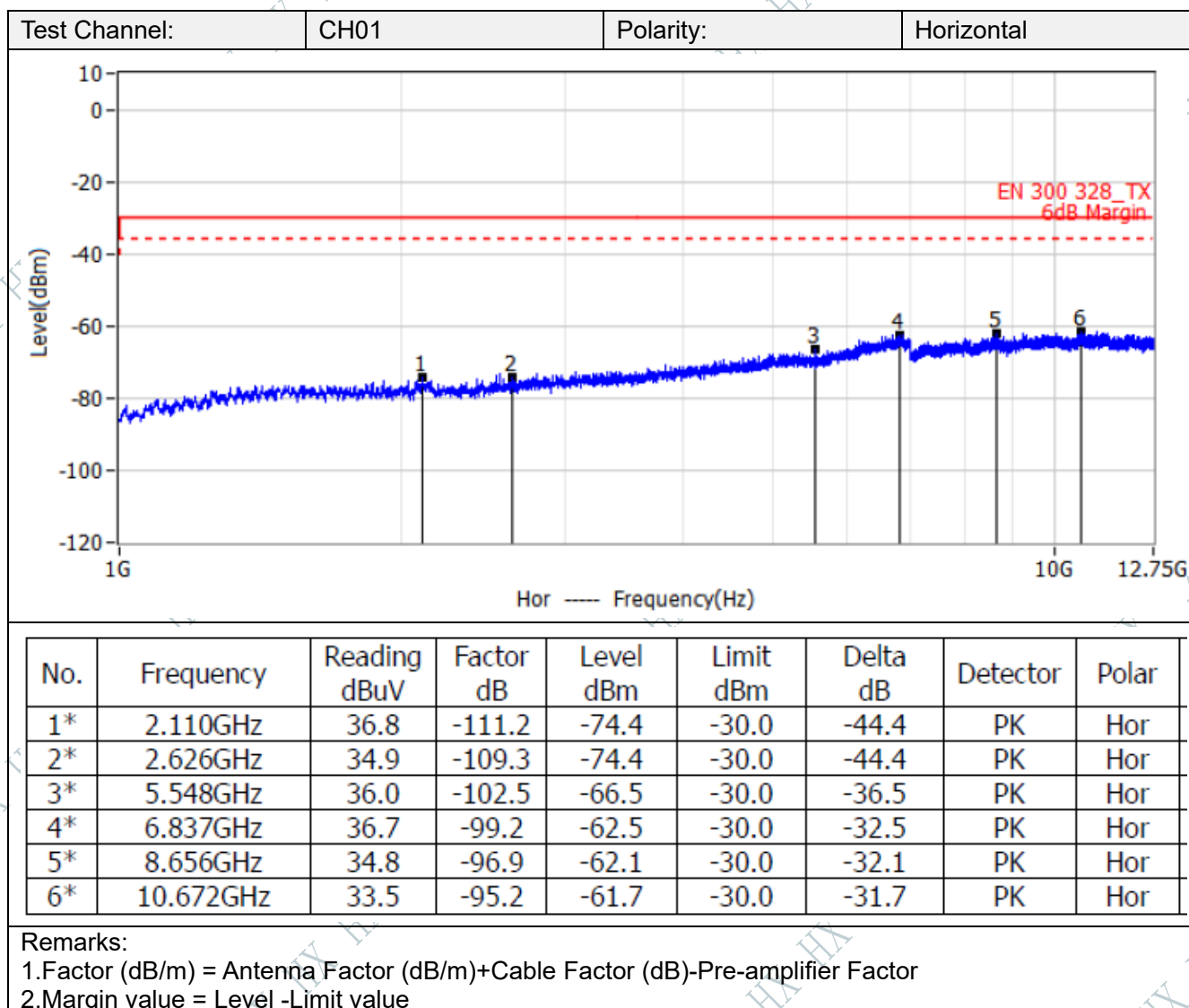
(1) Below 1G

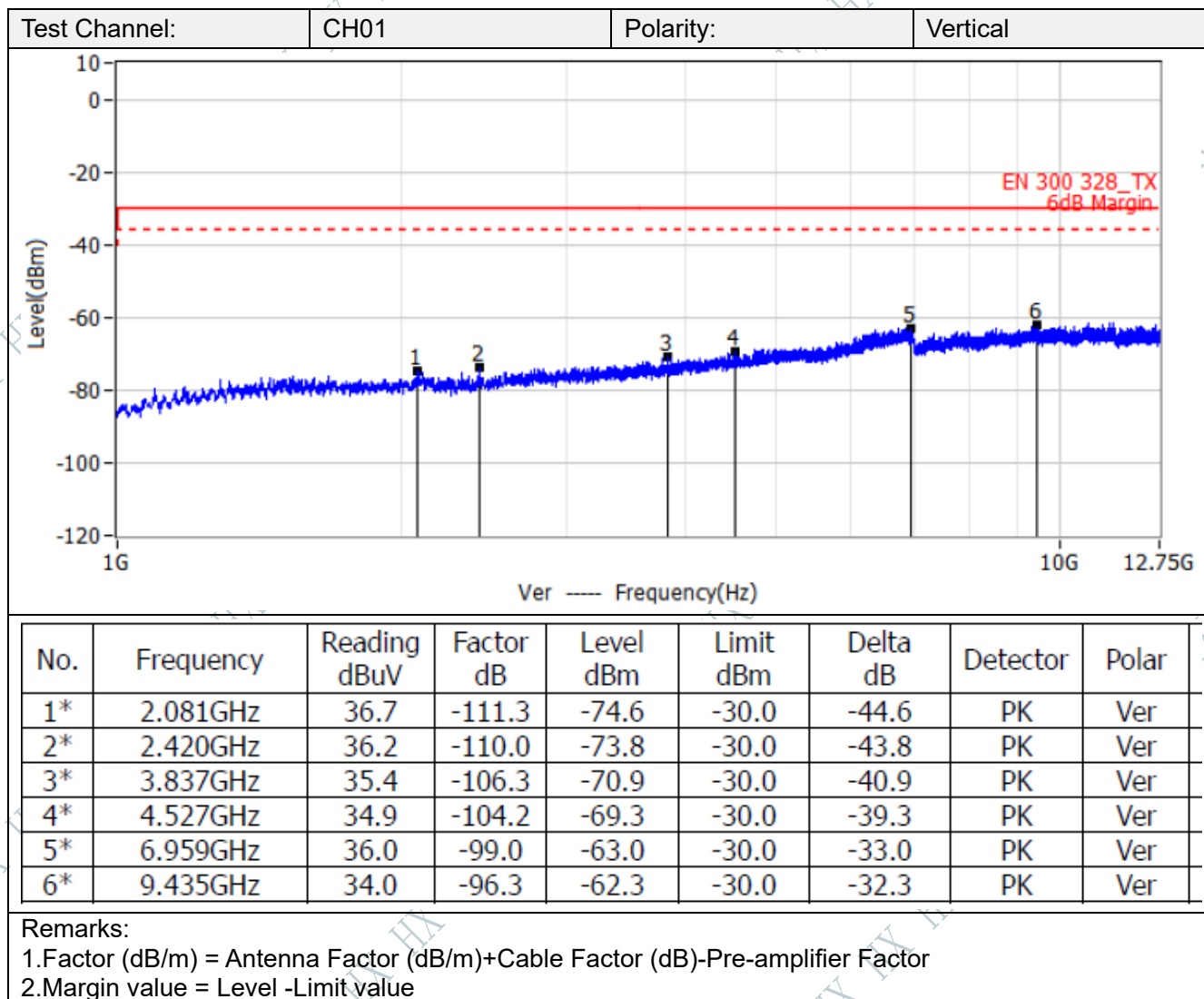






(2) Above 1G







3.9. Receiver spurious emissions-Conducted measurements

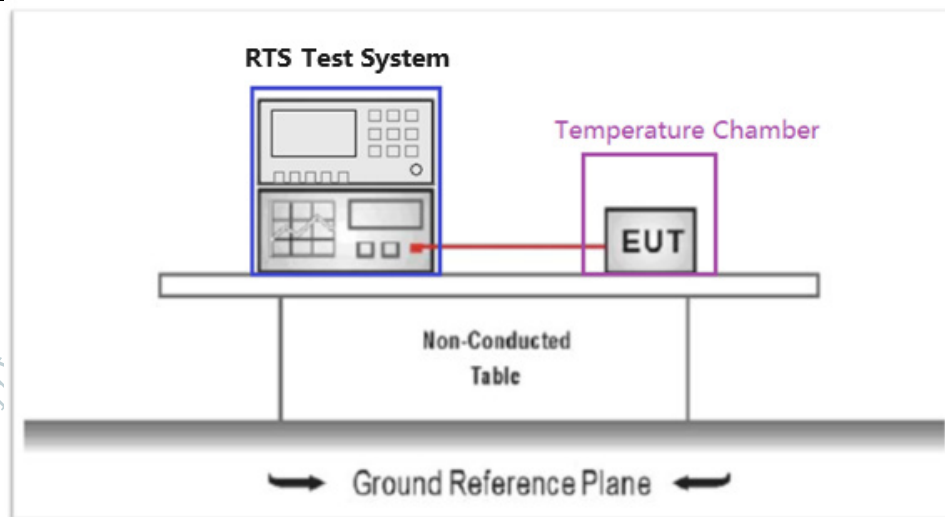
Limit

ETSI EN 300 328 Sub-clause 4.3.2.10.3

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 300 328 Sub-clause 5.4.10.2.1 for the measurement method.

Test Result

Please see the appendix.

3.10. Receiver spurious emissions-Radiated measurements

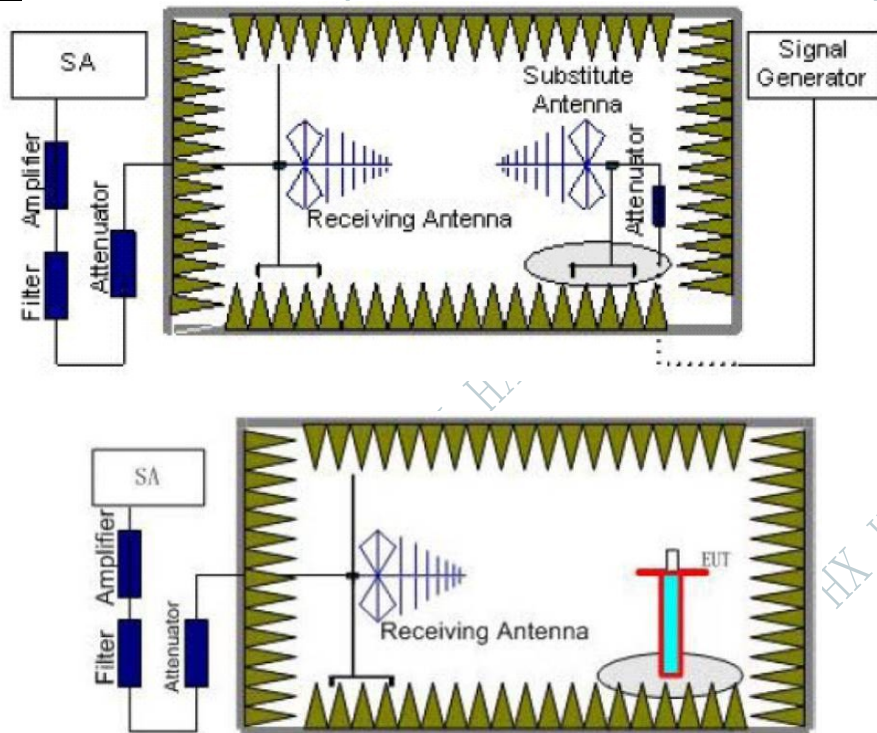
Limit

ETSI EN 300 328 Sub-clause 4.3.2.10.3

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 300 328 Sub-clause 5.4.10.2.2 for the measurement method.

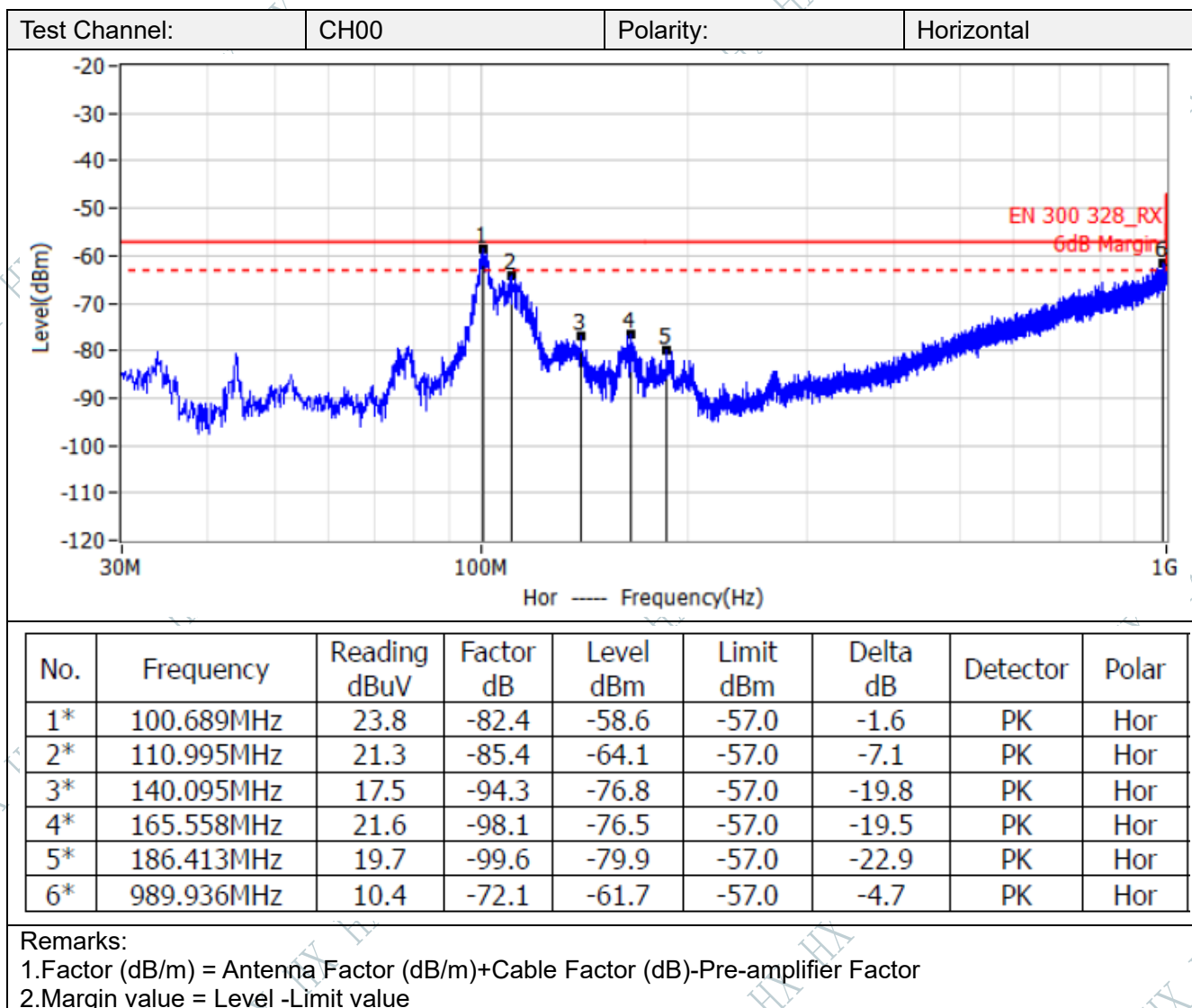
Test Result

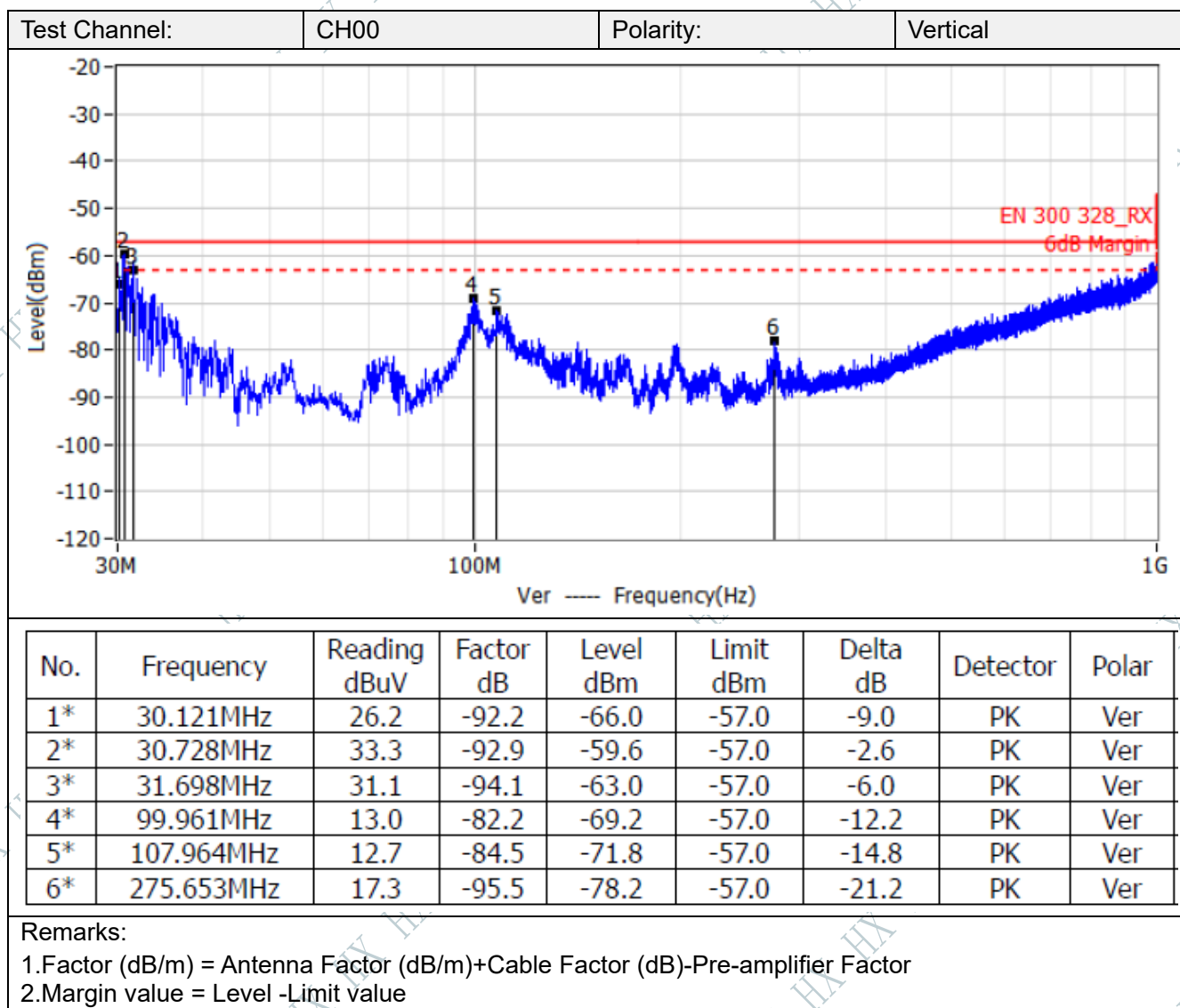
Note:

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 GFSK, $\pi/4$ -DQPSK, 8-DPSK modulation, and found the GFSK modulation LCH which it is worse case, so only show the test data for worse case.



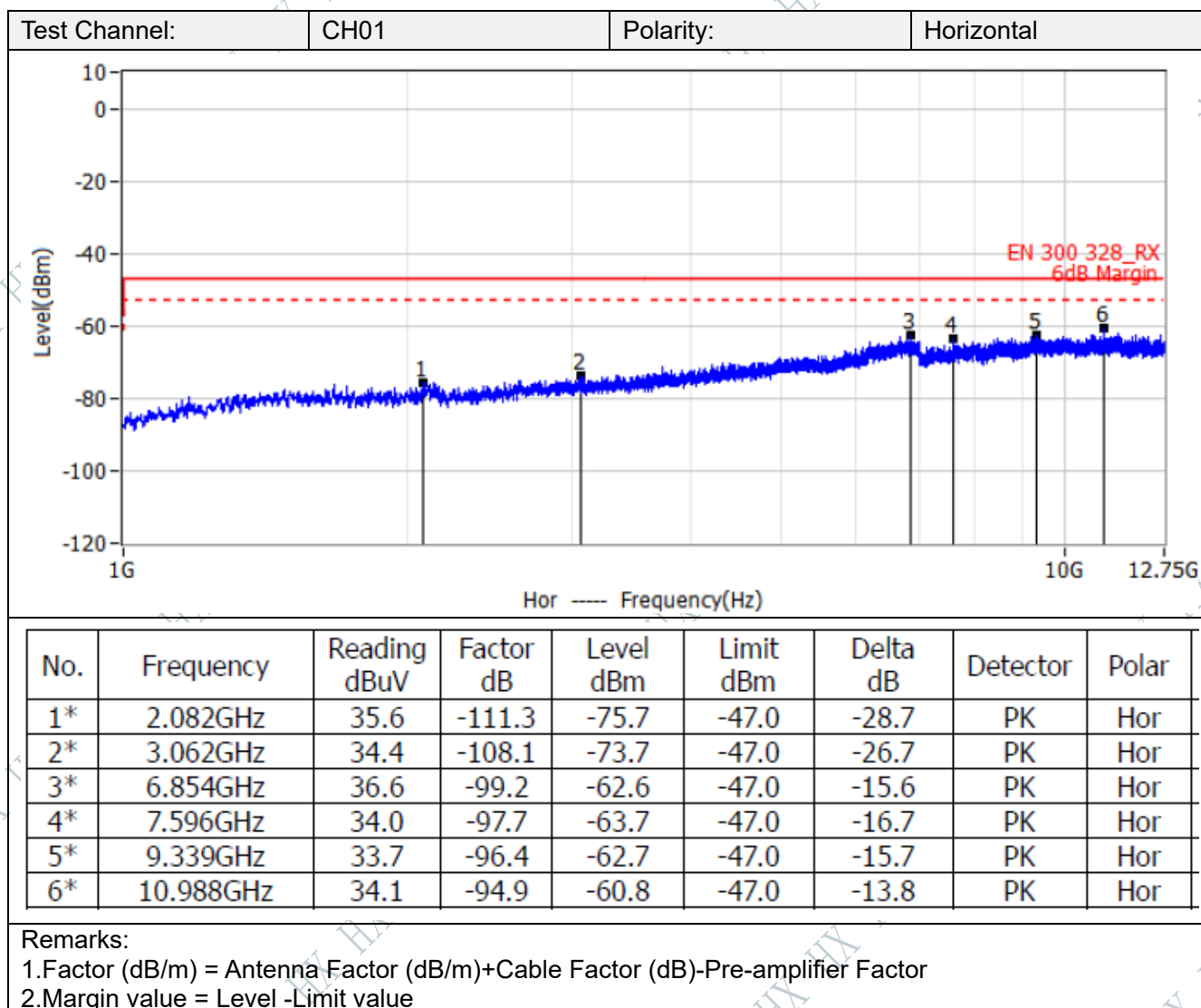
(1) Below 1G

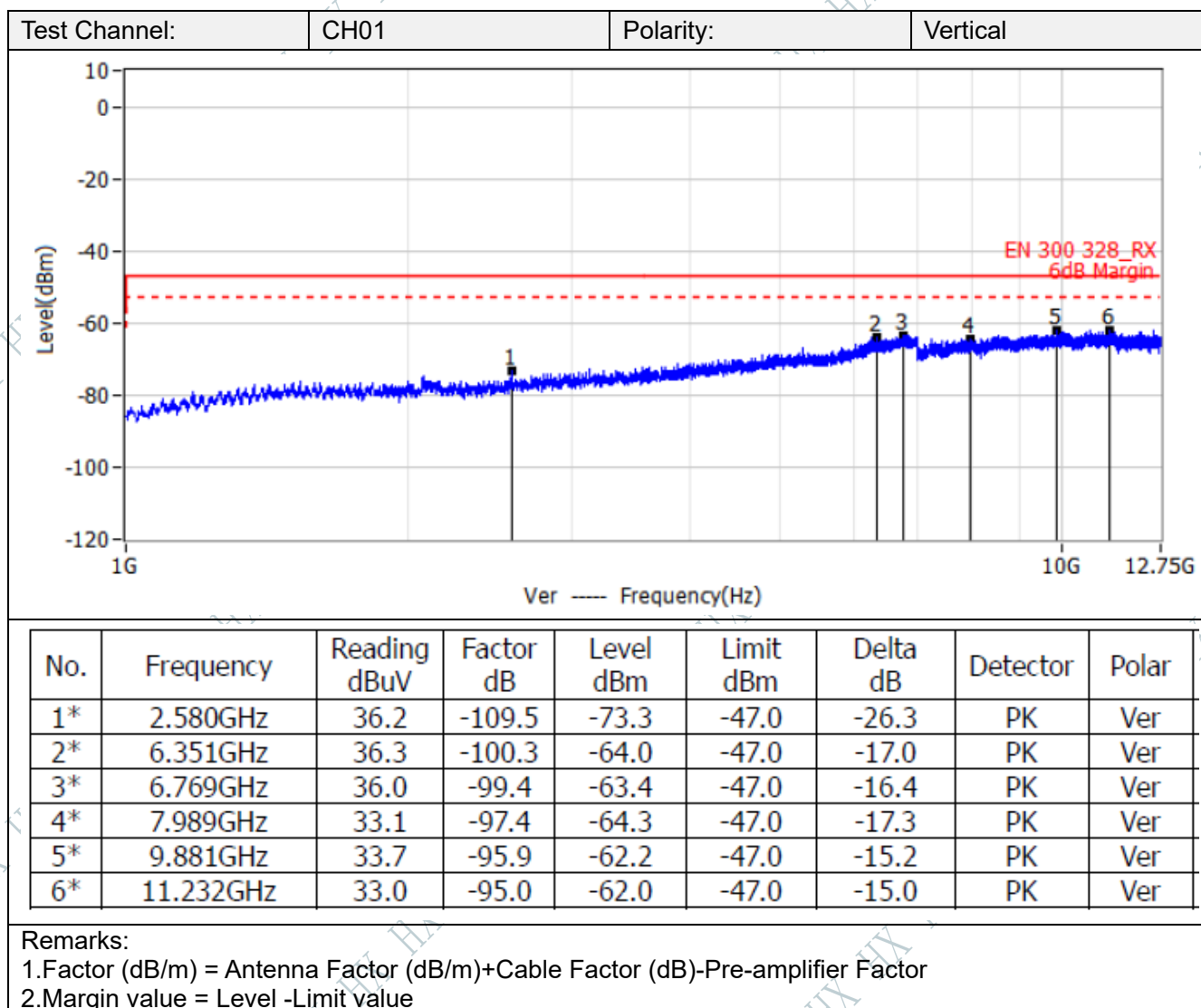






(2) Above 1G







3.11. Adaptivity

Limit

ETSI EN 300 328 Sub-clause 4.3.2.6

Non-LBT based Detect and Avoid

- 1) During normal operation, the equipment shall evaluate the presence of a signal 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 'unavailable'.
- 2) The channel shall remain unavailable for a minimum time equal to 1 s after which the channel may be considered again as an 'available' channel.
- 3) The total time during which an equipment has transmissions on a given channel without re-evaluating the availability of that channel, is defined as the Channel Occupancy Time.
- 4) The Channel Occupancy Time shall be less than 40 ms. Each such transmission sequence shall be followed by an Idle Period (no transmissions) of minimum 5 % of the Channel Occupancy Time with a minimum of 100 μ s. After this, the procedure as in step 1 needs to be repeated.
- 5) The detection threshold shall be proportional to the transmit power of the transmitter: for a 20 dBm e.i.r.p. transmitter the detection threshold level (TL) shall be equal to or less than -70 dBm/MHz at the input to the receiver assuming a 0 dBi (receive) antenna assembly. This threshold level (TL) may be corrected for the (receive) antenna assembly gain (G); however, beamforming gain (Y) shall not be taken into account. For power levels less than 20 dBm e.i.r.p., the detection threshold level may be relaxed to: $TL = -70 \text{ dBm/MHz} + 10 \times \log_{10} (100 \text{ mW} / P_{out})$ (P_{out} in mW e.i.r.p.)
- 6) The equipment shall comply with the requirements defined in step 1 to step 4 of the present clause in the presence of an unwanted CW signal as defined in below table.

Wanted signal mean power from companion device (dBm)	Unwanted signal frequency (MHz)	Unwanted CW signal power (dBm)
-30	2 395 or 2 488,5 (see note 1)	-35 (see note 2)
NOTE 1: The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. See clause 5.4.6.1.		
NOTE 2: The level specified is the level in front of the UUT antenna. In case of conducted measurements, this level has to be corrected by the actual antenna assembly gain.		

LBT based Detect and Avoid- Frame Based Equipment

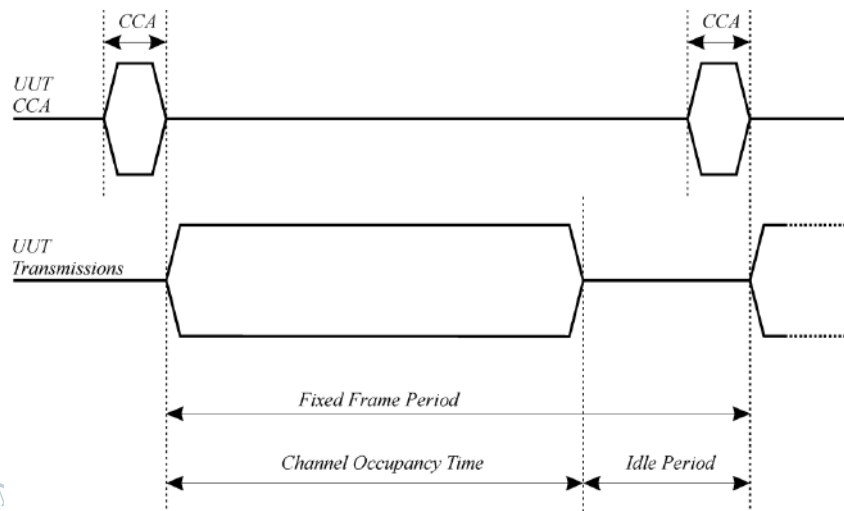
- 1) Before transmission, the equipment shall perform a Clear Channel Assessment (CCA) check using energy detect. The equipment shall observe the operating channel for the duration of the CCA observation time which shall be not less than 18 μ s. The channel shall be considered occupied if the energy level in the channel exceeds the threshold given in step 5 below. If the equipment finds the channel to be clear, it may transmit immediately.
- 2) If the equipment finds the channel occupied, it shall not transmit on this channel during the next Fixed Frame Period.
The equipment is allowed to switch to a non-adaptive mode and to continue transmissions on this channel providing it complies with the requirements applicable to non-adaptive equipment. See clause 4.3.2.6.1. Alternatively, the equipment is also allowed to continue Short Control Signalling Transmissions on this channel providing it complies with the requirements given in clause 4.3.2.6.4.
- 3) The total time during which an equipment has transmissions on a given channel without re-evaluating the availability of that channel, is defined as the Channel Occupancy Time.
The Channel Occupancy Time shall be in the range 1 ms to 10 ms followed by an Idle Period of at least 5 % of the Channel Occupancy Time used in the equipment for the current Fixed Frame Period.
- 4) An equipment, upon correct reception of a packet which was intended for this equipment can skip CCA and immediately (see also next paragraph) proceed with the transmission of management and control frames (e.g. ACK and Block ACK frames are allowed but data frames are not allowed). A consecutive sequence of such transmissions by the equipment without a new CCA shall not exceed the maximum Channel Occupancy Time.



- 5) The energy detection threshold for the CCA shall be proportional to the transmit power of the transmitter: for a 20 dBm e.i.r.p. transmitter the CCA threshold level (TL) shall be equal to or less than -70 dBm/MHz at the input to the receiver assuming a 0 dBi (receive) antenna assembly. This threshold level (TL) may be corrected for the (receive) antenna assembly gain (G); however, beamforming gain (Y) shall not be taken into account. For power levels less than 20 dBm e.i.r.p. the CCA threshold level may be relaxed to: $TL = -70 \text{ dBm/MHz} + 10 \times \log_{10} (100 \text{ mW} / P_{out})$ (P_{out} in mW e.i.r.p.)
- 6) The equipment shall comply with the requirements defined in step 1 to step 4 in the present clause in the presence of an unwanted CW signal as defined in below table.

Wanted signal mean power from companion device	Unwanted signal frequency (MHz)	Unwanted signal power (dBm)
sufficient to maintain the link (see note 2)	2 395 or 2 488,5 (see note 1)	-35 (see note 3)
NOTE 1: The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. See clause 5.4.6.1.		
NOTE 2: A typical value which can be used in most cases is -50 dBm/MHz.		
NOTE 3: The level specified is the level in front of the UUT antenna. In case of conducted measurements, this level has to be corrected by the actual antenna assembly gain.		

An example of the timing for Frame Based Equipment is provided in below figure .



LBT based Detect and Avoid-Load Based Equipment

1) Before a transmission or a burst of transmissions, the equipment shall perform a Clear Channel Assessment (CCA) check using energy detect. The equipment shall observe the operating channel for the duration of the CCA observation time which shall be not less than 18 μ s. The channel shall be considered occupied if the energy level in the channel exceeds the threshold given in step 5 below. If the equipment finds the channel to be clear, it may transmit immediately.

2) If the equipment finds the channel occupied, it shall not transmit on this channel (see also the next paragraph). The equipment shall perform an Extended CCA check in which the channel is observed for a random duration in the range between 18 μ s and at least 160 μ s. If the extended CCA check has determined the channel to be no longer occupied, the equipment may resume transmissions on this channel. If the Extended CCA time has determined the channel still to be occupied, it shall perform new Extended CCA checks until the channel is no longer occupied.

NOTE: The Idle Period in between transmissions is considered to be the CCA or the Extended CCA check as there are no transmissions during this period.

The equipment is allowed to switch to a non-adaptive mode and to continue transmissions on this channel providing it complies with the requirements applicable to non-adaptive equipment. Alternatively, the equipment is also allowed to continue Short Control Signalling Transmissions on this channel providing it complies with the requirements given in clause 4.3.2.6.4.

3) The total time that an equipment makes use of a RF channel is defined as the Channel Occupancy Time. This Channel Occupancy Time shall be less than 13 ms, after which the device shall perform a new



CCA as described in step 1 above.

4) The equipment, upon correct reception of a packet which was intended for this equipment can skip CCA and immediately (see also next paragraph) proceed with the transmission of management and control frames (e.g. ACK and Block ACK frames are allowed but data frames are not allowed). A consecutive sequence of transmissions by the equipment without a new CCA shall not exceed the maximum channel occupancy time as defined in step 3 above.

For the purpose of multi-cast, the ACK transmissions (associated with the same data packet) of the individual devices are allowed to take place in a sequence.

5) The equipment, upon correct reception of a packet which was intended for this equipment can skip CCA and immediately (see note 3) proceed with the transmission of management and control frames (e.g. ACK and Block ACK frames are allowed but data frames are not allowed). A consecutive sequence of transmissions by the equipment without a new CCA shall not exceed the maximum channel occupancy time as defined in step 3) above.

6) The energy detection threshold for the CCA shall be proportional to the transmit power of the transmitter: for a 20 dBm e.i.r.p. transmitter the CCA threshold level (TL) shall be equal to or less than -70 dBm/MHz at the input to the receiver assuming a 0 dBi (receive) antenna assembly. This threshold level (TL) may be corrected for the (receive) antenna assembly gain (G); however, beamforming gain (Y) shall not be taken into account. For power levels less than 20 dBm e.i.r.p., the CCA threshold level may be relaxed to: $TL = -70 \text{ dBm/MHz} + 10 \times \log_{10} (100 \text{ mW} / P_{out})$ (P_{out} in mW e.i.r.p.)

7) The equipment shall comply with the requirements defined in step 1 to step 4 of the present clause in the presence of an unwanted CW signal as defined in below table.

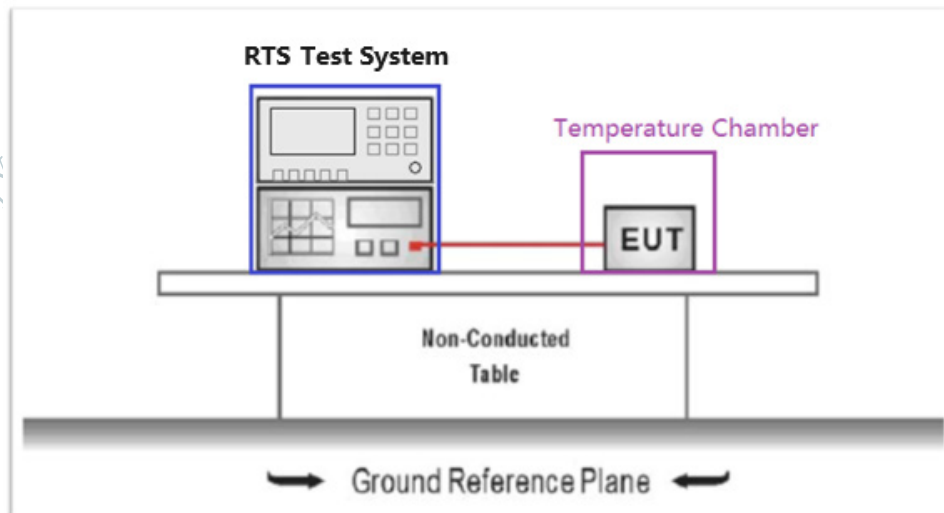
Wanted signal mean power from companion device	Unwanted signal frequency (MHz)	Unwanted signal power (dBm)
sufficient to maintain the link (see note 2)	2 395 or 2 488,5 (see note 1)	-35 (see note 3)
NOTE 1: The highest frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. See clause 5.4.6.1.		
NOTE 2: A typical value which can be used in most cases is -50 dBm/MHz.		
NOTE 3: The level specified is the level in front of the UUT antenna. In case of conducted measurements, this level has to be corrected by the actual antenna assembly gain.		

Short Control Signalling Transmissions

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.



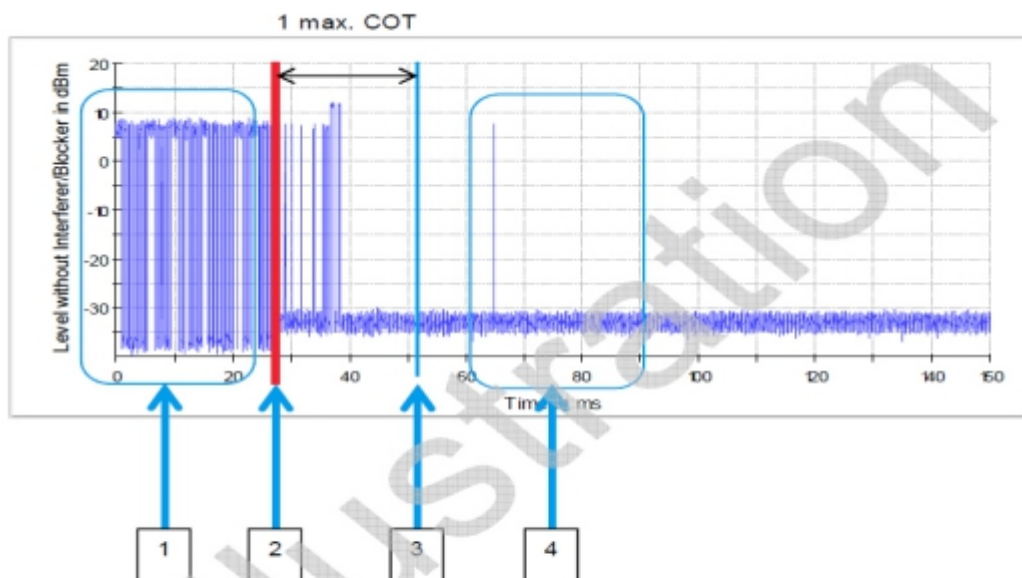
Test Configuration



Test Procedure

Please refer to ETSI EN 300 328 Sub-clause 5.4.6.2.1 for the measurement method.

Adaptivity Test schematic graphic



Test Results

Not applicable.

This requirement does not apply to adaptive equipment which maximum RF Output power level is less than 10 dBm e.i.r.p.



3.12. Receiver Blocking

Limit

ETSI EN 300 328 Sub-clause 4.3.2.11

Performance Criteria: For equipment that supports a PER or FER test to be performed, the minimum performance criterion shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER test to be performed, the minimum performance criterion shall be no loss of the wireless transmission function needed for the intended use of the equipment.

Receiver Category 1: Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p. shall be considered as receivercategory 1 equipment.

Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-133 dBm + 10 × log ₁₀ (OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × log ₁₀ (OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674		
NOTE 1: OCBW is in Hz.			
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P _{min} + 26 dB where P _{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.			
NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P _{min} + 20 dB where P _{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.			
NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

Receiver Category 2: Non-adaptive equipment with a Medium Utilization (MU) factor greater than 1 % and less than or equal to 10 % or adaptive equipment with a maximum RF output power of 10 dBm e.i.r.p. shall be considered as receiver category 2 equipment.

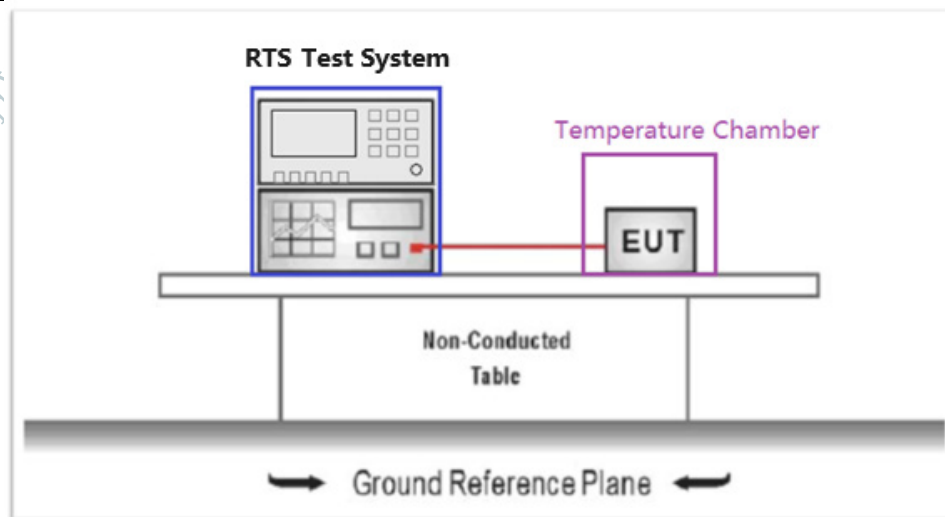
Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 10 \text{ dB})$ or $(-74 \text{ dBm} + 10 \text{ dB})$ whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz.			
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{\min} + 26 \text{ dB}$ where $P_{\min}$ is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.			
NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			



Receiver Category 3: Non-adaptive equipment with a maximum Medium Utilization (MU) factor of 1 % or adaptive equipment with a maximum RF output power of 0 dBm e.i.r.p. shall be considered as receiver category 3 equipment.

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 20 \text{ dB})$ or $(-74 \text{ dBm} + 20 \text{ dB})$ whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{\min} + 30 \text{ dB}$ where $P_{\min}$ is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

Test Configuration



Test Procedure

Please refer to ETSI EN 300 328 Sub-clause 5.4.11.2.1 for the measurement method.

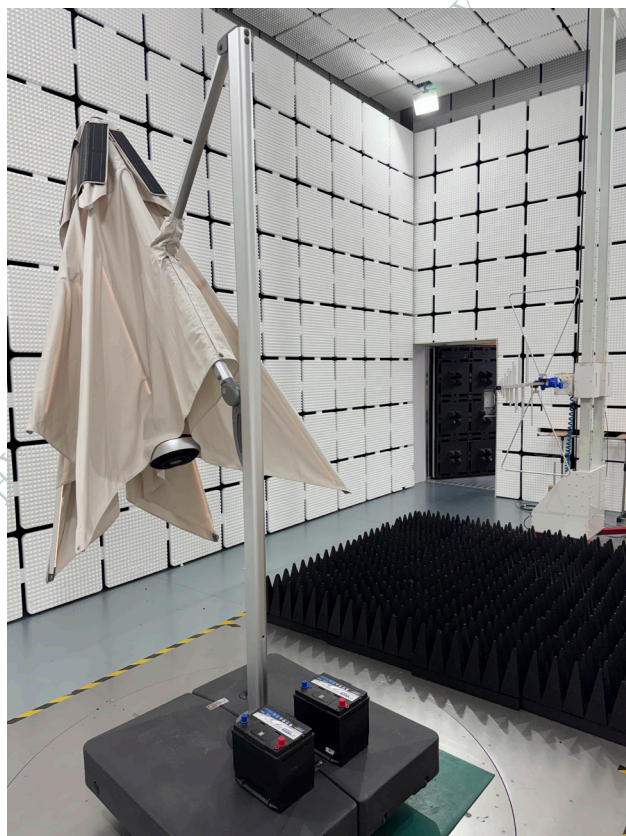
Test Results

Please see the appendix.

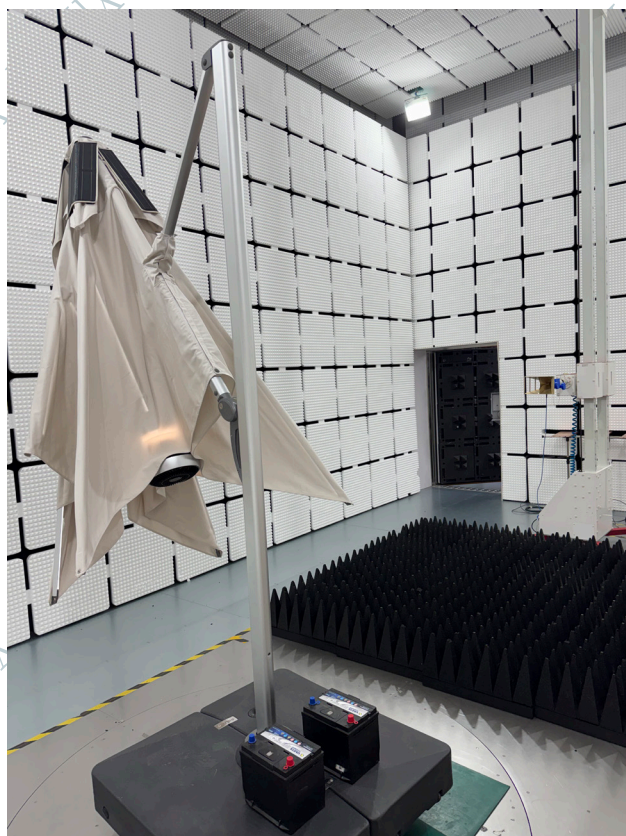


4. EUT TEST PHOTOS

Radiated Measurement



30MHz ~ 1000MHz



Above 1000MHz

*****THE END*****